

PERSISTENCE WITH NON-FUNCTIONAL PROBLEM SOLVING IN CHRONIC PAIN

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ABSTRACT

Research has demonstrated the relationship between persistence with problem solving focussed on pain removal and increased levels of distress in the chronic pain population. It has been suggested that one factor which motivates individuals to persist with pain removal strategies, despite repeated failed attempts, is their worries about the future. This can be conceptualised as the feared-for self. The purpose of this research was to investigate the relationship between problem solving strategies and the feared-for self in individuals with chronic pain. An additional aim of this research was to develop a new measure of problem solving requiring respondents to generate novel solutions to problem vignettes.

58 participants with chronic pain were recruited from specialist pain clinics. Participants completed the feared-for selves interview, a questionnaire measure of problem solving (PaSol), the new problem solving measure (MEPSP) and measures of pain severity (VAS), psychological distress (HADS), pain acceptance (CPAQ) and pain-related disability (PDI).

Persistence with pain removal (assimilative problem solving) was significantly correlated with proximity to the feared-for self and enmeshment with the feared-for self. Multiple regression analyses found mixed results. Proximity to the feared-for self was a significant predictor of assimilative problem solving when the MEPSP was used as the outcome variable but this was not replicated with the PaSol data. Enmeshment with the feared-for self was a significant predictor of assimilative problem solving when the PaSol was the outcome variable but this was not replicated with the MEPSP data.

This study has provided initial support for the relationship between the feared-for self and assimilative problem solving in the chronic pain population. However, further research is necessary to verify these findings. Initial results for the MEPSP suggest that further development of this measure is worthwhile. The clinical implications of these results are discussed along with suggestions for future research.

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ABBREVIATIONS

ACT: Acceptance and Commitment Therapy

COWAT: Controlled Word Association Test

CPAQ: Chronic Pain Acceptance Questionnaire

EPPS: Edward's Personal Preference Schedule

FGA: Flexible Goal Adjustment Scale

HADS: Hospital Anxiety and Depression Scale

MEPS: Means End Problem Solving task

MEPSP: Means End Problem Solving for Pain task

PDI: Pain Disability Index

PaSol: Pain Solutions Questionnaire

SDT: Self Discrepancy Theory

TGP: Tenacious Goal Pursuit scale

VAS: Visual Analogue Scale

VPMI: Vanderbilt Pain Management Inventory

CHAPTER 1: INTRODUCTION

It has recently been suggested that a proportion of people with chronic pain persist in trying to solve the problem of pain by seeking solutions focussed on pain removal (Eccleston & Crombez, 2007). Unfortunately for many people this problem is unlikely to be solvable and as a consequence persistent attention to this strategy is likely to be associated with increased frustration, distress and failure to attempt alternative solutions.

De Vlieger, Van den Bussche, Eccleston and Crombez (2006) have developed the Pain Solutions Questionnaire (PaSol) in an attempt to measure problem solving in chronic pain. The PaSol has been used to investigate the relationship between problem solving and distress in chronic pain. This has led to the conjecture that one factor which motivates people to persist with inappropriate problem solving is their perceived proximity to their feared-for selves (Crombez, Eccleston, Van Hamme, & De Vlieger, 2008).

This thesis has two main aims. First, to test the predicted association between the feared-for self and persistence with inappropriate problem solving in chronic pain. Although this relationship could be tested using questionnaire measures, the second aim of this thesis is to develop an alternative measure of problem solving based on an analysis of goal conflict and self-regulation, specifically the control theory of self-regulation proposed by Carver and Scheier (1998). Unlike the PaSol which relies on people endorsing statements, the new measure requires people to generate novel solutions to problems presented in vignette form.

1.1 Background

The International Association for the Study of Pain (IASP) defines pain as “an unpleasant sensory and emotional experience associated with actual and potential tissue damage” and chronic pain as “pain that persists beyond the normal time of healing” (IASP, 1994, p.210). Although this period can vary depending on the physical pathology of specific conditions this is generally considered to be pain which persists beyond three months. It is difficult to gain an accurate figure of the prevalence of chronic pain conditions partly because a significant proportion of people do not present for treatment (Verhaak, Kerssens, Dekker, Sorbi, & Bensing, 1998). The Pain in Europe study attempted to overcome this by interviewing a large community sample (Breivik, Collett, Ventafridda, Cohen, & Gallacher, 2006). This study estimated that 7.8 million people in the UK

suffer from a chronic pain condition (minimum duration of six months) with a mean duration of 5.9 years.

Despite the definition of pain as both a sensory and emotional experience, chronic pain is often conceptualised as a physical phenomenon related to a specific physical pathology. The biological purpose of pain is to alert the individual to potential tissue damage and to interrupt activity so that further damage can be prevented and healing can occur. Therefore, treatments focus on attempts to repair tissue damage and utilise analgesic treatments to ease the sensation of pain while healing occurs. This biomedical view of pain is useful for the treatment of acute pain, but becomes problematic when applied to chronic pain where such treatments are often ineffective.

There is a wealth of evidence to suggest that the intensity of pain and level of disability is not directly related to tissue damage in chronic pain patients (Turk, 1999). Furthermore, chronic pain does not necessarily lead to depression, and disability and distress are not directly linked to pain intensity (Jensen, Turner, Romano, & Karoly, 1991). Variability in adjustment to chronic pain cannot solely be explained by the physical characteristics of pain (e.g. intensity, duration). This has prompted much research into psychological factors which might explain this variance (Turk & Okifuji, 2002). Both cognitive and behavioural factors have been found to be important in explaining varying levels of distress and adjustment in people with chronic pain including the role of fear and avoidance (Crombez, Vlaeyen, Heuts, & Lysens, 1999) and catastrophising (Vowles, McCracken, & Eccleston, 2008). The role of social and contextual factors has also been recognised (Turk, 1999). Recent research has also focussed on the impact chronic pain conditions can have on self-identity (Pincus & Morley, 2001). Research in this area has demonstrated links between distress and the perception that chronic pain is preventing movement towards valued life goals (Morley, Davies, & Barton, 2005; Sutherland & Morley, 2008). The manner in which an individual approaches this problem has also been recognised as an important factor in affective distress (Van Damme, Crombez, & Eccleston, 2008).

1.2 Problem Solving and Chronic Pain

There has been some research into how people approach the problem of chronic pain. Traditionally this has been conceptualised in the literature in terms of coping styles and a variety of definitions of coping styles have been employed. The active versus passive coping distinction

postulated by Brown and Nicassio (1987) divides strategies in accordance with the expected outcome. Active coping is defined as an adaptive approach where strategies are aimed at “attempting to control their pain or to function in spite of their pain” (p. 54). Passive coping is defined as a maladaptive approach involving “relinquishing control of their pain to others or ... allowing other areas of their life to be adversely affected by pain” (p.54). The Vanderbilt Pain Management Inventory (VPMI; Brown & Nicassio, 1997) was constructed around these distinctions and various studies (e.g. Samwel, Evers, Crul, & Kraaimaat, 2006; Snow-Turek, Norris, & Tan, 1996) have demonstrated the relationship between increased levels of distress and a passive coping style. Active, problem solving approaches to coping are usually framed as being adaptive whereas passive, accepting approaches have been framed as maladaptive (Van Damme et al., 2008). In this definition relinquishing control and accepting pain is equated to giving in to pain and giving up valued activities and life goals, i.e. a passive coping strategy. However, this assumption is problematic as acceptance appears to play an important role in adaptive adjustment to chronic pain conditions (McCracken, Vowles, & Gauntlett-Gilbert, 2007). Literature on emotional well-being is also increasingly focussing on the benefits of being able to identify and disengage from unattainable goals (Wrosch, Scheier, Carver, & Schulz, 2003). Rigid distinctions between adaptive and maladaptive actions may therefore be too simplistic as the utility of a coping strategy is not determined by the specific strategy but by the context in which it is employed (Van Damme et al.). For example, taking pain relief medication may be adaptive in some circumstances if it has analgesic effects and allows the individual to continue with valued activities. However, if the medication is largely ineffective and results in adverse side effects, continuing with this strategy would be maladaptive.

1.2.1 The dual process model

An alternative way of thinking about coping is presented in the dual process model (Brandtstadter & Renner, 1990). This was originally developed to explain how individuals balance developmental gains and losses across the life span prompted by the observation that despite the physical limitations of aging, older people generally do not report reductions in quality of life. More recently, the dual process model has been applied to the area of chronic pain (Van Damme et al., 2008). The model postulates that when progression towards self development goals is challenged two distinct problem solving modes can be identified: assimilative and accommodative.

Assimilative problem solving is characterised by intentional attempts to adapt circumstances in pursuit of goals. This is an active approach where the individual believes a solution exists and they have the resources to achieve it. In contrast, an accommodative approach involves attempts to flexibly adapt goals to fit challenging circumstances, accepting that they are unable to change the situation but that important goals can be modified so they remain achievable. Brandtstadter and Renner (1990) proposed that both these approaches can be useful depending on the circumstances and the nature of the goal. Assimilative approaches will usually be employed in the first instance, attempting to actively solve the problem and change the situation while the goal remains intact. Repeated failed attempts to solve the problem in this way should lead to an accommodative approach where goals are re-assessed and adjusted to the circumstantial constraints.

Brandtstadter and Renner (1990) proposed that situational and individual factors will influence which style of problem solving is utilised at any one time. Two key factors in this process are the importance of the goal - the higher the value attached to a goal the longer an assimilative approach will be pursued, and the subjective attainability of the goal - the more control an individual believes they possess to reach the goal the more they will mobilise efforts to achieve it (Brandtstadter & Rothermund, 2002). A sufficient reduction in perceived individual control will lead to external support being sought. If this is not perceived to be sufficient to reach a solution accommodative processes should begin. An initial part of accommodation may involve a period of despondency and depression as the individual realises the initial goal cannot be met.

Brandtstadter and Rothermund (2002) state that, although assimilation and accommodation can be complementary, sequential processes, one can also inhibit the other. Evidence from information processing studies highlights how an assimilative problem solving style narrows focus on the goal, thus reducing the opportunity to become aware of alternative goals (Brandtstadter & Rothermund, 2002) which is an essential part of the accommodative process (Wrosch, Scheier, Carver et al., 2003). Additionally, the more effort and resources an individual perceives they have committed to achieving a goal, the more hesitant they will be to disengage from it. To persist with assimilative strategies an individual must believe that a goal is obtainable and whilst this belief persists they may not engage in accommodation (Wrosch, Scheier, Carver et al.).

An important aspect of the assimilation and accommodation distinction is that either style can be adaptive or maladaptive depending on the situation. An assimilative approach is adaptive if the perceived ability to change circumstances is a realistic one. If an accommodative approach was enabled when control was possible an individual would give up on reaching goals which were attainable and this would be maladaptive. However, persisting with assimilation is considered to be maladaptive if the problem being approached is an insoluble one.

Schmitz, Saile and Nilges (1996) used the dual process model to investigate the relationship between distress and problem solving in chronic pain patients. They used Brandtstadter and Renner's (1990) Tenacious Goal Pursuit (TGP) and Flexible Goal Adjustment (FGA) scales to measure assimilation (TGP) and accommodation (FGA) at a dispositional level. Results suggested that both approaches to problem solving were related to lower levels of depression. However, there was a stronger correlation between accommodation and lower depression scores. Furthermore, they found that high scores on the accommodation (FGA) scale weakened the relationship between pain intensity, disability and depression, with no such effect for the assimilation (TGP) scores. The authors claimed a 'buffering' effect of an accommodative approach against depression. However, the TGP and FGA ask about problem solving styles at a dispositional level and do not directly measure which approach participants take when dealing with their chronic pain. This may explain why assimilative strategies were also related to lower depression scores. Furthermore, De Vlieger, Crombez and Eccleston (2006) found that problem solving abilities in a treatment seeking chronic pain population were not abnormal when compared to a community sample. These findings led the authors to suggest that problem solving abilities do not differ between chronic pain patients and the general population. However, the nature of chronic pain means that these patients are now faced with an insoluble problem. Chronic pain puts sufferers in a situation over which they often have little control and for which a solution is often not possible and therefore if an assimilative problem solving strategy is applied to the problem of chronic pain it can be conceptualised as maladaptive.

Both of the above studies investigating problem solving and chronic pain (De Vlieger, Crombez et al., 2006; Schmitz, et al., 1996) measured general problem solving approaches and not problem solving efforts aimed specifically at chronic pain. To overcome this problem, the Pain Solutions Questionnaire (PaSol; De Vlieger, Van den Bussche et al., 2006) was developed specifically to

measure problem solving styles in relation to chronic pain. Crombez et al. (2008) used the PaSol to investigate the relationship between problem solving and pain-related disability and distress. Their results support a positive relationship between assimilative problem solving and increased emotional distress and disability in chronic pain patients, even when controlling for pain severity and demographic variables. They found that despite repeated assimilative attempts to eliminate pain, chronic pain patients had little hope that a solution to their pain would be found. The dual process model would suggest that, due to a reduction in belief that they could solve the problem of pain, these patients would move from an assimilative to accommodative approach yet this did not seem to be the case. It is currently unclear why some chronic pain patients persist with assimilative problem solving strategies despite repeated failures although possible explanations have been postulated (see Eccleston and Crombez's misdirected problem solving loop described in Section 1.2.2). As Brandtstadter and Rothermund (2002) note, moving from one approach to another depends on a range of variables. Wrosch, Scheier, Miller, Schulz and Carver (2003) emphasise that disengaging with unattainable goals and re-engaging with different ones is a complex process which involves redefining the current goal (in order to devalue its importance) and identifying, valuing and re-engaging with new ones.

1.2.2 The misdirected problem solving loop

Research suggests that adopting an assimilative approach to chronic pain is an inappropriate yet persistent activity. It is understandable that individuals would seek to reduce and eliminate pain, yet employing strategies and dedicating resources to pursuing this goal when it is not attainable can actually be counterproductive, leading to greater emotional distress and disability. Persisting with an assimilative coping approach to the problem of chronic pain is conceptualised in Eccleston and Crombez's (2007) misdirected problem solving loop. They suggest that framing chronic pain as a problem that can be solved leads to an individual becoming trapped in a cycle of problem solving, failed attempts and worry, resulting in approaches becoming "narrowed and inflexible, whilst greater effort is employed repeating the same solutions." (p. 235). In terms of the dual process model this can be seen as a repeated assimilative approach inhibiting accommodation. In this context, not only is an assimilative approach ineffective but it also has a negative impact on the individual's ability to pursue alternative adaptive coping strategies. De Vlieger, Crombez et al. (2006) found that assimilative, problem solving strategies were associated with distress even when

controlling for pain intensity. Their findings also support the suggestion that strategies focussed on pain removal are associated with increased attention to pain whereas accepting that pain cannot be solved is associated with reduced attention to pain. Increased attention to pain may be one factor which keeps some chronic pain patients stuck in the misdirected problem solving loop. Eccleston and Crombez (2007) suggest that increased attention to pain may increase perceived importance of solving pain, thus ensuring that efforts remain focussed on pain removal despite repeated failed attempts which suggest that pain is insoluble. They state that in order to break this cycle it is necessary to reframe the problem as one of attempting to adapt to, and cope with, chronic pain rather than seeking to eliminate it. This idea is consistent with an accommodative approach as conceptualised by the dual process model. Crombez et al. (2008) compared acute and chronic pain populations and found that those with chronic pain had a lower belief that a solution to their pain would be found but interestingly this did not seem to prevent them from using an assimilative approach to seeking a solution. Furthermore chronic pain patients who scored more highly on the assimilative problem solving scale (calculated from the PaSol; De Vlieger, Van den Bussche et al., 2006) engaged in more catastrophic thinking about pain which, in turn, was related to increased levels of distress. This led to the suggestion that “the chronic pain patient ruminates on the potential consequences of multiple threats, catastrophising about what further adversity pain might lead to and actively considering various solutions to the problem of pain” (Crombez et al., p. 561). This suggests that persisting with assimilative strategies, despite little hope of a solution, is motivated by a desire to escape something they fear in the future. This suggestion is of key interest in the current study and will be explored later in the review when discussing the role of possible future selves (see section 1.4.5). However, in order to further investigate this conjecture it is first necessary to outline a theoretical model for understanding motivation and behaviour.

1.3 The Control Theory of Self-regulation

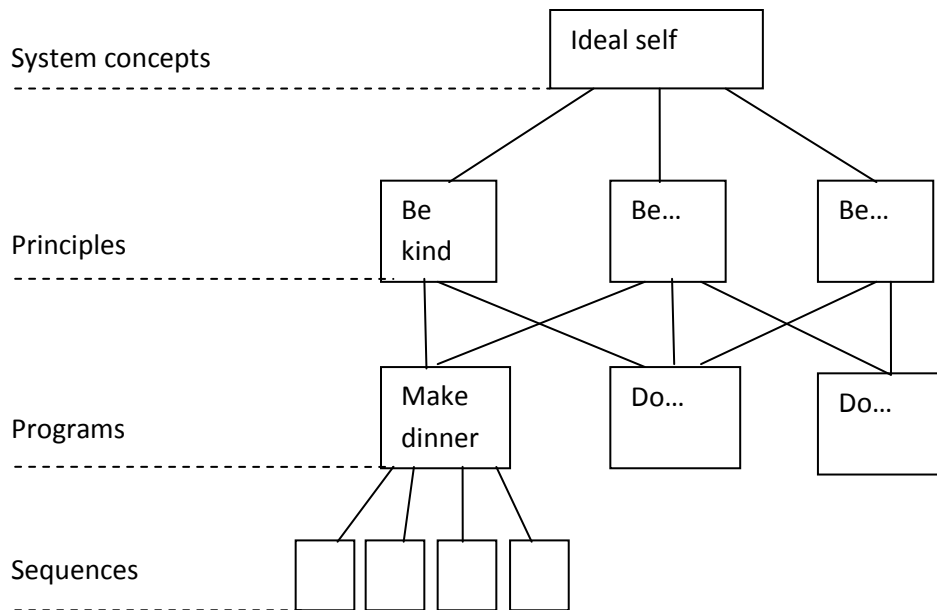
There has been an abundance of psychological research into goals and motivation which attempt to apply a structural framework linking goals, motivation and behaviour. Austin and Vancouver (1996) provide a table summarising psychological theories which propose “goal-like constructs”. The inclusion of thirty-one theories in this summary reflects the breadth of interest and research in this area. Amongst this literature there is some agreement that goals provide a structure which

guides and motivates behaviour. Carver and Scheier (1998) refer to goals as forming a system of self-regulation. They present a hierarchical model of self regulation linking specific concrete goals to more abstract goals of self-development. An outline of their model will be presented here to demonstrate its implications to the dual process model and underline its applicability to the current study.

The control theory of self regulation explicitly focuses on how behaviour happens in relation to the self systems. Carver and Scheier (1998) describe goals as sets of mental representations about the future which “engage the activities of those who adopt them” (p.65). Goals are conceptualised as dynamic, changing across the life span and can have either an approach or avoidance focus. In the control theory of self regulation, goals are broken down into four different levels: system concepts, principles, programs and sequences. These form a hierarchy (with system concepts at the top) of feedback loops, with goals being conceptualised as the reference points for these loops. System concepts, which can also be thought of as the ideal self (discussed further in section 1.4) are at the top of the hierarchy. Below the system concept are principles, also referred to as ‘be’ goals.

Principles can be thought of as a breakdown of the system concept, they are trait-like characteristics of what an individual wishes to become (e.g. to be a successful person). However, the system concept and principles are too abstract to directly shape behaviour. To operationalise these higher-order goals it is necessary to have more concrete goals beneath them. These concrete goals are referred to as programs or ‘do’ goals. Programs are the things we do to achieve principles and are usually behaviour that is directly observable. There are likely to be many different programs involved in attempting to attain a specific principle and the programs will vary across individuals (e.g. everyone has different ideas about what constitutes a successful person). Below programs are sequences which are specific motor control goals linked directly to action. The self-regulation model is illustrated in Figure 1.

Figure 1: Carver and Scheier's (1998) Control Theory of Self-Regulation



The important implication of this hierarchical model is that there are a number of programs that can be carried out to achieve a certain principle and, in turn, there are a number of principles that can lead to the system concept. This allows for flexibility in moving towards the system concept (the ideal self). This can be applied to the dual process model, described above in section 1.2.1. If something (e.g. chronic pain) blocks progression towards a goal at the program level an assimilative approach to coping in this situation would be to attempt to remove the block. Using the example of chronic pain this would involve utilising strategies to get rid of the pain so the same program can be pursued. Alternatively, a flexible approach might involve employing a new program goal to achieve the same principle or even adapting the goal at the principle level. Both these latter options could be considered to be examples of accommodative coping as goals are being adapted to meet circumstantial constraints (Brandstadter & Renner, 1990).

It is not clear from the dual process model at which level goal adjustment must occur for it to meet the criteria of accommodation. In fact, there seems to be some disagreement here. Brandstadter and Rothermund (2002) claim that “substitutions at the level of means or procedural sub goals involve an enduring commitment to and serve to maintain the focal goal” (p. 122) therefore still classifying this as an assimilative approach. However, they go on to state that “goals that are central to the person’s life design may resist accommodation; in such cases the

accommodation process may involve criteria of goal fulfilment or implementation rather than the goal itself" (p. 135) claiming that adaptation at a program level can be considered as accommodative.

It is suggested that when faced with the problem of chronic pain, accommodation at the program level might be sufficient to result in significant improvements in adjustment. The interruptive and interference effects of chronic pain might block goals at the program level but flexibly coping with this by using different programs to reach the same principles could prevent pain threatening higher-order goals associated with self-identity. However, further research in this area is needed.

1.3.1 Goal disengagement and re-engagement

As discussed above, some individuals with chronic pain seem to become stuck in an assimilative coping approach; despite little hope of achieving their goal, they seem unable to disengage from it. Wrosch, Scheier, Carver, et al. (2003) define the first stage of goal disengagement as recognising that the goal may be unobtainable. They describe two distinct types of giving up when disengaging from a goal: relinquishing effort and relinquishing commitment. They propose that giving up effort but retaining commitment to the goal results in increased distress and that it is only when commitment to the goal is relinquished that true disengagement can occur. Giving up commitment to a goal entails devaluation of the goal as once the value of the goal has been diminished disengaging no longer results in distress. This highlights the role of goal importance in the disengagement process, meaning that assimilative approaches are more likely to be persisted with if a goal is highly valued. The model proceeds to describe four distinct pathways following the disengagement of a goal. First, this may involve scaling back a goal to a more realistically obtainable level; secondly, an alternative path to the same higher order goal may be sought (as explained by Carver and Scheier's model discussed above); thirdly, a new higher order goal is adopted; and finally, no new goal is established. The latter of these scenarios is the one most associated with negative emotions (e.g. emptiness). This highlights a key point: it is not just the ability to devalue and disengage from futile goals that is the key to well-being but also the ability to assign value to and reengage with new ones. Again, this has implications for the assimilation-accommodation transition: it will be easier to accommodate if there are a range of alternative goals.

The research on goal disengagement and reengagement provides some suggestions as to why assimilative approaches may persist, namely that the pursued goal is highly valued or there is a lack of alternative options. According to the control theory of self-regulation, higher-order goals (i.e. principles and system concepts) hold more value and these goals are fundamentally related to identity; the conceptualisations of the kind of person an individual wishes to become or, in the case of the feared for selves, wishes to avoid becoming. Therefore, successful self-development is dependent on an individual's ability to engage in certain goal directed behaviours. If something occurs which prevents these goals being pursued identity will be threatened. Inappropriate yet persistent assimilative approaches to chronic pain may therefore be explained by the negative effect that chronic pain has on self-identity.

1.4 Chronic Pain and Identity

1.4.1 The schema-enmeshment model

In the chronic pain literature the schema-enmeshment model has emerged to account for the relationship between pain, the impact on self and emotional distress (Pincus & Morley, 2001). Enmeshment occurs when elements of different schemas are activated simultaneously and repeatedly, so that activation of aspects of one schema results in activation of aspects of another. In the case of self-pain enmeshment, self, pain and illness schema are thought to become enmeshed so that aspects of pain and illness become incorporated into the self. The concept of enmeshment serves to explain how an individual's self concept can become entrapped by pain (Morley, 2008).

This theory has been tested using a methodology developed from self-discrepancy theory (Higgins, 1987) and methods used in research on possible selves (Hooker & Kaus, 1994). Morley et al. (2005) measured enmeshment by asking participants to generate possible hoped-for and feared-for future selves and then rate the conditionality of these selves on the presence or absence of pain. Results demonstrated that self-pain enmeshment as measured by conditionality did predict levels of distress and disability even when controlling for other important variables such as pain severity and intensity. The relationship between self-pain enmeshment and distress has been supported by two further studies using a similar method for eliciting possible selves (Fogg, 2007; Sutherland & Morley, 2008). The self-pain enmeshment model does not provide an account of how

individuals become 'un-enmeshed' but one possibility is that they redefine their sense of self by disengaging from key goals and successfully identifying and engaging with new goals. However, as previously discussed, the process of doing this may be very difficult because of the high value attached to the original goals.

1.4.2 Future selves

There is a long history of literature on psychology of the self. Recently, two related strands have emerged which aim to explain the link between self-identity and motivation and behaviour: Self-Discrepancy Theory (SDT; Higgins, 1987) and possible selves (Markus & Nurius, 1986). Both these theories focus on the idea that central to current self-identity is the representations an individual holds of themselves in the future. These 'future selves' are often referred to as self-guides (or self concepts in Carver and Scheier's self-regulation model discussed above, section 1.3) as they motivate and shape behaviour in the pursuit of self development goals. This involves reducing the discrepancy between how an individual currently perceives their self and what they aspire to become in the future. If circumstances prevent this discrepancy from reducing, effectively blocking the self-development goal, this will result in distress. These future selves are thought to be an important aspect of identity. They are dynamic, changing across the life span and adjusting according to experience and circumstances. Future selves are also thought to affect cognitive processes including attention and memory (Dark-Freudeman, West, & Viverito, 2006).

1.4.3 Self-Discrepancy Theory (SDT)

Historically SDT has made a distinction between two different types of future self: the ideal self (the self a person would ideally like to be) and the ought self (the self a person feels they should be; Higgins, 1987). SDT states that the greater the discrepancy between the actual self (the way one perceives themselves now) and the ideal and ought selves the greater the level of emotional distress. Carver and Scheier (1998) extended this theory to include the importance of the perceived movement towards the ideal or ought self. In their model it is not only the size of the discrepancy but also the perception of movement towards the ideal/ought selves that is important.

SDT attributes different types of distress to different types of discrepancies. Dejection related emotions are thought to be the result of actual-ideal discrepancies and agitation related emotions are thought to be the result of actual-ought discrepancies. Evidence for this claim is mixed

(Sutherland, 2004), leading to suggestions that ideal and ought are not distinct but in fact represent one self-state defined as the “optimal self” (Tangney, Niedenthal, Covert, & Barlow, 1998, p. 266). Additionally, SDT only focuses on approach goals, moving towards ideal and ought selves. However, Carver and Scheier (1998) state that goals are conceptualised as mental representations not only of what we desire to become but also what we want to avoid becoming.

1.4.4 Possible selves

The literature on possible selves is less rigid in its distinctions than SDT (Markus & Nurius, 1986). It does not distinguish between ideal and ought selves but conceptualises them together as the hoped-for self. Possible selves are said to “provide the essential link between the self-concept and motivation” (Markus & Nurius, 1986, p.954). As this theory does not distinguish between ideal and ought selves it does not explain different types of distress but links both dejection and agitation to actual-hoped discrepancies. Behaviour is said to be motivated by attempts to both achieve and avoid certain possible selves which includes another possible future self: the feared-for self.

1.4.5 The feared-for self

This is described as something that the individual fears becoming. The feared-for self has been related to health, with links being made between health-related possible selves and an increase in health related behaviours (Hooker, 1999). Literature on the experiences of chronic pain patients suggests that the concept of feared selves may be particularly relevant to this population. Hellstrom’s (2001) qualitative study exploring chronic pain patient’s sense of themselves in the past and future supports this: “their expected selves ... were often negative and feared” (p.121). It is likely that the feared-for self is particularly relevant for chronic pain patients who face a future in which their feared selves, in relation to health, seem increasingly likely.

Further research into the feared-for self has been carried out by Carver, Lawrence and Scheier (1999) who incorporate the role of the feared-for self into SDT. They postulate that the feared-for and ought selves are opposite ends of the same spectrum and that an individual is motivated to approach the ought self as an indirect means of avoiding the feared-for self. This process is referred to as “a discrepancy-enlarging [actual and feared] feedback process being captured by a discrepancy-reducing [actual and ought] feedback process.” (p.784). In support of this hypothesis

Carver et al. (1999) found that actual-feared and actual-ought discrepancies were both predictors of agitation related emotions. Interestingly, this depended on the size of the discrepancy, particularly the proximity of the feared-for self. When the actual-feared discrepancy was perceived to be small this was a greater predictor of agitation related distress. However, when this discrepancy became greater the actual-ought discrepancy became a better predictor of agitation related distress. This seems to suggest that the feared-for self can be incorporated into SDT as part of the ought self. Their results also indicated that actual-feared discrepancies were linked to both agitation and dejection emotions again questioning the distinctions made in SDT.

The available literature on possible selves suggests that chronic pain patients who perceive the actual-feared discrepancy to be decreasing will seek to eliminate pain, motivated by a desire to escape feared selves. Until they perceive this threat has subsided they will be unable to focus on approaching or attaining other goals. Using the framework of the dual process model this can be thought of as assimilative coping persisting whilst a feared outcome is perceived to be imminent. This also fits with ideas presented above that to move from assimilation to accommodation new goals must be identified. However, if the focus is on avoidance this process is likely to be inhibited. Furthermore, if the feared-for self is conceptualised as being opposite to the hoped-for self some of the distress explained by a large and expanding actual-hoped discrepancy may in fact be attributed to a small and reducing actual-feared discrepancy. These issues suggest that the conjecture made by Crombez et al. (2008) that persistent assimilative approaches and reluctance to accommodate are driven by a desire to avoid a feared self is worthy of further investigation.

1.5 Measuring Problem Solving in Chronic Pain

As noted above there have been various definitions of approaches to coping in the chronic pain literature. This has led to a variety of different measures of coping (e.g. Vanderbilt Pain Management Inventory; Brown & Nicassio, 1987). However, in this study coping is understood from the perspective of the dual process model (discussed above) and re-framed as problem solving. The dual process model states that when faced with circumstances which act as a block to achieving goals individuals can either attempt to remove the block and pursue the goal by the same means (assimilation) or adapt the goal in accordance with circumstantial constraints (accommodation). As the assimilation/accommodation distinction will be used in this study it is necessary to consider ways of measuring these different strategies. Brandtstadter and Renner

(1990) developed the Tenacious Goal Pursuit (TGA) and Flexible Goal Adjustment (FGA) scales to measure assimilative and accommodative problem solving at a dispositional level. They used these scales to measure general problem solving tendencies in a large sample (n=1200) of adults at different life stages (ranging from 30 to 60 years of age). Their findings demonstrated a relationship between aging and increased scores on the FGA and decreased scores on the TGP. This indicates that as people age they have an increased tendency to adopt accommodative problem solving strategies, which Brandtstadter and Renner (1990) interpreted as evidence to explain why developmental losses associated with aging, do not result in a reduction in life satisfaction. However, these findings have not been replicated consistently and the validity of the FGA and TGP scales has been questioned (Mueller & Kim, 2004). These scales measure problem solving at a dispositional level and therefore are not sensitive to different strategies being applied in different circumstances.

De Vlieger, Van den Bussche et al. (2006) adapted the TGP and FGA scales to specifically measure problem solving strategies employed in response to pain. This resulted in the development of the Pain Solutions Questionnaire (PaSol). The PaSol was developed to be used with both acute and chronic pain populations and has demonstrated good reliability and validity. The PaSol allows for the calculation of an assimilative problem solving score. The PaSol demonstrates an important development in measuring problem solving in chronic pain populations as it does not focus on specific behaviours but recognises the context of the behaviour.

Despite this, the PaSol has a main limitation in common with previous measures of problem solving – they are all based on self-report measures. There are a number of difficulties in using self-report methods to measure problem solving including the fact that they result in a subjective rather than objective response and rely on the respondent being able to accurately reflect on their own behaviour (Rust & Golombok, 1999). These limitations are recognised by Crombez et al. (2008) and De Vlieger, Van den Bussche et al. (2006) who state that “of interest in the future may be the relationship between attitudes to problem solving in pain and actual attempts at problem solving.” (p.292). Part of the aim of this study is to develop an alternative method for measuring problem solving styles in a chronic pain population by involving participants in an actual problem solving task. This will be an adaptation of the Means-End Problem Solving Task (MEPS; Platt & Spivack, 1975). The development of this measure is described in detail in Chapter 2.

1.6 Summary and Research Aims

Literature on possible selves has been applied to the area of chronic pain to explain how the interruptive and interference effects of pain can have a negative impact on identity. Carver and Scheier's (1998) control theory of self-regulation provides a theoretical basis for understanding how this occurs. Pain blocks lower-level program goals which can result in higher-order goals associated with self-identity also becoming blocked. This hierarchical model also provides a possible explanation for why some people do not experience high levels of distress in response to chronic pain. Individuals who adjust to chronic pain conditions may find alternative routes to higher-order goals or may adapt higher-order goals in accordance with their circumstances. This fits with the distinct problem solving styles (assimilation and accommodation) proposed by the dual process model (Brandtstadter & Renner, 1990).

Recent literature attempting to explain the variance in distress experienced by chronic pain patients has highlighted the relationship between distress and an inappropriate assimilative problem solving approach to chronic pain (Crombez et al., 2008; De Vlieger, Crombez et al., 2006; De Vlieger, Van den Bussche et al., 2006; Eccleston & Crombez, 2007). This has left an important question: why do chronic pain patients persist with an assimilative approach despite little hope of a solution? The primary aim of this thesis is to explore this question. Crombez et al. (2008) suggested that "the chronic pain patient ruminates on the potential consequences of multiple threats, catastrophising about what further adversity pain might lead to and actively considering various solutions to the problem of pain" (p. 561). Given the literature on future selves discussed above, these worries and fears about the future can be conceptualised as feared-for selves. Therefore, it is possible that aspects of an individual's feared-for self may provide some explanation for persistent assimilative attempts to solve the problem of chronic pain. The specific aim of this research is to investigate if there is any evidence to support this proposition.

The literature suggests that there are two aspects of the feared-for self which could be important in explaining this persistence: proximity and enmeshment. Prior research has shown that both proximity and enmeshment significantly contribute to the variance in levels of distress reported in chronic pain populations (Fogg, 2007; Morley et al., 2005; Sutherland & Morley, 2008). Carver et al.'s (1999) extension of Self Discrepancy Theory (SDT) suggests that the closer an individual is to their feared-for self the greater focus they will place on avoiding this outcome. The dual process

model states that the transition from an assimilative to an accommodative problem solving approach involves accepting that the goal (e.g. removal of pain) may not be achievable (Brandtstadter & Renner, 1990). Research on goal disengagement suggests that this is unlikely to occur if the goal in question is highly valued (Wrosch, Scheier, Carver et al., 2003). If removal of pain is linked to higher order goals related to self identity this would explain why this goal is so difficult to disengage from and assimilative problem solving persists. Research on self/pain enmeshment has demonstrated that it is not only proximity to possible selves which is important but the extent to which an individual believes their feared-for selves are conditional on the continued presence of pain (Morley et al., 2005; Sutherland & Morley, 2008). If the realisation of the feared-for self is conditional on the continued presence of pain, the goal of pain removal will be motivated by a desire to escape the feared-for self. Therefore, feared-for/pain enmeshment may explain why an individual would persist with inappropriate attempts to solve the problem of pain.

This leads to the two specific hypotheses for this research, which are set out below.

1.6.2 Research hypotheses

1. Individuals who are closer in proximity to their feared-for selves will be more likely to use an assimilative approach to attempt to solve the problem of pain.
2. Individuals with higher levels of feared-for/pain enmeshment will be more likely to use an assimilative approach to attempt to solve the problem of pain.

The second aim of this study is to develop a new method of measuring problem solving in chronic pain patients which requires people to generate novel solutions to problem vignettes. This is described in detail in Chapter 2.

CHAPTER 2: DEVELOPMENT OF THE MEPSP

2.1 Introduction

One aim of this thesis is to develop a new method of measuring problem solving in chronic pain patients. This new measure has been developed by adapting the Means-End Problem Solving procedure (MEPS; Platt & Spivack, 1975). The MEPS measures a participant's ability to conceptualise the steps needed to move towards the solution of a problem. Participants are given the beginning of a story, which poses a problem and the end of the story, where the problem is solved. Participants are then asked to fill in the means by which the person in the story has moved from the beginning to the end.

The Means-End Problem Solving for Pain (MEPSP) developed in this thesis aims to measure flexible problem solving in people with chronic pain conditions. As in the MEPS participants are presented with a problem vignette. However, in the MEPSP some of the problems are caused by the presence of pain. In order to ensure equality across items and assist with coding and scoring responses, a unified structure for MEPSP items has been developed in accordance with the assimilation/accommodation distinction proposed by the dual process model (Brandstadter & Renner, 1990) and Carver and Scheier's (1998) control theory of self-regulation, both described in Chapter 1. Four pain items and four control items have now been developed and piloted.

2.2 Item Construction

2.2.1 General structure

The structure for MEPSP items was developed based on Carver and Scheier's (1998) control theory of self-regulation. As discussed in Chapter 1, this is a hierarchical model linking specific actions (programs) to more abstract goals of self-development (principles). Principles are trait-like characteristics representing what an individual wishes to be or become (e.g. to be a successful person) but are too abstract to directly shape behaviour. To operationalise these higher-order goals it is necessary to have more concrete goals beneath them. These concrete goals are referred to as programs. Programs are the things we do to achieve principles and are usually behaviour that is directly observable (e.g. achieving certain targets at work in order to be successful).

There are likely to be many different programs involved in attempting to attain a specific principle and the programs will vary across individuals (e.g. everyone has different ideas about

what constitutes a successful person). This allows for flexibility in achieving principles; if a person is no longer able to carry out a specific program there are likely to be many other programs they could pursue in order to move towards a certain principle.

This flexible approach to goal disengagement/re-engagement at the program level is helpful when a program has become blocked. For example, chronic pain conditions often interfere with an individual's ability to carry out a specific program and, according to the hierarchical structure presented here, this may also interfere with movement towards the associated principle goal. However, if the individual is able to find an alternative program that is not affected by pain they are still able to move towards their principle goal even if they cannot get rid of the pain. The MEPSP aims to measure how flexible participants are when goals are blocked at the program level. Four pain items have been constructed where pain is the presenting problem blocking the program goal. Four control items have been developed where a conflicting goal is blocking the program.

2.2.2 Principle goals

The first step in constructing suitable MEPSP items was to identify suitable principle, and associated program, goals. The following principle goals were chosen: affiliation, achievement, autonomy and healthy. The first three were selected from Edwards Personal Preference Schedule (EPPS; Edwards, 1959). Healthy was also added as a goal that is of particular relevance to people with chronic health difficulties, including chronic pain (Hooker & Kaus, 1994).

2.2.3 Defining accommodation and assimilation

As discussed in Chapter 1, Brandtstadter and Renner's (1990) dual process model does not define at what level (e.g. principles or programs) persistence must occur for it to be defined as assimilation or flexible goal adjustment must occur in order for it to be defined as accommodation. Van Damme, et al. (2008) define assimilation as "attempts to diminish the impact of pain in order to re-engage in pre-pain activities and life goals" (p.2). Therefore, assimilation could be construed as attempts to continue with the same program. In the case of chronic pain blocking a program, this would involve attempts to remove or solve the pain in order to continue with the same program. Accommodation would be either engaging in a different program in pursuit of the same principle goal or pursuing a different principle goal.

Figure 2: Assimilation and accommodation according to the self-regulation model

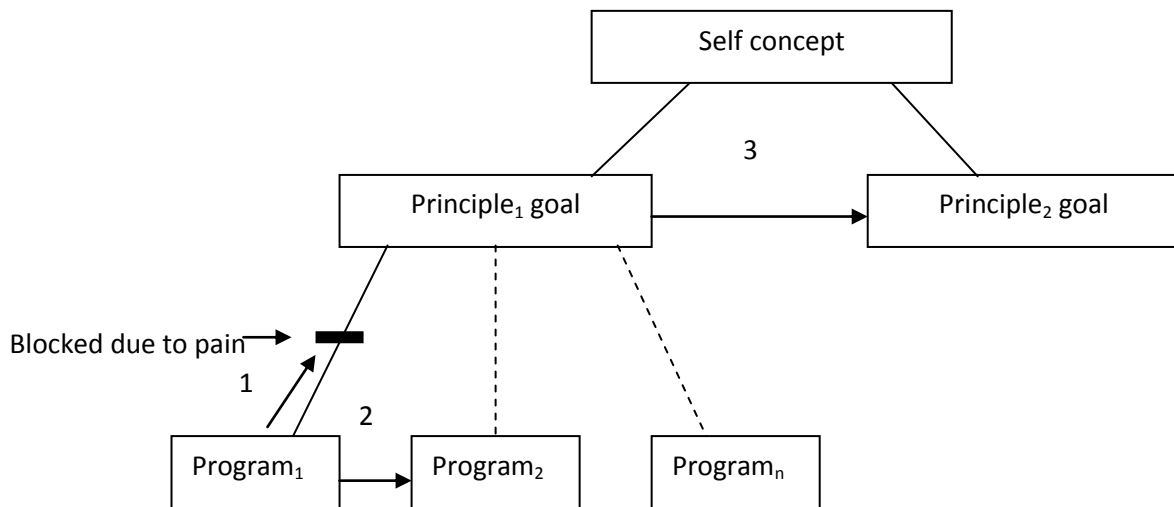


Figure 2 demonstrates that, according to Carver and Scheier's (1998) model, when a program is blocked there are three main responses: attempt to remove the block (1), pursue a different program (2) or, change the principle goal (3). Attempting to remove the block would be an assimilative approach, pursuing a different program would be accommodation at the program level and pursuing a different principle would be accommodation at the principle level.

2.2.4 Persistence

As discussed in Chapter 1, both accommodation and assimilation can be adaptive depending on the circumstances. For example, if an individual has the ability and resources to remove a block in order to pursue the same program (an assimilative approach) this may be the most helpful and effective way of solving a problem. However, assimilative attempts are associated with increased distress when they are applied to an insoluble problem. Therefore, the important point is whether an individual is able to switch from assimilation to accommodation when it is appropriate to do so.

The MEPSP is designed to measure the ability to switch from assimilation to accommodation when necessary by recording respondents persistence with an assimilative approach despite feedback that the problem may be insoluble. If a respondent gives an assimilative response to a pain item (i.e. a response which involves removing the pain) they are prompted by the interviewer to provide an alternative response (e.g. "they did go to the Doctor for treatment but unfortunately this did not get rid of the pain"). Respondents are prompted a maximum of two times for each item and their persistence is recorded.

2.2.5 The ending of the story

When developing the structure of the MEPSP items it was important to consider the ending of the story and, specifically, whether this involved the principle goal remaining in tact. If the ending of the stories stated that the principle goal remained then this would only measure accommodation at the program level because it does not allow the respondent the option of changing the principle goal. Additionally, if the ending stated that the context was the same, this would limit the number of alternative solutions available to respondents. For these reasons the decision was made to leave the ending open (see example in Section 2.2.6). This would allow for flexibility at the program and principle level to be measured.

2.2.6 Final structure

In accordance with the considerations described above, all MEPSP items are based on the following structure:

1. Statement of problem that includes reference to blocking of a program goal due to pain (pain items) or an interfering goal (control items).

E.g. Frank couldn't play tennis any more because of his back pain

2. Statement relating blocking of program goal to blocking of principle goal and emotional consequence of this.

E.g. Frank felt that his friends at the tennis club might be avoiding him. This upset Frank as it was important for him to be a sociable and well-liked person.

3. Ending which states that the problem has been resolved. There is no reference to the principle goal remaining in tact.

E.g. The story ends when Frank no longer feels upset.

4. Instructions for completing story.

E.g. You begin the story when Frank first notices his club mates avoiding him.

2.2.7 Response categories

This structure allows for five distinct categories of response to each item. These are:

1. Persist with same program.

E.g. Frank continues to play tennis despite his back pain.

2. Solving the problem by removing the pain (pain items) or the interfering goal (control items).

E.g. Frank sees a physiotherapist who helps his back get better so he starts playing tennis again.

3. Alternative solution, changing program but retaining context and principle goal.

E.g. Frank decides to volunteer to organise some social events at the tennis club.

4. Alternative solution, changing program and context but retaining principle goal.

E.g. Frank decided to leave the tennis club and spend more time with his friends from work instead.

5. Alternative solution, changing principle goal.

E.g. Frank decided to leave the tennis club. Being well-liked was no longer as important to him and he decided to focus on improving his performance at work instead.

These responses can be categorised more broadly into assimilation (1 & 2) and accommodation (3, 4 & 5) using the definitions in Table 1.

Table 1: Definition of assimilation and accommodation

	Definition
Assimilation	i. Any response which involves persisting or attempting to persist with the same program to achieve the same principle. or ii. Any solution to a pain item which involves removing or 'solving' the pain. or iii. Any solution to a control item which involves the removal of the interfering goal.
Accommodation	i. Any solution to a pain item which does not involve removing or 'solving' the pain. or ii. Any solution to a control item which does not involve the removal of the interfering/competing goal.

2.3 Pilot Study

The eight MEPSP items were piloted on ten volunteers. Feedback from the pilot study indicated that the items posed realistic dilemmas which seemed probable to respondents. The pilot study also confirmed that there were a range of possible responses to each item. These responses were used as an initial starting point for generating the categories of response listed in Section 2.2.7.

The pilot study identified that most respondents gave multiple responses covering different response categories to items, providing several suggestions as to how the end point of the story was reached rather than a single solution. Therefore, scoring procedures were developed which could record multiple responses and categories as outlined below.

A further outcome of the pilot was deciding on the number of times to provide interviewer prompts if respondents persisted with assimilative solutions. This was fixed at two prompts per pain item. Asking for prompts for all items would have lengthened the MEPSP considerably for some participants. As persistence with solving pain was the most important factor to measure, only pain items were prompted. Prompts were given a maximum of two times per item. This would provide some measure of persistence without making the measure too lengthy for participants.

2.4 Scoring Procedures

Each participant's MEPSP responses were transcribed and the transcriptions were scored by two independent raters. Scoring procedures were developed according to the response categories listed above. Solutions were given a quality score depending on how plausible and elaborated they were. Scoring instructions are outlined fully in the MEPSP manual included in appendix 1. The scoring procedure allows for each respondent to receive a score for each of the 5 sub-categories listed above and a mean quality of solution score. These can then be used to calculate an assimilation scale and accommodation scale for each participant.

CHAPTER 3: METHOD

3.1 Research Question and Hypotheses

3.1.1 Research question

Is there a relationship between the feared-for self and assimilative problem solving in chronic pain patients?

3.1.2 Hypotheses

1. Individuals who are closer in proximity to their feared-for selves will be more likely to use an assimilative approach to attempt to solve the problem of pain. Therefore, proximity to the feared-for self will predict assimilative problem solving scores.
2. Individuals with higher levels of feared-for/pain enmeshment will be more likely to use an assimilative approach to attempt to solve the problem of pain. Therefore, feared-for/pain enmeshment will predict assimilative problem solving scores.

3.2 Design

This is a single cohort, cross-section multiple measures design. This study replicated the design used in three previous DClinPsychol theses (Davies, 2002; Fogg, 2007; Sutherland, 2004). The data analysis involved carrying out correlations as an initial test of the predicted relationship between the feared-for self and assimilation and to establish which variables should be entered into the multiple regression model. Multiple regressions were then carried out to further test the predicted relationship between both proximity to the feared for self and enmeshment with the feared-for self and assimilation whilst controlling for other variables.

Tabachnick and Fidell (2007) suggest that for a multiple regression the sample size can be calculated as follows: $50 + 8m$ (where m is the number of predictor variables) for testing the multiple correlation and $104 + m$ for testing individual predictors. There is currently no published research investigating predictors of assimilative problem solving. Therefore the exact number of independent variables was unknown. It was planned that 110 participants would be recruited to allow for up to 6 independent variables ($m = 6$, $104 + 6 = 110$).

3.2.1 Ethical clearance

Ethical clearance for this study was obtained from the Leeds East Research Ethics Committee. A copy of the approval letter is included in appendix 2.

3.3 Participants

Participants were recruited via NHS pain clinics in the Leeds area. Patients attending the pain clinics who fitted the inclusion criteria outlined below, were given a participant information sheet and invited to contact the main researcher if they wanted to take part in the study. The inclusion criteria were: 18 years of age or above, non-malignant pain of at least 6 months in duration and sufficiently fluent in English to be able to complete measures.

3.4 Measures

3.4.1 Demographics

The following basic demographic and clinical data were collected: Date of birth, gender, school leaving age, reading or writing difficulties at school, pain duration, main diagnosis and previous treatments for pain.

Controlled Word Association Test (COWAT; Benton & Hamsher, 1976). This was used to measure participant's verbal fluency so that this could be controlled for when analysing the results of the feared-for selves interview and the MEPSP task. The COWAT presents participants with a letter and requires them to say as many words (excluding proper nouns and words with the same extension) beginning with that letter as they can in a minute. This is repeated three times first with the letter F then A then S. The total number of admissible responses for each letter are summed to give a total verbal fluency score.

3.4.2 Pain variables

Pain Visual Analogue Scales (VAS). These were used as a measure of pain severity. Participants are asked to rate the intensity of their pain by making a mark on a line. VAS have been shown to be an effective measure of pain intensity (e.g. Breivik, Björnsson, & Skovlund, 2000). As suggested by Von Korff, Deyo, Cherkin and Barlow (1993), measures of pain at its highest, lowest and usual intensity were recorded on a scale of 0-100mm. The mean of these scales was calculated for each participant and used as a measure of pain severity in the analysis. The same scale (0-100mm) was used to measure levels of affective distress associated with pain for five different states (depression, anxiety, frustration, anger and fear) over the past week. A copy of the VAS scales is included in appendix 3.

The Pain Disability Index (PDI; Pollard, 1984). The PDI is a brief self-report questionnaire measuring the extent to which pain interferes with daily activities on an 11 point scale (0-10).

It has 7 items each covering different life domains (e.g. family and home responsibilities). The PDI has adequate levels of reliability and validity (Tait, Chibnall, & Krause, 1990).

Chronic Pain Acceptance Questionnaire (CPAQ; McCracken, Vowles, & Eccleston, 2004). The most recent version of the CPAQ is a 20 item self-report questionnaire designed to measure acceptance of pain. All items are rated on a 7 point Likert scale from 0 (never true) to 6 (always true). The CPAQ has two subscales: activity engagement, which measures involvement in activities despite pain (11 items) and pain willingness, which measures attempts to control pain (9 items). It has good reliability and validity (McCracken et al.).

3.4.3 Problem solving

The Possible Solutions to Pain Questionnaire (PaSol; De Vlieger, Van den Bussche et al., 2006). The PaSol is a 14 item self-report questionnaire designed to measure assimilative and accommodative responses to pain. Participants are asked to rate the degree to which each item is applicable to them on a 7 point Likert scale (from 0, not at all applicable to 6, highly applicable). The PaSol has 4 subscales: Solving Pain (4 items), Meaningfulness of Life Despite Pain (5 items), Acceptance of the Insolubility of Pain (3 items) and, Belief in a Solution (2 items). The subscales were found to have good internal consistency (Cronbach's α .78-.86) and validity (De Vlieger, Van den Bussche et al.). The PaSol subscales can be used to calculate an assimilative problem solving score (Crombez et al., 2008). The assimilative problem solving score is calculated by summing the scores of the solving pain subscale and the reversed scores of the meaningfulness of life despite pain subscale and the acceptance of the insolubility of pain subscale. In this study, the assimilative problem solving score was calculated and used as the primary measure of assimilation.

The Means-End Problem Solving for Pain task (MEPSP). The MEPSP is a new measure developed during the current study. The MEPSP aims to measure the ability of respondents to be flexible in applying assimilative and accommodative solutions to problems presented in story vignettes. As persistence with assimilative problem solving is of particular interest in the current study the MEPSP was designed to measure this. If a removal solution was given to a pain item the participant was told by the interviewer that attempts to remove pain were unsuccessful. If, after this prompt, the participant still gave a response which was focussed on the removal of pain a point on the persistence scale was recorded.

The MEPSP was designed so that both an assimilative and accommodative problem solving score could be calculated from the responses. The assimilative score was calculated by summing the total number of persistence and removal solutions provided by a participant. The accommodative score was calculated by summing the total number of alternative solutions provided by a participant. Chapter 2 contains a full description of the development and administration of the MEPSP. The administration and scoring manual for the MEPSP is included in appendix 1.

Correlations were carried out between the MEPSP data and the feared-for selves data. These results and the descriptive data for the MEPSP are reported in Chapter 5.

3.4.4 Affect variables

The Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). The HADS is a widely used measure of anxiety and depression. It was chosen for use in the present study because it is quick and easy to administer. It was originally designed for use with populations attending outpatient health clinics, so is suitable for use in a population with physical health problems. The HADS provides separate scores for anxiety and depression. There were no significant differences in the correlations for anxiety and depression and the other key variables when considered as separate subscales so the total HADS score (the sum of the anxiety and depression subscales) was used as the main measure of distress in this study. This also allowed for comparisons with previous research which also used the total HADS score as a measure of affective distress.

3.4.5 Feared-for selves

The Feared-for Selves Interview. The method for eliciting feared for selves was based on an adapted version of the Selves Questionnaire developed by Higgins (1987) and Hooker and Kaus (1994). The Selves Questionnaire involves asking about both hoped-for and feared-for selves. However, as only the role of feared-for selves was being investigated in this study, only feared-for selves were elicited.

The concept of feared-for selves was explained to participants who were then asked to think about what their own current feared-for selves might be. Participants were then given 25 cards each displaying a possible feared-for self. The cards were included to prompt participants and reduce the time of the interview. Previous research involving the elicitation of future possible selves has not used this method of prompting participants with cards.

Previous research with chronic pain participants has shown that there are a series of feared-for selves which are commonly reported. The cards contained feared-for selves reported by Kindermans, et al. (in press), these are listed in appendix 4. Participants were instructed to select up to 10 feared-for selves. It was made clear that participants could also give their own feared-for selves if they were not included on the cards. Most participants selected some from the cards and provided some of their own.

After participants had selected their feared-for selves these were written on a response sheet by the researcher. Participants were then asked two questions about each of their feared-for selves. First they were asked how close they currently considered themselves to be to that characteristic (proximity) on a 7 point Likert scale (from '1, I am just like this now' to '7, I am the complete opposite of this'). The Selves interview developed by Higgins (1987) involved eliciting actual and feared selves and calculating discrepancies between these lists by counting the cross-referenced synonyms and antonyms in pairs of lists. However, a similar method to the one employed here was used by Carver et al. (1999) where participants were asked to rate how close they currently felt to each characteristic. The authors reported that this was a quicker and more direct method of measuring proximity than calculating actual/feared discrepancies. The mean proximity to feared-for selves was calculated for each participant and used as the independent variable when investigating the relationship between proximity to the feared-for self and assimilation when testing hypothesis 1.

Next, participants were asked whether they thought it would still be possible for them to become this characteristic even if they did not have their pain condition (conditionality). They were required to give a yes or no response which was recorded next to each characteristic. The conditionality responses were used to calculate enmeshment by summing the number of 'no' responses (total number of characteristics which were conditional on the continued presence of pain) and dividing this by the total number of feared-for selves elicited. For example, if a participant elicited 10 feared-for selves and stated that 5 of these were conditional on the continued presence of pain their enmeshment score would be $5/10 = 0.5$. A score of 1 indicates total enmeshment (i.e. all feared-for characteristics are dependent upon the continued presence of pain). This method for rating and calculating enmeshment was developed by Davies (2002) and replicated by Sutherland (2004).

Participants were then asked to consider their feared-for selves overall and rate how likely they felt it was that these characteristics would describe them in the future (expectancy) on a

7 point scale (from '1, *very unlikely*' to '7, *very likely*'). Finally, they were asked how capable they felt they were of preventing these descriptions from becoming true (efficacy) on a 7 point scale (from '1, *not at all capable*' to '7, *very capable*'). To assist participants with proximity, expectancy and efficacy ratings they were given a prompt sheet with the numbered scale and descriptions indicating the direction of the scale.

A copy of the instructions for the feared-for selves interview is included in appendix 5.

3.5 Procedure

Participants were recruited for the study from pain clinics taking place at Seacroft Hospital and St George's Centre, both based in Leeds. Patients fulfilling the inclusion criteria (listed above in section 3.3) were given an information sheet either by a receptionist or clinic nurse. If patients demonstrated interest in participating in the study they were asked to leave contact details and were then contacted by the researcher to arrange a suitable interview time. Most participants chose to meet with the researcher at their home, although a minority were interviewed in a private room at the pain clinic.

At the beginning of all interviews the researcher checked that the participant had had chance to read the study information sheet and gave a brief overview of what the interview would involve. If they were happy to proceed with the study, participants were then asked to read and sign a consent form. Demographic data were then collected followed by the controlled word association task and Visual Analogue Scales. The Means-End Problem Solving for Pain (MEPSP) task was then conducted followed by the Feared-for Selves interview. Finally the questionnaire measures were administered in the following order: PDI, PaSol, CPAQ and, HADS. The questionnaires were completed by participants unless they were unable to do so, in which case the researcher read the questions to participants and recorded their responses. The questionnaire measures were purposefully included at the end of the interview so that participant's responses to the MEPSP or Feared-for selves interview were not affected in any way by the questionnaires.

CHAPTER 4: MAIN STUDY RESULTS

4.1 Introduction

This chapter starts with a description of the sample including demographic, affect and pain variables and feared-for selves data. Next, the current study results will be compared with results reported by De Vlieger, Van den Bussche et al. (2006). Finally, results regarding the main hypotheses of the current study will be reported. Results for the MEPSP data will be presented in Chapter 5.

4.2 Description of the Sample

4.2.1 Assumption testing

The data were examined to ensure that assumptions required to carry out parametric statistical tests were met including homogeneity of variance and the assumption that data are normally distributed.

The data for some variables were not normally distributed. This was established using histograms, checking values of skewness and kurtosis and carrying out the Kolmogorov-Smirnov test. For variables which were not normally distributed transformations were considered. Pain duration was significantly positively skewed and a log transformation was applied to this data which resulted in a more normal distribution. Therefore, the transformed pain duration data will be used in subsequent analyses. However, transformations were not possible for other non-normally distributed variables. Where assumptions required for parametric tests were violated, non-parametric tests were used. These will be noted when reporting on findings.

4.2.2 Demographic information

Participants were recruited from NHS pain clinics held at Seacroft Hospital and St George's centre in Leeds. Participants were recruited over a six month period. During this time the researcher attended 30 clinics and approximately 600 patients who were eligible to participate in the research attended these clinics. Out of these 600 eligible patients, 66 (11%) agreed to participate in the research. 8 of those who agreed to participate either cancelled or did not attend their appointment to complete the research. As no data was collected until the research appointment there is no further information available on those who did not complete the research.

As participants were recruited from two different clinics with different referral procedures, t-tests were carried out to compare the means of participants from the two clinics on demographic and pain variables. Where data were not normally distributed Mann-Whitney U tests were used.

Participants recruited from the two clinics did not differ significantly in terms of age ($t = -7.12$, $p = .479$), school leaving age ($u = 336.00$, $p = .167$), verbal fluency test total score ($t = .289$, $p = .774$), total number of treatments ($t = -1.539$, $p = .130$), pain duration ($t = -.510$, $p = .612$) and pain severity ($t = -1.744$, $p = .087$). As there were no significant differences between participants recruited from the two clinics the data collected from both clinics will be treated as one sample.

Descriptive statistics for the demographic variables of the whole sample is presented in Table 2. The final sample included 27 males and 31 females. The mean age of participants in years was over 58.88 ($sd = 14.99$). This is slightly higher than that of a previous research sample ($M = 50$ years, $sd = 16.9$) which had no upper age exclusion criteria and was recruited from similar clinics (Fogg, 2007). The mean school leaving age of the sample was 15.84 years ($sd = 1.15$). This was very similar to previous samples ($M = 16.05$; Sutherland, 2004). The total scores on the verbal fluency test had a mean of 33.48 which was slightly higher than previous research samples ($M = 30.06$; Sutherland, 2004).

Table 2: Demographic information

	Minimum	Maximum	Mean	SD
Gender ratio m : f	27 : 31			
Age (years)	26	89	58.88	14.99
School leaving age (years)	14	18	15.84	1.15
Verbal fluency test total score	12	58	33.48	11.40

4.2.3 Diagnosis

Participants were asked if they had a diagnosis for the cause of their pain. Some participants reported specific medical diagnoses given by their doctor whilst others gave the location or specific cause of the pain (e.g. whiplash). The most common diagnosis reported was spinal damage which included slipped discs and other spinal injuries related to accidents. Two

participants did not currently have a diagnosis for the cause of their pain. Table 3 displays the frequency of different diagnoses for the current sample.

Table 3: Main diagnosis

Self-reported diagnosis	Frequency	Percent
Spinal damage	12	20.7
Osteoarthritis	6	10.3
Osteoporosis	5	8.6
Nerve damage	5	8.6
Back pain (unspecified)	4	6.9
Rheumatoid arthritis	3	5.2
Spondylosis	3	5.2
Spinal stenosis	3	5.2
Fibromyalgia	2	3.4
Shoulder pain	2	3.4
Ankle pain	1	1.7
Whiplash	1	1.7
Abdominal pain	1	1.7
Diabetic neuropathy	1	1.7
Sciatica	1	1.7
ME	1	1.7
Hereditary Neuropathy	1	1.7
Spinal osteophytes	1	1.7
Arterial Disease	1	1.7
Reflex Sympathetic Dystrophy	1	1.7
Spondylitis	1	1.7
Unknown	2	3.4

4.2.4 Previous treatments

Participants were asked to report all treatments they had received since the onset of their pain. Most participants reported a range of treatments (1-13). The mean number of treatments received was 5.48 (sd = 2.43). Table 4 shows a list and frequencies of the various treatments reported. The most common treatment was oral pain relief medication (96.6%), followed by physiotherapy (67.2%) and injections (50%). Treatments reported by fewer than 5 participants were included in the 'other' category. These included radio frequency, spinal cord stimulators and ultra sound.

Table 4: Previous treatments for pain

Treatment	Frequency	Percent
Oral medication pain relief	56	96.6
Physiotherapy	39	67.2
Injections	29	50
TENS	24	41.4
Acupuncture	24	41.4
Pain relief patches	22	37.9
Surgery	20	34.5
Chiropractor	13	22.4
Epidural	11	19
Hydrotherapy	6	10.3
Osteopath	7	12.1
Other	28	48.3

4.2.5 Pain measures

Descriptive data for the pain variables and correlations with pain duration and age are presented in Table 5. As some of the variables were not normally distributed Kendall's Tau (τ) was used to calculate correlations.

The mean pain duration was 174.25 months (14 years and 6 months). As discussed above this was significantly positively skewed. The median pain duration was 10 years. There was a large variation in pain duration from 9 months to 648 months (54 years). The mean pain duration was

higher than those reported in previous studies recruiting from similar clinics ($M = 145.13$; Fogg, 2007).

The mean pain severity as measured by the VAS (0-100) is 57.6 ($sd = 14.33$). It is not possible to compare this with previous research as different scales of measurement were used. The highest, lowest and mean VAS pain ratings were all significantly correlated with pain duration (highest, $\tau = .187$, $p = .023$; lowest, $\tau = .231$, $p = .006$; mean, $\tau = .194$, $p = .017$). The lowest VAS rating was also significantly negatively correlated with age ($\tau = -.156$, $p = .044$).

The mean PDI score was 36.02 ($sd = 13.54$). This is almost identical to the mean score reported in previous research ($M = 36.76$; Fogg, 2007). Pain disability was significantly negatively correlated with age ($\tau = -.249$, $p = .004$) and significantly positively correlated with duration ($\tau = .246$, $p = .004$).

Table 5: Pain measures

Variable	Mean	SD	Range	Correlations	
				Age	Duration
Pain duration (in months)	174.25	153.62	9-648	.025	-
Pain Severity (VAS ratings)					
Mean	57.60	14.33	18-90	-.097	.194*
Highest	85.28	15.07	35-100	-.047	.187*
Lowest	30.67	20.61	0-90	-.156*	.231**
Usual	56.85	18.88	9-100	-.015	.022
Disability (PDI)	36.02	13.54	9-63	-.249**	.246**

* Correlation is significant at the 0.05 level

** Correlation is significant at the 0.01 level

4.2.6 Affect measures

Descriptive data for the affect variables are displayed in Table 6. The mean HADS depression score indicates a level of depression ($M = 6.72$) within the normal range and level of anxiety ($M = 9.34$) within the mild/borderline range (Zigmond & Snaith, 1983). The HADS scores differ from results reported by Fogg (2007) who reported higher levels of depression ($M = 9.54$) but lower levels of anxiety ($M = 7.73$) and Sutherland (2004) who reported higher levels of both depression ($M = 9.99$) and anxiety ($M = 11.83$). However, the total HADS score does not differ significantly from previous research carried out to develop the PaSol (as noted in Section 4.3; De Vlieger, Van den Bussche et al., 2006).

There were no significant correlations between the affect measures and age or pain duration.

Table 6: Measures of Affect

Variable	Mean	SD	Range	Correlations	
				Age	Duration
VAS Affect					
Depression	35.14	29.6	0-100	-.043	-.022
Anxiety	39.15	30.64	0-100	-.109	-.014
Frustration	54.72	26.33	0-100	.048	-.038
Anger	27.30	31.07	0-100	-.069	.018
Fear	29.91	32.95	0-100	-.048	.001
Mean	37.31	24.42	0-96	-.039	-.025
HADS					
Depression	6.72	3.64	1-15	-.068	.016
Anxiety	9.34	4.21	2-19	-.143	.053
Total	16.07	7.24	3-32	-.107	.024

4.2.7 Feared-for selves data

One research participant declined to complete the feared-for selves interview. Two participants who began the feared-for selves interview stated that they did not feel they had any feared-for selves and therefore could not complete the rest of the interview. One participant did not feel they were able to quantify their ability to prevent their feared-for selves becoming reality (efficacy).

It will be recalled from Chapter 3 that this study used a new method of eliciting feared-for selves by giving participants cards with different feared-for selves written on them and asking them to select any that they thought were relevant to them. Participants were also allowed to generate their own feared-for selves that were not included on the cards. Participants were allowed to select a maximum of 10 feared-for selves. The descriptive data from the feared-for selves interviews is presented in Table 7. The mean number of feared-for selves selected by participants was 7.36 (sd = 2.73). Most feared-for selves chosen were taken from the cards, although some participants also generated some of their own.

Correlations between the total number of feared-for selves elicited and school leaving age and verbal fluency scores were carried out to see if education or verbal fluency were associated with the number of items generated. There were no significant correlations found between total number of feared-for selves elicited and verbal fluency score ($\tau = .152$, $p = .070$) or school leaving age ($\tau = .034$, $p = .377$).

Table 7: Feared-for selves data

	N	Mean	SD	Range
Total number of feared selves selected	58	7.36	2.73	0-10
Proximity (1-7)	56	4.07	1.42	1-7
Expectancy (1-7)	56	4.17	1.92	1-7
Efficacy (1-7)	55	4.44	2.06	1-7
Enmeshment (0-1)	56	0.61	0.34	0-1

4.3 Comparisons with De Vlieger, Van den Bussche et al. (2006) Data

The PaSol was developed in Belgium in the Dutch language by De Vlieger, Van den Bussche et al. (2006). Although the authors provide an English version there are currently no published studies that use the English language version. The differences between the current sample ($n = 58$) and the De Vlieger, Van den Bussche et al. (2006; $n = 476$) sample include sample size, language of PaSol (English and Dutch) and potential cultural differences. As the PaSol is a key measure in testing the main hypothesis of the current study it was important to establish whether the differences highlighted above led to significant differences in responses to the PaSol. To establish this, means and correlations of the two samples were compared.

4.3.1 Comparing means

T-tests were carried out to compare the means of each sample on all shared measures. Descriptive data and t-test results are presented in Table 8. There were six shared measures between the two studies: age, pain duration, PaSol, CPAQ, HADS and PDI. Although both studies measured pain severity, different measurement instruments were used so this variable could not be compared.

The current sample was significantly older than the De Vlieger, Van den Bussche et al. (2006) sample ($t = 2.973$, $p = .0041$). The current sample also scored significantly higher on the PaSol meaningfulness of life subscale ($t = 2.510$, $p = .012$), the CPAQ activity engagement subscale ($t = 3.640$, $p = .000$) and the CPAQ pain willingness subscale ($t = 2.157$, $p = .032$). The current sample scored significantly lower on the PDI ($t = 2.465$, $p = .014$) demonstrating that the current sample reported lower levels of disability as a result of their pain. All other variables did not differ significantly from the De Vlieger, Van den Bussche et al. (2006) sample.

Table 8: Comparison between De Vlieger, Van den Bussche et al. (2006) and current study data

Variable	Mean (SD)		t value	Effect size
	Current study N = 58	De Vlieger et al. (2006) N = 476		
Age	58.88 (14.99)	52.83 (11.28)	2.973**	0.52
Pain duration	174.25 (153.62)	184.93 (131.98)	0.571	0.08
PaSol				
Solving pain	19.18 (5.09)	17.92 (5.09)	1.779	0.25
Belief in a solution	6.14 (3.84)	6.07 (3.40)	0.146	0.02
Meaningfulness of life despite pain	22.47 (5.63)	20.48 (5.71)	2.510*	0.35
Acceptance of the insolubility of pain	10.23 (5.44)	9.59 (4.38)	0.863	0.14
CPAQ				
Activity engagement	38.30 (12.90)	32.13 (12.10)	3.640**	0.50
Pain willingness	19.80 (8.84)	17.47 (7.63)	2.157*	0.30
HADS total	16.07 (7.24)	17.66 (7.78)	1.480	0.20
PDI	36.02 (13.54)	40.72 (13.73)	2.465*	0.36

* Significant at the 0.05 level

** Significant at the 0.01 level

4.3.2 Comparing correlations

Correlational data from the current study and the De Vlieger, Van den Bussche et al. (2006) study were compared. As some variables from the current study were not normally distributed, Kendall's Tau was used to calculate correlations. However, De Vlieger, Van den Bussche et al. (2006) reported using Pearson's correlation coefficient to calculate correlations. As different tests were used to calculate correlations, comparisons can only tentatively be made. Table 9 displays the correlations from both studies. Correlations from the current study are presented in the non-

shaded rows and correlations from the De Vlieger, Van den Bussche et al. study are presented below in the shaded rows.

4.3.2.1 Age and Pain duration correlations. The De Vlieger, Van den Bussche et al. (2006) study report more correlations between age and the other variables than the current study. They found a significant correlation between age and pain duration ($r = .36, p < .01$) which was not replicated in the current study ($\tau = .025, p = .394$). In the current study age was only significantly correlated with disability ($\tau = -.249, p = .004$) but the De Vlieger, Van den Bussche et al. study found no such correlation ($r = .10, p > .05$). For pain duration, the current study found significant correlations with the PaSol subscales of solving pain ($\tau = -.164, p = .044$) and belief in a solution ($\tau = -.232, p = .007$) which were not found by De Vlieger, Van den Bussche et al.

However, both studies found a significant correlation between pain duration and disability ($\tau = .246, p = .004$ and $r = .12, p < 0.05$).

4.3.2.2 PaSol Subscales. The current study found a significant negative correlation between the PaSol subscales of belief in a solution and acceptance of the insolubility of pain ($\tau = -.186, p = .027$). However, De Vlieger, Van den Bussche et al. (2006) found no relationship between these two subscales ($r = .02, p > .05$). In terms of significant results, all other correlations between the PaSol subscales were similar for the two studies. However, the strength of the correlations did differ in places, perhaps most notably in the correlations between meaningfulness of life despite pain and acceptance of the insolubility of pain subscales where the correlation reported by De Vlieger, Van den Bussche et al. ($r = .51, p < .01$) was almost double that found in the current study ($\tau = .253, p = .004$). However, it is difficult to make direct comparisons of correlations as different statistical tests were used to calculate correlations in the two studies.

Overall, the data from the current study replicate the data from the De Vlieger, Van den Bussche et al. (2006) study reasonably well, particularly when accounting for differences in the sample size, the language the PaSol was administered in and the different statistical tests used.

Table 9: Correlations for the current study^a and De Vlieger, Van den Bussche et al.(2006)^b

	M (SD)	2	3	4	5	6	7	8	9	10
1. Age	58.88 (14.99)	.025	-.078	.017	.017	.083	.103	.075	-.107	-.249**
	52.83 (11.28)	.36**	.19**	.11*	.06	.18**	.06	-.23**	.06	.10
2. Pain duration	174.25 (153.62)		-.164*	-.232**	.142	.044	-.027	.058	.024	.246**
	184.93 (131.98)		.01	-.03	.07	-.13**	-.04	.02	.02	.12*
PaSol										
3. Solving Pain (PaSol)	19.18 (5.09)			.348**	.014	-.238**	.066	-.231*	.037	-.099
	17.92 (5.09)			.38**	.06	-.18**	-.17**	-.46**	.19**	.16**
4. Belief in a Solution (PaSol)	6.14 (3.84)				.177*	-.186*	.343**	.030	-.262**	-.242**
	6.07 (3.40)				.32**	.02	.18**	-.15**	-.19**	-.17**
5. Meaningfulness of life despite pain(PaSol)	22.47 (5.63)					.253**	.593**	.223*	-.468**	-.168*
	20.48 (5.71)					.51**	.59**	.06	-.53**	-.26**
6. Acceptance of insolubility of pain (PaSol)	10.23 (5.44)						.258**	.078	-.090	-.056
	9.59 (4.38)						.40**	.09	-.27**	-.12
CPAQ										
7. Activity Engagement	38.30 (12.90)							.273**	-.460**	-.351**
	32.13 (12.10)							.05	-.47**	-.47**
8. Pain Willingness	19.80 (8.84)								-.227**	-.160*
	17.47 (7.63)								-.36**	-.19**
9. Distress (HADS)	16.07 (7.24)									.296**
	17.66 (7.78)									.45**
10. Disability (PDI)	36.02 (13.54)									
	40.72 (13.73)									

^a Current study correlations are presented in the non shaded rows; ^b De Vlieger, Van den Bussche et al. correlations are displayed in the shaded rows

* Correlation is significant at the 0.05 level **Correlation is significant at the 0.01 level

4.4 Preliminary Analysis

To investigate the main hypotheses, correlations between the PaSol subscales and feared-for self data were carried out. As noted above, some of the variables were not normally distributed. These were the feared-for selves measures of expectancy, efficacy and enmeshment and the PaSol subscales of solving pain and meaningfulness of life despite pain. Therefore, non-parametric tests were chosen. Kendall's Tau was used because of the relatively small data set. However, as the main variables involved in the hypothesis 1 (assimilation and proximity to the feared-for self) were normally distributed, parametric tests (Pearson's correlation coefficients) were also calculated and compared with the non-parametric correlations. Both sets of correlations are presented in Table 10.

For correlations which were carried out between variables that met the assumptions required for parametric tests the Pearson's correlation coefficient will be reported. For correlations involving variables which violate the assumptions required for parametric tests, Kendall's Tau statistic will be reported.

Crombez et al's. (2008) findings suggested that increased assimilative problem solving was associated with increased levels of distress. In the current study, there was also a significant correlation between assimilative problem solving and levels of distress as measured by the HADS ($r = .417, p = .001$). This replicates Crombez et al's. (2008) findings who reported a very similar correlation between assimilative problem solving and distress ($r = .46, p > .001$).

The results represent a significant negative correlation between proximity to the feared-for self and the assimilation subscale ($r = -.412, p = .001$). This provides initial support for the first hypothesis and suggests it is worthy of further investigation.

Proximity to the feared-for self was significantly correlated with the PaSol meaningfulness of life subscale ($\tau = .432, p = .000$). As proximity from the feared-for self increases, meaningfulness of life despite pain scores also increase. There was also a significant correlation between proximity to feared-for self and the PaSol acceptance of the insolubility of pain subscale ($r = .304, p = .012$). As proximity to the feared-for self increases, acceptance of the insolubility of pain also increases.

There was a significant correlation between enmeshment with feared-for selves and the assimilative problem solving score ($\tau = .290$, $p = .001$). This correlation provides initial support for hypothesis 2.

Perceived efficacy of preventing feared-for selves was also significantly correlated with assimilation ($\tau = -.266$, $p = .001$). As the perception of ability to prevent the feared-for self increased, the assimilative problem solving score decreased. Efficacy was also significantly correlated with the other PaSol subscales in the expected direction with the exception of the solving pain subscale ($\tau = .041$, $p = .258$).

Of the PaSol subscales, expectancy of feared-for selves was only significantly correlated with the meaningfulness of life despite pain subscale ($\tau = -.231$, $p = .012$).

There was a significant correlation between expectancy of feared-for selves and efficacy of preventing feared-for selves ($\tau = -.391$, $p = .000$).

Enmeshment was correlated with all PaSol subscales except for the belief in a solution to pain subscale ($\tau = .053$, $p = .296$).

The significant correlations between the feared-for selves data and PaSol subscales suggest that aspects of feared-for selves may account for some of the variance in assimilative problem solving reported in previous research (Crombez et al., 2008.)

Table 10: Non-parametric^a and parametric^b correlations between feared-for selves data and PaSol

	Mean (SD)	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	58.88 (14.99)	.025	-.039	.140	-.191*	.152	-.118	-.074	-.078	.017	.083	.017	-.107	-.249**
		.033	-.103	.183	-.232*	.223	-.151	-.145	-.107	.052	.150	-.017	-.150	-.301**
2. Pain duration	174.25		.194*	.030	-.019	-.003	-.122	-.172*	-.164*	.142	.044	-.232**	.024	.246**
			.225*	.043	-.016	.027	-.169	-.303*	-.242*	.265*	.134	-.331**	.039	.356**
3. Pain severity	57.60 (14.33)			-.149	.183*	-.164**	.081	.115	.120	-.074	-.007	-.122	.286**	.242**
				-.249*	.224*	-.268*	.051	.074	.119	-.024	-.020	-.179	.370**	.314**
Feared-for selves														
4. Proximity	4.07 (1.42)				-.286**	.458**	-.227**	-.229**	.009	.324**	.210*	.034	-.424**	-.260**
					-.393**	.619**	-.266*	-.412**	-.122	.432**	.304*	.036	-.566**	-.326**
5. Expectancy	4.17 (1.92)					-.391**	.138	.102	.072	-.231*	-.039	-.123	.266**	.190*
						-.438**	.157	.203	.083	-.292*	-.047	-.150	.368**	.243*
6. Efficacy	4.44 (2.06)						-.220*	-.266**	.041	.476**	.185*	.275**	-.563**	-.256**
							-.303*	-.411**	.068	.608**	.267*	.337**	-.721**	-.325**
7. Enmeshment	0.61 (0.34)							.290**	.186*	-.306**	-.195*	.053	.283**	.165*
								.470**	.278*	-.426**	-.288*	.080	.390**	.245*
PaSol														
8. Assimilation	34.53 (11.40)								.421**	-.508**	-.622**	.158*	.257**	.074
									.628**	-.676**	-.808**	.245*	.417**	.123
9. Solving pain	19.18 (5.09)									.014	-.238**	.348**	.037	-.099
										-.029	-.350**	.501**	.128	-.135
10. Meaningfulness	22.47 (5.63)										.253**	.177*	-.468**	-.168*
											.354**	.231*	-.597**	-.260*
11. Acceptance	10.23 (5.44)											-.186*	-.090	-.056
												-.284*	-.136	-.101
12. Belief in a solution	6.14 (3.84)												-.262**	-.242**
													-.313**	-.322**
13. Distress (HADS)	16.07 (7.24)													.296**
														.413**
14. Disability (PDI)	36.02 (13.54)													

^a Non-parametric correlations are displayed in the non-shaded rows; ^b parametric correlations are displayed in the shaded rows

*Correlation is significant at the 0.05 level **Correlation is significant at the 0.01 level

4.5 Main Hypotheses Tests

The correlations presented in Table 10 suggested that the main hypotheses were worthy of further investigation. Multiple regression analyses were carried out to establish whether proximity and enmeshment were significant predictors of assimilative problem solving when the effects of additional variables were statistically controlled. The assimilative problem solving score as calculated from the PaSol was used as the outcome variable. First, multiple regression analyses were carried out separately for proximity and enmeshment and then both variables were entered into the model together.

4.5.1 Selecting additional predictor variables

There was no previous published research reporting predictors of assimilative problem solving which could have been used to inform the decision for the analyses carried out in this study. Guidance for selecting predictor variables recommends choosing the fewest predictor variables necessary where each should predict a substantial and independent portion of the outcome (Tabachnick & Fidell, 2007). The correlations presented in Table 10 were used to establish which variables significantly correlated with the assimilative problem solving score (outcome variable). These were: pain duration; efficacy (capability of preventing the feared-for self); belief in a solution (PaSol subscale); and HADS total score.

The three PaSol subscales which are involved in the calculation of the assimilation score were not included. Additional predictor variables were also considered based on the literature, these were: pain severity (as measured by VAS), disability (as measured by the PDI) and age. However, preliminary analyses suggested that these variables did not contribute to the amount of variance explained by the model so they were not included in the main analysis.

4.5.2 Method

Different methods of multiple regression were considered, including hierarchical methods. However, it was not clear which order the predictors should be entered into the model. Therefore, all predictors were entered simultaneously using the standard forced entry method. In this method each predictor variable is assessed as if it has been entered after all other predictor variables. This means that each predictor variable's unique contribution to the model is evaluated (Tabachnick & Fidell, 2007).

4.5.3 Checking assumptions

To identify multicollinearity within the data correlations between predictor variables, Variance Inflation Factors (VIF) and Eigen values were examined. These checks indicated that the assumption of no multicollinearity was met. The Durbin-Watson statistic was used to ensure the assumption of independent errors was met. Residuals were normally distributed and the assumption of homoscedasticity was met.

4.5.4 Hypothesis 1: Individuals who are closer to their feared-for selves will be more likely to use an assimilative approach to attempt to solve the problem of pain. Therefore, proximity to the feared-for self will predict assimilative problem solving scores.

The results for the multiple regression analysis to test this hypothesis are summarised in Table 11. The model accounted for 35.4% (adjusted $R^2 = .354$) of the variance in assimilation score. This was a significant contribution to the variance ($F = 6.799$, $p = .000$). Using this model, proximity to the feared-for self did not significantly contribute to the variance in assimilation ($t = -.797$, $p = .430$). Therefore, the results do not support hypothesis 1. The variables in the model which did significantly predict variance in assimilation were the HADS score ($t = 2.011$, $p = .04$) and the belief in a solution subscale of the PaSol ($t = 2.553$, $p = .014$).

Table 11: Summary of multiple regression for hypothesis 1 (PaSol)

	<i>b</i>	Std error	β
Proximity to feared-for selves	-.961	1.206	-.116
Pain duration	-4.382	2.970	-.178
HADS	.518	.258	.320*
Efficacy	-1.303	1.009	-.226
Belief in a solution	1.021	.400	.340*

4.5.5 Hypothesis 2: Individuals with higher levels of feared-for/pain enmeshment will be more likely to use an assimilative approach to attempt to solve the problem of pain. Therefore, feared-for/pain enmeshment will predict assimilative problem solving scores.

The results of the multiple regression analysis to test this hypothesis are presented in Table 12. The model accounted for 41% (adjusted $R^2 = .41$) of the variance in assimilation score. This was a significant contribution to the variance ($F = 8.363$, $p = .000$).

The results demonstrate that enmeshment did significantly predict assimilation score ($t = 2.296$, $p = .026$). As found in the previous model (Table 11), the PaSol belief in a solution subscale was also a significant predictor of assimilation score ($t = 2.485$, $p = .016$). However, unlike the previous model the HADS was not a significant predictor of assimilation score ($t = 1.662$, $p = .103$).

Table 12: Summary of multiple regression for hypothesis 2 (PaSol)

	<i>b</i>	Std error	β
Enmeshment	9.307	4.053	.270*
Pain duration	-3.535	2.851	-.144
HADS	.413	.248	.255
Efficacy	-1.481	.879	-.257
Belief in a solution	.935	.376	.311*

A multiple regression analysis was then carried out with both proximity and enmeshment as predictor variables. The results of this analysis are presented in Table 13. This model accounted for 40.7% (adjusted $R^2 = .407$) of the variance in assimilation score. This was a significant contribution to the variance ($F = 7.072$, $p = .000$).

The results demonstrate that belief in a solution to pain had the greatest effect on the assimilation score ($\beta = .280$) which was significant ($t = 2.156$, $p = .036$). This was only slightly higher than enmeshment ($\beta = .273$) which also significantly independently predicted the assimilation score ($t = 2.314$, $p = .025$).

Table 13: Summary of multiple regression with proximity and enmeshment (PaSol)

	<i>b</i>	Std error	β
Proximity	-1.031	1.155	-.125
Enmeshment	9.402	4.063	.273*
Pain duration	-3.662	2.861	-.149
HADS	.358	.256	.222
Efficacy	-1.122	.969	-.194
Belief in a solution	.843	.391	.280*

In summary, correlations indicated that the hypothesised relationships between both proximity to the feared for self and assimilation and enmeshment and assimilation were significant and in the expected direction. Multiple regression analyses were carried out to further investigate these relationships whilst controlling for other variables that were significantly correlated with assimilation. The results of these analyses suggest that proximity to the feared-for self does not significantly predict assimilation score when the variance explained by other variables is accounted for. However, the results did demonstrate that feared-for/pain enmeshment was a significant predictor of assimilation even when the variance from other variables is considered.

CHAPTER 5: MEPSP RESULTS

5.1 Introduction

The Means End Problem Solving for Pain task (MEPSP) is a new measure developed as part of this thesis. The MEPSP involves asking respondents to generate solutions to problem vignettes. In total 8 items were developed. This consisted of 4 pain items and 4 control items. The development of the MEPSP is described in detail in Chapter 2. All responses to the MEPSP were recorded and transcribed. Solutions for the MEPSP were divided into five categories. The transcripts were read and the solutions to each item were categorised and summed (see MEPSP manual, appendix 1). The categorisation of the MEPSP responses allows for the calculation of 2 scales for each participant: an assimilative scale and an accommodative scale. The assimilation scale is calculated by summing persistence and removal solutions and the accommodation subscale is calculated by summing all alternative solutions provided. These can be separately calculated for pain and control items.

Out of the 58 participants recruited for the study, 57 completed the MEPSP. A total of 55 MEPSP transcripts were scored giving a total sample size of 55 for the MEPSP data.

This chapter begins with results regarding the reliability and validity of the MEPSP. Descriptive data is then presented. The chapter ends with the preliminary results for the main study hypotheses when the MEPSP data are used as the problem solving measure.

5.2 Reliability and Validity of the MEPSP

5.2.1 Inter-rater reliability

To assess inter-rater reliability, all transcripts were scored by two independent raters. Three additional raters were recruited for this purpose (SD, SC and SM). Additional raters attended a 90 minute training session on the MEPSP scoring procedures and were given a scoring manual (included in appendix 1). All transcripts were scored by the main researcher (CW) and one of the three additional raters. This resulted in two sets of scores for each participant's data. Intraclass correlation coefficients (ICC) were calculated to assess consistency between the two sets of scores. The absolute agreement ICC was selected for this purpose as this is the most accurate calculation of absolute differences between raters (McGraw & Wong, 1996). Therefore, when applied to this data, the ICC gives an indication of the extent to which the same solutions were categorised and scored in the same way by each rater. The ICC produces

results for average measures and single measures. The single measures ICC will be reported here as the calculation of the ICC was based on single, as opposed to mean, ratings.

There are no specific guidelines for the interpretation of ICC's. However, the closer the ICC is to 1 the greater the consistency between raters. In this study, ICC's above .6 are considered to indicate adequate consistency and ICC's above .7 are considered to indicate good consistency.

The ICC results for each scale are presented in Table 14. Scoring of accommodation was adequately consistent ranging from .62 (SD) to .68 (SC). Scoring of assimilation was considered to be good with ICC's ranging from .73 (SM) to .90 (SC). The quality of responses was not rated by one additional rater (SM) so this data cannot be reported. However, the available data on quality of responses suggests that this scale was unreliable with both ICC's below .3. For this reason quality of responses was not used in any subsequent data analyses.

Table 14: Intraclass Correlations (ICC) for MEPSP scales

2 nd Rater	Scale	Absolute agreement ICC	
		Single	Average
SC n = 18	Assimilation	.90	.95
	Accommodation	.68	.81
	Quality	.27	.43
SD n = 19	Assimilation	.85	.92
	Accommodation	.62	.76
	Quality	.29	.45
SM n = 18	Assimilation	.73	.85
	Accommodation	.66	.79
	Quality	Not rated	

As ratings of the scales were considered to be at least adequately reliable, subsequent analyses involving the MEPSP are carried out using the main researcher's ratings.

5.2.2 Internal consistency

Cronbach's α was used to assess internal consistency of the MEPSP scales (assimilation and accommodation) for the four pain items. The assimilation scale demonstrated good internal consistency ($\alpha = .77$) but this was not as high for the accommodation scale ($\alpha = .64$). However, the administration of the MEPSP involved interviewer prompts for alternative solutions if pain removal solutions were initially provided. This is likely to have affected participant's responses to subsequent items. Taking this into consideration, the internal consistency of the MEPSP pain scales is acceptable.

5.2.3 Validity

To assess construct validity correlations between the PaSol subscales, the CPAQ and the MEPSP scales were carried out. As the MEPSP data were not normally distributed, correlations were calculated using Kendall's Tau statistic. These results are presented in Table 15.

Correlations between the MEPSP pain assimilation scale and the PaSol subscales were in the expected direction. The MEPSP pain assimilation scale was most associated with the PaSol acceptance of insolubility of pain subscale ($\tau = -.279$, $p = .002$) and the PaSol assimilation subscale ($\tau = .245$, $p = .006$). Although the correlation between the PaSol assimilation scale and the MEPSP pain assimilation scale was in the expected direction, it was not as high as expected considering that the two scales aim to measure the same construct.

The MEPSP pain accommodation scale was negatively correlated with the PaSol assimilation scale as expected. However, this correlation was not significant ($\tau = -.154$, $p = .061$). The MEPSP pain accommodation scale was significantly correlated with the PaSol acceptance subscale ($\tau = .180$, $p = .038$). However, the expected correlation between the MEPSP pain accommodation scale and the PaSol meaningfulness of life despite pain was not significant ($\tau = .130$, $p = .099$). The MEPSP pain accommodation scale was significantly correlated with the total CPAQ score ($\tau = .218$, $p = .033$) demonstrating that as acceptance increased so did the number of alternative solutions generated to the MEPSP pain items.

There were no significant correlations between the MEPSP control items and the PaSol subscales or the total CPAQ score. This was expected as the PaSol and CPAQ specifically target problem solving and acceptance in relation to pain.

5.3 Descriptive Data

Descriptive data for the MEPSP are presented in Table 16. The MEPSP scales were not normally distributed. As parametric assumptions were violated, the Wilcoxon signed-rank test was used to compare the mean number of responses to control items with the mean number of responses to pain items. The mean number of total solutions for pain items was higher ($M = 10.67$, $sd = 5.48$) than the mean number of total solutions for control items ($M = 5.13$, $sd = 1.45$). This was a significant difference ($z = -5.940$, $p = .000$). The mean assimilation score was significantly higher for pain items ($M = 6.22$, $sd = 6.33$) than control items ($M = 1.62$, $sd = 1.57$; $z = -5.048$, $p = .000$). The mean accommodation score was significantly higher for pain items ($M = 4.45$, $sd = 2.25$) than control items ($M = 3.51$, $sd = 1.57$; $z = -3.697$).

The significant differences between the number of responses to control items and pain items could be explained by differences in administration. During administration of the MEPSP if a removal solution was given to a pain item the interviewer prompted the participant for an alternative response. However, no prompt was given if removal solutions were provided to control items. Therefore it was expected that a greater number of solutions to pain items would be generated than to control items.

Table 156: Descriptive data for the MEPSP

	Scale	Minimum	Maximum	Mean	SD
Pain items	Assimilation	0	23	6.22	6.33
	Accommodation	0	11	4.45	2.25
	Total	2	26	10.67	5.48
Control items	Assimilation	0	8	1.62	1.57
	Accommodation	0	8	3.51	1.57
	Total	2	9	5.13	1.45

The assimilation and accommodation scales for the pain items were also compared using the Wilcoxon signed-ranks test. The mean number of assimilation solutions for pain items ($M = 6.22$, $sd = 6.33$) was higher than the mean number of accommodation solutions for pain items ($M = 4.45$, $sd = 2.25$). However, this was not a significant difference ($z = -.694$, $p = .246$).

5.3.1 Confounding variables

Correlations were carried out between MEPSP data and verbal fluency and school leaving age to see if education or verbal fluency were associated with the number of solutions generated. There were no significant correlations between the total number of pain solutions generated and school leaving age ($\tau = -.087$, $p = .207$) or verbal fluency score ($\tau = -.017$, $p = .433$). There were no significant correlations between the total number of control solutions generated and school leaving age ($\tau = .040$, $p = .361$) or verbal fluency score ($\tau = .026$, $p = .404$). This suggests that the total number of MEPSP solutions generated was not associated with education or verbal fluency.

5.4 Preliminary Analysis with MEPSP Data

Correlations between the pain variables, MEPSP scales and feared-for selves data were carried out as a preliminary test of the main hypotheses. These are a replication of the correlations carried out in Chapter 4, section 4.4 but substituting the PaSol data with the MEPSP data. As noted above, the MEPSP scales were not normally distributed. Therefore, Kendall's Tau was used to calculate correlations. The results of these correlations are presented in Table 17.

There was a significant relationship between the MEPSP pain assimilation scale and proximity to the feared-for self ($\tau = -.210$, $p = .016$). This is very similar to the relationship between the PaSol assimilation scale and proximity to the feared-for self ($\tau = -.229$, $p = .008$). This provides initial support for the hypothesis 1.

Also noteworthy is the significant correlation between the MEPSP accommodation scale and proximity to the feared-for self ($\tau = .358$, $p = .000$). As perceived proximity to the feared-for self increased, the number of accommodation solutions provided to pain items decreased.

There was a significant relationship between the MEPSP assimilation scale and pain/feared-for enmeshment ($\tau = .167$, $p = .048$). However, there was a greater correlation between the PaSol assimilation scale and pain/feared-for enmeshment ($\tau = .290$, $p = .001$). Both these findings provide initial support for hypothesis 2.

As noted for hypothesis 1, there is also a significant relationship between enmeshment and the MEPSP accommodation scale ($\tau = -.304$, $p = .002$). As the level of pain/feared-for enmeshment increases the number of accommodation solutions provided in response to MEPSP pain items decreases.

Table 16: Correlations between pain variables, MEPSP data, feared-for selves and distress

	Mean (SD)	2	3	4	5	6	7	8	9	10	11
1. Pain duration	174.25 (153.62)	.194*	-.172*	.061	-.010	.030	-.019	-.009	-.122	.024	.246**
2. Pain severity	57.60 (14.33)		.115	-.245**	.071	-.149	.153	-.164*	.081	.286**	.231**
3. PaSol Assimilation	34.53 (11.40)			-.154	.245**	-.229**	.102	-.266**	.290**	.257**	.074
MEPSP											
4. Pain accommodation	4.45 (2.25)				-.339**	.358**	-.139	.208*	-.304**	-.229*	-.168*
5. Pain assimilation	6.22 (6.33)					-.210*	.082	.036	.167*	.004	.113
Feared-for Selves											
6. Proximity	4.07 (1.42)						-.286**	.455**	-.227**	-.424**	-.260**
7. Expectancy	4.17 (1.92)							-.391**	.138	.266**	.190*
8. Efficacy	4.44 (2.06)								-.218*	-.555**	-.259**
9. Enmeshment	0.61 (0.34)									.283**	.165*
10. Distress (HADS)	16.07 (7.24)										.296**
11. Disability (PDI)	36.02 (13.54)										

* Correlation is significant at the .05 level **Correlation is significant at the .001 level

5.5 Main Hypotheses Tests with MEPSP Data

These were a replication of the regression analyses described in Chapter 4, section 4.5 with the MEPSP assimilation scale as the outcome variable. First, multiple regression analyses were carried out separately for proximity and enmeshment and then both variables were entered into the model together. Multiple regressions were carried out using the standard forced entry method with the following additional predictor variables: pain duration, efficacy of preventing feared-for selves, belief in a solution to pain (PaSol) and HADS total.

5.5.1 Checking assumptions

To identify multicollinearity within the data correlations between predictor variables, Variance Inflation Factors (VIF) and Eigen values were examined. These checks indicated that the assumption of no multicollinearity was met. The Durbin-Watson statistic was used to ensure the assumption of independent errors was met. Residuals were normally distributed and the assumption of homoscedasticity was met.

5.5.2 Hypothesis 1: Individuals who are closer to their feared-for selves will be more likely to use an assimilative approach to attempt to solve the problem of pain. Therefore, proximity to the feared-for self will predict assimilative problem solving scores.

To test this hypothesis a multiple regression model was calculated with the MEPSP assimilation score as the outcome variable, proximity to the feared-for self as one predictor variable and the additional predictor variables outlined above. This model accounted for 12% (adjusted $R^2 = .12$) of the variance in assimilation score. However, this did not quite reach the required level of significance ($F = 2.393$, $p = .052$). As the overall model nearly reached the required level of significance the contribution of individual predictors are reported in Table 18 as an exploratory finding. Only proximity to the feared-for self significantly contributed to the variance in assimilation ($t = -2.570$, $p = .013$).

Table 178: Summary of multiple regression for hypothesis 1 (MEPSP)

	<i>b</i>	Std error	β
Proximity to feared-for selves	-2.180	.848	-.456
Pain duration	1.671	1.926	.125
HADS	.054	.173	.060
Efficacy	.601	.652	.189
Belief in a solution	.344	.258	.210

5.5.3 Hypothesis 2: Individuals with higher levels of feared-for/pain enmeshment will be more likely to use an assimilative approach to attempt to solve the problem of pain. Therefore, feared-for/pain enmeshment will predict assimilative problem solving scores.

To test this hypothesis a multiple regression model was calculated with the MEPSP assimilation score as the outcome variable and enmeshment with the feared-for self, pain duration, efficacy of preventing feared-for selves, belief in a solution to pain (PaSol) and HADS total as predictor variables. This model accounted for 6% (adjusted $R^2 = .06$) of the variance in assimilation score. This was not a significant contribution to the variance ($F = 1.622$, $p = .173$).

A multiple regression analysis was then carried out which included both proximity and enmeshment as predictor variables. The results of this analysis are presented in Table 19. This model accounted for 15.1% (adjusted $R^2 = .151$) of the variance in assimilation score. This was a significant contribution to the variance ($F = 2.511$, $p = .035$).

The results demonstrate that proximity to the feared-for self had the greatest effect on the MEPSP assimilation score ($\beta = -.431$) which was significant ($t = -2.462$, $p = .018$). None of the other variables, including enmeshment, were significant predictors of the assimilation score.

Table 19: Summary of multiple regression with proximity and enmeshment (MEPSP)

	<i>b</i>	Std error	β
Proximity	-2.059	.836	-.431
Enmeshment	4.598	2.816	.235
Pain duration	1.961	1.900	.146
HADS	-.001	.173	-.001
Efficacy	.682	.642	.214
Belief in a solution	.255	.259	.156

5.6 Accommodation

An accommodation scale was calculated using the MEPSP. The accommodation scale was significantly correlated with other significant variables. Therefore, an exploratory regression analysis was carried out with the accommodation scale as the dependent variable to see which variables were significant predictors of accommodation. All variables which were significantly correlated with accommodation were entered as predictor variables. The data were checked for multicollinearity, normality, linearity and homoscedasticity. Collinearity was checked using VIF and Eigen values. Residuals were normally distributed and the assumption of homoscedasticity was met.

The results of this analysis are presented in Table 20. This model accounted for 33.4% of the variance in accommodation score (adjusted $R^2 = .334$). This was a significant contribution to the variance ($F = 5.175$, $p = .000$).

In terms of individual predictors, both enmeshment ($t = -2.561$, $p = .014$) and proximity ($t = 2.905$, $p = .006$) were significant predictors of the accommodation score.

Table 20: Multiple regression summary table for the prediction of accommodation

	<i>b</i>	Std error	β
Proximity	.786	.271	.453
Enmeshment	-2.193	.857	-.312
PDI	.017	.023	.098
HADS	-.034	.056	-.108
Efficacy	-.049	.189	-.044
Pain severity	-.011	.021	-.068

In summary, the correlations between both proximity to the feared-for self and feared-for/pain enmeshment and the PaSol assimilation score were replicated when the MEPSP was used as the measure of assimilation. However, the same multiple regression model was not a significant predictor of the MEPSP assimilation score. In contrast to the PaSol regression results, the MEPSP regression model demonstrated that proximity but not enmeshment was an independent significant predictor of assimilation.

The accommodation scale calculated from the MEPSP results was significantly correlated with variables measuring distress, pain and the relationship with the feared-for self. A regression analysis confirmed that proximity to the feared-for self and feared-for/pain enmeshment were both significant predictors of accommodation even when other variables were statistically controlled.

CHAPTER 6: DISCUSSION

6.1 Introduction

The main aim of this research was to explore the relationship between the feared-for self and persistence with inappropriate problem solving in chronic pain. A review of the relevant literature led to two specific hypotheses regarding problem solving and the feared-for self. First, it was hypothesised that individuals who were closer to their feared-for selves would be more likely to adopt an assimilative problem solving approach to dealing with pain. Second, it was hypothesised that individuals who reported higher levels of enmeshment would be more likely to persist with assimilative attempts to solve the problem of pain.

A cross sectional multiple measures design was used to investigate the research hypotheses and 58 participants were recruited from pain clinics in the Leeds area. Problem solving data gathered using the Pain Solutions Questionnaire (PaSol) and the new measure, the Means End Problem Solving for Pain task (MEPSP), were both used to test the main hypotheses. Multiple regression analyses were used to explore the relationship between the feared-for self and problem solving while the effects of other variables were statistically controlled.

This chapter begins with a consideration of the results in relation to the main research hypotheses. This is followed by a discussion of the other relevant findings of the study. Next, the limitations of the current study, including the MEPSP measures, are examined followed by a consideration of the clinical implications of the results. Finally, potential avenues for future research are suggested.

6.2 Research Hypotheses

Hypothesis 1 considered the relationship between proximity to the feared-for self and assimilative problem solving. The significant correlation between proximity to the feared-for self and both the PaSol assimilative problem solving score and the MEPSP assimilation scale provided initial support for hypothesis 1. Further support for this hypothesis was sought using the MEPSP assimilation scale as the criterion variable. However, the corresponding multiple regression analysis failed to reach significance at the conventional level ($p=0.52$) although with a univariate analysis proximity to the feared-for self was a significant predictor of the MEPSP assimilation scale. However, these findings were not supported by the regression analysis with the PaSol assimilation scale as the outcome variable where proximity to the feared-for

self was not found to significantly predict assimilation when other variables were statistically controlled.

Hypothesis 2 considered the relationship between enmeshment with the feared-for self and assimilative problem solving. The correlations between both measures of assimilation (PaSol and MEPSP) and enmeshment provided initial support for hypothesis 2. Further support for this hypothesis was provided by the results of the regression analyses with the PaSol assimilation scale as the outcome variable. However, this was not replicated when the MEPSP assimilation scale was used as the outcome variable.

The two measures of assimilation used in this study have produced different results making it difficult to draw definite conclusions regarding the main hypotheses. This may be because of problems with the instruments used to measure this variable. The PaSol has demonstrated good reliability and validity in two previous studies (Crombez et al., 2008; De Vlieger, Van den Bussche et al., 2006). However, its construct validity as a measure of actual problem solving behaviour has been questioned due to the limitations of the self-report questionnaire format (Crombez et al., 2008). The MEPSP was designed to address this issue as participants were required to generate solutions to problem vignettes, thus aiming to measure actual problem solving ability. However, the MEPSP is only in the early stages of development and the limitations of this new measure are discussed further in Section 6.4.7. The reduced sample size for testing individual predictors in the multiple regression analyses may also have affected these results. Further limitations of the current study are also discussed below.

In summary, results from the correlation analysis provide preliminary support for both hypotheses being tested in the current study. However, results from regression analyses differ depending on the instrument used as the measure of assimilation. For this reason, further investigations are necessary before rejecting or accepting either of the main hypotheses.

6.3 Other findings

6.3.1 Efficacy

In this study, efficacy represents the extent to which an individual perceives that they are capable of preventing becoming their feared-for selves. The current findings suggest a negative relationship between efficacy of preventing feared-for selves and assimilative problem solving. As perceived efficacy of preventing feared-for selves increases, assimilative problem solving decreases. Perhaps individuals whose feared-for selves are not conditional

on the continued presence of pain pursue alternative methods of avoiding the feared-for self than those associated with pain removal. The negative correlation between assimilation and efficacy may be explained because individuals who believe they are capable of preventing their feared-for selves are not as motivated to remove pain because pain removal is not associated with higher order goals related to self identity. These are only speculations extending from the current findings. Further research would be necessary to explore these propositions given that the multiple regression analyses revealed that when controlling for other variables efficacy did not independently predict the assimilation score.

6.3.2 Belief in a solution

The assimilation scale of the PaSol was significantly correlated with the belief in a solution to pain scale. Further analyses revealed that belief in a solution was still a significant predictor of assimilative problem solving (as measured by the PaSol) even when controlling for additional variables. These findings fit with the dual process model definition of assimilation as intentional attempts to adapt circumstances in pursuit of goals where the individual believes that both a solution exists and that they have the resources to achieve it. Brandtstadter and Renner (1990) state that when an individual holds the belief that a solution exists they will persist with assimilative attempts to solve the problem.

However, according to the current findings, belief in a solution only explains a relatively small proportion of the variance in assimilative problem solving. Crombez et al., (2008) reported that chronic pain patients engaged in persistent assimilative attempts to solve pain despite a low belief that a solution exists. This was concluded by comparing chronic pain patients with acute pain patients. Both groups reported similar levels of assimilative problem solving but the chronic pain group reported significantly lower levels of belief in a solution as measured by the PaSol. However, Crombez et al. (2008) do not report the correlation between assimilation and belief in a solution for the chronic pain group. De Vlieger, Van den Bussche et al. (2006) report a significant correlation between the problem solving subscale (which is included in calculating the assimilation scale) and belief in a solution.

Maintaining a high belief in a solution to chronic pain may be problematic if it encourages persistent pursuit of an unattainable goal (i.e. the elimination of pain). However, the correlation results of the current study suggest that belief in a solution is associated with lower levels of distress and pain related disability. These results are a replication of De Vlieger, Van den Bussche et al. (2006) who also report a significant negative correlation between belief in a

solution and distress and disability. These findings are contrary to expectations if belief in a solution is one of the factors which leads to persistent assimilative problem solving. However, causality cannot be inferred from these results. Therefore, it may be the case that maintaining a high belief in a solution does not directly cause assimilation but that, if an individual takes an assimilative approach, maintaining a high belief in a solution protects them from becoming distressed. Whilst belief in a solution is maintained assimilative problem solving is not as distressing because the individual expects to find a solution. It is possible that it is only when belief in a solution diminishes but assimilation continues that assimilation becomes problematic. This fits with the propositions made by Crombez et al. (2008). However, further research is necessary to fully explore this issue.

Another possible explanation for these findings is the relationship between belief in a solution and accommodation. Belief in a solution would be problematic if it inhibited accommodation as is suggested by the dual process model. However, the current findings regarding this issue are mixed. The correlations between the CPAQ results and belief in a solution show that a higher belief in a solution is related to higher levels of activity engagement despite pain. Increased scores on the CPAQ activity engagement subscale are associated with lower levels of distress in a chronic pain population (McCracken & Eccleston, 2006). Furthermore, the MEPSP data from the current study suggest that there is no relationship between accommodation and belief in a solution. This suggests that belief in a solution does not automatically inhibit the ability to generate alternative solutions to the problem of pain.

This was also demonstrated in responses given to the MEPSP task in the current study. Some participants clearly stated that they were hopeful that a solution to their pain would be found and that they would continue to pursue this. However, they also demonstrated that they were not waiting for a solution to their pain before pursuing other valued life goals. This was also demonstrated in their responses to the MEPSP task where they were able to provide alternative programs to achieve principle goals when current programs were blocked by pain. This is only an observation but it does provide further support for the need for further investigation of the role of accommodation.

6.3.3 Accommodation

The MEPSP data were used to calculate an accommodation scale by summing the total number of alternative solutions (i.e. solutions which did not directly involve attempts to remove pain) to pain items. Accommodation was negatively associated with both measures of assimilation

(MEPSP and PaSol) and measures of distress and disability. Proximity to the feared-for self and enmeshment were both independent predictors of accommodation even when the effects of pain severity, distress, disability and efficacy were statistically controlled.

These findings have several implications for the literature reviewed in the introduction. First, the negative association between accommodation and assimilation supports the proposition that assimilation can inhibit accommodation (Brandtstadter & Rothermund, 2002; Eccleston & Crombez, 2007). Part of the negative effects of assimilation may be due to the fact that continued assimilation inhibits consideration of alternative solutions as postulated in the misdirected problem solving loop (Eccleston & Crombez, 2007). Repeated assimilation may be problematic because it keeps individuals trapped in this loop. However, although the negative correlation between accommodation and assimilation is significant, it is less than expected for it to be concluded that assimilation directly inhibits accommodation.

Schmitz et al. (1996) suggested that accommodation had a 'buffering' effect which resulted in less distress and disability in a chronic pain population. This is supported by the current findings which demonstrate that distress and disability are negatively correlated with accommodation. Accommodation was also significantly correlated with acceptance, as measured by the PaSol and the CPAQ, which has consistently been shown to be related to lower levels of distress and pain related disability (McCracken, 1998). Acceptance may result in higher levels of accommodation or it could be that the process of accommodation (i.e. finding alternative solutions to higher order goals or adjusting goals in accordance with circumstances) results in the individual being more accepting of their pain because it does not pose a direct threat to their sense of self. Wrosch, Scheier, Miller et al. (2003) discuss the importance of identifying, valuing and engaging with new goals highlighting that it is not just the ability to devalue and disengage from futile goals that is important for well-being but the ability to attach value to and reengage with new ones. These findings suggest that it is important to consider the role of accommodation, and not just assimilation, when accounting for the variance in distress reported in chronic pain patients. Inability to accommodate may be more important when considering pain related distress than persistent assimilation.

A further finding of note is the positive correlation between accommodation and age. Although just below the required level of significance, this association fits with Brandtstadter and Renner's (1990) conclusions that as people become older they increasingly respond to

difficulties with an accommodative problem solving approach. This may also explain the negative correlations between age and distress and pain related disability.

6.4 Potential Limitations of the Research

There are several limitations to the current research which may affect the reliability and validity of the results. Due to recruitment procedures and ethical constraints there is no information available about patients attending the pain clinics that declined to participate in this study. Therefore, it is difficult to assess whether the sample is representative of the target population. Where possible the results of the current study were compared with previous research findings to assess whether the current sample differed substantially.

6.4.1 Sample size

The sample size was substantially lower than recommended for testing individual predictors for the multiple regression models. The sample size in the current study varied from 55 (for the calculations involving the MEPSP data) to 58 (for the calculations involving the PaSol data). The multiple regression analysis in this study included between 5 and 6 individual predictor variables. According to Tabachnick and Fidell (2007) a sample size of either 109 (for 5 individual predictors) or 110 (for 6 individual predictors) is required. However, the current sample size was sufficient to reliably predict correlations of $r = 0.26$.

6.4.2 Demographics

With the exception of age, all demographic results from the current sample were comparable to samples included in previous studies recruiting from specialist pain clinics in the same geographical area. The mean age of the current sample was higher than previous research which also did not have an upper age limit (Fogg, 2007). Results from the current study suggest that increased age was significantly correlated with lower levels of pain severity and less pain related disability. The increased age of the current sample mean that the results may not be generalisable to a younger population of people with chronic pain.

6.4.3 Pain measures

The sample in this study reported experiencing pain for a substantially longer duration than reported in previous studies which recruited samples from similar specialist pain clinics. This may partly be explained by the higher average age of participants in the current sample.

Participants in the current study reported very similar levels of pain related disability, as measured by the PDI, to those in previous research (Fogg, 2007). However, in contrast to previous studies, the current results demonstrated a significant negative correlation between age and disability suggesting that older participants reported lower levels of disability. The PDI is a subjective measure of pain-related interference and not a behavioural measure of what an individual can actually do. Therefore, one possible explanation for this finding is that older people perceive themselves to be less disabled rather than actually being less disabled as their expectations of how able-bodied they should be changes as they get older.. The PDI includes items related to vocational activities and family responsibilities and many older participants reported low levels of disability in these areas as they were no longer working or were not directly involved in the care of dependents so pain was no longer impacting on these areas of their life. Research supporting the psychometric properties of the PDI was carried out on a sample with a lower mean age than the current sample (Tait et al., 1990). The sample involved in the development of the PDI had a maximum age of 70 years (Pollard, 1984). Therefore, the reliability and validity of the PDI for individuals over 70 years of age has not been established. 16 participants in the current study were over 70 years of age.

6.4.4 Affect measures

Levels of distress reported by the current sample were lower than those reported in studies recruiting from similar clinics (Fogg, 2007; Sutherland, 2004). This indicates that the current sample may represent a less distressed group. It may be the case that less depressed individuals were more likely to agree to participate in the current research. Again, these findings might affect the extent to which the current results can be generalised to the wider chronic pain population. However, the current results regarding levels of distress did not significantly differ from those reported by De Vlieger, Van den Bussche et al. (2006) which included a much larger sample of participants.

6.4.5 Feared-for selves data

A novel method of eliciting feared-for selves was used in this study by giving participants cards with example feared-for selves written on them. Previous methods have required participants to generate their own feared-for selves without prompts (Carver et al., 1999; Davies, 2002; Sutherland, 2004). The method used in this study seems to have resulted in a greater number of feared-for selves being elicited than in previous studies (Sutherland, 2004). Although it was made clear to participants that they could generate their own feared-for selves many

participants selected only the feared-for selves included on the cards. The use of the cards may have encouraged participants to select feared-for selves which they would not have selected without this prompt. To address this, the researcher did emphasise that participants should only choose feared-for selves which they felt were currently directly relevant for them. This method may have also reduced the impact of other factors on the elicitation of feared-for selves (e.g. verbal ability). This is supported by the fact that the verbal fluency score was not correlated with the number of feared-for selves selected. However, it is acknowledged that other factors, not measured in the current study (e.g. ability to self reflect), may still have influenced the number and type of feared-for selves selected.

Proximity to the feared-for self was measured using the same method as Carver et al. (1999). This involved asking participants to rate how close they currently felt they were to each feared-for characteristic on a 7 point scale. Carver et al. (1999) do not report mean proximity to the feared-for selves. Therefore, it is not possible to compare their results with the current findings. This method was different to the original Selves Questionnaire (Higgins, 1987) which involved eliciting actual selves and comparing these with feared-selves to calculate discrepancies. However, Sutherland (2004) highlighted many difficulties with using this method of calculating discrepancies. Therefore, the current method was thought to be a quicker and more direct measure of proximity to future selves.

During the feared-for selves interview some participants expressed that it was much more important for them to avoid some of the feared-for selves they had selected than others. It makes sense that avoiding certain feared-for selves will have greater importance for certain individuals. However, this information was not captured by the method of data collection. This could have been measured by asking participants to rank the importance of avoiding each of the feared-for selves they had selected. This information could have been used in the analysis to investigate whether the variance in problem solving could be further explained by the importance of the feared-for self which was perceived to be in close proximity or enmeshed.

The extent of feared-for/pain enmeshment was measured in this study by asking participants if each of the feared-for selves they had elicited were dependent on the continued presence of pain. The enmeshment score was then calculated by dividing the number of feared-for selves conditional on the continued presence of pain with the total number of feared-for selves selected. This may have led to misrepresentative enmeshment scores for some individuals.

For example, a participant who only selected one feared for self which was dependent on the continued presence of pain (e.g. more disabled) would receive an enmeshment score of 1 indicating complete enmeshment.

The enmeshment score could also represent two different relationships with the feared-for self. The first possibility is that a participant with a high enmeshment score rates feared-for selves as being conditional on the continued presence of pain which someone with a low enmeshment score doesn't (e.g. being bad tempered). In this case, enmeshment represents attributing possible feared-for selves to the continued presence of pain which are not directly related to the pain. A second possibility is that a highly enmeshed person selects a greater number of feared-for selves which are accurately dependent on the continued presence of pain (e.g. becoming more disabled) than a person who reports lower levels of enmeshment. In this case, enmeshment represents a selective bias towards feared-for selves which are directly related to pain. Further exploration of the feared-for selves data is necessary to investigate this issue.

Efficacy and expectancy were also measured in relation to feared-for selves. This was done by asking participants to rate on a 1-7 scale how likely they felt it was that they would become their feared-for selves (expectancy) and how capable they felt they were of preventing their feared-for selves (efficacy). Some participants said they found it difficult to answer this in relation to their feared-for self overall as some of their feared for selves they felt they were very capable of preventing whereas others they felt they were not. In these cases, participants tended to provide ratings in the middle of the scale (4).

6.4.6 Design and analysis

In addition to the above issues, the results are also limited by the design of the study. The cross sectional design means that although relationships between variables can be evaluated, causality cannot be assessed. This issue has already been noted above in reference to the main findings of the study.

Although the results of the multiple regression analyses demonstrated that certain variables did significantly predict assimilation these models did not account for the whole variance in assimilation. This indicates that there are other unidentified variables which were not measured and controlled for in the current study which account for some of the variance in the assimilation score. Identifying and controlling for these variables could have significantly

affected the results regarding the main hypothesis and resulted in different conclusions being drawn.

6.4.7 The MEPSP

The MEPSP was a new measure developed during this study. Therefore there are no previous results to compare with the current sample. Comparisons between the PaSol assimilation subscale and the MEPSP assimilation scale reveal differences between the two. The PaSol is the only published measure of assimilation designed specifically for a chronic pain population. Correlations between the PaSol and MEPSP assimilation scales are significant. However, they are not as high as expected given that both scales aim to measure the same construct. Previous studies have established the reliability of the PaSol. However, the construct validity of the PaSol has been questioned (Crombez et al., 2008). The MEPSP was designed to address this issue by measuring actual problem solving ability. Further research is necessary to further establish the validity and reliability of these instruments as measures of assimilation.

The previous research on the relationship between assimilative problem solving and distress led to the expectation that there would be a positive correlation between assimilation and the HADS score. The PaSol assimilation and the HADS score were positively correlated. However, there was no correlation between the MEPSP assimilation scale and the HADS score. One possible reason for the differences between the MEPSP assimilation score and the PaSol assimilation score is that the PaSol assimilation score does not just measure persistent attempts to solve pain. The PaSol assimilation score is the sum of the solving pain subscale, the reverse score of the acceptance of the insolubility of pain subscale and the reverse score of the meaningfulness of life subscale. In the current sample, the solving pain subscale alone does not correlate with the HADS.

The results for the MEPSP indicate good levels of inter-rater reliability for assimilation ratings and adequate levels of inter-rater reliability for accommodation ratings. However, it may be possible to improve on inter-rater reliability by providing further training for additional raters. Each solution to the MEPSP was also rated according to its overall quality which included an assessment of the plausibility and elaboration of the response (see appendix 1). There was a large variation in the quality of solutions generated from single word responses to detailed responses where participants acknowledged the complexities of the problem and provided examples from their own lives. Therefore, the quality of responses and not just the number of solutions generated was considered to be important when analysing results. However, the

ratings of quality of response lacked inter-rater reliability so could not be included in further analysis. Feedback from additional raters indicated that the definitions of quality ratings were not clear enough. Inter-rater reliability for quality ratings could be improved upon by extending the instructions and definitions for quality ratings in the manual and providing further training for raters.

Although the MEPSP measures respondents' ability to generate different types of solutions to problem vignettes it does not measure the extent to which participants apply this to their own lives. In an attempt to address this issue participants were asked to consider what they thought they would do if they were the person in the vignette when responding to the MEPSP items. Some participants clearly did this as their response included examples from their own lives. The personal relevance of the MEPSP items for participants could have been assessed by asking participants to rate how important/relevant the principle goals presented in the vignettes were in the context of their own lives.

The MEPSP was designed to measure three different types of accommodative response: changing the program but retaining the context, changing the program and changing the context and, changing the principle. In the current analysis these responses were summed to produce the accommodation scale. However, further analysis involving the different types of accommodative response may be useful.

Furthermore, the MEPSP did not measure abandonment of goals. Some participants gave responses which indicated that the principle goal had been abandoned. Some responses indicated that this was following a process of acceptance; acknowledging that the goal could not be achieved and instead choosing to focus on goals which still could be. In these cases, responses were rated as changing the principle goal and thus contributed to the accommodation score. However, other responses indicated that the goal had been abandoned without engaging in alternative goals. These were indicated by the respondent not being able to state how the end of the story, where the person felt better, had been reached. The current MEPSP does not account for this type of response. However, the literature indicates that goal abandonment which is not followed by reengagement with other goals is highly related to increased levels of distress and disability. Therefore, it would be useful to adapt the MEPSP so that the concept of goal abandonment could also be measured.

There are also limitations to the MEPSP measure of accommodation. Currently this is a measure of an individual's ability to generate non-pain related solutions. However it does not

measure the processes involved in accommodation (e.g. reducing the importance of goals.) It is possible that participants who were able to provide alternative solutions reduced the importance of the goal of pain removal. However, it is also possible that for participants who provided alternative solutions the goal of pain removal was already of relatively low importance. The number of alternative responses generated could be influenced by a variety of factors not controlled for in this study. These might include, amongst others, availability of social support and an individual's experience of previous treatments for pain.

Control items were included in the MEPSP so that problem solving approaches to pain and non-pain problems could be compared. The control items could also be used to assess whether problem solving approaches were specific to problems relating to pain. However, direct comparison of pain and control items was not possible due to differences in administration of these items. Future development of the MEPSP could involve equality of administration between pain and control items so that responses to the different types of items can be directly compared.

The measure of persistence in the MEPSP is limited. It does not distinguish between persistence in removing pain and task persistence despite pain. Current research suggests that inappropriate persistence with removing pain is related to increased distress (Eccleston & Crombez, 2007). However, task persistence despite pain has been associated with lower levels of distress (McCracken, et al., 2007). The MEPSP could be adjusted to distinguish between these different types of persistence. Currently persistence and removal solutions are summed to produce the assimilation scale. However, as research suggests that the most important factor related to distress is persistence, it would be helpful to look at persistence with pain removal alone. This was not done in the current study as the persistence scores were relatively low. This was because only two prompts were given if the respondent gave a pain removal response in the first instance. Alternative methods of calculating persistence could be considered. For example, all additional removal solutions generated after the interviewer prompt could be counted as persistence.

6.5 Clinical implications

The results presented here suggest areas for consideration in terms of clinical interventions for chronic pain patients.

Previous research has established the link between a persistent assimilative approach to the problem of pain and increased levels of distress and disability (e.g. Crombez et al., 2008). This suggests that interventions which target inappropriate persistence may reduce associated distress. The current results provide initial support for the hypothesis that chronic pain patients who view themselves to be closer to, or entrapped by, their feared-for self are more likely to persist with assimilative problem solving. The current findings also indicate that an ability to generate alternative routes to valued principle goals (conceptualised here as accommodation) may also be important when accounting for the variance in distress observed in the chronic pain population. These results suggest that clinical interventions which address the relationship between pain and valued goals are likely to be beneficial in both reducing inappropriate problem solving and increasing well-being in individuals with chronic pain.

There is a growing evidence base to support the effectiveness of Acceptance and Commitment Therapy (ACT) with chronic pain patients (McCracken, Vowles & Eccleston, 2005; Vowles & McCracken, 2008). The present findings suggest that ACT's focus on increasing psychological flexibility and value driven behaviour may help to reduce persistence with unhelpful strategies and increase adaptive behaviour. ACT aims to increase an individual's ability to accept and focus on present experiences, reduce behaviour motivated by avoidance of unwanted experiences (e.g. feared-for selves) and encourage behaviour driven by valued life goals (Hayes, Strosahl & Wilson, 1999). This is referred to as values-based living. Techniques associated with ACT include: identifying that strategies based on control are unhelpful (developing creative hopelessness), learning to create distance from one's thoughts (cognitive defusion), identifying valued life goals and ways of moving towards these (committed action; Hayes et al.).

ACT emphasises that in order to move away from unhelpful avoidant behaviour it is necessary to recognise that past control efforts have not been successful. In the ACT literature this is referred to as creative hopelessness. This aims to move individual resources from futile efforts of attempting to control their experiences in order to allow space for new possible solutions to develop. This process can be compared to the assimilation/accommodation transition discussed in this thesis. A review of the usefulness of past strategies aimed at eliminating pain may encourage the transition to a more accepting, accommodative approach. The current findings demonstrated that generating a greater number of alternative (i.e. not involving pain removal) solutions to MEPSP items was associated with less distress and greater acceptance of pain. Although the direction of these relationships is not clear from the current results.

ACT also focuses on the importance of identifying valued life goals and ensuring behaviour is in accordance with these goals. One example of this is the life compass technique (Dahl, Wilson & Nilsson, 2004). This involves identifying valued life goals in ten life domains, rating how important each goal is and the extent to which the individual has behaved in a committed way to move towards each goal. This is designed to help patients recognise whether their current behaviour (e.g. in the case of chronic pain this could be actions which are focussed on the elimination of pain) is helping them move towards higher order values. Next, patients are asked to write down the specific barriers to moving towards valued life goals. For individuals that are highly enmeshed, chronic pain is likely to be a common barrier (Sutherland & Morley, 2008). The life compass technique (Dahl et al., 2004) allows the individual to assess whether or not chronic pain really is a barrier to pursuing valued life goals or whether there are alternative routes, not blocked by pain, which could be pursued. This fits with Carver and Scheier's (1998) hierarchical model. In cases where pain is a realistic barrier to goals, selecting a range of goals from different life domains allows for focus on alternative goals if necessary. This approach is supported by Wrosch, Scheier, Miller et al. (2003) who state that it is easier to disengage from current goals if a range of alternative goals are available. Increasing activity directed towards valued life goals (hoped-for selves) may also serve the purpose of reducing unhelpful problem solving strategies which are driven by the desire to avoid unwanted futures (feared-for selves). Past research has reported that participants with chronic pain believe they are more capable of achieving hoped-for selves than they are of avoiding feared-for selves (Davies, 2002), further supporting the positive role of value driven behaviour.

The positive relationship between assimilation and distress reported in previous research (Crombez et al., 2008) is supported by the current results. Eccleston and Crombez (2007) raised the importance of the manner in which the problem of chronic pain is framed by both patients and medical staff. These results further support the idea that framing chronic pain as a soluble problem is likely to be unhelpful as it may encourage persistence with an assimilative approach. This supports the importance of interventions at a systemic level. This might include working with staff teams to understand why individuals might be motivated to continually pursue pain removal despite repeated failed attempts and highlighting the importance of how the problem of chronic pain is framed and communicated to patients. This may increase understanding and appropriate reactions to patients so that their behaviour is understood but not reinforced.

6.6 Future research

The results of the current study suggest several important areas for future research.

First, the MEPSP data highlights the important role of accommodation and further research in this area would be useful. These results suggest that persistent attempts to remove pain may only be problematic if they prevent accommodative processes. Many participants' responses to the MEPSP demonstrated that they had adjusted to living with pain but they stressed the importance of attempting to persist with certain activities. This is a different approach to that described in the misdirected problem solving loop where accommodation is directly inhibited by assimilation. This describes individuals who are focussed on pain removal at the expense of pursuing other goals. However, the current research suggests that some people are able to remain focussed on pain removal whilst also pursuing other important goals. This could be conceptualised as persisting with assimilative attempts to solve pain whilst also adopting an accommodative approach. Understanding the processes involved in accommodation may be more helpful in a clinical context than attempting to reduce assimilation.

Second, the current research has focussed on the relationship between problem solving and the feared-for self. However, this has not taken into account the hoped-for self. Research in this area might further knowledge regarding the variance in assimilation and accommodation in the chronic pain population.

Third, this research has indicated the role of both enmeshment and proximity to feared-for self in inappropriate problem solving behaviour. However, there is currently no research on what might help patients become 'un-enmeshed' or increase the proximity from their feared-for self despite the continued presence of pain. The increasing evidence to support the role of both these concepts suggests that it would be helpful to explore what clinical interventions might assist with these processes.

Finally, the initial data from the MEPSP suggest that it would be worthwhile further developing this measure. Some of the ways in which this could be approached are indicated above in section 6.4.7. In summary these are: ensuring equality of administration for pain and control items; amending the manual and improving training of raters to increase reliability, particularly in relation to quality ratings; further research into the different types of accommodative response; adjusting persistence ratings both to capture different types of persistence and to

produce a persistence scale; and incorporating a scale of goal abandonment so that the relationship between this and other variables can be explored.

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APPENDICES

Appendix 1: Manual for the Means-End Problem Solving for Pain (MEPSP) Measure

Manual for the Means-End Problem Solving for Pain (MEPSP)

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Introduction

The Means-End Problem Solving procedure (MEPS; Platt & Spivack, 1975) measures a participant's ability to conceptualise the steps needed to move towards the solution of a problem. Participants are given the beginning of a story, which poses a problem and the end of the story, where the problem is solved. Participants are then asked to fill in the means by which the person in the story has moved from the beginning to the end.

The Means-End Problem Solving for Pain (MEPSP) measure is an adaptation of the MEPS. MEPSP aims to measure flexible problem solving in people with chronic pain conditions. MEPSP items are constructed to include pain as the presenting problem for the person in the story. In order to ensure equality across items and assist with coding and scoring responses, a unified structure for constructing items was developed.

Structure of the MEPSP items

The structure for MEPSP items was developed based on Carver and Scheier's (1998) control theory of self-regulation. This is a hierarchical model linking specific actions (programs) to more abstract goals of self-development (principles). Principles are trait-like characteristics representing what an individual wishes to be or become (e.g. to be a successful person) but are too abstract to directly shape behaviour. To operationalise these higher-order goals it is necessary to have more concrete goals beneath them. These concrete goals are referred to as programs. Programs are the things we do to achieve principles and are usually behaviour that is directly observable (e.g. achieving certain targets at work in order to be successful).

There are likely to be many different programs involved in attempting to attain a specific principle and the programs will vary across individuals (e.g. everyone has different ideas about what constitutes a successful person). This allows for flexibility in achieving principles; if a person is no longer able to carry out a specific program there are likely to be many other programs they could pursue in order to move towards a certain principle.

This flexible approach to goal disengagement/re-engagement at the program level is helpful when a program has become blocked. For example, chronic pain conditions often interfere with an individual's ability to carry out a specific program and, according to the hierarchical structure presented here, this may also interfere with movement towards the associated principle goal. However, if the individual is able to find an alternative program that is not affected by pain they are still able to move towards their principle goal even if they cannot get rid of the pain. The MEPSP aims to measure how flexible participants are when goal interference occurs at the program level.

In accordance with the model described above, all MEPSP items are based on the following structure:

Statement of problem that includes reference to blocking of a program goal due to pain (pain items) or an interfering goal (control items).

E.g. Frank couldn't play tennis anymore because of his back pain

Statement relating blocking of program goal to blocking of principle goal and emotional consequence of this.

E.g. Frank felt that his friends at the tennis club might be avoiding him. This upset Frank as it was important for him to be a sociable and well-liked person.

Ending which states that the problem has been resolved. There is no reference to the principle goal remaining in tact.

E.g. The story ends when Frank no longer feels upset.

Instructions for completing story.

E.g. You begin the story when Frank first notices his club mates avoiding him.

Four control items and four pain items have been developed for the MEPSP following the structure outlined above. Pain items are included in appendix 1 and control items are included in appendix 2.

Response categories for the MEPSP items

The structure of the MEPSP items allows for five distinct categories of response. These are:

Persist with same program.

E.g. Frank continues to play tennis despite his back pain.

Solving the problem by removing the pain (pain items) or the interfering goal (control items).

E.g. Frank sees a physiotherapist who helps his back get better so he starts playing tennis again.

Alternative solution, changing program but retaining context and principle goal.

E.g. Frank decides to volunteer to organise some social events at the tennis club.

Alternative solution, changing program and context but retaining principle goal.

E.g. Frank decided to leave the tennis club and spend more time with his friends from work instead.

Alternative solution, changing principle goal.

E.g. Frank decided to leave the tennis club. He decided that being well-liked was no longer as important to him and decided to focus on improving his performance at work instead.

These responses can be categorised more broadly into persistence (1), removal of goal interference solution (2) and alternative solutions (3, 4 & 5).

Persistence:

- Any response which involves persisting or attempting to persist with the same program to achieve the same principle.

Removal solution:

- Any solution to a pain item which involves removing or 'solving' the pain.
- Any solution to a control item which involves the removal of the interfering goal.

Alternative solution:

- Any solution to a pain item which does not involve removing or 'solving' the pain.
- Any solution to a control item which does not involve the removal of the interfering/competing goal.

Administration

A brief overview of the MEPSP task should be given to respondents before the start of the task. For example, the interviewer says "I am going to read you a series of short stories. In each case the person in the story is faced with a problem or dilemma. I am going to read you the beginning of the story, where the person in the story has a problem, and the end of the story, where the problem has been solved. I would like you to fill in the middle of the story by explaining how the person got from the beginning to the end. To help you think about how the person has reached the end of the story consider how you might act if you were in a similar situation."

MEPSP items can be administered in any order. Each item should be read aloud by the interviewer.

Scoring responses

Each item is recorded on a separate row of the scoring form (see below for example of scoring form). Items are scored in the order they were administered (this is the order they are

presented in the response transcription). The item code is copied from the response transcription and entered into the row.

Example Scoring form

Admin. order	Item Code	Persistence	Removal solution	Alternative solution			Additional comments
				Changing Program		Changing principle	
				Retaining context	Changing context		
1	Pain3Chris	I	II	I			
2							

In order to score responses it is necessary to initially divide them into the 3 broad categories described above. To do this, the response to the item should be read while considering -

Does the response involve doing more of the same (persistence)? E.g. Frank decides to keep playing tennis despite his back pain.

Does it involve removing the pain or the interfering goal (removal solution)? E.g. Frank goes to a physiotherapist for treatment on his back so he can start playing tennis again.

Is an alternative solution given (alternative solution)? E.g. Frank decides that he will organise a social event at the tennis club so he can still see his friends from the tennis club even though he can't play tennis.

If the response involves persistence, 1 point should be recorded in the 'persistence' column for the item.

If the response involves the removal of pain or interfering goal, 1 point should be recorded in the 'removal solution' column.

If the response involves an alternative solution this should be categorised further by asking -

Is the principle goal retained (i.e. the response indicates that it is important for the person to still be successful/sociable/healthy etc. but an alternative way of moving towards this is suggested.)? E.g. Frank volunteered as club secretary so he could still see his friends from the tennis club.

If the principle goal is not retained, 1 point should be recorded in the 'changed principle' column.

If the principle is retained, does the alternative solution -

Involve the same context as that presented in the original story (e.g. the tennis club, driving a car, working in a charity shop, exercising)?

Involve a different context than the one presented in the original story? E.g. As he can no longer play tennis Frank leaves the tennis club. He decides to join a chess club and makes lots of new friends there.

If the response involves the same context, 1 point should be recorded in the 'changing program but retaining context' column.

If the response involves a different context 1, point should be recorded in the 'changing program and changing context' column.

Multiple responses

Many responses involve multiple solutions. Each distinct solution should be categorised and recorded. In example 1 the respondent gives two removal solutions so a score of 2 should be recorded in the 'removal solution' column.

Example 1 (response to item Pain1Frank): "He should take some pain killers [1st removal solution] and then, if this doesn't work he should go and see his GP [2nd removal solution]."

Multiple responses may include a mixture of different categories of response. Again, each distinct type of solution should be categorised and recorded. In example 2 the respondent gives one removal solution and one alternative solution so 1 point is recorded in the 'removal solution' column and 1 point is recorded in the 'alternative solution – changing program but retaining context' column.

Example 2 (response to item Pain2Amanda): "She went to speak to her GP to see if there was anything they could do to control the pain [removal solution]. She then went to see her supervisor and explained the situation and they agreed on some adjustments she should make to her duties [alternative solution which retains context] so the pain wasn't affecting her performance at work as much."

Scoring persistence

As described above, points are recorded in the persistence column if a response involves persisting with the same program. However, points are also recorded in the persistence column if a respondent persists with a removal solution when prompted by the interviewer for an alternative response.

The interviewer prompts the respondent for an alternative response if they give a removal solution to a pain item (e.g. following the response in example 1 the interviewer might say "he did go to see his GP but unfortunately this didn't lead to him getting rid of the pain, can you

think of what else Frank might have done to reach the end of the story where he is no longer feeling upset?”).

If, after this prompt from the interviewer, the respondent still provides a pain response this is recorded in the ‘persistence’ column. 1 point for each distinct pain response provided *after* the interviewer prompt should be recorded in the ‘persistence’ column. **Please note these responses will also still be counted and recorded in the ‘removal solution’ column.** This method of scoring persistence only applies to pain items as no prompt is given during control item administration.

Quality rating of solutions

Each response is also scored in terms of how elaborate and plausible the response is. This is scored on a five point scale according to the following criteria:

0 = No solution given (e.g. don’t know)

1 = Brief solution with no description of how the end of the story is reached or the solution does not seem very plausible or realistic (e.g. they just got on with it)

2 = Potential solution with some elaboration (e.g. he did a different form of exercise to keep fit)

3 = Solutions are well described, elaborated and plausible (e.g. he went to the gym and asked the instructor what types of exercises he could do with his leg problem. They showed him some exercises and he felt happy that he could do something even though he couldn’t run anymore.)

4 = Solutions are well described and elaborated and include examples and descriptions from respondents own experience. (e.g. well when I had a similar situation I ...).

These should be recorded in the final column of the scoring sheet.

Additional comments

If there are any other comments regarding the responses or scoring of each item please enter these in the final column of the scoring form.

Appendices

Appendix 1: Pain Items

Story 1 – Frank

Frank couldn't play tennis anymore because of his back pain.

Frank felt that his friends at the tennis club might be avoiding him. This upset Frank as it was important for him to be a sociable and well-liked person.

The story ends when Frank no longer feels upset.

You begin the story when Frank first notices his tennis club mates avoiding him.

Story 2 – Amanda

Amanda was having difficulties concentrating at work because of pain in her right hand and wrist.

Amanda felt that she was no longer achieving her targets at work. Amanda felt down about this as it was important for her to be successful at work.

The story ends when Amanda no longer feels down.

You begin the story when Amanda begins to feel that she is no longer achieving her targets at work.

Story 3 – Chris

Chris could no longer go for his morning run because of a terrible ache in his right leg.

After a few weeks he started to feel as though he was not as fit as he had been.

Chris was worried about this as he wanted to be a healthy person.

The story ends when Chris no longer feels worried.

You start the story when Chris first notices his fitness declining.

Story 4 – Stephen

Stephen couldn't drive anymore due to pains in his neck and shoulder.

Stephen became increasingly reliant on his wife to drive him around. Stephen felt upset about this as he had always valued his independence.

The story ends when Stephen no longer feels upset.

You begin the story when Stephen starts to feel increasingly reliant on his wife.

Appendix 2: Control items

Story 1 – John

John works part-time in a charity shop. Recently John had been promoted to the position of manager. John was pleased that he had been chosen for the position. However this meant he had to take over many of the administration tasks and was therefore not able to socialise with colleagues and customers as he had done before. This made John unhappy as this had been part of the job he had particularly enjoyed.

The story ends when John is no longer unhappy.

You start the story when John first starts to feel unhappy.

Story 2 – Bob

Bob likes to keep fit and healthy by going to the gym. However, recently there has been a lot of pressure at work for him to achieve more and he has been working longer hours. He has not had time to go to the gym as much as usual. Bob became upset because he was no longer feeling as fit as he used to.

The story ends when Bob is no longer upset.

You start the story when Bob first starts to feel upset.

Story 3 – Judith

Judith is attending night school to learn tapestry. Since attending night school she has noticed that the quality of her tapestry has significantly improved. However, she does not like the fact that she has to follow a the same design as the rest of the class. She would like to do something different and is fed-up with following the same designs.

The story ends when Judith feels better.

You start the story when Judith begins to feel fed-up with following the same designs.

Story 4 – Beverley

Beverley had always lived on her own. However, recently her sister had come to stay until she could find her own place. Beverley wanted to help her sister but found it difficult as she liked having her own space. Beverley started to feel upset about her situation.

The story ends when Beverley no longer feels upset.

You start the story when Beverley first starts to feel upset.

Appendix 3: Scoring form

Admin. order	Item Code	Persistence	Removal solution	Alternative solution			Qualitative rating and
				Changing Program		Changing principle	Additional comments
				Retaining context	Changing context		
1							
2							
3							
4							
5							
6							
7							
8							

Appendix 2: Letter Granting Ethical Approval

Leeds (East) Research Ethics Committee

Room 5.2, Clinical Sciences Building
 St James's University Hospital
 Beckett Street
 Leeds
 LS9 7TF

Telephone: 0113 2065652
 Facsimile: 0113 2066772

16 July 2009

Miss Caroline Wells
 Psychologist in Clinical Training
 Leeds Institute of Health Sciences
 Charles Thackrah Building
 101 Clarendon Road
 Leeds
 LS2 9JL

Dear Miss Wells

Study Title: Persistence with non-functional problem solving in chronic pain.
REC reference number: 09/H1306/70
Protocol number: 1

The Research Ethics Committee reviewed the above application at the meeting held on 7 July 2009. Thank you for attending to discuss the study.

Ethical opinion

At the meeting, members requested clarification on how distress would be handled and what immediate support would be available. You confirmed that the interview would be stopped; you would offer immediate support and arrange referral to the psychologist attached to the pain team if the participant requested further support. Members were satisfied with this response.

The time given to patients to decide whether or not to take part was discussed. You explained that the original intention was a minimum of 24 hours but after discussion with the pain team, this had been left open to allow patients to make the decision immediately if they wished to, as patients were often waiting in clinic for some time. Members were content with this approach.

Members wondered whether you were looking at problem solving which was limited to pain issues or more general. You explained that the measures being used in the study contained control items about everyday issues so that issues related to pain could be identified. Members were satisfied with this response.

The use of the HAD scale was queried as some items were affected by somatic factors. Professor Morley indicated that, on balance, this was deemed the most appropriate measure. Members were happy with this explanation.

The members of the Committee present gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

Ethical review of research sites

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

Conditions of the favourable opinion

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

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

For NHS research sites only, management permission for research (“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 for research is available in the Integrated Research Application System or at <http://www.rdforum.nhs.uk>. Where the only involvement of the NHS organisation is as a Participant Identification Centre, management permission for research is not required but the R&D office should be notified of the study. Guidance should be sought from the R&D office where necessary.

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

An estimate of the length of time required to complete the questionnaires should be given in the participant information sheet.

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

Approved documents

The documents reviewed and approved at the meeting were:

<i>Document</i>	<i>Version</i>	<i>Date</i>	
Covering Letter		18 June 2009	
Protocol	1	19 June 2009	
Investigator CV		15 June 2009	
Application		19 June 2009	
CV for Dr Stephen Morley			
Participant Consent Form	1	19 June 2009	
Participant Information Sheet	1	19 June 2009	

Advertisement	1	19 June 2009	
Compensation Arrangements		02 October 2008	
Letter from Sponsor		18 June 2009	
Peer Review		26 April 2009	
Questionnaire: Means End Problem Solving Procedure for Pain (MEPSP)			
Questionnaire: The Pain Solutions Questionnaire (PASOL)			
Questionnaire: The Chronic Pain Acceptance Questionnaire (CPAQ)			
Questionnaire: The Pain Disability Index (PDI)			
Questionnaire: Visual Analogue Scale (VAS)			

Membership of the Committee

The members of the Ethics Committee who were present at the meeting are listed on the attached sheet.

Statement of compliance

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

After ethical review

Now that you have completed the application process please visit the National Research Ethics Service 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:

- Notifying substantial amendments
- Adding new sites and investigators
- 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.

09/H1306/70

Please quote this number on all correspondence

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

Yours sincerely

Dr John Holmes
Chair

Appendix 3: VAS Rating Scales

Pain Rating Scales

Indicate along the scale below the intensity of the painful sensation at its highest intensity.

No sensation

The most intense
sensation imaginable

Indicate along the scale below the intensity of the painful sensation at its lowest intensity.

No sensation

The most intense
sensation imaginable

Indicate along the scale below the intensity of the painful sensation at its usual intensity.

No sensation

The most intense
sensation imaginable

Feelings Rating Scales

What kind of negative feelings accompany your pain? Make a cross on each scale below to show the intensity of each feeling as it has related to your pain over the past week.

None

The most severe
imaginable

Depression _____

Anxiety _____

Frustration _____

Anger _____

Fear _____

Appendix 4: List of Feared-for Selves

1. Aggressive
2. Bitter
3. Bossy
4. Complaining
5. Demented
6. Disabled
7. Frightened
8. Frustrated
9. Inferior
10. Insecure
11. Jealous
12. Lonely
13. Moody
14. Nervous
15. Not wanting to spend time with others
16. Pessimistic
17. Self-obsessed
18. Short-tempered
19. Sombre
20. Tired
21. Uncared for
22. Unhappy/depressed
23. Unmotivated
24. Unreliable
25. Worrying

Appendix 5: Feared-for Selves Interview

THE FEARED-FOR SELVES INTERVIEW

This section is concerned with how you see yourself in the future. We all think about the future to some extent. When we do this we usually think about the kinds of experiences that are in store for us and the kinds of people we might possibly become. We may have images of ourselves that we fear, dread or don't want to happen. Examples of common feared-for selves are getting divorced, becoming ill, having financial problems or becoming bitter, resentful or unkind. Some of us may have a large number of feared possible selves in mind, whereas others may have only a few.

You have been given a set of cards. Written on each card is a characteristic that people with chronic pain have told us they might fear becoming in the future. Some of these may apply to you and some may not. There may be other things that you fear for that are not written on the cards. If this is the case we can also include these on the list. I would like you to choose up to ten characteristics that apply to you. You can choose these from the cards, choose your own or a mixture of both. Please take some time to think about it, have a look through the cards and let me know when you have finished.

When participant indicates they have finished, the interviewer writes each feared-for self identified on a separate line of the response sheet.

Now that you have identified some of your feared-for characteristics I am going to ask you two questions about each of these characteristics:

1. How close do you currently feel you are to this characteristic?
Please indicate on the scale how close you currently feel to this characteristic.
2. Is it possible to be like this without pain? Please give a yes or no response
E.g. Is it possible to be unkind without pain?

Now, thinking about the feared-for characteristics you have chosen overall:

1. How likely is it that these characteristics will describe you in the future
Please indicate on the scale how likely you feel it is.
2. How capable do you feel of preventing these descriptions from becoming true?
Please indicate on the scale how capable you feel of preventing them becoming true.

Feared-for Selves Interview Response Sheet

Feared-for selves	How close am I currently to this characteristic? (1-7)	Is it possible to be like this without pain? (yes/no)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

How likely is it that these characteristics will describe you in the future? (1-7)

How capable do you feel of preventing these descriptions coming true? (1-7)