EXPOSURE AND THE REDUCTION OF FEAR OF PAIN

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ABSTRACT

This research investigated interoceptive exposure as a treatment option for disabling pain-related fear. Interoceptive exposure was conceptualised as an extension of the Fear Avoidance Model and a literature review highlighted three important areas: attention/hypervigilance to pain and its threat value, fear-avoidance and the acceptance of pain. A treatment manual was developed based on a literature review and an elaborated single case experimental design methodology was used to determine treatment efficacy.

Seven participants were recruited and four completed treatment which was designed as an ABC sequence: A, baseline; B, education; C interoceptive exposure. Follow up data were obtained at three months post-treatment. Data were obtained from psychometrically standardised assessments, daily measures of the treatment target, and sessional process measures. Participants completed a post-treatment Change Interview in an attempt to evaluate treatment causality in a non-biased way.

There was variation on the standard measures; all of the participants made significant changes on some but not all of the measures. Target measures showed both variation and stability. Process measures showed that all of the participants could engage in the treatment exercises. The participants rated the treatment as being fairly logical however there was differences in expectations about how successful the treatment would be. At the Change Interview, all of the participants described changes which they stated were important and unlikely to occur without therapy.

There is some evidence at different levels that this treatment may be effective. A combination of attention, fear-avoidance and acceptance of pain treatment approach has not been used before and this research indicates promising results for those suffering with chronic pain. However further research is necessary. The procedure could be refined; interoceptive exposure could be explored in more depth and pain and avoidance behaviour could be considered in relation to other goals.

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ABBREVIATIONS

ACT: Acceptance and Commitment Therapy

CBT: Cognitive Behavioural Treatment

CPAQ: Chronic Pain Acceptance Questionnaire

CEQ: Credibility/Expectancy Questionnaire

FAM: Fear Avoidance Model

HSCED: Hermeneutic Single-Case Efficacy Design

IE: Interoceptive Exposure

MDT: Multi-disciplinary team

PASS: Pain Anxiety Symptom Scale

PCS: Pain Catastrophising Scale

PDI: Pain Disability Index

PDRS: Pain Desensitisation Record Sheet

PVAQ: Pain Vigilance and Awareness Questionnaire

r: reliability

RCI: Reliable Change Index

R/D: Relaxation/Distraction

SD: standard deviation

SEdiff: standard error of the difference score

Sem: standard error of measurement

INTRODUCTION

Aims

Interoceptive exposure (IE) will be considered as an extension of the Fear Avoidance Model (FAM: Vlaeyen and Linton, 2000) and applied as an intervention to modify individuals' experiences of pain. A single case experimental design methodology will be used replicating Flink, Nicholas, Boersma, and Linton (2009). A literature review focussing on attention/hypervigilance to pain and its threat value, fear-avoidance and acceptance of pain will be used to aid development of a treatment manual. To date, each of these processes has been researched as separate entities. Whilst there is acknowledgement in the literature that these processes are linked, a combined treatment has not been studied. This thesis will aim to do so and will focus on process in particular in order to determine which aspects of the intervention are most effective.

Background

Pain has been defined as being "an unpleasant sensory and emotional experience associated with actual or potential tissue damage." (International Association for the Study of Pain Task Force on Taxonomy, 1994). The literature on pain considers multiple syndromes, ranging from acute, (such as broken bones) to chronic (such as fibromyalgia) as well as pain associated with diseases (such as cancer). It can be argued that pain presents a similar challenge to all sufferers. The processes that occur as a result of pain have been found to be spread across a broad range of pain sufferers. Grotle, Foster, Dunn and Croft (2010) found that prognostic indicators for outcome (disability) were the same for both those suffering with acute and chronic pain; intense pain, catastrophic thinking and being unemployed all increased the risk of disability at twelve months. The influence of pain-related fear has been found to be a predictor of disability and depression in both whiplash and hand fractures (Nieto, Miro and Huguet, 2010; Keogh, Book, Thomas, Giddins and Eccleston, 2010). Crombez, Van Damme and Eccleston (2005) argued that hypervigilance towards pain and pain-related stimuli are not restricted to one syndrome. All pain is likely to present individuals with attentional difficulties, which may restrict the amount of cognitive resources available for other activities. This in turn may reduce goal driven behaviour, leading to negative affect and distress, which ultimately may lead to disability. The challenges presented to those suffering with pain are likely to be similar; as a result, this literature review will incorporate research from the broad literature base.

There has been considerable research into the management of pain. Cognitive Behavioural Treatment (CBT) has emerged as being the treatment of choice for those in pain, and there is considerable evidence to support this (Eccleston, Williams and Morley, 2009). However there is current debate about the mechanisms of change (Dehghani, Sharpe and Nicholas, 2004). Research has focused on three main areas: the threat value of pain, fear of pain and acceptance of pain. Work by Eccleston and Crombez (1999) concerning the *threat value of pain* has highlighted how pain interrupts attention which can lead to cognitive biases such as hypervigilance to pain stimuli and anxiety. Treatment involves attention retraining. *Fear of pain* has been argued to lead to catastrophising and hypervigilance, which ultimately reduces activity and leads to disability, as suggested by Vlaeyen and Linton in the Fear Avoidance Model (2000). This is treated using exposure work. *Acceptance of pain*, as conceptualised by McCracken, Vowles and Eccleston (2004) theorizes that an individual should demonstrate pain willingness and engage with the pain experience, rather than trying to cope with it by distracting oneself. Treatment involves encouragement of goal driven activities, and accepting that there is no cure for pain. The literature supports all three of these treatments as being effective for the management of pain, however limitations to each approach have been found and none has emerged as being optimal for the treatment of pain.

Interoceptive exposure

It has been argued that pain related fear has an important role in the development of disability (Vlaeyen and Linton, 2012). Interoceptive exposure (IE) has been proposed as a treatment option for disabling pain-related fear by De Peuter, Van Diest, Vansteenwegen, Van den Bergh and Vlaeyen (2011). They described an interoceptive fear conditioning account in which pain related fear is the result of interoceptive sensations (conditional stimulus) signalling pain (unconditional stimulus) which elicits a defensive fear response (including attempts to avoid the aversive stimulus). A conditional stimulus could be any bodily sensation which predicts pain (such as muscle fatigue). Increased predictive value of pain leads to fear of the conditional stimulus, providing motivation to escape this as well as the pain. However as interoceptive sensations cannot be escaped or avoided, this may result in physical activity becoming minimized in order to reduce the chance of experiencing bodily sensations (De Peuter et al., 2011). Operant conditioning may occur in which a reduction of the fear may reinforce the avoidant behaviours which increases the chance that the behaviour is

expressed in the future (Becker, Kleinbohl, Klossika and Holzl, 2008). This may result in a reduction in physical activities.

During IE, an individual is encouraged to experience their pain without trying to distract or alter their attention to the pain. Nicholas (2007) describes IE as follows: "Interoceptive exposure would entail the specific encouragement for the chronic pain sufferer to deliberately allow themselves to experience their pain without trying to divert or block their attention to their pain. If the person had the belief that they couldn't cope with their pain or that it would become unmanageable or something similar, successful exposure (where nothing terrible happened) could act to disconfirm such beliefs…By specifically fostering prolonged exposure to an aversive stimulus it is possible that habituation could be facilitated both psychologically (by disconfirmation of fears and new learning inhibiting the old learning) and physiologically via endogenous antinociceptive inhibitory mechanisms." Exposure to feared bodily sensations is achieved through harmless, brief exercises (Nicholas, 2007). If the individual believes that a negative consequence will occur, exposure to the pain could disconfirm such beliefs. The individual would learn that the sensations are not harmful. This would be beneficial for those who are likely to interpret neutral interoceptive signals as dangerous, such as those who catastrophise (Leeuw, Houben, Severeijns, Picavet, Schouten and Vlaeyen, 2010). IE has been shown to be an effective treatment for post-traumatic stress disorder with co-morbid pain (Wald, Taylor, Chiri and Sica, 2010).

Flink et al. (2009) reported an attempt to apply IE to chronic pain patients using a replicated single case method. Although this research is based on sound theoretical ideas, the execution of the study meant that it has been difficult to interpret the results. This thesis will aim to replicate this study; however it will be modified to better understand treatment results.

Critical appraisal of Flink et al. (2009)

Introduction: Although the Fear Avoidance Model (Vlaeyen and Linton, 2000; 2012) has support, treatment based on this model produces variation in outcomes. One explanation of this may be due to patients avoiding full exposure to their pain by employing safety behaviour such as distraction, and other cognitive strategies. IE may allow patients to confront their pain as part of a self-management programme and has been successful in reducing fear of bodily cues in those suffering with panic disorder.

This study compared IE with the current practice of encouraging patients to shift their attention away from the internal stimuli using relaxation or distraction.

Method: A multiple baseline (between subjects) crossover design was employed. Six participants were randomly assigned to a baseline of one, two or three weeks. They were introduced to either relaxation/distraction (R/D) or IE for three weeks, then the techniques were switched for three weeks. Participants were recruited from a local newspaper. Ten who met the criteria were randomly assigned to take part in the study. There were four participants who did not complete the treatment. Measures focused on:

- Pain related distress and pain intensity (measured daily).
- Acceptance of pain (measured every other week).
- Pain catastrophising, fear of movement and disability (measured before and after intervention).
- Acceptance of pain, pain catastrophising and disability (measured at three month follow-up, and during a daily diary which was completed for a week).

Three psychologists delivered the intervention. The participants were given education about the FAM. They were then introduced to either IE or R/D and given a rationale for why it may be beneficial. They were asked to practice the technique for fifteen minutes twice daily. After three weeks, this was reversed, and the participant was informed about the other treatment, and asked to practice that. Each participant attended weekly sessions for six weeks, lasting between 30-60mins.

Results: Patterns of daily ratings for pain-related distress were presented in graphs. The authors report that 'Visual inspection shows that the regression slopes decline from baseline in all cases, but in three of the cases the improvements were fairly small. In some there was a change again when the experimental condition changes after week three, but these were not as marked or consistent. In three of the follow-up cases there was a slight worsening in the regression slopes once treatment ceased, but they did not return to baseline. In sum, the participants' scorings for pain-related distress tend to decline during the treatment but there are no consistent differences between IE and R/D.'

Pain ratings: At post-test, three of the participants were experiencing slightly less pain, and three were experiencing more pain. At follow up three were experiencing slightly less pain than at baseline.

Acceptance of pain: Improvements range from 26%-111%, with no significant differences between IE and R/D.

Pre and post measures: Four participants showed improvements at follow-up compared to pre-test.

Discussion: There was a general trend of reduced pain related distress in most of the participants. Three participants reported changes in both catastrophising and disability scales. The authors report that these changes were comparable to studies using more comprehensive interventions with similar patients. The authors could not draw any conclusions about which most effectively reduces pain related distress. The authors recommend that IE and R/D should be further explored.

Critique

The participants: The participants were free to continue ongoing medical treatment. It would have been helpful to know more about this and the possible implications for differences in participants. Participants were recruited via a newspaper advert and may not be indicative of typical pain patients. There were differences in the length of time the participants had experienced pain (2-20 years) which may have impacted on the outcome. Level of disability was not identified pre-treatment. It may be difficult to make comparisons if the participants had differing difficulties. They may have responded to the treatment differently as a result.

Measurement: The rationale for the measurements used was very slim. Also to measure pain related distress, the researchers created their own tool using four questions from validated scales, and one question they formulated themselves. It is uncertain whether this is a valid/reliable way to measure pain-related distress. It is also uncertain if the intended target was measured.

The majority of the measurements were completed before sessions began, however the final measurement, was taken at the end of the last session. This change in time may have impacted upon the results. All of the measures were limited to self-report, which is a flaw, as it relies on the honesty of the participants.

Treatment: The treatment sessions differed in length of time and were between 30-60 minutes long. This may have impacted upon the results. It perhaps would have been advantageous if all the participants experienced the same time limit for each session. Also the treatment is reliant on the participants completing their tasks at home.

Participants were instructed to focus or distract themselves from pain whilst sitting or moving (depending on which treatment they were in). It may be that there is a difference in outcome dependent on whether the participants were moving or sitting, or what activity they were performing. It is unclear whether this had an impact however, as

it was not reported on. Also the time of day participants completed this may have had an impact, however this is also not reported on. It is perhaps difficult to make comparisons between participants, if they are all doing different activities at different times of the day.

It is unclear how the participants found each treatment. It may be difficult to practice IE, and there was no record of whether the participants felt confident and able to do this.

A three week intervention may have been too short a time-scale. It may have taken a while for the participants to practice and feel confident using IE, therefore the shift from IE to R/D (or vice versa) is too quick, and there are likely to be carryover effects, making it difficult to determine which treatment is responsible for change. This method is also likely to confuse the participants, as the two treatments are opposite of each other. If patients question this, it may reduce compliance in the second intervention (if they believe the theory for the first intervention to be superior).

The rationale for the differing baseline was due to the clients being their own control; however does exposure to two treatments in rapid succession prevent this? There is no justification for why a separate control group was not used.

Three different psychologists were used during this task, which may have impacted upon the results, if the treatments were delivered in slightly different ways, or if the psychologists had different biases which may have been transmitted to the participants. However, diversity of therapists helped to test generalisation.

Results: The results are presented visually, but it is difficult to compare the two different groups as the graphic display was poor and the data were not aligned side by side. Also as the graphs were so inconclusive, it may have been favourable to complete statistical analysis.

Implications for future research

Participant's experiences of IE treatment could be identified and measured. This may impact on the treatment time; it may take many weeks of practice for participants to feel comfortable using this treatment.

Measures should be carefully considered and justified in their use. One potential way of determining which aspects of treatment are effective would be to complete process measures. It has been noted that most research conducted in pain measures pre- and post-treatment outcomes. There is a current gap in the data, as within session measures are not taken or not included in final analysis of the results. Determining

efficacy of treatment will be aided by measuring and analysing process data. A way to identify process of change could include weekly measures during treatment, which may indicate interaction between variables.

IE and the call for research

Interoceptive exposure has been successful in reducing fear of subjective sensations in panic disorder (Arntz, 2002). However the links between interoceptive conditioning and pain related fear is understudied. De Peuter et al. (2011) called for both experimental and clinical research to investigate IE. Linton (2010) used IE to treat pain in a single case study. However other interventions such as goal setting, validation and behavioural experiments were also used. Although the results were successful, Linton (2010) concluded that it was difficult to determine which aspect of the treatment was most effective. This indicates that treatment needs to be focussed.

How IE could diffuse the threat value of pain

Vlaeyen and Linton (2000) present an 'activity' avoidance model in which a pain producing situation elicits a conditioned response of sympathetic activation such as fear which results in avoidance of the situation. Avoidance is reinforced by a reduction of the unpleasant stimuli. This results in a vicious cycle of activity avoidance. Behavioural exposure interrupts this cycle. Vlaeyen and Linton's model (2000) can be reformulated to explain how the pain experience is avoided both cognitively and behaviourally (see Figure 1). Individuals may believe that if they focus on the pain experience, they will be overwhelmed by pain, which may intensify. This will have a high threat value, which may result in catastrophising and increased arousal. This may lead to cognitive and behavioural avoidance of the pain experience which is reinforced by a reduction in fear and low threat status.

Given that pain will always have an impact on attention and will produce arousal, it is important to diffuse the threat value of pain. If the threat value is reduced, and individuals are able to focus on the sensation of pain, and be exposed to this, then the individual will learn that the pain sensations are not harmful. In this way, IE can break the cycle. De Peuter et al. (2011) stated that safety behaviours should be attended to. There is a risk that individuals may learn that harmless pain exposure in the therapeutic setting is an 'exception to the rule'. In order to prevent relapse, it will necessary to ensure that this does not occur and safety behaviours should be attended to during exposure therapy. De Peuter et al. (2011) suggested that it will be important for

patients to practice IE outside of the treatment context to ensure that learning is generalisable and not specific to the therapeutic environment.

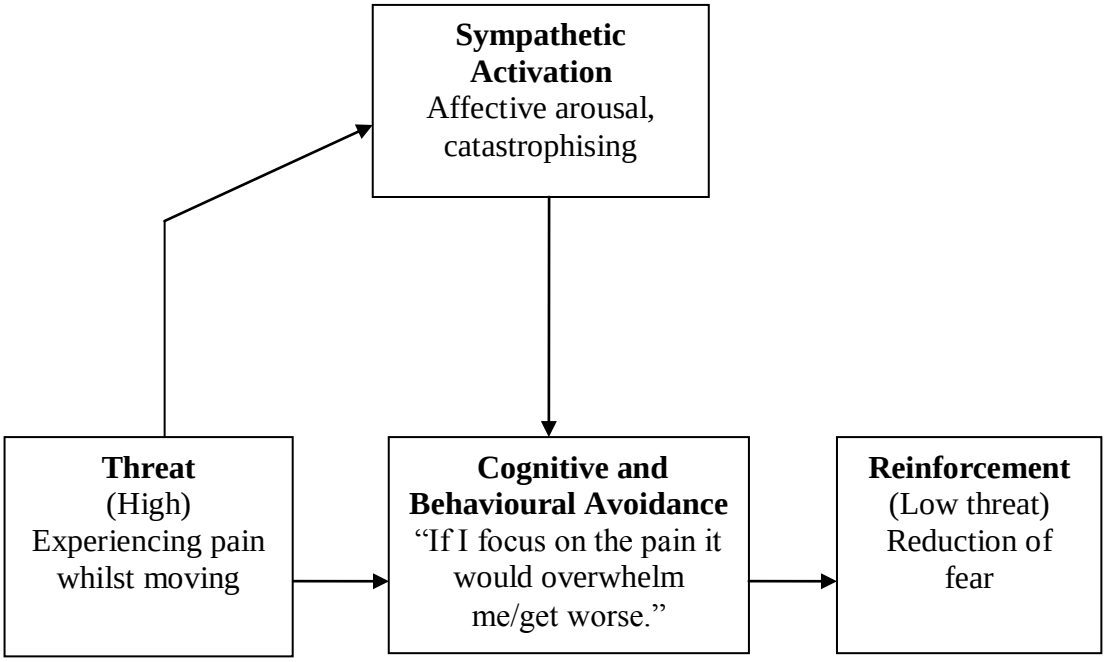


Figure 1: Pain experience avoidance model

Review of attention and pain

Eccleston and Crombez (1999) argued that pain interrupts thoughts and behaviour. Pain is a unique, unpleasant experience and functions to urge a person to act. This is achieved by interrupting attention. As pain carries a high threat value, it is extremely difficult to disengage from. As a result, other demands for attention will be minimised, and pain will emerge as the priority. Eccleston and Crombez (1999) argued that a number of different variables will moderate the interruptive nature of pain; intensity, novelty, threat, predictability as well as environmental factors such as emotion. Eccleston and Crombez (1999) concluded that coping with pain involves switching between pain and other demands in the environment as pain will chronically interrupt attention. Eccleston (1995a,b) further argued that pain that is unpredictable will have a greater impact on attention.

Selective attention towards pain

Vlaeyen and Linton (2000) proposed that those who are fearful of pain may focus on the pain and interpret it as harmful. Disability can occur when people are hypervigilant towards pain and avoid it as a result (Vlaeyen and Crombez, 1999). Research has considered whether those suffering with pain have selective attention for pain in an

attempt to discover a mechanism in which to interrupt the vicious cycle. It has been questioned whether changing cognitive biases associated with chronic pain could enable individuals to attend to pain less, be more active and begin to recover (Dehghani, Sharpe and Nicholas, 2003). The Stroop paradigm has been used in such research, however results have been inconclusive, perhaps as a result of the methodology employed (Pincus and Morley, 2001).

Haggman, Sharpe, Nicholas and Refshauge (2010) found that different groups of pain patients (both acute and chronic) had attentional biases towards sensory words on the dot-probe task when compared to healthy individuals. As this bias was found in all of the different groups of pain patients, Haggman et al. (2010) concluded that attention towards pain is an important area of study. Dehghani et al. (2004) also found that those with chronic pain had cognitive bias towards sensory pain words. Following an intense multidisciplinary, cognitive-behavioural pain management programme the biases were modified, although not reduced. Changes in fear of movement predicted changes in attentional processing. These changes occurred in follow-up indicating that it can take some time for cognitive biases to alter. This research supports Vlaeyen and Linton's Fear Avoidance Model (2001). Dehghani et al. (2004) concluded that these results imply that changing attentional biases should be a target of intervention, as a reduction in fear of movement should reduce hypervigilance to pain. As a result individuals will become less sensitive to pain related stimuli if they fear movement less, which is likely to lead to recovery.

Threat

Threat can result in defensive responses (Vansteenwegen, Crombez, Baeyens and Eelen, 1988). Vigilance serves to prioritise threat and promote action, and provides an awareness of the source of the danger. This is a normal response to threat (Aldrich, Eccleston and Crombez, 2000). Given that pain has a high threat value, it prompts escape or avoidance behaviours (Eccleston and Crombez, 1999). However, as there is no escape possible for pain, Aldrich et al. (2000) argued that rumination about escape will emerge. Awareness of one's body may increase, in which attentional interruption by pain is predicted (Eccleston, Crombez, Aldrich and Stannard, 1997). The urge to escape remains unfulfilled, yet efforts to escape persevere and even dominate (Borkovec, Metzger and Pruzinsky, 1986). In this situation, worry may be the only form of action. Aldrich et al. (2000) argued that the frustration and distress which follows this can also be viewed as threatening. They suggested that it is important to reduce the

impact of pain rather than eliminating pain, as change is possible without resolving the problem of pain.

The threat value of pain can have an impact on attentional bias. High threat levels can increase the attentional demand (Crombez, Eccleston, Baeyens, Van Houdenhove and Van den Broeck, 1999). However Van Damme, Crombez, Eccleston and Koster (2006a) argued that research which drew these conclusions was limited because attention was measured during pain, and should have been measured in anticipation of pain. They also cite the methodological issue of the task paradigm which was limited as it did not allow the identification of specific attention processes involved.

Van Damme et al. (2006a) designed an emotional adaptation of the spatial cueing paradigm in order to overcome these limitations. They found that healthy individuals became hypervigilant to learned pain signals. Individuals demonstrated enhanced engagement to pain signals compared to a control signal. This research also highlighted a number of important processes. Hypervigilance effects were resistant to extinction. Individuals found it difficult to disengage from pain signals. Pain signals were detected quicker than non-pain control signals, which suggested that those in threatening situations maintained a state of alertness, compared to those in a non-threatening situation. Van Damme et al. (2006a) suggested that this is because a function of attention is to be alert in order to respond quickly to high priority signals. In this study, individuals who anticipated pain (who were in the threatening condition) had an increased alertness for danger in order to quickly detect threat signals. This indicates that scanning for threat may be a function of hypervigilance.

Both of these findings have theoretical implications; it appears that learned pain signals will result in increased attention compared to neutral signals. Van Damme et al. (2006a) suggested that methodological factors may account for the fact that hypervigilance was found to be resistant to extinction. However, if learned pain signals do require increased attention, then this too has important clinical implications. Exposure therapy may not be sufficient to reduce hypervigilance to pain predicting signals, and could explain why relapse frequently occurs. Van Damme et al. (2006a) proposed that in order to improve the effectiveness of exposure treatment, attentional training techniques could be employed in particular focusing on disengaging from pain signals once they have been detected. This conclusion was supported by a follow-up study (Van Damme, Crombez, Hermans, Koster and Eccleston, 2006b) which found that when individuals were exposed to threat, extinction had a positive effect on

attentional biases and difficulties with disengaging, which reduced. However extinction was not complete and attentional biases towards threat were easily reinstated.

Distraction

Buck and Morley (2006) investigated the use of attentional control strategies in individuals with cancer. They found that distractions which were interesting, important and pleasant were positively correlated with perceptions of control over pain, an ability to decrease pain and positive affect. Distraction is a commonly used strategy based on the theory that pain will be diminished if attention is focused on something else (McCaul and Malott, 1984; Villemure and Bushnell, 2002). Buck and Morley (2006) found that catastrophising moderated the effects of focusing on pain strategies. This indicates that the threat value of pain influences how people cope with their pain. Buck and Morley (2006) concluded that it is important to consider manipulating the meaning of pain when using strategies that focus on pain, as well as investigating individual differences in the effects of attentional strategies.

Van Damme, Crombez, Van Nieuwenborgh-De Wever and Goubert (2008) also investigated the use of distraction as a coping strategy for pain. They argued that results based on previous research are inconclusive, which may be a result of methodology employed. Individuals' levels of engagement in distraction tasks are not commonly considered making it difficult to interpret the results. Given that pain will demand attention particularly when it has a high threat value (Crombez, Van Damme and Eccleston, 2005) the presence of pain is likely to interfere with the distraction task. A lack of control conditions used has meant that it has been difficult to draw accurate conclusions about this.

Van Damme et al. (2008) addressed these methodological concerns using the cold pressor task. They manipulated the threat value, and used two groups, one with distraction, and one without. They found that those who were distracted whilst in pain reported less pain than those who were not distracted and used strategies such as escape and avoidance less. Those in the high threat condition reported more anxiety and catastrophic thoughts. However the threat value did not affect the pain intensity, but did affect how individuals completed a task. Van Damme et al. (2008) concluded that when pain is perceived as threatening, individuals may catastrophise, which leaves less cognitive resources available to engage in alternative tasks. Given that those who seek treatment for pain are distressed and in an anxious state, it may mean that distraction is not an effective clinical tool.

However, the nature of the distraction task may have an impact on its effect, as suggested by Buck and Morley (2006). Verhoeven, Crombez, Eccleston, Van Ryckeghem, Morley and Van Damme (2010) found that those with a high level of catastrophic thoughts attended more to pain and also experienced more negative affect during pain compared to those who were less catastrophic in their thinking. For the high catastrophisers, distraction tasks were not effective, supporting Van Damme et al.'s (2008) findings. However when motivation was present (a monetary reward for good task performance) the high catastrophisers engaged with the distraction tasks which proved to be beneficial. Verhoeven et al. (2010) concluded that experiencing motivation aided displacement of worry. They suggested that distraction can work for those who catastrophise if motivation is present.

Attentional training techniques

Sharpe, Nicolson Perry, Rogers, Dear, Nicholas and Reshauge (2010) used attentional training techniques to investigate the effects on pain. Relaxation was used as an alternative intervention. Threat levels were manipulated. The results showed that those who received attentional training in the high threat condition experienced reduced hypervigilance compared to those in the relaxation group. The attentional training resulted in individuals becoming more externally focused. However, there were no differences in pain tolerance and pain ratings in the intervention groups. Sharpe et al. (2010) suggested that although attention training techniques will shift attention away from pain initially, there may be a need for further cognitive tasks which will address the difficulty of disengaging from pain. Sharpe et al. (2010) suggested that adding attentional training to effective pain treatments may be of use. Another possibility is changing the meaning of the stimuli, perhaps using a more acceptance based approach, in order to reduce the threat value of the negative sensations.

Fear avoidance

Letham, Slade, Troup, and Bentley (1983) introduced the concept that those suffering with pain will avoid movement or activities due to fear. This led to research around the cognitions and behaviours of those suffering with pain. It was suggested that negative appraisals of pain, such as catastrophic thoughts about the consequences of movement may lead to a reduction of activities that may promote pain (Phillips, 1987). Fordyce, Shelton and Dundore (1982) considered a more behavioural approach and described how those who experience pain are likely to learn to reduce activities that result in pain.

Such behaviour may lead to functional disability. This is likely to worsen the pain, as physical inactivity has a negative impact on the body. This may also impact on mood, which is likely to worsen the pain, as depression leads to a decrease in pain tolerance (Romano and Turner 1995).

Building on this previous work, Vlaeyen and Linton (2000) proposed a cognitive behavioural model, the Fear Avoidance Model (FAM) to describe the cycle of behaviours and cognitions in those suffering with pain. The model argued that if pain is catastrophically misinterpreted as being threatening, pain related fear will occur resulting in safety behaviours such as movement avoidance and hypervigilance (whereby attention will be directed at possible signs of threat). Avoidant behaviours may reduce fear in the short-term but may serve to strengthen the fear long-term, as maladaptive beliefs are not disconfirmed. Long-term consequences of such behaviours including disability and disuse may lower the threshold at which pain is experienced. Vlaeyen and Linton (2000) stated that the individual may not be aware of experiencing fear, as they may feel they experience only difficulty in movement for example. Alternatively, individuals may not be fearful of their current pain, but may be concerned that pain will occur in the future. Also individuals may be fearful of causing an (re)injury through movement.

Vlaeyen and Linton (2000) suggested that education about the nature of chronic pain may be beneficial. Pain can be conveyed as being a common condition that can be managed by the individual. This can be followed by graded exposure which challenges the maladaptive beliefs of the individual. Vlaeyen and Linton (2000) argued that individuals should be educated about the FAM. The individual's symptoms, beliefs and behaviours should be used to illustrate the vicious cycle and to design an individually tailored intervention, using a graded exposure hierarchy.

Vlaeyen, de Jong, Geilen, Heuts, and van Breukelen (2001) found support for this model in a single case cross-over design study. Four patients were treated using graded exposure in vivo or graded activity which was reversed after a period. Time series analysis on daily ratings of pain related fears and cognitions indicated improvement occurred following graded exposure only. Decreases in fear also occurred simultaneously with decreases in pain catastrophising and disability. The effectiveness of graded exposure in vivo at reducing pain related fear has since been supported by replicated experimental single case studies (de Jong, Vlaeyen, Onghena, Goossens, Geilen and Mulder, 2005; Boersma, Linton, Overmeer, Jansson, Vlaeyen, and de Jong, 2004).

Woods and Asmundson (2008) found strong support for graded exposure in vivo in a randomised controlled trial. Graded exposure was compared to graded activity and waiting list controls. Those in the graded exposure group demonstrated greater outcomes than those in the other groups. Fear of movement, fear-avoidance, pain related anxiety and pain self efficacy were all positively affected. Individuals became more comfortable about activity following exposure and their beliefs about the effects of movement were altered. This also led to an improved ability to predict pain (due to disconfirmation of negative beliefs). A decrease in hypervigilance and threat evaluation reduced anxiety avoidance and eventually catastrophising. As a result, function and self efficacy increased and mood changes were observed.

Richardson Ness, Doleys, Baños, Cianfrini and Richards (2009) have supported the link between mood and catastrophising; they found that catastrophising was associated with depressive symptoms. This indicates that addressing catastrophic thoughts can improve the affect of those with pain, which may have an important impact on outcome.

Catastrophising

Linton, Nicholas, MacDonald, Boersma, Bergbom, Maher and Refshauge (2010) found that catastrophising and depression both have an adverse effect on pain. High pain catastrophising was associated with poor adjustment, which was further affected if an individual was also depressed. They found that returning to work was associated with a reduction in catastrophic thinking. Linton et al. (2010) argued that depression and catastrophising both need to be targets for intervention.

Catastrophising has been shown to be a moderator of outcome in other studies. Flink, Boersma and Linton (2010) used exposure in vivo and found that addressing catastrophising moderated outcome in those who had moderate to low levels of catastrophising. Those who changed demonstrated improved outcomes on catastrophising, depression, anxiety and fear. Catastrophising decreased in the high change group, indicating that it may be a crucial area to target for improvement. Those who were high catastrophisers prior to treatment did not respond. Flink et al. (2010) suggested that this may be the result of safety behaviours employed by the individuals, resulting in limited exposure. This would mean that the full benefit of intervention would not have been experienced by the individuals.

Acceptance

Coping with pain has been defined as the effortful attempt to adapt to pain (Tunks and Bellissimo, 1988; Jensen, Turner and Romano, 1991). McCracken and Eccleston (2003) stated that since the 1980s, pain researchers have directed their studies towards coping strategies. They argued that such research is confused and has not led to identification of which coping responses are helpful. McCracken (1998) suggested that attempts to control pain may be seen as avoidant behaviour and can lead to frustration and disability as argued by Aldrich et al. (2000). McCracken, Carston, Eccleston and Keefe (2004) also argued that control can lead to rest, retirement from work and reduced quality of life. McCracken and Eccleston (2003) called for a move away from researching about coping with chronic pain, as this conceptualization may have distracted attention away from other ways to adapt to chronic pain.

McCracken and Eccleston (2003) suggested that it may be more useful to focus attention to the acceptance of chronic pain, which is argued to be the alternative to control (McCracken et al., 2004). Acceptance of chronic pain has been defined as living with pain without reaction, disapproval, or attempts to reduce or avoid it (McCracken, 1998). This would involve the dual process of disengaging from struggling with pain, and the engagement with daily activities.

Coping strategies

McCracken and Eccleston (2003) compared coping strategies with acceptance strategies to predict adjustment to chronic pain. This was measured using anxiety, depression and disability. Coping strategies included: ignoring pain sensations, increasing activity, diverting attention and praying. The results indicated that those who were more accepting about their chronic pain were in less pain and were less disabled, depressed and anxious. Diverting attention and praying were associated with greater pain and less healthy functioning. Coping and acceptance were not associated with each other. McCracken and Eccleston (2003) hypothesised that failing to control pain leads to greater distress, whilst being more accepting of pain may lead to a sense of greater control, as suggested by Jacob, Kerns, Rosenberg and Haythornthwaite (1993).

This was supported by work by Masedo and Esteve (2007) who compared acceptance to the coping strategy of thought suppression in relation to pain tolerance and distress. The Theory of Ironic Processes (Wegner, 1992) conjectures that the cognitive processes involved in thought suppression may lead to an increased occurrence of the thought than if the individual were to express the thought. Based on

this theory, Masedo and Esteve (2007) predicted that acceptance would result in superior outcomes. They found that those in the acceptance group had a greater tolerance of pain and were less distressed when compared to those in the thought stopping group. This supports the theory that greater acceptance can lead to engagement with daily activities.

Validity of acceptance

Viane, Crombez, Eccleston, Poppec, Devulderc, Van Houdenhoved and De Corte (2003) cited work by Risdon, Eccleston, Crombez and McCracken (2003) who found eight different accounts of acceptance, all sharing the common features of refocusing from pain to non-pain aspects of life, recognising that a cure for pain is unlikely, and the belief that acceptance is not equated with failure. Viane et al. (2003) investigated the validity and utility of acceptance of chronic pain. They found evidence for two core components of acceptance: engagement in activity, despite chronic pain, as well as the recognition that cure is unlikely. They also found that greater acceptance predicted greater mental health. Clinically, addressing the core components of acceptance is a commonly used practice to aid pain management. Viane et al. (2003) state that there are a variety of techniques in which to do this, including Mindfulness (Kabat-Zin, Lipworth and Burney, 1985) and Acceptance and Commitment Therapy (ACT: Hayes, Strosahl and Wilson, 1999). However Viane et al. (2003) argue that no technique is superior and that techniques from different approaches may be most effective when flexibly applied.

The effect on affect and activity engagement

McCracken et al. (2004) stated that by encouraging individuals to stop struggling to change things, individuals are enabled to move towards more satisfying actions. Kranz, Bollinger and Nilger (2010) supported this suggesting that when individuals are fighting pain and fail, this may result in negative affect. They theorized that positive affect may result if energy is redirected towards more satisfying goals. They found that chronic pain patients who were willing to engage in activities had more positive affect. A limited willingness to be active was associated with negative affect. Kranz et al. (2010) concluded that psychological well-being is influenced by engagement in activities. This is supported by work by McCracken, Vowles and Eccleston (2005) who found that acceptance was associated with better functioning and greater pain tolerance. They found a correlation between changes in acceptance score and change in outcome.

Acceptance can broaden an individual's awareness to incorporate the reality of their situation, rather than just thoughts and feelings. This enables individuals to recognise that thoughts and feelings are transient (McCracken et al., 2004). Keogh, Bond, Hanmer and Tilston (2005) described how third-wave CBT, which includes ACT and Mindfulness, emphasises noticing and experiencing, rather than changing negative cognitions. Vowles and McCracken (2008) theorized that perhaps treatment does not need to focus on the semantic meanings of thoughts and beliefs in order to be effective. They stated that it might be more effective to focus on how thoughts and beliefs impact on functioning. They suggested that action should be personally meaningful rather than focusing on eliminating unwanted experiences. Keogh et al. (2005) theorized that if an individual is willing to experience negative events or sensations such as pain, the form of pain will not change, but the impact will not be as debilitating. Individuals may not be as overwhelmed by pain and may be able to act towards their goals. Vowles and McCracken (2008) stated that an early focus on acceptance in the beginning of treatment may facilitate individuals engaging with value based action later on.

Future research

Whilst research has demonstrated the benefits of acceptance-based treatments on outcome for those in pain (McCracken and Eccleston, 2003; McCracken et al., 2005, Vowles, McCracken and Eccleston, 2007; Vowles and McCracken, 2008), there are calls to consider other processes (Vowles and McCracken, 2010). In much of the research, acceptance based treatments were delivered in a multi-disciplinary team (MDT) package. McCracken et al. (2005) argued that acceptance was the process of change for those who showed improvements following such treatments. However, given the varied treatments involved, it may be difficult to say with accuracy which particular part of the treatment was effective and McCracken et al. (2005) stated that the next generation of research should focus on the process and not just the general effects of treatment.

A challenge is presented in refining methods, and optimizing the processes that provide individuals with effective change (Vowles et al., 2007). One way to do so may be to consider the role of catastrophising in pain management. Vowles et al. (2007) found that individuals engaging in an acceptance based treatment plan showed changes in both catastrophising and acceptance during treatment. They reported that both these changes equally predicted positive outcomes and neither were superior suggesting that both contribute towards treatment results. McCracken et al. (2004) have also stated that

acceptance is not incompatible with other pain management strategies. In particular it can be extremely effective for those who engage in avoidance. Therefore it would be beneficial to consider the impact of catastrophising on pain management.

The links between these processes

During the literature review, various links between catastrophising/pain related fear, attention towards pain and acceptance of pain were found. Although research tends to focus on one of the above areas, there are calls to integrate interventions, based on literature that links these three processes together.

Boston and Sharpe (2005) found an association between threat intensity and coping strategy used. When individuals were fearful and found a stimulus to be threatening, there was an interaction between fear of pain, and attention directed at a task. This contributed to avoidance. Supporting this de Jong, Vangronsveld, Peters, Goossens, Onghena, Bulté and Vlaeyen (2008) found that a reduction in the threat value of physical activities and the redirection of attention away from bodily/pain sensations was a helpful component in a graded exposure intervention designed to target pain related fear safety behaviours such as avoidance and hypervigilance.

Verhoeven et al. (2010) found that those who were high catastrophisers reported more attention to pain and experienced more negative affect during tasks that required attention to shift to a stimulus other than the pain. However, when the high catastrophisers were given motivation to complete a task they were able to do so. Their attention was distracted from the pain, which had a beneficial effect on catastrophising. This indicates that those who catastrophise can shift attention away from pain if there is motivation to do so. Dehghani et al. (2004) argued that changing the attentional bias of an individual, as well as their fear of movement, will reduce fear of pain. This in turn may result in the individual becoming less sensitive to pain related stimuli, contributing to a recovery from a vicious cycle of fear.

McCracken and Eccleston (2003) considered whether there was a link between catastrophising and acceptance. They hypothesized that fear avoidance and acceptance are related, and that exposure could enhance an individual's acceptance of pain, especially those who engage in avoidance (McCracken et al., 2004). Supporting this, Linton et al. (2010) suggested that depression and catastrophising are associated with poor outcomes in those with pain. They argued that both of these areas need to be targeted clinically. One way to do so would be to increase individual's acceptance of pain, in order to enable individuals to engage in value-based activities. This in turn

could increase positive affect, which may produce meaningful change. Woods and Asmundson (2008) found that a key component responsible for success in a graded exposure in vivo treatment was engagement in enjoyable activities supporting Linton et al. (2010). Woods and Asmundson (2008) found an improvement was made in mood, pain experience and functioning following disconfirmation of catastrophic thoughts during the exposure.

Schutze, Rees, Preece and Schutze (2010) argued that mindfulness based interventions, such as accepting thoughts, rather than attempting to change them, may reduce catastrophic thinking. They found that low mindfulness predicted high levels of catastrophising in pain patients. When mindfulness was high, there was a weaker relationship between pain intensity and catastrophising. They argued that inflexible attention, combined with a lack of focus on the present moment may make an individual more likely to ruminate about pain, which in turn may magnify the threat status of pain. They argued that intervention should involve educating individuals that thoughts are transient, and are not an accurate reflection of reality. They also argued that mindfulness should be added to the FAM (Vlaeyen and Linton, 2000).

Finally, Aldrich et al. (2000), when studying vigilance to threat, concluded that it was important to consider acceptance as well as threat. They stated that individuals need to commit to life despite pain.

Patient expectations

Patients' expectations about treatment outcomes are considered as being one of the common factors of a successful therapy (Goldstein, 1960). Entering therapy can give individuals a source of hope; positive expectations can be instrumental to change (Frank, 1961). Constantino, Arnkoff, Glass, Ametrano and Smith (2011) reviewed the literature on patient expectations and therapeutic outcome in a meta-analysis. They found positive effects of patients' outcome expectations on their treatment outcomes. This implies that it is important to consider patient expectations at the start of therapy. They offer clinical strategies to address and enhance positive expectations which include offering a review of the research findings on the intended treatment.

Devilly and Borkovec (2000) highlight the importance of measuring both patient expectancy and therapy credibility. Some therapies have been shown to be more credible and have generated greater expectancy among participants (Borkovec and Nau, 1972). Expectancy has been shown to correlate with therapy outcome for a range of groups including social phobics (Chambless, Tran and Glass, 1997) and generalised

anxiety disorder (Borkovec and Costello, 1993). Credibility has been associated with simulated change (Nau, Caputo and Borkovec, 1974) and therapeutic improvement (Kirsch and Henry, 1977). As such it will be important to measure these constructs in the early stages of treatment as recommended by Devilly and Borkovec (2000).

Implications for treatment

External behaviours, such as avoidance of movement are central to the FAM. Literature suggests that behavioural exposure may be the most effective way of reducing fear, by disconfirming catastrophic thoughts and there has been some success for this approach. However there are difficulties with this approach, as the results are inconsistent. Current research indicates that avoidance also has a cognitive component. Due to the nature of pain, it is likely that most sufferers would try to avoid the experience cognitively. This theory has been supported by research, which has found that in particular, catastrophisers are likely to cognitively avoid painful experiences. This is likely to impact on behavioural treatments, and perhaps lead to a failure of individuals processing the experience, reducing the beneficial impact of the treatment. Cognitive techniques such as distraction may be used to minimise the degree of exposure (Van Damme et al., 2008).

Mindfulness and ACT approaches have been used to attempt to increase acceptance and decrease catastrophic thoughts about pain, however it is unclear whether these approaches, often used in combination with other CBT interventions (education/relaxation) are responsible for the success reported (Nicholas, 2007).

Although previous research has suggested it may be beneficial to distract attention away from pain, there is an implication that focusing on the pain experience may be of more use. The literature review suggests that exposure combined with attention training techniques may be useful to minimise chance of relapse.

Summary

Pain related fear is thought to be a contributor to disability in those suffering from pain. IE, an extension of the FAM has been proposed as a treatment option which aims to reduce the threat value of pain allowing individuals to focus on the sensation of pain in order to learn that pain sensations are not harmful. A single case experimental design methodology, replicating Flink et al. (2009) will be used. A treatment manual will be designed using literature from three aspects of pain research: attention/hypervigilance, fear-avoidance and acceptance of pain. To date, whilst acknowledging the links between

these processes, research has focused on the separate areas individually. A combination of these approaches may result in the optimal way to treat pain. It will be important to study process in order to determine which aspects of the treatment are most effective, including participant's expectations about the treatment and its credibility.

METHOD

Design

The study used a replicated experimental case series in which there was a standard design for each case. Conventional guidelines recommended by authorities in this field are three to five successful replications (Barlow, Nock and Hersen, 2009). The present single case series used an ABC design comprising of baseline, educational session, treatment (IE) and a three-month follow up.

A	B	C	F/U
Baseline/diary	Education	IE	

Experimental case series can establish the effectiveness of treatment. They allow the study of an individual intensively over time. Taking baseline measures of an individual's problem can allow identification of problem change when treatment is introduced. If a stable baseline is established and change occurs following the introduction of treatment, it could be concluded that treatment is responsible for the change. This can be supported if other individuals replicate the results in a case series.

The Treatment Assessment Funnel (Morley, 1996, Figure 2) was used in order to select measures and determine when they were used to enrich data collection. See Table 1 for types of measures used and data collection points. *Standard measures* are used for assessing constructs, such as anxiety, catastrophising or acceptance through the use of items that are regarded as good representations of the construct, in order for the measure to be relevant to most people. They are usually lengthy and so are not designed for repeated use over a short period of time. Standard measures allow comparisons between individuals in a group. *Target measures* allow more consideration of the individual and their complaints, by selecting items which are specific to the individual, for example, the individual's daily experience of pain. In single case designs target measures are taken both frequently and regularly. *Process measures* can be used to identify changes within the treatment session and can include measurement of a reaction to an exercise (such as exposure) or strength of belief about the outcome of the exercise.

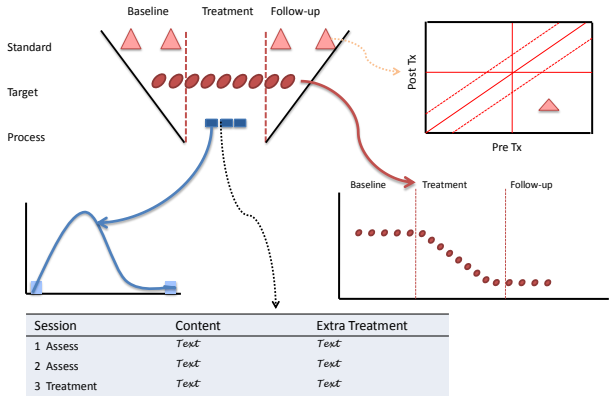


Figure 2: Treatment Assessment Funnel (Morley, 1996).

Table 1: Types of measures used and data collection points.

Measure	Type	Collection point
Global	Standard	Baseline. Pre-treatment. Post-treatment. 3 month follow-up.
Daily diary	Target	Daily from baseline, throughout treatment until one week following treatment end.
Session exercises	Process	At the end of every treatment session.
IE practice	Process	Daily during the treatment period.
Expectations	Process	Pre-treatment. Post-treatment.

The Change Interview (Elliott, Slatick and Urman, 2001) from Elliott's (2002) Hermeneutic Single-Case Efficacy Design (HSCED) was used to evaluate treatment causality in a non-biased way. This method allows researchers to consider all possible factors responsible for change, including non-therapy explanations. Information from all measures (global, target and process) is used to determine whether change has occurred. This information is then used to determine if there is direct evidence that therapy

contributed to change, and Elliott (2002) offers a range of methods to do this. There are eight different types of indirect evidence that can be considered to determine if there are other explanations for client change, such as client expectations, self-correction or medication effects. Both positive and negative evidence is weighed. Elliott (2002) states that it is optimal for the therapist to employ another person to complete the change interview to enhance validity. After this process is complete, the researcher can determine to what extent the therapy contributed to change.

Justification of this approach

This study aimed to replicate (with modifications) Flink et al.'s (2009) research on reducing the threat value of pain. Analysis of this paper allows identification of flaws in the method, perhaps the wrong measures were used, and also the reversal design resulted in difficulties in analysing the data. The principal modifications to Flink et al.'s (2009) approach were determined by using the treatment assessment funnel (Morley, 1996) to ensure that measures are focussed. Standard measures allow identification of change on constructs such as anxiety and acceptance. Target measures track individual changes about beliefs and pain experience. Methodological limitations in current research mean that very little is known about the mechanisms of change. Process factors need to be considered, and this study aims to identify within session change to enable conclusions to be drawn about the efficacy of treatment. Several process measures have been included to determine which aspects of treatment have been effective. Data for both the effectiveness of IE and attentional exercises were collected to allow identification of those exercises that were most beneficial for the participants.

To further enrich analysis of data an ABC design has been employed to give greater confidence in the effectiveness of treatment, unlike Flink et al. (2009) who used a cross-over design in which two treatments were introduced to participants. This meant it was difficult to determine treatment efficacy as carry-over effects were likely to have occurred. The literature review has highlighted that both education and exposure results in improvements in pain related fear for participants. High attention to threat and low acceptance of pain have been found to be important processes and related to poor outcomes in those with pain related fear. To date, research has not assessed the interaction between these three processes clinically, despite calls to do so. This study will consider attention to pain, fear-avoidance and acceptance of pain.

Alternative designs

Alternative designs were considered and rejected in favour of the proposed methodology due to limitations. The designs considered were:

Changing criterion design: Following baseline measures, several treatment phases could be introduced, with a change in criterion rate once the target behaviour has been reached. This would require a lengthy treatment time, especially if behaviour change is slow. This may be difficult to achieve.

Reversal (ABA) design: Given that Flink et al. (2009) had difficulties analysing data due to the use of reversed treatments, and possible carry-over effects it was decided that this would not be the most effective way to determine IE success. This may also be confusing for patients if very different (or opposing) rationales are given for treatment.

Ethical clearance

Ethical clearance for this study was obtained from the NHS National Research Ethics Service – South Yorkshire and Leeds Teaching Hospitals NHS Trust. Copies of the approval letters are included in Appendix 1 and 2.

Recruitment

Recruitment took place from the psychology pain waiting list at St James Hospital, Leeds. Potential participants were identified from the waiting list, those who were unlikely to be offered a routine appointment during the following three months were written to and informed of the study (for recruitment letter see Appendix 3). An information sheet about the study was included with the letter (for information sheet see Appendix 4). The Clinical Outcomes in Routine Evaluation-10 (CORE: Evans, Mellor Clark, Margiston, Barkham, McGrath, Connell and Audin, 2000) and the Pain Anxiety Symptom Scale (PASS: McCracken, Zayfert, and Gross, 1992) screening measures were also included in the letter to measure distress and anxiety (see Appendix 5 and 6 for copies). Those who were interested in taking part in the study were invited to return the screening questionnaire in a pre-paid envelope to determine if they would likely benefit from the treatment. Those who met the criteria were invited to attend a screening assessment appointment at the psychology department at St James's Hospital.

At the screening assessment participants were given more information about the study and had the opportunity to ask questions and discuss any concerns they had. All participants were informed that whatever the outcome of the assessment it would not affect their position on the psychology pain waiting list or their opportunity to receive

treatment at a later date. There was a structured assessment interview with questions about the participant's experiences of pain, their diagnosis and their current strategies for managing pain (for more details see Screening Assessment in Procedure section below).

If they were suitable for the study they were offered a place. They were given a consent form to sign (see Appendix 7). All participants were given 48 hours to make the decision, however all participants who were eligible consented straight away. They were informed about the daily diary and trained in the use of this measure. They were asked to begin to keep the diary for the two weeks prior to treatment beginning (baseline period). They were informed that there would be four treatment sessions over the following four weeks, and that they would be expected to continue to fill in the diary during this time and for a further week after treatment had ended. They were informed that they would be asked to attend for another interview to give their opinion on the treatment. Finally they were asked to attend for a three month follow-up session. Participants were offered £30 for travel expenses.

Inclusion criteria: Any adult who had experienced pain for more than six months, and who had a high fear of pain as assessed by the PASS at screening. Fluent spoken English was necessary, as well as the ability to keep a diary. Willingness to attend all sessions was important. The individuals had to be willing to maintain their current medication treatment and not change it. There were no age boundaries.

Exclusion criteria:

- Malignant pain.
- Uncertain diagnosis.
- Severe mental health problems such as psychosis.
- Learning Disability.
- High levels of generic distress.
- Risk of self-harm (assessed at assessment interview).

Screening

Twenty four invitation letters were sent to patients on the waiting list. Seven responded and returned their screening measures and were invited to a screening assessment. They all attended and agreed to participate in the research. Three dropped out and four were treated. See Figure 3 for a flowchart illustrating this.

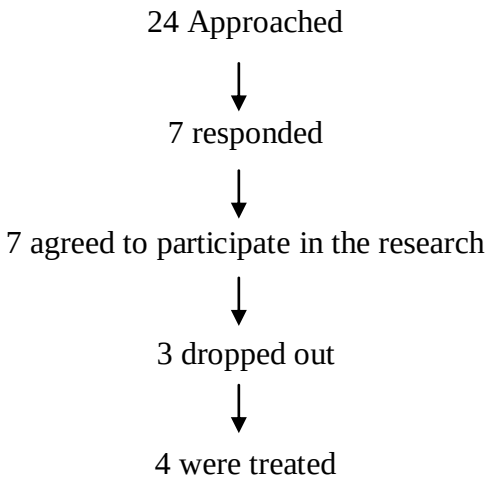


Figure 3: Flow chart of screening and participant numbers

Participants

Seven individuals who had suffered chronic pain for 10-35 years participated in the study and four completed treatment. One participant was unable to complete due to personal reasons and another due to work commitments. It is unknown why the final participant dropped out. Information on age, sex, diagnosis, length of pain and reason for drop out can be found in Table 2.

Table 2: Participant demographics

Participant	Age and Sex	Diagnosis and length of pain	Reason for non-completion
1	52, male	ME/CFS diagnosed at 35 years. Fibromyalgia diagnosed aged 37 years. Pain experienced in shoulder, neck, legs and stomach over previous 4 years.	
2	60, male	Trigeminal neuralgia. Pain began aged 40 years, intensified in previous 2-3 years.	
3	40, female	Left shoulder following reconstructive surgery for breast cancer (muscle was taken from shoulder/back) 10 years earlier.	
4	48, male	Bilateral peroneal rigid spastic feet – Tarsal Coalition, diagnosed aged 13.	

5	38, female	Spina Bifida Oculta, began at age 3 years, intensified at 12-13 years, diagnosed at 23-24 years	Unable to attend all sessions due to personal circumstances.
6	52, male	Back pain (wear and tear) over previous 10-15 years.	Dropped out due to work commitments.
7	36, female	Right side shoulder, neck, back following accident (hit by truck) 10 years earlier.	Dropped out – unknown.

Measurements

Standard measures

Participants were asked to complete a range of standard measures in the form of a booklet (see Appendix 8 for Global Booklet) at four points: baseline, pre- and post-intervention and at three-month follow up. The measures were selected as they assess constructs that were targeted by this intervention: catastrophising, anxiety, hypervigilance, acceptance and disability. The following measures were selected:

Pain Anxiety Symptom Scale (PASS: McCracken, Zayfert, and Gross, 1992): The PASS assesses pain specific anxiety symptoms using four components of pain-related anxiety: cognitive, fear, escape avoidance, and physiological. Each of the four subscales has five items. All items are rated from 0 (never) to 5 (always). The Physiological subscale was excluded from the booklet as this was not a target of treatment. Validity and reliability have been established for this measure (McCracken, Gross, Aikens, and Carnkike, 1996).

Pain Catastrophising Scale (PCS: Sullivan, Bishop and Pivik, 1995): The PCS is a measure of catastrophic thinking in relation to pain. It is a thirteen item self report scale that can be completed in five minutes. The items are rated on a five-point scale from 0 (not at all) to 4 (all the time) and have three different categories: Rumination (I can't stop thinking about how much it hurts), Magnification (I worry that something serious may happen) and Helplessness (It's awful and I feel that it overwhelms me). The PCS gives a total score and scores for each of the three subscales. Scores range from 0-52. The PCS has been found to have internal consistency (coefficient alphas: total PCS = .87, rumination = .87, magnification = .66, and helplessness = .78; Sullivan et al., 1995).

Chronic Pain Acceptance Questionnaire (CPAQ: McCracken, Vowles, Eccleston, 2004): The CPAQ assesses acceptance of pain using two factors: Activity Engagement (participation in daily activities while acknowledging the presence of pain) and Pain Willingness (the degree to which pain is allowed in experience without efforts to avoid or control it). Statements are rated from 0 (never true) to 6 (always true). The CPAQ gives a total score and scores on both of the subscales Validity and reliability have been established for this measure (Vowles, McCracken, McLeod and Eccleston, 2008).

Pain Vigilance and Awareness Questionnaire (PVAQ: McCracken, 1997): This is a measure of attention to pain and hypervigilance and was used to measure attention avoidance. There are sixteen items, and behaviour is considered over the previous two weeks ranging from 0 (never) to 5 (always). This gives a total score. Validity and reliability have been established for this measure (Roelofs, Peters, McCracken and Vlaeyen, 2003).

Pain Disability Index (PDI: Pollard, 1984). This is a brief self-report measure of disability and is designed to measure the extent to which chronic pain interferes with an individual's ability to engage in activities (Pollard, 1981). Respondents rate the degree to which pain interferes with functioning in seven broad areas: family/home responsibilities, recreation, social activity, occupation, sexual behaviour, self-care, and life-support activity on a ten-point scale of 0 (no disability) to 10 (total disability). An overall score (with a possible total of 70) is computed by summing the seven subscales. Validity and reliability have been established for this measure (Tait, Chibnall and Krause, 1990).

Target measures

Vlaeyen et al's. (2001) study on graded exposure and pain related fear measured:

1. catastrophising
2. fear of movement
3. fear of pain

Vlaeyen et al. (2001) selected items from the PASS, PCS and another pain measure (the Tampa Scale for Kinesiophobia – TSK: Kori, Miller, and Todd, 1990) to develop a short eleven item instrument that participants completed daily. Each participant was given the same instrument. This present study followed this strategy. A daily diary (see Appendix 9) was designed taking questions from PASS, PCS and CPAQ questionnaires to measure anxiety, catastrophising and acceptance as these three areas were the focus of each treatment session. Selecting questions from these measures would allow

identification of changes made as a result of treatment. Without the use of these questions on a daily basis, it would be difficult to ascertain how successful the treatment would be or if the individual had shifted in their beliefs. As the intervention was targeting these areas, it would be expected that change would occur on these measures when treatment was introduced. There were ten questions. Answers were given on a seven-point numerical scale (0=totally disagree, 6=totally agree). In addition, participants were asked to rate their daily experience of pain on three statements which required participants to rate their average, most severe and least level of pain for that day on an eleven-point scale (0=none, 10=worst imaginable). It was not expected that the pain experience would change during treatment as this was not the target of the treatment. The daily diary was completed daily from two weeks prior to the start of treatment, all throughout the treatment period and for one week following the end of treatment. See Table 3 for daily dairy questions and the measures they were taken from.

Table 3: Daily diary questions and the measures they were taken from

Question	Taken From
1. I think that if my pain gets too severe it will never decrease	PASS
2. When I hurt I think about the pain constantly	PASS
3. I get upset and frustrated when I am in pain	PASS
4. I avoid important activities when I am in pain	PASS
5. I worry all the time about whether the pain will end	PCS
6. I become afraid that the pain will get worse	PCS
7. There is nothing I can do to reduce the intensity of the pain	PCS
8. I wonder whether something serious may happen	PCS
9. It's Ok to experience pain	CPAQ
10. I have control over my pain	CPAQ
11. Today my average pain has been	
12. Today my most severe pain was	
13. Today my least pain was	

Process measures

Session exercises

In order to determine which aspects of the treatment were most helpful, process measures were used at every session to measure treatment fidelity. Participants were

asked to engage in several attention exercises and guided IE at each session. To aid analysis of treatment efficacy, it was important to gain data about how the participants found these exercises; could they engage in them, or did they employ strategies such as cognitive avoidance? This knowledge would allow identification of process change.

For each session a specific measure was developed with three questions about the exercises performed during the session (see Table 4 for details and Appendix 10 for session measures). The participants were asked to rate three statements about their ability to engage in the task, the ease with which they were able to engage in the task and whether thoughts interfered with their ability to engage in the task. A seven-point numerical scale (0=totally disagree, 6=totally agree) was used.

Table 4: Session exercise questions

Session	Question
1	I was able to shift attention between external and internal events.
	Thoughts interfered with my ability to make the shift.
	I found it easy to switch my attention
2	I was able to take positive action
	Thoughts interfered with my ability to take positive action
	I found it easy to take positive action
3	I was able to focus on a focal point
	I found it easy to focus on a focal point
	Thoughts interfered when I tried to focus on a focal point

IE practice

Participants were asked to practice IE at home three times daily. To monitor progress made, the participants were asked to keep a record of their practice sessions on a Pain Desensitisation Record Sheet (PDRS: Nicholas, 2007). This could indicate if practice at IE changed the pain experience of participants (see Appendix 11 for PDRS). Participants were asked to rate how much their pain bothered them using a scale of 0 (does not bother me at all) to 10 (bothers me extremely) before and after each IE practice session.

Treatment evaluation

The literature suggests that patient expectations about treatment and its credibility can have an impact on the outcome (Borkovec and Devilly, 2000). In order to consider whether patient's expectations were linked to therapeutic change, a pre- and post-treatment expectation measure was created, based on the Credibility/Expectancy

Questionnaire (CEQ: Borkovec and Nau, 1972). This is a scale for measuring treatment expectancy and rationale credibility. The CEQ uses two rating scales, one from 1 to 9 and another from 0 to 100%. There are two sets of questions. Set I are "think" and Set II are "feel" for example, in Set I a typical question is: "At this point, how logical does therapy seem to you?" for Set II, "At this point how much do you really *feel* that therapy will reduce your trauma symptoms?" There are four questions in Set I, three using the 0-9 scale and one on the 0-100% scale, and two questions in Set II, one on the 0-9 scale and one on the 0-100% scale. Devilly and Borkovec (2000) evaluated the psychometric properties of this questionnaire and found high internal consistency within each factor and good test-retest reliability.

For this study, similar questions were used however they were modified to include 'management of pain' rather than 'trauma symptoms'. This was entitled 'evaluation of therapy form' (see Appendix 12). There were two versions of the evaluation of therapy form; pre- and post-treatment. See Table 5 for the pre-treatment measure and Table 6 for the post-treatment measure. In the pre-treatment measure, Questions 1, 2, 3 in Set I and Question 1 in Set II were rated on a scale from 0 (not at all) to 9 (very). Question 4 on Set I and Question 2 on Set II were rated on a scale from 0-100%. In the post-treatment measure, all five questions were rated on a 0 (not at all) to 10 (completely) scale.

Table 5: Pre-treatment evaluation of therapy form

Set	Number	Question
I	1	At this point, how logical does the therapy offered to you seem?
	2	At this point, how successful do you think this treatment will be in helping you manage your pain?
	3	How confident would you be in recommending this treatment to a friend who experiences similar problems?
	4	By the end of the therapy period, how much improvement in your ability to manage your pain do you think will occur?
II	1	At this point, how much do you really feel that therapy will help you to manage your pain?
	2	By the end of the therapy period, how much improvement in your ability to manage your pain do you really feel will occur?

Table 6: Post-treatment evaluation of therapy form

Number	Question
1	How logical did the treatment offered to you seem?
2	How successful do you think this treatment was in reducing the impact of pain on your life?
3	How confident would you be in recommending this treatment to a friend?
4	How engaging and interesting was the treatment overall?
5	How satisfied were you with the overall quality of the treatment?

Procedure

Timescale

From beginning to end, a participant was involved for 20 weeks (see Table 7).

Table 7: Timescale of participant involvement

Activity	Timescale	Measure
Screening Assessment	1 session, followed by daily ratings/diary to gain baseline, two weeks	Global booklet Daily diary begins
Education/Formulation	1 session	Global booklet Evaluation of therapy form
Treatment	Three sessions over three weeks	Session exercises completed every session, IE PDRS every day throughout treatment
Change Interview	One session two weeks later	Global booklet Daily diary ends Evaluation of therapy form
Follow-up	One Session three months later	Global booklet

Measurement

Screening assessment: The global booklet was completed at the end of the screening assessment once participants consented to be involved. Participants were given two weeks of daily diaries, trained in how to use them and asked to begin filling in the diary daily.

Education session: At the end of the session, participants completed an evaluation of therapy form and a global booklet. Participants returned two weeks of completed daily diaries and were given more blank versions to fill in.

Treatment: At the end of every session, participants were asked to complete session exercises measures. They were also asked to begin filling in the Pain Desensitisation Record Sheet after IE practice (three times daily) and return these weekly, collecting more blank versions to fill in. Participants returned daily diaries weekly (at each session) and were given more blank versions to fill in. At the final treatment session, participants were given two weeks worth of daily diaries to fill in, a global booklet and an evaluation of therapy form. They were asked to fill this in on the last day of the daily diary and bring it along to the Change Interview.

Follow-up: Participants were contacted three months after treatment had ended to complete follow-up data. They were given the choice of having the global booklet sent in the post (along with a report which was a summary of the work and their pain scores) with a prepaid envelope to return the booklet or to come into the clinic and complete in a follow-up session.

Treatment

The following sections outline the screening assessment session, the education session and the three treatment sessions. These sessions were structured with an average length of an hour. The evidence base informed the design of both the screening assessment and the treatment manual used in this study. The treatment manual (see Appendix 13) provided information about the study and the research it has been based on in the education session and each of the three therapy sessions targeted acceptance, attention and pain related fear incorporating IE practice and attention management strategies to do so. Two therapists conducted the screening assessment interviews (with the exception of two interviews). One of the therapists conducted all of the education and treatment sessions and three month follow-up sessions and the other conducted the Change Interview.

Screening assessment

Seven participants were invited to attend a screening assessment at the psychology department (see Appendix 14 for screening assessment). They were informed that the aim of the study was to investigate whether focusing on the experience of pain reduces the distressful experience and that they would be asked to focus on the pain experience without trying to distract or avoid it. There is no evidence to suggest that this would increase their pain levels. They were advised that it was a limited treatment, being shorter in length than normal treatment; however they would be given tools to manage the pain, as in routine treatment. Participants were informed of their right to withdraw at any point and confidentiality was assured. Measures that would be taken throughout the course of the study were discussed as were details about what to expect from treatment sessions; there would be one education session and three treatment sessions. Sessions were expected to last 30-60 minutes long and would involve IE and exercises to help manage the pain. Exercises were expected to be practiced at home in between sessions. The three month follow-up commitment was also explained to patients.

A framework for interviewing patients was developed using the FAM and research by Flink et al. (2009) and De Peuter et al. (2011). Participants gave an account of their diagnosis and described their history of pain. Their pain episodes were explored including details about where the pain was located, how often episodes occurred and how intense the pain was. Participants described what made the pain worse and better. Their coping strategies were explored as well as the impact that pain had on their lives and what it prevented them from doing. Participants were asked about the meaning of their pain and if they thought they would ever be rid of it. They were asked if they were receiving treatment for anything else. Reading and writing skills were also established.

Participants were asked not to change their pain treatment during the course of the study, or to let the researchers know if they did. The importance of commitment to the project was explained, including the need to keep a daily diary for several weeks and to commit to all sessions and follow-up three months later.

The seven participants who were screened met the inclusion criteria and were recruited into the study. Once consent was given they were informed that their GP would be contacted (see Appendix 15 for letter). They completed the global booklet of standard measures. They also received training in how to complete the daily diary. It was explained that this would need to be completed every day for a period of eight weeks. Participants practiced filling in the diary and were given the opportunity to ask questions. They were informed that it needed to be filled in for two weeks prior to the

first session and were given enough paper copies to do so. Finally participants were asked if they had any more questions about the study. An appointment was arranged at the clinic for two weeks later for the education session. Participants were asked to bring in their completed daily diaries.

Education session

The session started with an overview of what the session would entail. Following this was a discussion about the daily diary. Participants were asked about their experience of filling it in and if any days stood out for them. All participants stated they were able to fill in the diary daily with no problems. They were thanked.

The Fear Avoidance Model was discussed and the rationale for the study was explained to the participants; people avoid processing pain which means that they do not get full exposure to it. They were informed that the aim of this work was to see if focussing on the experience of pain would reduce the distress they experienced. Training would be given to allow them to focus on the experience of pain.

Attention management of pain was discussed and the common response of escape/distraction, which can be frustrating if attempts to escape the pain fail. The rationale for attention management exercises was explained and how this links to the reduction of the threat value of pain. Participants were asked about their current attention management techniques which were explored in detail.

Current research into pain management, including methods used in a fear-avoidance approach, attention management approach, acceptance and IE were explained to participants. They were informed about emerging evidence which suggests that deliberately focusing on the pain experience may allow them to confront their pain.

The purpose of pain was discussed and acute and chronic pain was distinguished between. Desensitisation was explored with participants; focusing on pain, letting themselves feel it, telling themselves that they are ok, may allow them to accept this and try to move on despite the pain. It was acknowledged that the normal response to pain is to try to get away from it, and this process was compared to fear-avoidance, with an example of fear of heights. Those who are fearful of heights may avoid high places, but by doing so, do not realise that they are not very dangerous and this also places limits on their lifestyle. Participants were informed that the best treatment for fear is exposure to the feared stimulus; going to a high place and realising that it is ok. The process of habituation was also explained to participants in relation to hyper-vigilance, for example trying to escape something results in more attention on the feared stimulus. Both these

processes were applied to pain and participants were informed that this was what the treatment was aiming to do. They were informed that practice would be needed to achieve this.

Participant's responses, understanding of this information and their feelings about it were explored. At the end of the session, the participants completed the global measures booklet, the evaluation of therapy form and were given more copies of the daily diary.

Treatment session one: Attention

The session started with an overview of the session. The focus of the session was attention and some exercises would be performed. Participants were asked an open-ended question about what strategies were currently helpful for managing pain? When they were absorbed in an activity, did they notice the pain? This was to reconceptualise the problem; the mind can moderate pain and the perception of pain signals can be altered.

Attention management as a way of dealing with pain was discussed with the idea of using strategies to help control the pain. Participants were advised that not all strategies work all of the time and that practice is needed. Reformulation of the problem of pain and attention was discussed with patients. After in depth exploration of these concepts, using examples and experiences of the participants, attention exercises were introduced. See Table 8 for the list of exercises. Each exercises lasted one minute. Pain and distress levels were taken before and after each exercise using a scale of 0 (none) to 10 (worst imaginable).

Table 8: List of exercises for treatment session one

Trial	Exercise
1	Mini-practice relaxation (see Appendix 4 in treatment manual for script)
2	Focus attention on sounds in the room
3	Focus attention on breathing through nose
4	Alternate between the room and your nose three times
5	Switch from breathing through nose to current pain and alternate three times
6	Repeat Trial 5
7	Repeat Trial 5
8	Focus on an object in room (e.g. clock, picture)

Following these exercises there was a discussion about the experience, with a learning point that instead of fighting pain, participants can switch their attention in order to gain control.

IE was introduced to participants and a script (Nicholas, 2007) was read, providing a guide to focusing on pain, a reminder that the pain doesn't mean anything and that they were ok. They were asked to keep their attention on the pain, without trying to escape or change the pain and advised that any increase in pain would settle and that the pain would not get worse. This exercise lasted approximately three minutes. Pain and distress levels were taken before and after the IE practice using a scale of 0 (none) to 10 (worst imaginable). Following IE participants discussed their experience of the practice. They were given a copy of the script and asked to practice IE at home daily three times and record how much their pain bothered them before and after each practice on the pain desensitisation record sheet. They were also given the mini-relaxation script and asked to practice the attention exercises, experimenting with different types over the course of the week. Any questions they had were answered. Participants completed process session measures about the exercises. They returned completed daily diaries and were given blank diaries to fill in over the course of the week.

Treatment session two: Catastrophising

The session began with an overview. There was a homework review and participants were asked if they experienced any difficulties with practice at home, and if their abilities had improved with practice.

The focus of this session was about catastrophising and participants' reactions to times when their pain was severe were explored. To aid consideration of their thoughts, the participants were given a modified version of the Coping Strategies Questionnaire (CSQ: Rosenstiel and Keefe, 1983) to rate. The participants were asked to consider anything else they may think or visualise when their pain is severe. Their responses were discussed in detail. Reformulation occurred with catastrophisation being described as a 'mood trap':

> "Intense pain leads to very negative thoughts we call 'catastrophisation', and that cause further distress. Catastrophising often leads to thinking about other negative thoughts and memories, not directly associated with the pain. A vicious cycle can become established, which makes dealing effectively with the pain far more difficult."

Pro-active ways of managing pain were formulated with the aim of leading to a sense of self-efficacy. The Signal Breath exercise was introduced. This is a naturally occurring event (the sharp intake of breath with increased pain) as a signal to interrupt the habitual flow of thoughts and actions. The participants were asked to "stop and think" following a signal brief and were given the following instructions:

"When your pain is severe or getting worse STOP yourself and take a Signal Breath"

1. Inhale deeply
2. Release your breath slowly
3. Talk to yourself "let go", "take it easy", "relax", "stay calm"

This was rehearsed as an exercise. Pain and distress levels were taken before and after each exercise using a scale of 0 (none) to 10 (worst imaginable).

Following this a further aspect was added to the exercise. Participants were encouraged to diffuse catastrophic thoughts by taking positive actions both physically and mentally, which included relaxing, reassuring themselves that they have been in a similar situation and know what will happen (the pain will rise to a peak and decline) and focusing themselves on the pain rather than fighting it. It was suggested that it can be unhelpful to dwell on the cause of their pain which may be frustrating, if they do not know why the pain occurred. Patients were encouraged to 'let it go'. Patients completed guided rehearsals. Pain and distress levels were taken before and after each exercise using a scale of 0 (none) to 10 (worst imaginable). Their experiences were discussed following the exercise.

Next participants engaged in a guided IE practice; the script from session one was read out. Pain and distress levels were taken before and after the IE practice using a scale of 0 (none) to 10 (worst imaginable). Following IE participants discussed their experience of the practice. Participants were asked to continue to practice IE at home daily, three times recording how much their pain bothered them before and after each practice on the PDRS. They were asked to practice the Signal Breath and diffusion of catastrophic thoughts exercises. Any questions they had were answered. Participants

completed process session measures about the exercises. They returned completed daily diaries and PDRS sheets and were given blank versions to fill in over the course of the week.

Treatment session three: Acceptance

The session began with an overview. There was a homework review and participants were asked if they experienced any difficulties with the homework, and if their abilities had improved with practice. A focal point exercise was introduced. A focal point is a specific object, thought or sensation which can dominate attention. Participants were asked to suggest different types of focal points. For examples, see Table 9.

Table 9: Types of focal points

External	Mental	Somatic
Trees, painting, flower	Planning the day Fantasizing a holiday	Focusing on the breath

Participants were asked if they had ever used a focal point before and a range of different types of focal points were discussed, such as external (objects and sounds), mental (ideation and fantasy) and somatic (breath, warmth). Participants considered different types of focal points which they could use. They were asked to pick one from each of the type defined. This was practiced as an exercise, see Table 10. Each exercise lasted one minute. Pain and distress levels were taken before and after each exercise using a scale of 0 (none) to 10 (worst imaginable).

Table 10: Focal point exercises from treatment session three

Trial	Exercise
1	Bring attention on external focal point
2	Allow attention to drift as it wants
3	Move attention to mental focal point
4	Allow attention to drift
5	Bring attention to somatic focal point
6	Allow attention to be as before

Participants' experiences were discussed following the exercise and suggestions were made for how focal points can help to episodically control normal levels of pain, to increase a sense of self efficacy when dealing with the pain and to help improve sleep, for example. Participants were encouraged to experiment with the techniques and

practice over time so that their skills would become fully developed. A metaphor was used to compare the practice of attention techniques to weaving a parachute: “You don’t weave the parachute when you fall out of the plane - they have to be worked at regularly to ‘break the fall’ when they are needed.” This was discussed. Participants were asked use focal points at least twice daily.

Another exercise was introduced about sensitivity to pain to encourage participants to think about how much they are preoccupied by their pain, and also to suggest how attention management can help disengage them from the pain. They were asked to fill in the Pain Vigilance & Awareness Questionnaire (McCracken, 1997). Their answers were discussed. Participants were informed that one of the aims of attention management is to help put boundaries around the pain. It was suggested that a major goal for would be to live their lives around the pain - so that even when they are experiencing a lot of pain, they don’t feel that this defines their life. The following analogy was used:

> “Picture a lake by a mountain - the basic features of the scene remain throughout the year: the lake, the mountain, the trees and so on. There is stability in the scenery, just as there is stability in the chronicity of your pain - it doesn’t go away. However, change also occurs - the seasons come and go, the colours and hues of the landscape change, as does the weather. While some elements stay the same, others change, weather storms, grow and continue. Likewise your pain is a stable feature and is chronic, but your lives can never-the-less change, grow and continue around it. “

Participants were advised that it is useful to try and put boundaries around the pain whenever possible, while not attempting to ignore the existence of their chronic pain. This concept was discussed.

There was a guided IE practice; the script was read out. Pain and distress levels were taken before and after the IE practice using a scale of 0 (none) to 10 (worst imaginable). Following IE participants discussed their experience of the practice. Participants were asked to continue to practice IE at home daily, three times recording how much their pain bothered them before and after each practice on the PDRS for the following week. They were asked to practice using focal points during the following week. Any questions they had were answered. Participants completed process session measures about the exercises. They returned completed daily diaries and were given blank diaries to fill in. As this was the final treatment session, participants were given

the global booklet and an evaluation of therapy form and were asked to fill these in one week later (when the treatment practice ended) and to continue to fill in the daily diary for two weeks and bring these to the Change Interview. They were informed that a different therapist would be conducting the Change Interview. A date was arranged for this. Follow-up was also explained to participants, who were told what to expect and when they would next be contacted.

Change Interview

Two weeks after treatment had ended, participants attended for a Change Interview, conducted by a different therapist. This interview was as a relatively unstructured empathic exploration of the client's experience of therapy. An attitude of curiosity about the topics raised in the interview was adopted, using open-ended questions (see Appendix 16 for protocol) plus empathic understanding responses to help the client elaborate on their experiences. The interview covered: the client's assessment of change and assessed medication change as a possible reason, worsening and unfulfilled wants, attributions about change, helpful and unhelpful aspects of therapy, and their perception of the measures. Participants were asked to state changes they had noticed on three scales using a five point rating: Expected vs. Surprised (1=very much expected, 5=very much surprised), Likely without therapy (1=very unlikely, 5=very likely) and Importance or significance (1=not at all important, 5=extremely important). At this interview, participants returned their completed daily diaries, evaluation of treatment forms and global booklets.

Three month follow-up

Participants were contacted by telephone three months after treatment had ended and were offered the choice of attending for a three month follow-up appointment at the clinic to complete the global booklet and receive a report summary of the study and their pain scores, or to have these posted to them for them to return in a pre-paid envelope. Two participants attended for a follow-up session, one requested that the documents be sent in the post due to illness and one could not be contacted due to being in hospital.

The report summary of the study contained a brief plan of what the study planned to do, an overview of each session, details about the daily diary, three graphs displaying pain daily ratings throughout the study (for average, severe and least amounts of pain), a qualitative account (taken from the Change Interview) of what the

participants thought about the study and their nominated changes. Participants were also informed that they would receive an overall summary of the results once data analysis was completed. Participants were invited to make changes or amend any details of their summary reports and their feedback about the report was sought.

Analysis plan

Standard measures

Standard measures in the global booklets were analysed for reliable statistical change and clinical significance using Jacobson and Truax's (1991) reliable change methods. The Reliable Change Index (RCI) was used to assess whether the observed change at the end of treatment was reliable. The confidence interval of the score was assessed to determine if the change was statistically meaningful. To do this, psychometric data about the measures were used; an estimate of reliability (*r*) and standard deviation (SD) in the formula to estimate the standard error of measurement (Sem) and the standard error of the difference score (SEdiff) and in the formula for determining the reliable change index (RCI):

$$Sem = SD \times \sqrt{(1-r)}.$$

$$RCI = (\text{pre-test score} - \text{post-test score}) / SE_{diff}$$

$$SE_{diff} = 2 \times Sem^2$$

Change is regarded as significant if the value of the RCI is greater than 1.96 (using $p < 0.05$) and it can be concluded that changes made are not likely to be due to errors in measurement. As there are not standardised norms for each of the measures used in the global booklet, norms were taken from the following sources:

PASS: McCracken and Dhingra (2002).
PCS: Osman, Barrios, Kopper, Hauptmann, Jones and O'Neill (1997).
PVAQ: McCracken (1997).
CPAQ: McCracken, Vowles and Eccleston (2004).
PDI: Tait, Chibnall and Krause (1990).

For calculations see Table 11.

Table 11: RCI calculations

Test name	SD	*r*	Sem	SE_{diff}	RCI
PASS					
Cognitive	6.73	0.86	2.52	3.56	7
Avoidance	6.11	0.75	3.06	4.32	8
Fear	6.38	0.82	2.71	3.83	8
PCS Total	9.55	0.93	2.53	3.57	7
Rumination	4.04	0.91	1.21	1.71	3
Magnification	2.44	0.77	1.17	1.65	3
Helplessness	9.55	0.93	2.53	3.57	7
CPAQ Total	19	0.78	8.91	12.60	25
Willingness	9.7	0.78	4.55	6.43	13
Activities	12	0.82	5.09	7.20	14
PVAQ Total	13.5	0.86	5.05	7.14	14
PDI	9.32	0.86	3.49	4.93	10

Reliable Change Index information is presented in graphs displaying change at four different periods: Assessment to pre-treatment, pre- to post-treatment, pre-treatment to follow-up and post-treatment to follow-up. This is to consider stability pre-treatment, immediate treatment change, duration of change and the stability of the change. Individual participant's scores will be shown in graphical displays to allow visual inspection of the patterns of scores over the course of the study.

Daily diary

The daily diaries are plotted in graphs which enables visual inspection. The effect of the treatment can be evaluated through inspecting changes observed between the baseline, education and treatment and follow-up periods. A stable baseline followed by a steady improvement in scores following treatment would indicate treatment efficacy.

The daily diary scores were split into four sections, the average score from questions from each measure (PASS, PCS and CPAQ) and also their average pain score. For each participant there will be four graphs illustrating change on each of these sections of the daily diary with a running commentary about the change.

In-session exercises and IE practice

Each session's data is plotted separately for each participant and presented session by session. Participant scores of pain and distress levels before and after attention exercises are plotted in graphs to allow visual inspection. Participants were asked to practice these exercises alongside IE during the following week. As such pain levels before and after IE Practice were recorded and also plotted in graphs to allow visual inspection. Participants were asked to practice three times daily, however for ease of analysis, the three daily scores were averaged and a single score was displayed for each day of the week. Participant's scores on the process measures are displayed and analysed in relation to the attention exercises.

Evaluation of therapy

Participant's scores of pre- and post-therapy evaluations are displayed in a table to determine participant's expectations of treatment before starting and to determine their thoughts on treatment following sessions.

Change Interview

Changes that the participants experienced and their perceptions of change are displayed in a table. Answers from each participant's response to questions from the Change Interview are displayed in a qualitative table. The overall impact of the intervention has been assessed using the Hermeneutic Single Case Efficacy Design (Elliott, 2002) which provides an explicit method for combining information from the statistic analysis of the data and the consideration of additional qualitative information about causes of change other than the intervention. This information is gathered from session records and the Change Interview. Data from all sources is combined to determine whether change has occurred and information from the change interview can be used to determine if there is direct evidence that therapy contributed to change and to what extent.

RESULTS

This is a series of single case studies with measurements taken at multiple levels. The results will be presented in a structured order. First to be displayed will be traditional single case measures, standard measures, in a series of tables and graphs. The results of the target measures (a daily diary) will be presented next in the form of graphs. One of the aims of this research was to consider process and the effect of attentional and IE exercises completed in session. These will be reported in the form of graphs and tables. Data about participants' evaluations of therapy both pre and post will be presented in the form of tables. Finally information taken from the Change Interviews will be displayed using tables. After each section there will be a summary. Material about integration of these results will be considered in the discussion.

Standard measures

It was expected that there would not be significant changes on these scores.

Reliable Change Index

Reliability and standard deviations were used to calculate the Reliable Change Index (RCI). Tables 12 and 13 below display change at four different times: Assessment to pre-treatment, pre- to post-treatment, pre-treatment to follow-up and post-treatment to follow-up. This is to consider stability pre-treatment, immediate treatment change, duration of change and the stability of the change. It was not possible to gain follow-up data from Participant 3 as she was in hospital at the time of follow-up. It is unlikely that this was the result of this treatment.

Table 12 shows that Participant 3 made a significant change on the Cognitive subsection of the PASS during the period from pre- to post-treatment. There were no other changes on this measure; none of the other participants changed their scores significantly.

There were several changes to the PCS scores. Participant 1 shows changes on his Total score between pre- and post-treatment. His scores on the Rumination subscale are significant between assessment to pre-treatment, pre- treatment and post-treatment and from pre-treatment to follow-up. Participant 2 shows significant change on the Total score between assessment and pre-treatment. However between post-treatment and follow-up his scores have reversed significantly. This pattern is the same for the Magnification subscale with scores significant at the first period, but significantly reversed in the final period. This participant was ill at follow-up.

Table 12: Reliable Change Index for PASS and PCS

Measure	Participant	Subtest	Assessment to pre-treatment	Pre-treatment to post-treatment	Pre-treatment to follow-up	Post-treatment to follow-up
PASS	1	Cognitive	□	□	□	□
		Avoidance	□	□	□	□
		Fear	□	□	□	□
	2	Cognitive	□	□	□	□
		Avoidance	□	□	□	□
		Fear	□	□	□	□
	3	Cognitive	□	■		
		Avoidance	□	□		
		Fear	□	□		
	4	Cognitive	□	□	□	□
		Avoidance	□	□	□	□
		Fear	□	□	□	□
PCS	1	Total	□	□	■	□
		Rumination	■	■	■	□
		Magnification	□	□	□	□
		Helplessness	□	□	□	□
	2	Total	■	□	□	■■
		Rumination	□	□	□	□
		Magnification	■	□	□	■■
		Helplessness	□	□	□	□
	3	Total	□	■		
		Rumination	■	□		
		Magnification	□	■		
		Helplessness	□	■		
	4	Total	■■	■	■	□
		Rumination	□	■	■	□
		Magnification	■■	□	■	□
		Helplessness	□	□	□	□

Note: Reliable change is significant at the 0.05 level

Key □ No change ■ Significant change

■■ Significant change in the non-predicted direction

Participant 3's scores changed significantly on the Rumination subscale between assessment and pre-treatment. From pre- to post-treatment, her scores were significantly changed on the Magnification and Helplessness subscales, as well as the Total score. Participant 4 shows significantly reversed changes on the Rumination subscale and his Total score between assessment and pre-treatment. At the first comparison Participant 4's scores were significantly high, perhaps due to anxiety about the treatment. However at the next comparison, the Total score and the score from the Rumination subscale was significantly changed. In the period between pre-treatment and follow-up significant change was found on the Total score and the Rumination and Magnification subscales.

Table 13 shows changes on the CPAQ for Participant 1 only. Significant change occurred from pre-treatment to follow-up on the Total scale and the Willingness subscale. Between post-treatment and follow up significant change was maintained on the Willingness subscale.

Changes are noted on PVAQ for Participant 1 whose scores changed significantly between pre-treatment and follow-up. Participant 3 shows significant change between assessment and pre-treatment.

Participant 2 showed significant change between assessment and pre-treatment and between pre-treatment to post-treatment on the PDI. However between post-treatment and follow-up his scores reversed significantly. Participant 4 scores on the PDI changed significantly between pre-treatment and follow-up and between post-treatment and follow-up.

Standard measures – graphical displays

The participants' scores varied on the standard measures (see Figures 4-7). Participant 1's scores were low on all of the measures from pre-treatment period. This meant it was more difficult for this participant to achieve reliable change. The graphical displays below show the patterns of scores for participants over the course of the study. High scores on PASS indicate high levels of anxiety, high scores on PCS indicate high levels of catastophisation, high scores on CPAQ indicate high rates of acceptance and high scores on the PDI indicate high levels of disability.

Table 13: Reliable Change Index for CPAQ, PVAQ and PDI

Measure	Participant	Subtest	Assessment to pre-treatment	Pre-treatment to post-treatment	Pre-treatment to follow-up	Post-treatment to follow-up
CPAQ	1	Total	□	□	■	□
		Activities	□	□	□	□
		Willingness	□	□	■	■
	2	Total	□	□	□	□
		Activities	□	□	□	□
		Willingness	□	□	□	□
	3	Total	□	□		
		Activities	□	□		
		Willingness	□	□		
	4	Total	□	□	□	□
		Activities	□	□	□	□
		Willingness	□	□	□	□
PVAQ	1		□	□	■	□
	2		□	□	□	□
	3		■	□		
	4		□	□	□	□
PDI	1		□	□	□	□
	2		■	■	□	■■
	3		□	□		
	4		□	□	■	■

Note: Reliable change is significant at the 0.05 level

Key: □ No change

■ Significant change

■■ Significant change in the non-predicted direction

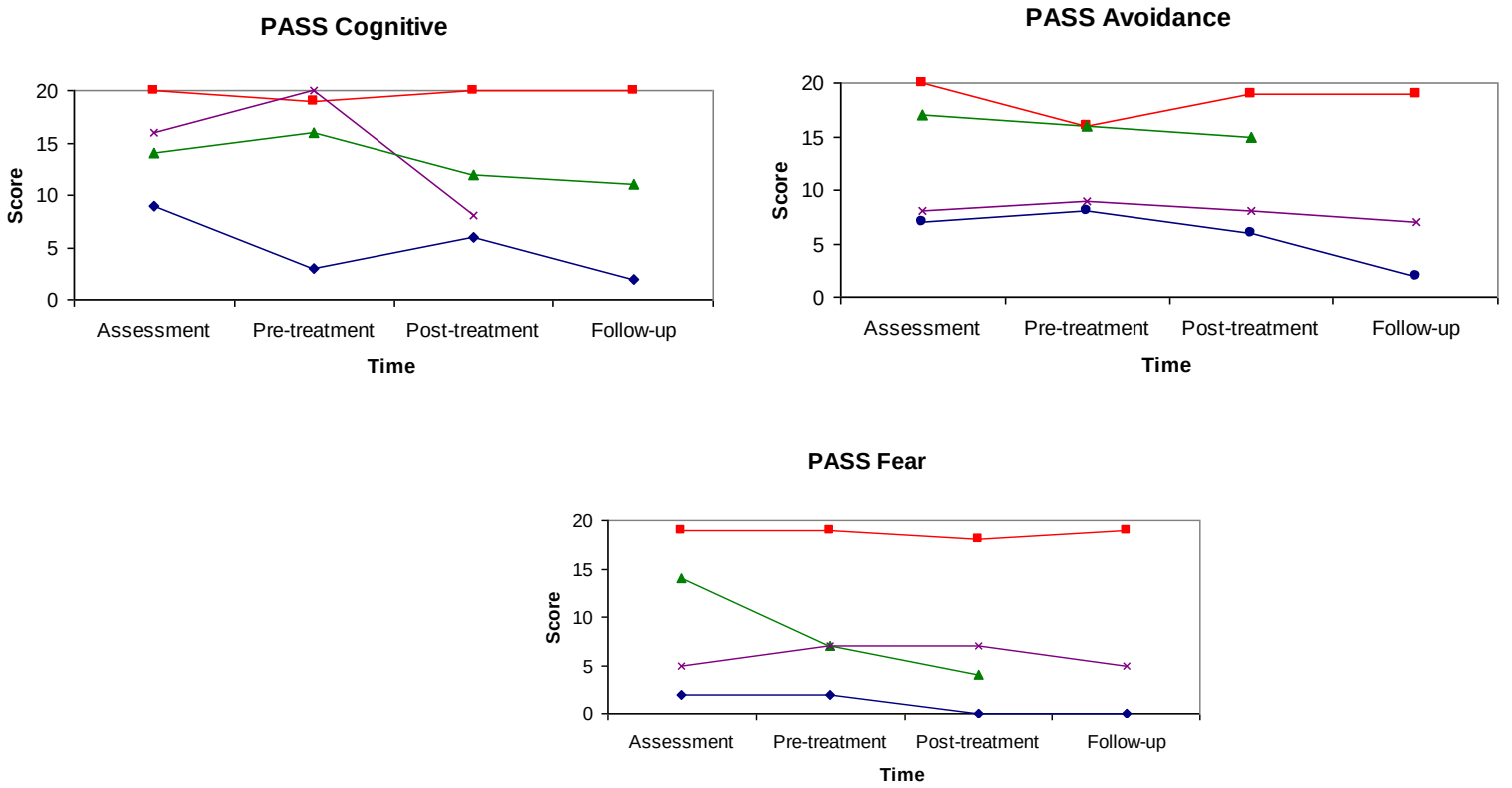


Figure 4: Participant scores for PASS subscales

Key: 1 2 3 4

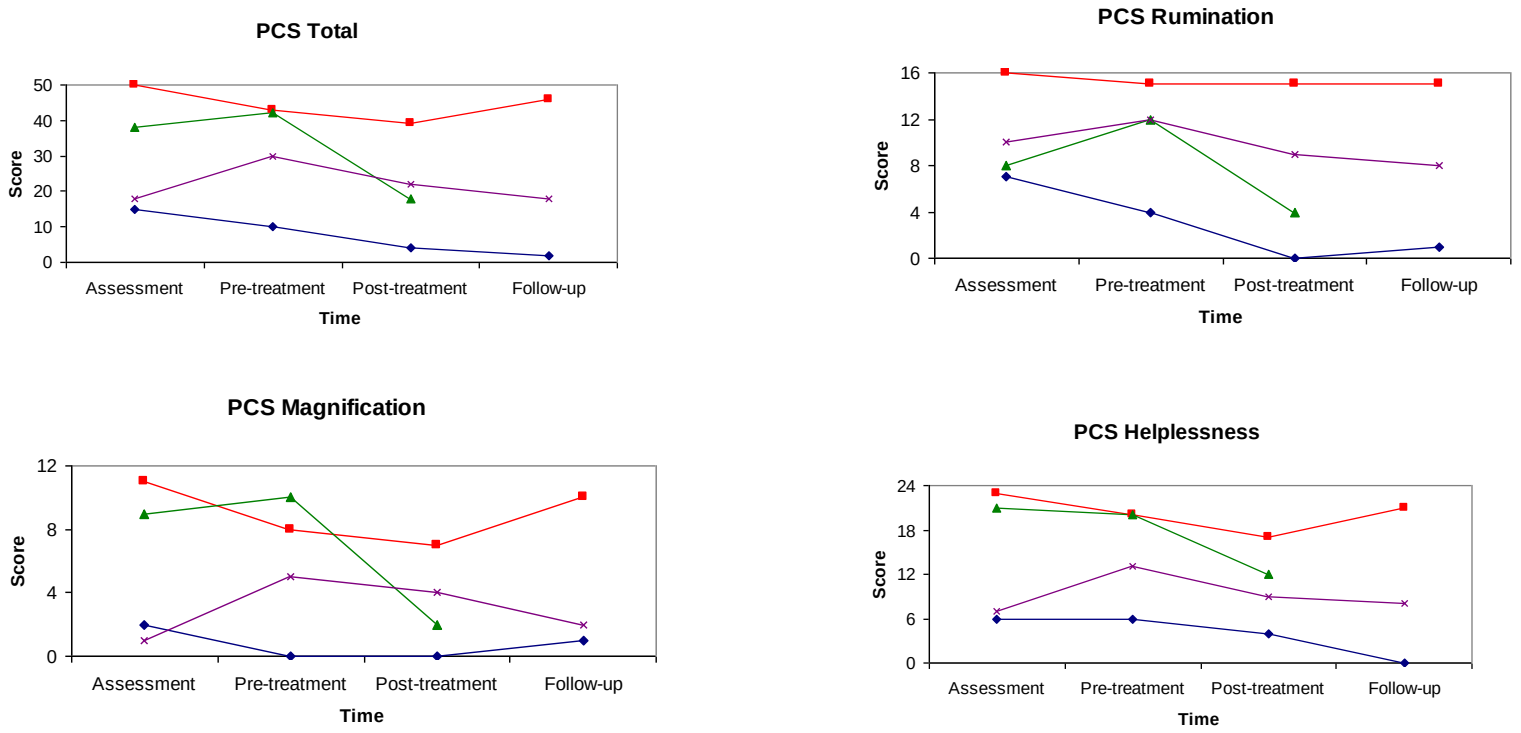
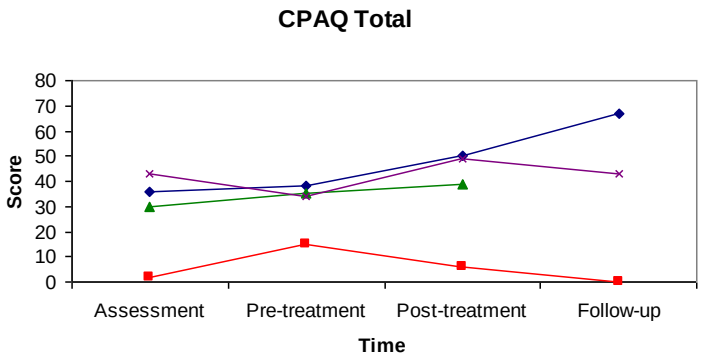
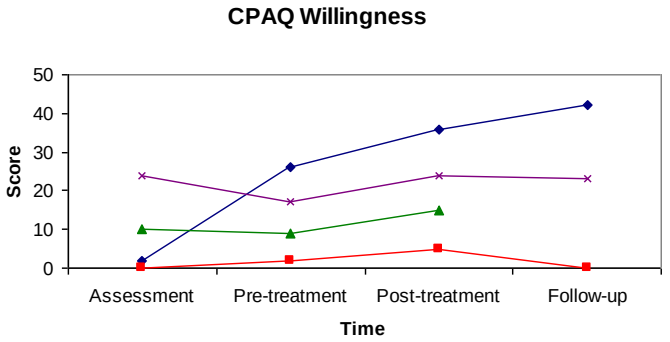


Figure 5: Participant scores for PCS Total and subscales

Key: 1 2 3 4





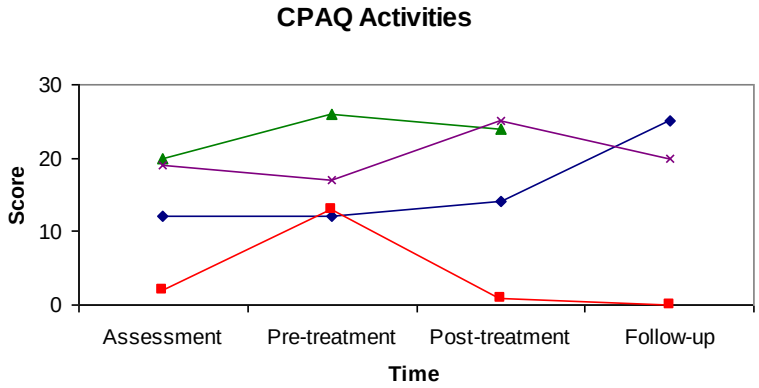


Figure 6: Participant scores for CPAQ Total and subscales

Key: 1 2 3 4

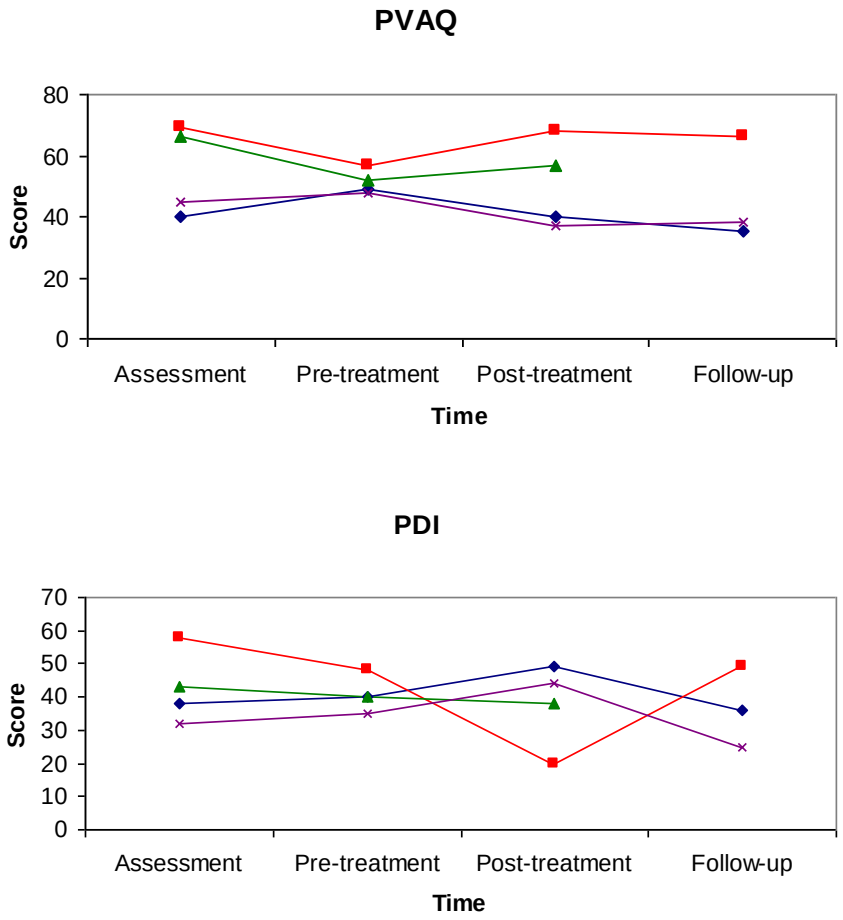


Figure 7: Participant scores for PVAQ and PDI

Key: 1 2 3 4

Summary of standard results

Only Participant 3 made significant changes on the PASS measure. All of the participants made significant changes on the PCS Total scores and some of the subscales also. Participant 1 made the only significant change on the CPAQ. Both Participants 1 and 3 made changes on the PVAQ and Participants 2 and 4 made significant changes on the PDI. All of the significant changes occurred at different times over the course of the study. By follow-up, Participant 2 had reversed significant scores on the PCS and PDI measures.

Consideration of the graphical displays shows that Participant 1 generally had low scores across the different measures, whilst Participant 2's scores were generally high. Participants' 3 and 4 scores were often moderate across the measures. On the CPAQ (Total) and PDI measures, Participants 1, 3 and 4 had very similar scores across the timescales. Scores across the three subscales of the PASS were very different for each participant, but on the PCS subscales, their scores were more similar.

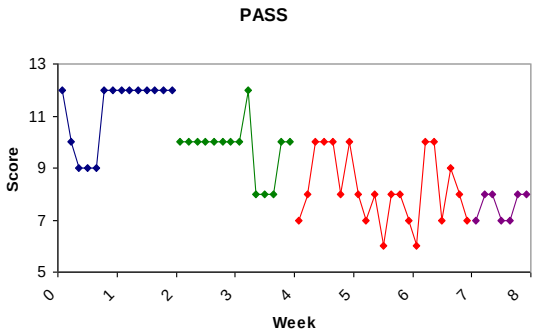
Daily diary

The daily diary is a sensitive and focused measure on which it was expected that change would be observed. The diary was comprised of questions from the PASS, PCS and CPAQ measures and pain ratings. There was fluctuation on all of the participant's diary scores; however the variation was not always the same for each section of the diary. If a response bias was present it would be expected that all four of the measures in the daily diary would change simultaneously. This did not occur.

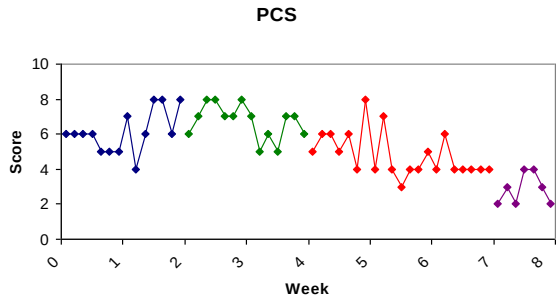
It was found that the treatment was beneficial for Participant 4. Participant 1 also responded to the treatment. Treatment had a delayed effect for Participant 3. Participant 2 did not respond to the treatment. Variation at the beginning of the baseline may indicate participants adjusting to using the measure. Figures 8-11 illustrate an individual analysis of each participant's scores on the daily diary. In some of the graphs the scales have been adjusted to aid visual inspection; not all start at 0. There is a running commentary alongside the figures explaining the results. Participant 1 had a longer education phase than others due to difficulties attending clinic on the day of the first treatment session, as such the treatment was postponed for one week and he continued to fill in the diary over this period. This is shown in his figures. High scores on PASS indicate high levels of anxiety, high scores on PCS indicate high levels of catastrophisation, high scores on CPAQ indicate high rates of acceptance and high

scores on the pain graphs indicate high levels of pain. The following key has been used for all of the figures in this section:

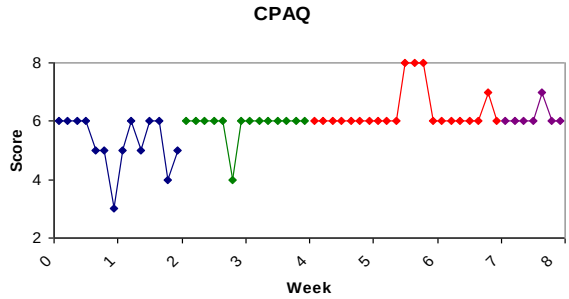
Participant 1



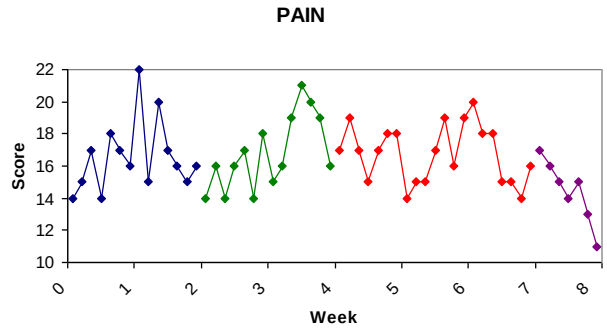
PASS: There was initial instability in the baseline phase which stabilised. There was a drop in score in the education phase with slight variation which slowed down. Fluctuation is seen during the treatment phase but the average was low. There was no change at follow-up.



PCS: During the baseline period, scores increase and remain high during the education phase. There is a drop in the score at the beginning of treatment which increases shortly after. Towards the end of treatment the scores fall and continue to do so at follow-up.



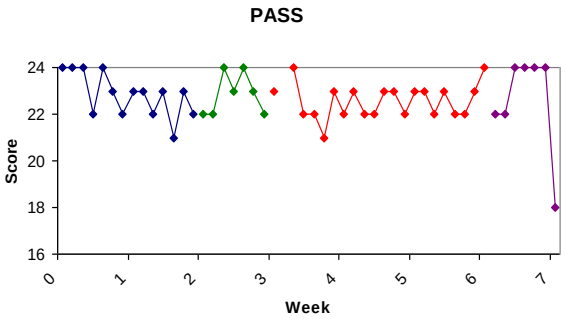
CPAQ: Acceptance levels fall shortly after the start of baseline. They increase during education, with a slight dip. During treatment acceptance increases to its highest peak, before dropping towards the end of treatment and remaining stable through to post-treatment. However there is little overall change.



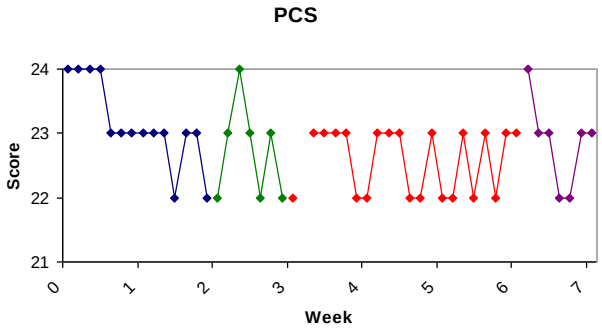
Pain: Pain scores started to increase throughout the baseline period. At education there is a drop, before another increase prior to treatment. After treatment there is variation in pain levels which drop and are maintained at post-treatment. Overall there is not a great change in the pain scores.

Figure 8: Participant 1 daily diary scores

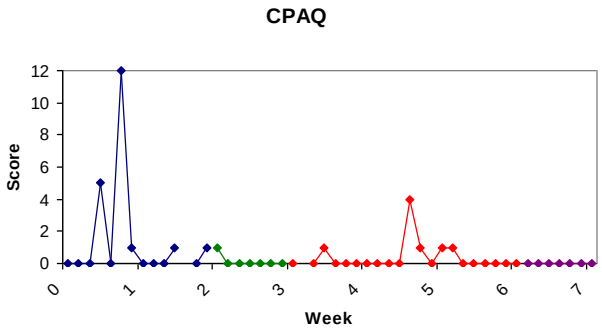
Participant 2



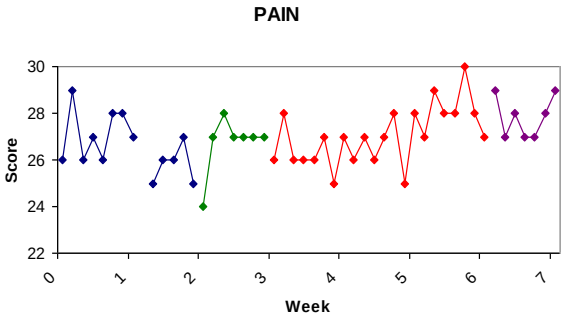
PASS: At baseline the scores are high. Shortly after the scores drop slightly. There is continued variation throughout all of the phases, with little change. Towards the end of the data collection there is a sharp decrease. Overall scores remains high throughout the study.



PCS: There is a slight decrease in scores mid-way through the baseline period. There is a slight variation in scores throughout data collection. However there is very little overall change.



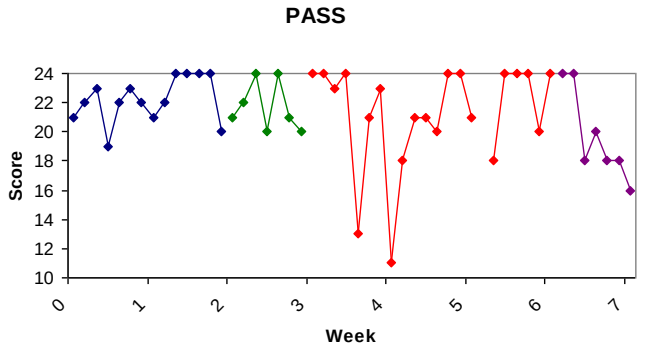
CPAQ: During the baseline period there is a sharp increase in scores. However this drops off before education starts and remains low until treatment. Mid-way through treatment there is a slight increase. However scores remain generally stable with little change.



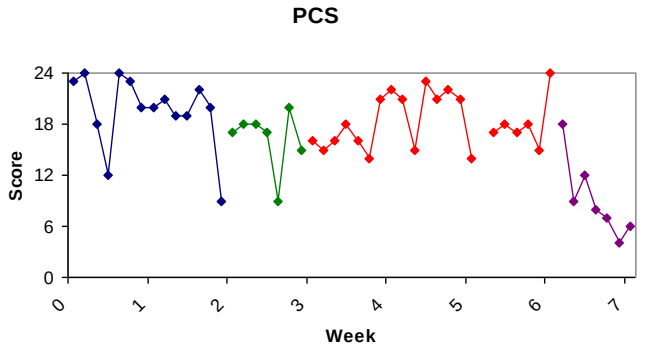
Pain: Pain levels are high at the start of the baseline period, but decrease as the education period approaches. Pain levels continue to remain high throughout the treatment period, and post-treatment period. Overall pain remains fairly high and constant.

Figure 9: Participant 2 daily diary scores

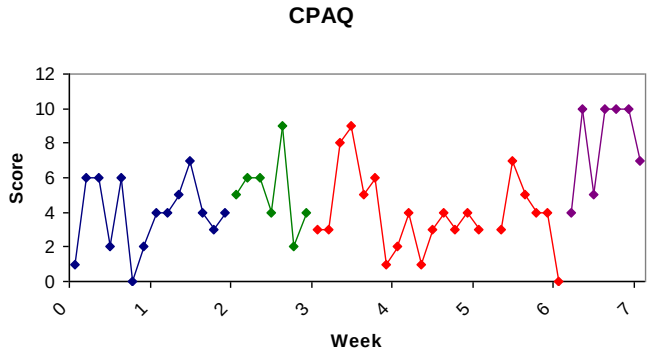
Participant 3



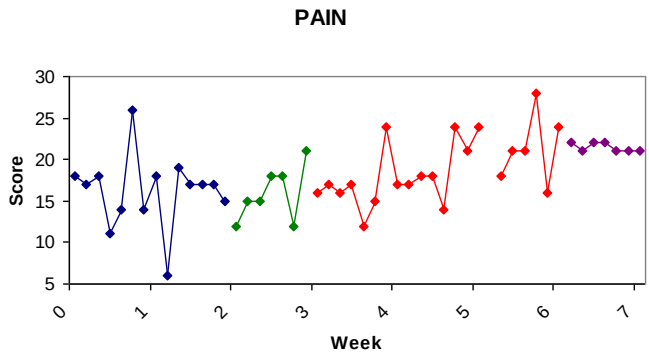
PASS: There is slight variation, but mostly scores remain stable during baseline and education periods. During treatment the scores fluctuate with two sharp decreases before a return to pre-treatment scores. At post treatment there is a drop in scores.



PCS: There is slight variation in the scores over the baseline, education and treatment periods. Scores generally remain stable. There is a drop in scores following the end of treatment.



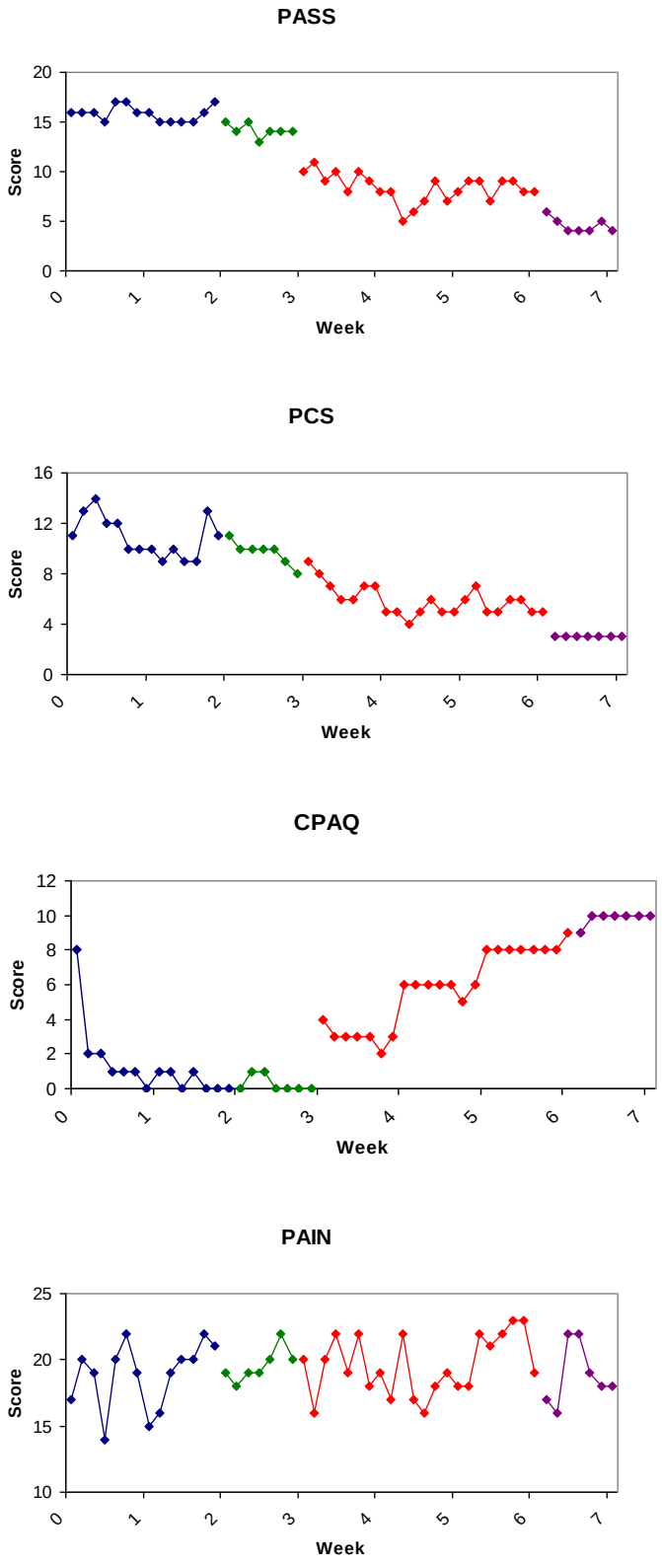
CPAQ: Scores are low at the baseline, but increase slightly during the education phase. There is variation in scores during the treatment phase. At post-treatment there is an increase in scores.



Pain: There is variation in the baseline period. Scores remain fairly stable throughout education, but increase throughout the course of treatment, before decreasing slightly post-treatment.

Figure 10: Participant 3 daily diary scores

Participant 4



PASS: Scores are stable during the baseline period. They begin to decrease from education phase onwards. Throughout treatment scores continue to reduce through to the post-treatment period.

PCS: Scores are mostly stable throughout the baseline period. Scores drop throughout the education and treatment phase and are maintained at a low level post-treatment.

CPAQ: Scores are initially high, before dropping suddenly at the beginning of baseline period. During education scores remained low, however the scores increase steadily throughout treatment and continue to rise and are maintained at post-treatment.

Pain: Throughout the study pain levels remained moderate with slight variation. Pain levels are generally maintained and change little throughout the study.

Figure 11: Participant 4 daily diary scores

Summary of daily diary

There is both variation and stability on the measures. For Participants 1 and 4, scores improve on both the PASS and PCS. For the CPAQ and pain scores, Participant 1's scores remain fairly stable, whilst Participant 4's CPAQ score improves whilst his pain score remains stable throughout. Participant 2's scores for all measures remain stable with little improvement. Participant 3 shows marked improvement on the PASS midway through treatment for a brief period. With this exception, her scores on PASS, PCS and CPAQ remain stable; however all improve slightly at the end of treatment. Her pain levels increase slightly over time.

Process measures

In each of the three treatment sessions a different aspect of pain was discussed and patients completed several attention management exercises. The sessions ended with guided Interoceptive Exposure (IE) practice, in which the participants were asked to calmly focus on the pain. Before and after completing each exercise and guided IE in session, participants were asked to rate their pain and distress levels on a 1-10 scale (1=none, 10=worst imaginable). At the end of the session a measure was completed which asked participants to rate the ease with which they completed the exercises. These measures were designed to assess compliance with exercises in sessions as a way of determining whether successful treatment was related to the treatment. The participants were asked to practice the exercises at home and to also practice IE three times daily over the following week. The participants kept a diary of how much pain bothered them before and after each IE practice at home. The results for each participant and the responses to the process measures are displayed (see Figures 12-23) and discussed in this section. For ease of display, an average score of IE practice was taken from each day. Below is a summary each session and of the exercises completed.

Session one: Attention

The participants engaged in discussions about how the mind can moderate pain. Attention management skills were practiced; participants were asked to switch their attention from listening to different sounds in the room, to the sensation of breathing, to looking at an object in detail and focusing on the pain.

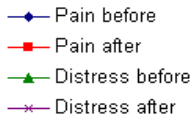
Session two: Catastrophising

Catastrophisation was discussed with participants. An exercise to interrupt catastophisation was practiced, whereby participants took a Signal Breath and were encouraged to try and cope using positive statements such as: “relax” and “stay calm”. Participants were encouraged to diffuse catastrophic thoughts by taking positive action (both physically and mentally) such as relaxing, and reassuring themselves about the pain.

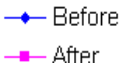
Session three: Acceptance

Participants were educated about using focal points to focus their attention. Different types were explored; external, mental and somatic. The participants practiced switching between different focal points. They switched from an external focal point, to letting their attention drift. They then repeated the process with mental and somatic focal points.

The following key is used for the exercises in session figures:

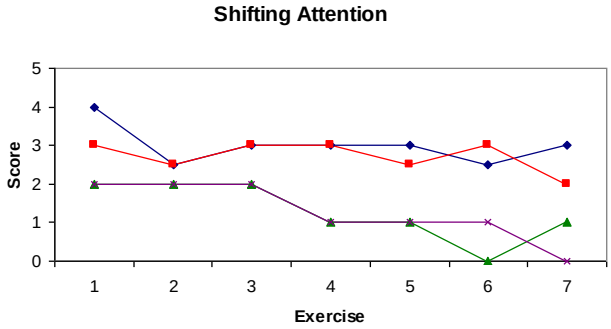


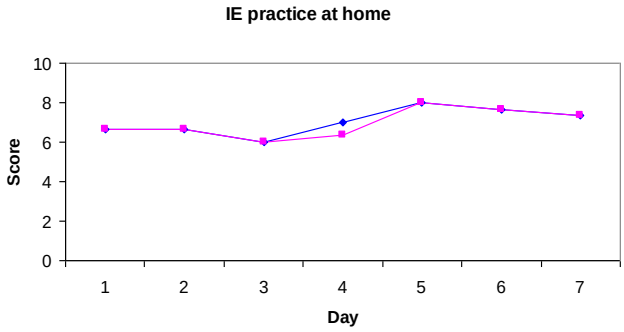
The following key is used for the IE practice at home figures and indicates how much participants are bothered about the pain before and after practice:



Session one: Shifting attention

Participant 1



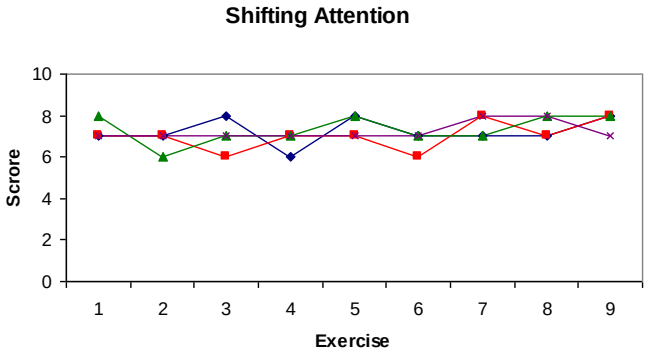


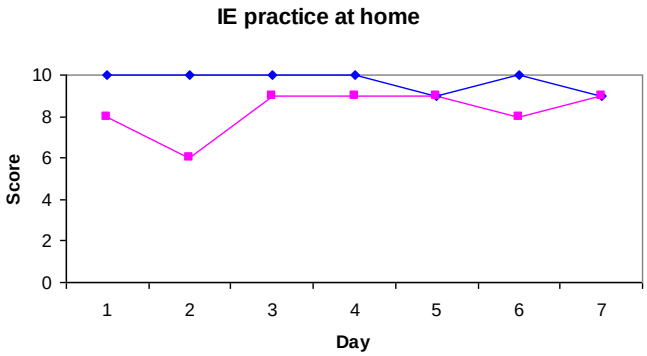
Participant 1 stated that he was able to shift his attention during the exercises in session. His pain and distress levels slightly reduced on some of the exercises. However his pain and distress levels generally remained stable in the session, and at home during IE practice.

	Totally disagree	Mostly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Mostly agree	Totally agree
1. I was able to shift attention between external and internal events							■
2. Thoughts interfered with my ability to make the shift				■			
3. I found it easy to switch my attention							■

Figure 12: Participant 1 session one process measures

Participant 2



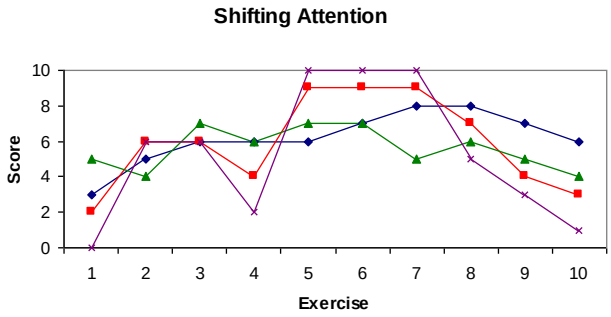


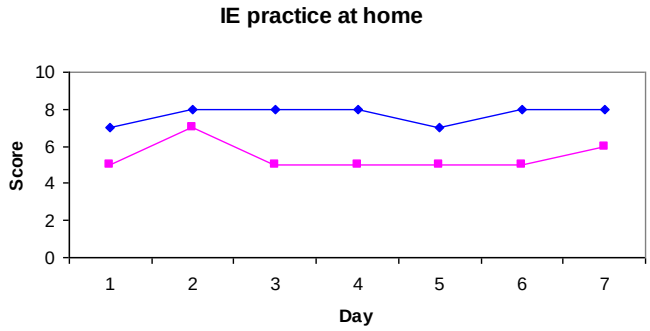
Participant 2 stated that he was able to shift his attention during the exercises in session, although it was difficult. His pain and distress levels generally remained stable during the session, with slight fluctuation. However at home, IE practice reduced the amount that pain bothered him.

	Totally disagree	Mostly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Mostly agree	Totally agree
1. I was able to shift attention between external and internal events					■		
2. Thoughts interfered with my ability to make the shift		■					
3. I found it easy to switch my attention					■		

Figure 13: Participant 2 session one process measures

Participant 3



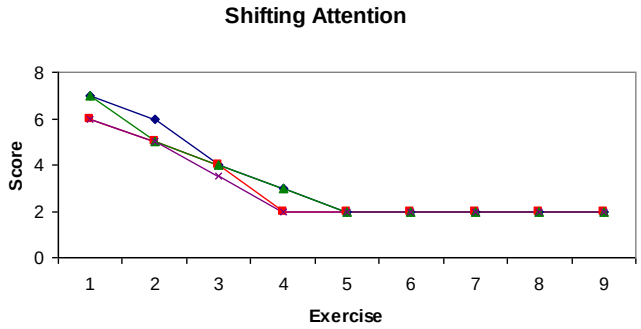


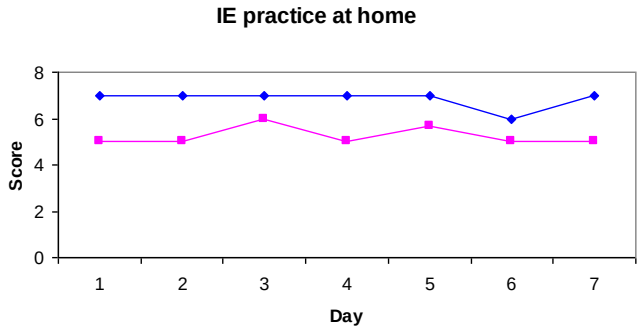
Participant 3 stated that she was able to shift her attention during the tasks, although this was difficult for her. Her pain and distress levels in sessions varied dependent on exercises; her pain and distress levels increased after focussing on pain. As such an extra exercise was added so that she could practice focussing on the pain. After IE practice at home, the pain bothered her less.

	Totally disagree	Mostly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Mostly agree	Totally agree
1. I was able to shift attention between external and internal events						■	
2. Thoughts interfered with my ability to make the shift	■						
3. I found it easy to switch my attention			■				

Figure 14: Participant 3 session one process measures

Participant 4





Participant 4 stated that he was able to shift attention without too much difficulty. His pain and distress levels reduced following exercises, as did the amount that the pain bothered him following IE exposure at home.

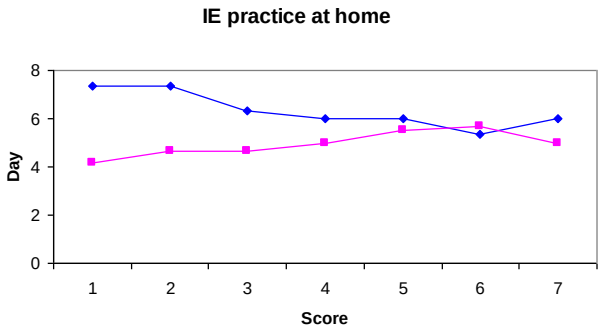
	Totally disagree	Mostly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Mostly agree	Totally agree
1. I was able to shift attention between external and internal events						■	
2. Thoughts interfered with my ability to make the shift		■					
3. I found it easy to switch my attention							■

Figure 15: Participant 4 session one process measures

Session two: Signal Breath

Participant 1

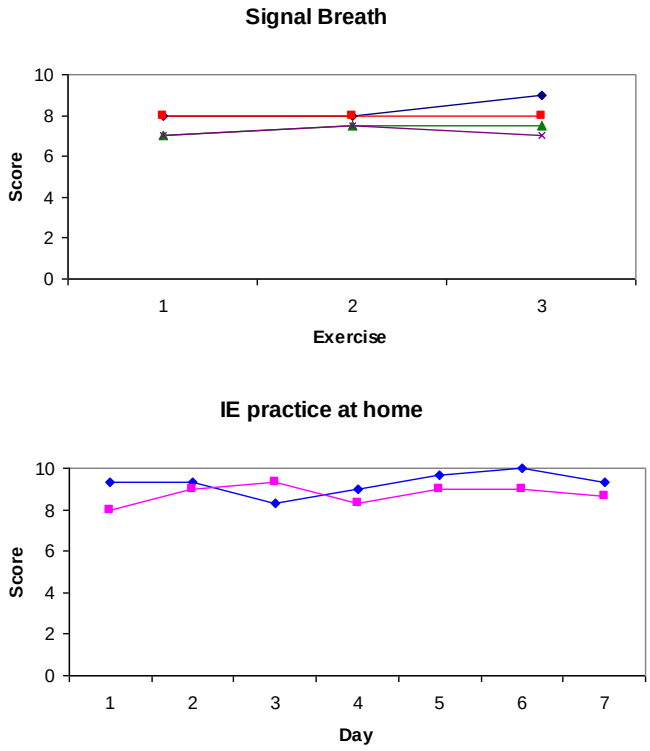
Participant 1 completed one practice of the Signal Breath exercise in which his pain and distress levels reduced (pain scores reduced from five to three, distress was zero before and after the exercise). After which he stated that he did not want to continue to practice the exercises planned for this session, as he was not suffering from pain. Also the Signal Breath technique was a coping method that he already utilised, which perhaps explains why he was able to fully take positive action during the session. During his practice at home, the amount that pain bothered him reduced after IE practice.



	Totally disagree	Mostly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Mostly agree	Totally agree
1. I was able to take positive action							■
2. Thoughts interfered with my ability to take positive action	■						
3. I found it easy to take positive action							■

Figure 16: Participant 1 session two process measures

Participant 2

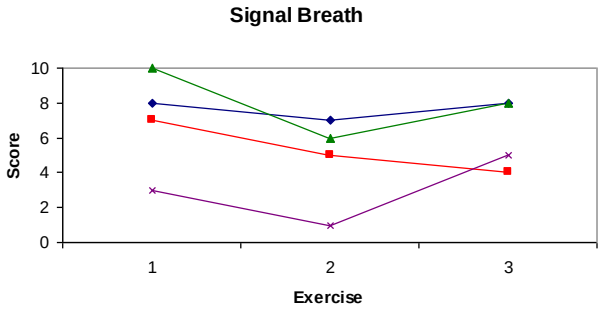


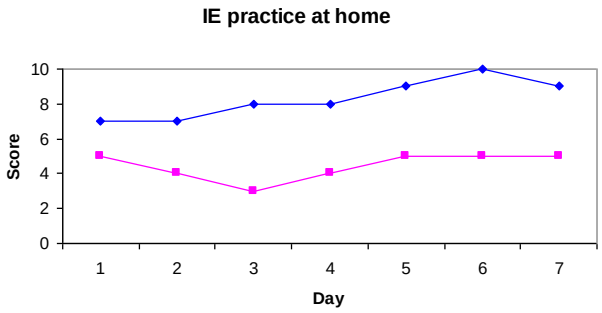
Participant 2 stated that he was able to take positive action, although thoughts did interfere with this. During the session, his pain and distress levels remained fairly constant. Practice at home led to a slight reduction in how much the pain bothered him, with the exception of day three when this increased.

	Totally disagree	Mostly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Mostly agree	Totally agree
1. I was able to take positive action						■	
2. Thoughts interfered with my ability to take positive action						■	
3. I found it easy to take positive action					■		

Figure 17: Participant 2 session two process measures

Participant 3



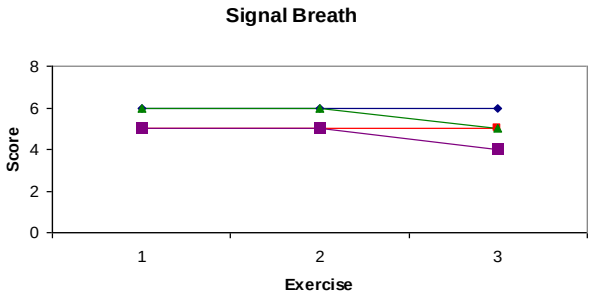


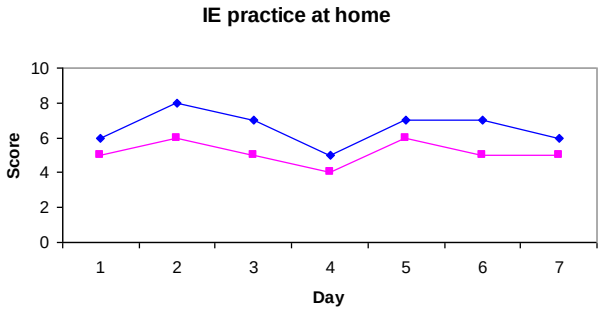
Participant 3's pain reduced following exercises, as did her distress levels. She stated that she was able to engage fully with the activities in session. Pain bothered her less following IE practice at home.

	Totally disagree	Mostly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Mostly agree	Totally agree
1. I was able to take positive action							■
2. Thoughts interfered with my ability to take positive action	■						
3. I found it easy to take positive action							■

Figure 18: Participant 3 session two process measures

Participant 4





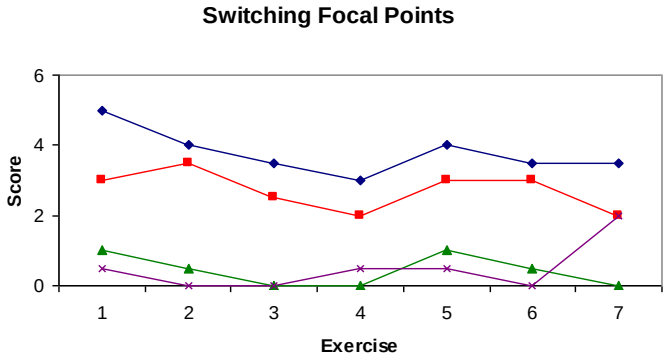
Participant 4 stated that he was unable to take positive action. However he also stated that he found it easy to take action and that thoughts did not interfere with this process; this indicates that there may have been an error when he answered the first question. Both his pain levels and distress levels reduced following exercises in session. At home, the amount that pain bothered him reduced followed IE practice.

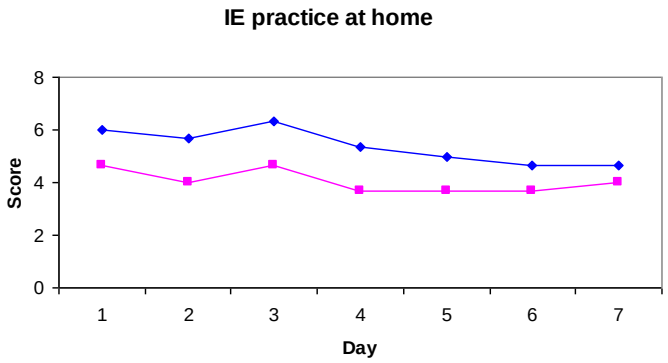
	Totally disagree	Mostly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Mostly agree	Totally agree
1. I was able to take positive action	■						
2. Thoughts interfered with my ability to take positive action	■						
3. I found it easy to take positive action	■						

Figure 19: Participant 4 session two process measures

Session three: Switching focal points

Participant 1





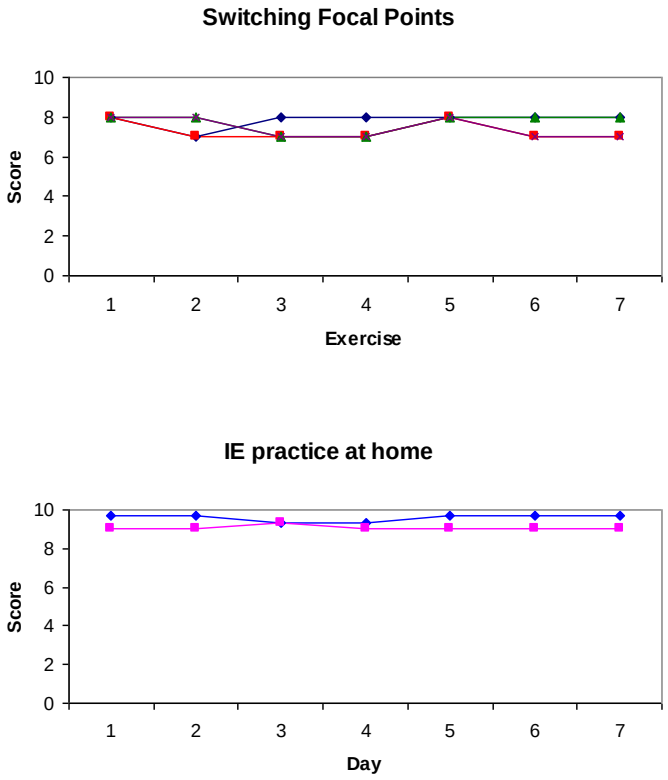
Participant 1 reported that he was able to engage fully with the tasks during the session. His pain and distress levels reduced following exercises in session. The amount that pain bothered him also reduced at home following IE practice.

	Totally disagree	Mostly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Mostly agree	Totally agree
1. I was able to focus on a focal point							■*
2. I found it easy to focus on a focal point							■*
3. Thoughts interfered when I tried to focus on a focal point	■*						

* These scores are taken from the recording of the session. Participant 1 spoke aloud as he filled in the form. The original data sheet which he completed is unavailable.

Figure 20: Participant 1 session three process measures

Participant 2

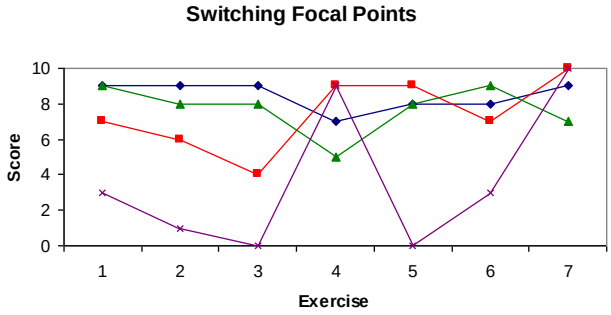


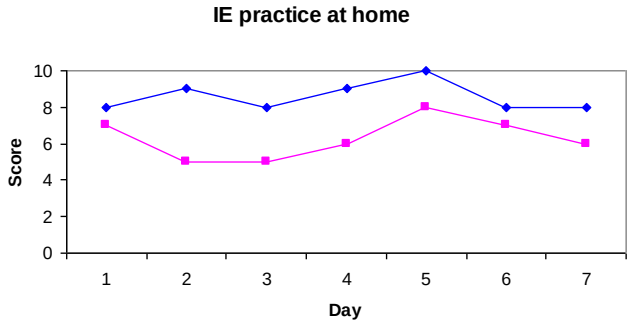
Participant 2 was able to switch focal points during the session. His pain and distress levels remained fairly constant during the session. Although the amount that pain bothered him reduced after IE practice at home, there was very minimal change.

	Totally disagree	Mostly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Mostly agree	Totally agree
1. I was able to focus on a focal point						■	
2. I found it easy to focus on a focal point					■		
3. Thoughts interfered when I tried to focus on a focal point				■			

Figure 21: Participant 2 session three process measures

Participant 3



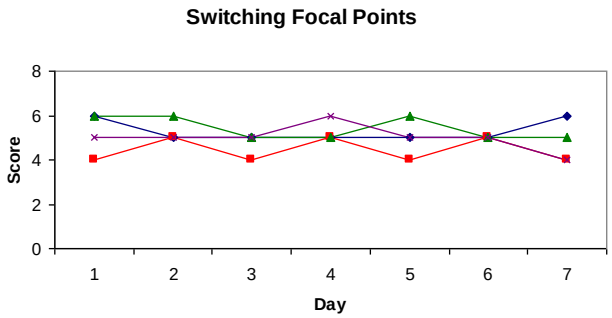


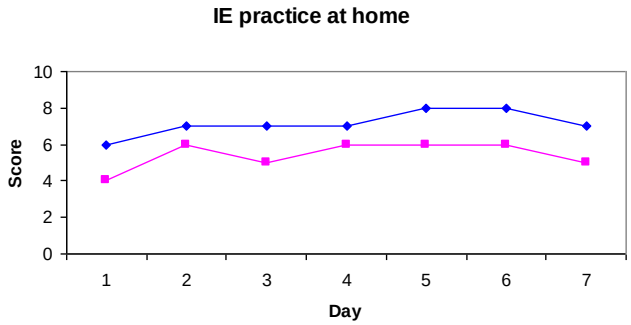
Participant 3 stated that she was able to focus on a focal point without too much difficulty, although she did state that thoughts interfered when she tried to do so. Her pain levels reduced initially following the exercises however increased as she focused on somatic sensations (breath and pain). Her distress levels mostly reduced, with the exception of exercises four and seven when her pain increased. This was following attention drift and focussing on pain. Following IE practice at home, the amount that pain bothered her reduced.

	Totally disagree	Mostly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Mostly agree	Totally agree
1. I was able to focus on a focal point							■
2. I found it easy to focus on a focal point						■	
3. Thoughts interfered when I tried to focus on a focal point							■

Figure 22: Participant 3 session three process measures

Participant 4





Participant 4 stated that he was able to focus on a focal point without difficulty. During the exercises in session, his pain and distress levels reduced following exercises, with the exception of exercise 4 (attention drift). Following IE practice at home, the amount that pain bothered him reduced.

	Totally disagree	Mostly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Mostly agree	Totally agree
1. I was able to focus on a focal point						■	
2. I found it easy to focus on a focal point							■
3. Thoughts interfered when I tried to focus on a focal point	■						

Figure 23: Participant 4 session three process measures

Summary of process measures

Session one: Shifting attention

All of the participants stated that they could engage in this exercise, although Participants 2 and 3 found this difficult. There was reduction in pain and distress levels after exercises for all of the participants except for Participant 1 whose scores remained stable. Participants 3's scores varied depending on the exercise; those that focused on pain sensations increased distress and pain levels. The amount that pain bothered the participants following practice at home and IE reduced for all of the participants except for Participant 2 whose scores remained stable.

Session two: Signal breath

Participants 1 and 3 stated they were able to engage in these exercises and Participant 1 stopped the exercises as he utilised this technique already. Participant 2 was able to complete the exercises, but found that thoughts interfered with the process. It is unclear how Participant 4 found these exercises as his statements about the exercises contradicted each other. It was found that Participants' 1, 3 and 4 pain and distress levels reduced following the exercises and Participants 2's scores remained stable. All of the participants' pain bothered them less following practice at home, although Participant 2's scores were only slightly reduced.

Session three: Switching focal points

All of the participants were able to engage in these exercises, however Participant 3 experienced thoughts which interfered with the process. All of the participants' pain and distress levels reduced following the exercises, with the exception of Participant 2's scores which remained stable and the exercises which involved somatic focal points for Participant 3. All of the participants' pain bothered them less following practice at home, although Participant 2's scores were only slightly reduced.

Evaluation of therapy

These measures were used to determine participant's expectations of treatment before starting and to determine their thoughts on treatment following sessions.

Table 14: Evaluation of therapy scores pre-treatment

Question	Participant	Score
At this point, how successful do you think this treatment will be in helping you manage your pain? (1= not at all useful, 9= very useful)	1	7
	2	8
	3	7
	4	7
How confident would you be in recommending this treatment to a friend who experiences similar problems? (1=not at all confident, 9=very confident)	1	7
	2	6
	3	7
	4	7
By the end of the therapy period, how much improvement in your ability to manage your pain do you think will occur?	1	40%
	2	10%
	3	90%
	4	70%
At this point, how much do you really feel that therapy will help you to manage your pain? (1=not at all, 9=very much)	1	6
	2	9
	3	8
	4	7
By the end of the therapy period, how much improvement in your ability to manage your pain do you really feel will occur?	1	30%
	2	10%
	3	90%
	4	70%

Pre-treatment scores

See Table 14 for pre-treatment evaluation of therapy scores. All of the participants rated the therapy as being fairly logical. Participant 1 gave the highest score of 8 and Participant 2 gave the lowest score of 5. All of the participants believed that the treatment would be mostly successful in helping them to manage their pain. The participants stated that they would be fairly confident in recommending the therapy to a friend; all of their scores were similar. Participant 3 had the highest expectations about her improvement in ability to manage her pain. Participant 4 also predicted moderate improvement. Participant 1 was less confident, and Participant 2 had low expectations. With regards to the two questions which asked about their feelings, all of the participants felt that the therapy would help them to manage their pain. Participant 3 felt

that a high amount of change would occur by the end of treatment, as did Participant 4. Participant 1 appeared to be more cautious and Participant 2 had very low expectations.

Table 15: Evaluation of therapy scores post-treatment

Question	Participant	Score
How logical did the treatment offered to you seem?	1	8
(1=Not at all, 10=Completely)	2	9
	3	2
	4	8
How successful do you think this treatment was in reducing	1	9
the impact of pain on your life?	2	1
(1=Not at all, 10=Completely)	3	10
	4	7
How confident would you be in recommending this treatment	1	9
to a friend?	2	10
(1=Not at all, 10=Completely)	3	10
	4	8
How engaging and interesting was the treatment overall?	1	9
(1=Not at all, 10=Completely)	2	10
	3	10
	4	8
How satisfied were you with the overall quality of the	1	9
treatment?	2	6
(1=Not at all, 10=Completely)	3	10
	4	8

Post-treatment scores

See Table 15 for evaluation of therapy post-treatment scores. With regards to how logical the treatment seemed, the participants increased their scores following therapy, with the exception of Participant 3, who reduced her score by 5 points. Participants 1, 3, and 4 indicated that the therapy was successful in reducing the impact of pain on their lives. Participant 2 however did not believe that the therapy was successful. All of the participants rated that they would be confident in recommending this treatment to a friend and their scores on this question increased following therapy. All of the participants found the treatment to be engaging and interesting. Participant 2 was least

satisfied with the overall quality of the treatment, scoring it moderately. The other three participants gave higher scores.

Change Interviews

Participants were interviewed three weeks after they finished treatment about their experience of therapy. The interview was unstructured, however there were several questions that all participants were asked. Participants were asked to provide as many details as possible. The interview aimed to discover the participants' assessment of change, anything that worsened, was unfulfilling and attributions about change. Participants were also asked to provide details about what was helpful and unhelpful about therapy and how they found the measures. Table 16 shows changes that the participants experienced and their perceptions of change. There is also a qualitative table for each participant with answers from their interviews. At the end of the section is a summary of the change interviews.

Table 16: Change Interview – changes made by participants

Participant	Change	Change was: 1 - expected 3 - neither 5 - surprised by	Without therapy: 1 - unlikely 3 - neither 5 - likely	Importance: 1-not at all 2-slightly 3-moderately 4-very 5-extremely
1	Change on perspective.	4	1	3
	Useful breathing exercise.	3	5	3
	Positive attitude.	2	1	4
	Pain is calmer.	5	1	5
2	Going back to sleep.	4	3	5
	More optimistic/hope.	5	2	4
	Attack length and frequency.	5	4	5
	Not fighting the pain.	5	2	4
3	Not so negative about pain	4	1	5
	Come to terms with pain	4	1	4

Participant	Change	Change was: 1 - expected 3 - neither 5 - surprised by	Without therapy: 1 - unlikely 3 - neither 5 - likely	Importance: 1-not at all 2-slightly 3-moderately 4-very 5-extremely
	More active/motivation	4	2	3
	Don't go to bed with pain so much	2	1	4
	I know pain is not harmful	5	1	4
	Learned to slow down	5	1	4
	Listening to body	5	1	5
4	Dealing with pain more effectively.	2.5	1	4
	Pain doesn't bother me all the time.	3	1	3
	Pain is not harming me.	5	1	4
	Experimenting with doing more.	5	1	4
	Focussing on pain causes distress.	5	1	4
	Trying to apply it to physiotherapy.	5	1	4
	Nothing bad is going to happen because of the pain.	1	1	4

Table 16 shows that the participants were surprised by the changes and that the majority of the changes would have been unlikely without therapy. All of the changes were moderately to extremely important for the participants. Changes included: attitude change about pain, differences in behaviour and increased feelings of hope and

calmness. This may be the result of the therapy or because of general contact with a therapist.

Participant 1

See Table 17 for Participant 1's Change Interview responses. Participant 1's medication did not change during the course of treatment. He stated at the change interview that he would like to 'cut back' on the amount of medication he uses.

Table 17: Change Interview responses for Participant 1

Question	Response
What changes, if any, have you noticed in yourself since therapy started?	Shift in perspective – e.g. 'is it ok to suffer pain' I don't think its right to suffer considerably. My attitude to pain was to go on with what your doing gritting teeth then bearing the consequences. Found the breath exercise particularly useful, it won't be the 'cure all' but it helps. Had episodes of chest pain, as like heart attack. ECG showed not a heart attack. My attitude – I'm a bit more positive towards things especially in last two weeks, have seen change. I've managed to do some work in the garden, sorting the fence out, this was a big bonus. My thought process has changed; I'm a bit more positive. I thought the treatment had merit and helped my ability to help myself. I am very tuned into changes in my body and feel as if my nerve system is hypersensitive. My pain became calmer and less variable.
Has anything changed for the worse for you since therapy started?	Not attributable to treatment, nothing.
Is there anything that you wanted to change that hasn't since therapy started?	Expectation change, 40% goals, 20% great, 2% would be a bonus. Has been a dramatic change in levels of pain.

Can you sum up what has been helpful about your therapy so far?	It should have been a larger period of treatment. Perhaps should do three and six month follow up, would appreciate that. You can call in three months for a follow up, I will keep records. Changes in last week, beginning to get a semblance of life back. Keeping records is helpful, tracks complex changes. Therapist has an empathic personality.
What kinds of things about the therapy have been hindering, unhelpful, negative or disappointing for you?	A lack of interesting things to focus on (e.g. pictures) A picture I can visualise e.g. Escher (optical illusion) would have been better. Using two scales that had inconsistent scores 0-10, could muddle.
Were there things in the therapy which were difficult or painful but still OK or perhaps helpful?	Record keeping-can be a bit nuisance and requires discipline. Not looking at previous days form. I could do this but it required discipline. Could look retrospectively. Feedback from the diary was useful.
Has anything been missing from your treatment?	Meditation
Do you have any suggestions for us, regarding the research or the therapy?	Went reasonably smoothly. Exercise length ten minutes max for me, personal preference.
In general, do you think that your daily diary ratings mean the same thing now that they did before therapy?	Notice changes in diary, good feedback useful tool. Was intrusive. My perspective on questions changed e.g. I am now aware that I am subconsciously 'aware of the pain'. Desensitization record sheet was pretty good.
Were any of these measures difficult for	No

you to complete?	
Any other comments you would like to make?	Keep doing it, breathing exercise is good. I would like to see my results.

Participant 1 noticed changes in himself over the course of the study including a shift in perspective, attitude and behaviour. He found that the Signal Breath exercise helped and that overall the treatment had merit and has helped his ability to help himself. He would have preferred a longer follow up period. He stated that his pain was calmer and that record-keeping allowed him to track complex changes. He gave useful feedback about helpful and unhelpful aspects of the therapy.

Participant 2

See Table 18 for Participant 2's Change Interview responses. Participant 2 did not change his medication over the course of the treatment. He had previously worried about becoming addicted to medication but had tried a period without and found that he suffered no withdrawal.

Table 18: Change Interview responses for Participant 2

Question	Response
What changes, if any, have you noticed in yourself since therapy started?	Sleeping a little but better. If I do have an attack in night I can go back to sleep, I've never been able to do that before. I think it's because I'm more optimistic. Because someone was interested, I had more time to think, not suggesting I need operations. People want to listen and have sympathy. Someone with an objective point of view. Changes in length of attacks, frequency dropped, from 30/50 to 5-6 attacks. Any change is an improvement. I used to try and fight the pain, now I talk myself through it and shift to past pleasantness or future wishes. This stuff fairly new to me so I am still learning to use it. I guess it's kind of given me hope, perhaps that I could earn some money, engage in work.

Has anything changed for the worse for you since therapy started?	My appearance-I worry more about being out and talking to people, paradoxically it's because now I'm feeling better and considering going out. Just to be able to take in sentences and paragraphs, not bumper stickers. I worry about that.
Is there anything that you wanted to change that hasn't since therapy started?	Intensity of the attacks, that's because it comes from the inside. My reaction to it is subtly shifting. I've accepted that I will have to do stuff on my own bat e.g. computing. I've accepted that I'm never going to be without hats and scarves
In general, what do you think has caused these various changes?	Being listened to giving hope. Encouragement to experiment. Belief that won't have to explore things like anti-psychotics. Breathing activities particularly. Used dental suggestion and tapping round the trigermonic nerve.
Can you sum up what has been helpful about your therapy so far?	Someone to talk to, who is aware of what it is but doesn't have it. Doing homework with forms is useful. Fear of going to dentist, is problematic as it stirs up the pain.
What kinds of things about the therapy have been hindering, unhelpful, negative or disappointing for you?	No - because still experimenting
Were there things in the therapy which were difficult or painful but still OK or perhaps helpful?	Trying to keep the negativity away. I was anxious prior to treatment that I would feel negative but it's not happened.
Has anything been missing from your treatment?	No down to me doing things. Need to get active.
Do you have any suggestions for us, regarding the research or the	No I don't think there is.

therapy?	
In general, do you think that your daily diary ratings mean the same thing now that they did before therapy?	Think that might have changes but can't be specific. Small change but important. Acceptable, managed to say what I wanted.
Were any of these measures difficult for you to complete?	Not difficult to finish.
Any other comments you would like to make?	Please contact on follow up.

Participant 2 noticed changes in himself over the course of the study. His sleep pattern improved as did the length and frequency of his pain attacks. He attributed this to different factors, perhaps as a result of being more optimistic, or perhaps as a result of speaking to someone had an objective point of view. He reported changes in the way he managed pain, from fighting it pre-treatment to shifting his attention post-treatment. He also reported increased feelings of acceptance. He gave useful feedback on what he found beneficial; being listened too, encouragement to experiment, breathing exercises and homework.

Participant 3

See Table 19 for Participant 3's Change Interview responses. Participant 3 increased anti-depressant medication after finishing treatment. She was given pain medication (which wasn't taken regularly) at the time of the education session.

Table 19: Change Interview responses for Participant 3

Question	Response
Has anything changed for the worse for you since therapy started?	I didn't like the exercise where I had to think about pain and it got worse but when I did relaxation then pain went down. No worsening symptoms I'm more relaxed and chilled.
Is there anything that you wanted to change that hasn't since therapy started?	I still get pain when I'm with people or places that I don't know because I'll be stressed, that's not gone.
In general, what do you think has caused these various	I think that doing the form every day has reminded me that I have to start living, do things, doing things

changes?	will help me, my mental health. The breathing exercise has really helped – helps calm me.
Can you sum up what has been helpful about your therapy so far?	Just talking to someone else, not keeping stuff to myself, the therapist is so nice, listens and explains what is happening. I have enrolled to go to college for ten weeks, Spanish, deaf awareness sign language. I would like to volunteer to work in deaf school.
What kinds of things about the therapy have been hindering, unhelpful, negative or disappointing for you?	*See previous comments.* I did not like thinking about pain. Also didn't find switching attention exercise. Did like focusing attention on breathing/image/sound of clock.
Were there things in the therapy which were difficult or painful but still OK or perhaps helpful?	Focusing on the pain– I found that I that could make it go down, which gave me a sense of control so that when the pain was bad I could get it down.
Has anything been missing from your treatment?	Like to listen to music-relaxing or rhythmic tapping on parts of the body.
Do you have any suggestions for us, regarding the research or the therapy?	Enjoyed it really.
In general, do you think that your daily diary ratings mean the same thing now that they did before therapy?	No it seems that they have shifted. I think the ratings have changed.
Were any of these measures difficult for you to complete?	No.
Any other comments you would like to make?	No.

Participant 3 reflected that her symptoms did not worsen over the course of the treatment and that she felt more relaxed. Filling in the diary every day and breathing exercises were helpful as was talking about the pain. Although it was difficult to focus on the pain, it did reduce the pain intensity with practice and gave a sense of control. Participant 3 was able to highlight helpful aspects of the treatment and also suggested

things that could have improved the treatment, such as listening to music or rhythmic tapping.

Participant 4

See Table 20 for Participant 4's Change Interview responses. Participant 4 was not taking any pain medication during the course of treatment.

Table 20: Change Interview responses for Participant 4

Question	Response
Has anything changed for the worse for you since therapy started?	Not at all, but things are more painful because I'm walking more.
Is there anything that you wanted to change that hasn't since therapy started?	I was unsure about what to expect. I didn't expect any more than what I received. I had an open mind.
In general, what do you think has caused these various changes?	Perhaps it's my thought processes. Thinking about things differently. My anxiety comes from my constraints. I began to look at pain in a different way. I think my anxiety has changed, I'm not so anxious.
Can you sum up what has been helpful about your therapy so far?	Knowing that there are things that I can do. Learning to go beyond the limitations and barriers. I think fear plays a big part and I'm learning not to be bound by it. Talking things through with someone who has knowledge.
What kinds of things about the therapy have been hindering, unhelpful, negative or disappointing for you?	Initially the thought that I was going to go beyond the limits that I had set. Suppose my fear weren't as bad as expected.
Were there things in the therapy which were difficult or painful but still OK or perhaps helpful?	To be honest I don't think there were negatives in the therapy. Some things we did brought into my awareness the things I was doing unconsciously and they were valuable.
Has anything been missing from your treatment?	I can't think of anything
Do you have any suggestions	I can't think of anything really.

for us, regarding the research or the therapy?	
In general, do you think that your daily diary ratings mean the same thing now that they did before therapy?	I think that there is not a huge difference Completing the questions has made me think about doing things differently and I am doing things differently, perhaps a bigger difference than I thought.
Were any of these measures difficult for you to complete?	No.
Any other comments you would like to make?	I'm beginning to shift things – a stepping stone.

Participant 4 reflected that he has become more active since the treatment. He stated that his thought processes had changed and he was thinking about pain differently. He also noticed a shift in his perception of his own anxiety which reduced. He stated that it was beneficial to learn exercises to manage his pain as well as talking to somebody. Completing the daily diary led to a change in perspective also.

Summary of Change Interviews

All of the participants noticed changes which they were surprised by, rated as important and believed to be unlikely to occur without therapy. Changes included a shift in perspective such as how they view pain, behavioural changes such as being more active, changes to the way they experienced their pain and increased acceptance and hope. All of the participants were able to describe aspects of the treatment which they found helpful and all stated that being able to talk to someone about their pain was beneficial. All of the participants stated that keeping a diary of their pain was helpful. Two participants suggested possible changes to the treatment to include meditation, music and rhythmic tapping.

Overall summary of results

There was variation on the standard measures. Participants 1's scores were generally low and although his scores improved, often the changes were not significant, perhaps because he did not have much overall improvement to make; his scores made it difficult to show significant change. Participant 2's scores were generally high on the measures and although significant change was found initially on some of the measures, by the end of the follow-up period some of the measures showed significant change in the reverse direction, perhaps because he was unwell at follow-up. Participants 3 and 4 scored

moderately however improvements were made on several of the measures, some of which showed significant change. All of the participants made significant changes on the PCS.

Analysis of the daily diary indicates both variation and stability on these measures. Participant 1's scores improved for both the PASS and PCS, whilst his scores on CPAQ and pain measures remain stable. Participants 2's scores remain stable across all measures. Participant 3's scores were also stable (with slight variation on the PASS). By the end of the post-treatment period her scores had improved, with the exception of her pain scores which worsened. Participant 4's scores improved across all of the measures; however his pain scores remained stable.

Consideration of the process measures highlights that all of the participants could engage in the attention exercises in session, however Participant 2 found these exercises more difficult than the others. His scores in two of the sessions indicate that the exercises did not reduce his distress or pain levels. However generally there was a reduction in pain and distress for the other participants following the exercises. The amount that pain bothered participants following IE practice at home reduced, except for Participant 2 whose scores remained stable or only improved slightly.

Pre-treatment, all of the participants rated the therapy as being fairly logical and believed that the treatment would be mostly successful in helping them to manage their pain. Following treatment the participants increased their scores of how logical the therapy seemed with the exception of Participant 3 who reduced her score. They also stated that treatment was successful, with the exception of Participant 2. Pre-treatment they were fairly confident about recommending the treatment to a friend; following treatment these scores increased indicating higher levels of confidence. There were differences in expectations about improvement; Participant 3 had high expectations, Participants 1 and 4 predicted moderate improvement and Participant 2 had low expectations. All of the participants stated that they felt the treatment would help them to manage their pain. Following treatment all of the participants stated that the therapy was engaging and interesting.

At the Change Interviews all of the participants described changes which they stated were important and unlikely to occur without therapy. Changes were behavioural and cognitive in nature. All of the participants stated that being able to talk to somebody and keeping a daily diary was useful.

DISCUSSION

Introduction

The main aim of this research was to investigate Interoceptive Exposure (IE) as an extension of the Fear Avoidance Model (FAM: Vlaeyen and Linton, 2000). A treatment based on De Peuter et al.'s (2011) interoceptive fear conditioning model was used in an attempt to reduce the threat value of pain, changing individuals' experiences of pain. A review of the literature highlighted the importance of three areas: attention/hypervigilance to pain and its threat value, fear-avoidance and acceptance of pain. Each of these processes have been researched as separate entities and whilst there is acknowledgement in the literature that these are linked, a combined treatment has not been studied. A treatment manual was designed based on the literature review incorporating IE and attention management exercises. Measures were taken at every level to increase understanding about this treatment. Process measures were a focus of this research in order to determine which aspects of the intervention were most effective. Integrating information from different levels allowed a thorough review of the links between IE and threat reduction, although it is acknowledged that measuring the threat value of pain is a challenge in this type of research.

A single case experimental design methodology was employed to replicate Flink, et al. (2009), however the design was modified and elaborated with the addition of a separate educational session in an attempt to determine treatment efficacy with more accuracy. An ABC design was used comprising of baseline (A), educational session (B), treatment (C) and a three-month follow up, lasting in total 20 weeks. Seven participants were recruited and four completed treatment. The treatment assessment funnel (Morley, 1996) was used to gather data at several different levels. Standard, target and process measures were used at different points and a Change Interview was used from Elliott et al.'s, (2001) hermeneutic single-case efficacy design (HSCED, Elliott, 2002) in an attempt to evaluate treatment causality in a non-biased way.

This chapter will present a summary of the results, followed by a discussion of other relevant findings in relation to the literature review. The limitations and strengths of this research will be examined followed by a consideration of the clinical implications of this study. Finally future research possibilities will be discussed.

Findings

Summary of results

Examination of the standard measures shows variation. Participant 3 made significant changes on the PASS measure. All of the participants made significant changes on the PCS (Total). Participant 1 made the only significant change on the CPAQ. Both Participants 1 and 3 made changes on the PVAQ and Participants 2 and 4 made significant changes on the PDI. All of the significant changes occurred at different times over the course of the study. By follow-up, Participant 2 had significant scores in the non-predicted direction on the PCS and PDI measures. Consideration of the graphical displays shows that Participant 1 generally had low scores across the different measures, whilst Participant 2's scores were generally high. Participants' 3 and 4 scores were often moderate across the measures.

The daily diary data shows variety and stability. Participant 1's scores improved for both the PASS and PCS, whilst his scores on CPAQ and pain measures remained stable. Participants 2's scores remained stable across all measures. Participant 3's scores were also stable (with slight variation on the PASS). By the end of the post-treatment period her scores had improved. Participant 4's scores improved across all of the measures, however his pain scores remained stable.

Process measures show that all of the participants could engage in the attention exercises, although Participant 2 struggled with these. Generally there was a reduction in pain and distress for participants following these exercises. Pain bothered participants less after IE practice, apart from Participant 2 whose scores remained generally stable.

Before therapy, participants rated the treatment as being logical and believed that it would be mostly successful in helping them to manage their pain. All would recommend the treatment to a friend. These ratings were mostly consistent following therapy; however Participant 2 stated that the therapy was not successful. There were differences in expectations about improvement, Participant 2 had low expectations, Participants 1 and 4 expected moderate change and Participant 3 had high expectations.

At the Change Interview, participants reflected on changes which they stated were important, unexpected and unlikely to have occurred without therapy. Changes included more activity and a changed perspective on pain.

Interoceptive exposure

It has been suggested that pain has an impact on attention, producing arousal. One way of intervening would be to diffuse the threat value of pain. To achieve this, individuals could focus on their pain experiences and learn that nothing terrible happens. This would diffuse catastrophic thoughts about pain, breaking a cycle (as suggested in Figure 1). This treatment is called interoceptive exposure (IE). De Peuter et al. (2011) has called for more research into IE as a way of treating pain related fear, which is thought to be instrumental in the development of disability in those suffering from chronic pain. There has been limited research into IE, which has been found to be successful for treating fear of subjective sensations in panic disorder (Arntz, 2002). Preliminary studies of IE in relation to pain have been conducted by Linton (2010) and Flink et al. (2009) although it was difficult to determine what impact IE had due to methodological limitations. Linton (2010) used a variety of other techniques such as goal setting and validation alongside IE which meant that interpretation of the successful treatment was difficult, as there were other factors that could have been responsible for change. Flink et al. (2009) could not identify whether IE or relaxation and distraction were more successful in reducing pain related fear, as a cross-over design meant it was difficult to draw accurate conclusions about the efficacy of this treatment.

This study has found that combining IE with attentional exercises can be beneficial to individuals suffering from pain, providing support for De Peuter et al.'s (2011) interoceptive fear conditioning model. This account proposes that when bodily sensations predict the occurrence of pain, the sensation will elicit a defensive reaction in anticipation of pain which may lead to fear of pain. De Peuter et al. (2011) recommended using IE as a treatment in which patients are exposed to the feared stimulus. Participant 4 responded well to this treatment. Participant 1 also showed improvements; however he had low initial scores on the measures, so it was difficult for him to show significant change. Participant 3 was beginning to show improvements towards the end of the treatment period. Although measures indicate that Participant 2 did not respond to the treatment, all of the participants (including Participant 2) reported positive changes in the Change Interview, indicating they gained benefit from engaging in treatment.

Leeuw et al. (2010) suggested that individuals who interpret neutral interoceptive signals as dangerous (including those who catastrophise) would benefit from IE as they will learn that pain sensations are not harmful. All participants reported that their perception of pain has changed and cited changes such as 'realising that the

pain isn't going to harm me' (Participant 4) and 'I know pain is not harmful' (Participant 3) as being unlikely without therapy, supporting Leeuw et al's (2010) conjecture.

Using process measures and the Change Interview allowed examination of how participants experienced IE, something that was lacking in previous research. All of the participants were able to engage in IE practice daily. Participant 2 described how IE is beneficial "I used to try and fight the pain, now I talk myself through it" however he also indicated that it takes practice "This stuff fairly new to me so I am still learning to use it." Although initially Participant 3 had an adverse reaction to IE "I didn't like the exercise where I had to think about pain and it got worse", she describes that with practice, she gained control over her pain "Focusing on the pain I found that I that could make it go down, which gave me a sense of control so that when the pain was bad I could get it down." This indicates that IE practice can be helpful for individuals suffering from pain. It appears that use of IE can diffuse the threat value of pain.

Attention to pain

IE may have diffused the threat value of pain as it was combined with attention training techniques. Van Damme et al. (2006a) proposed that relapse following exposure may occur because exposure therapy alone may not be sufficient to reduce hypervigilance to pain predicting signals. To reduce attentional bias towards pain, Van Damme et al. (2006a) suggested that attention training techniques could be employed to improve the effectiveness of exposure treatment, in particular focusing on disengaging from pain signals once they have been detected. Session one of the treatment in this study aimed to teach participants how to switch their attention between neutral stimulus (breathing through nose) and their pain.

Process measures indicated that all of the participants could engage in this exercise and switch their attention, although this was difficult for Participants 2 and 3. As a result of these exercises, participants' pain and distress levels reduced (with the exception of Participant 1). Buck and Morley (2006) found that distractions which were interesting, important and pleasant were positively correlated with perceptions of control over pain, an ability to decrease pain and positive affect. When asked about the treatment, Participant 1 stated (about session one) that he found "A lack of interesting things to focus on (e.g. pictures). A picture I can visualise e.g. Escher (optical illusion) would have been better." This provides support for Buck and Morley (2006) and may explain why Participant 1's pain and distress levels did not decrease following the

attention exercises in this session. Following practice of these exercises and IE at home, the amount that pain bothered participants reduced, with the exception of Participant 2. This supports Van Damme et al.'s (2006) suggestion that disengaging from pain signals using attention techniques can improve the effectiveness of exposure treatment.

Participant 2 stated difficulties engaging with the attention tasks in session one and his scores did not improve following practice at home. Van Damme et al. (2008) suggested that when pain is perceived as threatening, individuals may catastrophise, which leaves less cognitive resources available to engage in alternative tasks. Participant 2 scored highly on the standard measure for catastrophising (PCS) at both baseline and before treatment started and his scores from the PCS daily diary section following session one shows stability which may indicate that he had fewer cognitive resources available for engaging in attention tasks. Verhoeven et al. (2010) found that those who catastrophise attended to pain and experienced more negative effect than those who were less catastrophic in their thinking. However, when motivation was present, catastrophisers were more engaged in distraction tasks leading Verhoeven et al. (2010) to conclude that motivation may aid catastrophisers to displace worry and engage in attention tasks. This may link to expectations, as Participant 2 only expected a 10% improvement in his ability to manage his pain by the end of the therapy period; this may have had an impact on his motivation to engage in the treatment and overcome catastrophic thoughts.

Fear avoidance

The Fear Avoidance Model (Vlaeyen and Linton, 2000) proposed that catastrophic misinterpretations about the threatening nature of pain can lead to pain related fear and safety behaviours such as movement avoidance and hypervigilance, which may result in disability, as maladaptive beliefs are not tested or disconfirmed. Vlaeyen and Linton (2000) suggested that education about this may be beneficial, if pain is conveyed as being a common condition which can be managed by the individual. They suggested graded exposure which challenges the maladaptive beliefs of the individual should follow education. Linton et al. (2010) suggested that catastrophising needs to be a target for intervention for those suffering with pain. Flink et al. (2010) agreed with this, but warned that individuals who are high catastrophisers may use safety behaviours which interfere with exposure treatment resulting in limited exposure and less improvement. This research included education about the Fear Avoidance Model and IE in the education session and catastrophising was also a focus of treatment session two.

Participants were encouraged to cope with their pain pro-actively using the Signal Breath technique to interrupt the habitual flow of thoughts and structured self-talk (reassuring themselves and talking themselves through the pain) to diffuse catastrophic thoughts.

Process measures indicate that all of the participants were able to use these techniques; however Participant 2 found that thoughts interfered with the process. It is not known what these thoughts were, as he was not directly asked about this. All of the participants, with the exception of Participant 2, showed decreased levels of pain and distress following these exercises in session. Participant 2's scores remained stable. However, following practice at home, and daily IE practice, all of the participants became less bothered about the pain. In the Change Interview, when asked about specific aspects of the therapy, Participants 1, 2 and 3 all commented on how helpful this exercise was for them: "Found the breath exercise particularly useful, it won't be the 'cure all' but it helps" (Participant 1). When asked about what had caused positive change, Participant 2 replied: "Breathing activities particularly" and Participant 3 commented: "The breathing exercise has really helped – helps calm me."

This provides support for the importance of targeting catastrophic thoughts in relation to pain. Support for the FAM has also been found; all of the participants reported more activity following completion of the therapy (at the Change Interview). Participant 1 stated: "My attitude – I'm a bit more positive towards things especially in last two weeks, have seen change. I've managed to do some work in the garden, sorting the fence out, this was a big bonus…Changes in last week, beginning to get a semblance of life back." Participant 2 described how he was feeling more positive about engaging in a range of activities, both socially and occupationally: "I worry more about being out and talking to people, paradoxically it's because now I'm feeling better and considering going out… I guess it's kind of given me hope, perhaps that I could earn some money, engage in work." Participant 3 stated that one of the changes she had noticed as a result of therapy was "More active/motivation" and described how she had: "enrolled to go to college for ten weeks, Spanish, deaf awareness sign language. I would like to volunteer to work in deaf school." Activity change also occurred for Participant 4: "…things are more painful because I'm walking more." Vlaeyen and Linton (2000) argue that pain related fear results in disability, this study found that participants shifted their perceptions of pain and were able to engage in activities following therapy.

Acceptance

More activity engagement may be linked to a greater acceptance of pain experienced by the participants. McCracken et al. (2004) stated that by encouraging individuals to stop struggling to change things, they can be enabled to move towards more satisfying actions. This was the focus of treatment session three; participants were encouraged to use focal points to help put boundaries around their pain, with a goal of living their lives around the pain. McCracken et al. (2005) stated that the next generation of research should focus on the process and not just the general effects of treatment. This is because much of acceptance based research is delivered in an MDT package making it difficult to determine treatment efficacy. This research found that following acceptance based attention exercises, all of the participants' pain and distress levels reduced, with the exception of Participant 2's scores which remained stable. All of the participants' pain bothered them less following practice at home, although Participant 2's scores were only slightly reduced. As noted above, participants were reporting more activity engagement at the time of the Change Interview, two weeks after treatment had ended, something that they were striving towards at the beginning of treatment.

This may be the result of participants changing their willingness to experience negative sensations such as pain as suggested by Keogh et al. (2005) who stated that if this occurs, the form of pain will not change but the impact will not be as debilitating and individuals may be able to act towards their goals. As a result of changes in their attitude towards pain, individuals may be able to engage in activities more. Statements from the participants at the Change Interview support this and indicated that the participant's acceptance of pain had increased, despite generally stability of pain scores on the daily diaries. Participant 1 reported "Shift in perspective – e.g. 'is it ok to suffer pain'… My thought process has changed; I'm a bit more positive." Participant 2 described "If I do have an attack in night I can go back to sleep, I've never been able to do that before. I think it's because I'm more optimistic... My reaction to it is subtly shifting. I've accepted that I will have to do stuff on my own." Participant 4 also noticed changes "Perhaps it's my thought processes. Thinking about things differently. My anxiety comes from my constraints. I began to look at pain in a different way. I think my anxiety has changed, I'm not so anxious."

Kranz et al. (2010) examined the link between affect and pain, suggesting that when individuals are fighting pain and fail, negative affect may occur. They theorized that positive affect may result if energy is redirected towards more satisfying goals and found that chronic pain patients who were willing to engage in activities had more

positive affect. Participant 3 described how she reached a similar conclusion "I think that doing the form every day has reminded me that I have to start living, do things, doing things will help me, my mental health." This supports Kranz et al. (2010) who concluded that psychological well-being is influenced by engagement in activities.

It has been argued that a combination approach to pain management may be beneficial, as links between attention/hypervigilance, fear-avoidance and acceptance have been found. Sharpe et al. (2010) suggested a way to reduce threat value of pain is to use an acceptance based approach. Vowles et al. (2007) found that individuals engaging in an acceptance based treatment showed changes in both catastrophising and acceptance during treatment which equally predicted positive outcomes. McCracken et al. (2004) have also stated that acceptance is not incompatible with other pain management strategies which can be effective for those who engage in avoidance. De Jong et al. (2008) found that a redirection of attention away from bodily/pain sensations was a helpful component in a graded exposure intervention designed to target pain related fear safety behaviours such as avoidance and hypervigilance. This research used a combined approach and measured process at each session to determine efficacy. All three areas contributed to a reduction in pain and distress levels. This suggests that a combination approach can be beneficial when treating individuals with pain.

Expectations

It is important to examine patients' expectations about treatment outcomes. Frank (1961) stated that positive expectations can be instrumental to change as entering therapy can give individuals a source of hope. Frank's position is supported by, amongst others, Constantino et al. (2011) who found positive effects of patients' outcome expectations on their treatment outcomes. Deveilly and Borkovec (2000) recommend measuring patient expectancy, and also therapy credibility which has been associated with simulated change (Nau et al. 1974) and therapeutic improvement (Kirsch and Henry, 1977).

This study measured expectations and credibility both before and after treatment. Although all of the participants rated the therapy as being fairly logical, Participant 2 gave a relatively low score. He also had low expectations about how well he expected to improve his ability to manage his pain both on the 'think' and 'feel' question sets (I and II). Participant 2 responded least to the treatment and showed very little change over the course of the study. It may be that his low expectations had an impact on treatment outcome, as suggested by Constantino et al. (2011). Participant 2

also reflected about his expectations of treatment at the change interview: “I was anxious prior to treatment that I would feel negative but it’s not happened.” Participant 4 responded most to the treatment and improvements were found on his daily diary scores, as would be expected. He predicted moderate improvement on the ‘think’ question, but felt that he would achieve a high amount of change in his ability to manage his pain. This positive expectation may have led to a positive outcome.

Participant 1 was cautious with moderate expectations both on the ‘think’ and ‘feel’ questions. This perhaps reflects the moderate change that he experienced. However Participant 3 expected high change on both sets of questions, yet her change on the daily diary was limited and improvement occurred only at the very end of the treatment period. She did however report positive change at the Change Interview.

Following the end of treatment, the participants were asked to evaluate the therapy. With regards to how logical the treatment seemed, the participants increased their scores following therapy, with the exception of Participant 3, who reduced her score by five points, this may reflect her limited response to the treatment. Participants 1, 3, and 4 indicated that the therapy was successful in reducing the impact of pain on their lives, and Participant 2 did not believe that the therapy was successful, all of which were reflected in the measures. Despite experiencing an unsuccessful therapy, and also rating the overall quality of the treatment as being ‘moderate’, Participant 2 stated that he would be confident in recommending this treatment to a friend and this scored increased following therapy. The information from the treatment evaluation measures indicates that expectation may impact upon therapy outcomes.

This may due to expectations that therapy generates. This therapy was based on research which was explained to the participants and techniques were offered to help them manage their pain. All of the participants agreed that it was logical, being based on models of attention, fear-avoidance and incorporated ideas about the importance of accepting pain. All of the participants stated that they were keen to explore a psychological approach and expected change; however change was not evident on all of the standard measures. Examination of session data indicates that not all of the participants could engage in the exercises in order to develop skills. This may have contributed to minimized exposure which would have meant that participants were not benefiting as much from the procedures and could explain limited change on the standard measures. Also at the Change Interview participants rated changes that they were surprised about; Participant 2 reported a change in the quality of his sleep: “Sleeping a little but better.” This was unexpected. Although the aim of treatment was

to reduce the threat value of pain and to change the participants' experiences of pain, improvements in other areas occurred. This indicates that there may be a relationship between a reduction in the threat value of pain and engagement in other important goals (such as sleeping better).

Summary

There is some evidence at different levels that this treatment is working and has been effective, however the support is limited. Although it was hoped that IE treatment would be responsible for improvements made by participants there may be alternative explanations that could explain change. A hermeneutic single case efficacy design (HSCED: Elliott, 2002) was used to consider this.

Alternative explanations for change

Engaging in a therapy may have been a mechanism of change, perhaps because hope was offered to participants. The Equivalence Paradox (Stiles, Shapiro and Elliott, 1986) acknowledges that despite varied research into therapeutic outcomes, no therapy has emerged as being dominant. Barkham (2007) argues that common factors are the key ingredients of therapy. These can be attributable to the therapist, therapy procedures and client (Lambert and Ogles, 2004). It may be that without IE, attention exercises and daily diaries, participants might have benefited from a generic therapy in which they could discuss their experiences of pain. The participants reflected that they benefited from discussing their pain with someone: "Therapist has an empathic personality." (Participant 1); "Because someone was interested, I had more time to think, not suggesting I need operations. People want to listen and have sympathy. Someone with an objective point of view." (Participant 2); "Just talking to someone else, not keeping stuff to myself, the therapist is so nice, listens and explains what is happening." (Participant 3) and "Talking things through with someone who has knowledge." (Participant 4). The HSCED (Elliott, 2002) may help to explore the mechanism of change and can also offer alternative explanations for change that was found. Three questions about the research can be answered to consider change:

1. Have the participants changed?
2. Is psychotherapy responsible for the change?
3. What specific factors (within therapy or outside it) are responsible for change?

Information was taken from measures and the Change Interviews.

Trivial or negative change: The Reliable Change Index shows that Participant 2's scores on the PCS (Total and Rumination subscales) and the PDI changed in the non-predicted direction in the period between post-treatment to follow-up indicating negative change. All of the participants rated the changes as being moderately to extremely important and all but one of the changes would have been unlikely without therapy. This indicates that the changes were not trivial.

Relational artefacts: This refers to interpersonal dynamics between participants and the therapist, in particular attempts by the participant to please the therapist by emphasising change. As such, another researcher conducted the Change Interviews to ensure validity of client accounts by encouraging openness and self-reflection. Based on the information gained at the Change Interview it appears unlikely that relational artefacts are enough to explain changes seen in participants.

Self-correction: Client generated maturational processes or self-help efforts may be responsible for the change, or the change could be a continuation of an on-going trend. A strategy to evaluate for self-correction as suggested by Elliott (2002) is to ask the clients what they thought the change was and how likely the change would have occurred without therapy? As previously mentioned, all of the clients stated in the Change Interview changes that were unlikely to have occurred without therapy (with the exception of one). All of the clients had suffered from pain for a long time, suggesting that change was not the result of a developmental trend.

Extra-therapy events: Changes in relationships, occupation, social activities, and health can contribute both positively and negatively to the therapy outcome. None of the participants stated extra-therapy events at the Change Interview which could explain change.

Psychobiological causes: Improvement may be due to psychophysiological or hormonal processes, including medication, herbal remedies, hormonal effects of major medical illness or seasonal driven mood cycles. Participants were asked about medication at the Change Interview. Only Participant 3 changed her medication; she increased her anti-depressant medication after finishing treatment. She was also given pain medication (which wasn't taken regularly) at the time of the education session. The change in anti-depressant medication may explain why improvements in scores were observed on the last week of the daily diary (following treatment end).

Reactive effects of research: Change may be explained as a reactive effect of taking part in the research; the outcome may be a function of being in research, such as taking part in research activities, relation with staff and enhanced sense of altruism which

allows participants to transmute suffering by viewing themselves as helping others. Negative effects may occur if the research is time-consuming.

Participant 1 stated that "Keeping records is helpful, tracks complex changes" however he also stated: "Record keeping can be a bit nuisance and requires discipline". He also stated that: [the] "Therapist has an empathic personality." It may be that the research activity of completing the daily diary and the relation with the therapist is responsible for change, rather than the treatment. However Participant 1 also stated: "I thought the treatment had merit and helped my ability to help myself" indicating that many factors may be responsible for change, including the therapy.

Participant 2 also seemed to benefit from the relation with the therapist: "I think it's because I'm more optimistic. Because someone was interested, I had more time to think, not suggesting I need operations. People want to listen and have sympathy. Someone with an objective point of view." He also appreciated a non-medical approach and experimenting with different strategies: "Being listened to giving hope. Encouragement to experiment. Belief that won't have to explore things like anti psychotics…Someone to talk to, who is aware of what it is but doesn't have it." He also stated: "Doing homework with forms is useful." This indicates that research activity was of benefit to him.

Participant 3 also gained benefit from the daily diary "I think that doing the form every day has reminded me that I have to start living" and also benefited from the therapeutic relationship: "Just talking to someone else, not keeping stuff to myself, the therapist is so nice, listens and explains what is happening." It appears that different factors may be responsible for change for Participant 3.

Participant 4 stated: "Talking things through with someone who has knowledge" which supports the idea that common factors could be responsible for the changes observed. However when asked why he thought that change had occurred he stated: "Perhaps it's my thought processes. Thinking about things differently. My anxiety comes from my constraints. I began to look at pain in a different way. I think my anxiety has changed, I'm not so anxious" which indicates that the treatment itself and its focus on reducing the threat value of pain caused change.

Summary

Overall it appears that none of the participants experienced trivial change, however Participant 2 did experience negative change on two of the measures, PCS and PDI. Relational artefacts, self-correction and extra-therapy events do not appear to have

caused change. Psychobiological causes may have caused the improvements shown on the daily dairy after treatment had ended for Participant 3. Reactive effects of research, namely completing the daily diary and the relationship between the participants and therapist may have contributed to change for the participants, however when asked all of the participants stated that change was due to specific aspects of the therapy. Although the participants reflected on the qualities of the therapist as being helpful, not all experienced change. For example Participant 2 did not improve significantly, indicating that although he stated that the therapeutic relationship was important it was not responsible for changes made. Also every therapy would have a therapist who was empathic. This implies that therapy delivered in an empathic way is important for participants however the therapy needs specific components to be effective; a generic therapy would not be as beneficial to participants as this one was. Using a therapist to deliver this intervention is beneficial and may be the optimum way to teach IE and attentional skills to participants.

Although change was not displayed on all of the standard measures for participants, changes were observed on the daily diary for the participants (except for Participant 2) and all of the participants stated that positive changes have occurred as a result of the therapy, which would have been unlikely to have occurred without therapy. The alternative explanations do not seem to be responsible for the changes observed.

Potential limitations of research

A paradoxical treatment

The treatment had two specific components; exposure (IE) and attentional training. Both elements were performed in each treatment session and participants were asked to practice both techniques at home daily throughout the treatment period. The IE practice remained constant throughout and did not change; participants were asked to spend up to 15 minutes daily, three times, focusing on their pain without trying to escape or avoid it. The attentional training techniques varied. There were three treatment sessions, and each focussed on a different area: attention to pain, catastrophising and acceptance. With each session a different technique was practiced and was linked to that session's content, for example, in the 'attention' session; participants practiced switching their attention away from the pain to another sensation, such as breathing. Participants were asked to practice the attentional training techniques taught during the session daily throughout the week following the treatment session, alongside IE practice (but not at

the same time). On reflection, this is a contradictory treatment, as participants were asked to practice both exposing themselves to their pain and were also taught techniques to shift their attention away from their pain.

Foa and Kozak's fear-conditioning theory (1986) suggested that prolonged exposure to a feared stimulus would result in extinction of the conditioned fear. Exposure therapy in which repetitive exposure to the feared stimulus has been found to be a successful treatment for phobia (for a review see Wolitzky-Taylor, Horowitz, Powers and Telch, 2008). Behavioural exposure has been associated with a reduction of fear in pain patients; however the results have been variable (Boersma, Linton, Overmeer, Jansson, Vlaeyen and de Jong, 2004) suggesting that exposure alone may not be a sufficient intervention. This may be the result of cognitive strategies (such as distraction techniques) being employed by patients to minimise the degree of exposure. Foa and Kozak (1986) suggested that cognitive avoidance (such as distraction) would impede emotional processing and therefore affect the outcome. Van Damme et al. (2006a) suggested a way to overcome this would be through attentional training techniques.

However, Foa, Huppert and Cahill (2006) suggested that attentional distraction techniques may facilitate progress in emotional processing and McNally (2007) conjectured that distraction may enhance outcome in exposure treatment, dependent on the level of fear. If the fear was very high, distraction may make the fear more manageable. As such, this treatment used a combination of exposure and attentional training techniques, as it was considered that attentional training (disengagement from the pain) may reduce the threat value of the pain and enhance exposure. However, it is uncertain if attentional distraction does enhance exposure. Foa et al. (2006) also suggested that this may hinder exposure treatment depending on the type of anxiety disorder.

IE involves habituation to the feared sensation itself rather than to the feared situation, as in behavioural exposure. During behavioural exposure, the pain sufferer would perform a feared task until the fear response subsided. During IE, the patient would experience the aversive sensations (pain) until the aversiveness subsides. Nicholas (2007) suggested that habituation to the feared sensation (pain) might be greater than habituation to the feared situation which would result in better outcomes.

The treatment used in this research is contradictory. Participants were asked to focus on their pain, without distracting or avoiding it, yet they were also trained to practice attentional training techniques requiring them to disengage from their pain and

switch their attention to other objects or sensations. It was intended that the attentional training techniques would help to diffuse the threat value of pain which would aid participants to focus on the pain. It was also designed to instruct people about attention and to inculcate a sense of control over their attention. However, being trained to perform two contradictory techniques may have been confusing for the participants. As such this may have impacted upon the credibility of the treatment. Outcomes may also have been affected by the practice of two very different techniques which may or may not have complimented each other. It is possible, as suggested by McNally (2007) that if very high levels of fear were experienced by the participants that the attentional training may have made the fear more manageable. However, as suggested by Foa et al. (2006) the distraction may have hindered the exposure treatment. For these reasons, it is difficult to identify which part of this treatment was beneficial for the participants, although it is possible that a combined approach was helpful.

As IE is a relatively unexplored treatment, unlike behavioural exposure, it would have been beneficial to consider this as a stand-alone treatment. It may be that successful exposure to the feared sensation (pain) may be sufficient to diffuse the threat value of pain, without the need for additional techniques. Future research could investigate this. The attentional training techniques used in this treatment focused on three important processes involved in pain (attention, catastrophising and acceptance). To date these have not been researched in a combined approach. Future research could also consider how effective this treatment approach was, without IE, to determine if these techniques are of benefit to those suffering with pain.

Strengths and weaknesses of data collected

Single case experimental designs are well placed to examine the effectiveness of interventions (Morgan and Morgan, 2001). Participants provide their own control and comparison is within-subject, rather than between-subjects. The aim of single case designs is to determine whether a causal relationship exists between a manipulated independent variable and a meaningful change in the dependent variable. Measurement in single case designs requires the reliable assessment of change over time (Smith, 2012). This research used standard measures, target measures, process measures and the Change Interview from Elliott's (2002) HSCED. The treatment assessment funnel (Morley, 1996) was used to gather data at every level to enrich data collection. Although all of the measures provided information, the most useful data to answer the question: 'Did the treatment work?' came from the target measure (daily diary).

A baseline for each participant was established using the daily diary. In single case designs, gaining a baseline is important because is establishes a trend that can then be compared with the subsequent phases, such as education and treatment. As subjects provided their own data for comparison, gaining a stable comparison before the introduction of treatment was essential to inferring an effect (Smith, 2012). Following the establishment of a stable baseline, it was predicted that target beliefs (as measured by the daily diary) would change once the intervention was introduced. As such, the data provided by the daily diary was the most helpful when considering whether the treatment had an impact. Participant 4 clearly benefited from the treatment, as did Participants 1 and 3, although to a lesser extent.

Analysis of single case data typically involves visual analysis, although statistical methods can also be used (Kratowchwill, Levin, Horner and Swoboda, 2011). However visual analysis is the standard by which single case data are analysed (Parker, Cryer and Byrns, 2006) as statistical analysis may not always be appropriate (Smith, 2012). There are however difficulties with visual analysis, as it can be error-prone. It can be inconsistent, affected by autocorrelation, the effects can be overestimated (Matyas and Greenwood, 1990) and judgements about the success of interventions are subjective (Swoboda, Kratochwill and Levin, 2010). One way to enhance the presentation of the daily diary data in this research would have been to include trend-lines throughout the phases to more accurately compare the results from each of the phases to determine if change occurred from one phase to the next. Doing so may have allowed identification of subtle changes on the target measures. Also the Conservative Dual-Criterion Method (Fisher, Kelly and Lomas, 2003) for improving visual analysis of graphed data could also have been used which assesses an intervention by evaluating changes while taking into account different features of the graphed data.

Other levels used in this research included standard measures which provide comparisons between subjects. However in relation to single case design, the information provided is limited as they are not specific to individuals. Also as there is no control group (unlike in randomised controlled trials where these measures are routinely used) changes between pre- and post- treatment measurements cannot be easily interpreted. However in the absence of a control group, analysis was conducted on the standard measures to identify whether the observed change at the end of treatment was reliable using the Reliable Change Index. This allowed identification of significant changes made by the participants on the standardised measures, enhancing the data collected.

The process measures targeted different areas. The session measures were intended to gain data about how thoroughly the participants could engage in the exercises at each session in order to aid analysis of treatment efficacy. Although these measures allowed identification of whether participants could engage in activities, and whether thoughts interrupted the process, they were not specific enough to fully answer questions about the treatment. The participants engaged in both IE and attention exercises throughout the session and these measures did not specify which exercise the participants were rating. Also a lack of qualitative information about specific thoughts or safety behaviours that the participants engaged in limited their usefulness. The PDRS was used by participants three times daily following practice of IE at home. This measure was useful and helped to answer whether the treatment worked, as participants clearly recorded how much their pain bothered them following IE. For the majority of the participants, the amount that pain bothered them decreased following IE indicating that it was a helpful component of the treatment. Process measures about treatment expectations and credibility aided interpretation of the results in relation to motivation.

Finally the Change Interview from Elliott's (2002) HSCED was used to evaluate treatment causality. If change was observed which could not be attributed to several other factors, it could be concluded that treatment could explain the change. The participants were aware that this was an experimental treatment which was being investigated; it was not a well established treatment. However the data collected from this interview could be susceptible to response bias; the participants may have given responses which they believed the interviewer wanted to hear (such as the treatment was beneficial, even if it was not) limiting the usefulness of this data.

Participants

The sample size of four completed treatments out of seven may be too small, making it difficult to draw conclusions about the efficacy of treatment. However, conventional guidelines recommended by authorities in this field are three to five successful replications (Barlow, Nock and Hersen, 2009). There is only one female in the group; the demographics are limited. The first strength of this study is that all of the participants were recruited from the pain waiting list and so are representative of chronic pain patients attending tertiary services.

Measures

The Treatment Assessment Funnel (Morley, 1996) was employed to enrich data collection. Measures were used that targeted specifically the area of research. The measures were also robust. The daily diary consisted of questions taken from the PASS, PCS and CPAQ. The questions used were specifically selected as they were the most representative of the constructs that this research aimed to consider. However, it is uncertain if threat was measured as intended. It appears it is difficult to capture this using the current measures available. The physiological section of the PASS was removed from the measure, as this data did not need to be collected from participants as it was not a target. The measures used were all reliant on self-report from the participants, making it difficult to rely on them but there is no other known alternative.

A strength of this study is that process measures were taken in an attempt to link process to outcome, which does not usually occur in pain literature. This allowed identification of how participants found each session and the exercises. It would have been helpful to have two different measures for the sessions, to differentiate between IE and attention exercises. However, participants were asked about their experiences of IE during sessions and at the Change Interview. Participant 3 stated that although she did not like to practice IE, it did give a sense of control: "I didn't like the exercise where I had to think about pain and it got worse but when I did relaxation then pain went down…Focusing on the pain– I found that I that could make it go down, which gave me a sense of control so that when the pain was bad I could get it down." This indicates that although the initial experience of IE may be aversive for some, it is a beneficial technique that has aided Participant 3 to feel more in control of her pain and manage it better, even when her pain was severe. More information about the process of practicing IE was provided by Participant 2 who indicated that time was needed to learn the techniques: "I used to try and fight the pain, now I talk myself through it and shift to past pleasantness or future wishes. This stuff fairly new to me so I am still learning to use it."

However, although participants were asked in treatment sessions what their response was to being asked to focus on their pain, there was no formal measure used to collect this data. This may have been helpful. Information could have been collected on participants predictions about what would happen when they focussed on the pain. This could have been helpful for participants, if they experienced catastrophic thoughts when asked to focus on the pain, and it was proved that nothing bad happened, this may have helped to diffuse the threat value of pain. It would have been helpful to gain a direct

assessment of participant's experiences of IE perhaps through a measure, or a formal question at the Change Interview.

Although the process measures allowed identification of how well participants engaged with the session exercises, they did not give information about what safety behaviours were used by participants. Participants were asked if they were able to successfully engage in tasks and if thoughts interfered with their ability to complete tasks which they rated on a seven-point scale from 'totally agree' to 'totally disagree'. Although this gives information about their ability to engage in tasks, it does not allow identification of what specific thoughts were interfering or what prevented them from fully engaging with tasks, for example, they may have used distraction. This would mean that they did not get full benefit from the exercises and may have failed to develop skills. It would have been helpful to have a qualitative component to the process measures for participants to describe in detail what prevented them from successful engagement with the exercises. This could have been discussed with participants in session. This is a methodological flaw.

Participants experienced difficulties completing the measures. Answers that Participant 4 gave about treatment session two were incongruent, indicating that there may have been difficulty in completing the measure. Participant 1 reported that inconsistent scales on the different measures could "muddle" which is a flaw. Also the evaluation of therapy forms had different scales, pre-therapy the ratings were on a 0-9 scale, whilst the post-treatment form was on a 0-10 scale, and this limits comparisons between scores on these measures.

Participants were asked to keep a daily diary for eight weeks and the commitment had the potential to be bothersome. Participant 1 stated that the daily diary was "intrusive." However all of the participants (including Participant 1) stated that completing the daily diary was useful. There was potential for bias to occur when completing the daily diary, but although there was variation in participant's scores, the variation was not consistent across all questions indicating that bias was not present.

Alternative technology could have been used to collect daily diary data. Participants were given paper diaries to complete and returned these at regular intervals. It is possible that the participants may have completed several diaries on the day they were due to return them, however Participant 1 noted that he did complete them daily: "Record keeping…Required discipline. Not looking at previous days form, could do it but required discipline." Electronic technology could be employed, for example, participants could complete the diaries online daily to ensure all data was collected as

intended. This may also be a preferable format and could include daily email reminders for participants to complete the dairy.

Design and analysis

A single case design was used which has advantages for evaluating treatment. A baseline, education, treatment and follow-up design was clinically acceptable and allowed investigation of the treatment effect over these time periods by inspecting changes between each period. Each participant was considered individually. Also a systematic way of collecting case material was employed. Designs at all levels using robust measures ensured that the data was enriched, although it has been difficult to demonstrate if threat was measured. The study could have been improved by using randomisation tests (Onghena and Edgington, 2005), as used by other published studies to allow statistical control over unknown confounding variables and to enhance internal validity. However practicalities, such as time limits meant that this was not feasible.

Although this study has shown that pain had a less interruptive effect on attention and was less threatening following treatment, change was not significant for all of the participants. Powerful interventions that produce rapid change benefit most from single case designs. However, results from this research indicate that participants may need more time to fully develop skills and this intervention may only produce slow change. This is a difficulty of single case designs. A reversal design could have been employed to demonstrate treatment efficacy. If participants stopped IE practice for a period (for example, one week) and their scores changed or worsened, this would indicate that treatment was beneficial.

The same therapist was used for all of the treatment sessions. This could be considered a strength, as all the participants received the same experience from a therapist who was familiar with the material. However this could also be conceived as a flaw, as it limits the generalisability of the results. With a different therapist, the outcomes may have been different. Another strength of the research is that a different therapist conducted the Change Interviews, which meant that participants could perhaps be more open and reflective. Using another therapist helps to ensure validity of client accounts as this reduces the likelihood that participants would attempt to please the therapist (who conducted the therapy) by emphasising change.

Vlaeyen and Linton (2000) argue that patients should be educated about the nature of chronic pain and the FAM. A flaw of this research is that at the education session, although participants were given information about the FAM and IE including

the rationale for using it, their knowledge about it wasn't tested. Therefore it is difficult to say how much participants understood or retained the information given. Participants were asked in the education session about their understanding, but this was not measured directly in the form of a test. Two participants (2 and 4) requested more information about IE and were given a copy of De Peuter et al. (2011) for an overview. This may suggest that perhaps the information about IE given in the education session was not sufficient for patients understanding.

The procedure involved a graded guided introduction to IE and a chance for participants to practice skills, which is a strength of this research. However, Participant 1 stated that he would have liked more treatment time: "It should have been a larger period of treatment." Having a longer treatment time, as with traditional therapy would have meant that participants had more time to practice the exercises and IE which could have impacted upon the results. Participants may need time to practice both IE and attention exercises to feel confident in them and to increase the potential for habituation and desensitisation (as indicated by Participant 2). Three weeks of treatment time may have not been enough for participants to really benefit from IE, perhaps resulting in misleading results. Also a longer follow-up, as suggested by Participant 1: "Perhaps should do three and six month follow up, would appreciate that" would indicate how durable changes made are.

Participant 1 had a longer time between education and treatment sessions. It was planned that he would receive the same as the other participants and the sessions would be one week apart; however he was unable to attend the planned treatment session one week after the education session. He continued to complete the diary at home and attended two weeks after the education session for his first treatment session. This may have impacted upon the results, and makes it difficult to draw comparisons between his results and the others. Participant 1 also did not complete the Signal Breath exercises in treatment session two as he stated he already used this technique. This may also have impacted on the results.

De Peuter et al. (2011) recommends that IE should be practiced outside the therapy sessions to ensure that participants do not learn an "exception to the rule" when they practice harmless pain exposure in the therapeutic setting. Participants did practice IE three times daily at home to ensure that their learning was generalisable and not specific to the sessions. This is a strength of this study.

It would have been helpful to have a longer post-treatment follow up for participants completing daily diary, perhaps two weeks instead of one. However this

may have been burdensome for participants. Participant 3 showed improvement in the post-treatment period. It would have been helpful if there was a longer post-treatment period, to see if she continued to improve.

With regards to analysis, it was difficult to find normative data for the RCI using the standard measures. There is very little normative data available. The norms used were from a range of papers, some were the original papers in which the measure was published. More normative data for a range of variables would have been helpful in order to select relevant norms for the participants.

Each participant completed the PDRS daily three times. For ease of analysis and visual inspection, the daily scored were displayed as an average. It may have been helpful to look at each score individually, as averaging the daily scores may be misleading, if participants experienced great variety in their daily practice.

Clinical implications

This research has specifically considered the impact of IE as a treatment for diffusing the threat value of pain and has used measures at every level to determine treatment efficacy. The results of this research show that IE combined with attention management exercises helped one participant out of four according to daily target measures. One other participant showed change on some of the target measures and one was showing improvement during the post-treatment period. One participant did not respond as shown on the target measures. However all of the participants reported important changes that were unlikely to have occurred without therapy and they cited the treatment as the cause of this change. Participants reported that their perspective on how they viewed their pain had shifted and also reported more activity. Their pain experience had altered and they experienced increased feelings of acceptance towards their pain and hope for the future. This indicates that this treatment was beneficial for the participants.

A combination of attention, fear-avoidance and acceptance of pain treatment approach has not been used before and this research indicates promising results for those suffering with chronic pain. It appears that the threat value of pain was reduced following these exercises, mostly participants reported that their pain and distress levels reduced following attention exercises and with daily practice of IE, the amount that pain bothered them following exposure reduced, indicating that this technique should be explored in greater detail in regards to pain management.

Future research

Future research could aim to replicate this study, with modifications; the procedure could be refined. It would be important to measure the reduction of threat as accurately as possible and consideration needs to be given to the optimal way to do this. Measures could be improved upon, for example, consistency across all measures would be important.

IE could be considered in a more in-depth way. Predictions could be made about what would happen when participants focus on the pain. The experience of IE practice could be more thoroughly explored, including gaining ideas about how long it takes for an individual to feel confident and comfortable whilst practicing this technique. The length of treatment time could be extended. It may be that longer treatment time, giving participants more time to practice IE and attention techniques would reveal what length of time is optimal to benefit from IE and could allow identification of treatment efficacy. Also more attention could be paid to safety behaviours; what types are used by participants and when? Do individuals use safety behaviours to avoid full exposure? This data could be collected in a specific way, perhaps through using measures, or directly asking participants during sessions or at a Change Interview.

Other modifications may include testing participants about their knowledge following education, to see if they have understood and retained the information about the model. Different therapists could be used to test generalisability. Also a reversal design could be employed to see if discontinuing with treatment for a short period has an impact. Unexpected changes were found such as an improved sleep pattern, this could be explored in relation to change in threat value, for example, is a reduction in threat related to such unexpected changes?

This research indicates that expectations may have had an impact upon the therapy outcome. Given that it was only a short-term therapy, unlike what would have been given in routine practice, participants' expectations may have been low which impacted upon the outcome. A longer therapy may offer more hope and increased expectations to patients. They may also be motivated to work hard at the therapy and practice at home, if they believe it to be credible.

Participants 1 and 3 highlighted elements that they felt were missing from the therapy at the Change Interview. Participant 1 would have appreciated meditation and Participant 3 suggested listening to music and rhythmic tapping. However, it is important to deliver treatment that has been based on grounded theory, with a

demonstrable evidence base. Any additions to the treatment should have a clear evidence base.

Crombez, Eccleston, Van Damme, Vlaeyen and Karoly (2012) have proposed a motivational analysis of Fear Avoidance to the investigate goals and self-regulation of pain patients. Pain presents individuals with a conflict; they may have to choose between the goal of controlling or avoiding pain and daily living tasks. Crombez et al. (2012) argued that pain and avoidance behaviour should be considered in relation to other goals. Participants in this research discussed their goals, such as returning to work, this could be incorporated into the treatment and exposure training.

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APPENDIX

Appendix 1: National Research Ethics Service letter granting ethical approval

NHS
National Research Ethics Service

NRES Committee Yorkshire & the Humber - South Yorkshire
Millside
Mill Pond Lane
Meanwood
Leeds
LS6 4RA

Telephone: 0113 305 0128

01 August 2011

Miss Siobhan Taylor
Psychologist in Clinical Training
University of Leeds
Charles Thackrah Building
101 Clarendon Road
Leeds
L2 9LJ

Dear Miss Taylor

Study title: **Does focussing attention (interoceptive exposure) on pain reduce distress? An experimental case series.**

REC reference: **11/YH/0236**

Thank you for your letter of 27th July 2011 responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Non-NHS sites

The Committee has not yet been notified of the outcome of any site-specific assessment (SSA) for the non-NHS research site(s) taking part in this study. The favourable opinion does not therefore apply to any non-NHS site at present. We will write to you again as soon as one Research Ethics Committee has notified the outcome of a SSA. In the meantime no study procedures should be initiated at non-NHS sites.

Conditions of the favourable opinion

This Research Ethics Committee is an advisory committee to the Yorkshire and The Humber Strategic Health Authority
The National Research Ethics Service (NRES) represents the NRES Directorate within the National Patient Safety Agency and Research Ethics Committees in England

The favourable opinion is subject to the following conditions being met prior to the start of the study

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	*Version*	*Date*
Evidence of insurance or indemnity		10 September 2010
GP/Consultant Information Sheets	1	14 June 2011
Letter of invitation to participant	1	12 June 2011
Other: Screening assessment	1	12 June 2011
Other: Treatment manual	2	12 June 2011
Other: Student CV		12 June 2011
Other: Academic supervisor CV		12 June 2011
Participant Consent Form	2	25 July 2011
Participant Information Sheet	2	25 July 2011
Protocol	1	12 June 2011
REC application		30 June 2011
Response to Request for Further Information		27 July 2011

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document *"After ethical review – guidance for researchers"* gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

Feedback

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

Further information is available at National Research Ethics Service website > After Review

11/YH/0236	**Please quote this number on all correspondence**

With the Committee's best wishes for the success of this project

Yours sincerely

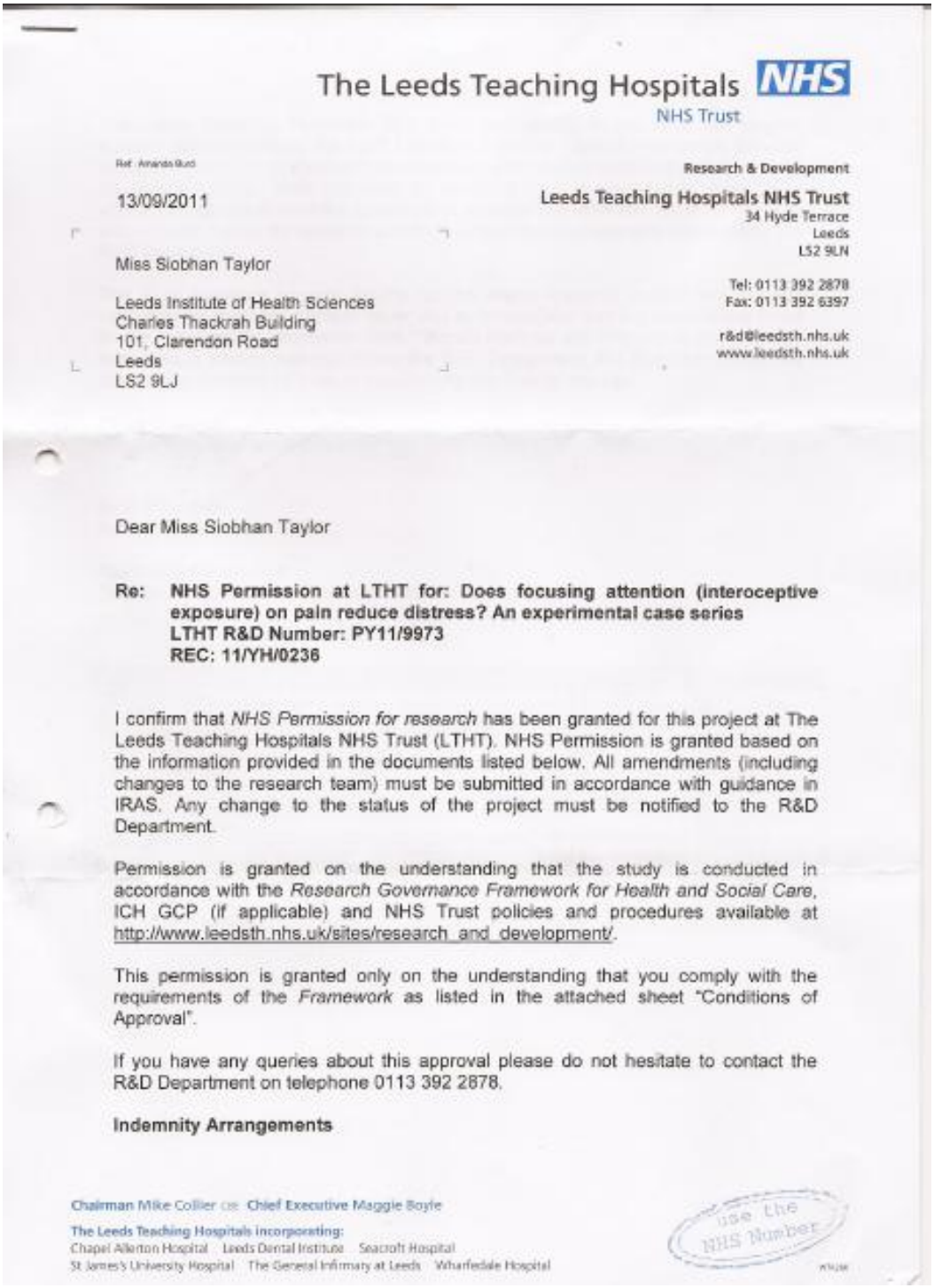
Ms Jo Abbott
Chair

Email: sinead.audsley@nhs.net

Enclosures: "After ethical review – guidance for researchers"

Copy to: *Mrs Rachel E de Souza, University of Leeds*
Dr Derek Norfolk, Leeds Teaching Hospitals Trust

Appendix 2: Leeds Teaching Hospitals NHS Trust letter granting permission for research



The Leeds Teaching Hospitals NHS
NHS Trust

Ref: Amanda Burt

13/09/2011

Research & Development
Leeds Teaching Hospitals NHS Trust
34 Hyde Terrace
Leeds
LS2 9LN

Tel: 0113 392 2878
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www.leedsth.nhs.uk

Miss Siobhan Taylor

Leeds Institute of Health Sciences
Charles Thackrah Building
101, Clarendon Road
Leeds
LS2 9LJ

Dear Miss Siobhan Taylor

Re: NHS Permission at LTHT for: Does focusing attention (interoceptive exposure) on pain reduce distress? An experimental case series
LTHT R&D Number: PY11/9973
REC: 11/YH/0236

I confirm that *NHS Permission for research* has been granted for this project at The Leeds Teaching Hospitals NHS Trust (LTHT). NHS Permission is granted based on the information provided in the documents listed below. All amendments (including changes to the research team) must be submitted in accordance with guidance in IRAS. Any change to the status of the project must be notified to the R&D Department.

Permission is granted on the understanding that the study is conducted in accordance with the *Research Governance Framework for Health and Social Care*, ICH GCP (if applicable) and NHS Trust policies and procedures available at http://www.leedsth.nhs.uk/sites/research_and_development/.

This permission is granted only on the understanding that you comply with the requirements of the *Framework* as listed in the attached sheet "Conditions of Approval".

If you have any queries about this approval please do not hesitate to contact the R&D Department on telephone 0113 392 2878.

Indemnity Arrangements

Chairman Mike Collier CBE Chief Executive Maggie Boyle

The Leeds Teaching Hospitals incorporating:
Chapel Allerton Hospital Leeds Dental Institute Seacroft Hospital
St James's University Hospital The General Infirmary at Leeds Wharfedale Hospital

use the NHS Number

The Leeds Teaching Hospitals NHS Trust participates in the NHS risk pooling scheme administered by the NHS Litigation Authority 'Clinical Negligence Scheme for NHS Trusts' for: (i) medical professional and/or medical malpractice liability; and (ii) general liability. NHS Indemnity for negligent harm is extended to researchers with an employment contract (substantive or honorary) with the Trust. The Trust only accepts liability for research activity that has been managerially approved by the R&D Department.

The Trust therefore accepts liability for the above research project and extends indemnity for negligent harm to cover you as investigator and the researchers listed on the Site Specific Information form. Should there be any changes to the research team please ensure that you inform the R&D Department and that s/he obtains an appropriate contract, or letter of access, with the Trust if required.

Yours sincerely

Dr D R Norfolk
Associate Director of R&D

Approved documents
The documents reviewed and approved are listed as follows

Document	*Version*	*Date of document*
NHS R&D Form	3.1	26/06/2011
SSI Form	3.1	20/06/2011
Directorate Approval		18/06/2011
Sponsor	U of L	06/07/2011
GP/Consultant letter	1.0	14/06/2011
Protocol	1.0	12/06/2011
REC Letter confirming favourable opinion		01/08/2011
Insurance/ Indemnity		29/09/2010
Letter of Invitation	1.0	12/06/2011
Patient information sheet (REC Approved)	2.0	25/07/2011
Consent form (REC Approved)	2.0	25/07/2011
Screen Assessment	1.0	12/06/2011
Treatment Management	2.0	12/00/2011

Appendix 3: Initial recruitment letter

Initial recruitment contact letter

Dear *name*

We are writing to you to invite you to consider taking part in a study of a simple psychological treatment aimed to help people with chronic pain. The study is being conducted by Ms Siobhan Taylor a clinical psychologist in training under the supervision of Professor Stephen Morley.

We are contacting patients who have been referred to the Psychology Department and who are on the waiting list. If you taking part in this study it will not affect your position on the waiting list or any treatment that you might receive in the future.

The purpose of the treatment is to help you to use your attention effectively to manage the pain and the distress it can cause.

If you are interested in taking part in the study we need to assess whether you are likely to benefit from the treatment. To do this we ask you to complete the *brief screening questionnaire* enclosed with this letter and return it in the stamped addressed envelope. If you meet the basic entry criteria we will invite you to come to the Psychology Department at St James's when we will interview you and tell you more about the treatment. We will ask you to complete a number of questionnaires. We will also show you the diary that we want you to keep.

We will give you an opportunity to ask questions about the study and discuss any concerns that you might have. If we think that you are eligible for the study we will offer you a place in the study. You will be given a consent form and asked decided whether or not you want to take part in the study. You will have 48 hours to make this decision. If you are not eligible for the study we will thank you. Please note that whatever the outcome of this assessment it will **not** affect your position on the Psychology Department waiting list or your opportunity to receive treatment at a later date.

If you consent to take part in the study we will ask you to begin keeping the diary for two or three weeks before treatment begins. There will be four treatment sessions in the next four weeks. At the end of this time we will ask you to continue to keep your diary for another two weeks. After this we will ask you take part in another interview to give your opinion on the treatment and to complete some questionnaires. We will also ask you to take part in a telephone interview 10 to 12 weeks after treatment is completed.

We are able to offer you a small amount of money to offset any expenses.

Ethical approval for this study has been given by Jo Abbott on 01.08.2011.

Yours sincerely,

Siobhan Taylor
Clinical Psychologist in Training

Stephen Morley
Honorary Consultant Clinical Psychologist
Professor of Clinical Psychology

Enclosure:

Brief Screening Questionnaire

Appendix 4: Information sheet

Information Sheet: Version 2.0. 25/07/11

You are invited to take part in a research study about attention and pain, conducted by Siobhan Taylor, a Psychologist in Clinical Training. Before making a decision about whether you would like to take part in this research, please read the following information carefully.

What is the purpose of the study?
I am interested in finding out about a simple psychological treatment aimed to help people with chronic pain. The purpose of the treatment is to help people to use their attention effectively to manage the pain and the distress it can cause.

Why have I been asked to take part?
I am contacting patients who have been referred to the Psychology Department and who are on the waiting list. If you take part in this study it will not affect your position on the waiting list or any treatment that you might receive in the future.

What will happen if I take part?
I will ask you to complete a diary for 2-3 weeks before the treatment begins. There will be four treatment sessions in the next four weeks. At the end of this time I will ask you to continue to keep your diary for another two weeks. After this we will ask you take part in an interview to give your opinion on the treatment and to complete some questionnaires. We will also ask you to take part in a telephone interview 10 to 12 weeks after treatment is completed.

Do I have to take part?
It is up to you to decide if you would like to take part. If you do want to take part I will ask you to sign a consent form to show you have agreed to take part. You are free to withdraw at any time, without giving a reason. If you decide not to take part this will have no affect on your treatment or your position on the waiting list.

Will my taking part in the study be kept confidential?
All information about you will be kept confidential. At no time will you be identified by name.

What are the possible benefits of taking part?
I hope that you will benefit from the treatment as you will be given tools to aid management of your pain, as you would get in therapy. Results we gather from this project may help to inform future research in this area.

What should I do if I experience any new pain?
This study only relates to existing pain and there are no expected side effects. If you experience any new pain please seek medical advice.

Where can I find out more information?
If you would like more information about taking part in this project, please contact Siobhan Taylor at:

Clinical Psychology Programme
Leeds Institute of Health Sciences
University of Leeds
Charles Thackrah Building
101 Clarendon Road
Leeds LS2 9LJ

Tel: 0113 233 2732 or 07970 820710

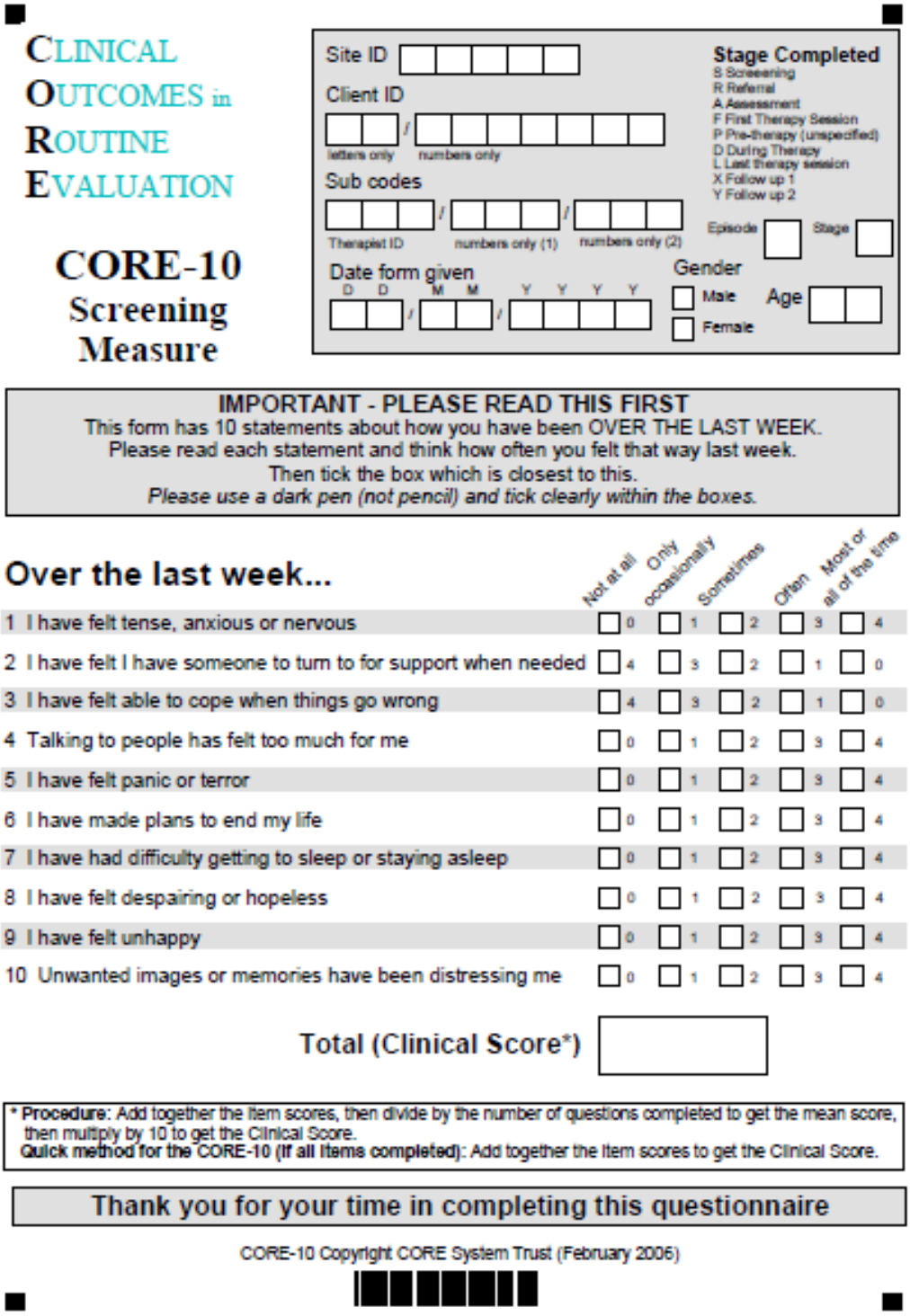
Email: phl2sct@leeds.ac.uk

General Advice and Information
The Patient Advice and Liaison Service (PALS) can provide confidential help, advice, information and guidance on all aspects of healthcare.

You can call them at the Patient Relations Office: 0113 2067 168

Or email: Patient.relations@leedsth.nhs.uk

Appendix 5: Clinical Outcomes in Routine Evaluation-10



CLINICAL OUTCOMES in ROUTINE EVALUATION

CORE-10 Screening Measure

Site ID

Client ID

letters only / numbers only

Sub codes

Therapist ID / numbers only (1) / numbers only (2)

Date form given D D / M M / Y Y Y Y

Stage Completed
S Screening
R Referral
A Assessment
F First Therapy Session
P Pre-therapy (unspecified)
D During Therapy
L Last therapy session
X Follow up 1
Y Follow up 2

Episode Stage

Gender ☐ Male ☐ Female

Age

IMPORTANT - PLEASE READ THIS FIRST

This form has 10 statements about how you have been OVER THE LAST WEEK.
Please read each statement and think how often you felt that way last week.
Then tick the box which is closest to this.
Please use a dark pen (not pencil) and tick clearly within the boxes.

Over the last week...	Not at all	Only occasionally	Sometimes	Often	Most or all of the time
1 I have felt tense, anxious or nervous	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
2 I have felt I have someone to turn to for support when needed	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
3 I have felt able to cope when things go wrong	☐ 4	☐ 3	☐ 2	☐ 1	☐ 0
4 Talking to people has felt too much for me	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
5 I have felt panic or terror	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
6 I have made plans to end my life	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
7 I have had difficulty getting to sleep or staying asleep	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
8 I have felt despairing or hopeless	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
9 I have felt unhappy	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
10 Unwanted images or memories have been distressing me	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

Total (Clinical Score*) ☐

* **Procedure:** Add together the item scores, then divide by the number of questions completed to get the mean score, then multiply by 10 to get the Clinical Score.
Quick method for the CORE-10 (if all items completed): Add together the item scores to get the Clinical Score.

Thank you for your time in completing this questionnaire

Appendix 6: Pain Anxiety Symptom Scale

PASS-20

DATE: _____

Below you will find a list of statements. Please rate the truth of each statement as it applies to you using the following scale.

		Never	Rarely	Sometimes	Often	Always
1.	I can't think straight when in pain.	⓪	①	②	③	④
2.	During painful episodes it is difficult for me to think of anything besides the pain.	⓪	①	②	③	④
3.	When I hurt I think about pain constantly.	⓪	①	②	③	④
4.	I find it hard to concentrate when I hurt.	⓪	①	②	③	④
5.	I worry when I am in pain.	⓪	①	②	③	④
6.	I go immediately to bed when I feel severe pain.	⓪	①	②	③	④
7.	I will stop any activity as soon as I sense pain coming on.	⓪	①	②	③	④
8.	As soon as pain comes on I take medication to reduce it.	⓪	①	②	③	④
9.	I avoid important activities when I hurt.	⓪	①	②	③	④
10.	I try to avoid activities that cause pain.	⓪	①	②	③	④
11.	I think if my pain gets too severe it will never decrease.	⓪	①	②	③	④
12.	When I feel pain I am afraid that something terrible will happen.	⓪	①	②	③	④
13.	When I feel pain I think that I may be seriously ill.	⓪	①	②	③	④
14.	Pain sensations are terrifying.	⓪	①	②	③	④
15.	When pain comes on strong I think I might become paralysed or more disabled.	⓪	①	②	③	④

Appendix 7: Consent form

Consent form: Version 2.0. 25/07/11

Exposure and the reduction of fear of pain

1. I confirm that I have read and understand the information sheet dated _____ for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

2. I understand that I have been asked to participate in a research study about treatment aimed to help people with chronic pain. ☐

3. I have been fully informed of the purpose of the research by the researcher undertaking the work and it has been explained to me that my participation is entirely voluntary. I understand that I am entitled to withdraw from the study at any time without prejudice. ☐

4. I give permission for the researcher to have access to my records. ☐

5. I also understand that any information I offer will be treated anonymously and all material arising out of the study will be dealt with on a confidential basis by the researcher involved. The research complies with the Data Protection Act (1998). ☐

6. I understand that relevant sections of data collected during the study may be looked at by individuals from the University of Leeds, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records. ☐

7. I have read and understood the above information and agree to participate in the named study. ☐

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Name of researcher	Date	Signature

Appendix 8: Global measures booklet

GLOBAL MEASURES BOOKLET

Name: …….

Date: …….

Assessment / Pre-Treatment / Post-Treatment / Follow-up

Instructions: In this booklet you will find 5 measures. Please read the instructions and follow them carefully. There will be a series of statements, followed by a scale. Please indicate on each scale how much the statement applies to you.

For example:

When I'm in pain….	**Not at all**	**To a slight degree**	**To a moderate degree**	**To a great degree**	**All the time**
1. I worry all the time about whether the pain will end.	⓪	①	②	③	④

For this question, if you worry all the time about whether the pain will end a lot of the time, you would circle or tick ③

PCS

Everyone experiences painful situations at some point in their lives. Such experiences may include headaches, tooth pain, joint or muscle pain. People are often exposed to situations that may cause pain such as illness, injury, dental procedures or surgery. We are interested in the types of thoughts and feelings that you have when you are in pain. Listed below are thirteen statements describing different thoughts and feelings that may be associated with pain. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.

When I'm in pain....		**Not at all**	**To a slight degree**	**To a moderate degree**	**To a great degree**	**All the time**
1.	I worry all the time about whether the pain will end.	⓪	①	②	③	④
2.	I feel I can't go on.	⓪	①	②	③	④
3.	It's terrible and I think it's never going to get any better.	⓪	①	②	③	④
4.	It's awful and I feel that it overwhelms me.	⓪	①	②	③	④
5.	I feel I can't stand it anymore.	⓪	①	②	③	④
6.	I become afraid that the pain will get worse.	⓪	①	②	③	④
7.	I keep thinking of other painful events.	⓪	①	②	③	④
8.	I anxiously want the pain to go away.	⓪	①	②	③	④
9.	I can't seem to keep it out of my mind.	⓪	①	②	③	④
10.	I keep thinking about how much it hurts.	⓪	①	②	③	④
11.	I keep thinking about how badly I want the pain to stop.	⓪	①	②	③	④
12.	There's nothing I can do to reduce the intensity of the pain.	⓪	①	②	③	④
13.	I wonder whether something serious may happen.	⓪	①	②	③	④

PASS-20

Below you will find a list of statements. Please rate the truth of each statement as it applies to you using the following scale: Never/Rarely/Sometimes/Often/Always.

		Never	Rarely	Sometimes	Often	Always
1.	I can't think straight when in pain.	⓪	①	②	③	④
2.	During painful episodes it is difficult for me to think of anything besides the pain.	⓪	①	②	③	④
3.	When I hurt I think about pain constantly.	⓪	①	②	③	④
4.	I find it hard to concentrate when I hurt.	⓪	①	②	③	④
5.	I worry when I am in pain.	⓪	①	②	③	④
6.	I go immediately to bed when I feel severe pain.	⓪	①	②	③	④
7.	I will stop any activity as soon as I sense pain coming on.	⓪	①	②	③	④
8.	As soon as pain comes on I take medication to reduce it.	⓪	①	②	③	④
9.	I avoid important activities when I hurt.	⓪	①	②	③	④
10.	I try to avoid activities that cause pain.	⓪	①	②	③	④
11.	I think if my pain gets too severe it will never decrease.	⓪	①	②	③	④
12.	When I feel pain I am afraid that something terrible will happen.	⓪	①	②	③	④
13.	When I feel pain I think that I may be seriously ill.	⓪	①	②	③	④
14.	Pain sensations are terrifying.	⓪	①	②	③	④
15.	When pain comes on strong I think I might become paralysed or more disabled.	⓪	①	②	③	④

PVAQ

Below you will find a list of statements. Please rate the truth of each statement as it applies to you using the following scale: Never/Very rarely/Seldom/Often/Almost always/Always.

	Never	Very rarely	Seldom	Often	Almost always	Always
1. I am very sensitive to pain	⓪	①	②	③	④	⑤
2. I am aware of sudden or temporary changes in pain	⓪	①	②	③	④	⑤
3. I am quick to notice changes in pain intensity	⓪	①	②	③	④	⑤
4. I am quick to notice effects of medication on pain	⓪	①	②	③	④	⑤
5. I am quick to notice changes in location or extent of pain	⓪	①	②	③	④	⑤
6. I focus on sensations of pain	⓪	①	②	③	④	⑤
7. I notice pain even if I am busy with another activity	⓪	①	②	③	④	⑤
8. I find it easy to ignore pain	⓪	①	②	③	④	⑤
9. I know immediately when pain starts or increases	⓪	①	②	③	④	⑤
10. When I do something that increases the pain, the first thing I do is check to see how much pain was increased	⓪	①	②	③	④	⑤
11. I know immediately when pain decreases	⓪	①	②	③	④	⑤
12. I seem to be more conscious of pain than others	⓪	①	②	③	④	⑤
13. I pay close attention to pain	⓪	①	②	③	④	⑤
14. I keep track of my pain level	⓪	①	②	③	④	⑤
15. I become preoccupied with pain	⓪	①	②	③	④	⑤
16. I do not dwell on pain	⓪	①	②	③	④	⑤

CPAQ

Below you will find a list of statements. Please rate the truth of each statement as it applies to you. Use the following rating scale to make your choices: Never true/Very rarely true/Seldom true/Sometimes true/Often true/Almost always true/Always true.

	Never true	Very Rarely true	Seldom true	Sometimes true	Often true	Almost always true	Always true
1. I am getting on with the business of living no matter what my level of pain is	⓪	①	②	③	④	⑤	⑥
2. My life is going well, even though I have chronic pain	⓪	①	②	③	④	⑤	⑥
3. It's OK to experience pain	⓪	①	②	③	④	⑤	⑥
4. I would gladly sacrifice important things in my life to control this pain better	⓪	①	②	③	④	⑤	⑥
5. It's not necessary for me to control my pain in order to handle my life well	⓪	①	②	③	④	⑤	⑥
6. Although things have changed, I am living a normal life despite my chronic pain	⓪	①	②	③	④	⑤	⑥
7. I need to concentrate on getting rid of my pain	⓪	①	②	③	④	⑤	⑥
8. There are many activities I do when I feel pain	⓪	①	②	③	④	⑤	⑥
9. I lead a full life even though I have chronic pain	⓪	①	②	③	④	⑤	⑥
10. Controlling pain is less important than any other goals in my life	⓪	①	②	③	④	⑤	⑥
11. My thoughts and feelings about pain must change before I can take important steps in my life	⓪	①	②	③	④	⑤	⑥

12. Despite the pain, I am now sticking to a certain course in my life	⓪	①	②	③	④	⑤	⑥
13. Keeping my pain level under control takes first priority whenever I'm doing something	⓪	①	②	③	④	⑤	⑥
14. Before I can make any serious plans, I have to get some control over my pain	⓪	①	②	③	④	⑤	⑥
15. When my pain increases, I can still take care of my responsibilities	⓪	①	②	③	④	⑤	⑥
16. I will have better control over my life if I can control my negative thoughts about pain	⓪	①	②	③	④	⑤	⑥
17. I avoid putting myself in situations where my pain might increase	⓪	①	②	③	④	⑤	⑥
18. My worries and fears about what pain will do to me are true	⓪	①	②	③	④	⑤	⑥
19. It's a relief to realize that I don't have to change my pain to get on with my life	⓪	①	②	③	④	⑤	⑥
20. I have to struggle to do things when I have pain	⓪	①	②	③	④	⑤	⑥

Pain Disability Index

The rating scales below are designed to measure the degree to which several aspects of your life are presently disrupted by chronic pain. In other words, we would like to know how much your pain is preventing you from doing what you would normally do, or from doing it as well as you normally would. Respond to each category by indicating the *overall* impact of pain in your life, not just when the pain is at its worst. For each of the 7 categories of life activity listed, please circle the number on the scale, which describes the level of disability you typically experience. A score of 0 means no disability at all, and a score of 10 signifies that all the activities in which you would normally be involved have been totally disrupted or prevented by your pain.

(1) Family/home responsibilities

This category refers to activities related to the home and family. It includes chores or duties performed around the house (e.g., yard work) and errands or favours for other family members (e.g., driving the children to school).

⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

no disability total disability

(2) Recreation

This category 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 category refers to activities, which involve participation with friends and acquaintances other than family members. It includes parties, theatre, concerts, dining out, and other social functions.

⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

no disability total disability

(4) Occupation

This category refers to activities that are a part of or directly related to one's job. This includes non-paying jobs as well as that of a housewife or volunteer worker.

⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

no disability total disability

(5) Sexual behaviour

This category refers to the frequency and quality of one's sex life.

⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

no disability total disability

(6) Self-care

This category includes activities, which involve personal maintenance and independent daily living (e.g., taking a shower, driving, getting dressed, etc.)

⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

no disability total disability

(7) Life-support activity

This category refers to basic life-supporting behaviours such as eating, sleeping and breathing.

⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

no disability total disability

END OF QUESTIONS, THANK YOU

Appendix 9: Daily diary

DAILY DIARY

Today is (circle) Mon Tue Wed Thur Fri Sat Sun

The date is ……. / …… / ……..

Below you will find a list of statements. Please rate the truth of each statement as it applies to you using the following scale: Totally disagree/Mostly disagree/Slightly disagree/Neither agree nor disagree/Slightly agree/Mostly agree/Totally agree.

	Totally disagree	Mostly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Mostly agree	Totally agree
1. I think that if my pain gets too severe it will never decrease	⓪	①	②	③	④	⑤	⑥
2. When I hurt I think about the pain constantly	⓪	①	②	③	④	⑤	⑥
3. I get upset and frustrated when I am in pain	⓪	①	②	③	④	⑤	⑥
4. I avoid important activities when I am in pain	⓪	①	②	③	④	⑤	⑥
5. I worry all the time about whether the pain will end	⓪	①	②	③	④	⑤	⑥
6. I become afraid that the pain will get worse	⓪	①	②	③	④	⑤	⑥
7. There is nothing I can do to reduce the intensity of the pain	⓪	①	②	③	④	⑤	⑥
8. I wonder whether something serious may happen	⓪	①	②	③	④	⑤	⑥
9. It's Ok to experience pain	⓪	①	②	③	④	⑤	⑥
10. I have control over my pain	⓪	①	②	③	④	⑤	⑥

For each of the 3 statements below, please circle the number on the scale, which describes your level of pain today. A score of 0 means no pain and a score of 10 signifies the level is the worst imaginable.

Today my average pain has been **None** ⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ **Worst imaginable**

Today my most severe pain was **None** ⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ **Worst imaginable**

Today my least pain was **None** ⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ **Worst imaginable**

Appendix 10: Session measures

Shifting Attention Exercise

Below you will find a list of statements. Please rate the truth of each statement as it applies to you using the following scale: Totally disagree/Mostly disagree/Slightly disagree/Neither agree nor disagree/Slightly agree/Mostly agree/Totally agree.

	Totally disagree	Mostly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Mostly agree	Totally agree
1. I was able to shift attention between external and internal events	⓪	①	②	③	④	⑤	⑥
2. Thoughts interfered with my ability to make the shift	⓪	①	②	③	④	⑤	⑥
3. I found it easy to switch my attention	⓪	①	②	③	④	⑤	⑥

Signal Breath Exercise

ID:
Date:

Below you will find a list of statements. Please rate the truth of each statement as it applies to you using the following scale: Totally disagree/Mostly disagree/Slightly disagree/Neither agree nor disagree/Slightly agree/Mostly agree/Totally agree.

	Totally disagree	Mostly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Mostly agree	Totally agree
1. I was able to take positive action	⓪	①	②	③	④	⑤	⑥
2. Thoughts interfered with my ability to take positive action	⓪	①	②	③	④	⑤	⑥
3. I found it easy to take positive action	⓪	①	②	③	④	⑤	⑥

Switching Focal Points Exercise

ID:
Date:

Below you will find a list of statements. Please rate the truth of each statement as it applies to you using the following scale: Totally disagree/Mostly disagree/Slightly disagree/Neither agree nor disagree/Slightly agree/Mostly agree/Totally agree.

	Totally disagree	Mostly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Mostly agree	Totally agree
1. I was able to focus on a focal point	⓪	①	②	③	④	⑤	⑥
2. I found it easy to focus on a focal point	⓪	①	②	③	④	⑤	⑥
3. Thoughts interfered when I tried to focus on a focal point	⓪	①	②	③	④	⑤	⑥

Appendix 11: Pain Desensitistion Record Sheet

Instructions for desensitising yourself to chronic pain

In order to give yourself the best chance of benefiting from this technique you should make sure you understand it before you start. It is recommended that you discuss it with a psychologist trained in the method. You should also read the notes that explain it. It also helps if you keep a record of each long session (10-20 minutes). We recommend that you use the form on the reverse side of this page. This will enable you (and us) to monitor your progress and quickly identify any issues that may arise.

1. To start with, do these sessions either sitting or standing during the day and lying down at night. Do not try to make yourself so comfortable your pain is minimal before you start.
2. Begin by taking a couple of deep breaths. As you breathe out try to let go of any tightness or tension in your body and allow yourself to relax as much as possible.
3. After a couple of deep breaths, let your breathing return to normal but keep letting go and calming yourself each time you breathe out.
4. Do this for a minute or so and then focus your attention on your pain. If you have many pain sites, choose one of them.
5. You can focus on your pain by simply allowing yourself to experience the pain – with no attempt to block it or change it. Let other thoughts or distractions from the task pass by.
6. When focussing your attention on your pain it is especially important that you try to ignore thoughts about how bad it is or how much it is hurting. It is just pain.
7. Remind yourself the pain is just activity in your nerves. It is not telling you anything you don't know – this pain is not acting as a warning signal – it is just pain.
8. Remind yourself you are OK – you cannot come to any harm by experiencing your pain.
9. To begin with many people find their pain feels stronger – this is common and you should try not to be concerned about it. It is probably because you are not trying to block it or push it away. Any increased pain will pass if you keep your attention on it and keep relaxing each time you breathe out.
10. Remind yourself: the goal of this method is not to relieve your pain. It is important for the success of the method that you try not to think about it in terms of pain relief (as that suggests you are still trying to get away from the pain).
11. Instead, the goal is to accept you have the pain and that it doesn't bother you so much.
12. Whenever your mind wanders bring it back to focussing on the pain and nothing else. This will need to be repeated many times.
13. Keep this up for around 20 minutes or until you feel calmer at the end than you did at the beginning. If you do happen to feel more distressed at any stage, it is important to keep going (otherwise you risk making yourself more reactive to pain).

Remember this technique involves only your mind. You cannot do any harm to yourself with it and it can help you to cope with your pain. But repeated practice is essential if you are to limit the effects of long-term pain. The goal of this technique is to accept you have persisting pain, but it doesn't bother you as much as it used to.

Pain Desensitisation Record Sheet

NAME: _____ Start date:_____

Please rate how much your pain bothers you **before and after** each long session (3/day). Rate **how much your pain bothers you** from 0-10, where 0 = 'does not bother me at all' and
10 = 'bothers me extremely'). Place a tick (√) in the last box for all brief sessions.

Day	How much bother? (0-10)		How much bother? (0-10)		How much bother? (0-10)		Brief sessions
	Start	End	Start	End	Start	End	(√)

Appendix 12: Evaluation of therapy forms

Evaluation of Therapy Form

We would like you to indicate below how much you believe, *right now*, that the therapy you are receiving will help to reduce your anxiety. Belief usually has two aspects to it: (1) what one *thinks* will happen and (2) what one *feels* will happen. Sometimes these are similar; sometimes they are different. Please answer the questions below. In the first set, answer in terms of what you *think*. In the second set answer in terms of what you really and truly *feel*.

Set I

1. At this point, how logical does the therapy offered to you seem?

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

not at all logical somewhat logical very logical

2. At this point, how successful do you think this treatment will be in helping you manage your pain?

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

not at all useful somewhat useful very useful

3. How confident would you be in recommending this treatment to a friend who experiences similar problems?

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

not at all confident somewhat confident very confident

4. By the end of the therapy period, how much improvement in your ability to manage your pain do you think will occur? (Please circle)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Set II

For this set, close your eyes for a few moments, and try to identify what you really feel about the therapy and its likely success. Then answer the following questions.

1. At this point, how much do you really feel that therapy will help you to manage your pain?

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

not at all somewhat very much

2. By the end of the therapy period, how much improvement in your ability to manage your pain do you really feel will occur? (Please circle)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Treatment Evaluation Form

ID:
Date:

These questions refer to the treatment you have received.

1. How logical did the treatment offered to you seem?

⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

Not at all Completely

2. How successful do you think this treatment was in reducing the impact of pain on your life

⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

Not at all Completely

3. How confident would you be in recommending this treatment to a friend?

⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

Not at all Completely

4. How engaging and interesting was the treatment overall?

⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

Not at all Completely

5. How satisfied were you with the overall quality of the treatment?

⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

Not at all Completely

Appendix 13: Treatment manual

Treatment manual: Version 2.0. 12/06/11

Exercises are taken from: A treatment manual for the cognitive-behavioural treatment of chronic pain (Morley, Biggs & Shapiro, 1999).

Education/Formulation Session

The session starts with an individualised formulation for the patient (using information from the assessment session). This will be based around the idea that people avoid processing pain and don't get full exposure to it. The patient will be informed that they will be trained to focus on the experience of pain which may reduce the distress they experience. This study is based on the Fear Avoidance Model, which has produced successful interventions for those who have specific fears related to injury.

The patient will be informed about the background to this study. This will be expressed in everyday language with good examples. They will be told that those who experience pain struggle with attention management. Attempts to use cognitive methods to control attention have been made, however the rationale for this has been based on the common sense view that attention has a limited capacity, and therefore distracting attention away from pain will be beneficial. However, the techniques to be used in this treatment (Interoceptive Exposure) has a more systematic evidence base. There is some evidence that a deliberate attempt to specifically focus on painful experiences may allow patients to confront their pain as part of a self-management programme (see below). This session will involve more than education. We will discuss the patient's current attention management strategies.

The following is taken from*: Focus on the pain itself (desensitising to chronic pain) – Nicholas (2007).*

'Many people try to distract themselves from their pain as a way of coping with it. This can be helpful at the time, but it does take effort and time, especially time away from other things you might like to do. You might like to consider what if you didn't have to distract yourself from your pain. What if you could have this pain but not be bothered by it?

One way of reducing how much pain bothers you is to learn to desensitise yourself to it. Unlike distraction, desensitising involves focussing your attention

directly on the pain and letting yourself feel it without trying to block it or get away from it. At first glance this technique may seem to go against 'common sense'. To help it make more sense, think about the original purpose of pain. Broadly speaking, acute pain is a warning signal. It warns us that something is wrong, we may have an injury or be about to have an injury. Acute pain lets us know we need to investigate the cause and do something about it. Such pain can be useful to us. But that mainly applies to acute pain.

In contrast, chronic pain isn't nearly so useful. Any damage has already been done, so it's not really telling us anything new. The possible cause of your chronic pain will have been extensively investigated and even if the cause has been identified there is no cure available at present. At least you should have been reassured that serious or life-threatening causes have been ruled out. You can tell yourself that you are physically OK and not in danger. [This will need checking out on a patient by patient basis].

Once you can accept that, you can try to move on, despite the chronic pain. To minimise the effect of the chronic pain on you and your lifestyle it can help to desensitise yourself to it.

This requires that you try not to avoid the pain. The normal response to ongoing pain is to try to get away from it or to distract yourself from it. But what would happen if you didn't try to get away from it? Remember, it is not a warning of damage, you will be physically OK.

Another way of looking at our response of trying to avoid or escape from pain is to compare it with what we might do when we are afraid of something that is not really dangerous. For example, if we have a fear of heights we might avoid going to high places, even though it is very unlikely that we would fall off. By avoiding heights, we may never learning that we'd be OK after all. That fear might also limit our lifestyle. Interestingly, we know that the best treatment for those sorts of fears is exposing yourself to whatever you are afraid of (like going up to a high place) and seeing for yourself that you are OK. It may take a few repetitions, but if you keep at it consistently, the method will work and you will overcome the fear. We call this desensitisation.

A similar method is called 'habituation' (or getting used to something). This is something we have all experienced. For example, if you buy a new painting or poster and put it on your wall you will notice it and admire it whenever you walk past initially. But after a few weeks you notice it less - it will start to become part of the background. You remain aware that it is there, you just don't notice it as much. That effect is called

habituation. If we weren't able to do it we would be constantly distracted by everything we walked past – it would be even less safe to walk across the road. To become habituated to something we must not avoid or escape from it. Repeatedly trying to escape from or avoid something keeps us more attentive to it. We are at risk of always being 'on the look-out' for it. It is not difficult to see how this can apply to pain.

What if we took the same approach to chronic pain? Instead of trying to avoid it or escape from it, what if we deliberately faced it for an extended period? To begin with, you could experiment with this idea by simply staring at a spot or small mark on a nearby wall for 5 minutes (without shifting your gaze) and see what happens. It's not as easy as it sounds is it? People often say the spot gets blurry and harder to focus on, or seems to start moving or changing in some way. These are normal responses of our senses (whether it is vision, hearing or touch) when we concentrate on one thing for long periods. What about trying it with pain? It can be done even when you are trying to do some activity or exercise and as well as when you are trying to go to sleep. But it does need practice to get good at it.'

The patient will be informed that this will be the focus of the treatment, and that we will be returning to it in the treatment sessions.

Measures

Evaluation of therapy form

Global booklet

SESSION 1: Attention

Exercise: Current Practice for managing pain

Ask the patient to brainstorm their current attention strategies. Start the session with an open ended question:

"What do you do now that is helpful in managing your pain?"

Possible examples are: distract self, ignore the pain, do something else. Ask about times when the person is absorbed in something (for e.g. when watching a film). Did they notice the pain? The point behind this is to demonstrate that pain is not all in the mind but that the mind can moderate pain. This is not to say that patients' pain goes away - it doesn't, pain signals are still being sent, but the perception of pain signals has been altered. Another example of this is when we are asleep - pain signals continue but they are not perceived. This point is central to reconceptualising the problem.

Debriefing - Discussion Points to bring out:

The aim is to draw out the fact that attention management is a common sense way of dealing with pain. A good example of this is when a nurse gives us an injection or takes blood - they may ask us to look away and keep us preoccupied by talking, before we know it the injection has been given or blood taken. Another example is a footballer who's just sustained an injury – the trainer will keep them moving, distracting them from the injury and keeping them in play when possible. Obviously we can't distract ourselves from pain all the time, but there may be times when we can use attention strategies to help control the pain, and/or to gain maximum benefits from rest breaks.

If you've tried a strategy and it helped - good, but realise there will be times when it will not work. On the other hand, if you have tried a technique once but it didn't bring any benefit, don't give up on it just yet - it may be worth re-exploring. Note that there may be difficult times - the times when attention methods are unlikely to work are: when experiencing intense pain; when trying to get to sleep.

- Coping with pain means using attention management to get episodic pain reduction.
- Particular strategies don't work all the time - we need to vary the techniques as the pain varies.
- Even severe pain can be overridden, e.g. when escaping a fire.

Reformulation

When engaged, the pain hasn't gone away but it's not occupying attention as much. *Aim of this is to organise attention so the pain is not occupying attention as much.* The key question to ask is:

"When you engage in something that occupies you, has the pain gone away?"

The answer is no in one sense - it's still there, but yes in another because it's not occupying your attention nearly as much. Attention management is all about learning to organise pain so it doesn't occupy your attention so much as it would otherwise do.

Exercise: Attention Awareness and playing with attention

Between each step in process/trial use relaxation.

Use **Trial Record sheet** (see Appendix 2) and **Simple Rating Scale** (see Appendix 3) to measure pain and distress levels **before and after** each trial.

1. Begin with a mini-practice relaxation: (see Appendix 4) (Trial 1: one minute).
2. Close your eyes (if not already closed)
3. Focus attention on sounds in the room - identify as many as you can (Trial 2: one minute).
4. Focus attention on breathing through your nose, describe the sensations (Trial 3: one minute).
5. Alternate between the room and your nose 3 times (Trial 4: one minute).
6. Alternate attention from breathing through your nose, describe the sensations and switch to current pain and back to nose. Do this three times (Trial 5, 6, 7: one minute each).
7. Open your eyes
8. Focus on an object, e.g. a clock on the wall, picture, room fixture and look at it in detail so that you can describe it (Trial 8).

When switching to pain sensations there is an expectation that the participant will be hesitant/it will be more difficult to disengage from pain than other areas (e.g. breath).

Learning point: Participant can focus on breathing instead of pain; instead of fighting pain, they can switch attention. Pain focus=control.

Pain exposure: Desensitisation/ Pain Focus.

<u>This will be given as homework prompt and diary to record.</u>

Taken from: *Focus on the pain itself (desensitising to chronic pain) – Nicholas*

There is a handout with instructions on, as well as a chart to monitor progress at home (see Appendix 1).

Use **Trial Record sheet** (see Appendix 2) and **Simple Rating Scale** (see Appendix 3) to measure pain and distress levels **before and after** pain exposure.

"Start by calming yourself with a couple of deep breaths and letting go – like when you relax. After a minute or so, while still letting go, close your eyes and shift your attention to your pain. Focus on your pain as calmly as possible - just like you did with the spot on the wall. Make no effort – just allow yourself to experience it. Try not to block the pain or even think about how bad the pain is – let those thoughts pass you by. Don't even curse it – don't give it any special status. Just calmly focus on that sensation you call pain. See what you can notice. You can try to be objective about it.

Keep reminding yourself that you are OK and the pain doesn't mean anything.

Keep your attention on the pain. Don't try to change the pain or even make it go away – as that is still trying to escape from it. Calmly focus all your attention on the pain – and continue relaxing. See what happens.

If the pain seems to get worse, don't let it stop you. Remind yourself that it can't cause you any damage. You are OK. Keep going because it won't continue getting worse. Any increase in pain will settle (after all you are not doing anything that can harm you – it is just activity in your nerves).

After each session spend a minute or so thinking about what you noticed. Try not to measure it in terms of 'did it work' or 'did it make the pain go away', rather what did you notice? Compare that with the last time you did it. Over time you should start to notice changes in the way you experience your pain at these times. You might like to experiment with the technique by trying it different ways and seeing what happens.

As you get better at the technique, try using it whenever you notice it, even when you are doing something. For example, you can use it when you are trying to go to sleep at night. Eventually, the technique can become almost automatic and you will find yourself doing it without thinking about it. By then the pain should be much less troubling than it used to be, even though it will still be present – like that old poster on the wall.

Each practice session should be about 15 to 20 minutes. Try to do two or three sessions, a day. Over time you should try shorter sessions and in different places, so you can learn to do it anywhere."

HOMEWORK: Attention Switching

Between each step in process/trial use relaxation.

1. Begin with a mini-practice relaxation: (see Appendix 4) (Trial 1: one minute).
2. Close your eyes (if not already closed)
3. Focus attention on sounds in the room - identify as many as you can (Trial 2: one minute).
4. Focus attention on breathing through your nose, describe the sensations (Trial 3: one minute).
5. Alternate between the room and your nose 3 times (Trial 4: one minute).
6. Repeat trial 3: attention on breathing through your nose, describe the sensations and switch to current pain and back to nose. Do this three times (Trial 5, 6, 7: one minute each).
7. Open your eyes
8. Focus on an object, e.g. a clock on the wall, picture, room fixture and look at it in detail so that you can describe it (Trial 8).

Learning point: Participant can focus on breathing instead of pain; instead of fighting pain, they can switch attention. Pain focus=control.

HOMEWORK: Attention Switching and Pain focus (see above)

Complete Process Measure

SESSION 2: Catastrophising

Homework review: Review the homework set in the previous session by asking whether there were any problems carrying out the exercise. Patients are likely to report difficulties in maintaining concentration, especially when in pain. The other important question to ask is whether ability to perform the exercise had improved with practise. Emphasise the fact that, as some people may already have experienced, attention can be trained. However, for those patients who encountered considerable difficulties with the exercise (or those given little time to practise) it is important to stress that the material in today's session should help them in building attention control skills.

Exercise: When pain is really bad - catastrophising

This first exercise is aimed at assessing what people do when the pain becomes severe. Introduce the idea that when pain gets really bad it is difficult to do anything else but dwell on the pain - this is natural but it can get in the way of adapting. Use a modified version of the CSQ catastrophising subscale to get patients to consider what thoughts preoccupy them at this time (Appendix 5). Hand out the subscale, asking patients to rate each of the catastrophising statements. Some patients will not identify with negative cognitions, but instead 'think' in images and this should be made clear. Ask patients to write down anything else they may think or picture when the pain gets really bad. The point to emphasise is that the questionnaire contains very general statements and most people will have their own particular thoughts and images - an example might be an image of themselves lying helpless on the sofa, alone and friendless because they have been abandoned.

<u>Modified CSQ - Catastrophising Scale</u>

When pain is really bad - do you catastrophise? (i.e. do your negative thoughts get out of hand?)

To find out circle the number after each statement which best describes whether you have thoughts like this when the pain is really bad. To find out how good you are at this sort of thinking just add up your score. The biggest score you can get is 10, and the smallest 0.

0 Never do that

1 Sometimes do that

2 Always do that

It's terrible and I feel it's never going to get any better	0 1 2
It's awful and I feel that it overwhelms me	0 1 2
I feel my life isn't worth living	0 1 2
I worry all the time about whether it will end	0 1 2
I feel I can't stand it any more	0 1 2
I feel like I can't go on	0 1 2

Debriefing and discussion

The purpose of the debriefing is to assess commonality of catastrophising in severe pain, also to identify whether patients have any more adaptive appraisals, which facilitate coping. State that you want them to start thinking about these issues. Acknowledge that some people may not "think" in terms of an internal voice, but often relate better to images.

Probes:

"Can you relate to these thoughts?"

"What sort of feelings do they generate?"

"Do you have particular thoughts & images which come when you are in bad pain?"

Reformulation / reconceptualisation

The next stage in this module is to put catastrophisation into the context of a vicious circle. Intense, bad pain has a cunning entrapment devise 'the mood trap'. Mood has a powerful influence on accessing thoughts, images & memories. This is widespread and natural not because they have a faulty personality. One way to explain the 'mood trap' is as follows:

> "Intense pain leads to very negative thoughts we call 'catastrophisation', and that cause further distress. Catastrophising often leads to thinking about other negative thoughts and memories, not directly associated with the pain. A vicious cycle can become established, which makes dealing effectively with the pain far more difficult."

- Repeated experience of bad pain makes you an expert at generating negative thoughts & images.

- The normal response to pain has been hijacked and is not helpful when you have to deal with it in the longer term.
- Dealing with severe pain on a regular basis often leads to despair and depression
- Thoughts and feelings whilst enduring severe pain may invade your wider sense of self, so that you feel your whole life is out of control.
- But it need not always be like this. We can break the cycle.

The aim of reformulation is therefore to formulate ways in which patients can deal with their pain pro-actively, using methods that both acknowledge the pain but put it in perspective, leaving patients with a greater sense of self-efficacy and integrity.

Exercise: Interrupting Catastrophising; The Signal Breath

This technique uses a naturally occurring event (the sharp intake of breath with increased pain), as a signal to interrupt the habitual flow of thoughts and actions. The first stage to coping once this occurs is to try and slow everything down - just like a slow motion picture - but one in which patients can intervene. The critical action is then to "stop & think". There is a handout to go with this (Appendix 6).

The 'Signal Breath' exercise:

"When your pain is severe or getting worse STOP yourself and take a Signal Breath"

1. Inhale deeply
2. Release your breath slowly
3. Talk to yourself "let go", "take it easy", "relax", "stay calm"

"It's called the signal breath because it gives you a signal about what to do next. We use the breath because very often when we get an increase in pain we take a sharp intake of breath. So it is a natural way of reminding ourselves to stop and think."

Rehearse the signal breath

Use **Trial Record sheet** (see Appendix 2) and **Simple Rating Scale** (see Appendix 3) to measure pain and distress levels **before and after** each trial.

The Signal Breath + Diffusion of Catastrophic Thoughts

This adds some structured self talk to the signal breath. There are a number of questions to ask. Guide the patient through the following sequence. Note that some patients will

not be able to relate to some of the verbal statements, but may 'think' in images instead. Suggest that they use images for the stages of coping and to note these down.

What positive actions should I take?

Physical - relax - sit down - stay put - wait here.....

Mental - talk yourself through the pain - RPFC:

Reassure - "been here before I know what will happen"
Think about past time when pain has increased. It will rise to a peak and then decline.

Pace - "it won't go on forever". It has always declined eventually.

Focus - "stay with it, don't fight it". This pain is strong. Don't go straight at it like a bull at a gate. That will only lead to frustration.

When it's over - "Think about how you coped with it and what you have learned. Give yourself a pat on the back if you didn't panic."

What caused the pain?
Patients naturally will want to know what caused the pain e.g. a sudden movement, over-stretching, prolonged activity, feeling tense for a reason independent of the pain etc. This should be done after the increased pain episode unless the reason is immediately obvious. Encourage patients not to dwell on what caused their pain (it may lead to frustration). Equally if they do not know what caused the pain, encourage them 'let it go'; acknowledging that pain mechanisms can be mysterious.

Now do guided rehearsals:
Use **Trial Record sheet** (see Appendix 2) and **Simple Rating Scale** (see Appendix 3) to measure pain and distress levels **before** and **after** each trial.

- Ask patients to close their eyes.
- Guide them through the Signal Breath and the stages of coping outlined.
- Bring the exercise to an end "Open your eyes and relax".

Pain exposure:

Taken from: *Focus on the pain itself (desensitising to chronic pain) – Nicholas*

Use **Trial Record sheet** (see Appendix 2) and **Simple Rating Scale** (see Appendix 3) to measure pain and distress levels **before and after** pain exposure.

"Start by calming yourself with a couple of deep breaths and letting go – like when you relax. After a minute or so, while still letting go, close your eyes and shift your attention to your pain. Focus on your pain as calmly as possible - just like you did with the spot on the wall. Make no effort – just allow yourself to experience it. Try not to block the pain or even think about how bad the pain is – let those thoughts pass you by. Don't even curse it – don't give it any special status. Just calmly focus on that sensation you call pain. See what you can notice. You can try to be objective about it.

Keep reminding yourself that you are OK and the pain doesn't mean anything.

Keep your attention on the pain. Don't try to change the pain or even make it go away – as that is still trying to escape from it. Calmly focus all your attention on the pain – and continue relaxing. See what happens.

If the pain seems to get worse, don't let it stop you. Remind yourself that it can't cause you any damage. You are OK. Keep going because it won't continue getting worse. Any increase in pain will settle (after all you are not doing anything that can harm you – it is just activity in your nerves).

After each session spend a minute or so thinking about what you noticed. Try not to measure it in terms of 'did it work' or 'did it make the pain go away', rather what did you notice? Compare that with the last time you did it. Over time you should start to notice changes in the way you experience your pain at these times. You might like to experiment with the technique by trying it different ways and seeing what happens."

HOMEWORK: Practice signal breath when in pain.
HOMEWORK: Pain focus (see above)
Complete Process Measure

SESSION 3: Acceptance

Homework review: Review the homework set in the previous session by asking whether there were any problems carrying out the exercise. Patients are likely to report difficulties in maintaining concentration, especially when in pain. The other important question to ask is whether ability to perform the exercise had improved with practise. Emphasise the fact that, as some people may already have experienced, attention can be trained. However, for those patients who encountered considerable difficulties with the exercise (or those given little time to practise) it is important to stress that the material in today's session should help them in building attention control skills.

Exercise: Using focal points

This exercise introduces the idea of a focal point - a specific object, thought or sensation which dominates attention. Ask patients to suggest what could be used as a focal point to attention. The responses can be crudely classified as external, mental and somatic.

External	Mental	Somatic
Trees, painting, flower	Planning the day Fantasizing a holiday	Focusing on the breath

Ask whether they use any of these focal points manage pain-the aim is to focus on the pain and not try to escape/distract. Guide them through the example focal point techniques. It is especially useful to emphasise the links with the techniques they already use. If the focal point has not already been suggested, one way to introduce them is to say:

"Have you ever thought about using..." or

"Thinking about it now, have you ever used...."

Again the aim of reconceptualisation is to make links between patients current practice and attention management techniques.

Focal Points

External: Focus attention on features of your environment

- *Objects:* Internal e.g. a flower, candle flame, statue, wood carving, vase, painting; or External e.g. trees, houses, clouds. Focus either on an individual objects or compare objects, analysing their colour, shape, texture, and if appropriate, the way they smells or how they are constructed.
- *Sounds:* Detect and analyse different sounds in the environment, count how many you can hear and from what distance you can hear them. You may prefer to concentrate on relaxing repetitive sounds such as the rain, ocean waves or birds chirping. (These can be bought on tape or CD.)

Mental: Focus attention on various thoughts

- *Ideation:* Attempt to recall the words to your favourite songs or poems, recall a happy childhood memory, plan the day's activities, decorate a room, cook a meal, take a journey you know well, construct a piece of furniture.
- *Fantasy*: Imagine you and your loved ones have been given an allexpenses- paid three week trip to anywhere in the world; imagine you have just won the lottery - plan how you would spend the money.

Somatic: Focus attention on bodily sensations other than pain

- Focus on the breath: concentrate on the sensations of the breath entering and leaving the body, cool on the inhalation and warm on the exhalation. Attempt to make the breath smooth.
- Focus on other areas of the body: focus on the warmth and comfort of other bodily regions, settle on one area and 'think' from that point.

Exercise: Practising switching focal points

Ask patients to choose three focal points that they can use right now, one from each of the broad types defined - external, mental and somatic.

Use **Trial Record sheet** (see Appendix 2) and **Simple Rating Scale** (see Appendix 3) to measure pain and distress levels **before and after** each trial.

1. "Bring your attention, on your external focal point." (if sounds are used do it with eyes closed) - 2 minutes. (Trial 1: one minute).
2. "Allow your attention to drift as it wants" (Trial 2: one minute).
3. "Now move your attention to the mental focal point." (close eyes) (Trial 3: one minute).

4. “Allow your attention to drift.” (Trial 4: one minute).
5. “Finally bring your attention to your somatic focal point.” (close eyes) (Trial 5: one minute).
6. “Open your eyes, allow your attention to be as before.” (Trial 6: one minute).

Debriefing and discussion

Discuss which focal points the patient used and how effective they were at holding their attention. Although some patients may already use focal points, it is unlikely that many will use them as the mainstay of their coping efforts. It is therefore important to ‘sell’ focal point techniques appropriately. Suggestions may include: to help episodically control normal levels of pain; to increase a sense of self-efficacy in dealing with pain; to improve the distracting qualities of a behavioural activity (mindfulness); to help improve sleep and prevent flare-ups; and to improve the quality of rest breaks (if they are using activity-rest cycling). It is important to encourage patients to explore or re-explore distraction techniques with an open mind, emphasising that the way they use these techniques will vary according to their own preferences. The other point to establish is that the techniques need to be practised over time not only so that patients can establish the limits of their utility, but that their attention control skills can become fully developed. Metaphors can be used to convey this idea more graphically; for example the practice of attention techniques can be compared to weaving a parachute:

> “You don’t weave the parachute when you fall out of the plane - they have to be worked at regularly to ‘break the fall’ when they are needed.”

Ask patients to use somatic or external focal points at least twice daily.

Exercise: What brings pain into awareness?

The next exercise raises the issue of patient’s sensitivities to pain. This object of this exercise is to encourage patients to think about how much they are preoccupied by their pain, and also to suggest how attention management can help disengage patients from the pain.

Ask patients to fill in the “Pain Vigilance & Awareness Questionnaire” (Appendix 7). This should focus patients’ awareness as to how much they dwell upon their pain and how capable they already are of distracting themselves from it. Items include:

- I am quick to notice changes in pain intensity.
- I become preoccupied with pain.

- I find it easy to ignore pain.

Debriefing

Inform patients that the aim of this exercise this exercise is not to suggest they are failing, but rather to underline how difficult it is to ignore pain. Point out that one major effect of chronic pain is that the pain tends to preoccupy sufferers - effectively taking over a large part of their identity. One of the aims of attention management is to help put boundaries around the pain - for example, using focal points during rest breaks helps improve the quality of this time. Suggest that one of major goal for patients would be to live their lives around the pain - so that even when they are experiencing a lot of pain, they don't feel that this defines their life. A helpful analogy is:

> "Picture a lake by a mountain - the basic features of the scene remain throughout the year: the lake, the mountain, the trees and so on. There is stability in the scenery, just as there is stability in the chronicity of your pain - it doesn't go away. However, change also occurs - the seasons come and go, the colours and hues of the landscape change, as does the weather. While some elements stay the same, others change, weather storms, grow and continue. Likewise your pain is a stable feature and is chronic, but your lives can never-the-less change, grow and continue around it. "

It is useful to try and put boundaries around the pain whenever possible, while not attempting to ignore the existence of their chronic pain.

Pain exposure:

Taken from: *Focus on the pain itself (desensitising to chronic pain) – Nicholas*

Use **Trial Record sheet** (see Appendix 2) and **Simple Rating Scale** (see Appendix 3) to measure pain and distress levels **before and after** each trial.

"Start by calming yourself with a couple of deep breaths and letting go – like when you relax. After a minute or so, while still letting go, close your eyes and shift your attention to your pain. Focus on your pain as calmly as possible - just like you did with the spot on the wall. Make no effort – just allow yourself to experience it. Try not to block the pain or even think about how bad the pain is – let those thoughts pass you by. Don't even curse it – don't give it any special status. Just calmly focus on that sensation you call pain. See what you can notice. You can try to be objective about it.

Keep reminding yourself that you are OK and the pain doesn't mean anything.

Keep your attention on the pain. Don't try to change the pain or even make it go away – as that is still trying to escape from it. Calmly focus all your attention on the pain – and continue relaxing. See what happens.

If the pain seems to get worse, don't let it stop you. Remind yourself that it can't cause you any damage. You are OK. Keep going because it won't continue getting worse. Any increase in pain will settle (after all you are not doing anything that can harm you – it is just activity in your nerves).

After each session spend a minute or so thinking about what you noticed. Try not to measure it in terms of 'did it work' or 'did it make the pain go away', rather what did you notice? Compare that with the last time you did it. Over time you should start to notice changes in the way you experience your pain at these times. You might like to experiment with the technique by trying it different ways and seeing what happens."

Measures will be taken before and after exposure as detailed above.

HOMEWORK: Practicing Focal points

Ask patients to undertake practise of somatic or external focal points at least twice daily.

HOMEWORK: Pain focus (see above)

Complete Process Measure

Following treatment

Post global measures and evaluation of therapy form given to participants along with two weeks of daily diaries to be returned at the Change Interview.

Change Interview Session

This will be conducted two weeks after the end of treatment.

Final Measures

3 month's later, global measures will be collected.

Treatment Manual Appendix
Appendix 1

Instructions for desensitising yourself to chronic pain

It helps if you keep a record of each long session (10-20 minutes), you can use the Pain Desensitisation Record Sheet (PMRC) below. This will enable you (and us) to monitor your progress and quickly identify any issues that may arise.

To start with, do these sessions either sitting or standing during the day and lying down at night. Do not try to make yourself so comfortable your pain is minimal before you start.

Begin by taking a couple of deep breaths. As you breathe out try to let go of any tightness or tension in your body and allow yourself to relax as much as possible.
After a couple of deep breaths, let your breathing return to normal but keep letting go and calming yourself each time you breathe out.

Do this for a minute or so and then focus your attention on your pain. If you have many pain sites, choose one of them.

You can focus on your pain by simply allowing yourself to experience the pain – with no attempt to block it or change it. Let other thoughts or distractions from the task pass by.

When focussing your attention on your pain it is especially important that you try to ignore thoughts about how bad it is or how much it is hurting. It is just pain.

Remind yourself the pain is just activity in your nerves. It is not telling you anything you don't know – this pain is not acting as a warning signal – it is just pain.

Remind yourself you are OK – you cannot come to any harm by experiencing your pain.

To begin with many people find their pain feels stronger – this is common and you should try not to be concerned about it. It is probably because you are not trying to

block it or push it away. Any increased pain will pass if you keep your attention on it and keep relaxing each time you breathe out.

Remind yourself: the goal of this method is not to relieve your pain. It is important for the success of the method that you try not to think about it in terms of pain relief (as that suggests you are still trying to get away from the pain).

Instead, the goal is to accept you have the pain and that it doesn't bother you so much. Whenever your mind wanders bring it back to focussing on the pain and nothing else. This will need to be repeated many times.

Keep this up for around 20 minutes or until you feel calmer at the end than you did at the beginning. If you do happen to feel more distressed at any stage, it is important to keep going (otherwise you risk making yourself more reactive to pain).
Remember this technique involves only your mind. You cannot do any harm to yourself with it and it can help you to cope with your pain. But repeated practice is essential if you are to limit the effects of long-term pain.

The goal of this technique is to accept you have persisting pain, but it doesn't bother you as much as it used to.

Pain Desensitisation Record Sheet

NAME: _____ Start date:_____

Please rate how much your pain bothers you before and after each long session (3/day). Rate how much your pain bothers you from 0-10, where 0 = 'does not bother me at all' and
10 = 'bothers me extremely'). Place a tick (√) in the last box for all brief sessions.

Day	How much bother? (0-10)		How much bother? (0-10)		How much bother? (0-10)		Brief sessions
	Start	End	Start	End	Start	End	(√)

Treatment Manual Appendix 2
Trial Record Form

TRIAL RECORD

ID:
Date:
Session:

TRIAL		PAIN	DISTRESS
1.	B A		
2.	B A		
3.	B A		
4.	B A		
5.	B A		
6.	B A		
7.	B A		
8.	B A		
9.	B A		
10.	B A		
11.	B A		
12.	B A		
13.	B A		

Treatment Manual Appendix 3
Simple rating scale

My pain is: **None** ⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ **Worst imaginable**

My distress is: **None** ⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ **Worst imaginable**

Treatment Manual Appendix 4
Method for a mini-relaxation exercise

This exercise is helpful to use before most attention strategies are used.

1. Begin by taking a long breath

2. Say the word RELAX to yourself

3. Slowly exhale and, while you do so, allow yourself to relax and focus on the sensations of relaxation

4. Allow your jaw to relax

5. Allow sensations of heaviness to flow downward from your shoulders throughout your body

6. Close your eyes (unless you are suffering from depression, in which case keep them open)

7. Scan through your body in order to identify any major areas of tension and 'let go' in those areas

8. Give yourself about 30 seconds to contemplate the feeling of relaxation

Treatment Manual Appendix 5

Catastrophising

When pain is really bad - do you catastrophise? (i.e. do your negative thoughts get out of hand).

To find out circle the number after each statement which best describes whether you have thoughts like this when the pain is really bad.

0 Never do that

1 Sometimes do that

2 Always do that

It's terrible and I feel it's never going to get any better.	0	1	2
It's awful and I feel that it overwhelms me.	0	1	2
I feel my life isn't worth living.	0	1	2
I worry all the time about whether it will end.	0	1	2
I feel I can't stand it any more.	0	1	2
I feel like I can't go on.	0	1	2

(adapted from the CSQ)

To find out how often you use this type of thinking, add up your score. The biggest score you can get is 10, and the smallest 0.

TOTAL:

Write here other things you think and imagine when the pain is bad

.....
.....
.....
.....
.....
.....

Treatment Manual Appendix 6

The 'Signal Breath'

When intense pain begins STOP & THINK

- inhale deeply
- release your breath slowly
- talk to yourself "let go", "take it easy", "relax", "stay calm"

Breaking the Vicious Cycle

- What positive actions should I take?

Physical - relax - sit down - stay put - wait here.....
Mental - talk yourself through the pain - RPFC:

Reassure - "been here before I know what will happen"
Think about past time when pain has increased. It will rise to a peak and then decline.

Pace - "it won't go on forever"
It has always declined eventually.

Focus - "stay with it, don't fight it"
This pain is strong. Don't go straight at it like a bull at a gate. That will only lead to frustration.

When it's over
"Think about how you coped with it and what you have learned. Give yourself a pat on the back if you didn't panic."

What caused the pain?
You may think about what caused the pain e.g., a sudden movement, overstretching, prolonged activity, feeling tense for a reason independent of the pain etc. Do this only after the episode is over, unless the reason is obvious. Even then, avoid dwelling on this aspect. If you don't know what caused the pain, 'let it go'.

Treatment Manual Appendix 7

The Pain Vigilance and Awareness Questionnaire

Rate each of the statements using the scale below:

0	1	2	3	4	5
Never					Always

1. I am very sensitive to pain.	
2. I am aware of sudden or temporary changes in pain	
3. I am quick to notice changes in pain intensity.	
4. I am quick to notice effects of medication on pain	
5. I am quick to notice changes in location or extent of pain	
6. I focus on sensations of pain	
7. I notice pain even if I am busy with another activity	
8. I find it easy to ignore pain	
9. I know immediately when pain starts or increases	
10. When I do something that increases the pain, the first thing I do is check to see how much pain was increased	
11. I know immediately when pain decreases	
12. I seem to be more conscious of pain than others.	
13. I pay close attention to pain	
14. I keep track of my pain level	
15. I become preoccupied with pain	
16. I do not dwell on pain	

Add up your ratings for each of the boxes (except 8 and 16.) This is your total score.

TOTAL =

(Lance McCracken, 1997)

Appendix 14: Screening assessment

Screening Assessment: Version 1.0. 12/06/11

Information about the Project

The aim of the study is to investigate if focusing on the experience of pain will reduce the distressful experience. So, instead of trying to distract yourself when the pain is bad, we will be asking you to focus on the pain and experience it rather than trying to get away from it, which may help you feel less bothered about your pain. There is no evidence to suggest that asking people to focus on their pain will make it worse. It is only a limited treatment, and the length and time of sessions is shorter than a normal treatment, however you will be given tools to manage pain, as you would in routine treatment. You can drop out at any time, and confidentiality is assured. We will be collecting measures at several points during the treatment. Some measures will be taken before and after the treatment. Some brief measures will be taken during the sessions. This is routine in clinical settings. Also you will be required to fill in a diary.

Diary

You will have to keep a diary throughout the course of treatment. This should not take too long to fill in. Here is a copy of the diary and how to fill it in (do together, answering questions). Before treatment starts the diary will need to be completed daily for two weeks. You will need to continue doing this throughout the treatment sessions, and for two weeks after (for a total of eight weeks).

What the treatment involves

Treatment will take place on Fridays at St James Hospital, Leeds. After two weeks of completing the diary, you will be invited to an educational session where you will learn more about the project and the activities we will be doing. One week later treatment sessions will begin. There will be three treatment sessions over the course of three weeks. Two weeks later we will contact you to ask you some questions about your experience of the treatment, and you will stop completing the diary. Three months later we will contact you to ask you some final questions.

Each session will last 30-60 minutes long. During the treatment we will be asking you to focus on your pain, as well as doing exercises to help you manage the pain. We will

discuss the exercises together and set goals about these before the treatment starts. There will also be homework set.

What we won't do

We cannot change your pain, or answer all your questions about pain. How do you feel about this?

Information we need from you

1. When did your pain start?

2. What diagnosis do you have?

3. Tell us about your pain episodes

   - How often?

   - Where do you experience pain? Which is the worst?

   - How intense?

   - What makes it better?

   - What makes it worse?

   - When is it worse? What are you doing?

   - When does it bother you the least?

- What do you currently do to manage the pain? Prompts: rest, massage, tablets, watch TV, be active.

- Does your pain prevent you from doing anything?

- What do you think the pain means? Do you think something is seriously wrong?

- Do you think you will ever be rid of pain?

4. Are you receiving treatment for any other illness?

5. Can you read and write fluently? Any problems with this?

What we expect from you

We will ask you not to change any of your pain treatment during the course of the study, or if you do, could you please let us know? We need you to be committed to the project and willing to keep a daily diary. You need to be prepared to take part in all of the sessions as well as the follow up three months later.

Consent

If you consent to take part we will inform your GP and/ or referrer.

Any questions?

Measures to be completed:

Pain Catastrophising Scale

Pain Disability Index

Chronic Pain Acceptance Questionnaire

Pain Anxiety Symptom Scale

Pain Vigilance and Awareness Questionnaire

What happens next?

The individual will be offered treatment or rejected.

If rejected: Thank you for attending today, but unfortunately, we do not feel you will be benefit from this treatment.

If offered treatment: We can offer you treatment if you are willing to take part. Please could you let us know your decision in the next 48 hours? We will be available for discussion during this time if you have any questions, please contact us on this xxx number. Here is a consent form for you to fill in, please return it if you want to take part.

There will be a phone call to ascertain participation, following which the individual will return the consent form and will be informed about travel expenses.

Appendix 15: GP Letter

Dear *name*

We are writing to let you know that *name* has consented to take part in a study of a simple psychological treatment aimed to help people with chronic pain. The study is being conducted by Ms Siobhan Taylor a clinical psychologist in training under the supervision of Professor Stephen Morley.

The purpose of the treatment is to help *name* use their attention effectively to manage the pain and the distress it can cause. The treatment will be conducted over four weeks at the Psychology Department at St James's. There are no expected side effects. I hope that *name* will benefit from the treatment as they will be given tools to aid management of their pain, as they would get in therapy.

If you have any questions about this, please contact me at the address above.

Ethical approval for this study has been given by Jo Abbott on 01.08.11.

Yours sincerely,

Siobhan Taylor
Clinical Psychologist in Training

Stephen Morley
Honorary Consultant Clinical Psychologist
Professor of Clinical Psychology

Appendix 16: Change Interview protocol

MODIFIED CLIENT CHANGE INTERVIEW PROTOCOL

Fear of pain project

Instructions

Interview Strategy: This interview works best as a relatively unstructured empathic exploration of the client's experience of therapy. Think of yourself as primarily trying to help the client tell you the story of his or her therapy so far. It is best if you adopt an attitude of curiosity about the topics raised in the interview, using the suggested open-ended questions plus empathic understanding responses to help the client elaborate on his/her experiences. Thus, for each question, start out in a relatively unstructured manner and only impose structure as needed. For each question, a number of alternative wordings have been suggested, but keep in mind that these may not be needed.

Ask client to provide as many details as possible

Use the "anything else" probe (e.g., "Are there any other changes that you have noticed?"):

Iinquire in a non-demanding way until the client runs out of things to say

The interview covers

the client's assessment of change and assesses medication change as a possible reason

worsening and unfulfilled wants, attributions about change

helpful aspect of therapy - and unhelpful ones

their perception of measures

Change Interview Record

Client Initials _____ Case ID _____

Interviewer _____ Date _____

Number of previous sessions

Pharmacological Medication Record (incl. herbal remedies)

Have there been any changes in your drug regime (prescribed and OTC) since you started treatment?

Medication Name	For what symptoms?	Dose/ Frequency	How long?	Last Adjustment?

What changes, if any, have you noticed in yourself since therapy started?

- For example, are you *doing, feeling, or thinking* differently from the way you did before?
- What specific ideas, if any, have you got from therapy so far, including ideas about yourself or other people?
- Have any changes been brought to your attention by other people?

Note them here - then insert in the change list - then rate them.

Worsening Has anything changed for the worse for you since therapy started?

Wants Is there anything that you wanted to change that hasn't since therapy started?

Attributions In general, what do you think has caused these various changes? In other words, what do you think might have brought them about? (Including things both outside of therapy and in therapy)

Helpful Aspects Can you sum up what has been helpful about your therapy so far? Please give examples. (For example, general aspects or specific events)

PROBLEM ASPECTS

What kinds of things about the therapy have been hindering, unhelpful, negative or disappointing for you? (For example, general aspects. specific events)

Were there things in the therapy which were difficult or painful but still OK or perhaps helpful? What were they?

Has anything been missing from your treatment? (What would make/have made your therapy more effective or helpful?)

Suggestions Do you have any suggestions for us, regarding the research or the therapy? Do you have anything else that you want to tell me?

THE MEASURES

Daily diary In general, do you think that your daily diary ratings mean the same thing now that they did before therapy? If not, how has their meaning changed? (Sometimes clients change how they use the scales; did that happen for you?)

Other measures In general, do you think that your daily diary ratings mean the same thing now that they did before therapy? If not, how has their meaning changed? (Sometimes clients change how they use the scales; did that happen for you?)

Were any of these measures difficult for you to complete? Can you tell me why?

Any other comments you would like to make?

THANK YOU FOR YOUR TIME

CHANGE LIST

Change	Change was: 1 - expected 3 - neither 5 - surprised by	Without therapy: 1 - unlikely 3 - neither 5 - likely	Importance: 1-not at all 2-slightly 3-moderately 4-very 5-extremely
1.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
2.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
3.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
4.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
5.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
6.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
7.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
8.	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

CHANGE SCALES

Expected vs Surprised: For each change, please rate how much you *expected* it vs. were *surprised* by it? (Use this rating scale)

(1) Very much expected it
(2) Somewhat expected it
(3) Neither expected nor surprised by the change
(4) Somewhat surprised by it
(5) Very much surprised by it

Likely without therapy For each change, please rate how *likely* you think it would have been if you *hadn't* been in therapy? (Use this rating scale)

(1) Very unlikely without therapy (clearly would not have happened)
(2) Somewhat unlikely without therapy (probably would not have happened)
(3) Neither likely nor unlikely (no way of telling)
(4) Somewhat likely without therapy (probably would have happened)
(5) Very likely without therapy (clearly would have happened anyway)

Importance or significance How important or significant to you personally do you consider this change to be? (Use this rating scale)

(1) Not at all important
(2) Slightly important
(3) Moderately important
(4) Very important
(5) Extremely important