How do partners' beliefs about chronic pain relate to patients' acceptance of pain?

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Contents

Abstract

Background: It is now widely acknowledged that pain acceptance predicts a wide range of functional outcomes in chronic pain patients. Whilst there has been considerable research into individual factors that contribute to acceptance, little is known about the impact of social relationships on this process.

Aims: This thesis aims to explore how spouse's beliefs about pain, and their responses to patients when in pain, impact on patient acceptance. Second, the role of catastrophic thinking and acceptance will be explored in relation to psychological distress.

Method: A cross-sectional survey design was used with 61 patients and their partners recruited at a specialist chronic pain service. Patients completed the Chronic Pain Acceptance Questionnaire, the Pain Catastrophising Scale, and the Hospital Anxiety and Depression Scale in addition to measures of pain severity, functional disability, and socio-demographic information. Partners completed the spouse version of the Pain Catastrophising Scale which explores their beliefs about their partner's pain.

Results: Both depressive and anxious symptoms were common in this sample, with 49% and 58% respectively experiencing at least mild symptoms. Pain catastrophising and acceptance scores were significantly correlated with psychological distress, functional disability and pain severity. After adjusting for confounders, the CPAQ was a significant predictor of depression but not anxiety. Pain catastrophising was a significant predictor of both depression and anxiety. The addition of spouse catastrophising significantly improved the model for the prediction of anxiety. Patient and spouse catastrophising scores were both significant independent predictors of acceptance after adjusting for confounders. There was a significant effect of the interaction between patient and spouse catastrophising on acceptance, such that when patient catastrophising was low, low catastrophising in spouses was associated with greater acceptance, but when patient catastrophising was high, catastrophising in spouses had no effect. Neither the CPAQ total score nor its subscales were significantly correlated with spouse responses to pain.

Conclusions: These findings suggest that spouse catastrophising can impact on both patient acceptance and psychological distress. Understanding a spouse's beliefs about their partner's pain may be an important factor in achieving greater acceptance in patients.

1. Introduction

This thesis considers how spouses may be involved in patients' acceptance of chronic pain. In particular, it investigates whether spouses' beliefs about pain, and the way in which they respond to their partners when experiencing pain may help, or hinder the process of acceptance. This chapter aims to review the key research areas related to these questions and provide a justification for the current project. The main characteristics of chronic pain are described, including the biological basis of pain, its chief causes, and its impact on psychological wellbeing, quality of life and physical functioning. A review of psychological models of chronic pain is provided, with particular reference to behavioural and cognitive behavioural approaches. The role of social support in chronic pain is considered in the context of these theories. Key cognitive processes will be discussed, in particular the role of catastrophic thinking and acceptance in the development and maintenance of chronic pain conditions. Finally the aims of the current project will be introduced.

1.1. Chronic Pain

Modern definitions of pain refer to both its physical and psychological features, for example, the International Association for the Study of Pain (IASP) described it as "an unpleasant sensory and emotional experience, associated with actual or potential tissue damage, or described in terms of such damage" (Merskey & Bogduk, 1994). It is referred to as *chronic* when it lasts for a prolonged period, usually defined as three or six months (Breivik, Collett, Ventafridda, Cohen, & Gallacher, 2006; International Association for the Study of Pain, 1986), or beyond the expected healing time for a given injury (American Society of Anesthesiologists, 2010).

1.1.1. Biological Basis of Pain

Pain can be described as either *nociceptive*, referring to tissue damage pain, or *neuropathic*, referring to nerve damage (NHS Quality Improvement Scotland, 2006). Nociceptive pain arises from stimulation of peripheral nerve fibres known as nociceptors, which can be in the form of mechanical stimulation (e.g. injury resulting in broken bones, sprains or a degenerative condition such as osteoarthritis), thermal stimulation (excessive heat or cold) or chemical stimulation (e.g. coming into contact with a harmful substance). It is usually characterised by aching, sharp, or stabbing sensations. Nociceptive pain tends to be well localized when associated with a specific injury but the pain can be more diffuse when associated with visceral structures (Nicholson, 2003). Neuropathic pain is caused by damage or degeneration to any part of the nervous system and is commonly seen in diabetes, stroke, spinal cord injuries and post-surgery patients (Bouhassira, Lantéri-Minet, Attal, Laurent, & Touboul, 2008). It is characterized by stabbing, shooting, burning and electric shock sensations and patients may also experience allodynia (pain sensation in response to stimuli that would not normally cause pain) (Gatchel, Peng, Peters, Fuchs, & Turk, 2007).

There are numerous theories that seek to explain the transition from acute to chronic pain and most contemporary models take a biopsychosocial approach to understanding the development and maintenance of chronic pain (Gatchel, et al., 2007; Main, Sullivan, & Watson, 2008). Many of these models are disease specific, and therefore a full review is beyond the scope of this thesis but a brief explanation of the biological processes involved in chronic pain will be described here. Inflammation and activation of spinal pathways occurs in the presence of acute pain, which lead to nerve fibres carrying information to the spinal cord to induce protective muscle spasm and avoid further injury. During the normal recovery process from an injury, fewer pain signals are sent and pain reduces. For patients who develop chronic pain, stimulation of nerve fibres and muscle spasm continue as if the body is still responding to an acute injury, causing continued avoidance of activities (Marcus, 2009). Over the longer term, continued reduction in movement can lead to ‘disuse’ or ‘deconditioning syndrome’ (Bortz, 1984).

The incorporation of biological and psychological elements of chronic pain was first introduced in Melzack and Wall’s (1965) Gate Control Theory. It proposed that nerve fibres carry information from the injury site to the dorsal horn on the spinal cord where a gating mechanism exists that could be opened or closed depending on the type of nerve fibre stimulated. Affective reactions to pain were thought to open the pain gate. This theory has subsequently been updated and modified to incorporate findings from imaging studies that provide a more comprehensive explanation of the relationship between biological and emotional processes (Gatchel, et al., 2007; Melzack, 2001; Melzack & Casey, 1968). Theories which further describe the role of cognitive and affective processes in chronic pain are described in section 1.2.

1.1.2. Epidemiology of Chronic Pain

Community-based surveys suggest a high level of self-reported chronic pain in the general population estimating the prevalence at between 15% and 48% depending on the severity and duration of pain (Bekkering et al., 2011; Breivik, et al., 2006; Elliott, Smith, Penny, Smith, & Chambers, 1999; Reid et al., 2011; Torrance, Smith, Bennett, & Lee, 2006). Longitudinal population-based studies suggest that pain is often a persistent condition with 78.5% of those who experienced chronic pain at baseline reporting that it was still present at 4-year follow-up (Elliott, Smith, Hannaford, Smith, & Chambers, 2002). Chronic pain is more common in women than men (Elliott, et al., 1999) and increases with age; 45-80% of older adults in institutional settings suffer from chronic pain (Maxwell et al., 2008) . Other factors that have been associated with chronic pain include lower income, unemployment and being retired (Morley, Williams, & Hussain, 2008).

The main causes of chronic pain in the community are musculoskeletal conditions (such as back pain, rheumatoid arthritis and fibromyalgia), post-injury pain, angina-related pain and gynecological pain in women (Elliott, et al., 1999). Neuropathic pain is less common in the general population (Breivik, et al., 2006; Torrance, et al., 2006) but generates a proportionately larger number of referrals to chronic pain clinics (National Institute for Health and Clinical Excellence, 2010). Experiencing pain in more than one site is common, with 40% of chronic pain sufferers experiencing pain in at least three locations. Many patients also experience a combination of both nociceptive and neuropathic pain (Elliott, et al., 1999).

Around one third of chronic pain patients do not have any specific diagnosis and no obvious injury can be detected (The Pain Society, 1997). Historically, if a medical cause could not be found then the pain was attributed to a psychological problem, or described as psychosomatic, but in recent years it is widely accepted that pain can exist in the absence of a clear injury (Fordyce, 1976). Eccelston (2010) notes that the IASP definition of pain acknowledges only a loose association between actual damage and the experience of pain. This is consistent with the poor correlation between physical pathology and self-reported pain severity (Sharp, 2001).

1.1.3. Impact of Chronic Pain

The experience of chronic pain varies widely and depends on its aetiology, location, specific sensations, and the extent to which it impacts on everyday life and prevents sufferers from performing their usual activities. A Europe-wide community based survey found that 65% of sufferers had disturbed sleep as a result of their pain, 54% reported that they struggled to do normal household chores, 47% felt it restricted their social activities, and 48% had either changed jobs or lost their job as a result of chronic pain (Breivik, et al., 2006).

The link between chronic pain and mood disorders is well established in both epidemiological surveys and studies of mental health problems in clinical pain samples (Bair, Robinson, Katon, & Kroenke, 2003). An estimated 40-50% of patients (Tunks, Crook, & Weir, 2008) suffer from significant depressive symptoms and 35% suffer from anxiety (McWilliams, Cox, & Enns, 2003). However, the direction of causality is hard to establish with prospective cohort studies reporting that pain is a significant predictor of affective symptoms and vice versa (Gatchel, et al., 2007; Tunks, et al., 2008). A number of possible explanations have been proposed to explain this relationship, for example, Rudy, Kerns and Turk (1988) suggested that a bidirectional relationship exists in which pain and mood disorders are mutually maintaining. Others suggest that chronic pain and mental health problems may have shared vulnerability, possibly due to genetics or early life experiences, which can lead to the expression of both conditions under certain environmental influences (Asmundson & Katz, 2009). Possible mechanisms by which patients may develop depression are discussed in greater detail in Section 1.2. Perhaps the most important feature of this relationship is that patients with comorbid depression and chronic pain tend to have poorer outcomes with regards to pain severity and disability than patients without depression (Bair, et al., 2003).

1.1.4. Treatment of Chronic Pain

Most patients with chronic pain are treated in primary care with analgesic or anti-inflammatory medication. In the event that this is unsuccessful, patients are referred to specialist pain management services which take a multidisciplinary approach to treatment. The remit of these services is to alleviate pain where possible and if pain relief cannot be achieved, the goal is to reduce disability and psychological distress associated with pain. Typically, pain services will offer specialist pharmacological therapy, surgical procedures, physiotherapy and stimulation induced analgesia, for example with the use of a transcutaneous electrical nerve stimulation (TENS) machine. Pain education is an important component of these services, with patients receiving advice on topics such as pacing activities, stretching, posture, and the impact of emotions on pain (The Pain Society, 1997). Some services also offer specialized pain management programmes, which usually take a cognitive behavioural approach (The British Pain Society, 2007), although increasingly, mindfulness and acceptance-based treatments are being offered in the UK (Vowles & McCracken, 2008) (discussed in section 2.2.3 and 2.2.4). Individual psychological interventions for chronic pain are usually only offered in specialist pain clinics and only then when other approaches to pain management have failed.

1.2. Psychological Models of Chronic Pain

This section reviews and critiques the prominent psychological models of chronic pain, in order to place the research questions in the context of relevant literature.

1.2.1. Behavioural Model

Contemporary psychological models of chronic pain are multidimensional, and incorporate a range of biological, psychological and social factors that interact to maintain symptoms. In the 1970s and 1980s, behavioural theories were prominent (Fordyce et al., 1973), and focused on how principles of operant conditioning could explain the existence of "pain behaviours" such as limping, verbal expressions of pain, taking analgesic medication or avoiding certain activities. Fordyce et al. (1973) reported that such pain behaviours increased when they were reinforced with sympathetic responses from family members and medical staff. This was thought to lead patients to exhibit pain behaviours as social cues to others that they were in pain, regardless of whether pain was actually experienced. Continued engagement in these pain behaviours was hypothesized to be detrimental to the recovery process as it prevented patients from returning to usual activities.

This theory is supported by a series of observational studies which explored how patients thought their spouses responded to them when they experienced pain. These studies focused on the role of 'solicitous' responses from significant others, such as encouraging rest to avoid exertion or taking over activities. Patients whose family members gave solicitous responses tended to display more pain behaviours and reported greater levels of disability than patients whose partner responded in a non-solicitous way (Block, 1981; Block, Kremer, & Gaylor, 1980; Romano, Jensen, Turner, Good, & Hops, 2000; Romano et al., 1995; Schwartz, Jensen, & Romano, 2005). Block, Edwin and Kremer (1980) used an experimental design to explore whether patient pain levels differed when in the presence of their spouse compared to the presence of a neutral observer. Patients who thought their spouse responded in a non-solicitous way reported lower pain levels in the spouse observed condition. By contrast, there was no difference in reported pain levels in the spouse- and neutral-observer conditions for patients who thought their spouse responded solicitously. Similar results have been reported in studies which used experimentally-induced pain (Flor, Breitenstein, Birbaumer, & Furst, 1995). Taken together these findings suggested that solicitous responses served to increase pain severity reported by patients as well as reinforce pain behaviours. This is substantiated in the literature by the finding that both patients' and spouses' ratings of spouse responses are associated with pain severity (for a review, see Leonard, Cano & Johansen, 2006)

Reducing reinforcement of pain behaviours has been shown to decrease their frequency, and providing reinforcement for coping with activities, such as doing housework and fulfilling usual social roles, has been shown to increase the frequency of these so-called 'well behaviours' (Cairns & Pasino, 1977; Fordyce, et al., 1973). These findings have led to behavioural treatment programmes based on the modification of environmental contingencies. A systematic review of studies comparing behavior therapy (BT) to a wait-list control group reported that those in the behaviour therapy group exhibited significantly fewer pain behaviours following treatment, and there was a small reduction in pain intensity, affective symptoms (excluding depression) and reduced interference in social role functioning (Morley, Eccleston, & Williams, 1999).

However, the behavioural model has come under criticism, both in terms of the theoretical underpinnings of the model and the interpretation of evidence used to support it (Sharp, 2001; Turk, 1996). Turk (1996) suggests that the concept of pain behaviours is poorly defined and the assumption that such behaviours are maladaptive is not necessarily accurate. The goal of extinguishing pain behaviours is often not shared by patients, and furthermore, attempts to reduce pain behaviours potentially causes patients to underreport the pain they experience, which may lead to inappropriate medical management. Finally, although some patients respond well to behavioural treatment, the rate of relapse is high, suggesting that the underlying factors maintaining the pain, and perhaps the emotional problems associated with them, have not been addressed (Turk & Rudy, 1991).

Sharp (2001) questioned the conclusion that successful behavioural treatment programmes confirmed the appropriateness of the behavioural model in explaining the maintenance of chronic pain. Specifically he suggested that it ignores potential cognitive shifts that may occur as a result of modification to the environment. Furthermore, if contingent reinforcement were the main reason that pain behaviours were maintained, then management programmes that involved spouses should result in better outcomes. However, a behavioural treatment programme that incorporated spouse training into the programme was no more effective than the standard inpatient based programme (Moore & Chaney, 1985). Finally, some studies have failed to replicate the finding that spouse solicitousness is associated with pain behaviours (Lousberg, Schmidt, & Groenman, 1992).

1.2.2. Cognitive-Behavioural Models

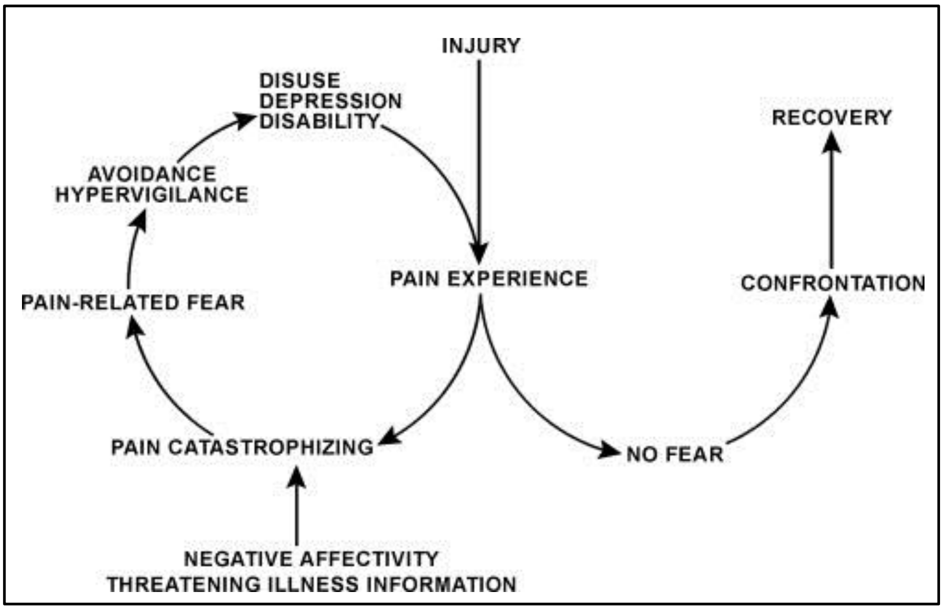
These criticisms, together with the broader shift towards incorporating cognitive theories has led to the development of cognitive-behavioural models of chronic pain (Asmundson, Norton, & Vlaeyen, 2004; Sharp, 2001; Turk, Meichenbaum, & Genest, 1983; Turk & Okifuji, 2002; Vlaeyen & Linton, 2000). These models acknowledge the role of operant conditional principles in maintaining chronic pain but place greater emphasis on patients’ cognitions about pain, and secondary appraisals made about the meaning of having pain, including their interpretation of environmental influences. These cognitive behavioural elements are now a well-accepted part of most biopsychosocial pain models, including those with an emphasis on the neurological processes that cause chronic pain (Gatchel, et al., 2007). A full review of cognitive behavioural models for chronic pain would be beyond the scope of this chapter, but three key models will be discussed here; the fear-avoidance model (Asmundson, et al., 2004; Lethem, Slade, Troup, & Bentley, 1983; Slade, Troup, Lethem, & Bentley, 1983; Vlaeyen & Linton, 2000), Sharp's cognitive-behavioural model (Sharp, 2001) and Vlaeyen and Morley's mood-as-input model (2004).

1.2.2.1. Fear Avoidance Model

The Fear-Avoidance Model was initially introduced by Letham and colleagues (1983) and proposed that fear of pain was a central cause of disability associated with pain. The model suggested that avoidance and confrontation can be seen as two bipolar opposite approaches to managing this fear, with the former maintaining chronic pain, and the latter leading to recovery. This hypothesis has been extended (Vlaeyen & Linton, 2000) and is represented diagrammatically in Figure 1.1.

Threat of Pain. According to the model, pain can be interpreted as either non-threatening or threatening and the extent to which pain is disabling, both emotionally and physically, depends on this interpretation. The perceived threat associated with pain is thought to stem from individual differences in vulnerability to anxiety, and past events that may have led to beliefs about personal resources or 'self-efficacy' (Bandura, 1977; Leeuw et al., 2006; Mineka & Zinbarg, 2006). Self-efficacy refers to "people's judgments of their capabilities to execute given levels of performance and to exercise control over events" (Bandura, O'Leary, Barr Taylor, Gauthier, & Gossard, 1987). In relation to chronic pain this refers to the extent to which a person feels able to manage their pain, and is willing to take action to bring about change or persevere with difficult challenges (Miller & Newton, 2006) .

Figure 1.1 The Fear Avoidance Model (Vlaeyen & Linton, 2000)



People who interpret pain as non-threatening are less fearful of the sensory experience, and are therefore more likely to continue with normal activities, as much as is possible, eventually leading to some form of recovery. By contrast, patients that interpret pain as threatening, tend to have 'catastrophic thoughts' about their pain.

Catastrophising. This refers to the presence of fear-provoking, and usually exaggerated predictions about the nature of pain, the consequences of it, and the ability to cope with it. Typical catastrophic thoughts might be: "I just can't stand it anymore" or "It's terrible and I think it's never going to get any better". The concept of catastrophising was first introduced by Ellis (1962) and is widely accepted in the anxiety literature.

Fear of pain and avoidance. Catastrophic thoughts are hypothesized to lead to a fear of experiencing pain, and avoidance behaviours in anticipation of experiencing pain.

Avoidance may also occur through a process of vicarious learning, for example, seeing other people experience pain when lifting and therefore avoiding lifting themselves. Continued avoidance of activities is negatively reinforced because pain is not experienced and there is no opportunity to disconfirm the belief that engaging in a specific activity will cause damage. This avoidance may generalize to a broader range of activities and prolonged avoidance of certain movements may lead to loss of physical conditioning (Bortz, 1984). A further behavioural response to catastrophic thoughts is hypervigilence to pain sensations. Continual monitoring of such sensations can lead to difficulties disengaging attention from pain. This may in turn lead to further avoidance measures and perpetuate the belief that pain is a sign of disease progression.

Disuse. Ultimately, this pattern of behaviour is hypothesized to increase functional impairment associated with chronic pain as well as emotional distress resulting from the inability to perform normal social roles such as working and caring for family. The model also acknowledges that negative affectivity and threatening illness information may increase the frequency or intensity of catastrophic beliefs.

1.2.2.2. Sharp’s Model of Chronic Pain

Sharp’s model of chronic pain (2001) shares many features with the fear-avoidance model, although it considers a more comprehensive set of environmental factors that may contribute to appraisals about chronic pain, for example, incorporating behavioural concepts of social reinforcement of pain (presented earlier) as well as the role of culture, financial factors and litigation. A further element of this model is Sharp's conceptualization of avoidance of activities, or taking steps to reduce the risk of harm, as 'safety behaviours', consistent with the terminology used in the anxiety literature (Salkovskis, 1991). Drawing from Salkvokskis and Bass' health anxiety model (1997), Sharp recognises the role of reassurance seeking from others in reinforcing patients' own beliefs.

1.2.2.3. Mood as Input Model

Vlaeyen and Morley (2004) recognised the weakness of the fear avoidance model in failing to explain why some chronic pain patients are prone to overexertion, and presented the mood-as-input model to account for this. They identify a number of studies that paradoxically found that depressed mood was associated with better physical performance in experimental tasks (van den Hout, Vlaeyen, Houben, Soeters, & Peters, 2001; Vlaeyen, Pastoors, & Peters, 2003) and that this may relate to 'the informational value of a mood in a given context' (Vlaeyen & Morley, 2004). Central to this model is the idea that people use 'stop-rules' to decide when to end a specific task, such as the 'As many as can' rule when finishing the task is the priority, and 'Feel like discontinuing' rule when they are not enjoying the task. The Mood-as-Input model posits an interaction between mood and stop rule such that depressed mood may result in task persistence when using the 'as much as can rule' but result in earlier termination of the task when using the 'feel like discontinuing' rule. Evidence is emerging to suggest the importance of stop-rules in task performance (Karsdorp, Nijst, Goossens, & Vlaeyen, 2010), however, as yet there is little evidence for the suggested interaction between mood and rule. Nevertheless, this model draws attention to an important gap in the literature in explaining overuse in chronic pain.

1.2.2.4 Evidence for the Cognitive-Behavioural Model

There is strong evidence for connections between elements of this model, both in the chronic pain literature (Vlaeyen & Linton, 2000) as well as the broader evidence-base for cognitive and behavioural approaches to mental health problems (Beck, Rush, Shaw, & Emery, 1979).

In cross-sectional studies, higher scores on pain-specific measures of catastrophic thinking (e.g. the Pain Catastrophising Scale, Sullivan, Bishop & Pivik, 1995) have been shown to predict pain-related fear better than pain intensity or severity (McCracken & Gross, 1993; Vlaeyen, Kole-Snijders, Boeren, & van Eek, 1995). Furthermore, catastrophic thoughts are associated with greater functional disability, interference with activities, and chronicity of back problems after accounting for pain severity (Burton, Tillotson, Main, & Hollis, 1995; Cook, Brawer, & Vowles, 2006; Sullivan et al., 2001). One study has reported a longitudinal relationship between catastrophic thinking and pain, with catastrophising prior to receiving a knee operation predictive of persistent post-operative pain, after adjusting for preoperative pain levels (Forsythe, Dunbar, Hennigar, Sullivan, & Gross, 2008). Catastrophic thinking is also strongly associated with suffering from symptoms of depression and anxiety (Gauthier, Thibault, & Sullivan, 2011; Sullivan, et al., 2001; Vowles, McCracken, & Eccleston, 2008a).

Both pain-related fear and catastrophising are correlated with functional impairment which supports the assertion that these cognitive processes result in avoidance of activities (McCracken, Zayfert, & Gross, 1992). However these findings were from a cross-sectional survey, and therefore it cannot be ruled out that fear is a response to heightened pain experienced by people with greater functional impairment. More convincing evidence comes from experimental studies which have shown that pain-related fear is associated with a narrower range of motion (Vlaeyen, et al., 1995) and length of time a weight could be lifted (Crombez, Vervaet, Lysens, Baeyens, & Eelen, 1998) after controlling for self-reported pain severity. The latter study found that fear of pain was more strongly correlated with duration of time the weight could be held than the intensity of pain involved in lifting the weight. This suggests that patients with a high fear of pain discontinue an activity in anticipation of further pain or damage rather than the actual pain experienced at that time.

Pain-related fear is correlated with excessive attention towards pain, supporting the hypervigilence element of the model (Leeuw, et al., 2006). The literature suggests that people who attend to pain stimuli excessively have difficulty in disengaging their attention from the pain, rather than a propensity to directing their attention to pain initially (Crombez, Van Damme, & Eccleston, 2005). High catastrophisers have more difficulty disengaging from pain cues compared to low catastrophisers which further supports the fear avoidance model.

Finally the fear avoidance model posits that the propensity to interpret stimuli as threatening is based on previous life experiences and self-efficacy. There is evidence from a cross sectional survey that beliefs about pain (e.g. “My pain would stop anyone from leading an active life”) are associated with greater pain severity, and greater interference in everyday activities (Cano, Miller, & Loree, 2009).

Studies show that self-efficacy is negatively correlated with catastrophic thinking and is associated with better physical and psychological outcomes in many pain conditions (Borsbo, Gerdle, & Peolsson, 2010; Denison, Asenlof, & Lindberg, 2004; Keefe, Lefebvre, Maixner, Salley, & Caldwell, 1997; Lefebvre et al., 1999; Shelby et al., 2008; Turner, Ersek, & Kemp, 2005). However the majority of these studies are cross-sectional, so again it is difficult to ascertain the direction of causality between these factors. It is plausible that those who have more difficulty in finding effective pain relief may experience a reduction in their self-efficacy with regards to managing their condition.

1.2.2.5. Cognitive-Behaviour Therapy

Cognitive Behaviour Therapy (CBT) is based on the cognitive-behavioural model of chronic pain and has been the mainstay of psychological therapy for pain management for some years. Good quality interventions incorporate a broad range of elements, but briefly, CBT focuses on identifying and modifying unhelpful thoughts and beliefs about pain and behavioural techniques such as activity scheduling, pacing and relaxation strategies (Morley, et al., 2008). Changes in catastrophic thinking, self-efficacy and broader pain beliefs have been associated with improvements in patients' physical functioning following treatment (Jensen, Turner, & Romano, 2007; Turner, Holtzman, & Mancl, 2007; Vowles, McCracken, & Eccleston, 2007) thus highlighting the importance of cognitive techniques. However, studies that have explored the efficacy of CBT have reported mixed results. A recent Cochrane review of CBT for chronic pain (Eccleston, Williams, & Morley, 2009) found only a weak treatment effect for pain, psychological distress and disability at follow-up when compared to active control groups. This, and other reports have highlighted the poor treatment quality of some studies and the possibility that dilution of the fundamental elements of CBT may reduce possible gains (Eccleston, et al., 2009; Morley, 2011). Furthermore, in a study of 1013 patients who had completed a four-week CBT-informed pain management programme, only one in four experienced a clinically significant change in their level of pain and one in three experienced a clinically significant change in measures of depression and anxiety (Morley, et al., 2008). Whilst this demonstrates that a significant minority did benefit from treatment, it highlights the need for further research into why CBT is effective for some but not others (Vlaeyen & Morley, 2005).

Keefe and colleagues have suggested that there is a lack of clarity as to how specific elements of CBT are associated with changes in functional disability and measures of pain severity, or indeed whether these are common to all patients (Keefe, Rumble, Scipio, Giordano, & Perri, 2004; Morley & Keefe, 2007). There is also evidence that improvement in psychological outcomes can occur in the absence of changes to cognitive processes (Longmore & Worrell, 2007) which calls into question whether cognitive change is a necessary objective of CBT. These criticisms have led to interest in alternative approaches to the psychological treatment of chronic pain that place less emphasis on challenging negative cognitions.

1.2.3. Mindfulness-based Models of Chronic Pain

There has been a growing interest in so-called Third-wave approaches to chronic pain, in particular acceptance- and mindfulness-based models (Hayes, Strosahl, & Wilson, 1999; Kabat-Zinn, 1982, 1990; Segal, Williams, & Teasdale, 2002). This approach to pain management is not new, although historically mindfulness has received less interest than CBT, perhaps due to the lack of a clear theoretical model in the early stages of its development (Baer, 2003; McCracken & Thompson, 2009). More recently, a number of authors have attempted to place mindfulness within a cognitive behavioural framework and with more focus on the theoretical underpinning of individual treatment components (Baer et al., 2008; McCracken & Thompson, 2009; Schutze, Rees, Preece, & Schutze, 2010).

Mindfulness has been described as the ‘awareness that emerges by way of paying attention on purpose, in the present moment and non-judgmentally to the unfolding experience moment by moment’ (Kabat-Zinn, 2003). This decentred approach to observing pain sensations is a fundamental aspect of mindfulness-based stress reduction programmes that have been shown to reduce psychological distress and improve quality of life in people with chronic pain (Grossman, Tiefenthaler-Gilmer, Raysz, & Kesper, 2007; Kabat-Zinn, Lipworth, & Burney, 1985; Pradhan et al., 2007; Sephton et al., 2007). There is also some evidence of an improvement in self-reported pain severity although the majority of studies have not found such an effect (Gardner-Nix, Backman, Barbati, & Grummitt, 2008; Grossman, et al., 2007).

1.2.4. Acceptance and Commitment Therapy

Acceptance and Commitment Therapy (ACT), sometimes referred to as Contextual Cognitive Behavioural Therapy, shares many common features with mindfulness-based approaches. ACT is predominantly behavioural in its approach and aims to address cognitive processes using behavioural techniques rather than modifying or restructuring the content of cognitions (Fletcher & Hayes, 2005; Vowles & McCracken, 2008).

A key theoretical framework underpinning ACT is Relational Frame Theory (RFT) which builds on Skinner’s (1957) work on the functional analysis of verbal behaviour. According to RFT, the ability to relate events (for example, seeing a cat, and relating it to the word “cat”) allows functions to be transformed. The way in which we relate events is dependent on both history and contextual factors (Hayes, Barnes-Holmes, & Roche, 2001). According to Fletcher and Hayes (2005) ‘Psychopathology evolves in part because derived relations dominate over other sources of behavioral regulation due to an inability to detect the ongoing process of thinking as distinct from the products of thinking’. The focus of ACT is to increase psychological flexibility, that is ‘the ability to fully contact the present moment and the psychological reactions it produces as a conscious person and to persist or change behaviour in the situation in the service of chosen values’ (Fletcher & Hayes, 2005). Six key elements are involved in the model of psychological flexibility, with ‘flexible’ modes represented in Figure 1.2 and their polar opposites, or ‘inflexible’ and harmful modes that lead to psychopathology, provided in Figure 1.3.

In this context *acceptance* refers to the willingness to experience pain sensations and emotions without attempts to avoid, control or suppress them (Hayes, et al., 1999). Acceptance can be thought of as a process of ‘disengagement from struggling with pain’ (McCracken & Eccleston, 2003). It contrasts from the inflexible approach of *experiential avoidance*, in which attempts are made to avoid private experiences, including cognitions and emotions, bodily sensations and behaviours (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996; McCracken & Vowles, 2007). Engaging in this avoidance may result in symptom relief in the short-term. However, it may prevent patients from participating in activities that lead to longer term life satisfaction (Wicksell, Lekander, Sorjonen, & Olsson, 2010).

Fusion refers to the dominance that a particular thought or verbal function has over other available information or verbal functions and the impact this has on behaviour (Hayes, et al., 1999). People are described as ‘fused’ with their thoughts if they have a strong belief in a cognition (e.g. “I am unlovable”) and then behave in accordance with this thought, even if this is inconsistent with goals or values. Thus *cognitive defusion* is the process of undermining the influence of verbal processes by distancing one's self from the content of a thought (Ciarrochi & Bailey, 2008). Cognitive defusion is similar to the notion that thoughts are just thoughts and not facts which is promoted in mindfulness-based therapy. (Segal, et al., 2002).

Figure 1.2: 'A model of psychological processes ACT seeks to strengthen' (Fletcher & Hayes, 2005)

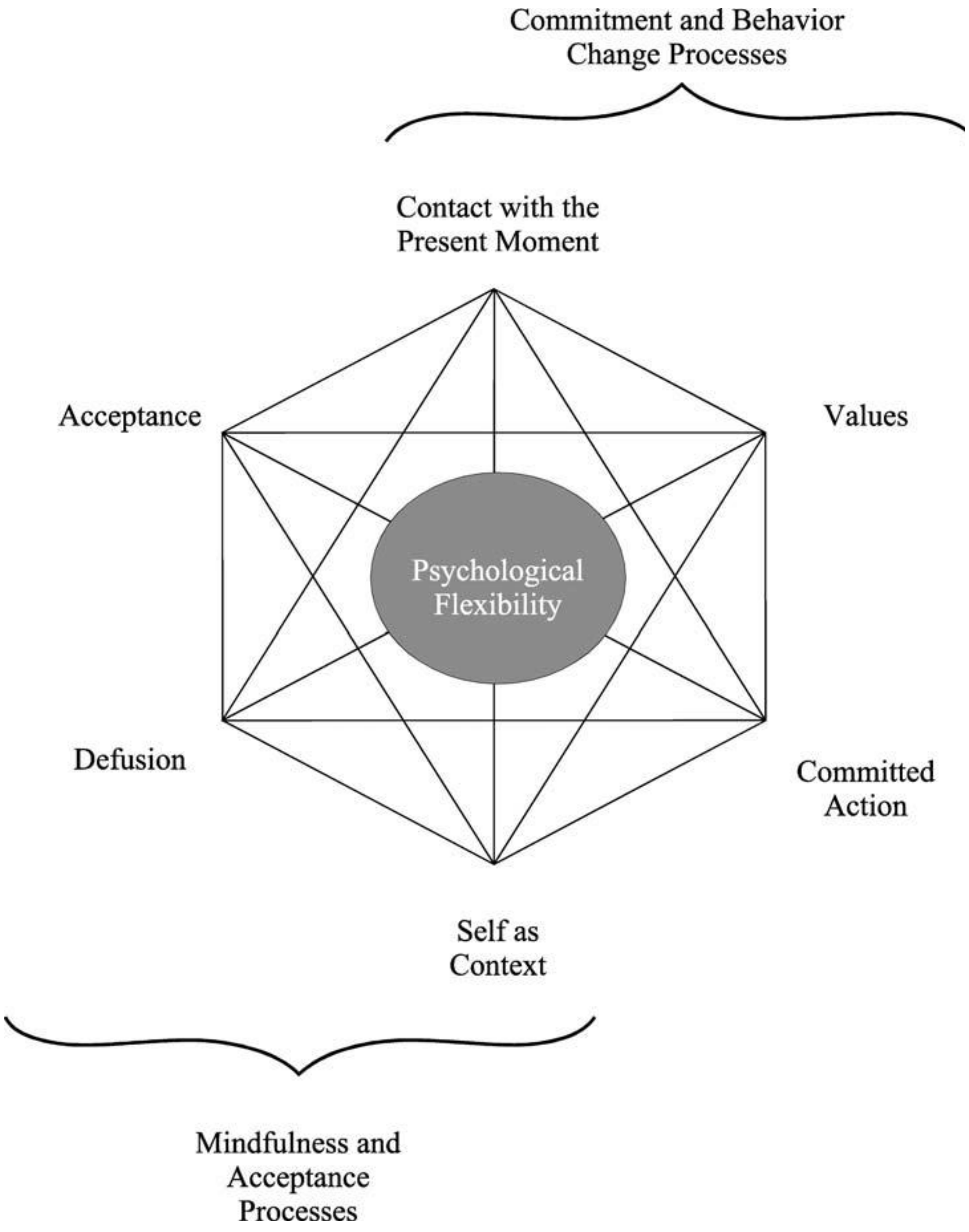
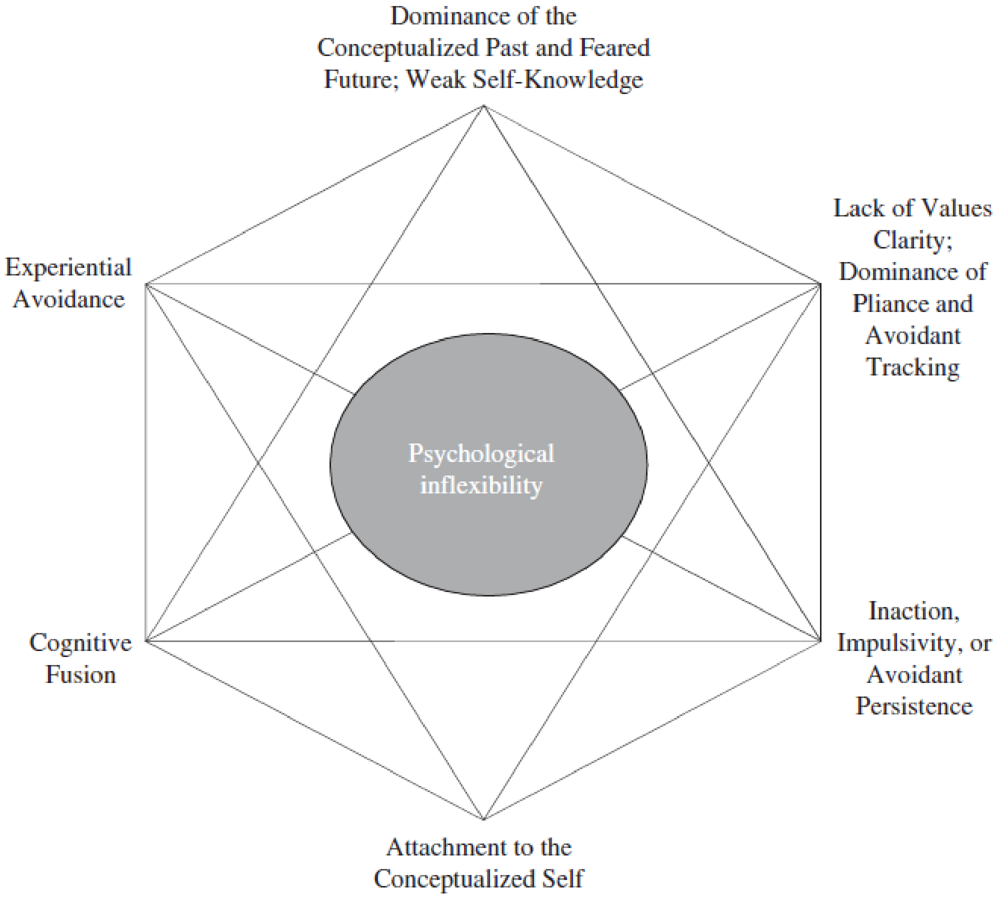


Figure 1.3 Model of psychopathology in ACT (Fletcher & Hayes, 2005)



Contact with the present moment involves attending to both internal stimuli, such as thoughts and sensations, and external stimuli in the here and now (Fletcher & Hayes, 2005). Patients are encouraged to see the self as a process, observing events in a non-judgemental way, and without making appraisals of themselves or the thoughts they are experiencing. This is contrasted with the unhealthy mode of focusing on either the past or the future and making self-judgements in relation to specific events. Poor contact with the present moment may lead people to ‘live in their heads’ consumed by the content of negative thoughts and reducing psychological flexibility (Hayes, Luoma, Bond, Masuda, & Lillis, 2006).

Self as context can be thought of as an ‘observer self’ leading to ‘a sense of self as a locus or perspective’ (Fletcher & Hayes, 2005). Encouraging patients to see the self as context helps them to shift from identifying with the conceptualised self, which may be characterized by negative appraisals, to a more de-centred self.

Values can be considered as a stated direction in which a person wants to go in their life and which are meaningful to them. These are distinct from goals in that they cannot necessarily be achieved, but are rather guiding principles, for example being a more considerate friend, or being a better father. *Committed action* refers to the practical application of moving towards chosen values, in a way that brings about tangible changes in behaviour. In ACT, the goal is to increase the extent to which behaviour is consistent with values expressed by the patient, also known as *value congruence*, and reduce behaviour that is guided by social pressures or a wish to avoid unpleasant experiences (Hayes, et al., 1999).

These six processes are inextricably linked and therefore effective changes in one element leads to other improvements (Fletcher & Hayes, 2005). For example, if acceptance is increased, then contact with the present moment is improved, and experiential avoidance of internal experiences will reduce. Acceptance may also help people to become more aware of values and associated goals.

1.2.4.1. Evidence for Acceptance-Based Models

During the early development of acceptance and mindfulness-based models, ACT was criticized for its lack of empirical evidence and that its use in clinical settings was premature (Corrigan, 2001). However, over the past decade, there have been considerable advances in defining and measuring the main concepts involved in

ACT. There have also been rigorous clinical trials of ACT for chronic pain with some comparing it to established treatments such as CBT.

Measures of acceptance have been developed, such as the Chronic Pain Acceptance Questionnaire (CPAQ) (Vowles, McCracken, McLeod, & Eccleston, 2008) which has the most robust psychometric properties of acceptance questionnaires that are specific to chronic pain (Reneman, Dijkstra, Geertzen, & Dijkstra, 2010). The questionnaire includes two main subscales with 11 items relating to ‘activities engagement’ (e.g. ‘I lead a full life even though I have chronic pain’) and 9 reverse-rated items relating to ‘willingness to experience pain’ (e.g. ‘I would gladly sacrifice important things in my life to control this pain better’). Cross-sectional studies have shown that higher scores on the CPAQ is associated with fewer symptoms of depression and anxiety, better physical functioning, health-related quality of life and lower self-reported pain intensity (Elander, Robinson, Mitchell, & Morris, 2009; McCracken & Keogh, 2009; McCracken & Velleman, 2010). A recent prospective study has found that pain acceptance predicted four month pain-related anxiety, depression and ability to undertake activities of daily living after controlling for these measures at baseline (McCracken & Vowles, 2008).

More broadly, measures of psychological flexibility and values-based action have been associated with better physical and psychological functioning on the Short Form-36 wellbeing questionnaire (McCracken & Velleman, 2010). Experiential avoidance is also strongly associated with measures of psychological distress in pain patients (Hayes et al., 2004).

Preliminary evidence from clinical trials investigating interventions targeting acceptance are encouraging and suggest that the ability to accept pain is not a fixed attribute but something that is amenable to change. Vowles and McCracken (2008) reported on a sample of 171 participants who completed 3 or 4 week intensive ACT treatment. Treatment resulted in statistically significant improvements in pain, depression, anxiety and disability. Seventy-five percent of participants experienced a clinically significant change in at least one of these domains post-treatment, and in a three year follow-up of 108 of these participants, 65% had a clinically significant change in at least one domain, compared to pre-treatment measures (Vowles, McCracken, & O'Brien, 2011). Two other studies have reported improved emotional and physical outcomes in patients who had ACT compared to a waitlist control group (McCracken, Vowles, & Eccleston, 2005; Wicksell, Ahlqvist, Bring, Melin, & Olsson, 2008).

A pilot study compared ACT to Cognitive Behaviour Therapy in a small sample of patients. This study found that ACT was more effective in reducing depression and was at least as good as CBT for other outcomes (Vowles, Wetherell, & Sorrell, 2009). Furthermore, changes in ACT-based therapeutic processes including acceptance, mindfulness and values-based action have also been associated with reduction in psychological distress following treatment for chronic pain (McCracken & Gutiérrez-Martínez, 2011).

Despite these advances in building the evidence base for ACT, there continues to be criticism of this approach in the literature, for example suggesting that ACT is a variation of CBT but not fundamentally distinct from it (Hofmann & Asmundson, 2008; Leahy, 2008). Furthermore, the intervention studies published are led by a small group of researchers, many of whom have been directly involved in the development of ACT-based therapies, and it has yet to be seen whether these findings will be replicated when attempted by other research groups or less skilled therapists. It is important to acknowledge that compared to other, more established therapies, ACT is still in its infancy and is still evolving.

1.2.4.2. Acceptance and Catastrophic Thinking

Acceptance is correlated with many well-established CBT constructs. Negative thoughts about pain and avoidance have been associated with poorer activities engagement and lower willingness to experience pain (Elander, et al., 2009; McCracken, Vowles, & Zhao-O'Brien, 2010). Patients with greater acceptance tend to give less attention to their pain and are therefore less hypervigilant to potential changes in pain sensations, and the tendency to make negative appraisals about such changes (Viane, Crombez, Eccleston, Devulder, & De Corte, 2004).

One important mechanism by which acceptance may contribute to a cognitive behavioural understanding of chronic pain is through its association with catastrophic thinking. Studies have reported a strong negative correlation between self-report measures of acceptance and catastrophising in chronic pain samples (-.50 to -.63), such that those who are less likely to engage in catastrophic thinking are more likely to be accepting of their pain (Richardson et al., 2010; Richardson et al., 2009; Vowles, McCracken, & Eccleston, 2008b). The mechanism by which these two processes are related is still under debate, however it makes logical sense that catastrophisers would be less willing to experience pain (a facet of pain acceptance) due to its feared consequences. Furthermore, catastrophising has been associated with greater difficulty in disengaging from pain (Leeuw, et al., 2006) which may result in poorer engagement in activities when pain is severe.

Another possible pathway is that acceptance may impact on the relationship between pain and catastrophising. In a study of experimentally-induced pain, willingness to experience pain was shown to moderate the impact of catastrophising on pain interference, as measured by speed of response on a Stroop task. Catastrophising was only associated with low pain tolerance when acceptance was also low (Richardson, et al., 2010) and therefore acceptance can be seen as a ‘buffer’ between catastrophising and pain interference (Figure 1.4). However, acceptance did not mediate the effects of catastrophising on pain-related activity interference in the past week.

Acceptance has been shown to have a mediating effect on the relationship between catastrophising and depression, pain-related fear and functional disability in chronic pain samples. Vowles, McCracken and Eccleston (2008b) reported that variance accounted for by catastrophising in predicting these outcomes reduced when acceptance was added into the model. This fits with the theoretical basis of ACT, that is, acceptance enables patients to continue with activities *despite* internal experiences such as catastrophic thinking, rather than by attempts to modify these experiences.

Vowles, McCracken and Eccleston (2007) have explored the relative contribution of changes in catastrophising and acceptance to improvement in psychological wellbeing and physical functioning outcomes following contextual cognitive behavioural therapy for chronic pain. Increased acceptance was associated with reductions in depression (r = -.55), pain-related anxiety (r = -.59) and to a lesser extent, physical disability (r = -.23). Correlations of a similar magnitude were reported for reduced catastrophising. In multivariate models, the independent contributions of catastrophising and acceptance to improvements in treatment outcomes were approximately equal and depended largely on the order in which these factors were entered into the model. These findings suggest that whilst acceptance and catastrophising are highly correlated, changes in both concepts are important to improving patient functioning. However, it should be noted that the intervention was acceptance-based and therefore did not specifically target catastrophising. The authors suggest that the improvement in catastrophic thinking may have been a by-product of changing the emotional experience and the behaviour pattern associated with the thought.

1.3. Interpersonal Factors

The relationship between key elements of social support and pain outcome measures will be summarized in this section. As the role of spouse responses in behavioural theories has already been described in Section 1.2.1, it will not be reviewed again here, but other models which incorporate interpersonal factors with cognitive models of pain will be discussed.

Although marital dissatisfaction does not correlate with pain intensity in most studies, there is strong evidence to suggest that marital factors are associated with specific functioning, for example, psychological distress and functional impairment (Leonard, Cano, & Johansen, 2006). It has been proposed that relationship difficulties may increase stress and reduce support, making it more likely that pain experiences will result in psychological distress (Burman & Margolin, 1992). Marital dissatisfaction may also impact on the patient’s interpretation of the responses they receive from their spouse when in chronic pain (Kerns, Haythornthwaite, Southwick, & Giller, 1990). In support of this theory, patients who rate their marital satisfaction as low tend to interpret their spouses’ responses as punishing (Pence, Cano, Thorn, & Ward, 2006).

Cano and Johansen (2007) have suggested that the Emotional Regulation Theory (ERT) may be particularly relevant to couples where one partner has chronic pain. ERT proposes that poor marital interaction may impact on an individual's ability to regulate their own emotions. This may reduce their ability to cope with the emotional aspects of chronic pain. An examination of the topics of disagreements in chronic pain couples found that they were broadly similar to problems reported in the general population (e.g. household, finances, children) but that the presence of chronic pain may make these issues more difficult to resolve (Cano, Johansen, Leonard, & Hanawalt, 2005). Thus according to this approach interactions are more than a set of responses to pain behaviours but incorporate broader aspects of communication in couples.

Other models have focused on the function of catastrophising in chronic pain couples. The Communal Coping Model (CCM) proposed by Sullivan and colleagues (Sullivan, et al., 2001; Thorn, Ward, Sullivan, & Boothby, 2003a) suggests that catastrophising is an attempt to communicate distress to others to elicit a sympathetic response or practical support. If spouses respond in a solicitous manner, patient behaviours and beliefs about the harmfulness of their pain may be reinforced, ultimately perpetuating the disuse cycle. In support of this model, studies have found that high catastrophisers display more non-verbal expressions of pain when others are present compared to when they are alone, whilst low catastrophisers do not (Sullivan, Adams, & Sullivan, 2004). Similarly, in studies of experimentally induced pain, neutral observers perceived the pain experienced by high catastrophisers to be greater than that exhibited by low catastrophisers, suggesting their pain behaviours are directed towards eliciting a supportive response (Sullivan, Martel, Tripp, Savard, & Crombez, 2006).

Cano and Williams (2010) have extended the CCM model by conceptualising catastrophising, and other verbalisations of pain, in the context of an intimacy process model. Catastrophising is seen as a form of emotional disclosure, i.e. an attempt to build intimacy, gain closeness and shared understanding, rather than purely to elicit support. This emotional disclosure provides an opportunity for the partner to validate the patient's emotions and experiences. In an observational study of spouse interaction, validating responses, as rated by a neutral observer, were associated with patient ratings of marital satisfaction and social support (Cano, Barterian, & Heller, 2008).

However, catastrophic beliefs have also been associated with more punishing responses by spouses, as rated by the patient (Boothby, Thorn, Overduin, & Ward, 2004; Buenaver, Edwards, & Haythornthwaite, 2007; Keefe et al., 2003). One study has suggested that pain duration moderates the relationship between catastrophising and punishing responses, with spouses more likely to respond in a punishing manner the longer the patient's pain persists. This may reflect spouses' beliefs about the nature of pain and its controllability (see Section 1.3.1).

Thus the context of catastrophising is complex; it can have positive ramifications for patients in terms of feeling supported by their spouse when solicitous responses are elicited, yet it can ultimately result in poorer functioning and increase punishing responses. Holtzman and DeLongis (2007) report that the relationship between catastrophising and negative affect was attenuated when patients were happy with the responses provided by their spouses suggesting that patient satisfaction with responses may be as important as the responses themselves.

1.3.1. Spouses' Beliefs about Pain

A cross-sectional survey of chronic pain clinic attenders found that patient catastrophising was strongly correlated with spouses' tendency to catastrophise about pain (Cano, Leonard, & Franz, 2005). The same study found that catastrophising in spouses was associated with greater psychological distress in patients. Post-hoc exploration of these findings suggested an interaction between patient and spouse catastrophising on depressive symptoms, such that when patient catastrophising was low, spousal catastrophising did not increase the risk of depressive symptoms, but when both partners were high catastrophisers, the risk of depression in the patient was significantly increased.

However, Gauthier, Thibault and Sullivan (2011) found that under certain circumstances, low catastrophising by the spouse may have negative consequences. In an experimental study, 58 patient-couple dyads were categorised as low or high catastrophising resulting in four groups (patient low/spouse low, patient low/spouse high, patient high/spouse low, patient high/spouse high). Patients were asked to pick up weighted canisters with their spouse observing them and pain behaviours were rated by a neutral observer. When patients were high catastrophisers and partners were low catastrophisers, patients exhibited significantly more pain behaviours than when both partners were high catastrophisers. The authors suggest that patients felt they had to increase the 'volume' of pain behaviours when spouses did not express catastrophic concerns about the patients' pain. Interestingly this study found that neither patient pain behaviours, nor catastrophising by spouses was associated with patient perceptions of spousal responses to chronic pain. This suggests that the increase in pain behaviours found in patients with low catastrophising spouses may simply reflect an attempt at alternative communication, rather than an attempt to elicit solicitous responses.

One study has reported that spouses' beliefs about the nature of pain relate to responses to pain behaviours, using the spouse version of the Survey of Pain Attitudes questionnaire (SOPA) (Cano, et al., 2009). The SOPA questionnaire measures spouses' beliefs about the controllability of pain (e.g. "The amount of pain my partner feels is completely out of his/her control."), the extent to which pain is seen as a sign of disability (e.g. "my partner's pain would stop anyone from living an active life"), and the contribution of emotions to pain (e.g. "Stress in life increases the amount of pain my partner feels") (Cano, et al., 2009). Patients were more likely to rate their spouse as responding in a solicitous manner if spouses thought that their partner's pain was a sign of disability. Spouses who thought that emotions contributed to their partner's pain rated themselves as more likely to respond in a punishing manner, and less likely to respond in a solicitous manner if they believed the patient had control over their pain. Finally spousal endorsement of items indicating that pain is a sign of disability was associated with pain severity and activity interference in patients, as well as depressive symptoms in both the patient and the spouse. In order for these beliefs to impact on patient outcomes, it could be hypothesized that spouses must respond to their partner's pain in a way that conveys these beliefs.

There is also a growing evidence base indicating that spousal overestimation of patients' ability to cope with pain may be detrimental. In a sample of 30 patients with cancer-related chronic pain there was generally a poor correlation between patients' and spouses' perceptions of self-efficacy. Patients were more likely to report higher levels of pain and a poorer relationship with their spouse when partners overestimated their self-efficacy (Porter et al., 2002). Similar results have been reported in patients with chronic musculoskeletal pain (Pence, et al., 2006). This is consistent with the transactional model of health (Kerns & Turk, 1984) which proposes that the couple's appraisal of a situation, together with the resources they perceive to be available at a given time, will define whether circumstances are perceived to be stressful. In relation to chronic pain, this could be defined in terms of self-efficacy and the tendency towards catastrophic appraisals of pain.

1.3.2. Impact of Chronic Pain on the Spouse

Spouses of patients with chronic pain are twice as likely to experience psychological distress compared to the general population (Roy, 2001). Estimates of the prevalence of depression in spouses range between 28 and 50%. Spouses who overestimate the patients' level of disability (compared to patient ratings) tend to suffer from a greater amount of psychological distress (Kerns & Turk, 1984; Riemsma, Taal, & Rasker, 2000; Schwartz, Slater, Birchler, & Atkinson, 1991). Other factors associated with greater psychological distress in spouses include patient pain severity, patient affect, marital dissatisfaction and patients' pain interference in everyday life (Johansen & Cano, 2007; Pence, et al., 2006; Schwartz, et al., 1991). As with patients, spouses of people with chronic pain tend to report poorer marital satisfaction than non-pain couples (Schwartz, et al., 2005) and one study suggests that they rate their marital satisfaction as lower than the patients themselves.

1.3.3. Inclusion of Significant Others in Treatment for Chronic Pain

Early attempts to involve partners in behavioural treatment programmes had mixed success. Moore and Chaney (1985) reported that the involvement of spouses in a group treatment programme did not improve outcomes either directly after treatment or at follow-up, compared to patient treatment alone. This apparently contradicts the behavioural approach in that social responses to pain are central to the model. However, Cano, Johansen, Leonard and Hanawalt (2005) point out that spouses were merely present at this treatment, and the intervention did not focus specifically on the role of the spouse or involve spouses in coping strategies. Keefe and colleagues have conducted a series of randomized controlled trials which included a patient only treatment arm and a spouse support arm, in which spouses were actively involved in coping skills training, including sessions on communication, mutual goal setting and role play (Keefe et al., 2004; Keefe et al., 1996, 1999). These studies found consistently better outcomes in the spouse-supported condition.

Cano and Leonard (2006) suggest that Integrative Behaviour Couples Therapy (IBCT) may be an appropriate treatment for couples who experience the psychological consequences of chronic pain. IBCT aims to help couples to adapt to the challenges presented by chronic pain, not only with mutual behavioural change and problem-solving but also by encouraging better communication of experienced emotions. In support of this approach, previous research in couples without chronic pain suggests that behaviour change is often perceived as insincere if it occurs in the absence of emotional acceptance. In the chronic pain literature, patients often believe that others do not appreciate the emotional suffering they experience in chronic pain (Herbette & Rime, 2004). Furthermore, there is often a mismatch between patient and spouse measures of self-efficacy and coping (Cano, Johansen, & Franz, 2005; Riemsma, et al., 2000), hence IBCT could foster a better understanding of each partner’s resources. However, there is little empirical evidence at present to support this as a therapeutic approach in chronic pain.

1.4. Social Support and Acceptance

One study has explored whether patients’ interpretations of support provided by partners is associated with their level of acceptance (McCracken, 2005). Two hundred and twenty eight patients from a chronic pain clinic completed a measure of acceptance and the spouse response section of the Multidimensional Pain Inventory. Pain acceptance was negatively correlated with solicitous responses (r = -.30), punishing responses (r =-.32), and to a lesser extent, distracting responses (r = -.19). There was also a weak association between general social support from the spouse and acceptance (r = -.15). In regression analysis, spouse responses accounted for 15% of the variance in patient acceptance after adjusting for patient-rated pain intensity, social support, and years of education. In explaining these findings, McCracken suggests that when spouses respond in a solicitous manner it reduces the opportunity for patients to decide to engage in activities despite their pain. With regards to punishing responses, patients may feel invalidated by the way their spouse responds to them, and therefore feel that their thoughts, emotions and sensations of pain should be avoided thus leading them to be less willing to experience pain.

1.5. Justification for the Current Project

The CCM posits that catastrophising is an attempt by patients to communicate distress to their partners and to build intimacy and gain a shared understand of pain. However, catastrophic thinking is almost universally associated with unfavourable functional outcomes possibly, because high catastrophisers tend to be more avoidant of activities and elicit more practical support from their spouses. Less is known about the role of catastrophic thinking in spouses and how this might fit into the CCM model. Preliminary studies have found that spousal catastrophic thinking is associated with poorer functional outcomes (Cano, et al., 2009; Pence, et al., 2006; Porter, et al., 2002) however ther inter-relationship between patient and spouse catastrophising is less clear. One possibility is that spouse catastrophic thinking only serves to increase emotional distress is patients when they are also high catastrophisers and may be irrelevant or in fact be interpreted as supportive and understanding when patients are low catastrophisers. Thus the first goal is to explore the extent to which catastrophic thinking in spouses modulates the relationship between patient catastrophising and psychological distress.

The second goal is to further explore the social context of acceptance. It is not known whether spouses' beliefs about chronic pain are associated with patient acceptance or whether these beliefs contribute to acceptance over and above the effect of pain responses alone. Spouses who hold catastrophic beliefs about the nature of pain may communicate in a way that conveys these concerns and reduces the patient's willingness to experience pain. Alternatively spouses who do not express catastrophic appraisals of the pain their partner experiences may be perceived to be invalidating, which may lead patients to attempt to avoid internal pain sensations and emotions, thus discouraging patients from accepting their symptoms.

Establishing the existence of such relationships would further our understanding of how acceptance fits within a cognitive-behavioural approach to chronic pain. It would also suggest whether spouses' beliefs may be an important factor in explaining whether psychological therapy for affective symptoms is successful and whether greater involvement of spouses is indicated.

1.6. Hypotheses

1.6.1. Main Hypotheses

Hypothesis 1 The relationship between patient catastrophising and psychological distress will be modulated by spouse catastrophising. Specifically it is hypothesised that the relationship between patient catastrophising and psychological distress will be stronger when spouses also catastrophise than when they do not.

Hypothesis 2 Spouse catastrophising will be associated with lower pain acceptance after adjusting for other significant factors.

Hypothesis 3 The relationship between patient catastrophising and acceptance will be moderated by spouse catastrophising. Specifically it is hypothesised that the relationship between patient catastrophising and acceptance will be stronger when spouses also catastrophise than when they do not.

Hypothesis 4 Perceived solicitous, distracting and punishing responses will be associated with a lower level of acceptance.

1.6.2. Preliminary hypotheses

Before testing the main hypotheses listed above, a number of preliminary hypotheses will also be explored to confirm that relationships previously published in the literature are evident in this dataset. These are as follows:

Hypothesis a Patient catastrophising will be associated with greater psychological distress in patients.

Hypothesis b Pain acceptance will be associated with lower pain severity, lower functional disability and fewer symptoms of psychological distress.

Hypothesis c There will be an interaction between patient pain catastrophising and acceptance in relation to depression and anxiety.

2. Method

2.1. Design

The study used a cross-sectional survey design involving patient-spouse dyads recruited from the Pain Service at Addenbrooke's Hospital. All data were collected through self-report questionnaires. This design was chosen as it required very little time commitment from participants and also allowed for the use of data that were already collected as part of routine clinical practice.

2.1.1. Sample Size

As the primary hypothesis had not been explored in previous studies, an estimation of the effect size expected in this study was not available. Therefore the sample size calculation was based on identifying a medium effect size using multiple linear regression with adjustment for an estimated 5 additional variables. With an alpha level .05 and 80% power with a medium effect size of 0.5, the sample size estimation was 98 patient-spouse dyads (Erdfelder, Faul, & Buchner, 1996). In practice, this sample size was not achieved due to delays in the recruitment process.

2.2. Participants

The pain service comprises a multidisciplinary team offering both medical and psychological interventions for chronic pain as well as education about pain management and seminars for carers of people with chronic pain. The service receives over 100 referrals per month and thus it was considered to be an ideal setting to recruit a large number of participants. Patients are referred to the service with a variety of different conditions, for example joint pain (including arthritis), fibromyalgia, pain resulting from traumatic injury, stroke and neuropathic pain. The service offers an initial assessment with a consultant in pain medicine to all patients and, depending on what treatment options are available, patients are allocated to one of two pathways and treatment is offered for a period of up to three years. The first pathway is for patients who will receive some form of medical intervention, where injections or other medical treatment would be offered. The second pathway is for patients who are unlikely to benefit from further medical intervention, and is referred to as the non-medical pathway. There is a third group for whom the pathway is not clear at the initial appointment.

2.2.1. Inclusion

The inclusion criteria were as follows;

1. Participants had to be aged 18 or over, because of the restrictions placed on referrals to the service.
2. Patients had to be married or in a common law relationship (patients' partners are referred to as spouses regardless of marital status for simplicity). There were no specific restrictions on the length or nature of the relationship, or whether they were living together at the time of the assessment. Ultimately it was up to the participant to decide whether it was appropriate to ask their partner to participate.
3. Participants had to have experienced pain for a period of at least 6 months. This criterion was required in order to exclude those with acute pain, for example immediately after breaking a leg, as these patients are usually expecting full recovery and are not focused on adjustment to, or acceptance of, the current level of pain.

2.2.2. Exclusions

The exclusion criteria were as follows;

1. Patients with significant cognitive impairment were not included in the study as the questionnaires would have been too challenging and potential misunderstanding of questions could have been distressing. Furthermore, such patients may not have had capacity to give consent to the study. However, patients with a very mild level of cognitive impairment, who were clearly able to understand the information sheet and make informed decisions about participation, were invited to participate. This was to ensure that the study was as inclusive as possible, and people were not discriminated against for mild impairments. The decision regarding capacity to consent was made by nurses at the initial routine clinical appointment, and is described in further detail in the procedures section.
2. Patients with diagnosed severe mental health problems, for example, psychosis, mania, or severe mood disorders, were excluded from the study if they were in an acute phase. It would have been inappropriate to ask patients with these conditions to complete extensive questionnaires relating to mental health difficulties at home, without knowing what level of support they had from other services. Furthermore, patients with severe mental health problems may not have had the capacity to give consent at the time of assessment. If patients reported a history of depression or anxiety, but had been well for a prolonged period, or felt they had been stable for a prolonged period, then they were offered the opportunity to participate.

3. Patients whose partner also suffered from chronic pain were excluded as the partner's beliefs were likely to reflect their own experiences of pain rather than their experiences as a spouse.
4. Patients who were actively seeking compensation for an accident or injury were excluded as it might affect their willingness to accept their current level of pain as it is.

2.2.3. Sample Characteristics

Sixty one participants consented to take part in the study, comprising 41 women (67%) and 20 men (33%). The mean age of the sample was 54.2 years old and ranged from 22 to 81 years old. The majority of participants were recruited shortly after acceptance into the service (n=44, 72%) with 28% recruited at the three and six month follow-up appointments. Further information relating to the sample is provided in the Results section.

2.3. Ethical Considerations

Participants were advised that they could choose not to take part in the study and that this would not affect their treatment. Participants' data remained confidential and was not shared with the clinical team on an individual basis. The only exception to this rule was if patients expressed thoughts of self-harm or suicidal ideation at any stage in the study, in which case the participants' GPs were notified and the participant was provided with signposting on where to get help. This exception was clearly stated in the information sheet (Appendix A1) and the Patient Consent Form (Appendix A2). In practice, nurses usually identified these risks in their assessment and did not refer patients with severe depression to the researcher.

One patient did state that she was struggling to cope and asked if she could receive further help with her mental health, although she did not report any suicidal ideation or suicidal plans. After discussion with the patient, a letter was written to her GP recommending a referral to mental health services.

The main ethical issue in this study was whether participants would find completing the questionnaires distressing. Many of the questionnaires used in this study have been used extensively elsewhere without specific reports of distress caused to participants, and around half of the measures used are administered as part of routine clinical practice. The content of questionnaires was summarised in the information sheet (Appendix A1) so that participants were aware in advance of the types of questions they would be asked. Participants were advised they could stop completing the questionnaires at any time if they did find them distressing and were provided with an opportunity to discuss any concerns they had.

In order to ensure that partners of people with chronic pain also had sufficient support from the study team, the information sheet included a telephone number they could call if the study raised any particular concerns or if they felt they would like to be sent further information about chronic pain in general.

Consent forms were stored at the Pain Service at Addenbrooke's hospital in a locked cabinet. Questionnaires were anonymised by using study numbers instead of names. Electronic data were anonymised and stored on a personal computer under a password.

The study received ethical approval from the Lancaster Research Ethics Committee (Appendix B1), and the Research and Development department at Addenbrooke's Hospital (Appendix B2).

2.4. Measures

Patients completed four brief questionnaires which took an estimated 15-20 minutes. The measures used were as follows:

Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983)

The HADS is a 14-item questionnaire (see Appendix C1) measuring depression (7 items) and anxiety (7 items) and is designed for use with populations who suffer from comorbid health conditions. Items are scored according to the frequency or severity of that symptom on a four point Likert scale. Item scores for each subscale are totalled yielding a depression score and an anxiety score. A score of 0-7 indicates normal levels, 8-10 indicates mild symptoms, 11-15 indicates moderate symptoms and 16-21 suggests severe symptoms. The HADS is considered to be superior to other measures of depression and anxiety in health populations as less emphasis is placed on symptoms that may have underlying physical causes than questionnaires such as the Beck Depression Inventory (Beck, Steer, & Brown, 1996) or the Centre for Epidemiological Studies – Depression Scale (Radloff, 1977). A review of the psychometric properties of the HADS has been conducted across a large number of studies (Herrmann, 1997). It was shown to have good internal consistency, with Cronbach's alpha ranging from .8 to .93 for both depression and anxiety, and test-retest correlations of .8 when administered 2 weeks apart. The questionnaire has also demonstrated good construct validity with the subscales of depression and anxiety correlating highly with other measures of these concepts.

The Chronic Pain Acceptance Questionnaire (CPAQ) (McCracken, Vowles, & Eccleston, 2004).

The CPAQ (Appendix C2) is a 20-item self-report measure of acceptance including subscales for (i) activity engagement, which assesses participation in activities despite the experience of pain, and (ii) pain willingness, which assesses the extent to which patients allow themselves to experience pain sensations or emotions without attempts at avoidance. Participants rate their agreement for each statement on a 7 point Likert scale, from “Never True” to “Always True”. This yields a score between 0 and 120 where a higher score indicates greater acceptance. The psychometric properties of the CPAQ have been explored in a sample of 611 patients with chronic pain which reported good internal consistency and test-retest reliability (Wicksell, Olsson, & Melin, 2009). In a review of chronic pain acceptance questionnaires, Reneman, Dijkstra, Geertzen & Dijkstra (2010) reported that the CPAQ had better psychometric qualities than other measures although acknowledged that further investigation of its psychometric properties is required, particularly with regards to construct validity.

Pain Catastrophising Scale (PCS) (Sullivan, Bishop, & Pivik, 1995)

The PCS is a 13-item self-report questionnaire (Appendix C3) measuring three dimensions of catastrophic thinking; magnification (e.g. “I become afraid that the pain may become worse”), rumination (e.g. “I can’t seem to get it out of my mind”) and helplessness (“There is nothing I can do to reduce the intensity of this pain”). Each item is rated on a 5 point scale from “not at all” to “all of the time” yielding a score from 0 to 52. In an outpatient chronic pain sample, the measure demonstrated high internal consistency (.92) (Osman et al., 2000) and the six week test-retest reliability was .78 (Sullivan, et al., 1995). There are other measures which assess pain catastrophising, for example the Cognitive Coping Strategy Inventory (Butler, Damarin, Beaulieu, Schwebel, & Thorn, 1989), the Pain-Related Self Statements Scale (Flor, Behle, & Birbaumer, 1993) and the Coping Strategies Questionnaire (Rosenstiel & Keefe, 1983). However, in a critique of available measures, Osman et al (2000) identify a number of problems with these questionnaires. The CCSI and the PPRS have not demonstrated strong psychometric properties in independent samples and items from the catastrophising subscale of the CSQ are strongly correlated with measures of depression suggesting it may not have acceptable discriminant validity. Furthermore, the PCS is the only measure that has yielded clear subscales of catastrophising.

The West-Haven Yale Multidimentional Pain Inventory, Version 3 (MPI)

(Kerns, Turk, & Rudy, 1985)

The MPI (Appendix C4) is an in-depth measure of patient functioning across a number of domains, and includes 15 questions relating to support provided by spouses which will be used in this study. These items are completed by the patient. The first three questions are drawn from Section 1 of the MPI and relate to the spouses' supportiveness, worry and attentiveness, for example, 'How supportive or helpful is your significant other to you in relation to your pain?'. Each item is scored on a 7 point Likert scale. Section 2 of the MPI comprises 12 items relating to perceived spouse responses including solicitous, distracting and punishing responses, and asks participants to respond on a 4 point scale relating to how frequently their spouse responds in this way. This has been used extensively in the literature for rating spousal responses to pain, and has been shown to have good psychometric properties with internal consistency scores between .74 and .86 and test-retest reliabilities from .62 - .89. There are other, more comprehensive measures of spousal responses, for example the Spousal Response Inventory (Schwartz, et al., 2005), however, this questionnaire has 39 items and was therefore considered too lengthy given the other questionnaires that were administered.

Additional information

Participants were asked for consent to collect basic information from their medical notes, specifically, their age, gender, medical diagnosis and treatment offered. All patients completed a questionnaire pack as part of normal clinical procedure when they were accepted into the service. Participants were asked for their consent to use information provided in these packs to reduce the time commitment required for participation in the study. Specifically, the McGill Short Form Pain Questionnaire (Melzack, 1987) and the Roland Morris Disability Questionnaire (Roland & Morris, 1983) were used:

McGill Short Form Pain Questionnaire (MPQ-SF) (Melzack, 1987) and Visual Analogue Scales

The MPQ-SF is a briefer version of the comprehensive McGill Pain Questionnaire (Melzack, 1975). The MPQ-SF (see Appendix C5) consists of 3 parts; 11 items relating to pain sensations, 4 items relating to the affective symptoms of pain, and 3 visual analogue scales measuring the severity of pain today, at its worst, and it its best. The sensory scale describes different sensations (e.g. tingling, throbbing) and the participant rates whether each of these was absent, mild, moderate or severe. This yields a score for sensory pain between 0 and 33. The affective scale describes emotional states associated with pain (e.g. tiring/exhausting, fearful) and yields a score from 0 to 12. In addition, patients were asked to rate the severity of their pain on a 6 point Likert scale. The visual analogue scales are rated from 0-10.

Few studies have explored the psychometric properties of the short form MPQ, although it has been shown to correlate highly with the long form MPQ (Melzack, 1987). Grafton, Foster & Wright (2005) found high intra-class correlations (ICCs) reporting .96, .95 and .88 for the total, sensory and affective scores indicating excellent test-retest reliability. The MPQ-SF has been shown to have good content validity (McDonald & Weiskopf, 2001) and convergent construct validity (Burckhardt & Bjelle, 1994).

Roland Morris Disability Questionnaire - Modified (RMDQ) (Roland & Morris, 1983)

The RMDQ (see Appendix C6) is a 24 item questionnaire relating to activities of daily living that may be affected by having chronic pain. Participants are asked to read each statement and tick those that apply, yielding a score from 0 to 24. The original version related solely to back pain, and has been validated extensively in this form (Roland & Fairbank, 2000). The questionnaire has strong construct validity and correlates highly with the 136-item Sickness Impact Profile from which it was derived (Deyo, 1986). Studies have reported internal consistencies between .84 and .93 (Roland & Fairbank, 2000). The current version has been modified such that the phrasing of items relates to any pain rather than specifically back pain. Other studies that have used this modification have reported internal consistencies similar to the original study (Patrick et al., 1995).

Spouses were asked to complete one questionnaire which took approximately five minutes. Although further valuable information could have been collected by asking spouses to complete measures of psychological distress and marital satisfaction, it was felt that such questions might be considered too personal and could potentially reduce participation. The inclusion of the spouse-rated version of the MPI (spouse response section) was considered, but ultimately, it is the patients' *perception* of spouse responses that impacts on psychological wellbeing regardless of how spouses may think they respond. Thus partners only completed the spouse version of the PCS:

Pain Catastrophising Scale-Spouse version (PCS-S) (Cano, Leonard, et al., 2005)

This corresponds to the PCS-patient version and comprises 13 items (Appendix D) relating to spouses' beliefs about their partners' pain. The factor structure identified in a sample of spouses matched that reported in the patient version of the PCS and was cross validated with a second sample of spouses. The high correlation between spouse and patient scores suggests good content validity. However, the PCS-S has not been subject to rigorous psychometric testing, specifically, the test re-test reliability has not been reported. There are no other measures of catastrophising in partners of people with chronic pain at this time.

2.5. Procedure

In the initial study protocol submitted to the Research Ethics Committee, the procedure was a follows:

Nurses were asked to approach patients to participate in the study at their first appointment, and distribute information sheets, consent forms and questionnaire packs. The inclusion criteria for the study were similar to the referral criteria for the pain education seminars, so it would take only one or two additional questions to check that patients were eligible. With patients attending the clinic twice in the following fortnight for the pain education seminars, it would have been fairly straightforward for the researchers to collect completed questionnaires at these seminars, or answer any questions or queries patients had about participation.

However, between designing the study and receiving ethical approval, the clinic experienced an increase in the volume of referrals, and there was now a 3 month wait between the nurse appointment and the first pain education group. Clearly this made the proposed procedure unrealistic as patients were unlikely to remember to return their questionnaires after a three month period, and this delay would increase the recruitment period. In addition, nurses felt that with these additional pressures, they did not have time to introduce the study to patients, or answer any questions that this may generate. Due to these problems, the procedure was updated and an amendment was approved by the Ethics Committee (Appendix B3). The new procedure was as follows:

When patients attended their first appointment with the nurse, they were asked if they would be interested in meeting with a researcher (either FM or the Consultant Psychologist in the service if FM was not present) to hear about a questionnaire-based research study that was running in the clinic. Nurses were not expected to explain the study in detail but instead refer patients with questions to the researcher. To save time, nurses were not asked to formally assess eligibility for the study, although in practice they did check the casenotes cover sheet to see if the patient had stated they were in a relationship. Other information relevant to inclusion and exclusion criteria was often divulged during the assessment (for example, if the patient was involved in a legal case relating to their pain condition), and in these situations, nurses did not refer patients to the researcher.

If patients seemed to be eligible, and had shown an interest in speaking with a researcher, they were taken into a separate room to speak with the researcher following their appointment. They were briefly introduced to the purpose of the study, and given important information about participation, such as their right to refuse, and their right to withdraw at any time. Patients were then screened to check for eligibility criteria. If they met these criteria, they were given the information sheet (see Appendix A1), a Patient Pack, which contained the Patient Consent Form (Appendix A2) and the Patient Questionnaires (Appendix C), and a Partner Pack containing the Spouse Consent Form (Appendix A3) and the Spouse questionnaire (Appendix D). At this point patients were also allocated a study number which was used on all questionnaires so that their responses could be matched to those of their spouse.

Patients were advised that even though they had been given the study questionnaires, they were under no obligation to participate, they could destroy the questionnaire packs or return them incomplete in the envelopes provided if they decided not to participate. They were asked to discuss the study with their spouse and give them the information sheet to read. If, following this discussion, both agreed to participate, they were asked to return the questionnaires by post in the stamped addressed envelopes provided. Separate envelopes were provided for the patient and their spouse to ensure that they could give honest and confidential responses. They were asked for consent for a reminder letter (Appendix A4) to be sent out in the post if the questionnaires had not been returned in two weeks and again were reminded that if they had decided not to participate in the study, they should ignore this letter. All participants asked consented to a reminder letter being sent. If either the patient or the spouse had any queries or concerns about completing the questionnaires they were advised to call the number provided in the information sheet, or ask for assistance at their next appointment. In practice, none of the participants called with queries.

If participants had not returned their questionnaire within two weeks, the reminder letter was sent out. If there was no response to this, then no further contact was made with the participant. In a small number of cases, consent forms had not been filled in correctly, for example, patients had initialed all of the boxes consenting to all aspects of the study but had failed to initial the box “I agree to take part in this study”. All of these participants had completed and returned the questionnaires. In hindsight, it seems likely that participants may have misunderstood this box to mean agreeing to take part in some larger study in addition to the questionnaires. Alternatively the position of the box at the end of the questionnaire may have meant that people simply did not notice it. Either way, patients were sent their consent form back with a brief note explaining the purpose of this box and apologizing for any confusion. In the majority of cases the consent forms were then returned completed.

2.5.1.Recruitment Issues

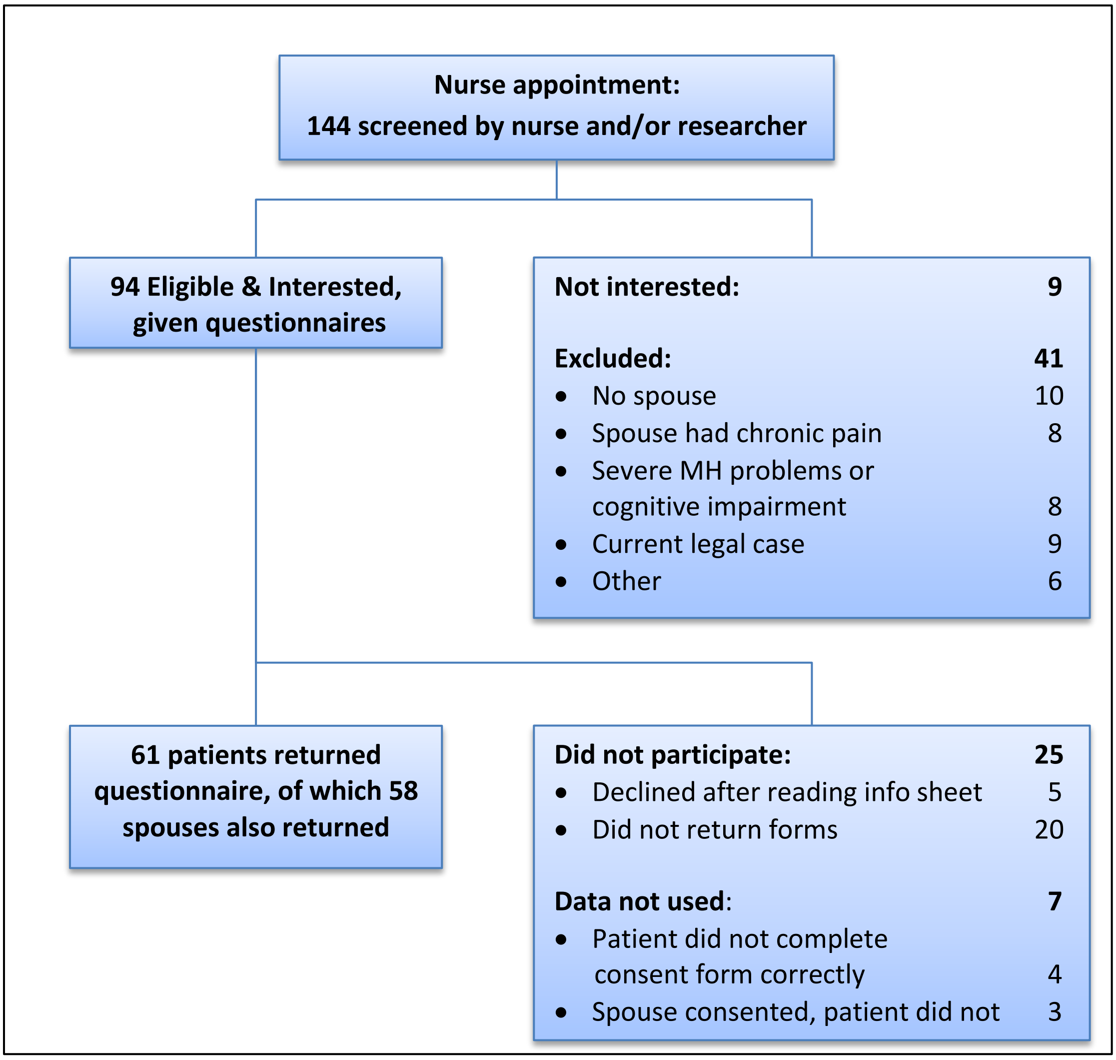
The alteration to the method caused some delay to starting recruitment and also meant that either the author or the team psychologist needed to be present in order to recruit participants. This reduced the number of people that could be approached. At an early stage in the recruitment process, a decision was made to also approach patients at the pain education group and the six month nurse appointment to increase recruitment numbers. Patients were only ever approached once (i.e. if they were approached at their initial appointment, they were not approached again at their 3 month follow-up appointment).

2.5.2 Recruitment information

A diagram of patient recruitment is provided in Figure 2.1. Those who were identified as not having a partner prior to their appointment (approximately 40% of patients) are not represented in this graph as they were not screened for the study.

Of those screened, 27% (n=41) did not meet the inclusion criteria; reasons for exclusion were spread fairly equally among the main exclusion criteria. Six percent (n=9) of those approached were not interested in participating. An additional 4 patients returned their questionnaires but failed to complete their consent forms correctly and did not respond to postal request to do so. Of those patients that did not return their questionnaires, three of their spouses did return their questionnaires, but these could not be used as patient consent is required to use spouses' views on their pain.

Figure 2.1: Study Flowchart



2.6. Plan of Analysis

2.6.1. Preliminary analyses

First, the preliminary hypotheses were tested in order to confirm previously reported relationships in the literature.

Hypothesis a Patient catastrophising will be associated with greater psychological distress in patients.

Analysis Simple logistic regression was used with patient catastrophising as the independent variable and HADS depression and anxiety scores as the dependent variables.

Hypothesis b Pain acceptance will be associated with lower pain severity, lower functional disability and fewer symptoms of psychological distress.

Analysis Partial correlations were used to measure the correlation between acceptance (CPAQ) and a range of functional outcomes (RMDQ, MPQ, HADS), adjusting for pain severity.

Hypothesis c There will be an interaction between patient pain catastrophising and acceptance in relation to depression and anxiety.

Analysis A multiple regression was used to explore whether there was an interaction between pain acceptance (CPAQ) and pain catastrophising (PCS) in relation to depression and anxiety (HADS). To reduce multicollinearity, the CPAQ and HADS scores were standardised to a mean of 0 and a standard deviation of 1 before multiplying to create an interaction term. This method was also used in subsequent analyses with interaction terms. The results of Analysis 1 were used to decide whether adjustment for other variables was necessary.

2.6.2. Main Hypotheses

Hypothesis 1 There will be an interaction between spousal catastrophising and patient catastrophising in relation to symptoms of depression and anxiety, such that the relationship between patient catastrophising and psychological distress will be stronger when spouses also catastrophise.

Analysis Multiple regression was used with a PCS x PCS-S interaction term, and with HADS depression and anxiety as outcome variables, adjusting for other variables that predicted depression and anxiety.

Hypothesis 2 Spouse catastrophising will be associated with lower pain acceptance after adjusting for other significant factors.

Analysis A partial correlation was used to explore the relationship between spouse catastrophising and patient acceptance adjusting for the effects of patient catastrophising and pain.

Hypothesis 3 There will be an interaction between patient and spouse catastrophising in relation to acceptance such that the relationship between patient catastrophising and acceptance will be stronger when spouses are high catastrophisers compared to when they are not.

Analysis Multiple regression was used with a PCS x PCS-S term, and with acceptance as the outcome, adjusting for other variables that predicted acceptance.

Hypothesis 4(i) Perceived solicitous responses (from the perspective of the participant) will be associated with a lower level of acceptance.

Hypothesis 4(ii) Distracting responses (encouragement to continue with enjoyable activities despite pain) will be associated with greater acceptance.

Hypothesis 4(iii) Punishing responses will be associated with a lower level of acceptance.

Analysis 4i, ii and iii Correlations were used to explore whether acceptance (CPAQ) was associated with solicitous, distracting or punishing responses (MPI).

3. Results

3.1. Missing Data

In total, 61 participants and 58 of their spouses contributed data to the analyses. Where two or fewer items were missing on any questionnaire, the missing item was replaced with the participant's average score on that questionnaire, in order to be able to compute a total score. This procedure was used for 7 participants on the CPAQ, 3 on the HADS, and 2 each on the PCS and PCS-S respectively. Where more than two items were missing, the responses were not used in the analysis. A total score could be calculated for 60 (98%) participants on the CPAQ, 59 participants on the HADS (97%), 60 participants on the PCS (98%) and 58 partners on the PCS-S (95%).

This study used some questionnaires administered as part of normal clinical practice at the clinic, so as not to ask participants to complete the same measures more than once. However the completeness of these questionnaires was somewhat poorer than expected. Of the 61 participants, only 48 (79%) had completed the MPQ and 50 had (82%) completed the RMDQ. No attempt was made to replace or impute this data.

3.2. Descriptive Statistics

Two thirds of the sample were female (n = 41, 67%). Most participants were recruited shortly after acceptance in to the service (n = 44, 72%), and 28% were recruited at either a 3 month or 6 month follow-up appointment. Sixty-two percent of participants (n = 37) were allocated to the Intervention pathway, meaning that they had been assessed as suitable to receive a surgical procedure to treat their pain. The remaining 38% were in the Non-Intervention pathway, meaning that only noninvasive treatments were indicated (e.g. TENS machine, medication). Based on patient self-report, 46% (n = 28) experienced pain in more than one location and 54% experienced pain in multiple sites. However, it should be noted that multiple pain sites may be attributable to one injury (for example, patients may report leg pain radiating from a back condition).

Table 3.1 provides further descriptive information relating to the sample measures. The average age of patients was 54.2 years (s.d. = 13.1) consistent with the relatively older population that attends pain services. Although all patients were referred to the pain service in the preceding twelve months they had experienced pain for an average of 9.1 years (s.d. = 11.4).

Table 3.1
Participant Characteristics

Characteristics	Questionnaire Range †	n	Mean	S.D.
Age (yrs)	-	61	54.2	13.1
Duration of pain (yrs)	-	55	9.1	11.4
Pain VAS (MPQ)	0-10	48	6.6	2.0
Pain Intensity (MPQ)	0-33	49	17.2	10.0
Disability (RMDQ)	0-24	50	10.9	5.8
Depression (HADS)	0-21	59	7.8	4.3
Anxiety (HADS)	0-21	59	8.5	4.2
Catastrophising (PCS-13)	0-52	60	22.5	11.9
Total Acceptance (CPAQ-20)	0-120	60	53.4	17.6
Activities Engagement (CPAQ-20)	0-66	60	34.3	12.1
Pain Willingness (CPAQ-20)	0-54	60	19.1	10.3
Social Support (MPI)	0-18	61	13.1	4.4
Solicitous Responses (MPI)	0-15	61	10.8	3.5
Distracting Responses (MPI)	0-12	60	6.8	3.0
Punishing Responses (MPI)	0-9	61	3.4	2.8
Spouse Catastrophising (PCS-S)	0-52	58	25.7	11.9

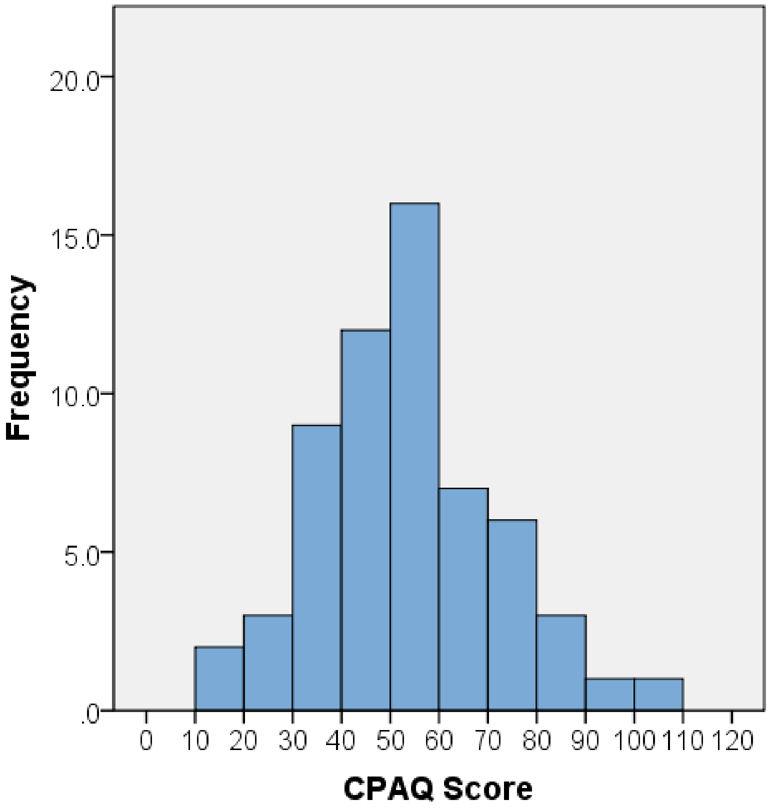
† Refers to the range of possible scores on each of the questionnaires, MPQ: McGill Pain Questionnaire, VAS: Visual Analogue Scale RMDQ: Roland Morris Disability Questionnaire, HADS: Hospital Anxiety and Depression Scale, PCS-13: Pain Catastrophising Scale, 13 item version, CPAQ-20: Chronic Pain Acceptance Questionnaire, 20 item version, MPI: Multidimensional Pain Inventory, PCS-S: Pain Catastrophising Questionnaire, Spouse Version.

The mean rating for current level of pain, rated on a visual analogue scale, was 6.6/10. Scores on the PCS indicate a high level of catastrophising in patients (mean = 22.5, s.d.11.9) and in spouses (mean = 25.7, 11.9). A full correlation matrix of the main study variables is provided in Appendix E Table E1.

3.2.1. Patient Acceptance

Figure 3.1 provides a visual representation of CPAQ scores and shows that this measure was normally distributed. Scores ranged from 14 to 102 with higher scores indicating greater acceptance.

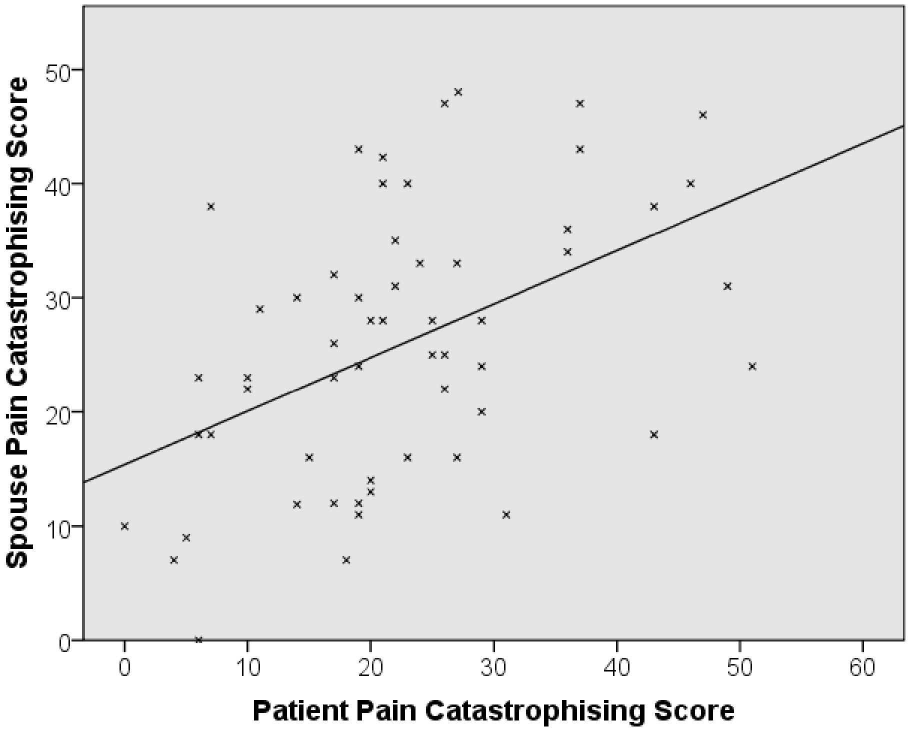
Figure 3.1
Frequency distribution of CPAQ Scores



3.2.2. Pain Catastrophising

There was a strong correlation between patient and spouse measures of catastrophic thinking. (r = .47, p < .001, Figure 3.2). Spouses reported having more frequent catastrophic thoughts than the patients themselves (t(56) = 2.1, p = .04).

Figure 3.2
Relationship between Patient and Spouse Catastrophising (PCS) Scores



3.2.3. Psychological distress

The HADS scores indicate a high level of psychological distress in this sample. Almost half of participants (49.2%) scored above the threshold for significant depressive symptoms (≥ 8), with 20.3% (n = 12) scoring in the mild range, 25.5% scoring in the moderate range (n = 15) and 3.4% (n = 2) scoring in the severe range. With regard to anxiety, 58.6% scored above the threshold, with 20.3%

(n = 12) scoring in the mild range, 30.5% (n = 18) scoring in the moderate range, and 6.8% (n = 4) scoring in the severe range.

Table 3.2 summarises mean PCS and CPAQ scores by severity of depression and anxiety, with differences between groups tested using one-way ANOVAs. The total CPAQ score was significantly lower in patients who reported higher levels of depression (F (2, 56) = 11.8, p < .001). A similar pattern was seen for the CPAQ subscales. Lower scores on the total CPAQ (F (2,56) = 5.1, p < .01) and the activities engagement subscale (F (2, 56) = 4.9, p < .05) were associated with a greater degree of anxiety. Pain catastrophising (including all three subscales of the PCS) was more common with greater severity of depression and anxiety.

Table 3.2
CPAQ and PCS scores by severity of HADS depression and anxiety symptoms

	Depression					Anxiety				
	None	Mild	Mod/ Severe	F	p	None	Mild	Mod/ Severe	F	p
CPAQ-20†										
Activities Eng.	40.5	29.7	26.2	11.7	<.001	37.6	38.2	28.1	4.9	<.05
Pain Willing.	22.2	13.7	17.4	3.4	<.05	22.0	17.6	16.4	2.0	.14
Total	62.7	43.3	43.6	11.8	<.001	59.8	55.7	44.5	5.1	<.01
PCS-13‡										
Rumination	6.5	9.5	9.6	5.1	<.01	6.4	7.5	10.1	5.9	<.01
Magnification	2.8	5.4	5.2	4.9	<.05	2.5	2.8	6.4	14.3	<.001
Helplessness	6.9	14.8	12.9	13.0	<.001	7.8	8.0	14.2	9.1	<.001
Total	16.2	29.7	27.8	10.3	<.001	16.8	18.3	30.7	11.7	<.001

HADS: Hospital Anxiety and Depression Scale, PCS-13: Pain Catastrophising Scale, 13 item version, CPAQ-20: Chronic Pain Acceptance Questionnaire, 20 item version, † n = 59 for analyses of CPAQ-20, ‡ n = 58 for analysis of PCS.

3.3. Preliminary Hypotheses

3.3.1.Hypothesis a: Patient catastrophising will be associated with greater psychological distress in patients.

Using simple linear regression with PCS as the independent variable and HADS depression score as the dependent variable, patient catastrophising was a significant predictor of depressive symptoms ($R^2 = .24$, F (1, 56) = 18.6, $p < .001$). Catastrophising was also a significant predictor of anxiety ($R^2 = .27$, F (1, 56) = 22.0, $p < .001$).

3.3.2. Hypothesis b: Pain acceptance will be associated with lower pain, lower functional disability and fewer symptoms of psychological distress.

A correlational analysis was conducted to assess whether the CPAQ and its subscales were associated with psychological distress (Table 3.3). The CPAQ score was negatively correlated with levels of depression (r = -.61), anxiety (r = - .48), functional disability (r = - .34) and pain (r = -.38). Using Meng and Rosenthal's (1992) method for comparing the magnitude of correlated correlations, the correlation between the CPAQ activities engagement subscale and depression was significantly stronger than the correlation between the CPAQ pain willingness subscale and depression (z=-1.90, p<0.03). Partial correlation analysis was used to explore the relationship between pain acceptance and functional outcomes, after controlling for MPQ Pain intensity and the Pain visual analogue scale. Total acceptance remained strongly correlated with both HADS subscales (depression r = -.54, anxiety r = -.44) but not functional disability.

Table 3.3
Correlation between CPAQ and functional outcomes

	Simple Correlations†				**Partial Correlations‡**		
	HADS Depression	HADS Anxiety	RMDQ	Pain VAS	HADS Depression	HADS Anxiety	RMDQ
Total CPAQ	-.61***	-.48**	-.34*	-.38*	-.54***	-.44**	-.23
Activities Engage.	-.61***	-.41*	-.29*	-.35*	-.55***	-.37*	-.18
Pain Willingness	-.30*	-.32*	-.23	-.23	-.23	-.29	-.16

† n = 44, ‡Adjusted for MPQ pain visual analogue scale, n = 43 * p < .05, ** p < .01, *** p < .001

3.3.3. Hypothesis c: There will be an interaction between pain catastrophising and acceptance in relation to depression and anxiety

Multiple linear regression was used to explore the independent contributions of the PCS and CPAQ to depressive and anxiety symptoms as well as a moderation analysis between the two variables. A hierarchical method was used, beginning with the RMDQ and VAS pain rating, and then adding the CPAQ and the PCS, and finally an interaction term of CPAQ*PCS. The assumptions of normality for the regression model were checked by plotting residuals and p-p plots, and are provided in Appendix E, Figures E1 and E2. Results for depression are provided in Table 3.4. The addition of the PCS and CPAQ in model 2 significantly increased the variance explained by the model (R^2change = .21, F (2, 40) = 9.0, p = .001) but only the CPAQ was an independent predictor of depression. The interaction between PCS and CPAQ was not significant and its addition did not increase the variance explained by the model (R^2 change = 0.003, F (1,39) = .30, p = 0.60).

Table 3.4
Multiple linear exploring effects of PCS and CPAQ on HADS depression score

	Unstandardized Coefficients B	Standard Error	Standardized Coefficients Beta	Sig.	F	p	Adjusted R^2
Model 1							
(Constant)	-0.13	2.24		.95			
MPQ Pain VAS	.66	.34	.26	.06			
RMDQ	.33	.11	.42	.00	10.3	<.001	.30
Model 2							
(Constant)	5.50	3.60		.13			
MPQ Pain VAS	.30	.31	.12	.34			
RMDQ	.25	.09	.32	.01			
PCS	.10	.05	.24	.07			
CPAQ	-.08	.03	-.33	.02	11.6	<.001	.49
Model 3							
(Constant)	4.85	3.80		.21			
MPQ Pain VAS	.36	.33	.14	.28			
RMDQ	.24	.10	.30	.02			
PCS	.10	.05	.24	.07			
CPAQ	-.07	.04	-.29	.06			
PCS*CPAQ	.29	.54	.07	.60	9.1	<.001	.48

MPQ: McGill Pain Questionnaire, VAS: Visual Analogue Scale, RMDQ: Roland Morris Disability Questionnaire, PCS-13: Pain Catastrophising Scale, 13 item version, CPAQ-20: Chronic Pain Acceptance Questionnaire, 20 item. n = 43.

As the Activities engagement subscale of the CPAQ was more strongly correlated with the HADS depression score (Analysis b), the regression was repeated with this as a predictor variable instead of the CPAQ total score. Results are provided in Table 3.5 (Residual and p-p plots in Appendix E, Figures E3 and E4). A similar pattern emerged, and the activities engagement subscale and PCS were both significant predictors of depression after adjusting for confounders. The addition of the PCS and CPAQ in model 2 significantly increased the variance explained by the model (R^2 change = .24, F (2, 40) = 11.0, p < .001). The interaction between PCS and CPAQ was not significant and its addition did not increase the variance explained by the model (R^2 change = 0.004, F (1, 39) = .36, p = .56).

Table 3.5
Multiple linear regression exploring the effects of Activities engagement and PCS on depression score

	Unstandardized Coefficients B	Standard Error	Standardized Coefficients Beta	Sig.	F	p	Adjusted R^2
Model 1							
(Constant)	-.13	2.24		.95			
MPQ Pain VAS	.66	.34	.26	.06			
RMDQ	.33	.11	.42	.00	10.3	<.001	.30
Model 2							
(Constant)	5.38	3.03		.08			
MPQ Pain VAS	.27	.30	.11	.37			
RMDQ	.26	.09	.33	.01			
PCS	.10	.05	.25	.04			
CPAQ AE	-.13	.04	-.37	.00	13.0	<.001	.52
Model 3							
(Constant)	5.30	3.06		.09			
MPQ Pain VAS	.30	.30	.12	.33			
RMDQ	.25	.09	.32	.01			
PCS	.10	.05	.25	.04			
CPAQ AE	-.13	.04	-.36	.01			
PCS*CPAQ AE	.31	.53	.06	.56	10.3	<.001	.52

MPQ: McGill Pain Questionnaire, VAS: Visual Analogue Scale, RMDQ: Roland Morris Disability Questionnaire, PCS-13: Pain Catastrophising Scale, 13 item version, CPAQ-20: Chronic Pain Acceptance Questionnaire, 20 item version. n = 43.

Finally, the analysis was repeated with anxiety as the dependent variable (Table 3.6, Residual and p-p plots in Appendix E, Figures E5 and E6). Again, the addition of the PCS and CPAQ in model 2 significantly increased the variance explained by the model (R^2change = .24, F (2, 40) = 7.6, p = .002). The interaction between PCS and CPAQ was not significant and its addition did not increase the variance explained by the model (R^2 change = .01, F (1,39) = .71, p = .41).

Table 3.6
Multiple linear exploring effects of PCS and CPAQ on HADS anxiety score

	Unstandardized Coefficients B	Standard Error	Standardized Coefficients Beta	Sig.	F	P	Adjusted R^2
Model 1							
(Constant)	5.55	2.39		.03			
MPQ Pain VAS	.02	.37	.01	.95			
RMDQ	.25	.11	.34	.04	2.8	.07	.08
Model 2							
(Constant)	8.22	3.89		.04			
MPQ Pain VAS	-.33	.33	-.14	.33			
RMDQ	.18	.10	.25	.08			
PCS	.14	.06	.38	.02			
CPAQ	-.05	.04	-.22	.17	5.7	.001	.30
Model 3							
(Constant)	7.11	4.12		.09			
MPQ Pain VAS	-.23	.36	-.10	.53			
RMDQ	.17	.11	.23	.12			
PCS	.14	.06	.39	.02			
CPAQ	-.04	.04	-.16	.38			
PCS*CPAQ	.49	.58	.13	.41	4.6	.002	.29

MPQ: McGill Pain Questionnaire, VAS: Visual Analogue Scale, RMDQ: Roland Morris Disability Questionnaire, PCS: Pain Catastrophising Scale, CPAQ: Chronic Pain Acceptance Questionnaire. n = 43.

3.4. Main Hypotheses

3.4.1. Hypothesis 1: The relationship between patient catastrophising and psychological distress will be modulated by spouse catastrophising.

Spouse catastrophising was significantly correlated with scores of HADS depression (r = .43, p < .01) and anxiety (r = .42, p < .01). Spouse catastrophising was entered into a regression with variables that were previously shown to be independent predictors of depression in the analyses for hypothesis c (Table 3.7, Residual and p-p plots in Appendix E, Figures E7 and E8). Neither the addition of the PCS spouse nor an interaction term of PCS*PCS-Spouse significantly improved the model for predicting depression (R^2 change = .02, F (2, 40) = 0.58, p = .57).

Table 3.7
Multiple linear regression exploring the effects of PCS-Spouse on depression

	Unstandardized Coefficients B	Standard Error	Standardized Coefficients Beta	Sig.	F	p	Adjusted R^2
Constant	5.69	3.00		.06			
RMDQ	.22	.10	.28	.04			
PCS patient	.10	.06	.23	.11			
CPAQ AE	-.11	.05	-.30	.03			
PCS spouse	.06	.05	.15	.29			
PCS*PCS-S	.12	.63	.02	.86	6.4	<.001	.37

RMDQ: Roland Morris Disability Questionnaire, PCS: Pain Catastrophising Scale, CPAQ: Chronic Pain Acceptance Questionnaire, Pain Catastrophising Scale- Spouse version, n = 43.

A regression analysis was conducted with anxiety as the outcome variable, to explore whether spouse catastrophising was a significant predictor of anxiety after adjusting for RMDQ and patient catastrophising (Table 3.8, Residual and p-p plots in Appendix E, Figures E9 and E10). Spouse PCS was a significant predictor and significantly increased the variance accounted for compared to a model with RMDQ and patient catastrophising alone (R^2 change =.07, F(2, 40) = 4.2 p = .046). The interaction between patient and spouse catastrophising was not significant and was therefore not included in this final model.

Table 3.8
Multiple linear regression exploring the effects of PCS-Spouse on anxiety

	Unstandardized Coefficients B	Standard Error	Standardized Coefficients Beta	Sig.	F	p	Adjusted R^2
Constant	1.66	1.55		.29			
RMDQ	.13	.09	.19	.15			
PCS patient	.12	.05	.33	.02			
PCS spouse	.10	.05	.29	.05	7.7	<.001	.31

RMDQ: Roland Morris Disability Questionnaire, PCS: Pain Catastrophising Scale, CPAQ: Chronic Pain Acceptance Questionnaire, Pain Catastrophising Scale- Spouse version.

3.4.2. Hypothesis 2: Spouse catastrophising will be associated with pain acceptance in patients

The first two columns of Table 3.9 show the correlation between CPAQ and pain catastrophising in patients and spouses. The results indicate a strong negative correlation between the CPAQ and both the patient and spouse versions of the PCS. The correlation between PCS-Spouse and CPAQ was calculated again controlling for patient catastrophising (final column). The CPAQ and the pain willingness subscale remained significantly correlated with the PCS-Spouse version (r = -.37, p < .01 and r = -.38, p < .01 respectively).

Table 3.9
Correlation between CPAQ and Pain Catastrophising in patients and spouses

	Simple Correlation		**Partial Correlation†**
	PCS	PCS-Spouse	PCS-Spouse
Total CPAQ	-.49***	-.52***	-.37**
Activities Engagement	-.31*	-.31*	-.19
Pain Willingness	-.47***	-.52***	-.38**

PCS: Pain Catastrophising Scale, 13 item version, CPAQ: Chronic Pain Acceptance Questionnaire †Partial correlation adjusted for the effects of patient Pain Catastrophising Scale, n = 58.

3.4.3. Hypothesis 3: There will be interaction between patient and spouse catastrophising in relation to acceptance such that the relationship between catastrophising and acceptance will be stronger when spouses are high catastrophisers compared to when they are not.

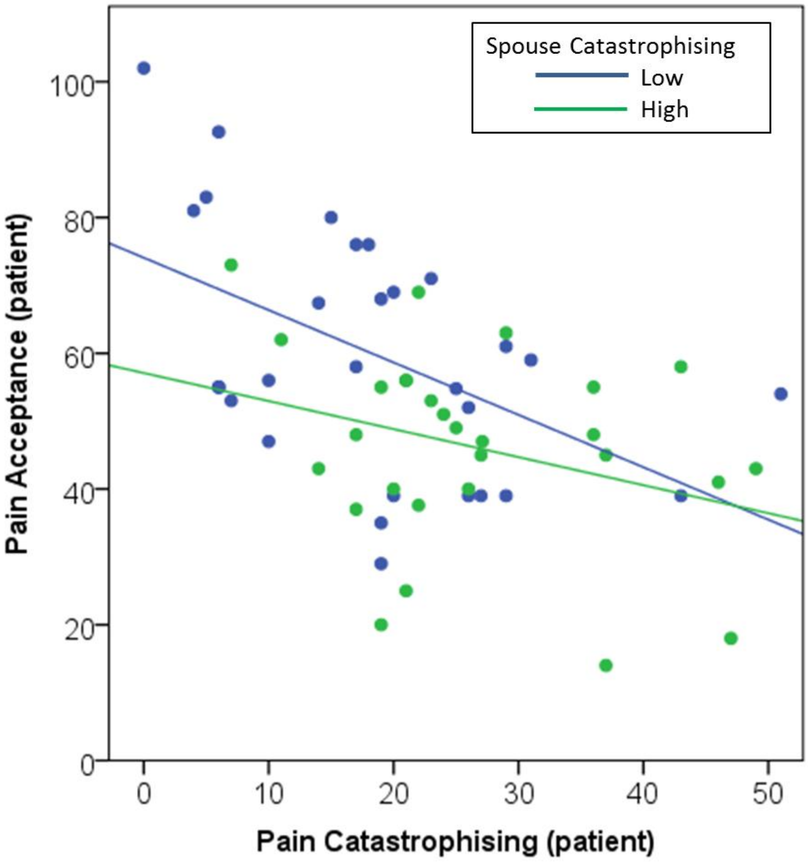
A multiple linear regression analysis was conducted to explore whether there was an interaction between patient and spouse catastrophising in relation to acceptance (Table 3.10, Residual and p-p plots in Appendix E, Figures E11 and E12). This demonstrated that after adjusting for pain (VAS), PCS and PCS-Spouse, there was a significant PCS*PCS-Spouse interaction ($t = 2.6$, $p = .02$). Figure 3.3 shows a scatterplot of PCS-Spouse and CPAQ stratified by PCS-Patient (low/high). When spouse catastrophising was low, low catastrophising in patients was associated with greater acceptance, but when spouse catastrophising was high, low catastrophising in patients was not associated with greater acceptance.

Table 3.10
Multiple linear regression exploring the effects of PCS-Spouse on patient acceptance

	Unstandardized Coefficients B	Standard Error	Standardized Coefficients Beta	Sig.	F	P	Adjusted R^2
Constant	111.42	12.77		.00			
MPQ VAS	-2.19	1.10	-.25	.05			
PCS patient	-1.81	.51	-1.14	.00			
PCS spouse	-1.16	.39	-.78	.01			
PCS*PCS-S	.04	.02	1.19	.02	8.0	< .001	.39

MPQ: McGill Pain Questionnaire, VAS: Visual Analogue Scale, PCS: Pain Catastrophising Scale, 13 item version, CPAQ: Chronic Pain Acceptance Questionnaire, 20 item, PCS-S: Pain Catastrophising Scale- Spouse version, n = 43.

Figure 3.3. Interaction between Patient and Spouse Catastrophising on CPAQ scores



3.4.4. Hypothesis 4: Spouse responses will be associated with pain acceptance.

Both solicitous and distracting responses were positively skewed suggesting a high level of endorsement of these items by patients (Appendix E, Figure E13). Scores for Punishing responses were negatively skewed with a quarter of the sample scoring 0 on this scale indicating that few patients thought their partners responded in this way. Due to the non-normal distribution of these scales, Spearman's correlation coefficient was used to measure their association with the CPAQ. Results are provided in Table 3.11. Neither the CPAQ, nor its subscales was significantly correlated with any of the spouse responses.

Table 3.11
Correlations between CPAQ and MPI Spouse responses

	Solicitous Responses	**Distracting Responses**	**Punishing Responses**
Total CPAQ	-.19	-.08	-.09
Activities Engagement	-.14	.00	-.14
Pain Willingness	-.19	-.11	.02

CPAQ: Chronic Pain Acceptance Questionnaire, MPI: Multidimensional Pain Inventory, n = 58.

4. Discussion

4.1. Summary of Main Findings

There was a high prevalence of depression and anxiety symptoms in this sample with 49% and 58%, respectively, scoring above the threshold on the HADS. Pain catastrophising and acceptance scores were significantly correlated with psychological distress, functional disability and pain severity.

After adjusting for confounders, the CPAQ was a significant predictor of depression. A post-hoc analysis demonstrated a stronger relationship when the activities engagement subscale was entered into the regression instead of the CPAQ total score. Pain acceptance did not predict anxiety in the multivariate model, and there was no significant effect of the interaction between pain catastrophising and acceptance on either depressive or anxious symptoms. Pain catastrophising was a significant predictor of both depression and anxiety after adjusting for confounders.

Patient and spouse catastrophising were strongly correlated. Adding the PCS-spouse to the prediction model for depression did not significantly increase the variance accounted for compared to the previous model. However, the addition of spouse catastrophising did improve the model for the prediction of anxiety. There was no evidence of a significant effect of the interaction between patient and spouse on either depression or anxiety after adjusting for potential confounders.

Patient and spouse catastrophising scores were both significant independent predictors of acceptance after adjusting for confounders. There was a significant effect of the interaction between patient and spouse catastrophising on acceptance, such that when patient catastrophising was low, low catastrophising in spouses was associated with greater acceptance, but when patient catastrophising was high, catastrophising in spouses had no effect.

Neither the CPAQ total score nor its subscales were significantly correlated with spouse responses to pain.

4.2. Limitations

This study was cross-sectional, and as such, it was not possible to ascertain the direction of causality between correlated factors. Longitudinal studies are needed to confirm the findings in this study.

Failure to reach the intended sample size meant that the study was underpowered to explore some hypotheses, which may have led to type 2 errors. In the discussion of results that follows, comparisons are made between the magnitude of correlations in this and other studies to examine whether these findings are consistent with the literature, even if they did not reach significance in this analysis.

Relying on information collected by the service led to a high level of missing data on some questionnaires, and in hindsight an audit of previously collected data may have identified this as a problem. Where possible, data were imputed in order to use questionnaires in which just one or two items were missing. Missing items were replaced with the participant’s mean item score on that questionnaire, which could have led to an over- or underestimate of a score, particularly if scores on that item tend to be higher than other item scores. However, in practice, this replacement was conducted on a small scale, and the impact of imputing one item in a 13- or 20-item questionnaire is limited.

The Spouse version of the pain catastrophising scale is a relatively new measure and only one study has explored its psychometric properties (Cano, Leonard, et al., 2005). Its construct validity was measured in relation to the patient catastrophising scale, thus correlation between the two is perhaps not surprising.

Furthermore, there are limited measures that could be used to assess its convergent validity as few well-validated questionnaires exist that measure a spouse's beliefs. Therefore further assessment of the psychometric properties of the PCS-Spouse questionnaire is required.

The researchers recruiting on this study were unable to attend the pain clinic every day, therefore only approximately half of potentially eligible patients were approached during the study period. That said, there is no reason to believe that patients invited to participate differed from those that attended on days when the researchers were unavailable. When the clinic was particularly busy, nurses did not always feel they had the time to explain the study to participants and therefore some patients will not have been approached for this reason. More complex patients who required longer appointments may have been less likely to be invited to participate.

A limited number of questionnaires were administered in this study to ensure that the time commitment for participants was low and to encourage a high level of response. However, further information such as quality of marital relationship, psychological distress in spouses, more comprehensive measures of spouse responses, and the spouse rated version of the MPI may have been helpful in elucidating the mechanisms behind the associations in this study.

4.3. Discussion of Results in the Context of Relevant Literature

4.3.1. Prevalence of Psychological Distress

The prevalence of depression falls within the 40-50% estimated in a recent review of epidemiological surveys (Tunks, et al., 2008) whilst the prevalence of anxiety is at the higher end of estimates in the literature. This may reflect the use of a screening measure as opposed to a structured interview that yields a formal diagnosis or self-report of treatment for a mental health problem. Although the HADS is specifically designed for use with medical populations, it may still result in an overestimate of psychological symptoms, as some items are common to many physical health problems (e.g. “I feel as if I’m slowed down”). Nevertheless it confirms the high prevalence of psychological distress in this patient population and the need for routine screening for mental health problems.

4.3.2. Discussion of preliminary hypotheses

Hypothesis a. The association between catastrophising and physical and psychological functioning has been well-documented in the literature (Burton, et al., 1995; Cook, et al., 2006; Gauthier, et al., 2011; McCracken & Gross, 1993; Sullivan, et al., 2001; Vlaeyen, et al., 1995). Further exploration of catastrophising by case status suggested that the magnification subscale was most strongly associated with severity of anxiety. This provides support for a significant role of the fear of the consequences of pain in the fear-avoidance model (Vlaeyen & Linton, 2000). By contrast, depression case status was more strongly correlated with helplessness which may reflect pessimism about the future, perceived inability to control the pain and low self-efficacy. Severijns, Vlaylen and van den Hout (2004) propose that the dimensions of catastrophising may represent different stages in the appraisal process of a specific threat, building on Lazarus and Folkman’s work (1984) of primary and secondary appraisals. Specifically they suggest that rumination and magnification are primary appraisals, whereas helplessness may be a secondary appraisal stemming from the initial situation. Further exploration of these subtypes of catastrophising has been highlighted as an important avenue of research (Quartana, Campbell, & Edwards, 2009), and may shed light on its relationship with acceptance.

Hypothesis b. Consistent with other studies, acceptance was significantly correlated with most functional outcomes (Elander, et al., 2009; McCracken & Keogh, 2009; McCracken & Velleman, 2010). In this study, correlations between adverse outcomes (pain severity, disability, psychological measures) and the engagement in activities subscale tended to be larger than correlations with the pain willingness subscale, which has been reported in some samples (Fish, McGuire, Hogan, Morrison, & Stewart, 2010; Vowles, et al., 2007; Wicksell, et al., 2009) although other studies have reported correlations of a similar magnitude between the two subscales and outcomes (McCracken & Eccleston, 2005; McCracken, et al., 2004). One longitudinal study has explored whether the subscales of the CPAQ predict future functional impairment (McCracken & Vowles, 2008) and reported that baseline activities engagement subscale scores were more strongly related to depressive symptoms, depression-related interference and physical and psychosocial disability an average of 18 weeks later, compared to the pain willingness scale. Taken together these findings tend to support a greater role of activities engagement in psychological distress than pain willingness. The ability to engage in activities despite pain will depend on factors such as motivation, lethargy and concentration, all of which are common in depression. By contrast, pain willingness may have a greater role in moderating the impact of pain on functional outcomes, i.e. those with high willingness to experience pain will have a lower level of functional disability than those who have a similar level of pain but are less willingness to experience it (Richardson, et al., 2010).

Hypothesis c. The interplay between acceptance and catastrophic thinking on functional outcomes is less clear in the literature. Previous studies have suggested that the effects of catastrophising on functioning are mediated by acceptance, such that the variance in functioning explained by catastrophising is significantly reduced when acceptance is added into the model (Vowles, McCracken, et al., 2008b). In this study, we found that the contribution of pain catastrophising in predicting depression reduced when acceptance was included in the model but was still close to being a significant predictor in its own right (p = .07). When only the activities of engagement subscale was entered in to the model, catastrophising remained a significant predictor. It is difficult to draw firm conclusions from these results given the small sample size, but these findings do not support a model whereby the effects of catastrophising are entirely mediated by acceptance. Furthermore, there was no evidence to suggest that acceptance moderated the effect of catastrophising on depressive or anxious symptoms as has been reported previously for pain tolerance (Richardson, et al., 2010). This may be because willingness to experience pain is more relevant to physical measures of pain and functional ability than psychological outcomes. Therefore the most likely explanation in this study seems to be that catastrophising and acceptance contribute independently to predicting depression.

4.3.3. Main Hypotheses

Hypothesis 1. Patient and Spouse Catastrophising and Psychological Distress

This is only the third study to explore the correlation between patient and spouse catastrophising; with the other two studies showing a strong positive correlation in one instance (Cano, Leonard, et al., 2005) and no association in another (Gauthier, et al., 2011). It is unclear why this second study differs from the results presented here, although its recruitment via newspaper advertisements, rather than through a pain clinic may have resulted in a less representative sample. Concordance between patient and spouse on factors such as pain severity and self-efficacy (Porter, et al., 2002), has been shown to be an important predictor of patient perceived social support and psychological distress, therefore it would be useful to explore this agreement further.

Spouse catastrophising was not a significant predictor of depression after adjusting for other predictors, which suggests that the effects of spouse catastrophising on depression may be mediated by other factors, in particular patient catastrophising and acceptance It is perhaps not surprising that spouse catastrophising remained a significant predictor in the model for anxiety, as the impact of a significant other overestimating the effects and consequences of pain is likely to heighten anxiety in the patient. This sample was too small to explore the impact of subscales of spouse catastrophising in a multivariate model but it would be interesting to see if a specific type of catastrophic thinking was associated with patient anxiety.

Hypothesis 2. Spouse Catastrophising and Acceptance

The most novel finding in this study was the strong correlation between spouse catastrophic thinking and patient acceptance, and raises the question of whether modifying spouse beliefs about pain could have an influence on patient acceptance. As spouse catastrophising remained significantly correlated with acceptance after adjusting for the impact of patient catastrophising, this effect must be more than the well-documented concordance between couples on functioning measures and cognitive constructs (Cano, Johansen, & Geisser, 2004). However, the mechanism by which these spouse beliefs are communicated, and impact on acceptance is unclear. One a priori hypothesis was that spouse catastrophising might explain the relationship between spouse responses and acceptance, however, this was not explored due to the low correlation between spouse responses and acceptance in this study. Had the sample size been larger it may have been interesting to explore whether spouse responses moderated the relationship between spouse catastrophic thinking and acceptance in patients, for example, spouses that expressed their catastrophic beliefs by responding in a solicitous manner may have discouraged acceptance in patients.

Another possibility is that spouse catastrophising is communicated via responses to well-behaviours, such that spouses who tend not to catastrophise respond more positively when patients try to do as much as possible themselves, thus encouraging engagement in valued activities. Examining the relationship between acceptance and the Spouse Response Inventory (Schwartz, et al., 2005), which measures well behaviours as well as pain behaviours, may be helpful in exploring this hypothesis. This would be compatible with behavioural models of chronic pain and also behavioural models of relationships more broadly (Jacobson, Christensen, Prince, Cordova, & Eldridge, 2000).

Responding with catastrophic interpretations may be an attempt by the spouse to validate the patient's experience of pain and express a shared understanding of the pain, much as the Communal Coping Model proposes that catastrophising by the patient is hypothesized to communicate distress, elicit support and build intimacy (Cano & Williams, 2010; Sullivan, et al., 2001; Thorn, Ward, Sullivan, & Boothby, 2003b). This is consistent with the correlation between spouse catastrophising and social support. Further exploration of the relationship between spouse and marital satisfaction could shed light on this idea.

Hypothesis 3. Interaction between Patient and Spouse Catastrophising on Acceptance. It was hypothesised that spouse catastrophising could moderate the relationship between patient catastrophising and acceptance such that high catastrophising in patients is more strongly associated with low acceptance when spouses are also high catastrophisers. In fact these findings suggest that if patients are high catastrophisers, the spouse’s level of catastrophising is unimportant, but if the patient is a low catastrophiser, they are less likely to be accepting of their pain if their partner is a high catastrophiser. Thus catastrophising spouses may inhibit acceptance in low catastrophising patients that may otherwise be accepting.

As mentioned in the limitations section, this study is cross-sectional and therefore we cannot rule out the possibility that spouse catastrophising is a consequence of patient factors rather than a cause and may be indicative of depression or anxiety in the spouse. Perhaps the most realistic conclusion is that a bi-directional relationship exists where both partners’ cognitive processes are impacted by the other.

Hypothesis 4. Spouse Responses and Acceptance. One other study (McCracken, 2005) has explored the relationship between spouse responses and acceptance in a similar patient population, and found significant correlations for all three response types ranging from -.19 to -.30. McCracken (2005) hypothesized that solicitous responses by spouses reduce the opportunity for patients to engage in activities despite pain. In the current study, none of the responses was significantly correlated with the total CPAQ score, although the relationship between solicitous responses and acceptance (r = - .19) may well have been significant had the sample size been larger. A further explanation for the lower correlations in this study is the use of a shorter 12-item version of the MPI spouse response section which may have different characteristics to the 14-item. In particular the short version excludes the item “When I experience pain, my partner ignores me” which may be more common than some of the more extreme items in the punishing responses scale. The low endorsement of punishing responses in this study also meant that there were limited data on which to calculate correlation estimates. However, even with these methodological differences, the results from both this, and McCracken’s study, suggest that the influence of spouse responses on acceptance is fairly small. This is somewhat surprising since spouse responses are associated with many other cognitive processes, such as catastrophic thinking and self-efficacy, but may reflect the very personal nature of acceptance, particularly in relation to the willingness to experience pain.

4.4. Clinical Implications

As previous studies have concluded, acceptance is associated with lower depression (Elander, et al., 2009; McCracken & Keogh, 2009; McCracken & Velleman, 2010) and therefore acceptance and commitment-based treatments for chronic pain should be recommended. This study suggests that if patients are low catastrophisers, taking steps to reduce spouse catastrophising may improve acceptance. However, this presents a dilemma with regards to treatment, as any attempt to change catastrophic thinking in spouses, or reduce the expression of these thoughts, may be interpreted by the patient as invalidating. Indeed early behavioural interventions that focused on reducing solicitous behaviour by partners were poorly accepted by patients (Turk, 1996). Any intervention that targets a reduction of catastrophising in spouses needs to be accompanied by patient education about why modification of cognitions may be helpful.

Although patients are often provided with sessions on how to explain their pain to friends and family, partners of people with chronic pain are rarely offered support or invited to participate in carer interventions. The high level of catastrophising in this study and the prevalence of mental health problems reported elsewhere (Roy, 2001) suggest that this group is in need of further support. Anecdotally, many patients who participated in this study expressed frustration that there was not more support available to their spouses within the service, or recognition of how difficult caring for someone with chronic pain could be, suggesting that patients are certainly open to partner involvement in treatment.

4.5. Further Research

This study focused specifically on psychological distress, however it may also be interesting to explore the inter-relationship between spouse catastrophising and acceptance on self-reported pain or functional disability. Further exploration of the role of pain behaviours in shaping spouses' beliefs about pain may also make sense of why some spouses tend to catastrophise when others do not.

Given the small sample size, it was not possible to explore the subscales of catastrophic thinking in either patients or their spouses in multivariate models, and this may be important. Furthermore, although catastrophising has been identified as a fundamentally important thinking error in mood disorders, it represents just one form of cognitive distortion and broader consideration of cognitive errors may be helpful.

Longitudinal studies that explore the longer term effects of spouse catastrophising on acceptance are required to establish whether it would be an appropriate target for carer intervention. Evidence that spouse beliefs predicted better outcomes in the absence of any intervention, or that patients made greater gains when spouses tended not to catastrophise would lend weight to this approach.

In this study, a number of potential participants did not meet the inclusion criteria because their partner also suffered from chronic pain. This significant minority may represent a particularly interesting group to explore the inter-relationship between patient and partner catastrophising over time.

4.5.1. Consideration of other ACT Constructs

This study was limited to the consideration of acceptance, however, proponents of ACT stress the importance of the inter-relationship between the six key elements of the ACT model (Acceptance, Defusion, Contact with the Present Moment, Committed Action, Self as Context, Values) and suggest that the effects of each of these elements cannot be isolated (Fletcher & Hayes, 2005). In practice, this is hard to avoid in a research setting where each concept must be measured in its own right, and be based on clear theoretical underpinnings. Some of the strong associations found between acceptance and functional measures may be more accurately accounted for by cognitive defusion or value congruence, and this deserves further attention.

More recently, a measure has been developed which aims to measure the extent to which somebody acts in a ‘flexible mode’, for example, cognitive defusion as opposed to cognitive fusion or acceptance as opposed to experiential avoidance (McCracken, et al., 2010). It is plausible that spouse thoughts and behaviours may impact on this flexibility and it may be that interventions which focus on increasing flexibility in both partners could have a positive impact on functioning.

4.5.2. Acceptance in Significant Others

Two studies have been published recently exploring the relationship between parental acceptance and functional disability in their adolescent children (McCracken & Gauntlett-Gilbert, 2011; Simons, Sieberg, & Kaczynski, 2011). Using a parent version of the Chronic Pain Acceptance Questionnaire (CPAQ-P), high parental endorsement of the Activities Engagement subscale was associated with less functional disability and better school performance. Parental acceptance was also associated with less pain catastrophising (by the parent) and lower pain-related anxiety in parents (Simons, et al., 2011). Along similar lines, McCracken and Gauntlett-Gilbert (2011) developed the Parent Psychological Flexibility Questionnaire (PPFQ), which measures parental flexibility in relation to their child’s chronic pain. High scores on the PPFQ were negatively associated with pain interference in social, emotional and family functioning and protective parental responses. These findings raise the possibility that spouse acceptance may impact on patient functioning, although clearly there are important differences between a parent-child and a marital relationship which could mean these results are not generalisable. Furthermore, there is a need for further clarity on the meaning of one person’s rating of another’s acceptance, and whether this reflects their own acceptance of their relative’s pain or their perception of their relative’s acceptance of pain. For example, the concept of willingness to experience pain might reflect their own willingness if they were in their child’s position, the parent’s willingness for their child to experience pain, or the parent’s rating of their child’s willingness.

Perhaps a clearer avenue of research would be to explore whether spouses’ acceptance of their own internal experiences impacts on how they relate to their partner with chronic pain. Spouses who report a high level of personal acceptance may relate to their spouse in a way that promotes acceptance, in particular, encouraging active participation in activities, rather than responding solicitously.

4.6. Conclusion

This study adds to the current evidence base by uniting two key areas of research in chronic pain; the importance of the social environment and the role of acceptance. These findings suggest that spouses' cognitions play an important part in the acceptance process, and this does not seem to be explained by their responses to pain behaviours alone. Further research is needed, particularly into the impact of subtypes of catastrophic thinking and exploration of spouse expressions of catastrophic thinking in order to elucidate the nature of this relationship.

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Appendices

Appendix A. Participant Forms
A1. Information Sheet

Cambridge University Hospitals NHS
NHS Foundation Trust

Fiona McDougall
Trainee Clinical Psychologist
University of East Anglia

Patient and Spouse Information Sheet

How do spouses' thoughts about chronic pain relate to patients' acceptance of pain?
You are being asked to take part in a research study run by a Trainee Clinical Psychologist studying at the University East Anglia. The aims of the research study are to find out about how you cope with chronic pain and how pain affects your thoughts, emotions and the things you do. We also want to know how your spouse supports you when you are in pain and how your spouse's views about pain affect you. If you decide that you are interested in taking part, we will ask you to discuss participation with your spouse and ask them to read this information sheet. This information sheet has two parts:

- Part 1 tells you the purpose of the study and what will happen if you take part.
- Part 2 gives you more detailed information about how the study will be undertaken.

If you have any questions about the study, please contact the Pain Service on 01223 217796 and choose option 2. Please ask to speak with Fiona McDougall (Chief Investigator). If she is not available, you can leave a message and she will return your call as soon as possible.

PART 1

What is the purpose of the study?
Research tells us that our thoughts about pain can affect our mood and can also affect the things we do. The way people cope with these thoughts and emotions is an important factor in maintaining the best quality of life possible. We know that spouses can play an important role in supporting people who have chronic pain and we want to find out about the kind of support your partner provides and how this affects you. We also want to ask your spouse how s/he feels about the pain you experience.

This research will tell us more about the thinking processes that contribute to the experience of chronic pain and can help us to improve psychological therapy for people who are experiencing chronic pain.

Why have I been chosen?
You have been chosen because you are a patient at the Pain Service and have experienced chronic pain for at least six months.

Do I have to take part?
No. It is up to you to decide whether or not you take part. If you choose not to take part it will not affect the treatment you receive at the Pain Service. If you do take part, you will be given this information sheet to keep. You and your spouse will also be asked to sign a consent form to show you agree to taking part. You are free to withdraw at any time and without giving a reason.

What will happen to me if I take part?
If you decide to take part, you will be asked to complete four short questionnaires. You can complete these at home or at your next visit to the clinic if you prefer. The questionnaires will ask about your pain, your emotions, and how you manage your pain. You will also complete a short questionnaire about how your spouse supports you when you are experiencing pain. These questionnaires will take 15-20 minutes. We will ask for your consent to use other information you have already provided to the service. Specifically we will ask to collect

information about your age, gender, diagnosis (if one exists), the severity and type of pain you experience, physical disability and the treatment offered by the Pain Service. Your spouse will be asked to complete a short questionnaire, which will take about 5 minutes. We will ask him/her what his/her thoughts are about your pain, for example, how severe it is and whether it stops you from doing things.

What are the possible disadvantages and risks of taking part?
Some people may find it distressing to think about their pain or the emotions they experience. If you do find the questions distressing, you can stop at any time.

What are the possible benefits of taking part?
These results may help us improve the services and psychological treatments available to patients who suffer from chronic pain.

PART 2

What if there is a problem?
Complaints: If you or your spouse have a concern about any aspect of this study, you should ask to speak to Fiona McDougall and she will do her best to answer your questions. You can also contact Professor Malcolm Adams at the University of East Anglia on 01603 456161. If you remain unhappy and wish to complain formally, you can do this through the NHS Complaints Procedure. Details can be obtained from Addenbrooke’s Hospital Patient Liaison Service on 01223 216756. If spouses have any questions about participating in the study or for general information on chronic pain, they can contact the Pain Service in confidence on the telephone number at the bottom of the page.

Will my taking part in this study be kept confidential?
Yes, the information you provide is confidential and will not be shared with anyone. The only exception to this rule would be if you told us you were concerned you might harm yourself. If you told us this, we would write to your GP and tell them how you are feeling. If necessary we would also ask a mental health professional to meet with you.

We will **not** share the information you give us with your spouse.

What will happen to the data I provide?
The consent form you sign will be stored at the Pain Service in a locked cabinet. The questionnaires you complete will be stored separately and will be anonymous so no one could trace them back to you.

What will happen to the results of the research study?
The results will be published in scientific journals and/or presented at scientific meetings. When data are published or presented they will be anonymised.

Who has reviewed the study?
This study has been reviewed by the National Research Ethics Committee North West – Lancaster, study number 11/NW/0750

What should I do now if I want to take part?
If you would like to take part, the first thing to do is to check that your spouse is also willing to take part. You should ask them to read this information sheet. If you decide to participate, please complete the form entitled ‘Patient consent form’ and the ‘Patient Questionnaire’ and return these by post in the envelope provided. Ask your spouse to complete the consent form entitled ‘Spouse consent form’ and the ‘Spouse Questionnaire’ and return these by post in the envelope provided. If you want to ask questions before signing these forms please call Fiona McDougall on the number provided below.

Contact Details
Fiona McDougall , Trainee Clinical Psychologist: 01223 217796
Dr. Emma Harrold, Consultant Clinical Psychologist, Pain Service: 01223 217796
Professor Malcolm Adams, Professor of Clinical Psychology, University of East Anglia: 01603 456161

Cambridge University Hospitals **NHS**
NHS Foundation Trust

A2. Patient Consent Form

Version 2.3, 05/01/2012

Patient Consent Form

Study Number: A092440
Patient Identification Number for this trial:

Title of Project: How do spouses' beliefs about chronic pain relate to patients' acceptance of pain?
Researcher: Fiona McDougall

Please read the following statements and put your initials in the box to indicate that you agree:

Please initial

Box

1. I confirm that I have read and understand the information sheet dated 05/01/2012 (version 2.3) 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 my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected. ☐

3. I agree to my GP being informed about the study if necessary. ☐

4. I agree for my spouse to answer questions about the pain I experience. ☐

5. I agree for study researchers to collect information from my medical notes as set out in the information sheet ☐

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

7. I agree to take part in this study ☐

Name of Patient	Date	Signature
………………………………………..	…………	……………………….

TO BE COMPLETED BY THE PAIN CLINIC

Name of person taking consent	Date	Signature
………………………………………..	…………	……………………….

When completed: 1 for participant; 1 for researcher site file; 1 (original) to be kept in medical notes.

Cambridge University Hospitals NHS
NHS Foundation Trust

A3. Spouse Consent Form

Version 2.3, 05/01/2012

Spouse Consent Form

Study Number: A092440
Patient Identification Number for this trial:

Title of Project: How do spouses' beliefs about chronic pain relate to patients' acceptance of pain?
Researcher: Fiona McDougall

Please read the following statements and put your initials in the box to indicate that you agree:

Please initial

Box

1. I confirm that I have read and understand the information sheet dated 05/01/2012 (version 2.3) 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 my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected. ☐

3. I understand that data collected during the study may be looked at by individuals 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 this information. ☐

4. I agree to take part in this study ☐

Name of Participant	Date	Signature
………………………………………..	…………	……………………….

TO BE COMPLETED BY THE PAIN CLINIC:

Name of Person taking consent	Date	Signature
………………………………………..	…………	……………………….

When completed: 1 for participant; 1 for researcher site file; 1 (original) to be kept in medical notes.

A4. Reminder Letter

Pain Clinic
Box 215
Cambridge University Hospitals NHS Foundation Trust
Hills Road,
Cambridge,
CB2 0QQ
Tel: 01223 217796

Dear [Patient name]

You may remember meeting with a researcher at Addenbrooke’s Hospital recently to discuss whether you would like to take part in a research study about the pain you experience.

If you would like to participate in the study please fill in the ‘patient pack’ given to you at your previous visit and ask your partner to fill in the ‘spouse pack’. Please return them by post in the envelopes provided.

If you have decided that you do not want to participate then please accept my apologies for contacting you again.

If you have any questions or concerns about the study or if you need new copies of the questionnaires, you can call Fiona McDougall at the Pain Clinic on 01223 217796.

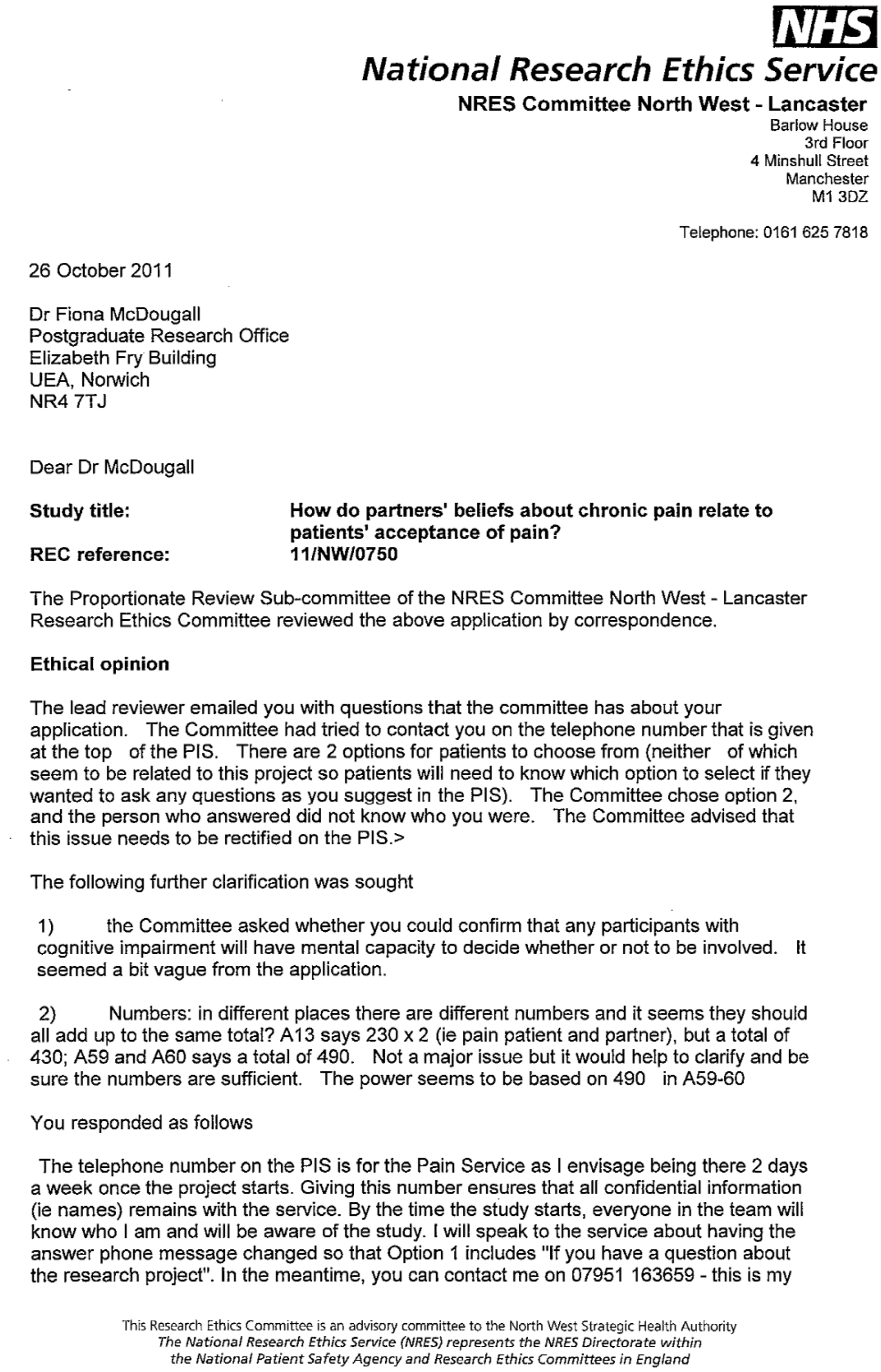
Thank you again for interest in the study,

Yours sincerely,

Fiona McDougall
Trainee Clinical Psychologist

Appendix B. Study Approval Documentation

B1. Research Ethics Committee Approval



NHS
National Research Ethics Service
NRES Committee North West - Lancaster
Barlow House
3rd Floor
4 Minshull Street
Manchester
M1 3DZ

Telephone: 0161 625 7818

26 October 2011

Dr Fiona McDougall
Postgraduate Research Office
Elizabeth Fry Building
UEA, Norwich
NR4 7TJ

Dear Dr McDougall

Study title:	**How do partners' beliefs about chronic pain relate to patients' acceptance of pain?**
REC reference:	**11/NW/0750**

The Proportionate Review Sub-committee of the NRES Committee North West - Lancaster Research Ethics Committee reviewed the above application by correspondence.

Ethical opinion

The lead reviewer emailed you with questions that the committee has about your application. The Committee had tried to contact you on the telephone number that is given at the top of the PIS. There are 2 options for patients to choose from (neither of which seem to be related to this project so patients will need to know which option to select if they wanted to ask any questions as you suggest in the PIS). The Committee chose option 2, and the person who answered did not know who you were. The Committee advised that this issue needs to be rectified on the PIS.>

The following further clarification was sought

1) the Committee asked whether you could confirm that any participants with cognitive impairment will have mental capacity to decide whether or not to be involved. It seemed a bit vague from the application.

2) Numbers: in different places there are different numbers and it seems they should all add up to the same total? A13 says 230 x 2 (ie pain patient and partner), but a total of 430; A59 and A60 says a total of 490. Not a major issue but it would help to clarify and be sure the numbers are sufficient. The power seems to be based on 490 in A59-60

You responded as follows

The telephone number on the PIS is for the Pain Service as I envisage being there 2 days a week once the project starts. Giving this number ensures that all confidential information (ie names) remains with the service. By the time the study starts, everyone in the team will know who I am and will be aware of the study. I will speak to the service about having the answer phone message changed so that Option 1 includes "If you have a question about the research project". In the meantime, you can contact me on 07951 163659 - this is my

This Research Ethics Committee is an advisory committee to the North West 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

personal mobile number.

1) Patients who lack the capacity to give consent will not be included in the study. This includes people with significant cognitive impairment. In practice, patients who lack capacity to consent would not be referred to the education groups from which this study is recruiting, so it is very unlikley that we will come into contact with patients that lack capacity. That said, this patient population includes older adults, so there may be people with very mild cognitive impairment who would be perfectly capable of deciding whether or not they would like to pariticpate. If at the initial appointment with the clinic nurse, it is very clear that they do have capacity to make this decision, they will be given the opportunity to participate. Just to be clear, we would not invite anyone to participate if there was any question at all about their capacity.

2) Participant numbers: you are correct, it should be 490 (245 patients plus 245 spouses). The other numbers were from previous versions and I didn't spot the inconsistencies. Please accept my apologies.

On behalf of the Committee, the sub-committee gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, **subject to the conditions specified below.**

Ethical review of research 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).

Conditions of the favourable opinion

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.

Other conditions specified by the REC

a. The Committee would like to see the Consent Forms revised to
    i) include a further clause on the patient form "I understand that my medical notes and data collected during the study may be looked at by individuals 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 this information"

ii) include a further clause on the partner form "I understand that data collected during the study may be looked at by individuals 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 this information"

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).

You should notify the REC in writing once all conditions have been met (except for site approvals from host organisations) and provide copies of any revised documentation with updated version numbers. Confirmation should also be provided to host organisations together with relevant documentation.

Approved documents

The documents reviewed and approved were:

Document	*Version*	*Date*
Evidence of insurance or indemnity	University of East Anglia	28 June 2011
Investigator CV	Dr F McDougall	17 October 2011
Letter from Sponsor	University of East Anglia	02 September 2011
Other: CV- Academic Supervisor	Professor M Adams	17 October 2011
Other: Letter from Academic Supervisor re. Scientific Review		17 October 2011
Participant Consent Form: Appendix I:Patient	2.0	10 July 2011
Participant Consent Form: Appendix J: Spouse	2.0	10 July 2011
Participant Information Sheet: Appendix A: Patient & Spouse	2.0	17 July 2011
Protocol	2.0	17 July 2011
Questionnaire: Appendix B: Hospital Anxiety & Depression Scale		
Questionnaire: Appendix C: Chronic Pain Acceptance Questionnaire		
Questionnaire: Appendix D: Pain Catastrophising Scale		
Questionnaire: Appendix E: The WH-MPI, Version 3		
Questionnaire: Appendix F: MsGill Short Form Questionnaire & Pain Visual Analog Scales		
Questionnaire: Appendix H: PCS-S		
Questionnaire: The Roland-Morris Disability Questionnaire- Modified		
REC application	3.2	14 October 2011

Membership of the Proportionate Review Sub-Committee

The members of the Sub-Committee who took part in the review are listed on the attached sheet.

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/NW/0750 **Please quote this number on all correspondence**

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

Yours sincerely

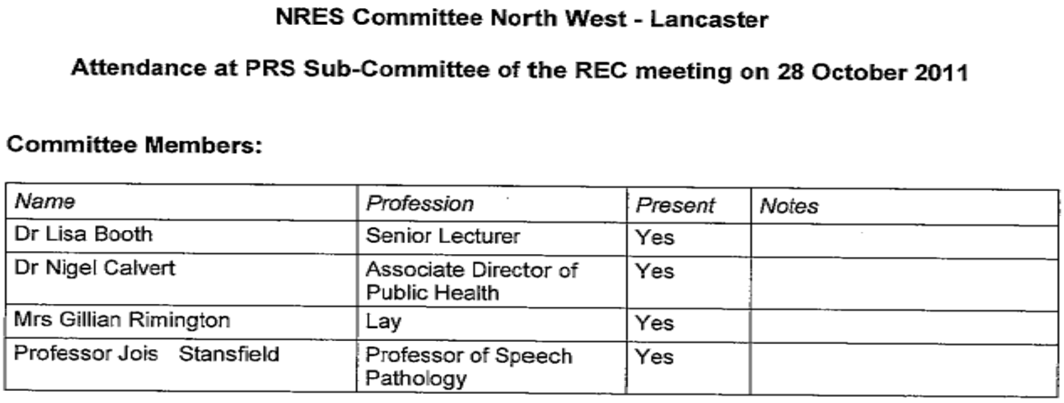
pp. **Dr Lisa Booth**
Chair

Email: carol.ebenezer@northwest.nhs.uk

Enclosures: *List of names and professions of members who took part in the review*

"After ethical review – guidance for researchers" [SL-AR2]

Copy to: *Mrs Sue Steel*
Mr Stephen Kelleher, Cambridge University Hospitals



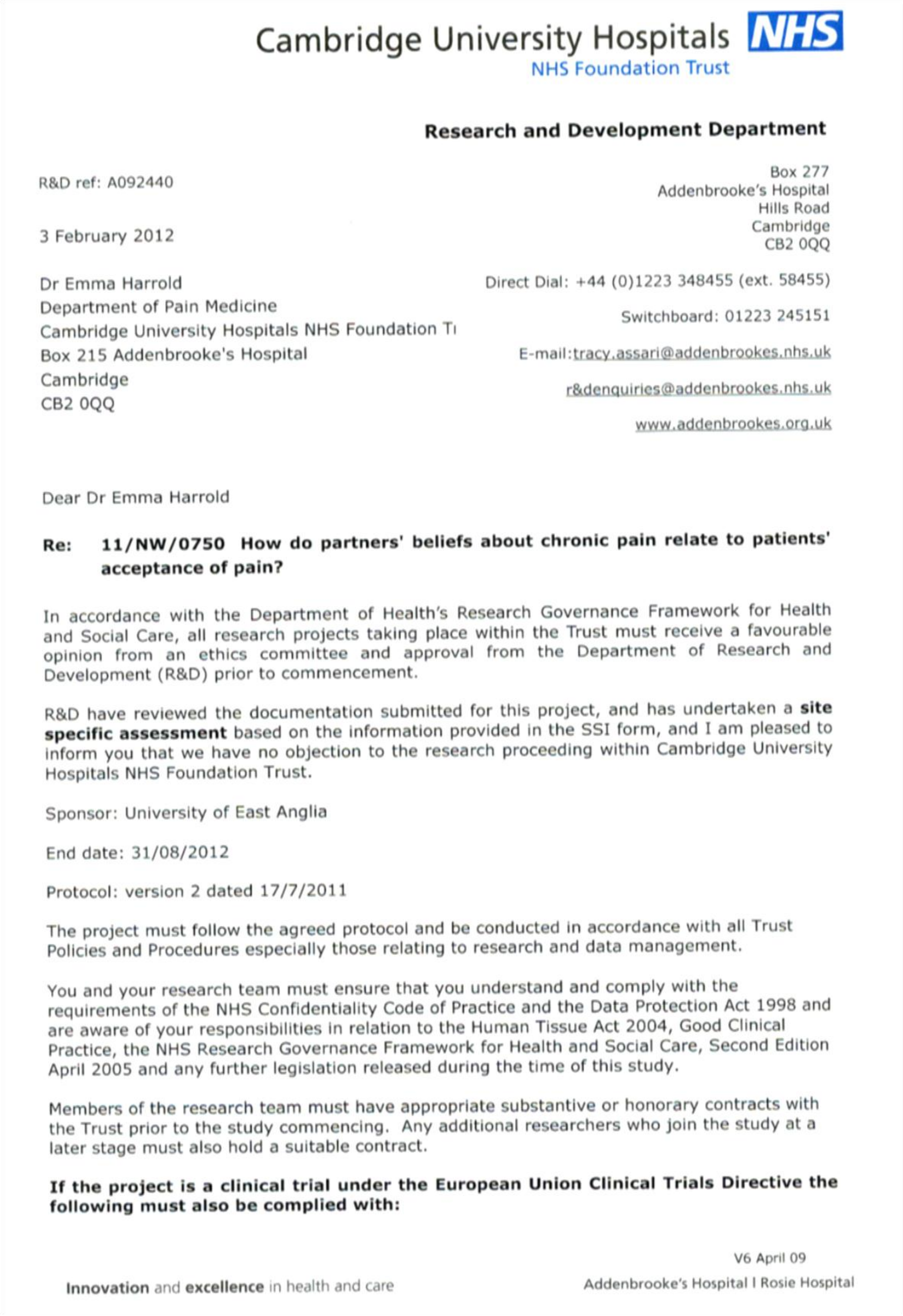
NRES Committee North West - Lancaster

Attendance at PRS Sub-Committee of the REC meeting on 28 October 2011

Committee Members:

Name	*Profession*	*Present*	*Notes*
Dr Lisa Booth	Senior Lecturer	Yes	
Dr Nigel Calvert	Associate Director of Public Health	Yes	
Mrs Gillian Rimington	Lay	Yes	
Professor Jois Stansfield	Professor of Speech Pathology	Yes	

B2. R & D Approval



Cambridge University Hospitals NHS
NHS Foundation Trust

Research and Development Department

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CB2 0QQ

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E-mail:tracy.assari@addenbrookes.nhs.uk

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www.addenbrookes.org.uk

R&D ref: A092440

3 February 2012

Dr Emma Harrold
Department of Pain Medicine
Cambridge University Hospitals NHS Foundation Ti
Box 215 Addenbrooke's Hospital
Cambridge
CB2 0QQ

Dear Dr Emma Harrold

Re: 11/NW/0750 How do partners' beliefs about chronic pain relate to patients' acceptance of pain?

In accordance with the Department of Health's Research Governance Framework for Health and Social Care, all research projects taking place within the Trust must receive a favourable opinion from an ethics committee and approval from the Department of Research and Development (R&D) prior to commencement.

R&D have reviewed the documentation submitted for this project, and has undertaken a **site specific assessment** based on the information provided in the SSI form, and I am pleased to inform you that we have no objection to the research proceeding within Cambridge University Hospitals NHS Foundation Trust.

Sponsor: University of East Anglia

End date: 31/08/2012

Protocol: version 2 dated 17/7/2011

The project must follow the agreed protocol and be conducted in accordance with all Trust Policies and Procedures especially those relating to research and data management.

You and your research team must ensure that you understand and comply with the requirements of the NHS Confidentiality Code of Practice and the Data Protection Act 1998 and are aware of your responsibilities in relation to the Human Tissue Act 2004, Good Clinical Practice, the NHS Research Governance Framework for Health and Social Care, Second Edition April 2005 and any further legislation released during the time of this study.

Members of the research team must have appropriate substantive or honorary contracts with the Trust prior to the study commencing. Any additional researchers who join the study at a later stage must also hold a suitable contract.

If the project is a clinical trial under the European Union Clinical Trials Directive the following must also be complied with:

V6 April 09

- the EU Directive on Clinical Trials (Directive 2001/20/EC) and UK's implementation of the Directive: The Medicines for Human Use (Clinical Trials) Regulations 2004;

- the EU Directive on Principles and Guidelines for Good Clinical Practice (EU Commission Directive 2005/28/EC); and UK's implementation of the Directive: The Medicines for Human Use (Clinical Trials) Amendment Regulations 2006;

Amendments

Please ensure that you submit a copy of any amendments made to this study to the R&D Department.

Annual Report

It is obligatory that an annual report is submitted by the Chief Investigator to the research ethics committee, and we ask that a copy is sent to the R&D Department. The yearly period commences from the date of receiving a favourable opinion from the ethics committee.

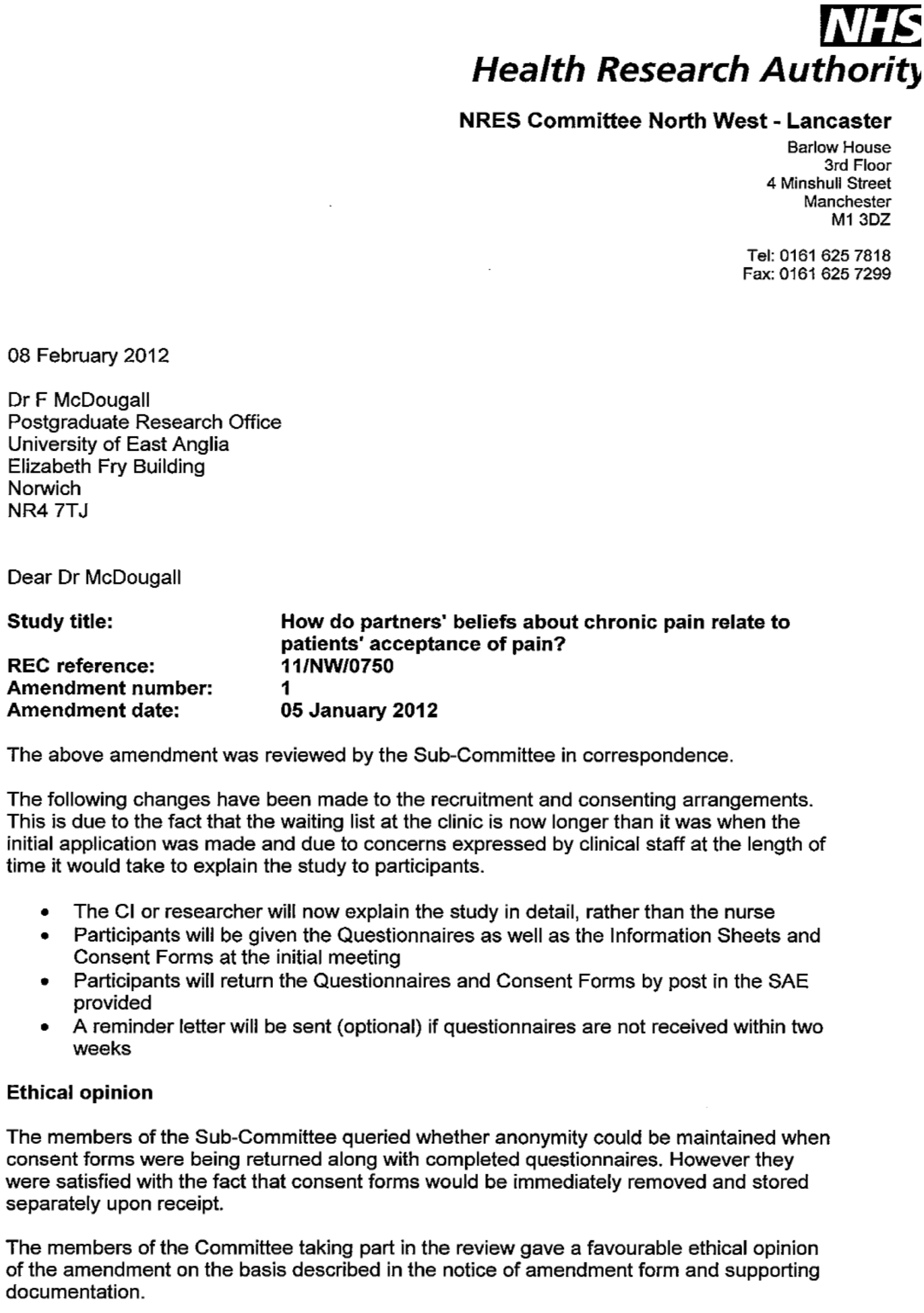
Please refer to our website www.cuh.org.uk/research for all information relating to R&D including honorary contract forms, policies and procedures and data protection.

Should you require any further information please do not hesitate to contact us.

Yours sincerely

Louise Stockley
Research Governance Manager

B3. Ethical Approval for Amendment



Health Research Authority

NRES Committee North West - Lancaster
Barlow House
3rd Floor
4 Minshull Street
Manchester
M1 3DZ

Tel: 0161 625 7818
Fax: 0161 625 7299

08 February 2012

Dr F McDougall
Postgraduate Research Office
University of East Anglia
Elizabeth Fry Building
Norwich
NR4 7TJ

Dear Dr McDougall

Study title:	**How do partners' beliefs about chronic pain relate to patients' acceptance of pain?**
REC reference:	**11/NW/0750**
Amendment number:	**1**
Amendment date:	**05 January 2012**

The above amendment was reviewed by the Sub-Committee in correspondence.

The following changes have been made to the recruitment and consenting arrangements. This is due to the fact that the waiting list at the clinic is now longer than it was when the initial application was made and due to concerns expressed by clinical staff at the length of time it would take to explain the study to participants.

- The CI or researcher will now explain the study in detail, rather than the nurse
- Participants will be given the Questionnaires as well as the Information Sheets and Consent Forms at the initial meeting
- Participants will return the Questionnaires and Consent Forms by post in the SAE provided
- A reminder letter will be sent (optional) if questionnaires are not received within two weeks

Ethical opinion

The members of the Sub-Committee queried whether anonymity could be maintained when consent forms were being returned along with completed questionnaires. However they were satisfied with the fact that consent forms would be immediately removed and stored separately upon receipt.

The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

Approved documents

The documents reviewed and approved at the meeting were:

Document	Version	Date
Participant Consent Form: Patient	2.3	05 January 2012
Participant Consent Form: Spouse	2.3	05 January 2012
Participant Information Sheet: Patient and Spouse Information Sheet	2.3	05 January 2012
Protocol	2.1	05 January 2012
Notice of Substantial Amendment (non-CTIMPs)	1	05 January 2012
Reminder Letter	1.0	05 January 2012

Membership of the Committee

The members of the Committee who took part in the review are listed on the attached sheet.

R&D approval

All investigators and research collaborators in the NHS should notify the R&D office for the relevant NHS care organisation of this amendment and check whether it affects R&D approval of the research.

Statement of compliance

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

11/NW/0750:	**Please quote this number on all correspondence**

Yours sincerely

pp. L. Brown

Dr Lisa Booth
Chair

E-mail: carol.ebenezer@northwest.nhs.uk

Enclosures:	List of names and professions of members who took part in the review
Copy to:	Mr Stephen Kelleher, Cambridge University Hospitals Mrs Sue Steel, Research & Enterprise Services, University of East Anglia

Appendix C. Patient Questionnaires

C1. Hospital Anxiety and Depression Scale

This questionnaire asks about how you have been feeling over the past week. For each question circle the number that corresponds to your chosen response.

1. I feel tense or 'wound up':

Most of the time	(3)
A lot of the time	(2)
From time to time, occasionally	(1)
Not at all	(0)

2. I still enjoy the things I used to enjoy:

Definitely as much	(0)
Not quite so much	(1)
Only a little	(2)
Hardly at all	(3)

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

Very definitely and quite badly	(3)
Yes, but not too badly	(2)
A little, but it doesn't worry me	(1)
Not at all	(0)

4. I can laugh and see the funny side of things:

As much as I always could	(0)
Not quite so much now	(1)
Definitely not so much now	(2)
Not at all	(3)

5. Worrying thoughts go through my mind:

A great deal of the time	(3)
A lot of the time	(2)
From time to time, but not too often	(1)
Only occasionally	(0)

6. I feel cheerful:

Not at all	(3)
Not often	(2)
Sometimes	(1)
Most of the time	(0)

7. I can sit at ease and feel relaxed:

Definitely	(0)
Usually	(1)
Not Often	(2)
Not at all	(3)

8. I feel as if I am slowed down:

Nearly all the time	(3)
Very often	(2)
Sometimes	(1)
Not at all	(0)

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

Not at all	(0)
Occasionally	(1)
Quite Often	(2)
Very Often	(3)

10. I have lost interest in my appearance:

Definitely	(3)
I don't take as much care as I should	(2)
I may not take quite as much care	(1)
I take just as much care as ever	(0)

11. I feel restless as I have to be on the move:

Very much indeed	(3)
Quite a lot	(2)
Not very much	(1)
Not at all	(0)

12. I look forward with enjoyment to things:

As much as I ever did	(0)
Rather less than I used to	(1)
Definitely less than I used to	(2)
Hardly at all	(3)

13. I get sudden feelings of panic:

Very often indeed	(3)
Quite often	(2)
Not very often	(1)
Not at all	(0)

14. I can enjoy a good book or radio or TV program:

Often	(0)
Sometimes	(1)
Not often	(2)
Very seldom	(3)

C2. Chronic Pain Acceptance Questionnaire

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

Use the rating scale to make your choices. For instance, if you believe a statement is 'Always True,' you would circle 6 in the Always true column.

	Never	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	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

C3. Pain Catastrophising Scale

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 feeling 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 scale, please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.

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

C4.The WH-MPI, Version 3 (MPI)

In this section, we are interested in knowing how your spouse (or significant other) responds to you when he or she knows you are in pain. Circle the number that best reflects your opinion.

How supportive or helpful is your significant other to you in relation to your pain?

0	1	2	3	4	5	6
Not at all supportive						Extremely supportive

How worried is your spouse (significant other) about you because of your pain?

0	1	2	3	4	5	6
Not at all worried						Extremely worried

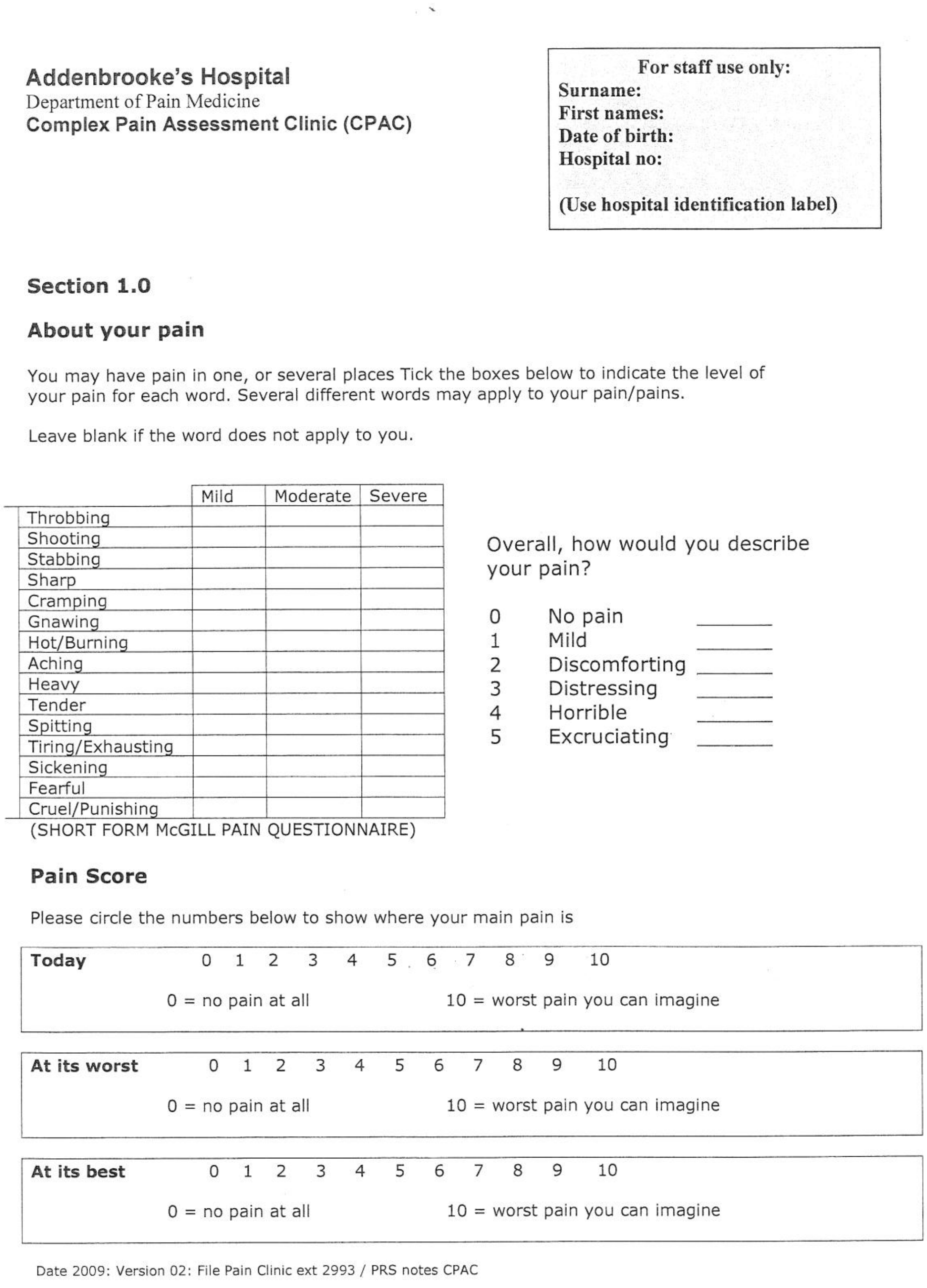
How attentive is your spouse (significant other) to you because of your pain?

0	1	2	3	4	5	6
Not at all attentive						Extremely attentive

On the scale listed below each question, check one of the responses to indicate how often your spouse (or significant other) responds to you in that particular way when you are in pain.

	Never	Seldom	Sometimes	Often
1. Asks me what he or she can do to help.	0	1	2	3
2. Gets irritated with me.	0	1	2	3
3. Takes over my jobs or duties.	0	1	2	3
4. Talks to me about something else to take my mind off the pain.	0	1	2	3
5. Gets frustrated with me.	0	1	2	3
6. Tries to get me to rest.	0	1	2	3
7. Tries to involve me in some activity.	0	1	2	3
8. Gets angry with me.	0	1	2	3
9. Gets me pain medication.	0	1	2	3
10. Encourages me to work on a hobby.	0	1	2	3
11. Gets me something to eat or drink.	0	1	2	3
12. Turns on the T.V. to take my mind off my pain.	0	1	2	3

C5. McGill Pain Questionnaire – Short Form



Addenbrooke's Hospital
Department of Pain Medicine
Complex Pain Assessment Clinic (CPAC)

For staff use only:
Surname:
First names:
Date of birth:
Hospital no:

(Use hospital identification label)

Section 1.0

About your pain

You may have pain in one, or several places Tick the boxes below to indicate the level of your pain for each word. Several different words may apply to your pain/pains.

Leave blank if the word does not apply to you.

	Mild	Moderate	Severe
Throbbing			
Shooting			
Stabbing			
Sharp			
Cramping			
Gnawing			
Hot/Burning			
Aching			
Heavy			
Tender			
Spitting			
Tiring/Exhausting			
Sickening			
Fearful			
Cruel/Punishing			

(SHORT FORM McGILL PAIN QUESTIONNAIRE)

Overall, how would you describe your pain?

0 No pain _______
1 Mild _______
2 Discomforting _______
3 Distressing _______
4 Horrible _______
5 Excruciating _______

Pain Score

Please circle the numbers below to show where your main pain is

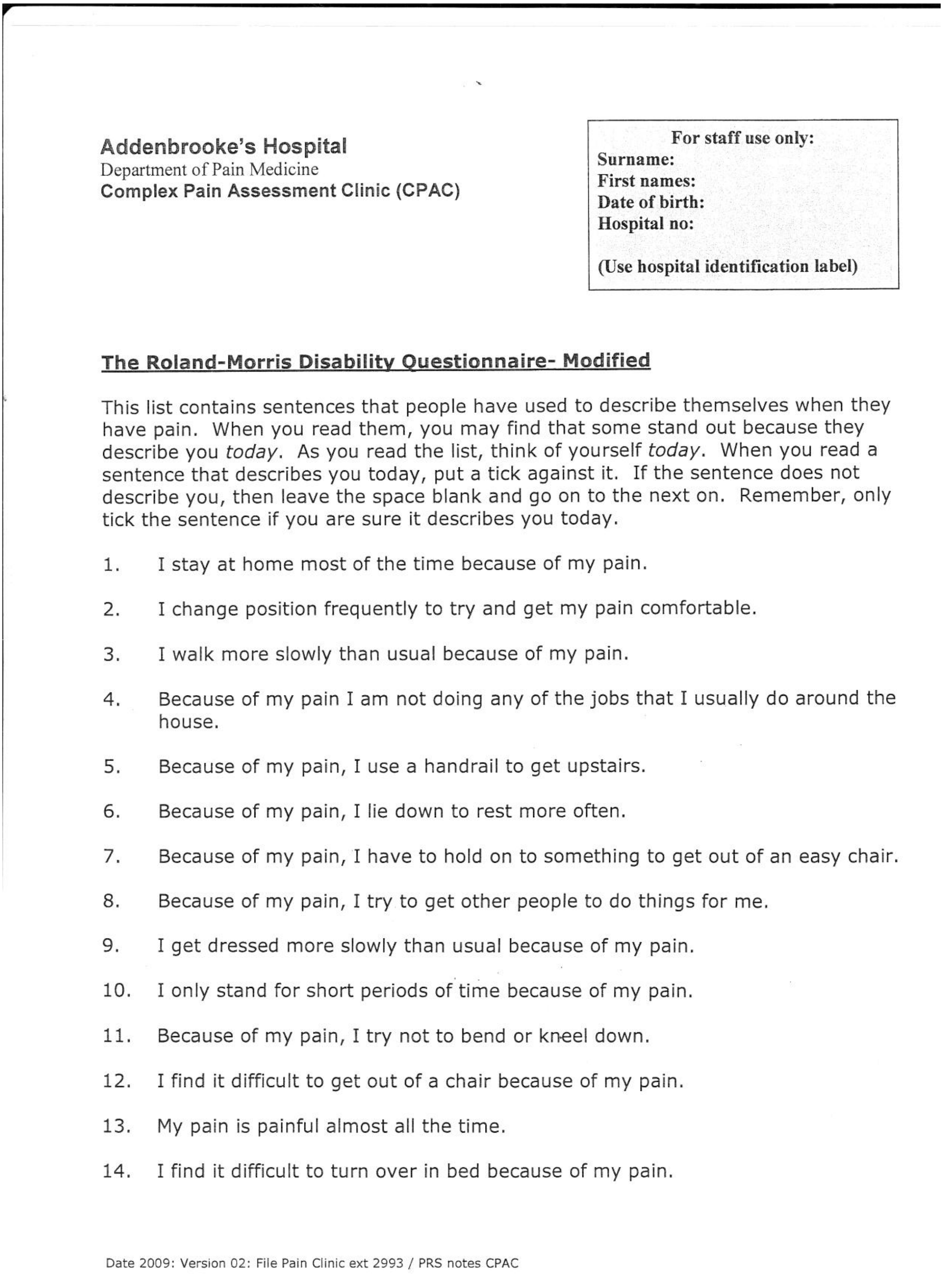
Today 0 1 2 3 4 5 6 7 8 9 10
0 = no pain at all 10 = worst pain you can imagine

At its worst 0 1 2 3 4 5 6 7 8 9 10
0 = no pain at all 10 = worst pain you can imagine

At its best 0 1 2 3 4 5 6 7 8 9 10
0 = no pain at all 10 = worst pain you can imagine

Date 2009: Version 02: File Pain Clinic ext 2993 / PRS notes CPAC

C6. Roland Morris Disability Questionnaire



Addenbrooke's Hospital
Department of Pain Medicine
Complex Pain Assessment Clinic (CPAC)

For staff use only:
Surname:
First names:
Date of birth:
Hospital no:

(Use hospital identification label)

The Roland-Morris Disability Questionnaire- Modified

This list contains sentences that people have used to describe themselves when they have pain. When you read them, you may find that some stand out because they describe you *today*. As you read the list, think of yourself *today*. When you read a sentence that describes you today, put a tick against it. If the sentence does not describe you, then leave the space blank and go on to the next on. Remember, only tick the sentence if you are sure it describes you today.

1. I stay at home most of the time because of my pain.
2. I change position frequently to try and get my pain comfortable.
3. I walk more slowly than usual because of my pain.
4. Because of my pain I am not doing any of the jobs that I usually do around the house.
5. Because of my pain, I use a handrail to get upstairs.
6. Because of my pain, I lie down to rest more often.
7. Because of my pain, I have to hold on to something to get out of an easy chair.
8. Because of my pain, I try to get other people to do things for me.
9. I get dressed more slowly than usual because of my pain.
10. I only stand for short periods of time because of my pain.
11. Because of my pain, I try not to bend or kneel down.
12. I find it difficult to get out of a chair because of my pain.
13. My pain is painful almost all the time.
14. I find it difficult to turn over in bed because of my pain.

Date 2009: Version 02: File Pain Clinic ext 2993 / PRS notes CPAC

Addenbrooke's Hospital
Department of Pain Medicine
Complex Pain Assessment Clinic (CPAC)

For staff use only:
Surname:
First names:
Date of birth:
Hospital no:

(Use hospital identification label)

15. My appetite is not very good because of my pain.
16. I have trouble putting on my socks (or stockings) because of the pain.
17. I only walk short distances because of my pain.
18. I sleep less well because of my pain.
19. Because of my pain, I get dressed with help from someone else.
20. I sit down for most of the day because of my pain.
21. I avoid heavy jobs around the house because of my pain.
22. Because of my pain, I am more irritable and bad tempered with people than usual.
23. Because of my pain, I go upstairs more slowly than usual.
24. I stay in bed most of the time because of my pain.

Total Score:

Date 2009: Version 02: File Pain Clinic ext 2993 / PRS notes CPAC

Appendix D. Partner Questionnaire

D3. Pain Catastrophising Scale, Spouse version

We are interested in looking at the relationship between thoughts and pain. Please indicate the degree to which you have experienced each of the following thoughts or feelings when your significant other experiences pain by choosing a number for each statement.

When my significant other feels pain...

	Not at all	To a slight	To a moderate	To a great	All the time
….I worry all the time about whether his/her pain will end	0	1	2	3	4
….I feel I can’t go on	0	1	2	3	4
….It’s terrible and I think it’s never going to get any better	0	1	2	3	4
….It’s awful and I feel that it overwhelms me	0	1	2	3	4
….I feel I can’t stand it anymore	0	1	2	3	4
….I become afraid that his/her pain may get worse	0	1	2	3	4
….I think of his/her previous painful experiences	0	1	2	3	4
….I anxiously want his/her pain to go away	0	1	2	3	4
….I can’t seem to keep it out of my mind	0	1	2	3	4
….I keep thinking about how much it hurts for him/her	0	1	2	3	4
….I keep thinking about how badly I want his/her pain to stop	0	1	2	3	4
….There is nothing I can do to reduce the intensity of his/her pain	0	1	2	3	4
….I wonder whether something serious may happen	0	1	2	3	4

Appendix E. Additional Results

Table E1.

Correlations between main study variables

	Pain Intensity	RMDQ	HADS Depress	HADS Anxiety	PCS	CPAQ	CPAQ AE	CPAQ PW	Social Support	Solicit.† Response	Distract† Response	Punish.† Response	PCS Spouse
VAS Pain	.44**	.44**	.44**	.20	.20	-.36*	-.34*	-.21	.23	.10	-.12	-.25	.36*
Pain Intensity	1	.46**	.28	.28	.28	-.34*	-.35*	-.16	.11	.08	-.10	-.02	.31*
RMDQ		1	0.44**	.31*	.16	-.35*	-.31*	-.22	.29*	.15	.20	.04	.19
HADS Depression			1	.64***	.50***	-.54***	-.52***	-.31*	.17	.06	-.07	.28*	.43**
HADS Anxiety				1	.53***	-.45**	-.35*	-.35*	.03	-.06	-.04	.32*	.42**
PCS					1	-.51***	-.34*	-.47***	.14	.11	-.11	.12	.47***
CPAQ						1	.82***	.75***	-.23	-.19	-.08	-.09	-.53***
CPAQ AE							1	.23	-.08	-.14	.00	-.14	-.32*
CPAQ PW								1	-.31*	-.19	-.11	.01	-.53***
Social Support									1	.67***	.49***	-.15	.32*
Solicitous† Responses										1	.54***	-.17	.13
Distracting† Responses											1	-.11	-.04
Punishing† Responses												1	.17
PCS Spouse													1

MPQ: McGill Pain Questionnaire, VAS: Visual Analog Scale RMDQ: Roland Morris Disability Questionnaire, HADS: Hospital Anxiety and Depression Scale, PCS-13: Pain Catastrophising Scale, 13 item version, CPAQ-20: Chronic Pain Acceptance Questionnaire, 20 item version, MPI: Multidimensional Pain Inventory, PCS-S: Pain Catastrophising Questionnaire, Spouse Version.* p<0.05, ** p<0.01, *** p<0.001. †Pearson correlation calculated as Spouse Response variables were not normally distributed. N for each correlation varies from 46 to 61.

Figure E1.
Normal P-P Plot of regression standardised residuals for Hypothesis c, depression

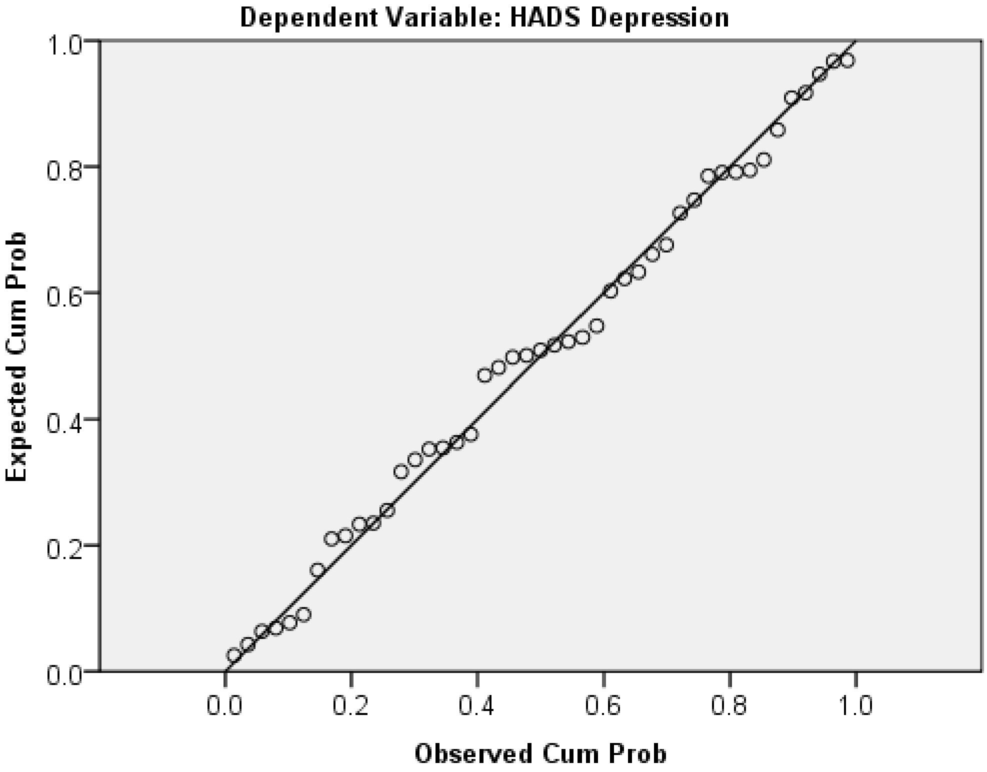


Figure E2.
Scatterplot of the standardised predicted values of the dependent variable against the standardised residuals for Hypothesis c, depression

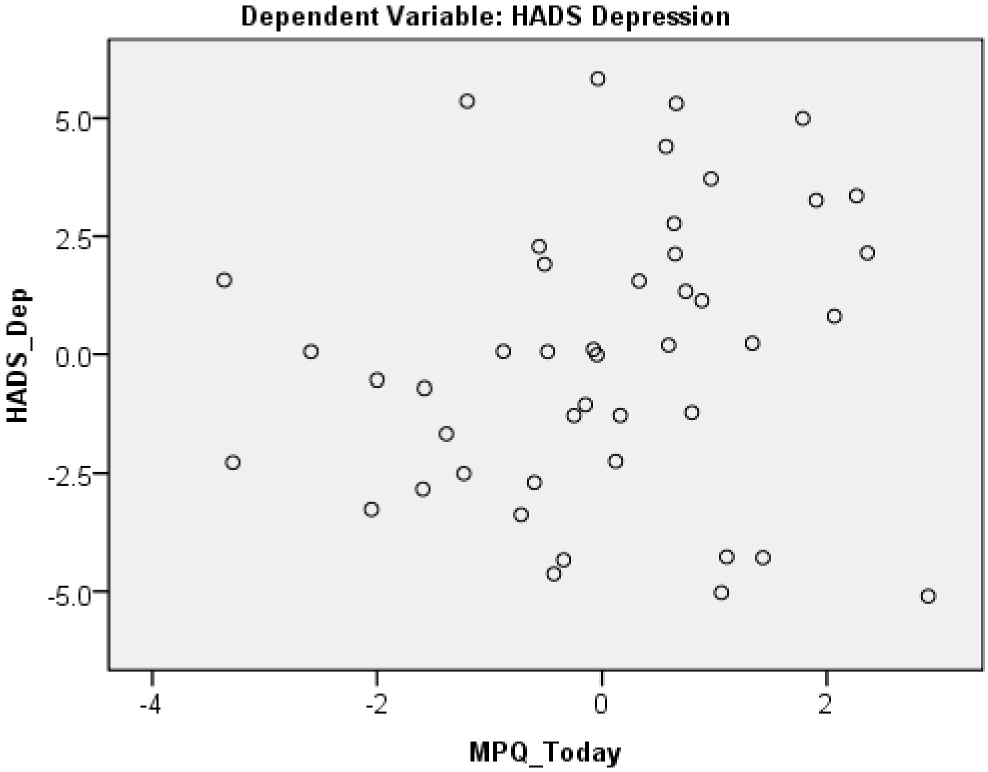


Figure E3.

Normal P-P Plot of regression standardised residuals for Hypothesis c, depression

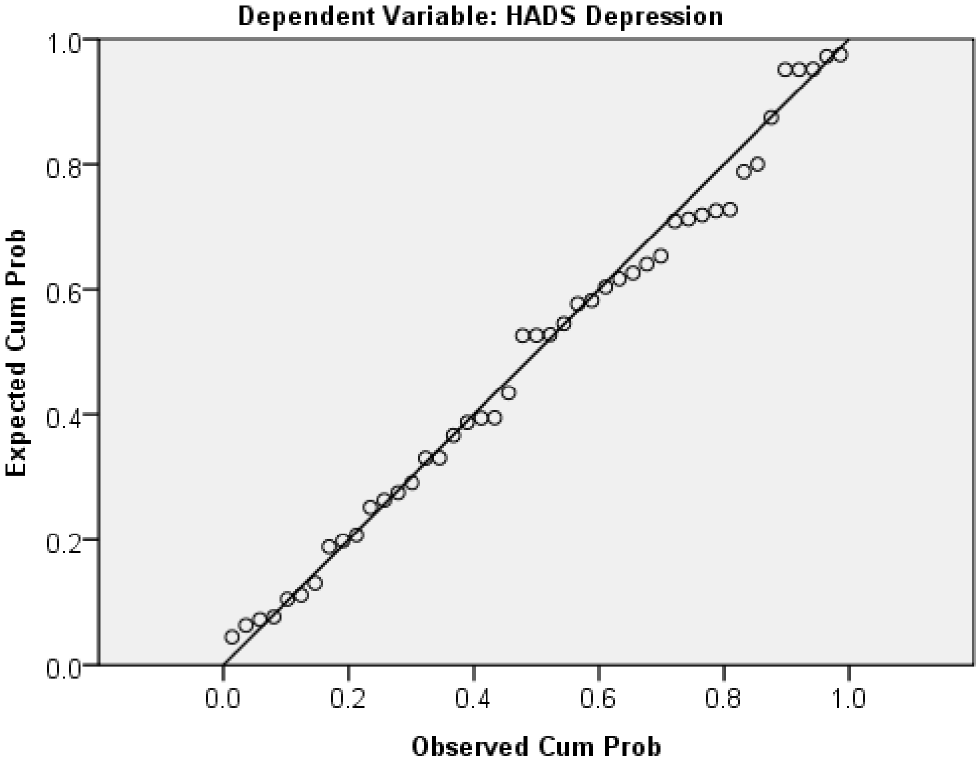


Figure E4.

Scatterplot of the standardised predicted values of the dependent variable against the standardised residuals for Hypothesis c, depression

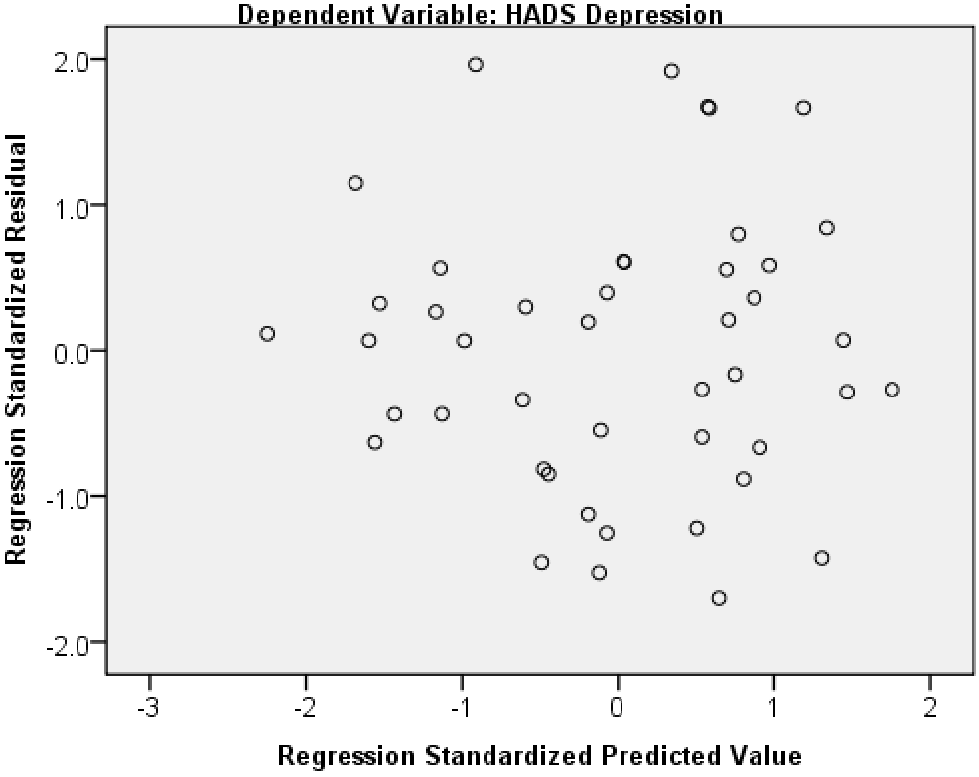


Figure E5.

Normal P-P Plot of regression standardised residuals for Hypothesis c, anxiety

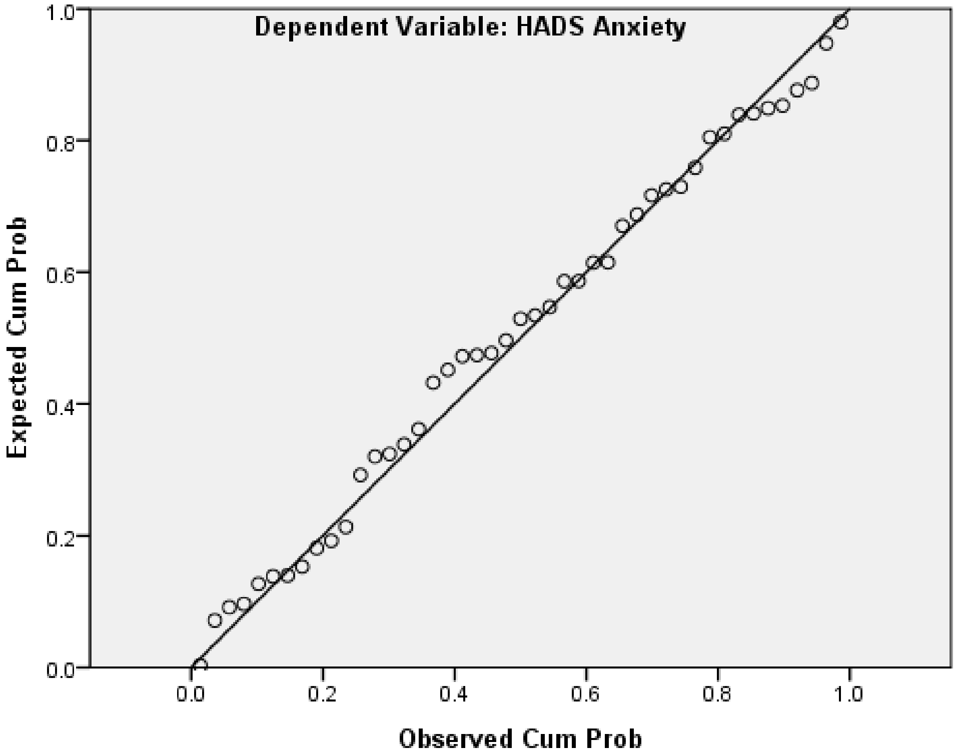


Figure E6.

Scatterplot of the standardised predicted values of the dependent variable against the standardised residuals for Hypothesis c, anxiety

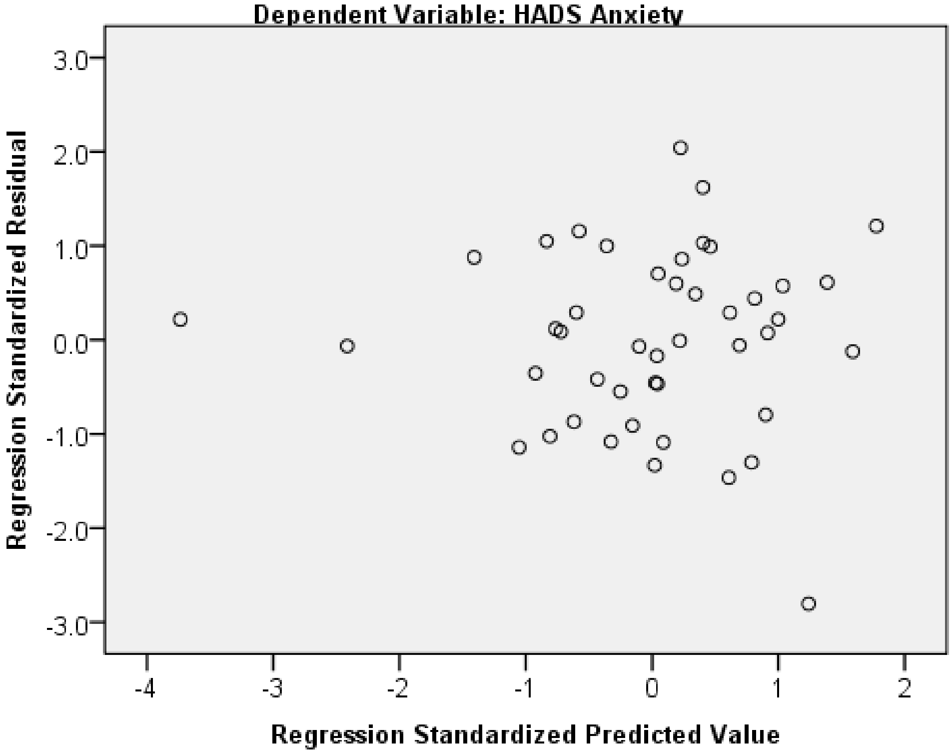


Figure E7.

Normal P-P Plot of regression standardised residuals for Hypothesis 1 - Depression

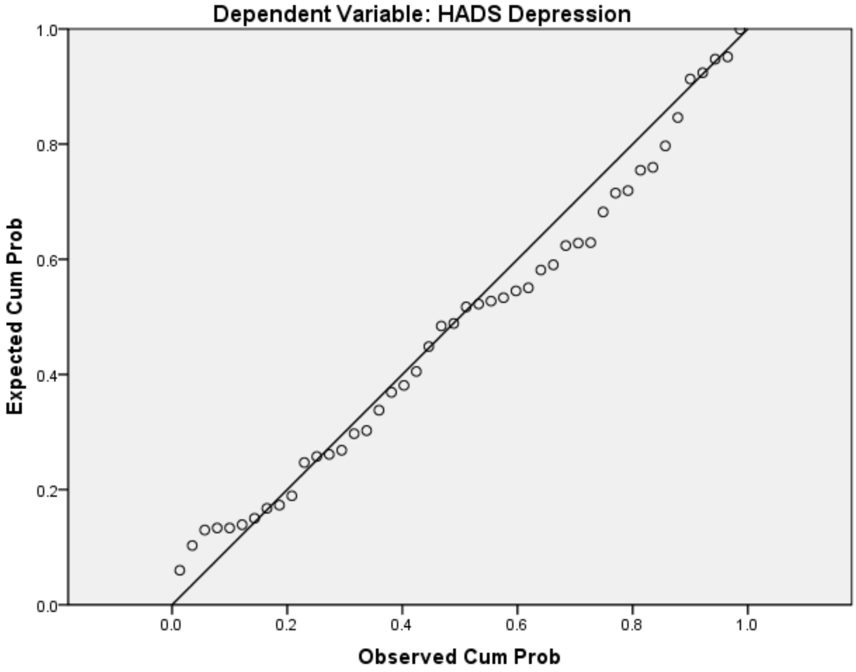


Figure E8.

Scatterplot of the standardised predicted values of the dependent variable against the standardised residuals for Hypothesis 1 – Depression

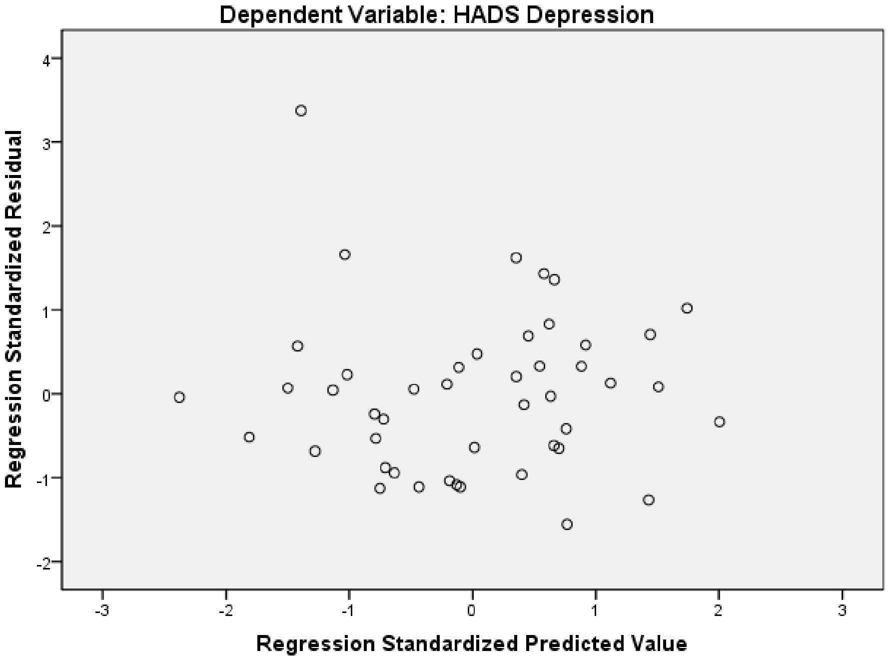


Figure E9.

Normal P-P Plot of regression standardised residuals for Hypothesis 1 - Anxiety

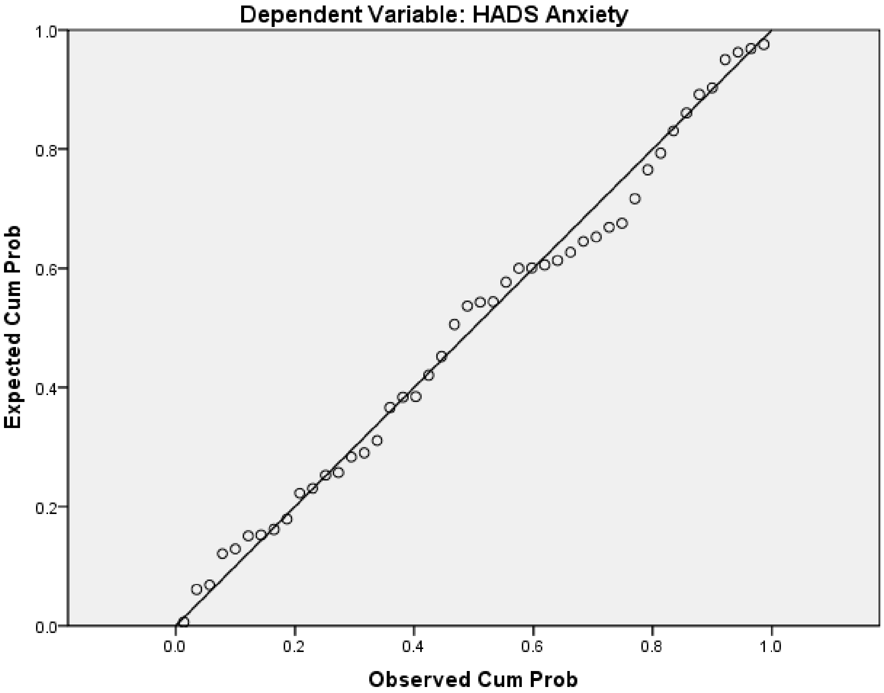


Figure E10.

Scatterplot of the standardised predicted values of the dependent variable against the standardised residuals for Hypothesis 1 – Anxiety

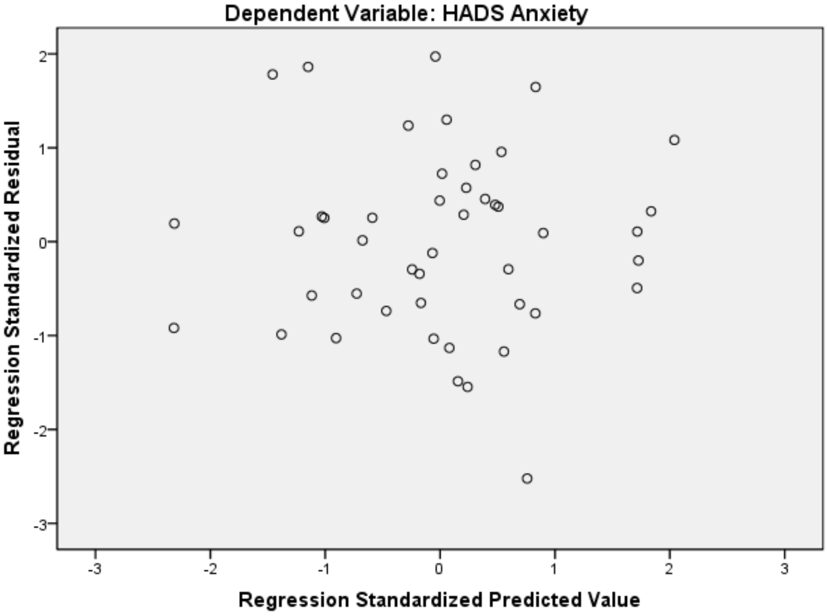


Figure E11.

Normal P-P Plot of regression standardised residuals for Hypothesis 3

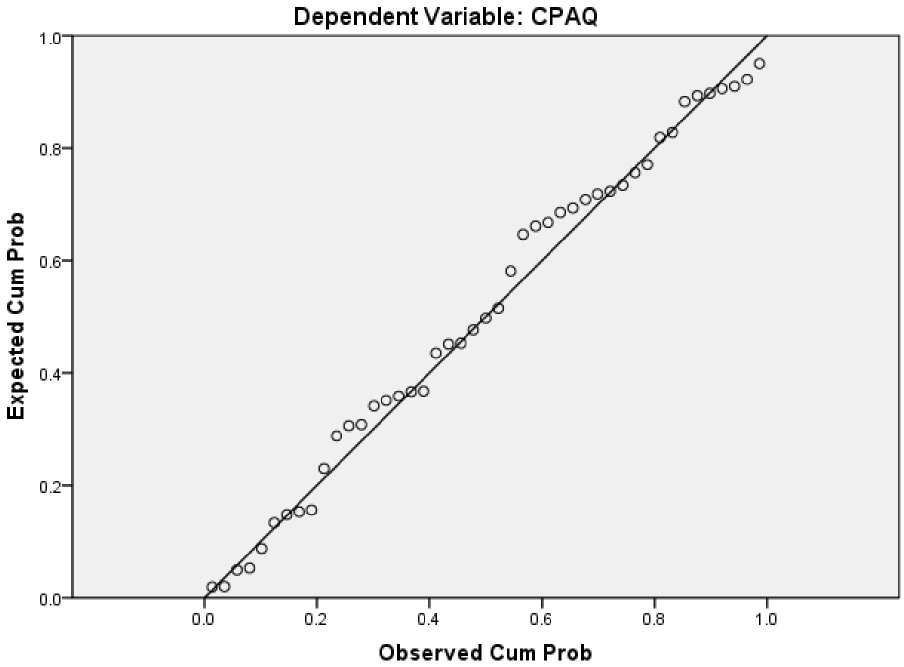


Figure E12.

Scatterplot of the standardised predicted values of the dependent variable against the standardised residuals for Hypothesis 3

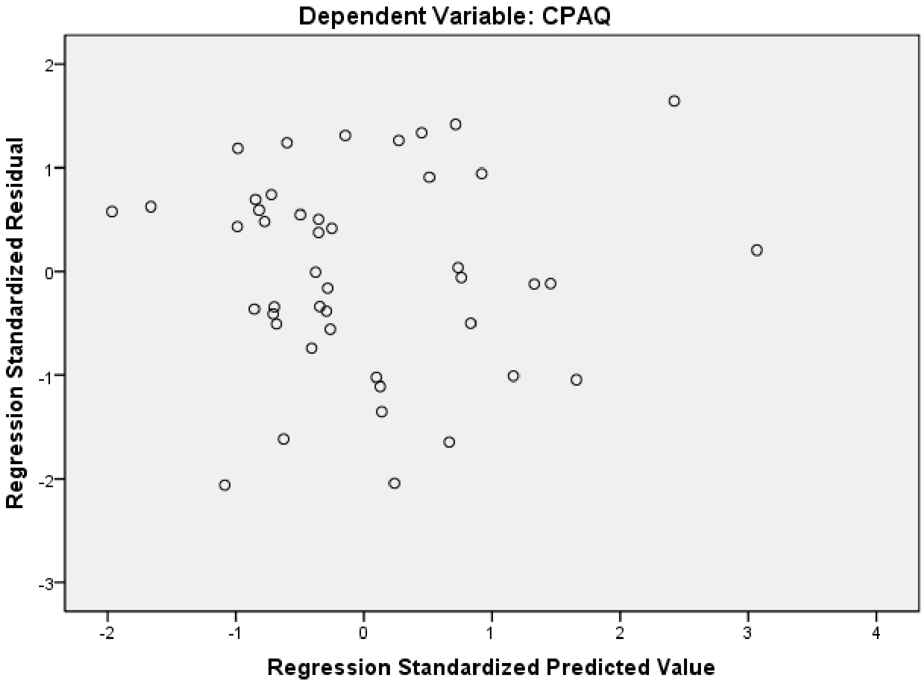


Figure E13.
Histograms of Spouse Responses scores