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**UNIVERSITY OF SOUTHAMPTON**

FACULTY OF MEDICINE, HEALTH AND LIFE SCIENCES

School of Psychology

**Illness Representations, Coping and Psychosocial  
Outcome in Chronic Pain**

By

Alethea Adair-Stantiall

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## ABSTRACT

Research has recognised the importance of understanding the chronic pain experience using a biopsychosocial model. This approach acknowledges the impact of cognitive factors on psychosocial adjustment to chronic pain. This literature review explores the difficulties encountered by individuals adapting to a life with pain. It evaluates the evidence pertaining to the idea that beliefs about illness and coping strategies affect psychosocial outcome in chronic pain. The review considers the role of cognitive factors in self-regulating illness using the Common-Sense Model of Illness Representations (CSM). An evaluation of this model as it applies to chronic conditions is provided. Reviewing the literature reveals that despite numerous studies examining the CSM in chronic illness, there is a paucity of research applying it specifically to chronic pain. This review highlights the potential usefulness of exploring the CSM in this population in order to consider both the empirical value of the CSM and gain further knowledge regarding useful psychotherapeutic interventions in chronic pain.

On this basis, the present study sought to investigate the CSM in a sample of adults with chronic pain. A significant relationship between a number of illness representations (beliefs about illness) and psychosocial outcomes was found. A subset of these met criteria for mediation. The findings imply that particular illness representations (identity, consequences and emotional representation) are associated with the coping strategy catastrophising, which in turn is associated with an increased tendency for depression, anxiety and reduced quality of life. Due to the cross-sectional design, causal inferences cannot be made. However, the findings imply partial support for the CSM in a chronic pain population. Directions for future research are highlighted, as well as implications for psychotherapeutic interventions which could help reduce unhelpful beliefs and maladaptive coping strategies.

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Signed\_\_\_\_\_

Date\_\_\_\_\_

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## LITERATURE REVIEW

# **The Role of Beliefs and Coping in Adjustment to Chronic Pain**

Alethea Adair-Stantiall

**Address for Correspondence:**

University of Southampton  
School of Psychology  
Shackleton Building  
Highfield  
Southampton  
SO17 1BJ  
Tel: +44 (0)23 8059 5575  
Fax: +44 (0)23 8059 2588  
Email: [aac106@soton.ac.uk](mailto:aac106@soton.ac.uk)

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## ABSTRACT

Research has recognised the importance of understanding the chronic pain experience using a biopsychosocial model. This approach acknowledges the impact of cognitive factors on psychosocial adjustment to chronic pain. This literature review explores the difficulties encountered by individuals adapting to a life with pain. It evaluates the evidence pertaining to the idea that beliefs about illness and coping strategies affect psychosocial outcome in chronic pain. The review considers the role of cognitive factors in self-regulating illness using the Common-Sense Model of Illness Representations (CSM). An evaluation of this model as it applies to chronic conditions is provided. Reviewing the literature reveals that despite numerous studies examining the CSM in chronic illness, there is a paucity of research applying it specifically to chronic pain. This review highlights the potential usefulness of exploring the CSM in this population in order to consider both the empirical value of the CSM and further knowledge regarding important psychotherapeutic interventions in chronic pain.

**KEYWORDS:** Illness representations, common-sense model, chronic pain, coping, outcome

## 1.0 INTRODUCTION

Chronic pain is a significant worldwide problem with substantial implications for both society and the individual. Further, the importance of the role of beliefs and coping in relation to adjustment to pain has been recognised. This review begins with discussions around the definition of chronic pain and an evaluation of the literature on epidemiology. The next section reviews the literature on the Common Sense Model of Illness Representations (CSM) and its application in a range of long term conditions, including chronic pain. A brief overview of literature on conceptualisations of coping is then provided, followed by a review of the coping literature as it applies to chronic pain. This section finishes with an exploration of literature which combines the concept of illness representations with coping in chronic pain. Finally, an evaluation of the reported applications of the CSM is summarised and limitations of this research for the chronic pain field are highlighted.

### 2.0 Chronic Pain

#### *2.1 What is Chronic Pain?*

Definitions of chronic pain generally rely on its temporal profile. For example, the definition of chronic pain provided by the International Association for the Study of Pain (IASP) is “pain that persists beyond normal tissue healing time, which is assumed to be 3 months” (IASP, 1979). Researchers such as Tunks, Crook and Weir (2008) also advocate a 3 month watershed for considering pain to be chronic. However, there is disagreement amongst researchers, with some stating that pain is considered to be chronic after 6 months (e.g. Deardoff, 2004).

The fact that chronic pain is considered to persist beyond the point at which healing would be expected highlights that it differs considerably from acute pain in that it does not serve a protective function for the body. The onset of acute pain is typically fast and often results from an injury. In contrast, chronic pain persists over time and in addition to purely physiological processes, it consists of what Gatchel (2004b) refers to as a “layer” of behavioural and psychological systems that serve to make the experience subjective and complex.

Chronic pain is a term associated with many conditions, including multiple sclerosis and rheumatoid arthritis. To aid understanding, researchers, such as Deardorff (2004) have attempted to classify sub-categories of chronic pain:

1. Chronic pain that is 'non-specific', which has no identifiable pain generator. For example, chronic low back pain. The pain may have started as a result of injury or trauma but the pain messages are 'set' and continue to send pain signals to the brain beyond the time of the injury healing.
2. Chronic pain that is due to a clearly identifiable cause or process (e.g. cancer)
3. Chronic pain that is due to some type of nerve damage or abnormal reaction of the central nervous system, known as neuropathic pain. With this type of pain, certain injured nerves continue to send pain messages to the brain even when the original injury has healed.

## 2.2 Epidemiology and Impact of Chronic Pain

Chronic pain is a devastating worldwide problem with considerable prevalence. According to a recent large scale study, chronic pain affects 1 in 5 (19%) adults across Europe (Breivik, Collett, Ventafridda, Cohen, & Gallacher, 2006), with similar rates reported in Scotland (McEwan, 2004) and Australia (Blyth et al., 2001). Gatchel (2004b) cites that the condition affects in excess of 50 million Americans and in Canada, prevalence rates have been reported to range between 11% and 44% (Birse & Lander, 1998; Crook, Tunks, Rideout, & Browne, 1986).

A recent review of the literature on gender and pain conducted by Fillingim, King, Ribeiro-Dasilva, Rahim-Williams and Riley, III (2009) examined the prevalence of chronic pain in men and women. Reporting on 10 separate studies conducted in Europe, Australia and the United States, they highlight a greater prevalence of chronic pain in women compared to men. On average the prevalence of pain in women exceeded men by around 7%. For example, prevalence rates in France were 35% for women and 28% for men. Similarly, rates in Sweden were 38% for women and 31% for men. The authors conclude that such findings support those reported in numerous earlier epidemiologic studies. Moreover, other studies have reported this difference between the sexes to be consistent over time (Freburger et al., 2009). Nevertheless, Fillingim et al. (2009) do cite some incidences where no significant sex differences were

reported. Other large scale studies have also reported relatively small differences in prevalence of pain between sexes (Hardt, Jacobsen, Goldberg, Nickel, & Buchwald, 2008). It is difficult to speculate the reasons for this disparity. Chronic pain populations are far from homogenous and variations in definitions of chronic pain employed across studies may explain some of the discrepancy. Further, Fillingim et al. (2009) cite that publication biases (resulting from attempts to report studies in a favourable light) may also contribute to an overestimate of sex differences.

By the very nature of many chronic pain conditions (e.g. arthritis), chronic pain is typically associated with older age (Elliott, Smith, Penny, Smith, & Chambers, 1999). Although it is acknowledged there is variance across reported pain populations (due to, for example, sample selection and location of pain), the average age of a person experiencing chronic pain is reported to be around 50 years (Breivik et al., 2006). It has been consistently reported that there is a steady increase in the prevalence of chronic pain with age, with a peak at the 55-65 year age group (Bouhassira, Lanteri-Minet, Attal, Laurent, & Touboul, 2008; Elliott, Smith, Hannaford, Smith, & Chambers, 2002; McBeth & Jones, 2007; Sjogren, Ekholm, Peuckmann, & Gronbaek, 2009; Van Den Kerkhof, Hopman, Towheed, Anastassiades, & Goldstein, 2003).

The literature has also highlighted the sorts of conditions most commonly experienced in chronic pain sufferers and the duration of their pain experience. In their study of chronic pain in the community, Elliott et al., (1999) report that back pain and arthritis were the most commonly reported causes of chronic pain, accounting for around one third of the total sample. This finding has been supported by a number of large scale epidemiological studies (Breivik et al., 2006; NOP World, 2005). In terms of duration, in a sample of over 46,000 people across 16 countries, the average duration of pain was found to be 7 years, with over 20% of the sample experiencing chronic pain for 20 years or more (Breivik et al., 2006). A lengthy experience of chronic pain was also reported by Andersson (2004) who found that 85% of people still reported chronic pain after 12 years.

### *2.2.1 Chronic Pain – Impact on Society*

It is widely acknowledged that chronic pain has a considerable impact on society. One such impact is greater utilisation of health services leading to increased health care

costs. In the United States, pain accounts for 80% of all physician visits and chronic low back pain alone accounts for over \$20 billion in treatment costs (Gatchel, 2004b). Disproportionate numbers of visits to doctors were also found in Europe, with over half of all chronic pain sufferers attending appointments 2-9 times in the last six months (Breivik et al., 2006). The detrimental effect of chronic pain on the economy has also been reported in terms of high use of prescribed analgesic medication (Latham & Davis, 1994; Tunks, Crook, & Weir, 2008) and loss earnings through unemployment and reduced productivity (Breivik et al., 2006; Gureje, Von, Simon, & Gater, 1998; Rigge, 1990).

### *2.2.2 Chronic Pain – Impact on the Individual*

As the term suggests, chronic pain is often unremitting. In a culture where pain is understood to equate to damage that must be fixed to eliminate the pain, chronic pain makes for a distressing picture for people because it is often the case that the “extent of complaint and disability...cannot be explained by the extent of damage or disease” (Eccleston, 2001, p.144). Quite often, relief proves to be elusive and people are ultimately left with little option but to ‘learn to live with it’.

Such an experience places immense stress on the individual and puts people at higher risk for a number of mental health problems. As Gatchel (2004b) summarises, “Nowhere do psychiatric and medical pathologies interface more prominently than in pain disorders” (p.795). Among the most common disorders are depression, anxiety and substance abuse, with base rates for the former two conditions reported to be higher than in the general population (Fishbain, Cutler, Rosomoff, & Rosomoff, 1997; Polatin, Kinney, Gatchel, Lillo, & Mayer, 1993; Tunks et al., 2008). Depression is considered to be remarkably high in chronic pain populations, with rates reported to be around 40-50% (Banks & Kerns, 1996; Dersh, Gatchel, Mayer, Polatin, & Temple, 2006; Romano & Turner, 1985). However, this varies across studies, with some disparity potentially attributed to sampling factors such as the population looked at. For example, Bair, Robinson, Katon and Kroenke (2003) found varying average rates of reported depression across settings, including 52% in pain clinics, 85% in rheumatology clinics and 27% in primary care settings. In terms of anxiety, types of disorder reported alongside chronic pain include generalised anxiety disorder, panic disorder and social phobia (Dersh, Polatin, & Gatchel, 2002). As with depression, rates of anxiety in



chronic pain are high. For example, in their look at world mental health surveys, Demyttenaere et al., (2007) examined data from over 85,000 participants across 17 countries and found that having pain more than doubled the prevalence of anxiety disorders. Alongside the presence of co-morbid mental health problems, quality of life in chronic pain patients has also been examined. Quality of life (QOL) refers to an individuals perception of their position in life, in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns (WHOQOL Group, 1995). More specifically, health related QOL (HRQOL) is quality of life associated with a specific health problem, disease or its treatment (Colwell, Mathias, Pasta, Henning, & Steege, 1998). Perhaps unsurprisingly, chronic pain that is not effectively treated and relieved has a detrimental effect on both general QOL and HRQOL (Kempen, Ormel, Brilman, & Relyveld, 1997; Schlenk et al., 1998; Becker et al., 1997; Boyle et al., 2004; Dysvik, Lindstrom, Eikeland, & Natvig, 2004; Jakobsson, Hallberg, & Westergren, 2004; Lame, Peters, Vlaeyen, Kleef, & Patijn, 2005).

### 2.3 The Biopsychosocial Approach to Chronic Pain

Early approaches to chronic pain embraced a dualistic viewpoint that embodied the assumption that the mind and body functioned independently. Such ideas provided support for the traditional medical model, where a biomedical reductionist philosophy to chronic pain was adopted (Gatchel, Bo Peng, Fuchs, Peters, & Turk, 2007).

Consequently, it has historically been assumed that a cure for pain lay in the location and treatment of the damaged area (Deardoff, 2004). Subsequent clinical and research findings have established explanations of pain perception attributed to purely physical pathology as inadequate (see Sharp, 2001 for a discussion on the evidence base).

Following on from early biomedical ideas, Melzack and Wall (1965) proposed the *gate control theory of pain* which acknowledged the interaction between physiology and psychological experiences in the perception of pain intensity (Main & Spanswick, 2001). Subsequent work published by Engel (1977) challenged the traditional medical model and called for illness to be understood by considering physiological, psychological and social factors.

It is now understood that an effective approach to chronic pain is one which employs a biopsychosocial model (Turk, 1996). This emphasises the dynamic interaction between

biological, psychological and sociocultural variables on a person's response to pain (Turk & Okifuji, 2002). For example, in terms of biology, prolonged activation of the stress regulation system leads to excess long term secretion of cortisol which can lead to impairment of growth, muscle atrophy and immune system suppression (Melzack, 2005). Psychologically, the experience of pain results in a number of difficult emotions, such as anxiety and anger, all of which are influenced by an individuals cognitions, including beliefs and interpretations of the pain experience (Gatchel et al., 2007). Finally, the 'social' aspect of the model comprises a multitude of factors which all play a crucial part in driving pain responses. For example, interpersonal relationships, social expectations, environmental stressors, and changes and difficulties in activities of daily living (Gatchel, 2004a) Pain is a completely subjective experience and subsequently, there is a large degree of variance in how individuals respond to it. A biopsychosocial approach is essential in providing adequate explanations for this variance by looking not only at the biological, psychological and social factors of a persons experience, but how the dynamic and reciprocal relationship between these factors shape a persons responses *over time* (Turk, 1996). Evidence advocating the usefulness of a biopsychosocial model has come from a variety of studies that highlight the interactive nature of these factors in chronic pain (e.g. Guzman et al., 2001; Kinney, Gatchel, Polatin, Fogarty, & Mayer, 1993).

As well as consideration of the biological, emotional and social elements associated with the chronic pain experience, the biopsychosocial model emphasises the importance of cognitive factors in a person's interpretation and subsequent experience of their pain. In their recent paper discussing the future directions of the biopsychosocial model, Gatchel et al., (2007) dedicate 5 pages to the discussion of pain and cognitive factors, such as beliefs, appraisal of pain and perceived self-efficacy. As Adams, Poole and Richardson (2006) cite "Many of the variables that influence pain intensity and physical and psychological disability are cognitive in nature" (p.292). The importance of considering cognition and subsequent pain behaviour is perhaps illustrated by the prevalence of supporting evidence for a cognitive behavioural model in treating the psychological sequelae of chronic pain (Linton & Nordin, 2006; Morley, Eccleston, & Williams, 1999). Given the importance of non-biological factors, such as cognition in the successful management of chronic pain alongside the fact that medical treatments often prove only partially effective (Margoless, 1999; Margoless & Funt, 1999),

it may be useful to better understand the internal self regulation processes that people employ to manage their pain.

### **3.0 ILLNESS REPRESENTATIONS**

Before examining the role of illness representations in chronic pain, this discussion will look at the theoretical foundations of illness representations and the recent findings from this area in chronic illnesses generally.

#### **3.1 Self-Regulation Theory**

As the term suggests, self-regulation refers to the ability to 'control or adjust oneself' (Dictionary.com Unabridged, 2009) and can be described as any efforts by the self to modify its inner states or behaviours. The concept of self-regulation has been applied in a number of areas in psychology including social cognition (Cameron & Leventhal, 2003). In recent years there has been a significant increase in the application of the self-regulatory perspective in health and illness behaviour. This is highlighted by the number of different models now available in the literature. For example, the stress-coping model (Lazarus & Folkman, 1984) and self-control model of stress (Carver & Scheier, 1998). One model that has received much attention in the literature is Leventhal's Common-Sense Model of Illness Representations.

#### **3.2 The Common-Sense Model of Illness Representations (CSM)**

The Common-Sense Model of Illness Representations (CSM), also known as the Self-Regulation Model (SRM) was initially developed to explain how people make sense of and respond to health threats and illness (Leventhal, Meyer, & Nerenz, 1980). There are a number of key assumptions underlying the model. When attempting to 'make sense' out of the health threat or onset of illness, it is assumed that people generate both cognitive representations and emotional responses to the illness. In an attempt to self-regulate, they will be motivated to find ways to manage these cognitions and emotions in the form of coping efforts. These efforts typically lead the individual to engage in 'common-sense' health behaviours (e.g. visiting the doctor, taking medication). The type of coping style selected is thought to be linked to the type of representation. In the third stage, it is assumed that people appraise the effectiveness of their styles of coping, which then determines outcomes in the form of cognitions, emotional responses and future selection of coping methods (Leventhal, Brissette, & Leventhal, 2003). Because coping procedures are selected based on the initial representations of the illness and then coping appraised against these, coping is

thought to play a mediating role between the person's representation of their illness and well-being. In this sense, the model is both dynamic and highly unique to the individual.

It is further assumed that the model operates as a parallel processing framework, with the cognitive and emotional responses to the illness stimulus occurring in parallel (Nerenz & Leventhal, 1983). This concept, along with the stages described above is shown in Figure 1.

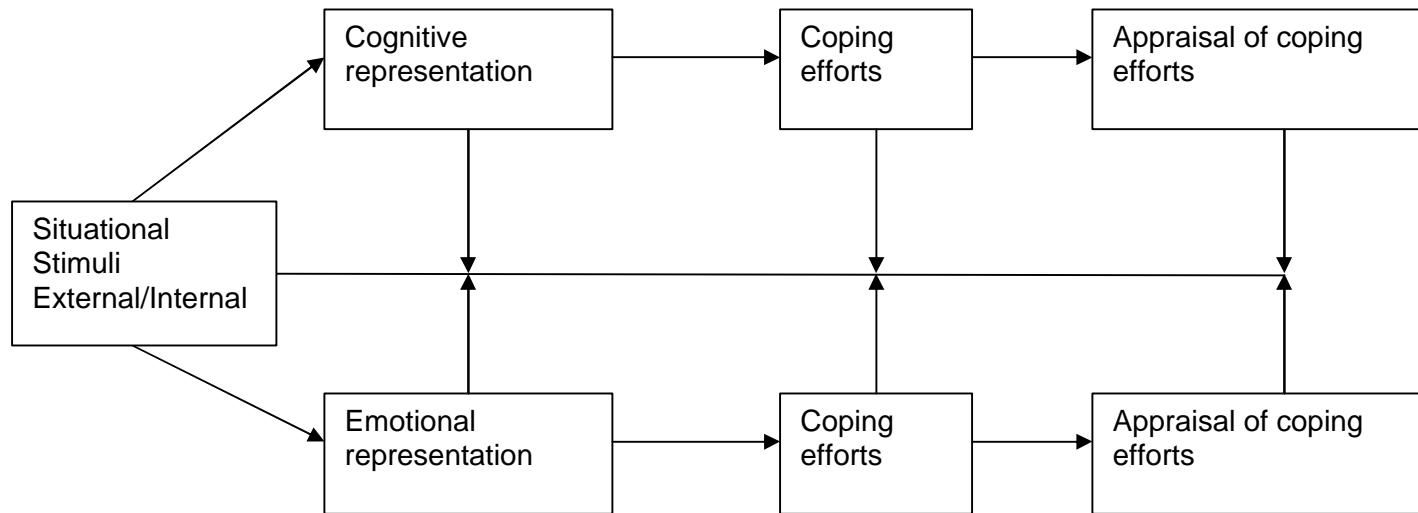


Figure 1. The Common-Sense Model of Illness Representations (CSM). Adapted from Leventhal, Diefenbach, and Leventhal (1992)

Central to the CSM is the cognitive representation or perception that a person has of their illness. This concept has been described by researchers in a number of ways. For example, patient schemata (Pennebaker, 1982), illness concept (Schussler, 1992), illness cognitions (Rutter & Rutter, 2002), illness representations (Leventhal, Nerenz, & Steele, 1984) and illness perceptions (Weinman, Petrie, Moss-Morris, & Horne, 1996). For the purposes of this discussion, the term illness representations will be used. As suggested above, illness representations are a persons 'view' of their illness, constructed in order for them to make sense of and create meaning out of their illness. This 'view' is formed using sources of information which is implicit within that persons understanding of that illness (Leventhal et al., 2003). For example, their current and past experience of the illness, information from previous social communication, cultural and general knowledge, as well as information from external authoritative sources, such as health professionals (Hagger & Orbell, 2003).

Research has consistently supported the idea that illness representations are comprised of five components (Baumann, Cameron, Zimmerman, & Leventhal, 1989; Lau & Hartman, 1983; Lau, Bernard, & Hartman, 1989; Meyer, Leventhal, & Gutmann, 1985). These are illustrated in the Figure 2.

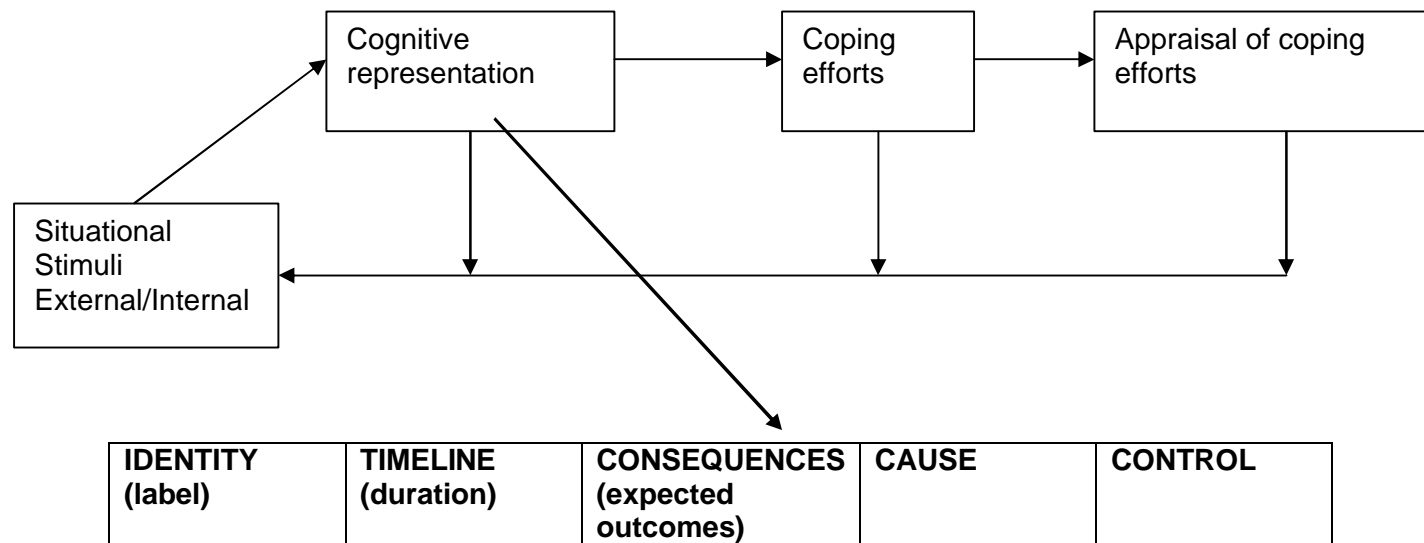


Figure 2. The Five Illness Representation Components. Adapted from Leventhal et al., (2003)



Identity refers to the label and associated perceived symptoms of the illness (for example, cancer and weight loss). The timeline refers to the persons belief about the duration of their illness (i.e. whether it is likely to be acute, chronic or cyclical) and the timescale of the illness symptoms (e.g. “the tiredness is persistent”). The consequences dimension encompasses beliefs regarding the severity and subsequent impact the illness will have on the person’s quality of life in terms of emotional, social, economical or physical aspects (Scharloo & Kaptein, 1997). For example, “this illness will prevent me working full time”. The cause dimension represents beliefs about the factors which may have caused the illness. Studies on illness representations have typically used factor analysis to cluster causal factors into groups. For example psychological causes (e.g. stress or personality; Moss-Morris et al., 2002), biological causes (e.g. compromised immunity; Jopson & Moss-Morris, 2003) and environmental/external causes (e.g. pollution, a virus; Rutter & Rutter, 2002). The control/cure dimension is related to how controllable an illness is believed to be and/or whether the person thinks something can be done to cure it. Since the model’s original inception, a sixth dimension, illness coherence, has also been added (Moss-Morris et al., 2002), which refers to how well people understand their illness and the extent to which they think about their illness in a coherent way.

It is notable that not all researchers have agreed on the use of illness representations as advocated in the CSM. For example, Heijmans (1999) has argued that separate analysis should take place to generate categories of representations specific to each illness (Hagger & Orbell, 2003). Nevertheless, Hagger and Orbell (2003) maintain that “since the theoretically derived dimensions [of illness representations] originated from extensive pilot work...the use of the...dimensions is a productive and fruitful endeavour” (p.144).

There are a number of strengths to the CSM. It is a model which can be applied to specific illnesses, as opposed to more generalised health behaviour models (Cameron & Leventhal, 2003). This point is demonstrated through its application to a variety of health problems, including asthma (Horne & Weinman, 2002; Knibb & Horton, 2008) multiple sclerosis (Jopson & Moss-Morris, 2003), heart disease (Cooper, Lloyd, Weinman, & Jackson, 1999), infertility (Benyamini, Gozlan, & Kokia, 2004), epilepsy (Fabbri, Kapur, Wells, & Creed, 2001), cancer (Elliott, Elliott, Murray, Braun, & Johnson, 1996) and allergies (Knibb & Horton, 2008). Furthermore, the model has been used to

increase knowledge regarding a number of important health behaviours. For example, lifestyle changes after illness (Weinman, Petrie, Sharpe, & Walker, 2000), attendance to treatment and rehabilitation programmes (Horne & Weinman, 1999; Ross, Walker, & MacLeod, 2004; Whitmarsh, Koutantji, & Sidell, 2003) and predicting recovery from illness (Petrie & Weinman, 1997).

### 3.3 Measuring Illness Representations

Early attempts to assess an individual's illness representations were typically undertaken using qualitative methods, such as semi-structured interviews (Leventhal & Nerenz, 1985). Despite its advantages, this method proved difficult with large samples and lacked psychometric validity (Petrie, Jago, & Devcich, 2007).

In response to these issues and the growing popularity of the application of the CSM to clinical research, the Illness Perception Questionnaire (IPQ) (Weinman et al., 1996) was developed. The IPQ is based on Leventhal's CSM and was validated against seven patient groups including diabetes, rheumatoid arthritis and asthma. A particular strong point of the measure is that items relevant to specific illnesses can be added whilst maintaining psychometric validity. This makes it possible to utilise the measure across a diverse range of illnesses. For example, heart disease, (Cooper et al., 1999) psoriasis, (Fortune, Richards, Griffiths, & Main, 2002), and asthma, (Horne & Weinman, 2002).

The IPQ has subsequently been revised (the IPQ-R; Moss-Morris et al., 2002). This has resulted in improved measurement of the timeline and cure/control subscales. It has also broadened the scope of the original IPQ with the addition of an assessment of emotional representations. As described earlier, a person's emotional representation of their illness is thought to work in parallel to their cognitive representations and comprises a key element of Leventhal's model that was not included in previous measures. A further subscale, 'illness-coherence' was also added. It was hoped that by including this scale, researchers could better capture the extent to which a person's illness makes sense to them (Moss-Morris et al., 2002). Eight patient groups were included for the validation of the IPQ-R, including asthma and chronic pain. Analysis confirmed good psychometric properties for the scale (Cronbach's alpha for the subscales ranged from 0.79 to 0.89).

### 3.4 Illness Representations in Chronic Conditions

It can be argued that the CSM, in particular, the concept of illness representations, is particularly pertinent in chronic illness. By definition of the term, people can live with chronic illness for a significant period of their lifetime, so it seems important to ask questions about the ways an individual thinks about their illness, how they cope, the sense they make of it and how this impacts on their adjustment.

Leventhal's CSM has been subject to substantial research in chronic illness. Access to tools such as the IPQ have facilitated quantitative studies which have looked into the sorts of representations people hold, their coping strategies and the relationships between them. Furthermore, some researchers have advocated that the self regulation processes described in Leventhal's model influence illness outcome such as disability, psychosocial adjustment, quality of life and social relationships (Johnston, 1996). Indeed, this notion is now widely accepted amongst researchers and reflected in the abundance of recent literature exploring illness representations, coping and outcomes in chronic illnesses. A meta-analytic review of such empirical studies using the CSM provided support for the relationships between these facets of the model (Hagger & Orbell, 2003).

The diversity of chronic conditions that have applied the CSM include Addison's disease (Heijmans, 1999), chronic obstructive pulmonary disease (COPD; O'Neill, 2002; Scharloo et al., 1998; Scharloo et al., 2007), rheumatoid arthritis (Carlisle, John, Fife-Schaw, & Lloyd, 2005; Graves, Scott, Lempp, & Weinman, 2009; Groarke, Curtis, Coughlan, & Gsel, 2005; Murphy, Dickens, Creed, & Bernstein, 1999; Schiaffino, Shawaryn, & Blum, 1998), chronic fatigue syndrome (CFS; Gray & Rutter, 2007; Heijmans, 1998; Moss-Morris, 2005), diabetes, (Cartwright & Lamb, 1999; Edgar & Skinner, 2003; Griva, Myers, & Newman, 2000; Paschalides et al., 2004), irritable bowel syndrome (IBS; Boddington, Myers, & Newman, 2002; Rutter & Rutter, 2002; Rutter & Rutter, 2007), multiple sclerosis (MS; Jopson & Moss-Morris, 2003; Schiaffino et al., 1998; Vaughan, Morrison, & Miller, 2003), and Huntington's disease (Kaptein et al., 2006). Together, such studies have generated a number of conclusions regarding the relationship between illness representations, coping and outcome. These findings will

be briefly discussed before moving on to consider the literature on illness representations in chronic pain.

Illness outcome has been examined in a variety of ways. For example, in the form of levels of physical disability, psychological distress, psychological well-being and quality of life. Collectively, studies in chronic conditions have consistently reported that an individual's personal beliefs about their illness play a significant role in adjusting to their disease. In fact, a number of studies report that illness representations outweigh disease severity as variables in explaining psychosocial and physical outcomes across disease contexts (Fortune et al., 2002; Groarke et al., 2005; Steed, Newman, & Hardman, 1999).

In terms of specific illness representations, it has been found that a strong identity, a strong emotional response, perceiving your illness to have serious consequences and a chronic timeline, believing you have weaker control and that your illness is caused by psychological factors have been found to be associated with poorer outcomes, including higher levels of depression and anxiety (Fortune et al., 2002; Jopson & Moss-Morris, 2003; Paschalides et al., 2004; Rutter & Rutter, 2002; Scharloo et al., 1998; Scharloo et al., 2007; Vaughan et al., 2003; Wittkowski, Richards, Griffiths, & Main, 2007). Conversely, holding a weaker illness identity, perceiving strong control over your disease and responding to it less emotionally are all associated with positive outcomes (Edgar & Skinner, 2003; Gray & Rutter, 2007; Scharloo et al., 2000). Although the literature is fairly consistent in these findings, there have been some notable discrepancies. For example, when examining illness representations in patients receiving haemodialysis, Covic, Seica, Gusbeth-Tatomir, Gavrilovici and Goldsmith (2004) found that patients perceiving their illness to have a chronic timeline felt more in control and reported better physical functioning. This is contrary to much of the literature on illness representations where perceiving a chronic timeline is typically associated with poorer outcomes. The authors explain this response as being very specific to chronic renal disease. That is, those who see their illness as acute and 'hope' their kidneys will heal themselves are actually in a worse position in terms of physical outcome due to possible non-compliance with dialysis. A further inconsistency was reported by Scharloo et al., (2007) in their study on patients with Chronic Obstructive Pulmonary Disorder (COPD). They reported no association between a

belief in personal control and outcome in the form of quality of life. The authors explain this in terms of the difficulty in attaining any kind of control COPD. Such findings highlight the importance of considering the differences in people's illness representations across varying disease types.

### 3.5 Illness Representations in Chronic Pain

The general acceptance of a biopsychosocial perspective as the most effective approach in chronic pain has led to the examination of the role of cognitive factors, such as beliefs, on an individual's physical and psychosocial adjustment. Subsequently, there is now a considerable body of research recognising the importance of a person's pain-related cognitions in their adaptation to chronic pain (Jensen, Turner, & Romano, 1994; Jensen, Turner, Romano, & Lawler, 1994; Jensen, Romano, Turner, Good, & Wald, 1999; Lame et al., 2005; Severeijns, Vlaeyen, van den Hout, & Weber, 2001; Turner, Jensen, & Romano, 2000).

Pain beliefs have been looked at generally in the chronic pain literature and can be referred to as assumptions about reality which shape how one interprets the experience of pain. A number of key beliefs have been identified which impact significantly on adjustment. For example, both catastrophising (the tendency to expect or worry about major negative consequences of an event) and fear-avoidance beliefs (a belief that it is necessary to avoid activities due to fear of exacerbating pain) have repeatedly been found to contribute significantly to poorer psychosocial outcomes in chronic pain (Basler, Luckmann, Wolf, & Quint, 2008; Grotle, Vollestad, Veierod, & Brox, 2004; Keefe, Rumble, Scipio, Giordano, & Perri, 2004; Samwel, Kraaimaat, Crul, & Evers, 2007; Smeets, Vlaeyen, Kester, & Knottnerus, 2006; Turk, Robinson, & Burwinkle, 2004; Vlaeyen, Kole-Snijders, Rotteveel, Ruesink, & Heuts, 1995). In addition, concepts such as beliefs about one's self-efficacy have been found to be significant in the process of adaptation (Gatchel et al., 2007; Jensen, Turner, Romano, & Karoly, 1991). Specific pain-related beliefs also found to have negative effects on outcome include the belief that pain signifies damage, that activity should be avoided, not understanding why one is suffering pain and the belief that pain is permanent (Jensen et al., 1991; Jensen, Turner, & Romano, 2007; Raichle, Hanley, Jensen, & Cardenas, 2007; Turner et al., 2000).

Despite some consistent and interesting trends emerging from the literature on beliefs and outcome in chronic pain, there are some limitations to be acknowledged. A sizeable proportion of samples are drawn from populations of patients referred to pain clinics. Such populations could be considered somewhat restrictive in terms of generalising findings to the wider pain population. This point is supported by researchers such as Turk and Rudy (1990) who highlight the uniqueness of patient samples referred to pain clinics (Turk & Rudy, 1992). Furthermore, much of the research in this area is correlational. Whilst such studies are useful in identifying factors such as beliefs that may impact on adjustment, they do not test for causal relationships. There is currently a paucity of experimental and longitudinal designs which may help expand theoretical understanding of the process of adjustment and its relationship with pain beliefs. Such research may also help inform current understanding about effective clinical interventions.

Some researchers have investigated the types of beliefs akin to those put forward in the CSM and their role in outcome. For example, Urquhart et al., (2008) found that negative beliefs regarding duration of pain (i.e. that it will last a long time) were associated with high pain intensity and high levels of disability in a sample of back pain sufferers. Furthermore, Turner et al., (2000) looked at beliefs in relation to functioning in 169 chronic pain patients and reported that beliefs associated with chronic duration ("this pain is permanent") were predictive of depression.

One area that has received a lot of attention in the literature is that of control over pain. The concept of perceived personal control over illness constitutes one of the illness representations advocated in the CSM. It seems intuitive that lacking a sense of control over a prolonged aversive sensation such as pain would be associated with more negative outcomes. This has indeed been the finding of research in this area. For example, Jensen, Turner and Romano (2007) found that decreased perceived control over pain, as measured by the Survey of Pain Attitudes (SOPA; Jensen et al., 1994) was consistently associated with poorer outcomes such as increased disability and depression. In addition, Raichle et al., (2007) report that not only was increased perceived control over pain associated with lower pain intensity, it was the only belief associated with better mental health. Patients reporting an increased sense of perceived control over pain are also more likely to select adaptive coping strategies

(Crisson & Keefe, 1988; Jensen & Karoly, 1991). Such studies exemplify the broader chronic pain literature findings that perceived control over pain is a consistent predictor of adaptation to the condition (Keefe & Williams, 1990; Osborne, Jensen, Ehde, Hanley, & Kraft, 2007; Skevington, 1983; Spinhoven et al., 2004; Stroud, Thorn, Jensen, & Boothby, 2000; Tan, Jensen, Robinson-Whelen, Thornby, & Monga, 2001; Turner et al., 2000)

As has been shown, cognition, beliefs and appraisals of chronic pain have been studied at length, with some useful conclusions drawn about their effect on outcome. Researchers have also looked at beliefs akin to illness representations, such as illness duration and perceived control. However, only a handful of studies have explored the full spectrum of illness representations as proposed in Leventhal's common-sense model in chronic pain. This discussion will now look at the findings of such studies.

When looking at the profile of illness representations in chronic pain populations, studies have found that people generally view their condition as chronic but cyclical, to have serious consequences, they respond emotionally towards it (i.e. have a significant proportion of emotional representations) and perceive themselves as having a weak degree of control over their pain (Moss-Morris et al., 2002; Nicklas, Dunbar, & Wild, 2009; Stuifbergen, Phillips, Voelmeck, & Browder, 2006; van Wilgen, van Ittersum, Kaptein, & van Wilje, 2008). Nevertheless, the profile of illness representations reported for pain populations is not always consistent. For example, van Ittersum, van Wilgen, Hilberdink, Groothoff, and van der Schans (2009) investigated representations in a sample of fibromyalgia patients. They found that patients reported a good degree of control over their pain and were not responding emotionally towards it. Given that this study used a sample from a Dutch population, disparities could be accounted for through cultural and/or language differences. However, perceptions regarding control and emotional representations have been reported as significant in other Dutch populations (e.g. van Wilgen et al., 2008).

In their study regarding the validation of the IPQ-R, Moss-Morris et al., (2002) report that in terms of perceptions of cause, those with chronic pain were more likely to attribute psychological causes to their pain. This finding has since been supported in other studies of pain patients (van Ittersum, van Wilgen, Hilberdink, Groothoff, & van

der Schans, 2009). Notwithstanding this latter finding, the cause subscale can be seen to have limitations. Unlike all other subscales on the IPQ-R, the authors recommend not treating it as a discrete scale but alternatively suggest subjecting the 18 items to a Principle Components Analysis (PCA) to yield meaningful factors. Although useful in identifying specific attributions relevant for individual studies, this makes comparison across the literature more difficult, because inconsistent factor structures are often reported across studies. For example, in the pain literature, some researchers report items loading on factors reported by the authors of the IPQ-R ('psychological', 'risk factor', 'immune' and 'chance'; e.g. van Ittersum et al., 2009). However, other studies have found only one meaningful factor (typically labelled 'psychological attributions'; e.g. Hill, Dziedzic, Thomas, Baker, & Croft, 2007). The latter finding has also been found in other chronic conditions (Rutter & Rutter, 2002). Further, in their study exploring illness representations in patients with Multiple Sclerosis (MS), Jopson and Moss-Morris (2003) report an entirely different set of attributional factors ('germ/virus', 'stress', 'hereditary', 'altered immunity'). Finally, some authors have not undertaken PCA, alternatively treating attribution items separately (e.g. Nicklas et al., 2009; Stuifbergen et al., 2006). Such methodological difficulties with the cause subscale have led some researchers to highlight the need for future research to focus on developing the factor structure of the causal subscale further (van Ittersum et al., 2009), whilst others have stated that illness specific causal attributions need to be identified (van Wilgen et al., 2008).

Although in its infancy, literature in this area has also been able to elucidate on possible relationships between illness representations and outcome in the form of adaptation to pain. For example, poorer outcomes in the form of greater levels of depression, anxiety, physical impairment and lower quality of life for patients are generally associated with them perceiving their pain as having severe consequences, a chronic timeline, to be caused by psychological factors and having weak control over their condition (Foster et al., 2008; Page et al., 2004; van Wilgen et al., 2008). Such findings echo those highlighted previously in other chronic conditions. However, some notable discrepancies have been reported. For example, the notion that beliefs regarding weak control over pain are linked to poor outcomes is not consistent. Indeed, researchers such as Hill et al., (2007), Page et al., (2004), and Rankin and Holtum (2003) have failed to show such a relationship. Further, some studies have shown an association



between the representation 'illness coherence' and poor functioning (Moss-Morris, Humphrey, Johnson, & Petrie, 2007; van Wilgen et al., 2008) whereas others have not (Page et al., 2004). This latter finding could be attributed to differences in sample size. The former two studies comprised relatively small samples (76 and 51 respectively), compared to Page et al., (2004) who reported on 144 patients. Moreover, comparisons across studies investigating illness representations in pain are made more complex given the varying pain populations reported on. These are diverse and include chronic headache (Page et al., 2004), fibromyalgia (Stuifbergen et al., 2006), musculoskeletal hand problems (Hill et al., 2007), low back pain (Foster et al., 2008) as well as more heterogeneous groups of chronic pain sufferers (Nicklas et al., 2009).

In terms of more successful adaptation to pain, research indicates that the following representations are important; perceiving stronger control over pain, having less of an emotional response, perceiving that pain has a shorter duration and fewer consequences on one's life (Foster et al., 2008; Hobro, Weinman, & Hankins, 2004). Furthermore, in their study of 116 chronic pain patients, Rankin and Holtum (2003) report that having a weaker illness identity and perceiving less serious consequences to be associated with greater acceptance, a factor now thought to be important in adjusting to chronic pain (McCracken, Vowles, & Eccleston, 2005; McCracken & Eccleston, 2005).

As can be seen, some useful initial steps have been made towards understanding both the pattern of illness representations in chronic pain and how these might be linked to adjustment. Useful comparisons of such studies are facilitated in that the majority have utilised a standard measurement of illness representations (the IPQ-R). However, one limitation of the current literature is that almost all studies employ a cross-sectional design with correlational data, thus prohibiting specific causal inferences between perceptions of pain and adjustment to be made.

As highlighted earlier, linked to outcomes in the CSM is the role of coping. Leventhal's model proposes that people engage in coping behaviours in an attempt to self-regulate their illness and that efforts to employ coping strategies are influenced by the person's representations of their illness. Following a summary of illness representations, the next section of this discussion will attempt to bring the two latter elements of the model

together. After briefly reviewing research findings on coping in chronic pain, the discussion will move on to look at findings on the relationship between illness representations and coping.

## 2.6 Illness Representations Summary

The Common-Sense model of Illness Representations was put forward in an attempt to explain the mechanisms by which a person attempts to self-regulate their health. It takes the form of a dynamic parallel processing framework whereby people form concurrent cognitive and emotional representations of their illness (known as illness representations) which then influence the selection of coping strategies. This follows with an appraisal of the effectiveness of their styles of coping which determines outcomes. The model therefore proposes that coping mediates the relationship between illness representations and illness outcome. Research has supported the presence of five illness representations; identity, timeline, cause, consequences and control. Psychometrically sound measures have been developed to assess these dimensions which have since been extended to include assessment of illness coherence and emotional representations. An abundance of literature exists examining the CSM in a diverse range of chronic conditions. These have revealed consistent patterns of illness representations and their associated relationships with health outcomes. Despite recognition of the importance of cognitions on illness outcome in pain, research specifically investigating illness representations is only just emerging in the chronic pain literature.

## 4.0 COPING

Early studies on coping dating back to the 1960's drew on the psychoanalytic concept of defence, which was viewed as a response to the management of threat to the self (Lazarus, 1993). Following on from this, researchers such as Haan (1969) differentiated between adaptive and maladaptive defensive responses, the former of which was labelled 'coping'. This approach placed thoughts about coping within the individual and intrinsically linked it with personality, hence the term, the 'trait' approach, which is typically attributed to this area of coping research (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986).

More recently, coping has been viewed as a process that changes over time and across situational contexts. This approach has been adopted by researchers since the introduction of the influential theory of stress and coping proposed by Lazarus and Folkman (1984). The theory proposes two key dynamic stages; cognitive appraisal, (pertaining to the evaluation of threat, potential for harm and evaluation of possible coping responses in a stressful situation) and coping itself. According to this process view, coping is defined as "ongoing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus, 1993, p.237). Furthermore, coping is typically divided into two sub-types; emotion-focussed coping (regulating stressful emotions) and problem-focussed coping (efforts to remove or reduce the threatening event). It is thought that rather than being two discrete types of coping, emotion-focussed and problem-focussed coping typically co-occur (Carver & Scheier, 1994). In addition, it is argued that the 'fit' between one or the other and the situation is important. In this sense, problem-focussed strategies are viewed as more adaptive in situations appraised as changeable and emotion-focussed strategies more adaptive in unresolvable situations (Lazarus & Folkman, 1984).

Additional ways of conceptualising coping have been to differentiate between approach and avoidance styles (e.g. Krohne, 1993). Approach strategies refer to a more active process whereby the person focuses on the event in the form of planning, seeking social support and positive reappraisal. Conversely, avoidance is a more passive tendency to avoid, ignore or deny the event. Strategies exemplifying this method

include behavioural and/or mental disengagement, focussing on emotions and distancing. The tendency to conceptually separate styles of coping such as the emotion-focussed/problem-focussed and approach-avoidant types have lead to assumptions that there are 'good' and 'bad' ways of coping. As Lazarus (1993) highlights, in the West, the assumption is often that coping strategies associated with taking action and control (i.e. problem-focussed and approach methods) are thought of more favourably than those associated more with emotion. However, aside from being inaccurate, such views lead to assumptions that there is one or more 'better' styles of coping, irrespective of individual circumstances and situational factors.

The process approach to coping research has proved useful in recognising the importance of the situation with regard to efficacious coping and the literature supports the view that whether or not a coping style can be deemed adaptive, depends very much on the particular circumstances (Carver & Scheier, 1994; Lazarus, 1993). For example, meta-analyses of the approach-avoidant classifications indicate that for short term, uncontrollable stress, avoidance is more helpful, whereas, for enduring, more controllable events, approach strategies of coping are more beneficial (Roth & Cohen, 1986; Suls & Fletcher, 1985).

The notion that duration of the stressor is important in selection of an adaptive coping style is pertinent to chronic illness. Recent literature supports the view that emotion-focussed strategies appear to dominate in chronic illness populations. For example, Endler, Kocovski and Macrodimitris (2001) found that people with chronic illness relied on different coping strategies (i.e. more emotional pre-occupation strategies) compared to individuals with acute illness. However, unlike the point made by Lazarus and Folkman (1984), the dominant view from the literature appears to be that coping strategies which are more emotion-focussed (particularly avoidance) are generally associated with poorer psychosocial outcomes than more active strategies (Bombardier, D'Amico, & Jordan, 1990; Heijmans & de Ridder D., 1998). Nevertheless, as cited earlier, it is important to be mindful of assuming a good-bad dichotomy for problem-focussed versus emotion-focussed styles of coping.

#### 4.1 Coping in Chronic Pain

Coping in chronic pain refers to the strategies that individuals engage in on a daily basis to minimise or reduce both the pain itself and distress associated with it (Turk & Rudy, 1992). As this discussion will illustrate, coping in chronic pain constitutes an integral part of understanding and predicting people's adjustment to the condition. Such information is crucial if clinicians are to assist patients in adopting effective, empirically derived strategies that will facilitate quality of life (Adams et al., 2006). There currently exists a prolific volume of literature on coping in chronic pain and a detailed review is unfortunately out of scope of this discussion. Alternatively, this section will focus on findings related to styles of coping specifically found in chronic pain populations and in keeping with the CSM, will look at their relationship with health outcomes.

Researchers have classified coping strategies in pain in a variety of ways. The problem-focussed/emotion-focussed and avoidance/approach conceptualisations cited in the general coping literature have been utilised. Additional ways of classifying coping specifically in chronic pain populations include active/passive (Brown & Nicassio, 1987). Active strategies refer to methods used to control pain, function in spite of pain or ameliorate its effects, whereas passive strategies refer to those which relinquish control of pain to external resources (e.g. other people) (Brown & Nicassio, 1987). Examples of the former include positive coping self-statements, pacing, distraction and seeking social support. Conversely, typical passive strategies include wishful thinking, activity avoidance and guarding (not moving painful body parts, being cautious in what you do). Classifying coping strategies into cognitive and behavioural dimensions has also been used (Rosenstiel & Keefe, 1983). Cognitive strategies include diverting attention, reinterpreting pain sensations, ignoring pain, praying/hoping and coping self-statements. Behavioural strategies typically refer to increasing activities. Fernandez (1986) has suggested an extension to the cognitive/behavioural classification to include physical coping strategies such as physiotherapy and medication. Further conceptualisations include attentional vs. avoidant strategies (Suls & Fletcher, 1985) and illness focussed (e.g. getting medical information) vs wellness-focussed (e.g. relaxation, distraction) (Jensen, Turner, Romano, & Strom, 1995)

Different ways of conceptualising coping has lead to a number of measures being used. These reflect a mix of pain-specific assessments such as the Chronic Pain Coping Inventory (CPCI; Jensen et al., 1995), Coping Strategies Questionnaire (CSQ;

Rosenstiel & Keefe, 1983) and Vanderbilt Pain Management Inventory (VPMI; Brown & Nicassio, 1987) as well as those derived from the general coping literature (e.g. Ways of Coping Questionnaire; Lazarus & Folkman, 1984).

#### *4.1.1 Coping in Chronic Pain – What Strategies Do People Use?*

An examination of the types of coping style reported in chronic pain populations will of course reflect the subscales comprising the measure used. For example, the VPMI reflects styles described as either active or passive, whereas the CSQ focuses on specific cognitive and behavioural coping methods. Studies using these measures have shown that populations of chronic pain patients utilise a wide range of coping styles. For example, Snow-Turek, Norris and Tan (1996) found that patients used a combination of both active and passive strategies to cope with their pain. Furthermore, more recent studies have replicated this finding, demonstrating the use of multiple types of coping strategy from resting, relaxation and seeking support to ignoring pain, praying for it to cease and the use of coping self-statements (Jensen et al., 2007).

Through the use of principle components analysis, some studies have attempted to show the presence of particular coping strategies in chronic pain by clustering the subscales of coping measures into statistically meaningful composites (or factors). However, the findings are mixed. For example, Lawson, Reesor, Keefe and Turner (1990) report a 3 factor model for the coping strategies questionnaire (CSQ) comprising 'Conscious Cognitive Coping', 'Self-Efficacy Belief' and 'Pain Avoidance'. Conversely, findings from studies conducted by Parker et al., (1989) and Nicassio, Schoenfeld-Smith, Radojevic, & Schuman (1995) suggest a 2 factor model, comprising dimensions 'Coping Attempts' and 'Pain Control and Rational Thinking'.

Findings exploring the use of individual coping strategies have also proved conflicting. For example, in their review of the chronic pain coping literature, Jensen et al., (1991) state that at least 12 studies report factors where the subscales ignoring pain and coping self statements appear, suggesting these are two frequently used coping strategies. However, the literature contains exceptions, where analyses suggest that coping self-statements are not widely used (e.g. Turner et al., 2000). Differences across studies in terms of the weight attributed to various coping strategies may reflect the heterogeneity of the chronic pain population. Indeed, studies such as that

conducted by Keefe and Dolan (1986) found specific differences in the use of coping strategies according to pain location, where patients suffering from low back pain used more attention diversion and praying or hoping strategies compared to patients with facial pain.

Despite conflicting findings regarding the relative use of particular coping strategies in chronic pain populations, a growing body of evidence exists suggesting agreement that the coping strategies a person adopts have a significant impact on their adjustment to the condition (Endler, Kocovski, & Macrodimitris, 2001; Jensen et al., 1991). Indeed, Keefe, Crisson, Urban and Williams (1990) found that in terms of explaining psychological distress, pain coping strategies played a greater role than demographic variables and medical status.

#### *4.1.2 Coping in Chronic Pain and Psychosocial Outcomes*

Of particular pertinence in considering the coping literature in chronic pain is the coping style catastrophising. As highlighted earlier, catastrophising is defined as the tendency to expect or worry about major negative consequences of an event (Turner et al., 2000). Specifically, pain catastrophising refers to “an exaggerated negative orientation toward pain stimuli and pain experience” (Sullivan et al., 2001, p.253). Items from the Coping Strategies Questionnaire that constitute the catastrophising subscale include ‘Its awful and I feel that it overwhelms me’, ‘I worry all the time about whether it will end’ and ‘I feel like I can’t stand it anymore’. It is important to consider this concept for two main reasons. Firstly, the literature has strongly and consistently found catastrophising to be significantly related to poorer outcomes in chronic pain patients (Jensen, Turner, & Romano, 1992; Jensen, Turner, & Romano, 2001; Jensen et al., 2007; Keefe et al., 2004; Martin et al., 1996; Roth, Lowery, & Hamill, 2004). For example, in their sample of over 500 people with enduring pain, Tan et al., (2001) report that catastrophising was the single most powerful predictor of depression. Further, Turner et al., (2000) reported catastrophising independently predicted depression in a sample of 169 patients awaiting a pain management programme. Examinations of the reverse relationship also support the argument regarding the critical role of catastrophising in poor outcomes. For example, cognitive behavioural treatment to reduce catastrophising has been shown to lower physical disability and pain interference (Turner & Clancy, 1988). Although the relationship between catastrophising and poorer outcomes is fairly robust,

it is interesting to note that some studies have reported the proportion of people adopting a catastrophising style to be relatively small (Osborne et al., 2007).

The second reason that catastrophising warrants attention is that recent literature has generated debate about whether or not catastrophising can be thought of as a coping strategy or whether it more accurately reflects an appraisal of a person's pain experience. For example, in their review of the coping literature in chronic pain, Jensen et al., (1991) highlight the issue of 'confounded assessment' in relation to the catastrophising subscale of the CSQ, arguing that it may be 'conceptualised more appropriately as appraisals rather than coping responses' (p.278). Further, McCracken and Gross (1993) concluded that due to its strong association with measures of anxiety, catastrophising is better viewed as a distress response than a coping strategy. Similar arguments have been made with regard to the close association between the concepts of catastrophising and depression (Sullivan & D'Eon, 1990), although some authors have found the two to be separate constructs (Geisser, Robinson, Keefe, & Weiner, 1994). More recent research has reflected the argument put forward by Jensen et al., (1991) and chosen either to exclude catastrophising from their analysis (e.g. McCracken & Eccleston, 2003) or analysed it separately from other coping subscales (e.g. Turner et al., 2000). Regardless of the outcome of this debate, it appears that catastrophising constitutes a crucial factor in understanding those people who struggle to adjust to their pain.

In addition to catastrophising, other styles of coping have been found to have particular relationships with a number of health outcomes. In general, those strategies considered passive (e.g. hoping and praying) and emotion-focussed (e.g. emotional pre-occupation) are found to be positively associated with pain severity, disability and psychological distress (Brown & Nicassio, 1987; Endler et al., 2001; Jensen et al., 1991; McCracken, Goetsch, & Semenchuk, 1998; Summerfeldt & Endler, 1998; Turner et al., 2000). For example, Samwel et al., (2007) found that the passive behavioural strategy of resting predicted disability whilst the passive cognitive strategy of worrying significantly predicted depression. Additional maladaptive strategies have been reported, including palliative coping (behaviour to attain comfort) (Jaspers, Heuvel, Stegenga, & de Bont, 1993) and guarding (Jensen et al., 1995).



On the other hand, individuals who employ action-oriented coping strategies report better outcomes such as lower levels of depression (Brown & Nicassio, 1987; Endler et al., 2001; Spinhoven, Ter Kuile, Linssen, & Gazendam, 1989). In their sample of 176 chronic pain patients, Jenson et al., (1995) found that regular exercise was associated with a more adaptive outcome. Interestingly, Nicassio, Schoenfield-Smith, Radojevic and Schuman (1995) report findings that are not consistent with this view. They found that active coping strategies were associated with negative outcomes, such as greater reported pain and depression. The authors suggest these conflicting results may be attributable to the sample population (fibromyalgia patients). They argue that, if not executed at the appropriate cautious pace, active strategies, such as exercise may actually exacerbate symptoms and disability due to the nature of the condition. Research also indicates that chronic pain patients fare better when they make greater use of attentional strategies, which refers to focussing attention directly on the source of pain in an attempt to manage it (e.g. seeking information). Those people who engage in such strategies report less depression, anxiety and pain severity and more social activity (Holmes & Stevenson, 1990; Katz, Ritvo, Irvine, & Jackson, 1996).

Interestingly, it may be thought that social support seeking would be associated with more positive outcome, given that it could be considered an 'active' strategy. However, research has not supported this view (e.g. Flor, Kerns, & Turk, 1987; Romano et al., 1992). Kreitler and Niv (2007) offer a possible explanation. That is, sympathetic family and friends may not only encourage the expression of suffering and pain sensations but facilitate those with chronic pain in avoiding activity which may benefit them longer term. However, it is worth noting that this finding has not received unanimous support. For example, Raichle et al., (2007) report an association between seeking social support and better mental health. Other styles of coping associated with a more adaptive outcome include problem-focussed coping (Blalock, Devellis, & Giorgino, 1995), positive self statements (Hill, 1993) and social comparison (viewing oneself as better off than others; Jensen & Karoly, 1991; Kreitler & Niv, 2007).

Some strategies found not to be related to adjustment in pain include 'reinterpreting pain' (using cognitive statements to 'distance' oneself from the pain; Kreitler & Niv, 2007), 'ignoring pain' (Geisser et al., 1994), 'diverting attention' (Engel, Schwartz, Jensen, & Johnson, 2000; Varni et al., 1996) and relaxation (Jensen et al., 1995;

Turner, Holtzman, & Mancl, 2007). However, as Jenson et al., (2007) highlight, such findings do not necessarily mean these strategies are not important, but that current measures may not be capturing an adequate assessment of the construct. The literature highlights the importance of remembering that over time, strategies may well change and those considered adaptive at start may not be as the condition becomes more chronic. This has found to be the case for avoidant coping strategies (Geisser et al., 1994; Holmes & Stevenson, 1990; Keefe & Williams, 1990; Vitaliano, Russo, Carr, Maiuro, & Becker, 1985)

As has been shown, the chronic pain coping literature provides some useful insights into types of strategy used and the relationship between coping style and psychosocial outcomes. However, some criticism has been levied at the literature for focussing solely on maladaptive strategies at the expense of understanding those strategies that will be helpful for people with chronic pain (Jensen et al., 1991; McCracken & Eccleston, 2003). This has led researchers such as Snow-Turek et al., (1996) to argue that it would be more beneficial for people to find ways of reducing passive strategies than trying to get people to engage in more active ways of coping.

#### 4.2 Illness Representations and Coping

As highlighted previously in this discussion, coping constitutes a key part in the CSM. Specifically, it proposes that an individual's cognitive representations of an illness threat (their illness representations) are related to the selection of coping strategies. The model proposes that the relationship is causal in that the illness representation "will exert an effect on coping behaviours in proportion with the perceived severity of the illness based on the representation" (Hagger & Orbell, 2003, p.145).

The literature examining the relationship of CSM components has largely supported an association between illness representations and coping strategies. For example, in their meta analysis of the CSM, Hagger and Orbell (2003) found that perceived controllability was related to active coping strategies and cognitive reappraisal. They also report that having a strong illness identity was associated with expressing emotion and avoidant coping strategies. Little support was found for the relationship between illness representations and the coping strategy seeking social support. More recent research has supported these findings. For example, Carlisle et al. (2005) examined

the CSM in patients with rheumatoid arthritis and found a significant relationship between avoidant coping strategies and a strong illness identity. Avoidance was also negatively correlated with perceived controllability. That is, people who viewed their illness as controllable coped in ways that didn't characterise avoidance. Further, Kaptein et al. (2006) report that a strong illness identity was associated with mental disengagement whilst perceiving good control over illness was related to the coping strategy 'positive reinterpretation' in a sample of patients with Huntington's disease. This study did not find a relationship between the illness representation consequences and any coping strategy. However, this is not supported by other studies using the CSM. For example, Rutter and Rutter (2002) found a significant relationship between perceived serious consequences and a number of potentially maladaptive coping strategies (e.g. restraint coping, venting emotions and mental disengagement). This latter finding is supported by previous studies which have found not only perceived serious consequences, but perceived longer duration of illness to be associated with less adaptive strategies such as disengagement and venting emotions (e.g. (Heijmans & de Ridder D., 1998; Moss-Morris, Petrie, & Weinman, 1996). A relationship between illness representations and coping has been reported in a number of other chronic illnesses such as psoriasis (Fortune et al., 2002), epilepsy (Goldstein, Holland, Soteriou, & Mellers, 2005) and chronic fatigue syndrome (CFS; Gray & Rutter, 2007).

Despite the abundance of research examining the relationship between illness representations and coping in chronic conditions, virtually no literature exists on the relationship between these components of the CSM in patients with chronic pain. However, it is possible to ascertain some ideas about this from studies which have examined concepts akin to illness representations. For example, Haythornthwaite, Menefee, Heinberg and Clark (1998) looked at pain coping strategies and perceived control over pain. They found that control was significantly associated with almost all coping strategies endorsed in the Coping Strategies Questionnaire with the exception of the praying and hoping subscale. Further, Harkapaa (1991) found a more specific relationship between control and coping, reporting that those individuals who perceived greater internal control over their pain utilised more active behavioural coping strategies.

Williams and Keefe (1991) examined the relationship between beliefs that pain is enduring and mysterious (concepts that could be related to the illness representations 'duration' and 'illness coherence') and found that those patients who endorsed these beliefs were less likely to use cognitive coping strategies. Finally, Ramirez-Maestre, Esteve and Lopez (2008) looked at appraisals and styles of coping in a sample of patients with musculoskeletal pain. They found that an appraisal of harm (the idea that because of pain, something important has been lost in the persons life – a belief that could be compared to the illness representation 'serious consequences') was significantly related to passive coping and negatively correlated with active coping strategies.

#### 4.3 Coping Summary

The literature on coping has been heavily influenced by the theory of stress and coping put forward by Lazarus and Folkman. This 'process' approach emphasises the situational context as central in a persons selection of coping strategies, with coping styles characterised as emotion-focussed or problem-focussed. The literature on coping in chronic pain has further conceptualised coping strategies. These classifications include active/passive, cognitive/behavioural, attentional/avoidant and illness focussed/wellness-focussed. People suffering with chronic pain utilise a variety of strategies to cope and researchers have differed on the degree with which specific strategies are employed. Nevertheless, a growing body of evidence supports the view that the coping strategy a person adopts significantly impacts on their adjustment to pain. Catastrophising is a particularly important theoretical and clinical issue, in terms of its striking association with poorer psychological adjustment to chronic pain and the debate in the literature about whether it constitutes a coping strategy or is best viewed as an illness appraisal. The concept of coping is central to the CSM and the literature highlights significant associations between certain illness representations and particular coping strategies. Although it has been possible to examine the relationship between beliefs and coping in chronic pain using concepts akin to illness representations, to date, no studies have looked at these concepts as proposed in the CSM.

## **5.0 THE RELATIONSHIP BETWEEN ILLNESS REPRESENTATIONS, COPING AND ILLNESS OUTCOMES**

As this review has illustrated, theory and research on chronic illness has examined the relationships between components of the CSM. The CSM explicitly links all three components in a mediational model. That is, illness representations are directly related to coping and, via coping, to adaptive outcomes such as psychosocial adjustment and quality of life. Coping is assumed to mediate between illness representations and adaptive outcome (Leventhal et al., 1984).

Support for this mediational model is mixed. A meta-analytic review of 45 studies examining the CSM found support for the relationships between CSM components (Hagger & Orbell, 2003). Nevertheless, they were unable to comment on the presence of mediation due to the low number of studies providing the necessary correlations between coping and outcome variables. Subsequent research in a number of chronic conditions has informed the picture a little more, but support for a mediation model remains patchy. For example, in a sample of patients with chronic fatigue syndrome, Gray and Rutter (2007) found support for mediation whereby the outcome quality of life was mediated by the coping strategy 'maintaining activity for physical functioning'. Evidence supporting mediation was also reported by Rutter and Rutter (2002) in their study of irritable bowel syndrome. For example, when looking at the outcome depression, the cure/control illness representation was found to be mediated by the coping strategy of behavioural disengagement. Partial support for mediation has also been reported in chronic conditions such as diabetes (Edgar & Skinner, 2003), rheumatoid arthritis (Carlisle et al., 2005) and epilepsy (Goldstein et al., 2005). However, mediation was not supported by Kaptein et al., (2006) in their study examining the CSM in patients with Huntington's disease. Alternatively, they found evidence for a direct effect of illness representations on psychosocial outcome. The notion that illness representations exert a direct influence on outcome is well supported in the literature (e.g. Goldstein et al., 2005; Hagger & Orbell, 2003; Vaughan et al., 2003) and some authors argue that this relationship better fits the data on illness representations and outcome than one whereby coping plays a mediating role (Heijmans & de Ridder D., 1998; Heijmans, 1999).

As can be seen, an examination of the relationships between all components of the CSM has been undertaken in a number of chronic conditions. These studies have provided promising information with regard to the important determinants of adjustment to chronic illness and the relationship between such components. It has also provided some evidence to consider the value of the CSM as an empirical model for understanding chronic illness. In addition, this discussion has demonstrated the central role that cognitive factors such as beliefs and coping play in adjustment to chronic pain. Given this and the evidence pertaining to the applicability of the CSM in a number of chronic conditions, it is feasible that an examination of Leventhal's model could prove important for a chronic pain population. As Carlisle et al. (2005) state "An advantage of utilising the self-regulatory model with individuals who are diagnosed with a chronic illness is the potential to explore sophisticated responses to an illness from a number of domains" (p.572). Although studies in chronic pain have either looked at coping as a mediating factor in outcome (e.g. Covic, Adamson, & Hough, 2000) or examined the mediating role of coping in one area of cognition such as control (Jensen & Karoly, 1991), to date, no studies exist that look at all components of the CSM in chronic pain including the proposed mediating role of coping.

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EMPIRICAL PAPER

**Illness Representations, Coping and Psychosocial  
Outcome in Chronic Pain:**  
**An Investigation into the Mediating Role of Coping in the Relationship  
between Illness Representations and Psychosocial Outcome**

Alethea Adair-Stantiall

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## ABSTRACT

The study aimed to investigate the pattern of illness representations in chronic pain, the impact of illness representations and coping on psychosocial outcome and whether illness representations are indirectly associated with psychosocial outcome through their influence on coping. A cross-sectional correlational design was employed. A series of regression analyses were performed to test the hypothesised mediator model. Self-report questionnaires were administered to individuals newly referred to a local pain clinic. The final sample consisted of 201 adults with chronic pain. A significant relationship between a number of illness representations and psychosocial outcomes was found. A subset of these met all criteria for mediation. Specifically, the illness representations identity, consequences and emotional representation were related to psychosocial outcomes depression, anxiety and aspects of quality of life, and these were fully mediated by the coping strategy catastrophising.

The findings imply that particular illness representations are associated with the coping strategy catastrophising, which in turn is associated with an increased tendency for depression, anxiety and reduced quality of life. The results also indicate that a number of coping strategies did not have a mediating effect between illness representations and psychosocial outcome. Due to the cross-sectional design, causal inferences cannot be made. However, the findings imply partial support for the Common-Sense Model of Illness Representations in a chronic pain population. Directions for future research are highlighted, as well as implications for psychotherapeutic interventions which target unhelpful beliefs and maladaptive coping strategies (e.g. cognitive behavioural therapy).

**KEYWORDS:** Illness representations, common-sense model, chronic pain, coping, catastrophising, outcome

## **1.0 INTRODUCTION**

### **1.1 The Impact of Chronic Pain**

Chronic pain is a ubiquitous, debilitating problem. Although estimates of prevalence vary, studies suggest it affects at least 20% of the worldwide population (Blyth et al., 2001; Breivik, Collett, Ventafridda, Cohen, & Gallacher, 2006; Gureje, Von, Simon, & Gater, 1998; Von Korff, Dworkin, Le, & Kruger, 1988). The literature highlights the substantial economic effect of chronic pain, in the form of utilization of healthcare services and loss of earnings through reduced productivity (Breivik et al., 2006; Latham & Davis, 1994; Tunks, Crook, & Weir, 2008; Von Korff et al., 1988). For people who suffer with chronic pain, their lives are often made difficult through attempts to deal with multiple emotional and psychological challenges, such as role loss (Harris, Morley, & Barton, 2003), changes in identity (Risdon, Eccleston, Crombez, & McCracken, 2003) and reduced concentration and attention (Kreitler & Niv, 2007). Research suggests that co-morbid depression is present in 40-50% of chronic pain patients (Banks & Kerns, 1996; Dersh, Gatchel, Mayer, Polatin, & Temple, 2006; Romano & Turner, 1985). Rates of anxiety in chronic pain are similarly high, with studies indicating that around 35%-40% of patients with pain met the criteria for an anxiety disorder (Manchikanti et al., 2002; McWilliams, Cox, & Enns, 2003; Means-Christensen, Roy-Byrne, Sherbourne, Craske, & Stein, 2008; Wolfe et al., 1990). The literature also highlights the significant and detrimental impact of chronic pain on a person's quality of life (Becker et al., 1997; Hadjistavropoulos & Craig, 2004; Skevington, 1998).

It is widely acknowledged that psychological responses to chronic pain such as those outlined above dynamically interact with biological and social variables to influence a person's pain experience (Turk & Monarch, 2002). Subsequently, a biopsychosocial model is currently considered the most effective approach to understanding and working with chronic pain (Gatchel, 2004). A central facet of the biopsychosocial model is the role of cognition in helping to explain how a person interprets and responds to their pain (Gatchel, Bo Peng, Fuchs, Peters, & Turk, 2007).

### **1.2 Chronic Pain, Beliefs and Coping**



*“For patients with chronic pain...beliefs form part of the psychological context, known to be the largest influence in predicting the extent of pain-associated disability”*  
(Eccleston, 2001, p.144)

Research has identified a number of pain beliefs (that is, assumptions which shape how one interprets the experience of pain) which have a powerful impact on an individual's emotional and behavioural response to pain. For example, the beliefs that pain signifies damage, that activity should be avoided, that pain is permanent and not understanding why one is suffering pain have all been linked to negative outcomes, such as increased depression, physical disability and pain interference (Jensen, Turner, Romano, & Karoly, 1991; Jensen, Turner, & Romano, 2007; Raichle, Hanley, Jensen, & Cardenas, 2007; Turner, Jensen, & Romano, 2000). In addition, the literature consistently demonstrates an association between fear-avoidance beliefs (a belief that it is necessary to avoid activities due to fear of exacerbating pain) and poorer outcomes (Basler, Luckmann, Wolf, & Quint, 2008; Grotle, Vollestad, Veierod, & Brox, 2004; Samwel, Kraaimaat, Crul, & Evers, 2007). A perception that one has little control over pain is another belief that has been associated with poorer outcomes such as increased disability and depression (Jensen et al., 2007). Conversely, studies have reported that perceived control over pain is a strong predictor of successful adaptation (Osborne, Jensen, Ehde, Hanley, & Kraft, 2007; Raichle et al., 2007; Spinhoven et al., 2004; Stroud, Thorn, Jensen, & Boothby, 2000).

In addition to specific beliefs about pain, an important area where cognition can affect the way a person adjusts to their condition is coping. Coping in chronic pain refers to the strategies that individuals engage in on a daily basis to minimise or reduce both the pain itself and distress associated with it (Turk & Rudy, 1992). Research has revealed that people suffering with chronic pain report utilising a wide range of strategies. These include relaxation, seeking support, ignoring pain, praying for it to cease and the use of coping self-statements (Jensen et al., 2007). Further, a considerable body of literature now highlights the relationship between a person's choice of coping strategy and their subsequent adjustment to pain (Endler, Kocovski, & Macrodimitris, 2001; Jensen et al., 1991; Keefe, Crisson, Urban, & Williams, 1990). More specifically, researchers have found that strategies considered passive, such as hoping or praying for pain to cease, guarding (not moving painful body parts, being cautious in what you do) and palliative

coping (behaviour to attain comfort) are associated with poorer psychosocial outcomes (Endler et al., 2001; Geisser, Robinson, Keefe, & Weiner, 1994; Jaspers, Heuvel, Stegenga, & de Bont, 1993; Jensen et al., 1991; Samwel et al., 2007; Turner et al., 2000). In contrast, pain patients who employ more action-oriented and attentional strategies, such as relaxation, regular exercise and seeking information report better outcomes in the form of lower levels of depression, anxiety and pain severity (Brown & Nicassio, 1987; Holmes & Stevenson, 1990; Jensen, Turner, Romano, & Strom, 1995; Katz, Ritvo, Irvine, & Jackson, 1996).

One of the most enduring findings in the pain coping literature is the association between the coping strategy catastrophising and poor physical and psychosocial outcomes in chronic pain patients (Keefe, Rumble, Scipio, Giordano, & Perri, 2004; Raichle et al., 2007; Roth, Lowery, & Hamill, 2004; Smeets, Vlaeyen, Kester, & Knottnerus, 2006; Sullivan et al., 2001). Catastrophising can be defined as the tendency to expect or worry about major negative consequences of an event (Turner et al., 2000). In terms of the pain experience, catastrophising refers to an over inflated negative orientation toward actual or anticipated pain experiences coupled with a tendency to devalue one's ability to deal with pain (Gatchel et al., 2007; Keefe et al., 2004). Items from the catastrophising subscale of the Coping Strategies Questionnaire (CSQ; Rosenstiel & Keefe, 1983) include "It's terrible and I feel it's never going to get any better" and "I feel I can't stand it anymore". Considerable debate currently exists in the literature regarding catastrophising as a psychological construct (Sullivan et al., 2001; Turner & Aaron, 2001). Studies demonstrating a strong association with measures of distress such as anxiety (McCracken & Gross, 1993) and depression (Sullivan & D'Eon, 1990) have lead some researchers to argue that catastrophising more accurately reflects an appraisal of a persons pain experience as opposed to a style of coping. Subsequent research has reported catastrophising to be distinct from distress responses such as depression (Geisser et al., 1994). Nevertheless, recent literature has tended to ensure catastrophising is analysed separately from other coping subscales (Osborne et al., 2007; Turner et al., 2000)

As has been demonstrated, cognitive factors and choices made with regard to coping strategies impact considerably on the pain experience. One model increasingly used to understand the role of cognitions and their relationship with coping and outcome in

various health conditions is the Common Sense Model of Illness Representations (CSM).

### 1.3 The Common Sense Model of Illness Representations (CSM)

The Common Sense Model of Illness Representations, also known as the Self-Regulatory Model (SRM) was proposed by Leventhal and colleagues (Leventhal, Meyer, & Nerenz, 1980; Leventhal, Nerenz, & Steele, 1984) to explain how people interpret and respond to health threats and illness. Inherent in the model is the assumption that people are active problem solvers who are motivated to return to a state of health. Therefore, when experiencing ill health, they will strive to understand and adjust through the development of an idiosyncratic a 'common sense' model of their illness (Leventhal, Diefenbach, & Leventhal, 1992).

Central to Leventhal's model is the notion that people reflect on their experiences of illness and form subjective perceptions and interpretations called illness representations. Research has consistently supported the idea that illness representations are comprised of five components (Baumann, Cameron, Zimmerman, & Leventhal, 1989; Lau & Hartman, 1983; Lau, Bernard, & Hartman, 1989; Meyer, Leventhal, & Gutmann, 1985); identity, timeline (duration), consequences, cause and control. Identity refers to the illness label and associated perceived symptoms of the illness. Timeline refers to the person's belief about the duration of their illness. The consequences representation encompasses beliefs regarding the severity and subsequent impact the illness will have on the person's quality of life. The cause dimension pertains to beliefs about possible factors which may have caused the illness and the control dimension is related to how controllable an illness is believed to be and/or whether the person thinks something can be done to cure it. More recently, the model has been updated to include a representation which refers to how well people understand their illness (illness coherence) (Moss-Morris et al., 2002). Further, contemporary measures designed to capture a persons illness representations (i.e. the Illness Preceptions Questionnaire – Revised; Moss-Morris et al., 2002) have included a subscale to capture what Leventhal et al., 1992 refers to as a persons emotional representations (how they respond emotionally to their illness).

Illness representations are thought to constitute a framework for how a person interprets their illness. Further, the CSM proposes an explicit causal link between illness representations and behaviour. That is, illness representations guide coping efforts which in turn influences outcomes such as physical and psychological wellbeing (Leventhal et al., 1980). The CSM is therefore considered a mediation model, where coping mediates the influence of illness representations on health outcomes (Hagger & Orbell, 2003).

### *1.3.1 Illness Representations and Chronic Illness*

The CSM has been subject to substantial research in chronic illnesses. Applications of components of the model have been undertaken with a variety of chronic conditions including Huntingtons disease (Kaptein et al., 2006), rheumatoid arthritis (RA) (Carlisle, John, Fife-Schaw, & Lloyd, 2005; Graves, Scott, Lempp, & Weinman, 2009), chronic obstructive pulmonary disease (COPD) (O'Neill, 2002; Scharloo et al., 2007), irritable bowel syndrome (IBS) (Rutter & Rutter, 2002) and multiple sclerosis (MS) (Jopson & Moss-Morris, 2003; Vaughan, Morrison, & Miller, 2003). Together, these studies have shown that an individual's personal beliefs about their illness play a significant role in adjusting to their disease. Indeed, in some cases, beliefs outweigh other variables such as disease severity in explaining psychosocial and physical outcomes (Fortune, Richards, Main, & Griffiths, 2000; Groarke, Curtism Coughlan & Gsel, 2005; Steed, Newman, & Hardman, 1999). Further, when looked at collectively, such studies have produced a number of broad conclusions regarding the relationship between illness representations and adjustment (Fortune, Richards, Griffiths, & Main, 2002; Jopson & Moss-Morris, 2003; Paschalides et al., 2004; Rutter & Rutter, 2002; Scharloo et al., 1998; Wittkowski, Richards, Griffiths, & Main, 2007). Research in this area has also been able to inform understanding about the relationship between illness representations and coping. The reader is referred to Hagger and Orbell (2003) and more recently Carlisle et al., (2005); Goldstein, Holland, Soteriou, and Mellers, (2005); Gray and Rutter, (2007), and Kaptein et al., (2006) for further detail.

As can be seen, there is an abundance of literature supporting a direct relationship between illness representations and outcome. In addition, a meta-analytic review of 45 studies examining the CSM found support for relationships between the three CSM components; cognitions, coping and outcome. However, at the time, there was little

evidence for the argument that coping mediates the influence of illness representations on health outcomes. More recently, research has informed the picture further, with some studies examining chronic conditions reporting presence of mediation (Carlisle et al., 2005; Edgar & Skinner, 2003; Goldstein et al., 2005; Gray & Rutter, 2007; Rutter & Rutter, 2002). Nevertheless, this has not consistently been the case (Kaptein et al., 2006; Moss-Morris, Petrie, & Weinman, 1996; Scharloo et al., 1998) and some researchers argue that a model whereby illness representations exert a direct effect on outcome is more compelling than one where coping plays a mediating role (Heijmans & de Ridder D., 1998; Heijmans, 1999).

#### 1.4 Illness Representations and Chronic Pain

The concept of illness representations appears to lend itself to the study of chronic pain. Chronic pain is often characterised by a variable, unpredictable course, it can be of unknown aetiology and it is not uncommon for people to have tried a prolific number of medications and strategies to manage their pain (Margoless, 1999; Margoless & Funt, 1999). Therefore, themes such as 'identity', 'duration', 'cause' and 'control' seem pertinent to informing understanding in this population.

Researchers have investigated the types of beliefs akin to those put forward in the common-sense model (CSM) and their role in outcome. For example, when looking at pain duration, Palmer, Reading, Linaker, Calnan and Coggon, (2008) found that persistent pain was significantly more common in people who held the belief their pain would last at least 12 months compared to those without this expectation. Negative beliefs regarding pain duration are also associated with poor outcomes such as increased disability and depression (Urquhart et al., 2008; Turner et al., 2000).

In their study examining the relationship between pain beliefs and health related quality of life (HRQL), Dysvik, Lindstrom, Eikeland and Natvig, (2004) found that patients who perceived their pain to be a 'mystery' (a concept which could be considered similar to the illness representation 'illness coherence'), was predictive of poorer mental health. One area that has received a lot of attention in the literature is that of control over pain. The concept of perceived personal control over illness constitutes one of the illness representations advocated in the CSM. As highlighted previously, research consistently reports that greater perceived control over pain predicts more adaptive physical and

psychosocial outcomes. Interestingly, there is also support for the idea that better outcomes are associated with the perception that treatment will be effective (a concept akin to the illness representation 'treatment control' as measured by the Illness Perceptions Questionnaire-Revised; IPQ-R) (see Linde et al., 2007).

Although a number of beliefs analogous to those put forward in the CSM have been examined in chronic pain, only a handful of studies have looked at the full spectrum of illness representations as proposed in Leventhal's CSM in chronic pain. Although in its infancy, this research has been able to reveal some findings regarding the profile of illness representations in chronic pain and their relationship with health outcomes.

Studies have found that people generally view their pain as chronic but cyclical, to have serious consequences, they respond emotionally towards it (i.e. have a significant proportion of emotional representations) and perceive themselves as having a weak degree of control over their pain (Moss-Morris et al., 2002; Nicklas, Dunbar, & Wild, 2009; Stuifbergen, Phillips, Voelmeck, & Browder, 2006; van Wilgen, van Ittersum, Kaptein, & van Wijhe, 2008). Further, the literature supports the notion that people tend to attribute their pain to a variety of causes. Most typical are psychological attributions (e.g. stress/worry, overwork; Moss-Morris et al., 2002; van Ittersum, van Wilgen, Hilberdink, Groothoff, & van der Schans, 2009) and factors such as bad luck and ageing (Foster et al., 2008; Nicklas et al., 2009). In addition to looking at patterns of illness representations, research in this area has also been able to elucidate on possible relationships between illness representations and outcome in the form of adaptation to pain. For example, poorer outcomes in the form of greater levels of depression, anxiety, physical impairment and lower quality of life for patients are generally associated with them perceiving their pain as having severe consequences, a chronic timeline, to be caused by psychological factors and having weak control over their condition (Foster et al., 2008; Page et al., 2004; van Wilgen et al., 2008). Conversely, those patients who adapt more successfully to their pain report having stronger control over their illness, less of an emotional response, perceive their condition as having a shorter duration and fewer consequences on their life (Foster et al., 2008; Hobro, Weinman, & Hankins, 2004). Evidence from one study suggests that beliefs such as those highlighted above remain stable over time (Foster et al., 2008).

Although the literature does highlight a degree of concurrence in those illness representations associated with adjustment in chronic pain, some divergence has been reported. For example, in terms of personal control, some researchers have found no significant relationship between beliefs about control over pain and positive or negative outcomes (Hill, Dziedzic, Thomas, Baker, & Croft, 2007; Page et al., 2004; Rankin & Holttum, 2003). Furthermore, although some authors report that illness coherence was predictive of outcomes (Moss-Morris, Humphrey, Johnson, & Petrie, 2007; van Wilgen et al., 2008), other studies have not found a relationship between illness coherence and any aspect of adjustment (Page et al., 2004). Finally, although the majority of studies completed so far have shown that chronic pain patients report a high emotional response and perceive themselves as having low control over their pain, this has not always been the case (van Ittersum et al., 2009). Moreover, the current literature is limited in terms of the degree with which causal inferences can be made due to the fact that studies typically employ a cross-sectional design with correlational data.

As has been illustrated, the majority of research looking at the CSM in chronic pain has examined the profile of illness representations and/or their relationship with outcomes. However, with the exception of one study, the coping component of the CSM appears to have been neglected. This is somewhat surprising, given that the pain literature has consistently highlighted coping as a central factor in adjustment. van Wilgen et al., (2008) examined illness representations, the coping strategy catastrophising and quality of life in a sample of patients suffering from Fibromyalgia. They report that beliefs associated with catastrophising were poor illness coherence, a cyclical timeline and emotional representations. Despite the lack of research in this area, it is possible to draw further ideas about the relationship between illness representations and coping from studies which have examined concepts akin to illness representations. For example, Williams and Keefe (1991) examined the relationship between beliefs that pain is enduring and mysterious (concepts related to the illness representations 'duration' and 'illness coherence') and found that those patients who endorsed these beliefs were less likely to use cognitive coping strategies. Further, Ramirez-Maestre, Esteve and Lopez (2008) found that an appraisal of harm (analogous to the illness representation 'serious consequences') was significantly related to passive coping and negatively correlated with active coping strategies. Associations between beliefs regarding control over pain and coping have been mixed. For example, some studies

report that control related to a number of different coping strategies (Haythornthwaite, Menefee, Heinberg, & Clark, 1998) whereas others have argued it is related particularly to behavioural coping strategies (Harkapaa, 1991).

To date, only one study has directly applied the CSM in a chronic pain population. Nicklas et al., (2009) looked at the role of illness perceptions and medication beliefs in explaining the variance in adherence to medication. In this mediator model, the variables 'treatment necessity' and 'treatment concerns' were found to mediate patient's adherence to medication, providing initial support for the CSM in chronic pain. Although this study applied the CSM as a mediator model, it solely focussed on the variables medication and adherence, as opposed to specific coping strategies with psychosocial outcome. Although researchers have examined the relationship between cognitive appraisals, coping and outcome within the context of the CSM (e.g. van Wilgen et al. 2008) or those akin to it (Nielson & Jensen, 2004; Ramirez-Maestre, Esteve, & Lopez, 2008; Turner et al., 2000), no studies to date have investigated these three factors in a mediating model, as put forward by Leventhal and colleagues. Nevertheless, this area has been highlighted throughout the literature as one requiring further attention. For example, Hobro et al., (2004) talk about the importance of the CSM as a model to help "inform healthcare professional understanding of how thinking patterns can influence patients' relationships with their pain" (p.281). Further, Sciacchitano, Lindner and McCracken (2009) highlight the importance of investigating the "cognitive precursors" to coping strategies (p.47) whilst Foster et al., (2008) state that [pain] "research needs to identify potential mediators between perceptions and outcomes, such as coping...to facilitate better clinical outcomes" (p.185).

### 1.5 Aims of the Current Study

The current study aimed to add to the literature by exploring the patterns of illness representations in adults with chronic pain and their relationship to psychosocial outcome. In addition, this study sought to examine the ways in which a person's illness representations and psychosocial well-being were related to coping. Finally, this study sought to investigate the role of coping as a mediator between illness representations and psychosocial outcome for the first time in a chronic pain population.



In line with previous literature on the CSM in chronic illness and research examining coping in chronic pain, the study aimed to address the following hypotheses:

**Hypothesis 1.** It was predicted that participants would view their pain as chronic, cyclical, as having serious consequences, perceive themselves as having weak control and have strong emotional representations of their pain. In terms of outcome, a strong illness identity, perceived serious consequences, perceived chronic timeline, perceived lack of control and greater emotional representation of chronic pain would be associated with poor outcomes, namely higher levels of depression and anxiety and lower levels of quality of life.

**Hypothesis 2.** It was predicted that coping strategies reflecting cognitive and behavioural avoidance and catastrophising would be associated with poor outcomes. In contrast, coping strategies reflecting attempts to accommodate illness and maintain or increase activity will be associated with positive outcomes.

**Hypothesis 3.** It was expected that relationships between a person's illness representations and psychosocial outcome (in the form of anxiety, depression and quality of life) would be mediated by coping.

## 2.0 METHODOLOGY

### 2.1 Design

The study used a cross-sectional design. There was one predictor variable (illness representation) with eight levels (identity, timeline acute/chronic, timeline cyclical, consequences, personal control, treatment control, illness coherence and emotional representation). There was one mediator (coping) which comprised seven levels (diverting attention, reinterpreting pain sensations, catastrophising, ignoring sensations, praying or hoping, coping self-statements and increased behavioural activities). There were eight outcome variables (anxiety, depression, overall quality of life, overall health satisfaction, and physical, psychological, social and environmental quality of life).

### 2.2 Participants

The total sample size ( $n = 201$ ) was determined using a medium effect size (0.15) and a desired statistical power of 80%, in line with previous research examining the CSM in chronic pain (Nicklas et al., 2009). According to Soper (2010), with 8 possible predictors (as given by the IPQ-R) in a multiple regression model, the minimum sample size would need to be at least 141. There is a danger of a Type I error when conducting several analyses with the same data. Therefore, an alpha level of 0.01 was considered appropriate. This is in line with previous research exploring the CSM in chronic illness (Carlisle et al., 2005; Edgar & Skinner, 2003; Steed et al., 1999)

#### *2.2.1 Participant Characteristics*

Participants ( $n = 201$ ; 136 females, 65 males) were recruited from a list of referrals to an NHS Pain Clinic in the South of England. Details of all demographic and pain related characteristics of the final sample are contained in Table 1.

**Table 1: Demographic and Pain Characteristics of the Final Sample (n = 201)**

<b>Variable</b>	<b>Category</b>	<b>N</b>	<b>Frequency (%)</b>	<b>Mean (SD)</b>
<b>Age (years)</b>	-	-	-	54.34 (16.10)
<b>Gender</b>	Male	65	32.3	-
	Female	136	67.7	-
<b>Ethnicity</b>	White	184	91.5	-
	Asian	3	1.5	-
	Hispanic	1	0.5	-
	Other	5	2.5	-
	Prefer not to say	1	0.5	-
	No response	7	3.5	-
<b>Marital Status</b>	Single	25	12.4	-
	Married	105	52.2	-
	Living as Married	19	9.5	-
	Separated	4	2.0	-
	Divorced	29	14.4	-
	Widowed	19	9.5	-
<b>Education Level</b>	None	3	1.5	-
	Primary	5	2.5	-
	Secondary	102	50.7	-
	College/University	90	44.8	-
	Not given	1	0.5	-
<b>Employment Status</b>	Employed (FT)	44	21.9	-
	Employed (PT)	32	15.9	-
	Retired	76	37.8	-
	Unemployed	47	23.4	-
	Unknown	2	1.0	-
<b>Pain Duration (years)</b>	-	-	-	8.75 (9.67)
<b>Diagnosis Given</b>	Yes	87	43.3	-
	No	78	38.8	-
	Not given	36	17.9	-
<b>Diagnosis (n=87)</b>	Arthritis	22	25.3	-
	General disc degeneration	20	23.0	-
	Sciatica	5	5.8	-
	Fibromyalgia	4	4.6	-

**Table 1: Demographic and Pain Characteristics of the Final Sample (n = 201)**

Variable	Category	N	Frequency (%)	Mean (SD)
<b>Diagnosis (n=87)</b>	Spondylosis	4	4.6	-
	Other	22	25.3	-
<b>Pain in more than one location</b>	Yes	162	80.6	-
	No	39	19.4	-
<b>Site of pain</b>	Back	64	31.8	-
	Neck	13	6.5	-
	Head	6	3.0	-
	Chest	6	3.0	-
	Shoulder and/or upper extremity	13	6.5	-
	Lower extremity	19	9.5	-
	Hips/buttocks	8	4.0	-
	Abdomen/pelvis	18	9.0	-
	Whole body	12	6.0	-
	3 or more separate sites	27	13.4	-
	Not given	15	7.5	-
<b>Pain severity</b>	-	-	-	6.28 (1.74)
<b>Pain interference</b>	-	-	-	6.57 (2.12)

The majority of participants were married (52.2%) and educated to secondary school or college/university level (50.7% and 44.8% respectively). Participants reported various statuses of employment (full time employment = 21.9%; part time employment = 15.9%; retired = 37.8% and unemployed = 23.4%). The majority of participants reported their ethnicity to be White (91.5%). The mean age of participants was 54.34 (SD = 16.10).

All participants had experienced pain for at least 6 months (mean = 8.75 years, SD = 9.67). Of the participants who cited a diagnosis for their pain, a wide variety of diagnoses were reported. Amongst the more common ones were arthritis (25.3%), general disc degeneration (23.0%), sciatica (5.8%), fibromyalgia (4.6%) and spondylosis (4.6%). 38.8% of participants had received no formal diagnosis. 80.6% of participants reported experiencing pain in more than one location. The site of pain varied, with individuals experiencing pain in their back (31.8%), neck (6.5%), head (3.0%), chest (3.0%), shoulder and/or upper extremity (6.5%), lower extremity (9.5%),

hips/buttocks (4.0%), abdomen/pelvis (9.0%), whole body (6.0%) and 3 or more separate sites (13.4%). The mean pain severity score was 6.28 (SD = 1.74) and mean pain interference score was 6.57 (SD = 2.12).

### 2.3 Measures

Participants were asked to complete a demographic form (Appendix A) which was designed to assess basic demographic information (e.g. age, gender, ethnicity) and characteristics of their chronic pain, such as pain duration and location. The remaining five questionnaires assessed the study related variables.

#### *2.3.1 Pain Interference and Severity*

The severity of pain and its interference in daily life was assessed using the Brief Pain Inventory Short Form (BPI; Cleeland, 1989). The BPI is a seventeen-item self-rating scale developed to assess pain severity, location, degree of relief from medication and pain interference in daily life. Responses to the severity and interference items are summed and divided to provide an overall rating between 0 and 10 with higher scores indicating greater pain interference and severity. The BPI is widely used and studies have shown support for its two factor structure. The literature also reports good psychometric properties, with Cronbach's alpha for the severity and interference scales ranging from 0.82 to 0.95 (Keller et al., 2004; Tan, Jensen, Thornby, & Shanti, 2004).

#### *2.3.2 Illness Representations*

Illness Representations were assessed using the Illness Perceptions Questionnaire Revised (IPQ-R; Moss-Morris et al., 2002). The IPQ-R is a self-report questionnaire designed to rate CSM illness representations. The dimensions comprise; 'identity' (14 items), 'timeline' (10 items), 'consequences' (6 items), 'control-cure' (11 items), 'causes' (18 items), 'emotional representation' (6 items) and 'illness coherence' (5 items). The questionnaire comprises 3 parts. The first part measures the identity dimension with a list of 14 commonly occurring symptoms (e.g. weight loss, stiff joints, dizziness). Using a yes/no response, respondents indicate whether they experience particular symptoms and whether they believe the symptom to be specifically related to their chronic pain. The second part consists of 38 items and participants respond using a 5-point likert scale (from 'strongly agree' to 'strongly disagree'). The third part of the questionnaire measures causal attributions. It uses the same five point likert scale and consists of 18

items. The IPQ-R shows good reliability and internal validity, with Cronbach's alpha values ranging from 0.75 to 0.91 (Jopson & Moss-Morris, 2003; Moss-Morris et al., 2002). This study uses the version adapted by the authors produced specifically for a chronic pain population (Moss-Morris et al., 2002)

### *2.3.3 Coping*

Coping was assessed using the Coping Strategies Questionnaire (CSQ; Rosenstiel & Keefe, 1983). The CSQ is a 42-item self-report measure of strategies for coping with pain. The items describe different coping responses and these give rise to six cognitive coping strategies (diverting attention, reinterpreting pain sensations, catastrophising, ignoring sensations, praying or hoping, coping self-statements) and one behavioural coping strategy (increased behavioural activities). Items are measured on a 7-point Likert scale. Responses range from 0 ('Never do') to 6 ('Always do that'). Responses are summed to yield a total score for each coping strategy subscale. The CSQ has demonstrated satisfactory internal consistency and concurrent validity, with Cronbach alpha values ranging from 0.70 to 0.85 for all subscales (Rosenstiel & Keefe, 1983).

### *2.3.4 Outcome Variables*

Outcome variables were assessed in the form of psychological distress (depression and anxiety) and quality of life.

Psychological distress was measured using the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). The HADS is a widely used measure of emotional distress in clinical populations (Angst, Verra, Lehmann, Aeschlimann, & Angst, 2008; Dunn, Croft, Main, & Von, 2008). It is a 14 item self-report questionnaire comprising seven anxiety and seven depression items from which separate scores for these two subscales are calculated. Respondents are asked to report how they have been feeling over the past 2 weeks on 4-point scales, with higher scores indicating greater severity. Outcome scores for each subscale are classified into 4 groups; normal (0-7), mild (8-10), moderate (11-14) and severe (15-21). In addition, research has suggested that the cut off for clinical caseness for both the anxiety and depression subscales is 10 (Snaith, 2003; Wisely, Hoyle, Tarrier, & Edwards, 2007) and that a score of 11 and above indicates clinical significance. The HADS has been subject to two reviews, which both provide consistent support for its validity and reliability (Bjelland, Dahl, Haug, &

Neckelmann, 2002; Herrmann, 1997). Good internal validity has been found with Cronbach's alpha's ranging from 0.68 to 0.93 (mean 0.83) for the anxiety scale and 0.67 to 0.90 (mean 0.82) for the depression scale (Bjelland et al., 2002).

Quality of life was assessed using the World Health Organisation Quality of Life – BREF (WHOQOL-BREF; Harper & Power, 1998). The WHOQOL-BREF is a 26 item scale abbreviated version of the WHQOL-100 quality of life assessment. Respondents are asked to score on a 5-point likert scale. It produces scores based on four domains related to quality of life; physical health, psychological health, social relationships, and environment. It also contains two generic questions relating to overall quality of life and overall health satisfaction. Scores produced by the WHOQOL-BREF correlate highly (0.89 or above) with WHQOL-100 scores. The WHOQOL-BREF has good to excellent psychometric properties of reliability and performs well in tests of validity, with Cronbach's alpha for all domains between 0.68 to 0.84 (Harper & Power, 1998; Skevington, Lotfy, & O'Connell, 2004).

#### 2.4 Procedure

The study received ethical and risk approval (Appendix B) from the University of Southampton School of Psychology Ethics board. Approval to conduct the study was gained from the Hospital Research and Development Office where participants were recruited from (Appendix C). As the study involved NHS patients, ethical approval was also gained from the Local NHS Research Ethics Committee (Appendix D). All new patient referrals were sent a pack containing the a letter of invitation (Appendix E), consent form (see Appendix F), participant information sheet (Appendix G), debrief sheet (Appendix H), demographic questionnaire (Appendix A) and the five questionnaires relating to the study. Those participants who chose to participate in the study after reading the information sheet were asked to sign the consent form and return it with the completed questionnaires using a FREEPOST envelope provided. Those questionnaire packs returned without a consent form were excluded from the study. The consent form contained information relating to the participants name so that should they choose to opt out of the study after providing consent, it would be possible to identify and remove their data. The information sheet indicated that participants could opt to receive a summary of the study. A total of 625 research packs were sent

out and 230 were returned, giving a response rate of 37%. One respondent did not provide a consent form and they were excluded from the study.

## 2.5 Data analysis strategy

Statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS) Version 17.0. Preliminary statistics indicated that the requirements for parametric statistics were met and so Pearsons Product Moment Correlation analysis was performed to examine the relationship between components of the IPQ-R, CSQ, HADS and WHO-QOL-BREF. These correlations were used as the basis for entry into regression analyses to allow formal tests of mediation to be undertaken. Parametric assumptions required for regression were also checked. As previously highlighted, significance levels were set at an alpha value of 0.01 to guard against Type I error. An overview of mediation analysis is provided below.

### *2.5.1 Overview of mediation analysis*

A number of methods for testing mediation have been proposed (MacKinnon, Lockwood, Hoffman, West & Sheets, 2002), however, the most widely used method in psychological literature is the 'causal steps strategy' advocated by Baron and Kenny (1986). According to this method, four criteria, tested using a series of regressions, must be met in order to establish mediation:-

Step 1. The predictor variable significantly affects the outcome variable in the absence of the mediator (path c, direct effect)

Step 2. The predictor variable must significantly affect the mediator (path a)

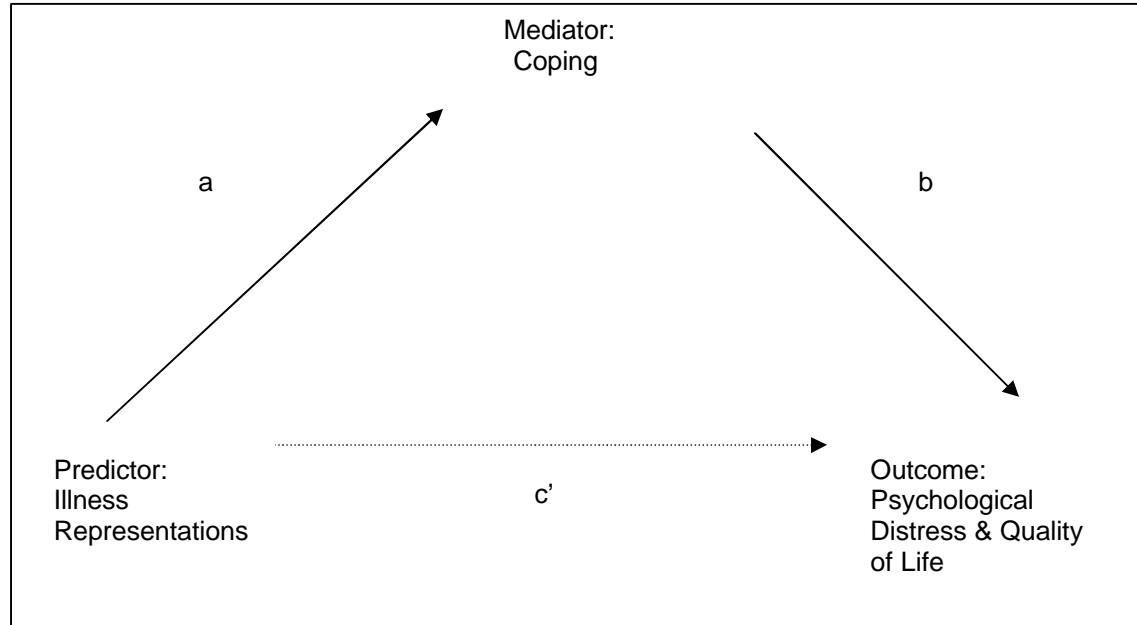
Step 3. The mediator must significantly affect the outcome variable (path b) whilst controlling for the predictor variable

Step 4. The effect of the predictor variable on the outcome variable (path c, direct effect) must be reduced upon addition of the mediator to the model (path c, indirect effect). To establish complete mediation, the predictor should no longer have an effect on the outcome. That is, path c should not be significantly different from zero.

The hypothesised mediation model is displayed in Figure 1.



**Figure 1: Mediated Model**



One key limitation of this approach is that the mediated (indirect) path is not itself tested. Consequently, researchers have argued that a method for testing the significance of the mediated effect should be used (Frazier, Tix, & Barron, 2004). One such method is the Sobel test (Sobel, 1982). The Sobel test determines the significance of the indirect effect of the mediator by testing the hypothesis of no difference between the total effect (path c) and the direct effect (path c') (Psychwiki, 2010). In studies comparing different methods for assessing mediation effects, the Sobel test was found to be superior (MacKinnon et al., 2002). Further, this study allowed the use of the Sobel test over other advocated methods of testing indirect effect (e.g. Bootstrapping) due to its large sample size (Preacher & Hayes, 2004). The Sobel test was conducted using an online calculator developed by Preacher and Leonardelli (2006). As recommended by Baron and Kenny (1986) and Preacher and Leonardelli (2006), the Aroian version of the Sobel test was used (Aroian, 1944).

### **3.0 RESULTS**

#### **3.1 Preliminary Statistics**

Initially the data were screened as recommended by Field (2005) and Tabachnik and Fidell (1996) and explored using histograms, frequencies and box plots. Exploratory data analysis revealed that the IPQ-R variable 'timeline acute/chronic' and CSQ variable 'reinterpreting pain sensations' were skewed (positive and negative skew respectively). These variables were transformed using log and square root transformations, however, this did not improve the normality sufficiently and both variables were dropped from further analyses.

A total of 28 participants returned questionnaires with some missing data points. As there were a reasonable number of participants for the purposes of the study, it was decided to exclude these cases. Deleting the participants with missing data avoided problems with test validity as suggested in the IPQ-R manual, which states that the scale is not valid if more than 2 items are missing from one subscale (Moss-Morris, 2005). Further, deleting the participants with missing data avoided the potential problems of introducing error by the management of missing data by substituting means, or weakening the statistical analyses by including cases with missing data.

#### **3.2 Descriptive Statistics**

Means and Cronbach's Alpha were calculated for all research variables and are displayed in Table 2.

**Table 2: Means, SDs and Cronbach's Alpha for BPI-SF, IPQ-R, CSQ, HADS and WHOQOL-BREF questionnaires (n = 201)**

Questionnaire	Mean	SD	Cronbach's Alpha
<b>BPI-SF</b>			
Severity	6.28	1.74	.854
Interference	6.57	2.12	.888
<b>IPQ-R</b>			
Identity	5.46	2.53	.743
Timeline Acute/Chronic	4.07	1.00	.877
Consequences	3.60	1.09	.780
Personal Control	2.92	1.10	.663
Treatment Control	3.08	0.95	.682
Illness Coherence	3.24	1.24	.915
Timeline Cyclical	3.02	1.22	.750
Emotional Representations	3.37	1.15	.869
Cause: Psychological Attribution	2.19	1.09	.874
<b>CSQ</b>			
Diverting Attention	1.73	1.77	.821
Reinterpreting Pain Sensations	0.91	1.47	.773
Catastrophising	2.75	1.97	.865
Coping Self Statements	1.95	1.79	.812
Ignoring Sensations	2.07	2.11	.814
Praying/Hoping	3.32	1.78	.739
Increasing Behavioural Activities	2.20	1.78	.689
<b>HADS</b>			
Depression	8.25	4.24	.818
Anxiety	9.58	4.74	.846

**Table 2: Means, SDs and Cronbach's Alpha for BPI-SF, IPQ-R, CSQ, HADS and WHOQOL-BREF questionnaires (n = 201)**

WHOQOL-BREF	Mean	SD	Cronbach's Alpha
Overall QOL	3.09	0.88	-
Overall Health Satisfaction	2.29	0.96	-
Physical QOL	2.51	1.09	.849
Psychological QOL	3.10	1.08	.849
Social Relationships QOL	3.21	1.15	.623
Environmental QOL	3.37	1.10	.828

All but four subscales (IPQ-R Personal Control and Treatment Control, CSQ Increasing Behavioural Activities and WHOQOL-BREF Social Relationships QOL) reached the level of 0.7, which is generally accepted to show good internal reliability (Kline, 1999). The four items with alpha values of 0.6 were subject to further analyses. Field (2005) states that if the corrected item total correlation figure is above 3 on all items of the subscale, this still constitutes reliability. This was found to be the case for the IPQ-R Treatment Control and WHOQOL-BREF Social Relationships subscales and these were considered reliable. The remaining two subscales IPQ-R Personal Control and CSQ Increasing Behavioural Activities were retained to provide a more comprehensive view of the data, but due to their lower alpha value, should be viewed with caution.

### *3.2.1 Illness Representations*

Scores for illness identity ranged from 0 to 14 with a mean of 5.46 (SD = 2.53). The three symptoms most frequently endorsed were pain (100%), sleep difficulties (79.6%) and loss of strength (73.1%). Possible scores for the remaining items ranged from 1 to 5 with higher scores indicating a stronger belief in that illness representation. Mean scores for the two timescales; timeline acute/chronic and timeline cyclical were 4.07 (SD = 1.00) and 3.02 (SD = 1.22) respectively, indicating that participants viewed their pain as predominantly chronic as opposed to fluctuating. In terms of consequences, a mean score of 3.60 (SD = 1.09) shows that participants tended to view their condition as having serious consequences for their life. The mean score for personal control was 2.92 (SD = 1.10) and for treatment control was 3.08 (SD = 0.95), implying that overall,

participants held the belief that they did not have a lot of control over their pain but that it might be more amenable to control via treatment. A mean score for illness coherence of 3.24 (SD = 1.24) suggested that participants did not have a clear understanding of their chronic pain. Finally, the emotional representations subscale indicates that participants reported having an emotional response to their pain (mean score; 3.37; SD = 1.15).

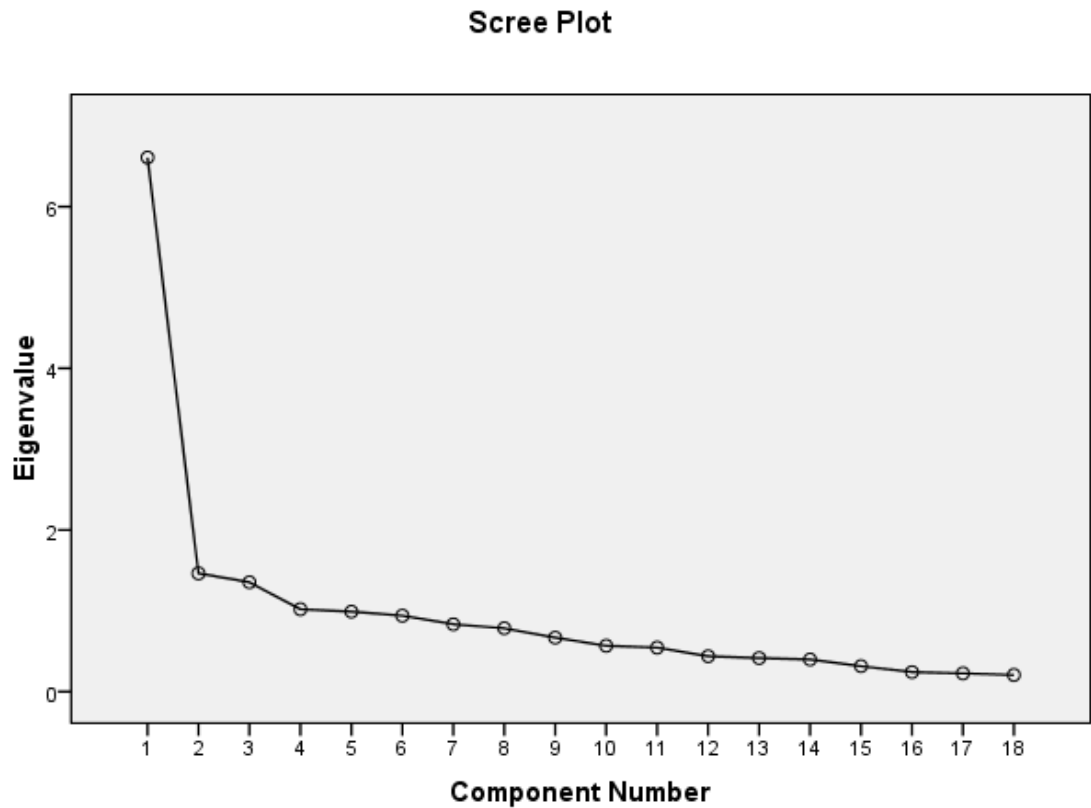
In terms of causes, the most commonly reported attributions (participants stated they 'agree' or 'strongly agree' with the statement) were accident/injury (49.76%), chance/bad luck (41.29%) and ageing (40.30%). The percentage response for all 18 causal attributions is displayed in Table 3.

**Table 3: Perceived Causes of Chronic Pain from IPQ-R (n=201)**

Possible Causes	Agree or Strongly Agree	
	<i>n</i>	Frequency (%)
Accident/injury	100	49.8
Chance/bad luck	83	41.3
Ageing	81	40.3
Overwork	44	21.9
Poor medical care in past	40	19.9
Stress/worry	38	18.9
Hereditary	38	18.9
My emotional state	29	14.4
My own behaviour	28	13.9
Altered immunity	28	13.9
Family problems/worries	27	13.4
Pollution in the environment	18	8.5
My mental attitude	16	8.0
Diet/eating habits	15	7.5
Personality	15	7.5
Germ/virus	14	7.0
Smoking	13	6.5
Alcohol	9	4.5

In accordance with the IPQ-R instructions (Moss-Morris et al., 2002), the 18 causal items were examined using Principle Components Analysis (PCA) with Varimax rotation. This produced one factor with an eigenvalue greater than 1 (see Figure 2) comprising the items 'stress or worry', 'my own mental attitude', 'family problems or worries', 'overwork' and 'my emotional state'. This factor was labelled 'psychological attribution' as recommended by Moss-Morris et al. (2002). The five items comprising this component were subjected to reliability analysis, yielding an alpha value of 0.87 (see Table 2). As recommended by Rutter and Rutter (2002), the psychological cause components were summed and divided by the number of items so that they could be compared with other items on the IPQ-R.

**Figure 2: Scree Plot for the IPQ-R Causes subscale**



### *3.2.2 Relationships between Illness Representations and Coping*

Relationships between illness representations and coping were examined using Pearsons Product Moment Correlation. Although further analyses for mediation were conducted based on relationships set at  $p < 0.01$ , correlations at the  $p < 0.05$  level are included to provide a more comprehensive view of the results (see Tables 4 and 5 contained in Appendix I).

The IPQ-R subscales identity (participants who endorsed a greater number of symptoms) and timeline acute/chronic were positively associated with catastrophising. The use of catastrophising as a coping strategy was also more likely to be employed by participants who perceived their pain to have a cyclical timeline and those who attribute their pain to psychological causes. Those participants who perceived their pain as having serious consequences were more likely to employ the coping strategies; diverting attention, catastrophising and increasing behavioural activities, but less likely to cope by ignoring their pain. The IPQ-R subscale personal control was positively related to the coping strategies; diverting attention, ignoring pain sensations, and coping self statements and negatively correlated with catastrophising. Those participants who held the belief that their pain could be effectively controlled with treatment were more likely to cope using strategies; ignoring, praying/hoping and coping self statements but less likely to catastrophise. The IPQ-R subscale emotional representations was positively associated with coping strategies diverting attention, catastrophising and increasing behavioural activities and negatively associated with ignoring pain sensations. Finally, those participants who believed they did not have a coherent understanding of their pain (IPQ-R subscale illness coherence) were less likely to cope by praying or hoping.

### *3.2.3 Relationship between Illness Representations and Outcomes*

As can be seen in Table 4, correlational analyses revealed numerous significant relationships between the IPQ-R and outcome measures. The IPQ-R subscales identity, timeline acute/chronic, consequences and emotional representations were positively correlated with anxiety and depression and negatively associated with all aspects of quality of life (QOL; overall QOL, health satisfaction and physical, psychological, social and environmental QOL). In terms of outcome, participants who held stronger beliefs in the efficacy of treatment to control their pain (IPQ-R subscale treatment control) reported greater levels of QOL in all areas (overall QOL, health satisfaction and physical, psychological, social and environmental QOL) and lower levels of anxiety and depression. Participants who perceived themselves as having greater personal control over their pain reported lower levels of depression and higher levels of physical and overall QOL. Attributing pain to psychological causes was positively associated with depression, anxiety, health satisfaction and psychological and environmental quality of life. There were no significant associations with levels of



anxiety and depression and aspects of QOL and the IPQ-R subscale illness coherence. Perceiving pain to have a cyclical process (IPQ-R subscale timeline acute/chronic) was negatively associated with social and environmental QOL.

### 3.3 Mediation Analysis

#### *3.3.1 Relationships between Illness representations, Coping and Outcomes*

Examination of the Pearson's correlation coefficients revealed 40 relationships where all three variables (IPQ-R, CSQ and HADS and/or WHOQOL-BREF) were significantly correlated (see Tables 4 and 5), supporting further analysis for mediation. These relationships were each subjected to the steps outlined above to test for mediation (see Appendix J for outcome of each step).

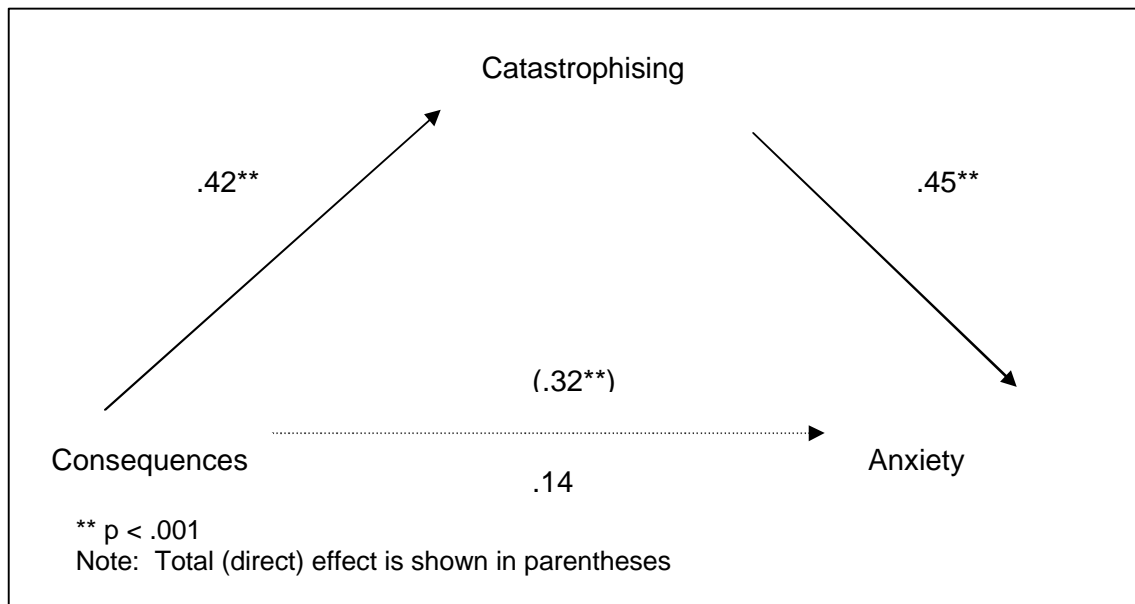
A series of regressions were performed in order to assess whether the conditions of mediation outlined above were met. Simple regressions were used to examine steps 1 and 2 using the forward procedure, as recommended by Baron and Kenny (1986). Multiple regression was used to examine steps 3 and 4. For all regressions, demographic and illness variables were controlled for by entering gender and age in the first block and pain duration and pain severity in the second block. These steps and the application of the Sobel test revealed that 15 models were found to fit the data (see Table 6 contained in Appendix K) and did not violate the assumptions of regression analyses (Field, 2005), suggesting that the findings could be generalised to the wider chronic pain population. In terms of illness representations, identity, consequences and emotional representations were the only predictor variables that fit the model, whilst the outcome variables anxiety, depression, overall QOL, psychological and physical QOL featured consistently across the models. Catastrophising was the only coping strategy found to mediate relationships between illness representations and outcome in the form of psychological distress and quality of life.

Due to the number of models found to fit the data, it is not feasible to report individually on each model. However, in order to illustrate the process of analysis undertaken for mediation and to provide a visual representation of the results, one of the 15 models is described below. The consequences (predictor) – catastrophising (mediator) – anxiety (outcome) model has been selected as the coefficient of the relationship between the predictor and the outcome variables demonstrated a large (in comparison to the other

models) reduction when the mediator was added, indicating a particularly strong mediating effect in comparison with the other 14 models.

A simple regression analysis showed that the illness representation consequences did significantly predict anxiety ( $\beta = .32, p < .001$ ) suggesting that Step 1 was met (path c was significant). Step 2 was also met because consequences significantly predicted catastrophising ( $\beta = .42, p < .001$ ; path a was significant). Step 3 was tested using a hierarchical multiple regression where anxiety was regressed on both consequences and catastrophising. The relationship between catastrophising and anxiety remained significant ( $\beta = .45, p < .001$ ), even whilst controlling for consequences, therefore the condition for step 3 was met (path b was significant). The third regression also provided an estimate of path c', the relation between consequences and anxiety whilst controlling for catastrophising. This coefficient was not significant ( $\beta = .14, p = .063$ ; path c' was not significant) and because the coefficient of the relationship between consequences and anxiety reduced from .32 to .14 when the mediator was added to the model, the condition for step 4 was met. This suggested that catastrophising fully mediated the relationship between the illness representation consequences and anxiety. The Aroian version of the Sobel test found that the indirect effect was also significant (Aroian = 4.36,  $p = .00001$ ). Standardised coefficients for the model are shown in Figure 3. Test statistics for the Aroian Sobel test for all mediated models are shown in Table 7.

**Figure 3: Mediated Model with Standardised Coefficients ( $\beta$ )**



**Table 7: Sobel Test Outcome (Aroian version) for Testing Significance of the Mediated Effect**

Predictor	Mediator	Outcome	Test statistic	SE	p value
Emotional Representations	Catastrophising	Anxiety	2.80*	0.04	0.005
Emotional Representations	Catastrophising	Depression	3.32**	0.04	0.0009
Emotional Representations	Catastrophising	Overall QOL	-2.65*	0.008	0.008
Emotional Representations	Catastrophising	Physical QOL	-3.14*	0.03	0.002
Emotional Representations	Catastrophising	Psychological QOL	-3.84**	0.03	0.00012
Emotional Representations	Catastrophising	Environmental QOL	-2.74*	0.03	0.006
Consequences	Catastrophising	Anxiety	4.36**	0.04	0.00001
Consequences	Catastrophising	Depression	3.04*	0.03	0.0023
Consequences	Catastrophising	Physical QOL	-2.76*	0.02	0.0057
Consequences	Catastrophising	Psychological QOL	-3.96**	0.03	0.00007

**Table 7: Sobel Test Outcome (Aroian version) for Testing Significance of the Mediated Effect**

Predictor	Mediator	Outcome	Test statistic	SE	p value
Consequences	Catastrophising	Environmental QOL	-2.81*	0.02	0.005
Identity	Catastrophising	Anxiety	3.04*	0.06	0.0024
Identity	Catastrophising	Depression	2.69*	0.04	0.0071
Identity	Catastrophising	Physical QOL	-2.67*	0.03	0.008
Identity	Catastrophising	Psychological QOL	-2.97*	0.04	0.003

\* =  $p < 0.05$  \*\* =  $p < 0.01$

## **4.0 DISCUSSION**

### **4.1 Summary of Main Findings**

This study had three main aims. Firstly, to explore the profile of illness representations and their relationship to psychosocial outcome in adults with chronic pain. Secondly, to examine the ways in which illness representations and psychosocial outcome were related to coping. Finally, this study aimed to investigate the role of coping as a mediator between illness representations and psychosocial outcome in a chronic pain population.

The pattern of illness representations reported was generally as expected. That is, patients viewed their pain as being chronic, having serious consequences, perceived they had weak personal control and reported strong emotional representations of their condition. Participants reported a slightly stronger belief in the efficacy of treatment to control their pain compared to their own personal control. In addition, participants did not strongly report their pain to be cyclical. There was a significant association between illness representations and a number of outcomes. These relationships were in the predicted direction. That is, having a strong illness identity and beliefs that pain was chronic, had serious consequences, one had weak personal control and a strong emotional representation of their pain were associated with poor outcomes. In terms of causal attributions, believing one's pain to be caused by psychological factors was related to poorer outcomes, including reduced Quality of Life (QOL) and increased anxiety and depression. The representation illness coherence was not related to any outcome and beliefs about pain having a cyclical timeline was only associated with the outcomes social QOL and environmental QOL.

Particular illness representations were also associated with a number of coping strategies. The strongest and most consistent of these were with the coping strategy catastrophising, where a relationship was found with all representations except illness coherence. All these correlations were positive except for personal and treatment control. Personal control, emotional representations and consequences were related to a number of different ways of coping. However, identity, timeline acute/chronic, timeline cyclical and psychological causes were not related to any coping strategies. Coping

strategies were associated with a number of psychosocial outcomes. There was support for the prediction that catastrophising would be associated with poor outcomes and that strategies considered “active” would be associated with better adjustment. However, the prediction that increased behavioural activity would be associated with positive outcomes was not supported.

The study found partial support for the third hypothesis. That is, one coping strategy, catastrophising, was found to mediate the relationship between three of the eight different illness representations and various measures of psychosocial outcome. The findings suggest that the representations consequences, identity and emotional representation are associated with anxiety, depression and aspects of quality of life, but only indirectly through their relationship with the coping strategy catastrophising.

#### 4.2 Discussion of Main Findings

The finding that people reported a strong emotional response to their pain, viewed they had little control over it, that it was chronic and had serious consequences for their lives, is supported by previous studies examining the common sense model (CSM) in chronic pain (Hill et al., 2007; Moss-Morris et al., 2002; Nicklas et al., 2009; Stuifbergen et al., 2006). Furthermore, the finding that particular illness representations are strongly associated with poorer outcomes such as increased depression and anxiety and reduced QOL is consistent with research in other chronic conditions (Fortune et al., 2002; Groarke et al., 2005; Hagger & Orbell, 2003; Kaptein et al., 2006; Scharloo et al., 2007; Vaughan et al., 2003). The current study demonstrated that individuals who attributed the cause of their pain to psychological reasons had poor outcomes. This provides additional support for previous similar findings in the chronic pain literature (Page et al., 2004; van Wilgen et al., 2008) and exemplifies conclusions from the wider literature on chronic conditions, that attributions for the cause of an illness can affect social and psychological functioning (Jopson & Moss-Morris, 2003; Rutter & Rutter, 2002; Watkins et al., 2000). It is interesting to speculate why this might be. Some researchers have suggested that people who believe their pain to be caused by factors such as ‘stress/worry’ or ‘my personality’ may have a tendency to report more psychological difficulties (Hill et al., 2007). Alternatively, there may be other processes at work. For example, in their study looking at illness representations in patients with multiple sclerosis (MS), Jopson and Moss-Morris (2003) reported that attributing non-

psychological attributions to the condition (i.e. physiological reasons) appeared to serve a protective function for self esteem. It has also been shown that causal attributions which are not associated with psychological factors (e.g. that illness is inherited) do not relate to measures of physical or psychological functioning (Kaptein et al., 2006). Together, these findings suggest that investigating the reasons for people attributing psychological causes to their pain and the association of this with poorer outcomes warrants further investigation in future research.

The chronic pain literature has consistently identified that an individual's beliefs about the degree of control they exert over their condition impacts on adjustment. That is, the greater perceived control, the more successfully people adapt to pain (Jensen & Karoly, 1991; Jordan, Lumley, & Leisen, 1998; Woby, Watson, Roach, & Urmston, 2004). This notion was supported to an extent in the current study. Weaker personal control was found to be both associated with and predictive of greater depression and reduced physical quality of life (QOL). However, this finding was not extended to a number of other outcome measures, such as anxiety, overall QOL or health satisfaction. Mixed support for the role of control in influencing psychosocial outcomes has been previously reported in chronic pain (Hill et al., 2007; Rankin & Holttum, 2003; van Wilgen et al., 2008) and related illnesses, such as rheumatoid arthritis (Scharloo et al., 1998). Speculations about why this occurred in the present study might be informed by looking at the association of the IPQ-R variable treatment control and outcomes. Unlike personal control, treatment control was related to and predictive of greater levels of anxiety and depression and a reduction in health satisfaction and all aspects of QOL after controlling for age, gender, pain duration and pain severity. Although the correlation between personal and treatment control indicated a degree of conceptual overlap across the two variables, this finding supports the idea that there is something specific about believing in the efficacy of treatment in controlling pain that has a significant impact on adjustment. The importance of expectations about the success of treatment in influencing outcomes has been demonstrated elsewhere in the pain literature (Linde et al., 2007). The differences in relation to outcome for these two control variables might point towards the usefulness of further investigation into the different ways that control is conceptualised in chronic pain (a point highlighted by other researcher's examining the CSM, e.g. Rankin & Holttum, 2003). For example, by breaking down appraisals of personal control into more detailed components, such as

control over symptoms or illness trajectory, it may further inform our understanding about the pathways between control and outcome in chronic pain (Affleck, Tennen, Pfeiffer, & Fifield, 1987). Indeed, recent research has begun to investigate the contribution of very specific types of control and functioning in chronic pain (see Tan, Jensen, Robinson-Whelen, Thornby, & Monga, 2002)

The results of the study illustrated that catastrophising was associated with all psychosocial outcomes in the expected direction. This is consistent with the wealth of existing literature purporting the magnitude of the relationship between catastrophising and psychosocial outcome in pain (Osborne et al., 2007; Severeijns, Vlaeyen, van den Hout, & Weber, 2001). The strategies 'coping self-statements' (CSS) and 'ignoring sensations' (IS) also demonstrated an association with outcomes. Participants reporting the use of both these strategies reported lower levels of depression and anxiety and better QOL in a number of areas. Researchers have argued that IS is classified as an 'active' strategy (Watkins, Shifren, Park, & Morrell, 1999). In addition, it could be argued that use of CSS reflects an attempt to accommodate to pain (statements include 'I tell myself I can't let the pain stand in the way of what I have to do'; 'No matter how bad it gets, I know I can handle it'). In this sense, these findings replicate not only previous studies reporting the usefulness of CSS and IS in pain (Haythornthwaite et al., 1998; Jensen & Karoly, 1991; Jordan et al., 1998; Riley, III, Robinson, & Geisser, 1999) but also more general conclusions in the literature that 'active' strategies are closely linked to better adjustment (Endler, Corace, Summerfeldt, Johnson, & Rothbart, 2003). Nevertheless, the latter inference was not supported in the current study by the coping strategy 'increasing behavioural activities'. That is, engaging in more behavioural activities was not associated with better adjustment on any variables. However, it was related to a greater tendency to report being anxious. It is feasible that this CSQ subscale was not tapping relevant behavioural activities in the current sample (items are quite specific to particular activities such as reading and watching TV). However, the reported inverse relationship between anxiety and behavioural activity does support assumptions implicit in the fear-avoidance model of pain, which stipulates that pain related anxiety is linked to specific cognitions about fear of movement due to injury (Vlaeyen, Kole-Snijders, Boeren, & van Eek, 1995), and hence lower activity levels. Subsequent studies have demonstrated that elevated levels of such fear induced anxiety are predictive of a decrease in daily activities (Boersma et



al., 2004; Buer & Linton, 2002; Swinkels-Meewisse, Roelofs, Verbeek, Oostendorp, & Vlaeyen, 2003).

This study reported a number of relationships between illness representations, coping strategies and outcome. It also demonstrated that the coping strategy catastrophising mediated the effect of certain illness representations on particular outcome variables. The fact that mediation was found for one but not all coping strategies is consistent with the majority of studies examining the CSM in chronic illness (Carlisle et al., 2005; Edgar & Skinner, 2003; Goldstein et al., 2005). An examination of the results indicates that rather than mediation being the dominant finding, in a number of instances, no direct relationships were found between representation and coping variables. In addition, there was strong evidence for several direct relationships between representations and outcome. The latter finding has been reported previously and to some extent supports arguments by Heijmans (1999; 1998) that a direct illness representation to outcome model is a superior fit to the data than a mediating one. There are various interpretations as to why further mediating relationships in this study were not found. For example, it is possible that one of the central tenets of the CSM is incorrect. That is, perhaps coping strategies do not serve to mediate the effect of a person's beliefs about illness on their subsequent adjustment. Indeed, some studies exploring the CSM have reported no mediation (Kaptein et al., 2006). However, this idea must be considered in the context of the findings of both this study and previous similar research that has found some support for the CSM. An alternative explanation is that such relationships were not found because the instrument used to measure coping strategies did not sufficiently capture people's repertoire of coping efforts.

The 'checklist' format of many coping measures has been cited as a limitation when capturing responses to chronic illness (Hagger & Orbell, 2003). Criticisms point toward a tendency to rely on the self-report of thoughts (or attempts to modify these) at the expense of attaining information about the various behavioural responses to pain that typically characterise people's everyday lives (McCracken & Eccleston, 2003). One suggestion to improve this issue might be to use a more objective measure of coping that captures problem-focussed behavioural responses (Hagger & Orbell, 2003). Examples of this include frequency of use of pain management techniques or adherence to a multidisciplinary treatment programme. Although adherence to

medication has been looked at (Nicklas et al., 2009), given the weight now attributed to a biopsychosocial model, the above behaviours might prove useful to investigate in future research. The difficulties associated with coping measures highlighted above have begun to be addressed. For example, studies have attempted to overcome issues with a lack of specificity by utilising more than one coping measure (e.g. Endler et al., 2003; Nicassio, Schoenfeld-Smith, Radojevic, & Schuman, 1995) and attempting to gain more information about behavioural coping responses (Tan et al., 2001). It is highlighted that the CSQ used in the current study was chosen because it is frequently used in pain research and has good psychometric properties. However, one recommendation for future replications of the current study is to consider broadening the number of measures used to identify coping strategies and/or to make use of questionnaires that tap into a wider range of coping styles, including more behavioural responses, such as the Chronic Pain Coping Inventory, (CPCI; Jensen et al., 1995) or the Pain Solutions Questionnaire (PaSol; De Vlieger, Bussche, Eccleston, & Crombez, 2006).

Future research may also benefit from investigating the mediating role of responses akin to coping. The concept of acceptance has been increasingly acknowledged as significant in chronic pain research. It refers to a way of responding to pain without trying to control or avoid it and to engage in valued activity despite pain (McCracken & Eccleston, 2005). Debates about the conceptual distinction or absence of it between coping and acceptance pervade the acceptance literature (McCracken & Eccleston, 2003; McCracken & Eccleston, 2006). Nevertheless, it has proved a key concept in informing understanding about responses to pain and the subsequent evidence base for efficacious treatments (McCracken, Vowles, & Eccleston, 2005; Vowles & Sorrell, 2004). Further, research in this area demonstrating a relationship between illness representations and acceptance (Rankin & Holtum, 2003) together with superiority of acceptance measures over coping measures in predicting particular outcomes (Esteve, Ramirez-Maestre, & Lopez-Marinez, 2007; McCracken & Eccleston, 2006), indicates that exploring the role of acceptance as a mediator within the CSM framework may comprise a useful future addition to the pain literature.

Despite the lack of evidence for mediation amongst the majority of the coping strategies in the current study, quite substantial support was reported for the mediating role of catastrophising. Such a finding constitutes an important and largely novel contribution

to the literature. It may also be interpreted as providing support for Leventhal's model. Nevertheless, it is important not to ignore the current debate in the literature with regard to whether catastrophising constitutes a legitimate coping strategy, or whether it better reflects either a distress response or specific type of appraisal. Some researchers have asserted that catastrophising is too closely related to variables such as pain severity (Wolff et al., 2008). However, this was controlled for in the current study. In addition, the argument regarding a possible conceptual overlap between catastrophising and concepts such as depression have been asserted (e.g. (Sullivan & D'Eon, 1990). However, researchers such as Geisser et al., (1994) do not support this view. Further, in a recent review of the catastrophising literature, it was reported that it comprises a legitimate coping strategy (Sullivan et al., 2001). Whatever conclusion is drawn from this ongoing debate, it does not detract from the fact that the current study supports the notion that catastrophising indirectly consistently influences the impact of certain illness representations on particular outcomes (namely, anxiety, depression and aspects of QOL). It also contributes to the ongoing debate about the nature of catastrophising and provides important information about the relationship between peoples representations of their illness in general, catastrophising and psychosocial adjustment to pain.

#### 4.3 Implications

As has been discussed, this study has theoretical implications, in terms of providing some support for the Common-Sense Model of Illness Representations (CSM). The findings also highlight useful areas of future research for the CSM in chronic pain. In addition, the study has important clinical implications with regard to interventions that may be beneficial in a chronic pain population. The fact that a number of beliefs were found to be directly predictive of poor outcomes and that catastrophising is an important mediating variable between illness representations and outcome highlights the importance of a person's cognitions in adapting to pain. Subsequently, it provides further support for treatment programmes designed to modify maladaptive beliefs, such as Cognitive Behavioural Therapy (CBT). A close look at the results illustrates that in terms of outcome, the illness representation 'consequences' was most strongly and consistently associated with worse outcomes. Further, the role of catastrophising as a mediator was most significant for the consequences representation. This is perhaps intuitive as catastrophic thoughts typically relate to an exaggerated tendency to attribute negative outcomes (or serious consequences) to an event. These findings suggest that

not only is it important to evaluate people's beliefs relating to the consequences their pain has for their life, but that this must accompany an understanding of whether they endorse catastrophic thinking if we are to fully understand pathways to poorer outcomes such as anxiety, depression and reduced physical QOL. Further, CBT approaches in chronic pain have more recently been modified to include a greater element of acceptance (McCracken, 2004). Given that acceptance advocates striving towards a meaningful life despite pain (Thorn & Dixon, 2007), a concept that contradicts the perception that pain has devastating consequences for one's life, this study provides some support for this modified version of CBT. In addition to support for certain psychotherapeutic approaches, the study generates questions about the potential utility of questionnaires related to illness representations and catastrophising as part of a multidisciplinary assessment. By identifying these types of cognition at an early stage, it may provide the opportunity to consider potentially useful interventions earlier. More generally, this study provides further substantiation for the argument that the chronic pain experience is most usefully understood using a biopsychosocial model.

#### 4.4 Strengths and Weaknesses

This study was the first to explore the role of different coping strategies in the CSM in a chronic pain population, making an important contribution to the literature. Throughout this discussion, associations and predictions between variables have been highlighted. However, because the study relies purely on correlational data and a cross-sectional design, firm inferences regarding directionality or temporal order of the relationships cannot be made. For example, it was reported that illness representations influence coping which then influence outcome. However, it may also be that outcomes feed into beliefs about pain. For example, a person might be depressed for a number of reasons (e.g. social isolation) and the negative thinking styles this entails may influence the illness representations a person holds about their pain. The relationships between illness representations, coping and psychosocial outcomes are no doubt complex. Further, according to Leventhal and colleagues, the CSM is a dynamic, recursive model where information related to illness representations and coping is 'updated' and fed back into the person's idiosyncratic self regulation model. In order to address the complexity of such inter-relationships, a prospective longitudinal study would be required. This would aid in teasing apart the direction of such relationships.

It is important to consider factors associated with the study's sample, due to potential limitations with generalising the findings more widely. The sample size was quite large and is considered a strong point. Indeed, the majority of previous studies examining the CSM in both chronic illness and pain had less than 200 participants. The fact that the sample comprised individuals from a general chronic pain population enabled the inclusion of a wide range of pain conditions. However, it is feasible that profiles of beliefs and coping strategies differ across different pain groups and these differences would not have been highlighted in the current study. The recruitment strategy was considered advantageous in that it enabled individuals to participate who were referred to but may not necessarily have accessed a pain service. Nevertheless, it is possible that certain populations (e.g. ethnic minorities) were underrepresented, given that this group constituted only 4.5% of the sample. Although it is feasible that this was simply representative of the chronic pain population locally, this supports research purporting a general under representation of ethnic minorities in pain treatment services (Gatchel, Polatin, & Kinney, 1995; Tait & Chibnall, 2001). This is an important point, given recent research that highlights possible differences in the experience of and interpretation of pain across different racial and ethnic groups (Green et al., 2003). The assumption that participants were as representative of the service as possible was strengthened by the strategy to recruit over a fairly long time period (approximately 8 months), helping to ensure those recruited did not represent just a 'snapshot' of referrals to the service. Comparisons of participant characteristics with a large recent epidemiological pain study (Breivik et al., 2006) indicated approximate matches in terms of pain duration, employment status and age. However, the current study appeared to be overrepresented by women (67.7% females compared to approximately 56% in the Breivik et al. study). This suggests that although the findings can be compared to the general chronic pain population, caution should be taken when applying the results to groups that might be underrepresented (i.e. ethnic minorities and men). The study did not apply stringent exclusion criteria, helping to ensure the volume of responses was not limited and making it more ecologically valid in terms of the profile patients typically presenting in clinical practice. Nevertheless, as with many studies investigating the chronic pain population, interpretation of results are complicated by issues of co-morbidity. Although chronic pain can occur independently, it is often the consequence of an underlying health condition (e.g. arthritis; Breivik et al., 2006; Elliott, Smith, Penny, Smith, & Chambers, 1999). It is feasible that these conditions could influence illness

representations, coping and outcome. Attempts were made to minimise this by asking participants to respond to questionnaires specifically with pain in mind. Further efforts to minimise confounding variables were undertaken by controlling for demographic and pain variables in the analyses.

The study utilised standardised self-report questionnaires as it allowed a large volume of data to be collected anonymously, and enabled some specific (illness representations) but also broad constructs (coping, psychological distress and quality of life) to be summarised efficiently. Self-report measures are inexpensive and quick to administer and allow comparisons to be made with outcomes of previous research. The current study enabled participants to complete measures in their own time, therefore helping eliminate bias due to rushed responses. Nonetheless, a number of limitations are noted. Due to their design, questionnaires compel participants to respond in pre-defined ways, which may bias findings and/or lead to the omission of important information. Further, research has highlighted a potential limitation of the HADS in that the somatic nature of some of the questions may affect responses provided in a medical population (e.g. Moorey et al., 1991). Nevertheless, all questionnaires used in the study had been employed extensively in previous research and demonstrated good psychometric properties. Therefore, it can be assumed they provided a fairly accurate assessment of the variables in question.

### Conclusion

Despite extensive application in a number of chronic conditions, the Common Sense Model (CSM) of Illness Representations has received little attention in chronic pain. This study reported on particular patterns of illness representations and coping strategies and the relationship of these with measures of psychosocial outcome. In addition, it was found that the coping strategy catastrophising mediated the effect of the illness representations identity, consequences and emotional representation on particular outcomes including depression, anxiety and aspects of quality of life. The latter finding provides some support for the CSM. Notwithstanding the limitations cited above, this study makes a new and important contribution to the literature. It adds to the existing literature regarding the CSM in chronic conditions and to the emerging evidence looking at the CSM in chronic pain. The study also provides support for the use of CBT and modified versions that incorporate the concept of acceptance, as

clinical interventions in the amelioration of distressing responses to chronic pain. Avenues for future research were identified, including further investigation into the mediating role of catastrophising on psychosocial adjustment.

## **Appendix A: Demographic Questionnaire**



## Demographic Questionnaire Sheet

### Illness Representations, coping and outcome in chronic pain

**Please write, circle or mark the answer you wish to give**

- |  |  |        |
|--|--|--------|
| 1. What is your gender?  | Male   | Female |
| 2. What is your date of birth?   | _____ (DD/MM/YYYY)   |        |
| 3. What is the highest level of education you have received?                               | None<br>Primary School<br>Secondary School<br>University/College   |        |
| 4. What is your employment status?   | Employed      (Part time)      (Full time)<br>Retired<br>Unemployed  |        |
| 5. What is your marital status?  | Single                      Separated<br>Married                      Divorced<br>Living as married              Widowed |        |
| 6. What is your ethnic origin?   | Black/African American      Asian<br>White/Caucasian              Hispanic<br>Prefer not to answer              Other    |        |
| 7. How long have you been experiencing chronic pain?                                       | _____ years      _____ months  |        |
| 8. Where is your main pain? (The pain for which you have been referred to the pain clinic) |  |        |
| 9. Do you have pain in more than one place?  | Yes  | No     |
| 10. If you have one, please state the diagnosis for your chronic pain                      | _____  |        |

11. Have you received any previous treatment for your chronic pain?

Medication

Chiropractor/Osteopath

Physiotherapy

Counselling/Psychological Therapy

Medical Procedure (e.g. Joint Injection)

Homeopathic Remedy

Other (please state)\_\_\_\_\_

\_\_\_\_\_

12. Please list any other medical problems you suffer from (e.g. diabetes, asthma, arthritis)

13. Do you currently suffer from any mental health problems?

Please state.....

Thank you.

## **Appendix B: Ethical and Risk Approval from University of Southampton**

**Your Ethics Form approval**

Psychology.Ethics.Forms@ps1.psy.soton.ac.uk  
[Psychology.Ethics.Forms@ps1.psy.soton.ac.uk]

**Sent:** 23 May 2008 09:46

**To:** stantiall a. (aac106)

This email is to confirm that your ethics form submission for "Illness Representations, coping and outcome in chronic pain" has been approved by the ethics committee

Project Title: Illness Representations, coping and outcome in chronic pain

Study ID : 460

Approved Date : 2008-05-23 09:46:31

[Click here to view Psychobook](#)

If you haven't already submitted the Research Governance form for indemnity insurance and research sponsorship along with your ethics application please be aware that you are now required to fill in this form which can be found online at the link below.

Research Governance Form:

[http://www.psychology.soton.ac.uk/psyweb/psychobook/admin/ethics/research\\_governance.doc](http://www.psychology.soton.ac.uk/psyweb/psychobook/admin/ethics/research_governance.doc)

This will need to be returned to the address provided on the form.

Please note that you cannot begin your research before you have had positive approval from the University of Southampton Research Governance Office (RGO).

You should receive this by email in a maximum of two working weeks. If you experience any delay beyond this period please contact Pippa Smith.

More information about Research Governance can be found at the link below. (You will be prompted to log into sussed.)

<http://www.resource1.soton.ac.uk/legalservices/rgo/regprojs/whatdocs.html>

## **Appendix C: Approval from Portsmouth Hospital Research Office**

Mrs A Stantall  
Trainee Clinical Psychologist  
University of Southampton  
Psychology Dept. Building 44  
Highfield  
Southampton  
SO17 1BJ

Portsmouth Hospitals NHS Trust  
Research Office  
1<sup>st</sup> Floor Gloucester House  
Queen Alexandra Hospital  
Cosham, PO6 3LY  
Tel: 023 9228 6236  
Fax: 023 9228 6037

29<sup>th</sup> October 2008

Dear Mrs Stantall

**Re: Illness Representations, Copying and Outcome in Chronic Pain**

**Main REC No: 08/H0505/149**

**Research Office No: PHT/2008/33ST**

I have received confirmation that the above study has been processed through the Portsmouth Research Office. The Office has checked your submission meets the requirements of governance approval and has received full ethical approval.

On behalf of Portsmouth Hospitals NHS Trust I have therefore signed off the study under the remit of 'SSA exempt' and the above named project may now commence, in accordance with the agreed protocol. However, please note the following conditions of this approval:

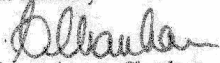
- (1) As an individual external to the immediate clinical team, you must not be given access to identifiable patient data without the prior consent of the patient. Therefore all packs should be labelled and posted to the patient's homes via the clinical team. Once consent has been obtained and the packs returned to you, you may use the data in accordance with your approved protocol.

As Chief Investigator for the study, you should ensure that you and your team are fully aware of your responsibilities under the National Research Governance Framework for Health & Social Care (Department of Health, April 2006) and other professional codes of good conduct. You can access the Framework from the [www.doh.gov.uk](http://www.doh.gov.uk) web site but should you find yourself unsure of its requirements please do not hesitate to contact the Research Office for support.

We note the University of Southampton has agreed to undertake sponsorship responsibilities. Please ensure we are copied in to all correspondence and reporting requirements of the National Research Ethics Service (NRES) to keep us informed of the status and outcome of your project.

I wish you well in your project

Yours sincerely



Professor Anoop Chauhan

Consultant Respiratory Physician and Director of R&D

C.c. Dr Anne Waters, Consultant Clinical Psychologist, Pain Clinic, PHT.

Dr Martina Prude, Head of Research Governance, UoS

## **Appendix D: Ethical Approval from NHS**



## National Research Ethics Service

### Berkshire Research Ethics Committee

Building L27  
University of Reading  
London Road  
Reading  
RG1 5AQ

21 October 2008

Telephone: 0118 918 0550 / 0551  
Facsimile: 0118 918 0559

Mrs Alethea Stantiall  
Trainee Clinical Psychologist  
University of Southampton  
Psychology Dept, Building 44  
Highfield  
Southampton  
SO17 1BJ

Dear Mrs Stantiall

Full title of study: Illness representations, coping and outcome in chronic pain  
REC reference number: 08/H0505/149

Thank you for your letter of 08 October 2008, responding to the Committee's request for further information on the above research and submitting revised documentation.

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

#### Confirmation of ethical opinion

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

#### Ethical review of research sites

The Committee has designated this study as exempt from site-specific assessment (SSA). The favourable opinion for the study applies to all sites involved in the research. There is no requirement for other Local Research Ethics Committees to be informed or SSA to be carried out at each site.

#### 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 at NHS sites ("R&D approval") should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements. Guidance on applying for NHS permission is available in the Integrated Research Application System or at <http://www.rdforum.nhs.uk>.

This Research Ethics Committee is an advisory committee to South Central 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*



### Approved documents

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

Document	Version	Date
Covering Letter		13 August 2008
Application	1	06 August 2008
Investigator CV		11 August 2008
CV: Dr Liossi		06 August 2008
Protocol	1	06 August 2008
Peer Review		
Response to review comments		
Letter from Supervisor: Proposal approved		20 February 2008
Letter of invitation to participant	1	06 August 2008
GP/Consultant information sheets	1	06 August 2008
Participant debriefing statement	2	06 August 2008
Questionnaire: HADS		
Questionnaire: Brief Pain Inventory (short form)		
Questionnaire: WHOQOL-BREF (UK)		
Questionnaire: Coping Strategies		
Questionnaire: Your views about Chronic Pain		
Questionnaire: Demographic sheet	2	06 August 2008
Indemnity & Insurance Letter		07 July 2008
Letter from Sponsor		23 June 2008
Response to Request for Further Information		08 October 2008
Participant Information Sheet	4	08 October 2008
Participant Consent Form: Clinic based	2	06 October 2008
Participant Consent Form: Postal	4	06 October 2008

### Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2004) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

### After ethical review

Now that you have completed the application process please visit the National Research Ethics Website > After Review

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.

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

This Research Ethics Committee is an advisory committee to South Central 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.

- Notifying substantial amendments
- 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.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email [referencegroup@nres.npsa.nhs.uk](mailto:referencegroup@nres.npsa.nhs.uk).

**08/H0505/149****Please quote this number on all correspondence**

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

Yours sincerely

  
Professor Nigel Wellman  
Chair

Email: [scsha.berksrec@nhs.net](mailto:scsha.berksrec@nhs.net)

Enclosures: "After ethical review – guidance for researchers"

Copy to: Dr Martina Prude, University of Southampton

N:\Letters\08 REC Numbers\08\_H0505.141 - 150\08\_H0505.149 - SL14 - 21.10.08.doc

This Research Ethics Committee is an advisory committee to South Central 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*

## **Appendix E: Participant Letter of Invitation**

**Re: A research project investigating chronic pain**

Dear Sir/Madam,

I am writing to ask you if you would give your consent to take part in a piece of research which is being undertaken by Alethea Stantiall, Trainee Clinical Psychologist, at the Pain Clinic in St Mary's Hospital. This will involve inviting you to complete five questionnaires and a short information sheet about yourself. In order to help you make this decision I have enclosed an information sheet, outlining the background and aims of the study. You have been identified from the list of patients referred to the pain clinic.

Although you are unlikely to benefit directly from taking part in the study, the information gained will help us to better understand the experiences of people with chronic pain.

If you have any concerns or require any further information, please do not hesitate to contact me at the Pain Clinic. A full description of the research is available upon request. We would also be happy to provide you with a summary report of the findings, when these become available.

If you agree to take part please complete the consent form, information sheet and questionnaires enclosed. A freepost envelope has been provided for you to return these should you choose to take part. I would be grateful if you could return the questionnaires by XX/XX/XXXX.

If you do decide to take part please remember that you are free to withdraw your consent at any time, and this will not affect your care in any way.

Thank you for your time.

Yours sincerely,

Dr Anne Waters  
Consultant Clinical Psychologist  
Pain Clinic, St Mary's Hospital

## **Appendix F: Participant Consent Form**

## Participant Consent Form

### Illness representations, coping and outcome in chronic pain

Researcher: Alethea Stantiall

By signing this form and returning the questionnaires, I give my consent for the information in the questionnaires to be used in the above named study.

Please initial box

I confirm that I have read and understand the information sheet dated 06/08/2008 (Version 3) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

☐

I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason, without my care being or legal rights being affected.

☐

I agree to the Pain Consultant at the Pain Clinic responsible for my care being informed of my participation in the study.

☐

I agree to take part in the above study

☐

---

**Name of patient**

---

**Date**

---

**Signature**

## **Appendix G: Participant Information Sheet**

## **Participant Information sheet**

### **Illness representations, coping and outcome in chronic pain**

My name is Alethea Stantiall and I am in my final year of training to be a clinical psychologist at the University of Southampton. As part of the academic requirement of the Doctoral Programme in Clinical Psychology, I am required to conduct a research project. I have chosen to study how people think about and cope with chronic pain.

I am inviting you to take part in the research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Do not hesitate to contact me if there is anything that is not clear, or if you would like more information. Please take your time to consider whether or not you wish to take part.

Thank you for your time and attention. Your help is much appreciated.

#### **What is the purpose of the study?**

The study is designed to provide information about what people with chronic pain think about their illness, how they cope with it and how it impacts on areas of their life. It is hoped the study will help professionals working with people with chronic pain to understand more about how people think of their chronic pain and what is likely to be helpful support to offer.

#### **Why have I been invited?**

For the study to be meaningful, we hope to recruit a number of people over 18 who currently experience chronic pain. You have been chosen because you are over the age of 18 have been invited to attend a clinic for people with chronic pain.

#### **Do I have to take part?**

No. It is entirely up to you whether or not to take part. Deciding not to take part will not affect any treatment. You are free to withdraw at any time, without giving a reason. This would not affect the standard of care you receive.

#### **What will happen if I decide to take part?**

If you decide to take part you will be asked to complete a brief sheet that describes you (e.g. your age and gender) and five further questionnaires (related to your experience of chronic pain, the ways you cope and how you feel in areas of your life). These should take around 25 minutes to complete in total. A FREEPOST envelope that does not need a stamp is provided for you to return the questionnaires by post. If you are provided the questionnaires in the clinic, these can be returned to the receptionist.

Completing and signing the consent form will be taken as evidence of your giving informed consent for your questionnaire answers to be used in the study.

#### **Will the information I provide be kept confidential?**

Yes, any information that you give will be kept strictly confidential. All data will be stored in an anonymous format. Paper questionnaires will be kept in a locked cabinet. Answers will be analyzed as group data and individual participants will not be



identifiable. Only researchers involved in the study will have access to the anonymised data.

**Who is organizing and funding the research?**

I am a trainee clinical psychologist at the University of Southampton Doctoral Programme in Clinical Psychology. This research is conducted as part of my training and is supervised by Dr Christina Liossi, Lecturer at the University of Southampton and Dr Anne Waters, Consultant Clinical Psychologist at the pain clinic in Portsmouth.

**What will happen to the results of the research study?**

A dissertation using the data will be written and submitted to the university. An academic paper may be submitted for publication in a professional journal. A brief summary of the findings can be made available on request. Please provide your contact details if you wish to receive a summary.

**Who has reviewed the study?**

The School of Psychology Research Ethics Committee at the University of Southampton has reviewed the study. In addition, all research in the NHS is looked at by an independent group of people called a Research Ethics Committee to protect your safety, rights, wellbeing and dignity. This study has been reviewed and approved by the Berkshire Research Ethics Committee.

**Further information and contact details**

If you would like more information about any aspect of the study, or if you have any questions or concerns at any time, please do not hesitate to contact me:

Alethea Stantiall (Trainee Clinical Psychologist)  
Department of Clinical Psychology  
34 Bassett Crescent East  
University of Southampton  
SO16 7PB  
Tel: 02380 595575.  
Email: [aac106@soton.ac.uk](mailto:aac106@soton.ac.uk)

If you would like to seek independent advice about participating in the study, you may contact the following people:

Patient Advice and Liaison Service (PALS)  
Freepost RLSR-TSJR-GREU  
Portsmouth Hospitals NHS Trust  
Patient Advice & Liaison Service  
Room 102 - Management Centre  
Portsmouth  
PO3 6AD  
Freephone 0800 917 6039  
[PALS@porthosp.nhs.uk](mailto:PALS@porthosp.nhs.uk)

Dr Martina Prude  
Research Governance Manager  
Legal Services, Building 37  
University of Southampton  
Highfield  
Southampton  
SO17 1BJ  
023 8059 8848  
Email: [rgoinfo@soton.ac.uk](mailto:rgoinfo@soton.ac.uk)

## **Appendix H: Participant Debrief Sheet**

## **Participant debriefing statement**

### **Illness representations, coping and outcome in chronic pain**

#### **Background**

Research suggests that there is a relationship between the way we think about an illness, the way we cope and the impact of an illness on our lives. This study was designed to look at this relationship in people with chronic pain. Your data will help us understand this further.

#### **Methodology**

Participants completed five questionnaires, which aimed to explore how people think about their chronic pain, the ways they cope and how chronic pain might be impacting on their lives. Descriptive information such as to age, gender, severity of pain, duration of pain and education was also collected to describe participants.

#### **Results**

The results will be written up as part of a Doctoral dissertation and may be submitted for publication in a professional journal. The results will not identify any individual. A brief summary of findings will be made available on request. Please provide your contact details if you wish to receive a summary.

#### **Your response to the questionnaires**

The questionnaires used in the study were not designed to be distressing. However, if you feel upset after completing the questionnaires, then please contact your usual sources of support to help you deal with this. Additional sources of support may include:

1. Your general practitioner (GP)
2. You can contact your Consultant at the pain clinic, or Dr Anne Waters, researcher for this project and Consultant Clinical Psychologist at the pain clinic.

If you have a concern about any aspect of this study, you should ask to speak to the researcher who will do their best to answer your questions (023 80 595 575). If you remain unhappy and wish to complain formally, you can do this through the NHS Complaints Procedure. Details can be obtained from the hospital.

Furthermore, If you have questions about your rights as a participant in this research, or you feel that you have been placed at risk, you can contact: The Chair of the Ethics Committee, Department of Psychology, University of Southampton, Highfield, Southampton, SO17 1BJ, Tel: 023 8059 3995.

## **Appendix I: Correlations of Illness Representations, Coping and Outcome**

**Table 4: Correlations (Pearsons *r*) of Illness Representations (IPQ-R), Coping (CSQ) and Outcomes (HADS; WHOQOL-BREF) (n=201)**

	Identity	Timeline Acute/ Chronic	Consequences	Personal Control	Treatment Control	Illness Coherence	Timeline Cyclical	Emotional Representations	Cause: Psychological Attribution
<b>IPQ-R</b>									
Identity	1	.260**	.521**	-.086	-.184**	.030	.135	.296**	.211**
Timeline	.260**	1	.504**	-.217**	-.414**	.141*	-.112	.310**	-.021
Acute/Chronic									
Consequences	.521**	.504**	1	-.155*	-.274**	.055	.044	.514**	.166*
Personal Control	-.086	-.217**	-.155*	1	.326**	.132	.308**	-.134	.192**
Treatment Control	-.184**	-.414**	-.274**	.326**	1	.045	.037	-.252**	-.043
Illness Coherence	.030	.141*	.055	.132	.045	1	-.101	-.099	-.027
Timeline Cyclical	.135	-.112	.044	.308**	.037	-.101	1	.098	.284**
Emotional	.296**	.310**	.514**	-.134	-.252**	-.099	.098	1	.194**
Representations									
Cause:	.211**	-.021	.166*	.192**	-.043	-.027	.284**	.194**	1
Psychological									
Attribution									
<b>CSQ</b>									
Diverting Attention	.083	.077	.176*	.177*	.070	-.006	.105	.193**	.115

\* =  $p < 0.05$  \*\* =  $p < 0.01$

**Table 4: Correlations (Pearsons *r*) of Illness Representations (IPQ-R), Coping (CSQ) and Outcomes (HADS; WHOQOL-BREF) (n=201)**

	Identity	Timeline Acute/ Chronic	Consequences	Personal Control	Treatment Control	Illness Coherence	Timeline Cyclical	Emotional Representations	Cause: Psychological Attribution
<b>CSQ</b>									
Reinterpreting Pain Sensations	.009	-.049	.096	.249**	.149*	.006	.153*	-.023	-.048
Catastrophising	.318**	.293**	.485**	-.244**	-.246**	-.108	.147*	.641**	.179*
Coping Self Statements	-.093	-.067	-.137	.236**	.166*	-.011	.112	-.120	-.073
Ignoring Sensations	-.118	-.130	-.221**	.241**	.169*	-.043	.124	-.204**	.026
Praying/Hoping	.097	-.114	.053	.047	.145*	-.173*	.100	.075	-.040
Increasing Beh. Activities	.091	.082	.154*	.109	.081	-.061	.032	.196**	.003
<b>HADS</b>									
Depression	.427**	.286**	.509**	-.217**	-.313**	-.029	.043	.386**	.215**
Anxiety	.382**	.223**	.412**	-.115	-.234**	-.061	.116	.658**	.307**
<b>WHOQOL-BREF</b>									
Overall QOL	-.359**	-.247**	-.406**	.162*	.215**	.036	.079	-.319**	-.106

\* =  $p < 0.05$  \*\* =  $p < 0.01$

**Table 4: Correlations (Pearsons *r*) of Illness Representations (IPQ-R), Coping (CSQ) and Outcomes (HADS; WHOQOL-BREF) (n=201)**

	Identity	Timeline Acute/ Chronic	Consequences	Personal Control	Treatment Control	Illness Coherence	Timeline Cyclical	Emotional Representations	Cause: Psychological Attribution
<b>WHOQOL-BREF</b>									
Overall Health Satisfaction	-.407**	-.302**	-.485**	.100	.258**	-.027	.028	-.410**	-.238**
Physical QOL	-.525**	-.296**	-.622**	.216**	.309**	-.105	-.025	-.416**	-.133
Psychological QOL	-.383**	-.213**	-.448**	.121	.245**	.051	-.126	-.515**	-.217**
Social Relationships QOL	-.345**	-.247**	-.316**	.118	.224**	.010	-.176*	-.192**	-.119
Environmental QOL	-.354**	-.159*	-.413**	.071	.258**	.106	-.214**	-.373**	-.275**

\* =  $p < 0.05$  \*\* =  $p < 0.01$

**Table 5: Correlations (Pearsons *r*) of Coping (CSQ) and Outcomes (HADS; WHOQOL-BREF) (n=201)**

	Diverting Attention	Reinterpreting Pain Sensations	Catastrophising	Coping Self Statements	Ignoring Sensations	Praying/ Hoping	Increasing Behavioural Activities
<b>HADS</b>							
Depression	-.026	.011	.463**	-.236**	-.171*	-.091	-.044
Anxiety	.180*	.080	.566**	-.092	-.132	.090	.158*
<b>WHOQOL-BREF</b>							
Overall QOL	-.023	.028	-.387**	.168*	.123	-.025	-.024
Overall Health Satisfaction	.050	.083	-.348**	.232**	.209**	.108	.024
Physical QOL	-.098	.009	-.484**	.238**	.227**	.000	-.014
Psychological QOL	-.018	.014	-.537**	.288**	.193**	.096	.011
Social Relationships QOL	.039	.017	-.294**	.131	.128	.035	.037
Environmental QOL	-.115	-.069	-.420**	.128	.031	.005	.000

\* =  $p < 0.05$  \*\* =  $p < 0.01$



## **Appendix J: Relationships Tested for Mediation**

**Table 8: Progress of Steps Required for Mediation for all 40 Relationships Meeting Criteria for Testing**

	Predictor	Mediator	Outcome	Mediation Occurred?*			
				Step 1	Step 2	Step 3	Step 4
1	Emotional Rep.	Ignoring Sens.	Overall Health Sat.	Yes	Yes	No	n/a
2	Emotional Rep.	Ignoring Sens.	Physical QOL	Yes	Yes	No	n/a
3	Emotional Rep.	Ignoring Sens.	Psychological QOL	Yes	Yes	No	n/a
4	<i>Emotional Rep.</i>	<i>Catastrophising</i>	<i>Anxiety</i>	Yes	Yes	Yes	Yes
5	<i>Emotional Rep.</i>	<i>Catastrophising</i>	<i>Depression</i>	Yes	Yes	Yes	Yes
6	<i>Emotional Rep.</i>	<i>Catastrophising</i>	<i>Overall QOL</i>	Yes	Yes	Yes	Yes
7	Emotional Rep.	Catastrophising	Overall Health Sat.	Yes	Yes	No	n/a
8	<i>Emotional Rep.</i>	<i>Catastrophising</i>	<i>Physical QOL</i>	Yes	Yes	Yes	Yes
9	<i>Emotional Rep.</i>	<i>Catastrophising</i>	<i>Psychological QOL</i>	Yes	Yes	Yes	Yes
10	Emotional Rep.	Catastrophising	Social QOL	Yes	No	n/a	n/a
11	<i>Emotional Rep.</i>	<i>Catastrophising</i>	<i>Env. QOL</i>	Yes	Yes	Yes	Yes
12	Personal Control	Coping Self St.	Depression	Yes	Yes	Yes	Yes+
13	Personal Control	Coping Self St.	Physical QOL	Yes	No	n/a	n/a
14	Personal Control	Catastrophising	Depression	Yes	Yes	Yes	Yes+
15	Personal Control	Catastrophising	Physical QOL	Yes	Yes	Yes	Yes+
16	Personal Control	Ignoring Sens.	Physical QOL	Yes	No	n/a	n/a
17	Treatment Control	Catastrophising	Anxiety	Yes	No	n/a	n/a
18	Treatment Control	Catastrophising	Depression	Yes	Yes	Yes	Yes+
19	Treatment Control	Catastrophising	Overall QOL	Yes	No	n/a	n/a
20	Treatment Control	Catastrophising	Overall Health Sat.	Yes	Yes	Yes	Yes+
21	Treatment Control	Catastrophising	Physical QOL	Yes	Yes	Yes	Yes+
22	Treatment Control	Catastrophising	Psychological QOL	Yes	No	n/a	n/a
23	Treatment Control	Catastrophising	Social QOL	Yes	Yes	Yes	Yes+
24	Treatment Control	Catastrophising	Env. QOL	Yes	No	n/a	n/a
25	<i>Consequences</i>	<i>Catastrophising</i>	<i>Anxiety</i>	Yes	Yes	Yes	Yes
26	<i>Consequences</i>	<i>Catastrophising</i>	<i>Depression</i>	Yes	Yes	Yes	Yes
27	Consequences	Catastrophising	Overall QOL	Yes	Yes	Yes	Yes+
28	Consequences	Catastrophising	Overall Health Sat.	Yes	Yes	Yes	Yes+
29	<i>Consequences</i>	<i>Catastrophising</i>	<i>Physical QOL</i>	Yes	Yes	Yes	Yes
30	<i>Consequences</i>	<i>Catastrophising</i>	<i>Psychological QOL</i>	Yes	Yes	Yes	Yes
31	Consequences	Catastrophising	Social QOL	Yes	Yes	Yes	Yes+
32	<i>Consequences</i>	<i>Catastrophising</i>	<i>Env. QOL</i>	Yes	Yes	Yes	Yes
33	<i>Identity</i>	<i>Catastrophising</i>	<i>Anxiety</i>	Yes	Yes	Yes	Yes
34	<i>Identity</i>	<i>Catastrophising</i>	<i>Depression</i>	Yes	Yes	Yes	Yes
35	Identity	Catastrophising	Overall QOL	Yes	Yes	Yes	Yes+
36	Identity	Catastrophising	Overall Health Sat.	Yes	Yes	Yes	Yes+
37	<i>Identity</i>	<i>Catastrophising</i>	<i>Physical QOL</i>	Yes	Yes	Yes	Yes
38	<i>Identity</i>	<i>Catastrophising</i>	<i>Psychological QOL</i>	Yes	Yes	Yes	Yes
39	Identity	Catastrophising	Social QOL	Yes	Yes	Yes	Yes+
40	Identity	Catastrophising	Env. QOL	Yes	Yes	Yes	Yes+

**\*Mediation Criteria**

Step 1 – Predictor significantly affects outcome

Step 2 – Predictor significantly affect mediator

Step 3 – Mediator significantly affects outcome whilst controlling for predictor

Step 4 – Effect of predictor on outcome is reduced when mediator is added

+Relationships met all 4 steps but did not produce a significant Sobel result.

Relationships in italics indicate those meeting full mediation.

## **Appendix J: Regression Analyses to Test Mediation**

**Table 6: Regression Analyses to Test Mediation (n = 201)**

Predictor	Mediator	Outcome	Regression 1 (Path c, direct)				Regression 2 (path a)				Regression 3 (paths b and c', indirect)			
			B	(SE)	$\beta$	p	B	SE	$\beta$	p	B	(SE)	$\beta$	p
Emotional Representations	Catastrophising	Anxiety	.537	.049	.61	.000	1.001	.096	.60	.000	.105	.036	.20	.004
											<i>.432</i>	<i>.060</i>	<i>.49</i>	<i>.000</i>
Emotional Representations	Catastrophising	Depression	.231	.053	.29	.000	1.001	.096	.60	.000	.137	.039	.29	.000
											<i>.094</i>	<i>.064</i>	<i>.12</i>	<i>.147</i>
Emotional Representations	Catastrophising	Overall QOL	-.034	.011	-.21	.002	1.001	.096	.60	.000	-.022	.008	-.22	.007
											<i>-.012</i>	<i>.013</i>	<i>-.01</i>	<i>.369</i>
Emotional Representations	Catastrophising	Phys. QOL	-.178	.036	-.31	.000	1.001	.096	.60	.000	-.086	.026	-.25	.001
											<i>-.091</i>	<i>.044</i>	<i>-.16</i>	<i>.038</i>
Emotional Representations	Catastrophising	Psych.QOL	-.253	.038	-.43	.000	1.001	.096	.60	.000	-.112	.027	-.31	.000
											<i>-.141</i>	<i>.045</i>	<i>-.24</i>	<i>.002</i>
Emotional Representations	Catastrophising	Env. QOL	-.137	.037	-.25	.000	1.001	.096	.60	.000	-.077	.027	-.23	.005
											<i>-.060</i>	<i>.045</i>	<i>-.11</i>	<i>.190</i>
Consequences	Catastrophising	Anxiety	.336	.077	.32	.000	.830	.143	.42	.000	.235	.035	.45	.000

Note: For Regression 3, path c' (indirect) is indicated underneath path b in italics

**Table 6: Regression Analyses to Test Mediation (n = 201)**

Predictor	Mediator	Outcome	Regression 1 (Path c, direct)				Regression 2 (path a)				Regression 3 (paths b and c', indirect)			
			B	(SE)	$\beta$	p	B	SE	$\beta$	p	B	(SE)	$\beta$	p
Consequences	Catastrophising	Depression	.401	.066	.43	.000	.830	.143	.42	.000	.141	.075	.14	.063
											.116	.032	.25	.000
Consequences	Catastrophising	Phys. QOL	-.346	.042	-.50	.000	.830	.143	.42	.000	.304	.069	.33	.000
											-.067	.021	-.19	.001
Consequences	Catastrophising	Psych. QOL	-.279	.050	-.40	.000	.830	.143	.42	.000	-.291	.045	-.42	.000
											-.132	.024	-.37	.000
Consequences	Catastrophising	Env. QOL	-.195	.047	-.30	.000	.830	.143	.42	.000	-.169	.051	-.24	.001
											-.075	.023	-.23	.001
Identity	Catastrophising	Anxiety	.596	.125	.32	.000	.830	.246	.23	.001	-.132	.050	-.20	.009
											.233	.032	.44	.000
Identity	Catastrophising	Depression	.578	.110	.34	.000	.830	.246	.23	.001	.402	.115	.21	.001
											.140	.030	.30	.000
Identity	Catastrophising	Phys. QOL	-.496	.072	-.40	.000	.830	.246	.23	.001	.462	.108	.27	.000
											-.091	.020	-.26	.000
Identity	Catastrophising	Psych. QOL	-.404	.084	-.32	.000	.830	.246	.23	.001	-.420	.071	-.34	.000
											-.144	.022	-.40	.000
											-.285	.079	-.22	.000

Note: For Regression 3, path c' (indirect) is indicated underneath path b in italics

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