

Treatment Expectancy in Individuals with Chronic Pain attending a Pain

Management Program

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Author note:

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List of Tables

1	Frequency Data for Demographic Information.....	58
2	The Shapiro- Wilk Test Results of Normality for the Self-report Measures.....	59
3	z-scores of Skewness and Kurtosis for the Baseline Results of the Psychosocial Measures.....	60
4	Factor analysis based on Varimax Rotation for Active and Passive Treatment Expectancy at Pre and Post-program.....	63
5	Mean and standard deviation of the psychosocial measures over the four time points.....	65
6	Linear Mixed Model Mean Expectancy Scores for Passive and Active Treatment Strategies over time.....	65
7	Kendall Correlation Matrix for Predictor Variables at Pre treatment....	67
8	Linear Regression using Backward Method for Pre-program Expectancy for Passive Treatment Scores.....	69
9	Linear Regression using Backward Method for Pre-program Expectancy for Active Treatment Scores.....	70
10	Kendall Correlation Matrix for Pre and Post Scores on Poor Coping, Self-efficacy and Expectancy Scores for Passive Treatment Strategies.....	71
11	Kendall Correlation Matrix for Pre and Post Scores on Poor Coping, Self-efficacy and Expectancy Scores for Active Treatment Strategies.....	73

List of Figures

- 1 Loading Plots of Active and Passive Components within the Treatment
Expectancy Questionnaire at Pre and Post-program.....62
- 2 Mean Standardized Scores for Poor Coping and Expectancy for Passive
Treatment Strategies over time.....74

Contents

Author note.....	2
Acknowledgements.....	3
List of Tables.....	4
List of Figures.....	5
Abstract.....	9
Introduction.....	10
Pain.....	11
Biopsychosocial Models of Pain.....	12
Psychosocial Variables and Pain.....	13
Treatment for Chronic Pain.....	25
Treatment Expectancy.....	30
Response Expectancy theory.....	35
The present study.....	39
Aims.....	41
Hypotheses.....	41
Method.....	42
Participants.....	42
Materials.....	42
Procedure.....	49
Data collection.....	53
Data analysis.....	54
Results.....	56
Demographics.....	56
Analysis of self-report measures.....	58

Hypothesis one.....	63
Hypothesis two.....	65
Hypothesis three.....	69
Hypothesis four.....	71
Discussion.....	75
Analysis of the Treatment Expectancy Questionnaire.....	75
Changes in treatment expectancy.....	76
Influence of psychosocial variables on treatment expectancy at pre- treatment.....	77
Poor coping and self-efficacy on treatment expectancy for passive treatment strategies following treatment.....	78
Poor coping and self-efficacy on treatment expectancy for active treatment strategies following treatment.....	80
Limitations of this research.....	82
Future direction.....	86
Clinical implications.....	87
References.....	93
Appendix A.....	115
A1.....	116
A2.....	118
A3.....	119
Appendix B.....	120
B1.....	121
B2.....	122
B3.....	123

B4.....	124
B5.....	126
B6.....	127
B7.....	128
Appendix C.....	130
Appendix D.....	135
Table D1.....	135
Table D2.....	135
Figure D1.....	136

Abstract

The experience of chronic pain and subsequent treatment outcomes, as guided by the biopsychosocial models of pain, is influenced by both physical and psychosocial variables. The cognitive variable of expectancy requires further investigation within this population group. Treatment expectancy is a predictor of treatment outcome for people with chronic pain, both for active and passive treatment strategies. Multi-disciplinary pain management programs are considered gold standard in the treatment of chronic pain, however non-adherence and relapse rates remain high. The current study aimed to explore changes in treatment expectancy, as well as the influence of psychosocial factors on self-reported expectancy in patients referred to a pain management program. In an effort to gain further insight into how treatment expectancy may influence relapse. Seventy-one chronic pain patients completed self-report measures over four time points (pre-program; post-program; one-month; three-month follow-up). These measures assessed variables of depression, catastrophizing, fear of movement/(re)injury, self-efficacy, disability and pain intensity. Factor analysis, correlation, Linear Mixed Model and regression analysis were undertaken with results highlighting changes in treatment expectancy, influenced over time by poor coping and self-efficacy. These results lend support to the targeting of treatment expectancy by health care practitioners as a modifiable cognitive variable that should be considered when determining treatment, monitored throughout intervention and at follow-up. Addressing treatment expectancy throughout treatment may support efforts to reduce dropout rates and subsequent relapse within the chronic pain population. It is recommended that future research extend on these findings, further evaluating the influence and adaptability of treatment expectancy within a pain program.

Treatment Expectancy in Individuals with Chronic Pain attending a Pain Management Program

Pain is defined as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage” (Bonica, 1979, p. 250). Pain often acts as a protective mechanism, preventing injury by alerting the body to the presence of aversive stimuli (MacDonald & Leary, 2005; Nicholas, Malloy, Tonkin, & Beeston, 2005). Pain neural systems process, interpret and make meaning of the physical aspects of pain and influence cognitive and emotional responses to pain (Casten, Parmelee, Kleban, Lawton, & Katz, 1995; Hirsch & Liebert, 1998; Lousberg, et al., 2005; MacDonald & Leary, 2005; Priest & Hoggart, 2002; Vossen, van Os, Hermens, & Lousberg, 2006). Cognitive and emotional factors contributing to pain include but are not limited to depression, self-perceived disability, catastrophizing, fear of movement/(re) injury and self-efficacy. Evidence supports the impact these variables have on the pain experience (including intensity and duration), disability and coping (Astin, 2004; Casey, Greenberg, Nicassio, Harpin, & Hubbard, 2008; Huijnen et al., 2010; Osborne, Jensen, Ehde, Hanley, & Kraft, 2007). Expectancy is a cognitive construct that has received less attention amongst researchers in the field of chronic pain. Specifically, the influence treatment expectancy has on the experience and management of chronic pain, the relationship between treatment expectancy and the above-mentioned psychosocial variables, and the impact these have on chronic pain management. Little research has explored these queries in people attending a multi disciplinary pain management program (Goossens, Vlaeyen, Hidding, Kole-Snijders, & Evers, 2005).

Pain

Pain is defined as either acute or chronic depending on its persistence. Acute pain occurs in the short term, lasting anywhere from a few seconds to up to three months (Vesela, 2001). Acute pain can be alleviated through analgesic medication or manual therapies and generally resolves as the cause of the pain heals (Katz & Rothenberg, 2005). If this fails to resolve it can develop into a chronic pain problem. Chronic pain refers to pain that has been present for three months or more or has continued beyond the usual expected recovery period (Katz & Rothenberg, 2005; Priest & Hoggart, 2002). Chronic pain rarely eases spontaneously and in many cases not at all even with medical intervention (Hirsch & Liebert, 1998).

Chronic pain is one of the most prevalent health care problems faced in the industrialized world (Blyth, March, Brnabic, Jorm, Williamson, & Cousins, 2001), affecting approximately 3.2 million Australians each year (1.4 and 1.7 million males and females respectively; Access Economics, 2007; Grabois, 2005; Stang, Von Korff, & Galer, 1998). Accessing data from NSW Health and the pain epidemiology research group, Access Economics (2007) calculated that the annual economic cost of chronic pain is approximately \$34AUD Billion in Australia. This comprises of direct costs to patients, carer costs, health system and productivity costs, with the majority of this cost relating to burden of disease, hospital and productivity costs (Access Economics, 2007).

Patients differ substantially in the way they experience pain and pain-related distress, and in the way they respond to pain treatments (Good, Brodwin, & Good, 1992). Early research attempted to understand chronic pain through a biomedical framework, addressing chronic pain problems purely through a medical model of care. However, research and clinical practice has demonstrated that this approach fails to fully explain the impact of chronic pain and subsequent disability (Schultz et al., 2004).

Frequently pain occurs in the absence of any evidence of physical damage, demonstrating that it is not purely a physical phenomenon, but rather additional variables, namely psychosocial factors, also contribute to the pain experience (Casey et al., 2008; I.A.S.P., 2002; Jensen, Turner, & Romano, 2007; MacDonald & Leary, 2005). The literature demonstrates that psychosocial factors contribute to disability, loss of physical function, decreased pain tolerance and an increase in psychological distress and reduced ability to cope in chronic pain sufferers (Jensen et al., 2007; Katz & Rothenberg, 2005).

Consequently, chronic pain is now accepted as a complex interaction of physiological (physical damage and neural dysfunction), cognitive, behavioural and emotional factors (Casey et al., 2008; Merskey & Bogduk, 1994; Suprina, 2003). In recognising this complexity, it is understandable that the biomedical model of pain, which relies heavily on objective evidence for determining treatment, fails to address all components that contribute to the maintenance of chronic pain. Rather researchers and treatment providers alike now subscribe to a more holistic theoretical understanding of chronic pain incorporating all factors, namely the biopsychosocial model of pain (Casey et al., 2008; Suprina, 2003). The biopsychosocial model of pain provides a theoretical understanding for the maintenance of pain as it relates to physical and psychosocial variables.

Biopsychosocial Models of Pain

The biopsychosocial models of pain have evolved from the biomedical and the cognitive behavioural theory literature. These models theorise that chronic pain is part of a reciprocal system influencing physical, social and psychological factors, and that these factors in turn influence the experience of chronic pain (Fordyce, 1976; Suprina, 2003), with no single factor providing an explanation of chronic pain on its own (Covic,

Adamson, Spencer, & Howe, 2003). The biopsychosocial models provide a clearer explanation of the link between body and mind in the understanding of chronic pain e.g., the influence of depression on chronic pain and vice versa (Logan, 2003). The biopsychosocial models provide a theoretical framework around understanding how variables interact with pain and subsequent maladaptive coping and disability.

The biological component of the biopsychosocial models is concerned with how the cause of the pain stems from the functioning of the individual's body (Santrock, 2007). The psychological component looks for potential cognitive influences on the pain experience, such as lack of self-control, emotional turmoil, and negative thinking. Some of the most commonly reported psychosocial prognostic variables in the literature that relate to pain and disability include pain catastrophizing, depression, fear avoidance behaviours and self-efficacy (Vlaeyen, de Jong, Geilen, Heuts, & van Breukelen, 2002; Schultz et al., 2004). Lastly, the social component incorporates how different social factors such as socioeconomic status, culture, technology, and religion can influence pain and overall health (Santrock, 2007). Research has identified this model as the most useful to guide effective treatment approaches for chronic pain (Linton, 2000; Schiphorst-Preuper et al., 2007; Suprina, 2003) and consequently it is regularly employed to guide and tailor treatment interventions, such as cognitive behavioural therapy based pain management programs (Kole-Snijders et al., 1999).

Psychosocial Variables and Pain

Chronic pain can have a significant impact on an individual's ability to maintain healthy life functioning, with responses to pain developing in maladaptive ways. Pain may be evaluated in distressing ways, leading to potential disengagement from valued aspects of life, and the encouragement of maladaptive or poor coping strategies focussing on control or avoidance of painful experiences (McCracken & Eccleston,

2005). Poor adjustment to pain has been identified as being influenced by psychological factors including depression, fear of movement/(re)injury, catastrophizing, whilst more adaptive adjustment is associated with enhanced self-efficacy (Vlaeyen et al., 2002; Schultz et al., 2004). Cognitive behavioural models provide evidence that pain related avoidance behaviours, such as fear of movement/(re)injury, passive pain coping and negative treatment outcome expectancies are linked to future disability and pain outcomes in patients with chronic low back pain (den Boer, Oostendorp, Beems, Munneke, & Evers, 2006; Vlaeyen & Linton, 2000). Understandably, many of these variables are investigated concurrently given their complex interaction. In an attempt to enhance readability, these psychosocial variables have been separated to highlight the evidence on their relationship with chronic pain. However, given the complex interaction between variables, research frequently investigates multiple psychosocial variables simultaneously, and as such this is also unavoidable within the following sub headings.

Self-reported disability and pain intensity. Some of the beliefs associated with pain are that it is excessively disabling, that pain is a signal of physical harm and a belief that one has little control over the pain (Turner, Jensen, & Romano, 2000). Self-reported pain intensity is the most common pain dimension assessed in both clinical work and treatment outcome research (Jensen & McFarland, 1993). Evidence has identified that self-reported disability and pain intensity in chronic pain patients are associated with cognitive and behavioural consequences of pain, often with overlapping interactions (Huijnen et al., 2010). For example, Leeuw et al. (2007) conducted a study on people with lower back pain in the general population, and identified that pain intensity was only moderately related to functional disability. Moreover, fear of movement/(re)injury also contributed to an equal or greater extent to functional

impairment, when compared to other psychosocial variables and in addition to the influence of pain intensity. Similarly, Worz (2003) in a clinical update acknowledged that people with depression are less likely to be active, also impacting on the course of pain, outcome and disability.

Depression. Depression is well researched as a significant emotional determinant of the pain experience and its relationship with chronic pain is well documented (Casey et al., 2007; den Boer et al., 2006; Jensen et al., 2007; Sullivan, Rodgers, & Kirsch, 2001). Chronic pain patients have an increased prevalence of depression (Bennett et al., 1996; Blyth et al., 2001); however there remains no clear consensus as to whether chronic pain precedes depression or vice versa. Despite this there is agreement that depressive symptoms contribute to the chronicity of pain and increased self-reports of pain intensity and disability (Geisser, Roth, Theisen, Robinson, & Riley, 2000; Huijnen et al., 2010; Samwel, Evers, Crul, & Kraaimaat, 2006; Sullivan, Reesor, Mikail, & Fisher, 1992; Tang et al., 2008).

Specifically, research has noted that higher rates of depression can lead to greater vigilance about physical symptoms, higher ratings of pain symptoms and severity (Romano & Turner, 1985), more pain behaviours, feelings of helplessness and loss of control (Campbell, Clauw, & Keefe, 2003). Depression can have an adverse influence on the effectiveness of treatment for pain and increased dropout rates (Bair, Robinson, Katon, & Kroenke, 2003; Geisser et al., 2000), highlighting the importance of including and assessing for depressive symptomatology when targeting treatment strategies. The impact of depression on pain intensity and disability has also been reported regardless of the site/type of pain (Farmer, Zaslavsky, Reynolds, & Cleary, 2010; Samwel et al., 2006) including, but not limited to, low back pain, osteoarthritis, rheumatoid arthritis and fibromyalgia (Borsbo, Peolsson, & Gerdle, 2009; Brown,

Nicassio, & Wallston, 1989; Haythornthwaite, Sieber, & Kerns, 1991). A relationship between depression and pain has also been observed in non-clinical undergraduate students and both chronic pain patients participating in treatment and experimental pain procedures (Tang et al., 2008; Walsh et al., 1998).

For instance, Tang et al. (2008) evaluated the effect of experimentally induced depressed and happy moods (neutral control group) on pain responses in 55 people diagnosed with chronic pain in an effort to demonstrate a reciprocal relationship between depression and pain. Tang et al. predicted that increasing or decreasing depressed mood would modify pain responses i.e. increased feelings of depression would enhance reported pain intensity. A comparison of the results from baseline to task completion demonstrated that the induction of a depressed mood resulted in significantly higher pain ratings at rest and the opposite for the happy mood. Tang et al. noted that they did not control for potentially mediating variables (e.g., catastrophizing) or the interaction between depressed mood and the level of arousal associated in the modulation of pain. Depression and chronic pain have also been researched within the context of people attending a pain management program.

Samwel et al. (2006) conducted a study on a heterogeneous sample of 169 patients with chronic pain attending a multidisciplinary pain management program, to identify the contribution that helplessness, fear of pain, and passive pain coping have on levels of pain, disability and depression. Pain intensity was not significantly different between those experiencing back pain, leg pain, neck/shoulder pain, other pain locations, and more than one pain location, thus allowing analysis of the whole sample. Helplessness in this study was defined as an “attributional style, explaining negative events as uncontrollable, unpredictable and unchangeable and generalising these consequences to daily functioning (p.246)”. Helplessness was the only factor to

significantly explain the variance for pain level and disability, with the latter additionally explained by the passive coping strategy of resting. The cognitive coping strategy of worrying alone significantly explained the variance in depression, lending itself to previous research supporting the relationship between catastrophizing and depression (Hassett, Cone, Patella, & Sigal, 2000). In the Samwel et al. study fear of movement did not independently contribute to explaining changes amongst pain level, disability and depression. However, not all variance could be accounted for, nor causal relationships identified and other studies are required for further clarification and to explore other contributing variables such as outcome expectations and catastrophizing.

Kinesiophobia. Kinesiophobia refers to an irrational specific fear that physical movement and activity will result in (re)injury and subsequent pain (Kori, Miller, & Todd, 1990; Samwel et al., 2006). Over the past decade, pain related fear has received increasing attention as an important contributor to the maintenance of chronic pain and as a predictor of pain-related avoidance behaviour and occupational disability (Al-Obaidi, Nelson, Al-Awadhi, & Al-Shuwaie, 2000; Crombez et al., 2002; Peters, Vlaeyen, & Weber, 2005; Picavet, Vlaeyen, & Schouten, 2002; Roelofs, Goubert, Peters, Vlaeyen, & Crombez, 2004; Samwel et al., 2006; Vlaeyen et al., 2002).

Avoidance behaviour contributes to a considerable reduction in the level of physical and psychological functioning (Samwel et al., 2006). It has been demonstrated that people with chronic pain that have elevated fear of movement/(re)injury exhibit more selective attention to pain and report higher pain intensity (McCracken, 1997; Sorbi et al., 2006).

Leeuw et al. (2007) investigated whether fear of movement/(re)injury mediated the relationship between pain catastrophizing and functional disability in a sample of 152 people from the general population with lower back pain at baseline and 6-month follow-up. This study was unable to confirm this relationship, however they did

identify that pain catastrophizing was significantly related to fear of movement/(re)injury at follow-up (Leeuw et al., 2007). This suggests that people who interpret their pain catastrophically at baseline are likely to experience increased fear of movement/(re)injury later on. Fear of movement/(re)injury was related to functional disability, in addition to pain intensity. These results further support the notion that a cognitive-behavioural model of fear also applies to the area of chronic pain, highlighting the importance of pain catastrophizing as a potential vulnerability factor for the development of pain-related fear.

Multidisciplinary treatment programs often address self-efficacy and fear of movement/(re)injury, as evidence suggests that they are amongst the most salient predictors of pain and disability (Asenlof & Soderlund, 2010; Cook, Brawer, & Vowles, 2006). Asenlof and Soderlund (2010) conducted a study to further explore the empirical basis for tailoring pain treatments with regard to self-efficacy and fear of movement/(re)injury. They aimed to further clarify the association between self-efficacy, fear of movement/(re)injury with disability, and to estimate the magnitude of self-efficacy and fear of movement/(re)injury required to make a reliable change to pain related disability. Results suggested that pre treatment levels of pain-related disability and changes in fear of movement/(re)injury throughout treatment are important for the explanation of the variation seen in treatment outcomes and reported disability levels post-treatment. Clinically, Asenlof and Soderlund stated that this evidence provides support that self-reported disability and elevated fear of movement/(re)injury should be addressed in tailored pain treatments. They acknowledged that they only addressed a limited number of psychosocial variables in their study and that other variables including catastrophizing (e.g., Buer & Linton, 2002) and treatment expectations are

also related to pain-related disability. Thus, suggesting that these pain cognitions may also be important when tailoring treatment programs.

Woby, Watson, Roach and Urmston (2004) explored whether changes in catastrophizing, fear-avoidance beliefs, and appraisals of control were related to pre and post treatment changes in chronic lower back pain and disability amongst 54 patients participating in a cognitive-behavioural based intervention. Unlike other research, Woby et al. (2004) found that changes in the cognitive factors were not significantly associated with changes in pain intensity. However, reductions in disability were associated with increased perceptions of control over pain and lower fear-avoidance beliefs toward work and physical activity. Moreover, a negative association between catastrophizing and perceived ability to control or reduce pain was identified. The contributions of these findings to changes in disability were evident after controlling for reductions in pain intensity, age and sex (Woby et al., 2004). Overall, there is growing body of evidence highlighting the role fear of movement/(re)injury with other psychosocial variables, especially catastrophizing, as contributing to the development and maintenance of chronic pain and disability (Cook et al., 2006).

Catastrophizing. Turner and Aaron (2001) refer to the cognition of catastrophizing as a “phenomenon of expecting or worrying about major negative consequences from a situation, even one of minor importance”.. Sullivan, Bishop and Pivik (1995) conceptualized catastrophizing as a multidimensional construct comprising elements of rumination, magnification and helplessness Osman et al., 1997; Sullivan et al., 1995). Whilst, originally detailed in cognitive models of anxiety (Clark, 1988 as cited in Turner & Aaron, 2001) and hypochondria (Warwick & Salkovskis, 1989), the past two decades has seen catastrophizing emerge as one of the most robust, and reliable

psychological predictors of pain (Geisser, Robinson, & Riley, 1999; Keefe et al., 1999; Picavet, Vlaeyen, & Schouten, 2002).

Specifically, catastrophizing has been shown to predict pain level, disability and distress in different chronic pain populations and is associated with enhanced attention to pain (Campbell et al., 2010; Jensen et al., 2007; Samwel et al., 2006; Severeijns, Vlaeyen, van den Hout, & Weber, 2001; Sullivan et al., 2001; Turner & Aaron, 2001). Turk and Rudy (1991) and Sullivan et al. (1995) reported that catastrophic thinking can evolve as a consequence of a prior painful experience, or associated beliefs about pain-eliciting situations, including those never experienced. They state that this can result in individuals coming to expect that future pain eliciting situations will be associated with a high degree of pain, for example exercise.

The relationship between catastrophizing and pain has been observed in a variety of populations, including individuals undergoing aversive diagnostic procedures (Sullivan et al., 1995), general non-chronic pain in the general population (Buer & Linton, 2002), chronic pain patients (Jensen et al., 2007; Picavet et al., 2002; Sullivan et al., 2001; Turner & Aaron, 2001), arthritis patients (Keefe et al., 1999), dental patients (Sullivan & Neish, 1998), post-surgical patients (Keefe et al., 1987), and healthy populations undergoing experimental pain procedures (Campbell et al., 2010).

Buer and Linton (2002) conducted research exploring the occurrence of fear avoidance and catastrophizing in people with varying degrees of non-chronic spinal pain recruited from the general population. They identified a positive relationship between pain intensity and catastrophizing and demonstrated that as fear of movement increased people reported reduced activities of daily living. Buer and Linton also identified that both variables are present within the early stages of the pain process highlighting the importance of the need for screening procedures along with their

inclusion in early intervention and treatment. Buer and Linton suggested that both catastrophizing and fear of movement/(re)injury are important in the transition from acute to chronic pain.

Severeijns et al. (2001) investigated the relationship between catastrophizing, pain intensity, disability and psychological distress in 211 patients with chronic musculoskeletal pain. All questionnaires were completed prior to receiving treatment at a pain management centre. Overall, Severeijns et al. identified that catastrophizing is significantly related to pain intensity, disability and psychological distress. Furthermore, no significant difference was identified between different pain locations. The authors noted that they were unable to identify a casual relationship and recognized that a more direct measure of pain related disability, such as the Roland Morris Disability Questionnaire (RMDQ), would provide greater accuracy of the relationship with disability (Severeijns et al., 2001). Additionally, Turner and Aaron (2001) also reported that self-report measures of catastrophizing thoughts when in pain are positively correlated with self-report measures of pain intensity. In contrast to the negative impact catastrophizing, fear of movement and depression are reported to have on pain and disability, self-efficacy is proposed to be an important mediator of disability and pain (Astin, 2004; Denison, Asenlof, & Lindberg, 2004; Devine & Spanos, 1990; Lackner, Carosella, & Feuerstein, 1996).

Self-efficacy. Bandura (1977) was the first to explore the concept of self-efficacy, proposing a link between a person's belief about their ability to perform a behaviour and their subsequent performance. Bandura posited that efficacy expectations (or self-efficacy beliefs) determine how much effort and perseverance a person will put into a behaviour in the face of obstacles and adverse experiences, and that such beliefs are modifiable with experience (Asghari & Nicholas, 2001; Bandura,

1977). Evidence suggests that self-efficacy may have important implications for psychological and physical health, with this extending to the management of pain (Astin, 2004; Denison et al., 2004; Jensen, Turner, & Romano, 1991; Lackner et al., 1996).

Specifically, self-efficacy is believed to be an important mediator of disability and pain intensity as it relates to chronic pain (Asghari & Nicholas, 2001; Denison et al., 2004; Lackner et al., 1996). Lim et al. (2007) reported that low self-efficacy is predictive of pain and physical disability in numerous population groups including fibromyalgia, chronic back pain and mixed chronic pain conditions. In addition, they reported that self-efficacy can enhance the long term effects of treatment outcomes and have a significant influence on the likelihood of utilisation of pain coping strategies, enhanced feelings of control over pain and promotes adaptive psychological functioning.

Arnstein, Caudill, Mandle, Norris and Beasley (1999) conducted a study of 126 patients in an aim to identify if self-efficacy mediated pain intensity, pain related disability and depression. They identified that self-efficacy partially mediated the relationship between pain intensity and disability (47% variance) and that disability explained 26% of the variance in the relationship between pain intensity and depression. Arnstein et al. concluded that a person's lack of belief in their ability to manage pain, or cope and function in spite of pain, was a significant predictor of the extent to which people with chronic pain become depressed and/or disabled. In this study higher self-efficacy contributed to higher activity levels, lower psychological distress and reduced severity of pain (Arnstein et al., 1999).

Asghari and Nicholas (2001) prospectively explored the relationship between pain self-efficacy beliefs and a range of pain behaviours, such as avoidance behaviour,

in a heterogeneous sample of 145 chronic pain patients referred to a pain centre over a nine-month period. They controlled for other variables including age, gender, pain severity, pain chronicity, neuroticism, depression, physical disability and catastrophizing, noting that these have been previously demonstrated to have an effect on pain behaviours. It was identified that self-efficacy at baseline was predictive of total pain behaviour and disability associated with pain over the nine-month study period, even after controlling for other variables.

Interaction of psychosocial factors and chronic pain. Whilst, a range of studies explore the influence of a specific psychosocial variable on chronic pain and vice-versa it is often noted that not all variance is accounted for. As such, there continues to be a growing body of research on the interaction between multiple psychosocial variables on the experience of chronic pain. Boersma and Linton (2006) aimed to identify possible patterns of psychosocial factors, including fear and avoidance beliefs, pain catastrophizing and depression, and to test whether they are related to the development of disability in 81 participants who report having to take leave from work due to pain. They identified strong relations between fear avoidance beliefs and catastrophizing and noted that whilst it is possible, they are not necessarily always accompanied by depression.

Jensen et al. (2007) investigated whether changes in pain related beliefs (as measured by the Survey of Pain Attitudes) and coping (measured by the Chronic Pain Coping Inventory) would be associated with changes in pain, physical disability and depressive symptoms post multidisciplinary pain treatment and at 12 month follow-up, in an effort to further critically test the biopsychosocial models of chronic pain. Further analysis aimed to identify the specific beliefs and coping strategies most significantly correlated with changes in outcome. Self-report questionnaires from 141 patients

revealed that as self-efficacy and the use of active coping strategies decreased (including coping self-statements, relaxation, exercise and stretching), depression and disability and a tendency to resort to passive coping strategies increased, including guarding, resting and negative thinking such as catastrophizing. Overall, their findings were consistent with their prediction that based on biopsychosocial models of pain, patient's outcomes after treatment are influenced by beliefs, behaviours and psychosocial factors (Jensen et al., 2007). The authors suggest that further research could examine the association between other passive and active coping strategies in relation to the adjustment to pain.

Den Boer et al. (2006) conducted a study of 277 patients undergoing surgery for lumbosacral radicular syndrome in order to clarify the role of pre-operative cognitive behavioural factors in the development of post-operative disability and pain intensity. Questionnaires were completed pre-operatively, and at six weeks and six months post surgery. They identified that higher levels of fear of movement/(re)injury, increased use of passive pain coping strategies, namely excessively worrying and resting, and lower outcome expectancies were predictive of greater self-reported disability and increased reports of pain at both six week and six month follow-up. Outcome expectancies were measured on a four-item scale assessing "the extent to which patients expect disability, leg pain and back pain to disappear and medical help to become unnecessary within the next 6 months" (den Boer et al., 2006, p.47). Reduced outcome expectancies most consistently and independently predicted both disability and pain at follow-up in addition to other pain related cognitive factors (den Boer et al., 2006).

The literature emphasises the complex nature of chronic pain and the recommendation of a treatment modality that addresses simultaneously a multitude of psychosocial variables, acknowledging that one variable also contains information

about another, rather than treating them as separate entities (Boersma & Linton, 2006). Results such as that of den Boer et al.'s (2006) highlight the importance of including psychosocial variables when developing screening procedures and determining treatment options for chronic pain.

Treatment for Chronic Pain

There is a plethora of interventions available for the treatment of chronic pain, with most individuals having made numerous attempts at pain relief (Blyth, March, Nicholas, & Cousins, 2005). Specifically, these can be categorised as either active or passive treatment strategies (Blyth et al., 2005). In this instance, coping refers to “specific thoughts and behaviours people use to manage their pain or their emotional reactions to their pain” (Turner & Clancy, 1986, p.355). Specifically, passive coping involves attempts to have less pain or to avoid pain and active coping involves managing pain independently and having no reliance on an external agent.

Passive Treatment Strategies. According to Blyth et al. (2005) passive treatment strategies are defined as including “any treatment where something was done to or given to the patient for the purpose of pain relief who, in turn, played a passive role” (p.287). Passive strategies to control pain involve relinquishing control over pain to others and are generally maladaptive to the chronic pain experience (Brown & Nicassio, 1987; Jensen et al., 2007). In line with the above-mentioned definition of passive strategies, Blyth et al. (2005) conducted an Australian population based survey on self-management approaches employed by members of the community with chronic pain. The most commonly reported passive treatment strategies as recorded by Blyth et al. (2005) include surgery, nerve block injections, medication, resting, using hot/cold packs, physiotherapy, transcutaneous electrical nerve stimulation (TENS), chiropractor and acupuncture. Hayes and Duckworth (2006) also recognised analgesics, surgery,

physical therapy and chiropractic care as some of the most common passive pain treatments employed by chronic pain sufferers. Additionally, Blyth, March and Cousins (2003) conducted a telephone survey of 2092 Northern Sydney residents, with 474 (22.1%) reporting chronic pain. They identified 71% of these chronic pain sufferers reported using analgesic medication at the time of the survey.

Samwel et al. (2006) also acknowledged that avoidance behaviour, for example resting and other passive coping strategies represent a maladaptive response to pain. Avoidance in this context refers to “the performance of a behaviour which postpones or averts the presentation of a perceived aversive event” (Kazdin, 1980). Individuals avoid physical and other activities as they expect they will cause an increase in pain. Moreover, avoidance behaviours prevent individuals from correcting their negative expectations of the consequences of activities and may reinforce further catastrophic thoughts (Samwel et al., 2006). Snow-Turek, Norris and Tan (1996) conducted a cross sectional study on 76 veterans with chronic pain and found that passive pain coping, including avoidance behaviour was closely related to depression (Samwel et al., 2006). Where as, the use of active treatment strategies are considered to be adaptive, demonstrating enhanced self-efficacy to manage chronic pain.

Active Treatment Strategies. Active treatment strategies are defined as “any instrumental activity initiated by the individual to deal with their pain, but only if not characterised by avoidance or escape” (Blyth et al., 2005, p.287). Active strategies aim to promote the preservation of function and minimise distress associated with the pain experience. Brown and Nicassio (1987) investigated active and passive coping strategies in 361 patients with a diagnosis of rheumatoid arthritis. They identified that whilst active coping tended to be negatively associated with pain and positively associated with adjustment and higher levels of self-efficacy, passive coping was

associated with reports of greater pain and functional impairment. Brown and Nicassio suggested that patients who assume a more active role in dealing with their pain were less likely to experience feelings of helplessness and depression than patients relying on passive coping strategies, and will overall experience better adjustment to chronic pain.

Interestingly, many medical professionals continue to be guided in their treatment decisions by a biomedical model of care, which generally prescribes passive treatment strategies, for example nerve blocks, pharmaceuticals and surgery. These strategies are directed toward the biological causes and physical symptoms of chronic pain and tend to focus on blocking pain signals. However, active coping strategies, drawing from biopsychosocial models, offer a complimentary or alternative approach to managing chronic pain and evidence is continuing to emerge supporting their effectiveness (Blyth et al., 2005).

Cognitive behavioural active treatment strategies aim to incorporate a holistic approach to the management of chronic pain. Brown and Nicassio (1987) reported that cognitive behavioural interventions that maximise active coping are helpful in reducing chronic pain self-reports and improving psychosocial functioning. Blyth et al. (2005) reported a number of active cognitive and behavioural strategies such as exercise, stretching, relaxation techniques and other psychological approaches such as mental distraction and multidisciplinary pain management programs, which assist with an adaptive adjustment to chronic pain (Blyth, Macfarlane, & Nicholas, 2007; Goossens et al., 2005). Pain management programs aim to promote improvement in functioning and more active self-management strategies in individuals with chronic pain, enabling them to be able assume more responsibility for their own health by learning how to actively manage their pain (Hadjistavropoulos & Shymkiw, 2007). Multidisciplinary pain programs are currently considered the gold standard of treatment for individuals with

chronic pain as they aim to address the complex interaction of psychosocial and physical aspects of chronic pain, with evidence demonstrating positive outcomes for individuals following completion of such a program (Access Economics, 2007; Dysvik, Vinsnes, & Eikeland, 2004; Hadjistavropoulos & Shymkiw, 2007; Jensen et al., 2007; Priest & Hoggart, 2002).

Multidisciplinary pain management programs incorporate multiple active coping strategies, such as but not limited to medical management (e.g., supervised reduction of medication to manage pain levels), physical (e.g., exercise, stretching) and psychological (e.g., Cognitive Behavioural therapy (CBT), relaxation strategies) interventions. The use of CBT within a multidisciplinary program aims to promote cognitive change by targeting psychosocial variables contributing to chronic pain (Burns, Kubilus, Bruehl, Harden, & Lofland, 2003; Flor, Fydrich, & Turk, 1992). It is well established that CBT pain management programs are effective in reducing pain and disability. Furthermore, studies that have examined CBT in isolation from the other components of a multidisciplinary program have provided evidence that CBT contributes to pre and post treatment gains, specifically within the psychological domains of depression, catastrophizing, coping and pain severity (Burns et al., 2003; Morley, Eccleston, & Williams, 1999).

Morley et al. (1999) conducted a meta-analysis to identify if active psychological treatments, namely CBT (including behaviour therapy and biofeedback) were better than wait list control and/or alternative active treatments including occupational therapy, physical therapy and an educational and advice package. Of the 25 studies included in the meta-analysis results revealed that CBT was more effective compared to wait list control conditions, specifically in relation to changes in pain experience, mood/affect, cognitive coping (reduction in negative coping and an increase

in positive coping), pain behaviour, activity level and social role function. When these outcomes were compared with other treatments, the efficacy of CBT was reduced and limited to outcomes of pain experience, positive coping and a reduced behavioural expression of pain. Morley et al. conclude that this analysis provides further evidence supporting the effectiveness of CBT and behaviour therapy (BT) for chronic pain in adults. Flor et al. (1992) conducted a meta analysis on 65 studies and identified that multidisciplinary treatments that include some cognitive and behavioural components have better outcomes than no treatment, wait list control or single modality treatments, such as physical therapy or usual medical care, in patients with chronic lower back pain (Astin, 2004).

However, more recently Eccleston, Williams and Morley (2009) conducted a systematic review of the data from 40 randomised control trials (4781 participants) to evaluate the effectiveness of psychological therapies on pain, disability and mood. Overall, CBT and BT were compared with two control conditions (treatment as usual and active control) at post treatment and six month follow-up. The authors concluded that current evidence suggests that both CBT and BT have minimal effects at improving pain and disability associated with chronic pain. However, CBT and BT were effective at altering mood outcomes post treatment and at six-month follow-up (Eccleston et al., 2009). This review highlighted the need for continued improvements in understanding the content, duration and format of treatment for chronic pain sufferers, which in turn may further contribute to enhanced understanding of reasons for relapse.

Whilst pain management programs and other active coping and treatment strategies are promoted as providing the most successful outcomes in this population group relapse rates remain high (Jensen et al., 2007). Turk and Rudy (1991) reported relapse rates following successful treatment outcomes to be 30%- 60% (Turk & Rudy,

1991; Morley, 2008), suggesting that other factors contribute to the outcomes seen in treatments for chronic pain. Jensen et al. (2007) stated that investigating specific beliefs for instance, treatment expectancy and other psychosocial variables closely linked to changes in functioning could be useful when planning a treatment program for chronic pain and to guide the direction of follow-up sessions. Suggesting that by ensuring that specific variables identified as contributing to chronic pain within the literature are targeted, this may increase the likelihood of continued self-management.

Empirical evidence provides support that treatment expectancy has an effect on treatment outcome. Research has been concerned with short-term treatments within the chronic pain population, whilst continued calls have been made to explore treatment expectancy within self-management approaches to chronic pain. Whilst, many other psychosocial factors, including those previously discussed, have been widely researched with respect to chronic pain, the cognitive construct of expectancy has received limited attention in the chronic pain field, with most research confined to the placebo literature (Kirsch & Weixel, 1988; Pollo et al., 2001). Specifically, the relationship between expectancy and the aforementioned psychosocial variables and the influence expectancy has on treatment choices and subsequent outcomes have received limited attention.

Treatment Expectancy

Expectancy has been identified to be an important predictor of treatment (Devilly & Borkovec, 2000). Treatment expectancy refers to “any improvements that a patient believes will be achieved from a certain treatment” (Kazdin, 1979). The influence of expectation has been reported as a strong component in the analgesic effects of placebos, and within the outcomes of cognitive therapies. According to Devilly and Borkovec (2000) expectancy has been shown to correlate with actual therapy outcome among such groups as inpatient Vietnam veterans (Collins & Hyer,

1986), individuals with social phobia (Chambless, Tran, & Glass, 1997), and generalised anxiety disorder (Borkovec & Costello, 1993).

For instance, in a study undertaken by Kirsch and Weixel (1988) coffee and decaffeinated coffee were administered following different verbal instructions. In one case, it was given according to a double-blind paradigm with participants not informed of what type of coffee they would receive, and in the other the decaffeinated coffee was deceptively presented as real coffee. The authors hypothesised that the deceptive administration would produce more substantial changes, as the expectation within the double blind paradigm is uncertain. As predicted, within the deceptive administration group they identified an increase in systolic blood pressure, pulse rate, alertness, tension and certainty of having consumed caffeine. However, the opposite results were identified within the double-blind administration where participants were uncertain if they had received caffeine or not. Moreover, the effects of the placebo on motor performance varied according to the participant's beliefs about the effects of caffeine.

Similarly, Pollo et al. (2001) found similar effects in 38 post surgery patients receiving an infusion of saline solution for three consecutive days post treatment. Participants were divided into three groups with one not being told anything about the analgesic effect (natural history), the second group told the infusion was either a painkiller or placebo (double-blind administration) and the third that it was a painkiller (deceptive administration). During this period patients could make a verbal request for analgesic treatment. Results revealed that requests for analgesic medication were reduced in the double-blind group compared to the natural history group, with this reduction even larger in the deceptive administration group. These studies highlight the effects of expectancy when patients are provided certain expectations compared to uncertainty regarding their expected psychological and physiological responses.

Chambless et al. (1997) conducted a study to explore the treatment outcomes of 62 patients with social phobia attending cognitive behavioural group therapy both at post treatment and at 6-month follow-up. Participants completed self-report measures assessing depression, treatment expectancy, personality disorder traits, frequency of negative thoughts during social interactions and clinician-rated extent and severity of impairment. They identified that higher depression, more avoidant personality traits, and lower treatment expectancy were each related to poorer treatment response on one or more outcome criteria. Specifically, after controlling for depression, patients who at the beginning of treatment reported higher expectancy for benefit found the treatment more credible and were more likely to have sustained improvements on outcome variables of anxious apprehension and self-ratings of their anxiety and skills when undertaking conversation role-play, both components of the CBT group therapy program (Chambless et al., 1997).

Similar to those seeking therapeutic interventions, Davies, Crombie, Brown and Martin (1997) reported that chronic pain patients often have long and complicated medical histories often with unknown pathology. As a result pain clinicians often work through a list of plausible treatments until relief is gained. They proposed that patients who receive little benefit from the first few treatments will therefore have lower expectations about gaining benefit from those following (Davies et al., 1997). Davies et al. stated that if patients develop expectancy for only diminished returns, not only is this a significant burden on clinic resources but this can also be demoralising for patients, lowering levels of efficacy and perceived control over the pain experience. Davies et al. (1997) gathered data of 1912 patients across a number of pain clinics over seven years. Surprisingly, they did not identify a trend between the number of treatments and failure rate. It is however noted that a short time scale assessment was used to gain data and

benefit from treatment was assessed by the physician based on the patient's report with a one question response, impacting on the validity of the outcome results. In contrast, Goossens et al. (2005) noted in their research that the median expectancy score for chronic pain patients entering a pain management program in their study was surprisingly moderate. Goossens et al. suggested that patients might be protecting themselves from further disappointment after having a long history of treatment failures.

In the pain literature, various definitions of expectations have been proposed including patient expectancy, practitioner expectancy, outcome expectancy and treatment expectancy with many similarities between the overlapping labels, with the latter that of specific interest to this study. Treatment expectancy is known to have an effect on the outcomes of patients seeking treatment for chronic pain and the beliefs a person holds about a particular treatment (Goossens et al., 2005; Kalauokalani, Sherman, & Cherkin, 2001; Smeets et al., 2008; van Hartingsveld et al. 2010). Early research focused on therapeutic change by providing treatment rationales to enhance treatment expectations. It was identified that by providing positive treatment rationales expectations for treatment and subsequent outcome improved (Horvath, 1990). Foster, Thomas, Hill and Hay (2010) detailed evidence highlighting the relationship between treatment preferences, expectations and clinical outcomes in pain. Specifically, research has identified a positive relationship between treatment expectancy, chronic pain and clinical outcomes i.e. higher expectancy leads to better outcomes (Foster et al., 2010; Kalauokalani et al., 2001; Ostelo & de Vet, 2005).

Treatment expectancy has been reported in a number of studies as a prognostic factor in the outcome of active treatments (Goossens et al., 2005; Kalauokalani et al., 2001; Smeets et al., 2008). Kalauokalani et al. (2001) conducted a randomized

controlled trial assessing whether participant expectations regarding benefit from a specific treatment were associated with functional improvement in 135 people with chronic lower back pain. Prior to randomization into a treatment condition, participants were asked to rank their expectations regarding the helpfulness of each treatment on a scale of 0 to 10. This served as the main predictor variable, and the outcome of disability was measured at the end of the treatment period using the modified Roland Morris Disability Questionnaire (RMDQ). Results indicated that improved function (by at least two points on the RMDQ) was seen in 86% of participants who held higher expectations for the treatment they received, as compared with 68% who held lower expectations.

Goossens et al. (2005) investigated treatment expectancy for a pain management program in individuals with chronic pain. They explored the construct of treatment expectancy by attempting to determine what factors contribute to expectancy for a CBT pain management program for chronic lower back pain and Fibromyalgia. They identified three variables (positive attitude, active use of coping skills and less disability compensation) that predicted higher expectancy from CBT treatment. However, in this study only 10% of variance in treatment expectancy was identified and it was acknowledged that a range of other factors might be contributing to this expectancy, namely other psychosocial factors.

Goossens et al. (2005) noted that an individual's expectation to reach certain functional goals would consequently foster activity levels. Following this line of reasoning, Goossens et al. suggested that individuals with chronic pain who do not believe they can control their pain will have lower treatment expectancy (when treatment is aimed at improving coping and control) leading to lower treatment outcome in the long-term. Studies such as these support the recommendation that expectations

not only continue to be assessed in people participating in clinical trials, but also in studies of chronic pain conditions for which the clinical states before and after treatment are subjectively defined (Goossens et al., 2005; Kalaukalani et al., 2001). Response expectancy theory has been suggested as offering a basis for treatment expectancy and its influence on outcomes.

Response Expectancy Theory

The response expectancy theory is embedded within a social cognitive approach to understanding human experience and behaviour. Specifically, this theory proposes that; (1) expectations for non-volitional responses e.g., pain, emotional reactions, are sufficient to cause an expected outcome; (2) response expectancy effects are not mediated by other psychological variables and; (3) effects of response expectancies are self-confirming and seemingly automatic (Kirsch, 1997; 1999; Kirsch & Lynn, 1999; Koshi & Short, 2007; Price et al., 1999; Sullivan et al. 2001). Response expectancies are the expectations an individual holds about their emotional and physiological responses (Pollo et al., 2001). For example, an expectation of being anxious before an exam can evoke anxiety, just as an expectation to feel more alert after drinking coffee can induce this response. Similarly, expectations for pain reduction following placebo administration are hypothesized to directly cause subsequent pain relief. Koshi and Short (2007) reported that expectations can be produced without direct personal experience, for instance through observational learning, verbal information and persuasion. Expectancy has been researched within the placebo and surgical literatures and as a contributing factor to outcome in therapeutic interventions, particularly those targeting anxiety and depression (Kirsch, 1999). To date, there has been little extension of the response expectancy theory and its application to the understanding of

expectations associated with treatment choice, particularly within the context of chronic pain patients participating in ongoing active treatments.

Expectancy within the placebo effect is a complex psycho-physiological response that involves both cognitive and physiological responses and has been the basis of numerous investigations (Benedetti, 2007; Finniss & Benedetti, 2005; Koshi & Short, 2007). Specifically, placebo administration generates response expectancies, and response expectancies in turn produce changes in experience both psychologically and physically (Kirsch, 1997). Volkow et al. (2003) identified that participants who expected to receive the treatment of an actual drug showed greater significant changes in brain metabolic activity than those who expected to receive a placebo, even though both groups received the same real analgesic. Koshi and Short (2007) argue that understanding this cognitive construct is essential for practitioners managing patients who have been shown to be most influenced by the placebo response, including chronic pain patients.

There is relatively limited literature exploring expectancy for treatments, otherwise known as treatment expectancy, in chronic pain patients receiving alternative, non-medical, treatment approaches. From extensive review of the literature it appears Goossens et al. (2005) is the only study to date exploring expectancy in chronic pain patients attending a pain management program, suggesting that the mechanism contributing to the relationship between treatment expectancy and outcome compares to outcomes of expectancy within the placebo literature. The majority of literature testing the assumptions of the response expectancy theory has been within placebo trials, involving short-term passive treatments e.g., taking medication, where expectancy is only measured at one time point. This methodological approach is in contrast to those generally employed in measuring modifiable psychosocial variables within the chronic

pain literature. Following the line of reasoning that expectancy is representative of a psychosocial variable in the chronic pain experience suggests that research to date has produced limited knowledge of the extent to which this cognitive construct is changeable.

Changes in Treatment Expectancy. Whilst research is emerging regarding the association between treatment expectancy and outcome, and variables that contribute to treatment expectancy (Goossens et al., 2005; Smeets et al., 2008), little research has explored modifiability of this variable. Most studies only measure it at one to two points in time, usually prior to the treatment commencing (van Hartingsveld et al., 2010). Van Hartingsveld et al. (2010) highlighted this regularity as warranting further investigation arguing that it is not known to what extent expectations can (or will) change over time. Similarly, Kalaukalani et al. (2001) reported the limitation in their study that they only measured treatment expectancy at one time point, pre treatment, acknowledging that further investigation is needed to determine the extent that expectations change over time in response to other variables, such as interaction with providers (Kalaukalani et al., 2001) and/or changes in other psychosocial variables. Sorbi et al. (2006) supported this recommendation stating that there is no clear understanding as to what extent treatment expectancy is modifiable in response to other variables, such as depression, catastrophizing, self-efficacy, disability and so on (Sorbi et al., 2006).

In line with the theoretical underpinnings already discussed as they relate to chronic pain, expectancy is described as a psychological variable subject to change according to emotional and behavioural factors along with other external influences (Goossens et al., 2005; Koshi & Short, 2007). Goossens et al. (2005) supported this view stating that “treatment expectancies can best be considered as varying on a continuous scale from very negative to very positive expectancies (p.18)” and that these

may influence treatment outcome prior to as well as after treatment regardless of the type of treatment.

To the best of the author's knowledge, Goossens et al. (2005) is the only study to measure treatment expectancy at pre and post treatment and again at 6 and 12 months following the completion of a pain management program. Whilst they hypothesised that a change in treatment expectancy would alter treatment outcome at follow-up, they were unable to provide confirmation, noting that there was no change in expectancy score pre and post treatment and whilst it was correlated it was not a significant predictor of the psychosocial outcome measures at the 6-month follow-up. They suggest that this result may be due to a good match between patient and treatment rationale. Further investigation is needed to explore the variability of treatment expectations for a range of active and passive treatments sought by a chronic pain patient, specifically those attending a pain management program.

Treatment Expectancy in Active and Passive Treatments. Van Hartingsveld et al. (2010) reported that the majority of treatment guidelines for chronic pain recommend the use of active treatments, stating that expectations represent an important prognostic factor in the outcome of active treatments. Sullivan et al. (2001) stated that whilst psychosocial interventions for pain management demonstrate improvements due to changes in expectations, little research has investigated this relationship. Similar to Goossen et al. (2005), a study conducted by Smeets et al. (2008) reported that active treatments such as exercise, CBT and multidisciplinary treatment approaches are effective in reducing pain and disability. Moreover, identifying modifiable predictors of treatment outcomes, such as treatment expectancy, further enhanced these outcomes.

Smeets et al. (2008) conducted a study on 223 patients randomised to active physical therapy treatment, CBT and a combined therapy. Patients completed a

credibility and expectancy questionnaire after being provided a treatment rationale and again at the conclusion of the treatment. Their results revealed that expectancy was associated with outcome in rehabilitation treatment for chronic lower back pain.

Overall, lower expectancy was associated with higher levels of pain related fear. After controlling for age, sex, pain intensity at baseline, duration of disability and irrespective of the treatment offered, expectancy explained variance in disability (2.3%) and satisfaction (10.7%) to a modest extent.

Current evidence supports the view that active coping and treatment strategies are positively associated with self-efficacy and negatively correlated with depression, catastrophizing and fear of movement, with the opposite evident for passive treatment strategies (Arnstein et al., 1999; Asghari & Nicholas, 2001; Jensen et al., 2007; Lim et al., 2001). Following, this line of reasoning and in light of the biopsychosocial models of pain, it can be postulated that when self-efficacy levels are high and other maladaptive cognitive factors (e.g., fear of movement) are low it would be anticipated that expectancy for self-management, such as participation in pain management, may be higher than expectancy for passive treatment strategies which is more closely linked with perceived disability. However, further research is required to determine this possibility.

The Present Study

Treatment expectancy has been shown to influence treatment outcomes in the chronic pain population (Goossens et al., 2005; Kalaukalani et al. 2001; Smeets et al., 2008). However, to date the research has conceptualised treatment expectancy in somewhat limited terms, particularly as a construct that does not change over time, generally being only measured pre-treatment (van Hartingsveld et al., 2010; Kalauokalani et al., 2001). Whilst it is agreed that pain management programs are the

most advantageous choice of treatment, minimal research has explored treatment expectancy in regard to this treatment approach. Goossens et al. (2005) is the only study to date that has investigated treatment expectancy for a pain management program in individuals with chronic pain as detailed above. This study investigated the contribution that treatment expectancy has on outcomes in pain management programs and in doing so has raised a number of valuable questions and highlighted its potential impact on relapse rates within the chronic pain population.

No evidence was identified that treatment expectancy in chronic pain patients attending a pain management program has ever been investigated with an Australian population. Specifically, further investigation is necessary to better understand the role expectancy has on individual's outcomes following a pain management program (Logan, 2003). Investigation is warranted into the variability in treatment expectancy over time in an individual, amongst different active and passive treatments and lastly the influence psychosocial factors associated with chronic pain have on treatment expectancy. Van Hartingsveld et al. (2010) recognised that research is needed to explore the relationship between treatment expectation and other psychosocial states and to better understand the extent to which expectancy changes over time.

Kalauokalani et al. (2001) stated that understanding treatment expectancy and including it in the assessment and design of treatment strategy may not only enhance patient autonomy and satisfaction but also provide support for the role of shared decision making by patients and providers as a basis for improving clinical outcomes.

Clinically, it is hoped this research will assist in further understanding the process for people with chronic pain becoming active participants in a pain management program. Further understanding into the contribution of treatment expectancy on the widespread incidence of relapse will be explored. Currently, many chronic pain

sufferers revert back to the use of passive treatment strategies in the time following a successful intervention of an active treatment strategy. Jensen et al. (2007) acknowledged that the literature emphasizes incorporating relapse prevention strategies into multidisciplinary pain management programs, with an aim to increase the likelihood of continued improvement. However, little research has explored that process of change and contributing factors to the likelihood of sustained self-management in patients following such programs (Jensen et al., 2007). In order to explore the construct of treatment expectancy, the relationship with the above mentioned psychosocial factors and how this relationship influences individual's treatment outcomes over time and their experience of chronic pain, the followings aims and hypotheses are proposed for this current study.

Aims. This study aims to explore the change in treatment expectancy and to further investigate the influence psychosocial factors contributes to variability in treatment expectancy in chronic pain patients attending a pain management program. Moreover, this study aims to further clarify the role of treatment expectancy in passive and active treatment choices and how it relates to relapse post-treatment.

Hypotheses. It is hypothesised that; (a) treatment expectancy changes over time; (b) treatment expectancy varies according to a range of psychosocial factors at pre treatment; (c) the expected positive value of passive treatments is associated with poor pain coping and self-efficacy; and (d) there is an inverse relationship with self-management strategies i.e. treatment expectancy for active treatment is associated with better coping and enhanced self-efficacy. Hence, treatment expectancy relates to relapse following a pain management program.

Method

Participants

The sample consisted of 71 consecutive referrals to a four-week multidisciplinary pain management program (Innervate Pain Program) at the Hunter Specialist Medical Centre. The sample consisted of 37 male and 34 female, *M* age = 42.94, age range: 19 to 62 years. All participants in this study were in receipt of workers' compensation and were taking pain medication on entry into the program and the study. Those who were accepted into the Innervate Pain Management program were invited to participate during the program preparation meeting held one week prior to the commencement of the program. Inclusion and exclusion criteria for this research project corresponded with the criteria required for entry into the Innervate pain program.

Participants were included in the study if they had experienced pain on a persistent basis for more than six months, to a level interfering with their ability to carry out their normal activities e.g., working, socialising, doing housework, hobbies and other activities of daily living. Participants were excluded if they had a significant substance use problem, were currently experiencing psychosis or had depression to a level that would impact on their ability to meet the requirements of participation i.e. had a lack of interest or motivation to participate, and/or if they were unable to manage the physical requirements of the pain management program.

Materials

The initial participant's package at recruitment consisted of an information sheet outlining the project and a consent form (Appendix A1 and A2), along with the Treatment Expectancy Questionnaire (see Appendix B7). All consenting participants had already completed the pre-program questionnaires required for their participation in the pain management program, which were further analysed within this study. These included six questionnaires measuring a range of psychosocial variables including

depression, pain catastrophizing, fear of injury related to movement, self-efficacy, pain intensity and self-perceived disability (see Appendix B1-B6). Demographic information was obtained upon consent from the client's initial registration form submitted on their referral to the Innervate Pain Program. Information collected included gender, age, compensable status, primary pain site, number of pain locations, pain duration and cause of onset of pain. All data was de-identified prior to the collation of results.

Psychosocial Questionnaires.

Depression, Anxiety, Stress Scale 21 (DASS21; Lovibond & Lovibond, 1995).

The DASS21 is a short form of the original 42-item self-report measure of anxiety, depression and stress and has been used with a diverse range of populations and settings (Crawford & Henry, 2003; Lovibond & Lovibond, 1995). The DASS21 consists of 21 self-report items forming three subscales to distinguish states of depression, anxiety and stress, with seven questions for each subscale (Henry & Crawford, 2005). The scales list symptoms and require the participant to rate the severity/frequency of each item over the past week on a four-point Likert scale (0= *Did not apply to me at all* to 3= *Applied to me very much, or most of the time*). The depression subscale score is the only being recorded for the purposes of this study. Evidence demonstrates that this subscale provides a valid measure of this construct with chronic pain patients (Crawford & Henry, 2003; Taylor et al., 2005). Scores were calculated by the summation of items 3,5,10,13,16,17,21. Given that the DASS21 is a shortened version, the summed score is doubled, to be comparable to the 42 item DASS. The interpretation of severity is based on cut-off scores ranging from normal to extremely severe (Crawford & Henry, 2003).

The internal consistency of the DASS21 is strong ranging from .82- .97 (Antony, Beieling, Cox, Enns, & Swinson, 1998; Clara, Cox, & Enns, 2001; Crawford

& Henry, 2003) and test retest reliability at .71 is just as strong as the 42-item version (Weinman, Wright, & Johnston, 2001). The DASS21 has demonstrated strong concurrent validity against other depression and anxiety measures ($r = .71 - .79$; Antony et al., 1998; Crawford & Henry, 2003; Henry & Crawford, 2005). Overall, psychometric robustness has been demonstrated in clinical and non-clinical samples (Lovibond & Lovibond, 1995; Weinman et al., 2001).

Pain Catastrophizing Scale (PCS; Sullivan et al., 1995). The PCS is a reliable and valid 13-item self-report measure useful for both clinical and nonclinical populations (Osman et al., 1997; Sullivan et al. 1995). Catastrophizing refers to the phenomenon of expecting or worrying about major negative consequences from a situation, even one of minor importance (Turner & Aaron, 2001). The PCS is useful in understanding the psychological processes that lead to heightened physical and emotional distress in response to aversive stimuli (Sullivan et al., 1995). The PCS lists 13 different thoughts and feelings that may be associated with pain, for example “When I’m in pain I worry all the time about whether the pain will end “(Sullivan et al., 1995). Each PCS item is rated on a 5-point Likert scale (0 = *not at all* to 4 = *all the time*) with participants indicating the degree to which they experience these statements. Item scores can be divided into three subscales; helplessness, magnification and rumination. Total scores range from 0 to 52 with higher scores indicating greater levels of catastrophizing.

The PCS has been shown to have satisfactory levels of internal consistency ($\alpha = .87 - .95$; Osman et al., 1997; Sullivan et al., 2001) in both community and pain outpatient groups (Osman et al., 2000) and sufficient test-retest reliability ($r = .75$; Boersma & Linton, 2006; Osman et al., 2000). The PCS has also demonstrated satisfactory construct, convergent and discriminant validity (Osman et al., 1997) and

concurrent validity is established against other measures of negative thoughts in response to pain (Osman et al., 1997).

Tampa Scale of Kinesiophobia (TSK modified; Goubert et al., 2004). The TSK is a questionnaire that measures fear of (re)injury associated with normal movement or activity (Goubert et al., 2004). The TSK is the most common scale for measuring pain-related fear of movement, and is suitable to be used in chronic pain population (French, France, Vigneau, French, & Evans, 2007; Swinkels-Meewisse, Swinkels, Verbeek, Vlaeyen, & Oostendorp, 2003). The items are scored on a 4-point Likert scale from 1= *strongly disagree* to 4= *strongly agree* (Goubert et al., 2004). There is variability in the recommended factor structure and internal consistency results for the TSK, with (Vlaeyen, Kole-Snijders, Rotteveel, Ruesink, & Heuts, 1995) recommending a four-factor structure including harm, fear of (re)injury, importance of exercise and avoidance of activity. Other studies recommend a two-factor structure model, which has been identified to account for higher levels of variance (49%) in chronic pain patients using exploratory factor analysis (Clark, Kori, & Brockel, 1996 as cited in Goubert et al., 2004; Geisser, Haig, & Theisen, 2000). Goubert et al. (2004) analysed the data from eight different studies using confirmatory factor analysis to determine the internal structure of the TSK. It was identified that a two factor structure including an eight item activity avoidance subscale and a five item pathological somatic focus subscale yielded better results than a four factor structure model.

In order to reduce the load on subjects, the TSK used in this study is a modified version of the original 17-item TSK and is comprised of the 13 items recommended by Geisser et al. (2000) and Goubert et al. (2004). The questionnaire has shown strong concurrent validity, construct validity and predictive validity and reliability, with test-retest reliability, $r=.78$ (Boersma & Linton, 2006; Roelofs et al., 2004; Swinkels-

Meewisse et al., 2003; Vlaeyen et al., 1995a) and internal consistency ($\alpha = .73$; activity avoidance) and $.70$ (pathologic somatic focus) in a chronic pain patient sample (Goubert et al., 2004).

Pain Self-Efficacy Questionnaire (PSEQ; Nicholas, 1989). The PSEQ is based on Bandura's (1977) concept of self-efficacy which emphasised persisting in the face of obstacles and adverse experiences (Asghari & Nicholas, 2001). The PSEQ consists of 10 items, designed specifically for chronic pain. Participants rate their confidence in performing activities such as "I can still do many of the things I enjoy doing, such as hobbies or leisure activity, despite the pain" on a 7-point Likert scale (0= *not at all confident* to 6= *completely confident*). Scores on the PSEQ range from 0 to 60, with higher scores indicating stronger self-efficacy beliefs (Asghari & Nicholas, 2001; Nicholas, Wilson, & Goyen, 1992).

It has supportive validity as identified in two different studies with chronic pain patients ($.67$ - $.84$), internal consistency ($\alpha = .92$ and $.79$) and test-retest reliability ($r = .73$; Asghari & Nicholas, 2001; Nicholas, 1994; Nicholas, 2007). Asghari and Nicholas (2001) demonstrated high levels of internal reliability ($\alpha = .92$). The PSEQ remains the most validated measure of self-efficacy in a chronic pain population (Williams et al., 1996; Williams, Nicholas, Richardson, Pither, & Fernandes, 1999). The PSEQ has been shown to predict outcome from pain management interventions (Coughlan, Ridout, Williams, & Richardson, 1995), with patients who report lower levels of pain self-efficacy significantly more likely to drop out of pain treatment than those reporting enhanced self-efficacy (Coughlan et al., 1995).

Pain intensity rating. As recommended from previous studies, pain intensity was measured on an 11-point Numerical Rating Scale (NRS) ranging from 0 = *no pain at all* to 10 = *pain as bad as it could be* (Asghari & Nicholas, 2001; Jensen, Karoly, &

Braver, 1986; Lim et al., 2007). A particular advantage of the NRS is its simplicity, sensitivity, reproducibility and universality (Dysvik et al., 2004). The score on the item ‘What was the usual level of your pain in the last week?’ is included in the analyses for the purposes of this study, following the same practice as already employed by the Innervate pain management team. Such scales have been shown to be valid and sensitive to change, test-retest reliability ($r = .95$) and criterion related validity with other instruments ($r = .42-.91$; Jensen et al., 2007; Jensen & Karoly, 2001; Osborne et al., 2007). Jensen and Karoly (2001) noted that this scale is strongly associated with other measures of pain intensity and is also responsive to changes in pain in response to pain treatments.

Roland Morris Disability Questionnaire (RMDQ; Roland & Morris, 1983).

The RMDQ is a 24-item measure of self-reported pain contingent physical disability. It is derived from a larger measure of general health, the Sickness Impact Profile (Bergner, Bobbitt, Carter, & Gilson, 1981). The 24 items are statements about limitations on activity due to pain, and participants mark the items that apply to them. The sum of the items marked represents the total disability score. The scale has been reported as having high levels of test-retest reliability ($r = .91$), construct validity and internal consistency ($\alpha = .84$ and $.93$ respectively) for assessing physical disability in the chronic pain population (Jensen et al., 2007; Roland & Fairbank, 2000; Roland & Morris, 1983; Schiphorst-Preuper et al., 2007; Vlaeyen et al., 2002). In addition, the RMDQ has shown comparative validity with other measures of disability (Roland & Morris, 1983).

The opening statement on the RMDQ states “This list contains sentences that people have used to describe themselves when they have back pain” (Roland & Morris, 1983). The word “back” was removed in the present study to allow the questionnaire to

apply to all pain, regardless of site. Previous research such as that of Genevay, Stingelin and Gabay (2004), Molloy et al. (2006) and Lim et al. (2007) have set a precedent for modifying the RMDQ in this way.

Treatment expectancy questionnaire. Treatment expectancy refers to a patient's belief about the actual or potential benefits of a given treatment. Variability exists in the literature regarding measures of treatment expectancy, with little psychometric analysis existing for any one measure (van Hartingsveld et al., 2010). There is no standard measure of treatment expectancy reported in the literature (van Hartingsveld et al., 2010). For the purposes of this study, the term treatment will be used to encompass strategies, treatments or activities designed as an act, manner, or method of handling or dealing with pain.

The treatment expectancy questionnaire used in this study has been adapted from the treatment expectancy questionnaire used by Goossens et al. (2005), which comprises three items. One relates to personal benefit from treatment, the other expectancy question concerns the effectiveness of the therapy in general, and the final is a question relating to treatment credibility. Compared to credibility, the evidence to date reveals that expectancy is a stronger predictor of treatment outcome (Deville & Borkovec, 2000) and is to be independently measured in the current study. Additionally, as this study involves people's beliefs about 12 different treatments, rather than beliefs about one treatment, which is usually asked, patient response overload again became an issue. The three items in the scale used by Goossens et al. (2005) were all significantly inter correlated ($r = .64-.81$), and other single item measures of treatment expectancy have proven to be reliable and valid (Linde et al., 2007; Milling, Reardon, & Carosella, 2006; Price et al., 1999). It was therefore decided to employ the first item in the Goossens et al. (2005) study, the anticipated benefit from the treatment

for the individual as the treatment expectancy measure. However, to ensure its appropriateness for this study, preliminary analysis was undertaken to gain some initial psychometric properties of the treatment expectancy measure and to confirm the appropriate categorisation of active or passive for each treatment. This was undertaken using factor analysis, which is to be reported within the results section.

The treatment expectancy questionnaire used in this study asks about participant's beliefs on how much a given treatment will help them to cope with their chronic pain. The items are rated on an 11-point Likert scale (0= *not at all* to 10= *very much*) with higher ratings indicating greater treatment expectancy for a given treatment. The current treatment expectancy questionnaire asks the same question for each treatment e.g., "How much do you think surgery will help you to cope with your chronic pain?". The various treatments being asked about in the expectancy questionnaire have been defined in previous research as either passive or active treatments (Blyth et al., 2005). Passive treatment refers to any treatment where something was done to or given to the patient who, in turn, played a passive role. Where as, active treatments require an effortful engagement on the part of the patient (Blyth et al., 2005). The treatments included in the questionnaire include stretching, relaxation, chiropractic, acupuncture, massage, hydrotherapy, surgery, injection/nerve blocks, TENS machine, pain management program, pain medications and exercise (Blyth et al., 2005).

Procedure

Ethics approval was obtained from the University of Newcastle Human Research Ethics Committee (see Appendix A3) for all materials given to participants.

Recruitment and pre-program activities. Individuals referred to the Pain Management Program were invited to participate in the study. Specifically, following a two-hour semi-structured interview with the Innervate pain management team

comprising of a Clinical Psychologist and Physiotherapist, those who met the inclusion criteria, as detailed above, were invited to participate in the cognitive behavioural therapy based pain management program. Pre-treatment interviews are currently standard practice at the Innervate pain management program. Following this, all patients attended a program preparation meeting with the Innervate Pain Management program facilitator (Ms Helen Macauley; Registered Nurse and Rehabilitation Counsellor), approximately one week prior to the commencement of the program. At the completion of the program preparation meeting the student researcher was introduced to all patients by the program facilitator, who then distributed the research project information sheet and invited patients to voluntarily participate. Recruitment occurred at the end of the meeting to allow patients to leave if they were not interested in participating. Those who were interested in participating after reading the information sheet were provided with a consent form and upon completion of this, the expectancy questionnaire. This questionnaire was provided in addition to the forms and questionnaires they had already completed regardless of their participation in this study including the DASS21, PCS, TSK, PSEQ, Pain Intensity rating and the RMDQ. Following this, participants commenced the pain management program approximately one week later.

Pain management program. The Innervate Pain Program is an intensive, cognitive behavioural program that teaches active coping skills for improving quality of life despite persistent pain (Innervate pain program, n.d.). Refer to Appendix C for a copy of the timetable for the pain management program.. The Innervate Pain team involved in the delivery of the program consists of a Clinical Psychologist, Physiotherapists, Exercise physiologist, Nurse-rehabilitation counsellor and three medical specialists with expertise in chronic pain.

Content. All sessions were accompanied by a manual consisting of a timetable, worksheets, recording forms and handouts that were taken home by the participants at the end of the course.

Exercise and stretch program. A half hour stretch program occurs every morning (12 sessions in total) followed by approximately two hours of light exercises every afternoon (11 sessions in total). These sessions were designed to improve overall fitness and flexibility, to build muscle strength and to correct individual postural problems. Frequency and intensity of exercises are set by patients to determine a manageable baseline and improve tolerance over the four weeks of the program.

Goal setting. Three, hour long goal setting sessions were held in the program on the second, sixth and final day of the program. Goals covered work, leisure, social, family and domestic activities. Short-term goals usually consisted of increased sitting, standing, typing and walking tolerances.

Education. A total of 15 education sessions, 30 minutes to one hour in length were multidisciplinary in delivery and designed to counteract fears of re-injury and to empower the client to feel confident to manage their chronic pain. Sessions covered concepts such as nutrition, chronic and acute pain, appropriate use of medication and sleep hygiene.

Cognitive behavioural therapy and positive psychology. Nine, on our sessions on problem solving, changing common unhelpful thinking patterns regarding pain, changing maladaptive behaviours, desensitizing to pain and maintaining proactive behavioural changes were delivered.

Medication reduction. Pain medication reduction plans were developed collaboratively in the second week and reviewed in the final week.

Applied relaxation. Nine sessions of approximately 15 minutes duration were held teaching a simple breathing technique to be practiced within the group. As confidence increased patients were encouraged to apply these strategies in different settings e.g. in a quiet and noisy place and when sitting or walking.

Inclusion of significant others. Significant others were encouraged to attend on one full day to facilitate their understanding of chronic pain management. As well as teaching principles of communication, patients and their significant others were taught to recognise the impact of solicitous behaviours on disability and strategies for expressing care and concern.

Vocational counselling. A large part of the program is placed on managing pain for vocational activities. Five, one hour group sessions provide education around principles of returning to work or remaining at work with a chronic pain problem. A further 1-2 hours are spent with each participant individually helping to identify potential work roles based on qualifications and experience, or for those currently working, on incorporating the pain management strategies into the work environment. The physical therapy sessions then try to emulate work activity where possible. The vocational counsellor also took a proactive role in contacting relevant stakeholders e.g. insurance company case manager to ensure that the vocational rehabilitation would continue once the pain management program was complete. During the final week of the program there is also input from an employment placement consultant who specialises in injured workers and a volunteer coordinator along with meetings with their General Practitioner and rehabilitation provider to plan the next strategies to return to work following the completion of the program.

The course work is also complemented with homework including medication monitoring, practicing calming strategies and so on. Participants attend the program in

groups of no more than ten. The course runs for three days per week (Tuesday, Thursday and Friday), from 9am to 5pm, over four weeks (96 treatment hours in total; Innervate pain program, n.d.).

Post pain management program activities. Post-treatment follow-up is currently a standard practice for all participants who have completed the pain management program. As such, all participants were requested to complete the same battery of questionnaires, including the DASS21, PCS, TSK, PSEQ, Pain Intensity, RMDQ and the Treatment Expectancy questionnaire on the last day of the program and prior to or at their one and three month follow-up meetings with the Clinical Psychologist. A staff member at Innervate mailed all questionnaires out two weeks prior to the follow-up for them to return in a reply paid envelope, or at their follow-up appointment. However, in an attempt to increase response rates, participants were contacted if they failed to return the one or three month follow-up questionnaires to provide a reminder and another opportunity to complete and return.

Data collection

Once all questionnaires were returned to the student researcher or a member of the Innervate Pain program staff, they were stored in a secure location, and data was entered into a computer spreadsheet password protected by the student researcher. All demographic information and questionnaires were kept at the Hunter Specialist Medical Centre in accordance to the procedures outlined by the University of Newcastle Ethics Committee policy.

Data analysis

All statistics were analysed using the software PASW, version 18, using a probability of $\alpha < .05$, representing statistical significance (except where there is noted a statistical significance of $p < .01$). This study was a within subject repeated measures design. In relation to the data collected, in instances where two numbers were circled the highest score was recorded to ensure consistency within the recorded data. Results of a power analysis indicated that a sample size of 55 would provide sufficient statistical power to detect a medium effect size ($f^2 = .15$ or R^2 increase = .09, from a base of $R^2 = .30$) in a regression model, power = 0.80, type 1 error = .05.

With respect to the treatment expectancy questionnaire to ensure that the first question item used in Goossens et al.'s (2005) study was appropriate for use in the treatment expectancy questionnaire for this study, test-retest analysis was undertaken to gain some initial psychometric properties of the measure. The baseline data and post-program scores were then analysed by means of a factor analysis with Varimax rotation, using a correlation coefficient matrix. Even though it is recommended that a larger sample size is more advantageous, this analysis was deemed acceptable as there were at least double the participants compared to variables analysed at pre and post treatment (Field, 2009). Internal consistency checks were not performed at one and three month follow-up due to the small sample size.

In order to test the hypothesis that treatment expectancy changes over time, Linear Mixed Model (LMM) for outcomes with fixed covariate coefficients was applied to investigate longitudinal changes within the treatment expectancy questionnaire for passive and active treatment expectancy items. Unstructured covariance was used within this LMM and all subsequent mixed model analysis as it resulted in the lowest Akaike Information Criterion (AIC) score. A lower AIC score reflects the production of the most accurate model, demonstrating better parameter estimates and therefore most

useful for the interpretation of results. LMM was used rather than repeated measures ANOVA to model change in expectancy over time as the LMM allows the use of all available data from a participant even when an observation is missing (Field, 2009), as is the case in the present data set. The second hypothesis is concerned with how changes in predictor variables, specifically psychosocial variables, relate to identified changes in treatment expectancy at pre treatment and Kendall correlation matrix and a linear regression using backward method supports this exploration. Additionally, LMM analysis allows for the additional exploration of the contribution of psychosocial factors over time on treatment expectancy and to investigate longitudinal changes within the treatment expectancy questionnaire and the association of poor coping, pain self-efficacy and pain intensity on passive treatment expectancy and separately on active treatment expectancy. Kendall correlation matrix was also undertaken to identify the direction of this relationship.

Results

Demographics

In total, 71 participants agreed to participate in the study however at pre treatment a total of 69 participants returned a full completed set of questionnaires. 57 participants returned their questionnaires at post- treatment. The numbers of completed and returned questionnaires dropped substantially at one month and three month follow-up, with 29 participants returning a full set of questionnaires at one month and 25 participants at three- month follow-up. This represents a 36% return rate at 3-month post-program follow-up. Only one participant dropped out of the study as a consequence of them not being permitted to commence the pain management program due to non-approval from their insurer.

All of the study participants experienced chronic pain and had a history of treatment seeking behaviour. Upon entering the pain management program representation of males and females were relatively equally distributed in regards to numbers and age (see Appendix D1). Results of a between subjects Analysis of Variance (ANOVA) revealed no significant age difference between males and females, $F(1, 64) = .155, p = .695$ (see Appendix D1).

Frequency Data for Demographic Information

		Frequency (%)
Onset of pain:	Accident at work	45 (63.4%)
	At work, not an accident	12 (16.9%)
	Accident not at work	7 (9.9%)
Pain locations:	One pain area	5 (7%)
	Two pain areas	15 (21.1%)
	Three or more pain areas	44 (62%)
Primary pain site:	Lower back	28 (39.4%)
	Neck and/or shoulders	25 (35.2%)
	Upper back	0 (0%)
	Other	11 (15.5%)

As can be seen in Table 1, 63.4% of participants reported that their onset of pain was due to an accident at work, 62% of the participant group had three or more pain areas and 39.4% of participants reported that their primary pain site was their lower back, followed closely with 35.2% of the sample group experiencing most pain in their neck and/or shoulders, with the remaining in other areas. To further determine the significance of differences between males and females an ANOVA was run and pair wise comparisons revealed that none of the demographic variables listed in Table 1 were significantly different between males and females with the exception of cause of pain onset (see Appendix D2). However, results of a Kendall correlation matrix revealed that pain onset was not significantly associated with passive or active expectancy or any of the psychosocial variables and as such was not included in further analysis (see Appendix D3).

Analysis of self-report measures

Assumptions of normality were assessed and satisfied for all the self-report psychosocial measures and treatment expectancy.

Table 2

The Shapiro- Wilk Test Results of Normality for the Self-report Measures

Measures	Statistic	Df	Sig.
Treatment Expectancy	.979	69	.307
DASS21	.966	68	.058
PCS	.981	68	.397
TSK	.986	68	.647
PSEQ	.972	68	.126
RMDQ	.984	68	.510

As can be seen in Table 2, the scores obtained from the baseline data for the psychosocial questionnaires and the treatment expectancy questionnaire were all not significant ($p > .05$), providing evidence for assumption of normality. The respective z-scores of skewness and the kurtosis z-scores were calculated for these measures and are detailed in Table 3. Converting the values of skew and kurtosis to z-scores is informative as z-scores are useful as they allow the comparison of values from different measures (Field, 2009).

Table 3

*z-scores of Skewness and Kurtosis for the Baseline Results of the Psychosocial**Measures*

Measures	z- scores of skewness	z-scores of Kurtosis
Treatment Expectancy	$-.255/.289 = .882$	$-.506/.570 = .888$
DASS21	$-.138/.291 = .474$	$-.816/.574 = 1.42$
PCS	$-.022/.291 = .076$	$-.710/.574 = 1.28$
TSK	$-.056/.291 = .192$	$-.542/.574 = .944$
PSEQ	$-.355/.291 = 1.220$	$-.533/.574 = .929$
RMDQ	$-.235/.291 = .807$	$-.413/.574 = .720$

Negative z scores represent scores that fall below the mean and the inverse for positive z- scores. Furthermore, z-scores of skewness and Kurtosis z- scores that are greater than 1.96 represent significant findings ($p < .05$; Field, 2009). Therefore, as can be seen in Table 3, these results represent non-significant findings. Field (2009) reports that non-significant findings provide support that the scores on these measures are normally distributed.

Analysis of the treatment expectancy questionnaire. Test-retest data were collected from a pilot sample of 17 people who were attending for individual treatment at the Hunter specialist medical centre. The test-retest interval was two weeks and whilst consent forms were obtained, no controls were implemented regarding current treatment they were receiving. Also, no demographic details or other psychosocial measures were collected from this pilot group. Results supported the reliability of the measure with a correlation of the summed expectancy score between the two time points, $r = .75$. Internal consistency checks regarding the dimensionality of the

treatment expectancy questionnaire were then assessed. The treatment expectancy questionnaire had high internal reliability, Cronbach's $\alpha = .807$.

The baseline data and post-program scores were then analysed by means of a factor analysis with Varimax rotation, using a correlation coefficient matrix. Results on the pre-treatment expectancy scores for all 12 items in the treatment expectancy questionnaire indicated that it was satisfactory for factor analysis, with high values in the anti-image correlation matrix. The Kaiser-Meyer (KMO) measure of sampling adequacy was .736 and Bartlett's test of sphericity was significant ($p < .01$). Hutcheson and Sofroniou (1999 as cited in Field, 2009) reported that KMO values between .7 and .8 are good and provide support that the sample size is adequate. With all the items for the treatment expectancy questionnaire included in the analysis, two factors explained 47.8% of the variance for expectancy for treatment. Factor analysis with Varimax rotation was also performed at post-treatment and the results revealed a KMO measure of sampling adequacy of .645 and that the Bartlett's test of sphericity was significant ($p < .01$). Furthermore, two factors explained 51.4% of the variance within the treatment expectancy measure. However, from pre to post treatment a number of the items showed variability within their scores, namely acupuncture, massage, hydrotherapy, chiropractor and the TENS machine.

It appears that the variability in these items demonstrate an apparent change in participants expectancy of the helpfulness of certain treatments as evident in Appendix D. This variability occurs after their participation in the pain management program, whereby they are provided with a high level of information regarding active self-management principles; hence it is possible that the factors change to reflect this new learning (see Figure D3). However, whilst this variability is evident a number of items remain consistently loaded together from pre to post treatment including surgery,

medication and injection/nerve blocks and secondly relaxation, stretching, exercise and the pain management program. Factor analysis was rerun on these later items independently as can be seen in Figure 1, providing support that they represent two relatively independent factors.

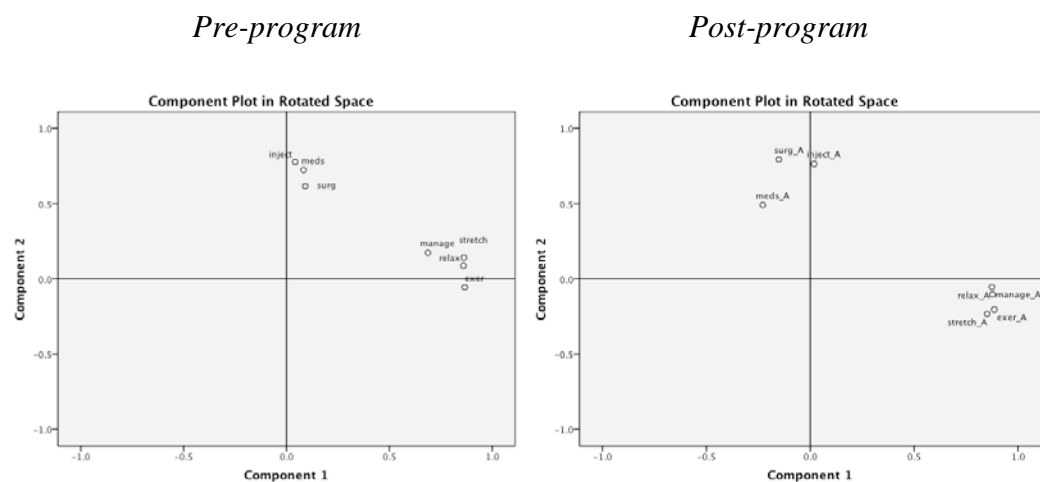


Figure 1. Loading Plots of Active and Passive Components within the Treatment Expectancy Questionnaire at Pre and Post-program

As can be seen in Figure 1 by removing 5 treatment question items that demonstrated variability within the measure from pre to post treatment, potentially due to enhanced knowledge from their participation in pain management program, two relatively independent groups are evident. The horizontal axis represents the variables that correlate highly with factor 1 (termed active treatment strategies) but have a low correlation with factor 2 on the vertical access (termed passive treatment strategies). Factor loadings for the remaining seven items are presented in Table 4.

Table 4

*Factor Analysis based on Varimax Rotation for Active and Passive Treatment**Expectancy at Pre and Post-program*

Questionnaire Items	<u>Pre- treatment</u>		<u>Post- treatment</u>	
	Factor 1	Factor 2	Factor 1	Factor 2
Pain medication	.08	.78	.02	.76
Injection/Nerve block	.04	.62	-.15	.79
Surgery	.09	.72	-.23	.49
Exercise	.87	-.06	.89	-.20
Relaxation	.86	.09	.87	-.05
Stretching	.86	.14	.85	-.23
Pain management program	.69	.17	.88	-.10

Note: Component loadings >.400 are in bold face

In relation to the pre-treatment expectancy scores in Figure 1 the indicators of factorability were good, including the values of the anti-image correlation matrix. The KMO measure of sampling adequacy was .796 and Bartlett's test of sphericity was significant ($p < .01$). These two factors explained 61.3% of the variance within the treatment expectancy measure. With the five items removed a higher degree of variance was explained with the factorability of the measure remaining strong. Factor analysis of the post-treatment results for the active and passive treatment groups also showed that data was suitable for factor reduction, with residuals indicating that the solution was satisfactory. The KMO measure of sampling adequacy was .629 and Bartlett's test of sphericity was significant, with 66.9% of the variance explained by these two factors.

These findings support the factors detailed in Figure 1, in that they are representative of an expectancy score for passive and active treatment strategies.

Hence, results from preliminary analysis recommend removing five of the original 12 items from those identified from Blyth et al.'s (2005) study of active and passive treatments as the analysis identifies only seven treatment items as consistently being representative of active and passive treatment strategies. As such the remaining seven identified above were used for further data analysis.

In order to ensure that further analysis is based around a standard unit of measurement (Field, 2009), the active and passive treatment scores for the seven items were standardized. Standardizing the data involves dividing the amount that a raw score differs from the mean of the distribution by the standard deviation from which it came from, resulting in a transformed score with a central point of zero (Field, 2009; Salkind, 2008). The pre treatment standard deviation was used to standardise the scores at all time points, as the standard deviations were not significantly different at follow-up, and this ensured consistency among the results obtained. Factor scores were then obtained from the standardized score and the corresponding coefficient of the component score covariance matrix. These factor scores were then used for further analysis of treatment expectancy as it is changes over time and relates to other psychosocial measures.

Hypothesis 1: Treatment expectancy changes over time

Table 5 details the mean and standard deviation for each of the psychosocial measures at pre-treatment, post-treatment, one and three month follow-up.

Table 5

Mean and standard deviation of the psychosocial measures over the four time points

	Pre-program	Post-program	1 month follow-up	3-month follow-up
DASS-21	23.32 (10.86)	11.69 (9.9)	15.48 (10.81)	17.43 (12.76)
PCS	27 (12.1)	14.69 (11.88)	17.93 (14.28)	18.46 (14.43)
TSK	33.4 (8.93)	24.22 (8.9)	27.41 (12.17)	27.57 (11.29)
RMDQ	14.31 (4.66)	9.72 (5.98)	10.35 (6.22)	9.71 (5.33)
PSEQ	21.63 (9.67)	37.95 (14.4)	34.65 (15.96)	35.32 (14.03)

Following this active and passive treatment expectancy was explored over the four time points. The results of an LMM with fixed covariate coefficients are presented in Table 6. As can be seen results revealed that time had a significant effect on passive and active standardized treatment expectancy factors, with results falling within a range of -1 to 1 as a result of standardization.

Table 6

Linear Mixed Model Mean Expectancy Scores for Passive and Active Treatment

Strategies over time

Treatment Items	Pre-program	Post-program	1 month	3 month	Sig.
Passive expectancy	-.01 (.12)	-.92 (.11)	-.55 (.14)	-.38 (.15)	.00
Active expectancy	.02 (.12)	.80 (.12)	.39 (.14)	.22 (.16)	.00

Note. Standard errors are in parentheses

Table 6 represents the results the mean expectancy scores for passive and active treatment strategies obtained from an LMM. Time had a significant effect on the standardized passive treatment expectancy mean scores, $F(3), 46.32 = 15.77, p < .001$,

which was evident across all time points with the exception of one to three month follow-up which was not significantly different. As can be seen in Table 6, expectancy for passive treatments significantly decreased following the completion of the pain management program and then increased significantly at one and three-month follow-up from baseline and post-program results. Furthermore, time had a significant effect on the standardized mean active treatment expectancy scores, $F(3), 50.01 = 13.44, p < .001$. This effect was significant at all time points with the exception of pre to three-month follow-up and from one to three month follow-ups.

Expectancy for active treatment went in the opposite direction compared to expectancy for passive treatments. Expectancy for active treatments significantly increased from pre to post-program follow-up, however this increase became less pronounced at one and three month follow-up, with the results from pre-program to three month follow-up not being significantly different. Overall, these results support hypothesis one, demonstrating that treatment expectancy does change over time.

Hypothesis 2: Treatment expectancy varies according to a range of psychosocial factors at pre treatment

Data preparation. Existing literature supports the relationship between the psychosocial measures included in this study, namely the DASS, PCS, TSK modified and RMDQ modified with evidence suggesting they all reflect “poor coping” with pain (den Boer et al., 2006; Vlaeyen et al., 2002; Schultz et al., 2004, Vlaeyen & Linton, 2000). In contrast, self-efficacy is thought to be an adaptive coping response and hence negatively correlated with the other measures, which is demonstrated in Table 7.

Furthermore, given that the literature supports the contribution of pain intensity to the formation of maladaptive coping responses (Huijnen et al., 2010) it was also included in the correlation. Results of a Kendall correlation matrix, as can be seen in Table 7, reveal

that all of the poor coping measures were significantly positively inter correlated and pain self- efficacy was negatively correlated against the other measures. Active and passive treatment expectancy was also included in this correlation to highlight its relationships with the other psychosocial variables.

Table 7

Kendall Correlation Matrix for Outcome and Predictor Variables at Pre-treatment

	1.	2.	3.	4.	5.	6.	7.	8.
1. Active expectancy	1							
2. Passive expectancy	.00	1						
3. DASS21	-.23	.09	1					
4. PCS	-.27*	.13	.59**	1				
5. TSK	-.35**	.09	.41**	.63**	1			
6. RMDQ	-.26*	.11	.29*	.36**	.59**	1		
7. PSEQ	.30*	-.12	-.50**	-.61**	-.53**	-.55**	1	
8 Pain intensity	-.15	-.06	.27*	.46**	.34**	.13	-.43**	1

* $p < .05$, ** $p < .01$

The correlations of the four measures (DASS21, PCS, TSK-M and RMDQ-M) coupled with existing literature (Schultz et al., 2004; Vlaeyen et al., 2002), that these measures reflect maladaptive coping responses to chronic pain i.e. the higher the score the poorer the person is coping, provides support to couple these measures into one psychosocial variable labelled poor coping. As can be seen in Table 7, at baseline pain intensity was not correlated with the RMDQ. Pain intensity differs from the other measures assessing cognitive variables in that it is a self-report about the perceived physical presence of pain rather than cognition. As such, pain intensity was not included in the standardization of the poor coping variable, but rather explored

independently. Furthermore, PSEQ was significantly negatively correlated to the other psychosocial variables as expected. This variable is representative of adaptive coping when endorsed strongly and as such will be further analyzed independent of the poor coping variable. This will allow for a true indication of the change within self-efficacy, which may be lost if included into an overall psychosocial measure of poor coping.

As these measures, namely the DASS21, PCS, TSK and RMDQ are scored differently and therefore distributed differently they require standardization so that they may be compared to one another and/or collapsed to represent a single variable. Standardizing the data involves dividing the amount that a raw score differs from the mean of the distribution by the standard deviation from which it came from (Field, 2009; Salkind, 2008). The pre treatment standard deviation was used to standardise the scores at all time points. Moreover, since there is more than one variable, the corresponding coefficient matrix principal component score was then multiplied against the standardized scores for each of the psychosocial measures. The end result is a single standardized poor coping score for each participant.

Hypothesis 2. Expectancy for active treatments was significantly negatively correlated to PCS, TSK and RMDQ and positively correlated with PSEQ, whilst passive expectancy was not correlated with any other measures at pre-treatment as detailed in Table 7. Following this, in order to further test the hypothesis that treatment expectancy varies according to a range of psychosocial factors at pre treatment, a linear regression using backward method was undertaken. Active and passive treatment expectancy were incorporated as the outcome variables and the combined poor coping standardized score, pain self-efficacy and pain intensity as predictor variables.

Table 8

Linear Regression using Backward Method for Pre-program Expectancy for Passive Treatment Scores

	B	Std. Error	β
Step 1			
(Constant)	0.78	0.72	
Poor coping	0.11	0.17	.12
PSEQ	-0.01	0.02	-.11
Pain intensity	-0.09	0.08	-.15
Step 2			
(Constant)	0.46	0.47	
Poor coping	0.18	0.13	.18
Pain intensity	-0.07	0.08	-.13
Step 3			
(Constant)	0.03	0.12	
Poor coping	0.13	0.12	.13

Note: $R^2 = 0.037$ for Step 1, $R^2 = 0.032$ for Step 2, $R^2 = 0.018$ for Step 3. * $p < 0.01$

The results from the regression detailed in Table 8 do not support any of the variables as predicting expectancy scores for passive treatment strategies at pre-treatment.

Table 9

Linear Regression using Backward Method for Pre-program Expectancy for Active Treatment Scores

	B	Std. Error	β
Step 1			
(Constant)	-0.27	0.68	
Poor coping	-0.29	0.17	-.30
PSEQ	0.01	0.02	.09
Pain intensity	0.01	0.08	.01
Step 2			
(Constant)	-0.22	0.38	
Poor coping	-0.29	0.16	-.29
PSEQ	0.01	0.02	.09
Step 3			
(Constant)	-0.03	0.12	
Poor coping	-0.35	0.12	-.36*

Note: $R^2 = 0.130$ for Step 1, $R^2 = 0.130$ for Step 2, $R^2 = 0.126$ for Step 3. * $p < 0.01$

In regards to expectancy ratings for active treatment strategies, the results of the regression indicate that poor coping cognitions are associated with a reduced belief in the value of active treatment strategies. Specifically, poor coping accounted for 12.6% of variance in expectancy scores for active treatment strategies at pre-treatment.

Hypothesis 3: The expected positive value of passive treatments is associated with poor pain coping following treatment

To examine the influence of time on treatment expectancy and psychosocial variables, a LMM was run to identify the relevant predictor variables. In addition to

time having a significant effect on treatment expectancy scores for passive treatment strategies, with the addition of poor coping results demonstrate that it also predicts expectancy for passive treatment strategies, $F(1), 120.41 = 17.59, p = .00$. This result is in contrast to the findings of the pre-treatment linear regression suggesting that over time poor coping is influencing expectancy responses for passive treatment strategies. A Kendall correlation matrix was undertaken in order to further clarify relationships and the directions of these relationships for poor coping, pain related self-efficacy and the expectancy for passive treatments.

Table 10

Kendall Correlation Matrix for Pre and Post Scores on Poor Coping, Self-efficacy and Expectancy Scores for Passive Treatment Strategies

	1.	2.	3.	4.	5.	6.
1. Pre passive expectancy	1					
2. Pre poor coping	.11	1				
3. Pre PSEQ	-.07	-.49**	1			
4. Post passive expectancy	.16	.21*	-.08	1		
5. Post poor coping	.07	.38**	-.38**	.36**	1	
6. Post PSEQ	.02	-.17*	.37**	-.23**	-.54**	1

*, Correlation is significant at the 0.05 level (2-tailed) **. Correlation is significant at the 0.01 level (2- tailed).

Table 10 shows that expectancy for passive treatments prior to the program was not significantly associated with any of the psychosocial variables. However, as predicted following completion of the pain management program, passive treatment expectancy was negatively correlated with self-efficacy and positively correlated with poor coping. Thus, as expectation for passive treatments increases so do maladaptive coping strategies. Interestingly, following the completion of the pain management

program the relationship gets significantly stronger between poor coping and expectation for passive treatment strategies. This result is expected potentially as a result of enhanced learning regarding their relationship from completion of the pain management program. Similarly, this finding is mirrored in the significantly negative relationship between PSEQ and expectancy for passive treatments post-program.

Hypothesis 4: Treatment expectancy for active treatment is associated with better coping and enhanced self-efficacy. Hence, treatment expectancy relates to relapse following a pain management program.

Results of a LMM revealed that in addition to the significant effect of time on treatment expectancy scores for active treatments, poor coping also had a significant effect $F(1, 144.50) = 51.41, p = .00$. This is in line with current evidence involving pain management and their influence on changing poor coping and expectation of treatment (Goossens et al., 2005). A Kendall correlation matrix was undertaken in order to further explore relationships between poor coping, pain related self-efficacy and the expectancy for active treatments.

Kendall Correlation Matrix for Pre and Post Scores on Poor Coping, Self-efficacy and Expectancy Scores for Active Treatment Strategies

	1.	2.	3.	4.	5.	6.
1. Pre active expectancy	1					
2. Pre poor coping	-.20 [*]	1				
3. Pre PSEQ	.16	-.49**	1			
4. Post active expectancy	.21 [*]	-.05	.14	1		
5. Post poor coping	-.21 [*]	.38**	-.38**	-.42**	1	
6. Post PSEQ	.28**	-.17*	.33**	.36**	-.54**	1

*. Correlation is significant at the 0.05 level (2-tailed) **. Correlation is significant at the 0.01 level (2-tailed).

As can be seen in Table 11, prior to the pain management program commencing expectancy for active treatment strategies was only significantly negatively correlated with poor coping, suggesting that expectancy for active treatment increases as poor coping decreases. Interestingly, at post-program follow-up the negative relationship is strengthened between expectancy for active treatment and poor coping, whilst a significant positive relationship is evident between active expectancy and self-efficacy (PSEQ). These results are in line with the predicted hypotheses and the changes are suggestive of enhanced learning through the pain management program, in that treatment choices are influenced by an enhanced belief in oneself to actively self-manage chronic pain.

Treatment expectancy over time. Figure 2 further exemplifies these findings and identifies trends at one and three months follow-up. Data here show a gradual decline over time in coping and expectancy with participants beginning to lean back toward passive treatments and maladaptive coping cognitions.

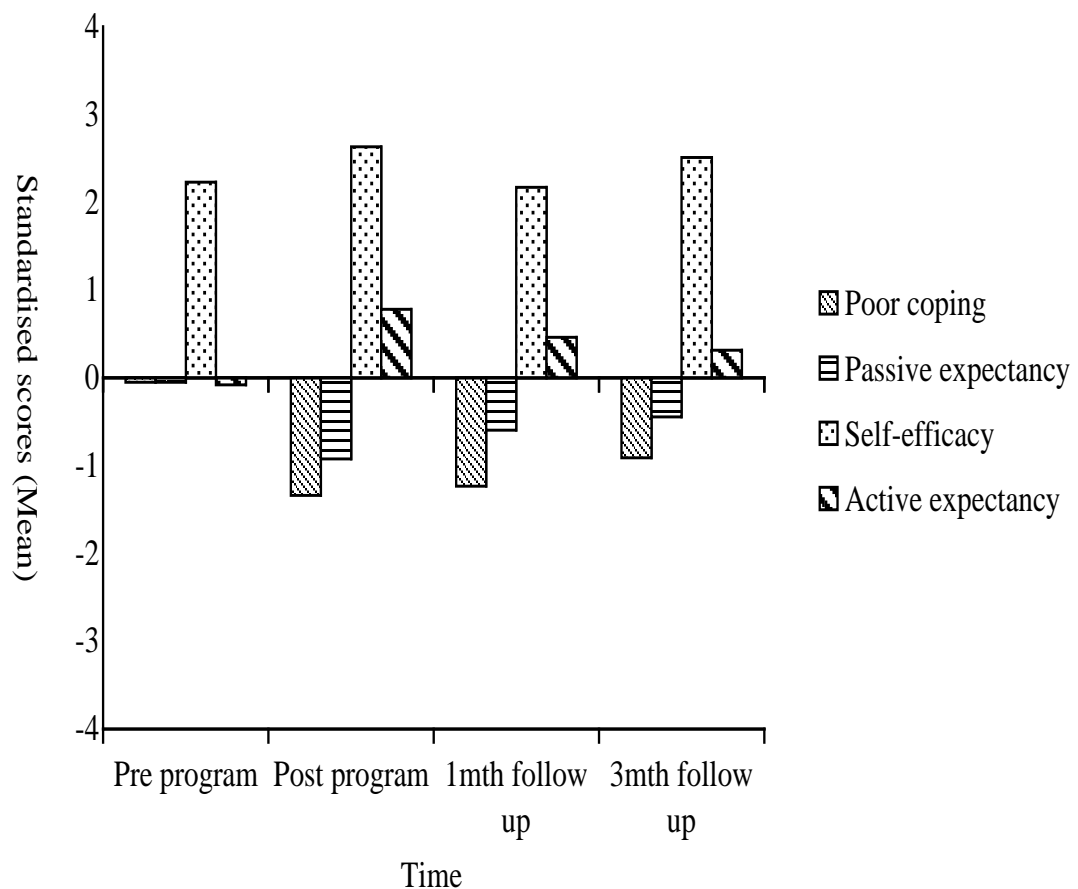


Figure 2. Mean Standardized Scores for Poor Coping and Expectancy for Passive Treatment Strategies over time.

These results as viewed in Table 10 are in line with Figure 2, demonstrating that following the pain management program, levels of poor coping decrease along with the expected benefit of passive treatments. Following this, at one and three month post treatment, the expected benefit of passive treatments begin to rise as poor coping including depression, fear of movement/(re)injury, pain catastrophizing and perceived disability also begin to increase. These results support hypothesis three by demonstrating the positive relationship between expectancy for passive treatment and poor coping constituting maladaptive psychosocial factors.

In contrast, Table 11 and Figure 2 highlight an inverse relationship with active self-management strategies. As shown in the table, expectancy for active treatment

strategies has a positive relationship with self-efficacy and a negative relationship with poor coping. Over time, as can be seen in Figure 2, this relationship still holds but weakens as the expected benefits of active treatments decline. These results provide support that expectancy for active and passive treatment strategies relate to relapse following a pain management program. Specifically, over time participants tend to lean back towards maladaptive coping cognitions and subsequently show an increase in expectancy for passive treatment strategies.

Discussion

Analysis of the Treatment Expectancy Questionnaire

The treatment expectancy questionnaire was interpreted using fixed effects within the factor analysis. Consequently, the results were restricted to the sample collected and therefore unable to be generalised to the entire population (Field, 2009). At baseline, the identified components were not entirely consistent with Blyth et al.'s (2005) definition of active and passive treatment strategies. The results determined that seven of the twelve treatments in total were representative of active and passive treatments. It appears that participant's decision making was influenced by other factors than the definitions of active and passive proposed by Blyth et al.

For instance, participants may have been responding according to the level of perceived medicalisation of the treatment, such as if a doctor or perceived medical professional provides the treatment. This may have been the case in the treatments excluded from extended analysis including acupuncture, chiropractic, TENS machine, massage and hydrotherapy. A slightly different definition of active and passive treatment strategies proposed by Nicholas, Wilson and Goyen (1992) would support this view. Brown and Nicassio (1987) reported that active strategies involve "an attempt by a patient to deal with the pain by using their resources" and passive strategies are characterised by "helplessness and or a reliance on others". For example, when consulting a medical practitioner for medication an individual may perceive that their locus of control is external and subsequently develop reliance on the practitioner to control pain rather than if they feel they are taking an active role in their treatment (Snow-Turek, Norris, & Tan, 1996).

The variability seen within expectancy for treatments defined by Blyth et al. (2005) as active and passive treatment strategies is most notable at pre-treatment,

suggesting that at pre-treatment the patients have none or only minimal knowledge of self-management strategies. As such, patients may believe that when seeking passive treatment strategies they are making an internal decision to seek treatments to assist with pain control and therefore perceive that they are actively managing their pain (Nicholas et al., 1992). This is plausible given that the variability in perceived expectation for complimentary approaches including hydrotherapy, TENS machine, acupuncture, massage and chiropractor from pre to post-program.

Changes in treatment expectancy

It was hypothesised that treatment expectancy would change over time and the results supported this hypothesis. An effect of time on active and passive treatment strategies was seen from pre to post-program and from pre and post-program to both one and three month follow-up. The findings were less marked from one to three month follow-up; however a reduction in the return rates of questionnaires may have impacted on this result, with a small sample size at both these time points. Acquired knowledge from the pain management program may have resulted in the marked increase in expectancy for active treatments and the significant decrease in expectancy for passive treatments post-program. The direction of the change in treatment expectancy was in line with that suggested by Goossens et al. (2005), however they were unable to confirm this change within their study.

Similar to the relapse literature (Jensen et al., 2007; Turk & Rudy, 1991), the trend identified in this study suggests that, over the period following treatment, patients have a tendency to resort back to endorsing passive treatment strategies. Within this study, expectancy for passive treatments initially decreased following treatment however slightly increased again at three-month follow-up. The inverse to this was seen for expectancy for active treatments. Evidently, the results support that the cognitive

variable of treatment expectancy is sensitive to change and contradicts previous suggestions made by researchers who explored treatment expectancy through a single shot view of treatment expectancy, implying immobility (Foster et al., 2010; Kalaukalani et al., 2001).

The study of treatment expectancy within the chronic pain literature (Goossens et al., 2005; Kalaukalani et al., 2001; Thomas et al., 2010) has drawn from the findings within the placebo literature (Pollo et al., 2001) and also research exploring treatment expectancy in non-medical treatments for a range of conditions (Chambless et al., 1997; Borkovec & Costello, 1993). The current study extended on the findings of Goossens et al. (2005), however in contrast to Goossens et al., this study demonstrated a significant change in treatment expectancy over time. These results address the recommendations for future research noted by Kalaukalani et al. (2001) and van Hartingsveld et al. (2010) by providing support that treatment expectations do change and as such provide evidence for the importance of measuring treatment expectations over time within the chronic pain population, including those participating in a pain management program. Recognising the influence of this cognitive variable over time can contribute to further understanding its influence on treatment outcomes and subsequent relapse rates and provides evidence that participation in pain management programs is effective in altering treatment expectancies.

Influence of psychosocial variables on treatment expectancy at pre-treatment

The psychosocial variables impacting on changes in treatment expectancy over time were explored in hypothesis two. Hypothesis two predicted that treatment expectancy varies according to a range of psychosocial factors at pre treatment and this prediction was partially supported within this study. Regression analysis was used to identify what if any psychosocial variables impacted on treatment expectancy for active

and passive treatments prior to the commencement of the program. At pre-treatment, poor coping, pain self-efficacy or pain intensity did not predict expectancy for passive treatment scores. However, poor coping was found to be a significant predictor of expectancy for active treatment strategies at pre-treatment. Whilst, the accounted variance was relatively small, the results do suggest that patients with a negative state of mind about their pain condition have reduced expectancy for the perceived helpfulness of active treatment strategies.

Acknowledging the influence a patient's state of mind has on their pain experience is important for health professionals to recognise and address. Failure to recognise may result in health practitioners being tempted to refer back to passive treatment modalities, which the evidence suggests is not as effective in the long term for chronic pain. This is in line with the general consensus of previous literature on active self- management strategies and psychosocial principles, with people demonstrating better outcomes with active treatments when poor coping strategies are reduced and self-efficacy is high (Asghari & Nicholas, 2001; Denison et al., 2004; Lim et al., 2007; Smeets et al., 2008). Interestingly, pre-program self-efficacy did not have a significant influence on expectancy for active and passive treatment strategies, as would have been expected from previous research (Asghari & Nicholas, 2001). It may be that self-efficacy may be more influential on changes in poor coping rather than directly relating to expectancy at pre-treatment. This was then further explored in subsequent analysis.

Poor coping and self-efficacy on treatment expectancy for passive treatment strategies following treatment

The third hypothesis proposed that expectancy for passive treatments is associated with poor coping and self-efficacy following treatment and this was supported within this study. Whilst the second hypothesis was limited to pre-treatment

this hypothesis focused on post-treatment. The results demonstrated that in addition to time i.e. pre-program, post-program, one and three month follow-up, poor coping was also predictive of expectancy for passive treatment strategies. The influence of poor coping on expectancy for passive treatment was only significant following the completion of the pain management program, suggesting the relationship between these two variables is stronger following completion of the intervention. Specifically, as expectancy for passive treatments increased so did levels of poor coping, whilst self-efficacy decreased. Furthermore, there was a significant inverse relationship between poor coping and self-efficacy, and self-efficacy and expectancy for passive treatment strategies. This finding is in line with previous research demonstrating a relationship between poor coping, self-efficacy and passive treatment strategies (Asenlof & Soderlund, 2010; Samwel et al., 2006). The mediating effect of self-efficacy on poor coping variables, disability and pain intensity is well established (Arnstein et al., 1999; Astin, 2004; Lim et al., 2007) and this finding is further supported within this study. However, these findings are extended by including the variable of treatment expectancy, demonstrating a relationship with these variables and providing insight into another important predictor on a patient's decision for passive treatment and subsequent outcomes from a pain management program.

These results are as predicted and it appears that exploring the influence of psychosocial factors on expectancy offers valuable insight into the cognitive changes influencing people throughout their participation in the pain program. There was a noticeable association between treatment expectancy and poor coping from pre to post-program. One suggestion for this may be that participation in the pain program results in increased knowledge regarding the influence of these psychosocial variables and the teaching of active self-management principles in an environment where they can be

learnt and rehearsed aims to enhance self-efficacy to promote the endorsement of these strategies.

Poor coping and self-efficacy on treatment expectancy for active treatment strategies following treatment

The final hypothesis predicted that treatment expectancy for active treatment is associated with better coping and higher self-efficacy, providing support that treatment expectancy relates to relapse following a pain management program. The results demonstrated that in addition to time, poor coping was significantly associated with expectancy for active treatment strategies; however this relationship was the opposite to that seen for passive treatment strategies, with poor coping decreasing as expectancy for active treatments increased alongside self-efficacy. These results are similar to Smeets et al. (2008) who identified an association between lower expectancy for active treatments and higher levels of pain related fear, highlighting the influence of psychosocial variables on patient's expectations for treatment. It was noted that active expectancy and self-efficacy were at their highest directly following treatment, whilst the reverse was seen for passive expectancy and poor coping following treatment. It appears that post-program is a time when learnt information is fresh, participants have been well supported in a contained environment and motivation is high. However, a gradual change occurs over the follow-up periods as self-efficacy and expectancy for active treatments begins to decrease and expectancy for passive treatments increases as participants presumably begin to revert back to poor coping cognitions and strategies. This trend is similar to that identified by Jensen et al. (2007) who identified a positive relationship between self-efficacy and the use of active coping strategies and over time noted that as these decreased patients resorted back to passive coping strategies. This research extends on this finding by suggesting the treatment expectancy may serve as a

cognitive variable influencing this change over time. Higher expectancy is known to relate to better outcomes (Kalaouklani et al., 2001; Smeets et al., 2008).

The results of this study demonstrate that treatment expectancy plays a role in treatment choice and outcome, and is associated with other psychosocial variables. Treatment expectancy should be considered when attempting to understand the high relapse rates seen within the chronic pain population and those participating in a pain management program. These findings are in line with the relapse literature (Jensen et al., 2007; Morley, 2008), which highlights a significant return to poor coping strategies and reliance toward more passive treatment strategies e.g., medication. Research would benefit from extending beyond these findings by measuring these changes over a longer time frame to further assist in gaining more insight into the role treatment expectancy has on relapse.

Relapse is a complex phenomenon that is likely influenced by a magnitude of factors including and in addition to expectancy, for example self-efficacy and depression. It is acknowledged that the explained variance from the psychosocial variables on treatment expectancy, whilst partially significant, remains small suggesting that other factors e.g., compensable status (Gooseens et al., 2005) may also influence treatment expectancy. Further research is warranted into other contributing factors. For instance, depression was correlated with active and passive expectancy at post-treatment follow-up and it may be that the mood is influencing treatment expectancy. Further investigation of mood independent of additional psychosocial pain variables on expectancy may provide further insight into the influences on treatment expectancy. The size of the explained variance could be considered small compared to the results of some of the other studies previously described. However, most of the current literature on treatment expectancy focuses on interventions with a very short time scale (e.g.,

expectancy of gains from medication). Whereas, the pain management program goes for four weeks, and as such comparisons must be made with caution. There are a number of other considerations that must be taken into account in regards to the current study.

Limitations of this research

There are a number of methodological considerations and limitations within the current study. In relation to the sample of participants, this study included a selection of chronic pain patients seeking specialty multidisciplinary treatment in Australia, and as such the results cannot be generalised to the whole population of chronic pain sufferers (McCracken & Eccleston, 2005; Samwel et al., 2006). Generalisation of the results is also limited due to the method employed in the LMM analysis using fixed effects. In addition, there is a selective filtering in the referral process to the pain management program (e.g., refusal by third-party payers, patient motivation, substance use etc.) and as a result this is transcended into recruitment into the study. In this study participants were all in receipt of workers' compensation and as a result their insurer determined their participation in the program. A compensable status reduces the necessity of the individual relying on their own efforts to seek treatment for their chronic pain, which is often prescribed by the insurer, having the potential to impact on the patient's motivation for participation. This may have influenced their endorsement of the pain program and investigation of this influence on treatment expectancy is warranted. This would specifically be of interest when compared to participants choosing their own treatment, not in receipt of compensation and personally funding any treatment they are receiving for chronic pain.

No data was collected on those who participated in the pain management program but did not participate in the study and therefore no conclusions can be drawn

regarding the differences or similarities of these groups and consequently this is encouraged to be explored in future research.

The sample of patients had heterogeneous pain sites and as such may have different limitations in daily life, treatments and subsequent fears (Samwel et al., 2006). This is often the case within patients attending a pain management program, wherein most pain management programs do not specifically accept patients with all the same pain site, as this would not be reflective of the complex nature of chronic pain. Moreover, much of the pain literature incorporates participants with multiple pain sites (Asghari & Nicholas, 2001; Samwel et al., 2006). Participants demand characteristics may have influenced results at any of the time points with the tendency for participants to report an effect that they believe the experimenter expects or desires them to report. This has the potential to affect ratings of expectation, pain and self-reports on the psychosocial questionnaires independent of any changes in pain experience (Wager, 2005)..

This research has a strong reliance on self-report measures and this may be viewed as a limitation. Specifically, patients may tend to over or under report their symptoms as was identified in a study conducted by Huijnen et al. (2010) whereby participants with depression when compared to objective measurements, underestimated their self-report daily activity levels. However, in this study the objective measurement at times was used incorrectly potentially resulting in over estimation. Furthermore, those considered significantly disabled due to chronic pain were excluded from the study. Generally, most of the variables explored in this study are only accessible through self-report, specifically when evaluated within a clinical setting rather than an experimental setting, as is the case in this study. Whilst further investigation is still required into objective measurements for disability and current physical functioning, it

remains that many cognitive variables such as mood and self-efficacy require reliance on self-report measures. As such there remains a strong argument that a patient's self report is a valid object of assessment and intervention (Asghari & Nicholas, 2001). Specifically, this applies when a large body of normative data providing comparison against a standardised sample exists for these measures, as is the case with the majority of the self-report measures used within this study (Nicholas, Asghari, & Blyth, 2008).

As previously noted there is no standard measurement of treatment expectancy within the chronic pain literature (van Hartingsveld et al., 2010). As a result, drawing from past literature (Goossens et al., 2005; Kalauokalani et al., 2008) a single-item measure was developed. As a result, the psychometric robustness of the measure needed to be assessed, supporting the completion of test-retest analysis on a pilot group of individuals. Whilst reliability was demonstrated, it is important to point out that no controls of confounding variables were implemented for this sample. Further analysis is needed to provide additional evidence regarding the psychometric robustness of this measure. Approximately 39% of variance within the treatment expectancy questionnaire is unaccounted for suggesting that other variables are contributing to the results on this measure. The treatment expectancy measure is given to participants after they are provided with a treatment rationale, thereby potentially influencing their expectancy for that particular treatment. However, this procedural design has been undertaken in previous studies (Goossens et al., 2005; Smeets et al., 2008) and is deemed acceptable. Nevertheless, future research should ensure consistency regarding the timing in which the questionnaires are provided to participants to reduce the possible influence of confounding factors and influences on treatment credibility. Currently, there continues to be no gold standard of measurement of treatment expectancy within the literature. Moreover, some previous studies have incorporated

expectancy questionnaires with no or limited psychometric properties and as such future research is needed to address this limitation.

Assessment of pain intensity within this study was similar to that detailed in most pain literature. However, Jensen and Macfarland (1993) noted that whilst most clinicians attempt to assess and manage average pain over a given period of time, current measures tend to only assess current pain. They propose that a single rating of pain intensity is unlikely to be a reliable or valid measure of change as pain reports vary over time and that environmental factors influence the pain intensity rating obtained at a single point in time. Jensen and Macfarland suggested that consideration must be given to a patient's single pain assessment obtained pre and post assessment as they may not always accurately reflect treatment effects, recommending a more detailed analysis of this variable. All the same, this method of assessing pain intensity is the most common approach detailed in the literature and has been suitably validated (Asghari & Nicholas, 2001; Jensen et al., 1986; Lim et al., 2007). The lack of significant findings associated with pain intensity may suggest that psychosocial factors are playing more of a role on chronic pain, treatment choices and outcome than the biological component of pain alone (Wicksell & Olsson, 2010). Continually, research is demonstrating that psychosocial variables contribute to an equal or greater extent to disability than pain intensity (Lim et al., 2007; Woby et al., 2004), as is supported in the current study.

The completion of questionnaires by participants was an issue throughout this study, becoming quite pronounced at one and three month follow-up. This may have significantly influenced the overall results and it may be possible that observed trends might reach significance with a larger sample size at these time points. Moreover, it cannot be known to what influence participants who did not complete questionnaires at follow-up influenced the results. However, demographic characteristics and pre

treatment measures of the dropouts were not particularly different from those who completed all the assessments, suggesting that the influence in this respect may not have been of concern but analyses reaching levels of significance may have been affected (den Boer et al., 2006). Whilst there is a number of limitations that need to be addressed in future research, it is believed that they do not take away the validity of the results found within this study and the subsequent clinical implications.

Future direction

Further research into treatment expectancy for chronic pain patients attending a pain management program is warranted. Additional investigation into what constitutes the best time to first measure treatment expectancy is recommended. Van Hartingsveld et al. (2010) suggested that it may be better to wait until one or two treatment sessions have been completed so that patients have accurate information to score their expectation, based on their perception of treatment, rather than their ideas only. Whilst it was impractical to do this within this study, as time during the program did not allow this interruption, expectancy was measured after they were exposed to a thorough explanation about the program and watched a DVD regarding the program. This allowed participants to make an informed judgement when responding to their expectancy for treatment.

It is recommended that future studies implement strategies to increase the response rate for the analysis. Whilst the reliability of the principal component analysis may have been strengthened by a larger sample, it is recognized that this analysis can still be run if there are less than 100 participants, provided there are double the participants compared to variables. As such it was deemed that this method was appropriate for the current study (Brace, Kemp, & Snelgar, 2009). The incorporation of proactive strategies to minimize dropout rates at one and three months are required to

get a more detailed account of the changes occurring over these time points and to further test the significance of trends identified in this study. This would be made more possible if the researcher was available on site to meet each participant when they return to the pain program for their one and three month follow-up. More assertive follow-up and reminder strategies to prompt participants to return completed questionnaires would also be of benefit.

Emotional and behavioural factors and treatment expectancy are measured at different time points in order to demonstrate changes upon the completion of the program and at two intervals following the program. Assessing expectancy over time may assist in the identification of participants who have or are likely to relapse and return to previously unsuccessful poor coping strategies. Future research should look at investigating more thoroughly the psychometric properties of the available treatment expectancy measures in an attempt to ascertain a well-rounded, reliable and valid measure of treatment expectancy. The true impact of treatment expectancy is difficult to ascertain without a valid and reliable measure. Whilst all efforts were made to check the psychometric robustness of the treatment expectancy measure used within this study it is noted that this is the first instance this measure has been used and further analysis of psychometric properties is warranted. Additionally, comparison of treatment expectancy amongst people who entered the research study and those who commenced the pain management program but did not volunteer for the study would be of interest to identify any differences in expectancy, psychosocial measures and subsequent drop out rates.

Clinical implications

Treatments for chronic pain that place emphasis on a self-management approach, such as a pain management program, are repeatedly demonstrating their

effectiveness in reducing the experience of pain and disability to an extent that they are now considered the gold standard of treatment (Kerns & Rosenberg, 2000). In economic terms, they also represent a cost effective treatment option further encouraging their utilisation. Unfortunately, drop-out rates and relapse rates remain high (Kerns & Rosenberg, 2000), providing support for the need of studies such as this current research to assist in further understanding the variables that may contribute to relapse, with treatment expectancy demonstrating its potential influence on this phenomenon. Specifically, it may be that client's expectations for treatment have not been addressed, met and reassessed throughout the duration of the patient's treatment. Contrary to much of the literature, this study contributes to evidence that treatment expectancy is variable over time and therefore open to influence by health care providers. Efforts to ascertain and monitor levels of expectation for a given treatment and to address this throughout the treatment process may further support successful engagement, adherence and maintenance of treatment gains (Kerns & Rosenberg, 2000).

Further evidence is provided that the variability seen in self reported treatment expectancy is influenced by other psychosocial variables, suggesting that by supporting a patient to enhance self-efficacy and minimize poor coping cognitions they may be more likely to continue active self-management or persist with a treatment program promoting an active approach to managing chronic pain. Treatment expectancy is changeable with beliefs for a particular treatment related to emotional and behavioural factors and deterioration in a person's ability to cope impacting on treatment choice. Kalauokalani et al. (2001) supported this view suggesting that determining levels of expectancy are important for therapy choices made in the clinical setting. They stated that the greater the treatment expectancy for the treatment of choice, the better the

outcome would be for the patient. Patients need a sense of hope that a treatment can help in order to decide to commence it to begin with, as well as to continue with treatment (Frank, 1974).

Davies et al. (1997) supported this view noting that patients are likely to disengage more freely with expectations wavering after numerous unsuccessful treatment attempts. Furthermore, in the psychotherapy literature it is recommended that expectation be explicitly assessed and discussed (e.g., Kirsch, 1990). Where expectation for treatment is negative, the health practitioner may play a role in increasing positive expectations as a means to provide early relief from discomfort and to encourage the commencement of treatment (Kirsch, 1990). It is likely that this process is similarly true for people with chronic pain attending treatment, with those who have negative expectations receiving short-lived relief from pain during a flare up, resulting in relapse.

Zenz and Strumpf (2007) reported that expectations strongly influence a patient's perception of quality medical care, suggesting that expectations for treatment can be enhanced through effective patient-practitioner communication. Zenz and Strumpf reported that in the field of pain management there are ongoing issues of practitioner's not adequately addressing patient's expectations. This then results in patients feeling frustrated and despondent over the effectiveness of medical intervention and an overall feeling of not being heard or included in the decision making process regarding their health care. Unmet expectations can result in decreased patient satisfaction, poor adherence and reduced outcomes following treatment and relapse (Jackson & Kroenke, 2001).

The study of treatment expectancy, the variables it is influenced by and its role on treatment choice may provide further insight into strategies to manage relapse rates

within the chronic pain population. Byth et al. (2005) reported that understanding the extent and nature of daily self-management of chronic pain symptoms is important, as research has consistently shown that self-management is associated with better outcomes (Cohen, Nicholas, & Bland, 2000; von Korff, Barlow, Cherkin, & Deyo, 1994). Hence, there is a role for health care practitioners to provide self-management support for people experiencing chronic pain, especially through flare-ups, offering strategies to enhance self-efficacy and reduce poor coping symptoms. This support promotes greater opportunities and increases the likelihood of patients maintaining adaptive coping strategies, rather than reverting back to passive strategies, allowing for more overall positive outcomes for people with chronic pain.

Health care professionals are regularly torn between their expectations for a patient and the patient's own belief in self and expectations for treatment. Many patients present requesting passive treatment strategies, such as medication, and/or losing confidence with an active treatment. Rather, practitioners are offered an alternative for patients such as those included in this study by drawing their focus back to what they learnt within the pain program and supporting them to reapply these principles. This approach may assist in enhancing self-efficacy, rather than supporting patients as they revert back to passive treatment strategies. Passive treatment strategies for many chronic pain sufferers are overall less valuable for long-term quality of life.

In addition, health care professionals also have a role to educate patients and enhance their knowledge surrounding the influence of psychosocial factors and treatment expectancy and the subsequent effect this has on treatment choices (Davies et al., 1997; Zenz & Strumpf, 2007). There is a responsibility to present this information so that patients are making informed and effective treatment choices to have the best possible outcome coupled with reduced relapse rates. Relapse from active self-

management principles are also variable and do not need to represent a complete failure of active treatment. Rather patients can be assisted to acknowledge that they have had a slip and require assistance with improving self-efficacy to get back on track with managing their pain independently, rather than resorting back to previously unsuccessful passive treatment strategies. Managing chronic pain is an ongoing effort for patients and practitioners alike. Through a collaborative effort patients have the greatest chance of bouncing back from flare-ups and maintaining active self-management principles for enhanced quality of life.

The aetiology of chronic pain is complex and this is reflected in the magnitude of treatment choices a patient has on offer, reflecting both active and passive treatment strategies (Blyth et al., 2005). Many psychosocial variables impact on a patient's experience of chronic pain and included in this is treatment expectancy (Goossens et al., 2005). Treatment expectancy is a variable that warrants further investigation within the chronic pain research given its relationship with psychosocial variables following the successful completion of a pain management program. Treatment expectancy is a pliable cognitive construct that serves as a potential mediator for reducing relapse rates within the chronic pain population. High relapse rates within this population continue to be of significant concern not only for the individual but also for the greater community who bear the economic consequences of chronic pain. Ongoing investigation into variables contributing to relapse is warranted. This is important so that they may be targeted in treatment to not only assist individuals recover from a lapse but to also prevent this occurrence. Detailed assessment of psychosocial variables, including treatment expectancy, is essential throughout all stages of the treatment program. The consideration of these variables will enhance the long-term success of

treatments for chronic pain and in turn reduce the debilitating burden of this health condition.

References

- Access Economics (2007). *The high price of pain: the economic impact of persistent pain in Australia*. Retrieved from <http://accesseconomics.com.au/publicationsreports/search.php?searchfor=Sydney>
- Al-Obaidi, S.M., Nelson, R.M., Al-Awadhi, S. & Al-Shuwaie, N. (2000). The role of anticipation and fear of pain in the persistence of avoidance behaviour in patients with chronic low back pain. *Spine*, 25(9), 1126-1131.
- Antony, M.M., Bieling, P.J., Cox, B.J., Enns, M.W. & Swinson, R.P. (1998). Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psychological Assessment*, 10(2), 176-181.
- Arnstein, P., Caudill, M., Mandle, C.L., Norris, A. & Beasley, R. (1999). Self-efficacy as a mediator of the relationship between pain intensity, disability and depression in chronic pain patients. *Pain*, 80(3), 483-491. doi:10.1016/S0304-3959(98)00220-6
- Asenlof, P. & Soderlund, A. (2010). A further investigation of the importance of pain cognition and behaviour in pain rehabilitation: longitudinal data suggest disability and fear of movement are most important. *Clinical Rehabilitation*, 24(5), 422-430. doi: 10.1177/0269215509353264
- Asghari, A. & Nicholas, M.K. (2001). Pain self-efficacy beliefs and pain behaviour: A prospective study. *Pain*, 94(1), 85-100. doi:10.1016/S0304-3959(01)00344-X
- Astin, J.A. (2004). Mind- body therapies for the management of pain. *The Clinical Journal of Pain*, 20(1), 27-32.

- Bair, M.J., Robinson, R.L., Katon, W. & Kroenke, K. (2003). Depression and pain comorbidity: a literature review. *Archives of Internal Medicine*, 163(20), 2433-2445.
- Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191-215.
- Benedetti, F. (2007). What do you expect from this treatment? Changing our mind about clinical trials. *Pain*, 128(3), 193-194. doi:10.1016/j.pain.2007.01.005
- Bennett, R.M., Burckhardt, C.S., Clark, S.R., O'Reilly, C.A., Wiens, A.N. & Campbell, S.M. (1996). Group treatment of fibromyalgia: a 6 month outpatient program. *Journal of Rheumatology*, 23, 521-528.
- Bergner, M., Bobbitt, R., Carter, W. & Gibson, B. (1981). Sickness Impact Profile: Development and final revision of health status measure. *Medical Care*, 19(8), 787-805.
- Blyth, F.M., Macfarlane, G.J., Nicholas, M.K. (2007). The contribution of psychosocial factors to the development of chronic pain: The key to better outcomes for patients? *Pain*, 129(1-2), 8-11. doi: 10.1016/j.pain.2007.03.009
- Blyth, F.M., March, L.M., Brnabic, A.J.M., Jorm, L.R., Williamson, M. & Cousins, M.J. (2001). Chronic pain in Australia: a prevalence study. *Pain*, 89 (2-3), 127-134. doi:10.1016/S0304-3959(00)00355-9
- Blyth, F.M., March, L.M. & Cousins, M.J. (2003). Chronic pain-related disability and use of analgesia and health services in a Sydney community. *The Medical Journal of Australia*, 179, 84-87
- Blyth, F.M., March, L.M., Nicholas, M.K. & Cousins, M.J. (2005). Self-management of chronic pain: a population- based study. *Pain*, 113(3), 285-292. doi:10.1016/j.pain.2004.12.004

- Boersma, K. & Linton, S.J. (2006). Expectancy, fear and pain in the prediction of chronic pain and disability: A prospective analysis. *European Journal of Pain*, 10(6), 551-557. doi:10.1016/j.ejpain.2005.08.004
- Bonica, J.J. (1979). The need of a taxonomy [Editorial]. *Pain*, 6(3), 247- 252. doi:10.1016/0304-3959(79)90046-0
- Borkovec, T.D. & Costello, E. (1993). Efficacy of applied relaxation and cognitive-behavioral therapy in the treatment of generalized anxiety disorder. *Journal of Consulting and Clinical Psychology*, 61(4), 611-619. doi: 10.1037/0022-006X.61.4.611
- Borsbo, B., Peolsson, M. & Gerdle, B. (2009). The complex interplay between pain intensity, depression, anxiety and catastrophizing with respect to quality of life and disability. *Disability and Rehabilitation*, 31(19), 1605-1613. doi: 10.1080/09638280903110079
- Brace, N., Kemp, R. & Snelgar, R. (2009). SPSS for psychologists (4th ed.). United Kingdom: Palgrave Macmillan.
- Brown, G.K. & Nicassio, P.M. (1987). Development of a questionnaire for the assessment of active and passive coping strategies in chronic pain patients. *Pain*, 31(1), 53-64. doi:10.1016/0304-3959(87)90006-6
- Brown, G.K. & Nicassio, P.M. & Wallston, K.A. (1989). Pain coping strategies and depression in rheumatoid arthritis. *Journal of Consulting and Clinical Psychology*, 57(5), 652-657. doi: 10.1037/0022-006X.57.5.652
- Buer, N. & Linton, S.J. (2002). Fear- avoidance beliefs and catastrophizing: occurrence and risk factor in back pain and ADL in the general population. *Pain*, 99(3), 485-491. doi:10.1016/S0304-3959(02)00265-8

- Burns, J.W., Kubilus, A., Bruehl, S., Harden, N.R. & Lofland, K. (2003). Do changes in cognitive factors influence outcome following multidisciplinary treatment for chronic pain? A cross-lagged panel analysis. *Journal of Consulting and Clinical Psychology*, 71(1), 81-91. doi: 10.1037/0022-006X.71.1.81
- Campbell, L.C., Clauw, D.J. & Keefe, F.J. (2003). Persistent pain and depression: a biopsychosocial perspective. *Biological Psychiatry*, 54(3), 399-409.
- Campbell, C.M., Kronfli, T., Buenaver, L.F., Smith, M.T., Bera, C., Haythornthwaite, J.A. & Edwards, R.R. (2010). Situational versus dispositional measurement of catastrophizing: Associations with pain responses in multiple samples. *The Journal of Pain*, 11(5), 443-453. doi:10.1016/j.jpain.2009.08.009
- Casey, C.Y., Greenberg, M.A., Nicassio, P.M., Harpin, R.E. & Hubbard, D. (2008). Transition from acute to chronic pain and disability: A model including cognitive, affective and trauma factors. *Pain*, 134(1-2), 69-79.
doi:10.1016/j.pain.2007.03.032
- Casten, R.J., Parmelee, P.A., Kleban, M.H., Lawton, M.P. & Katz, I.R. (1995). The relationships among anxiety, depression, and pain in a geriatric institutionalized sample. *Pain*, 61(2), 271-276. doi:10.1016/0304-3959(94)00185-H
- Chambless, D.L., Tran, G.Q. & Glass, C.R. (1997). Predictors of response to cognitive-behavioural group therapy for social phobia. *Journal of Anxiety Disorders*, 11(3), 221-240. doi:10.1016/S0887-6185(97)00008-X
- Clara, I.P., Cox, B.J. & Enns, M.W. (2001). Confirmatory factor analysis of the depression anxiety stress scales in depressed and anxious patients. *Journal of Psychopathology and Behavioral Assessment*, 23(1), 61-67.
doi: 10.1023/A:1011095624717
- Cohen, M., Nicholas, M.K. & Bland, A. (2000). Medical assessment and management

- of work-related low back and neck/arm pain. *Occupational Health and Safety Australia and New Zealand*, 16(4), 307-317.
- Collins, J. & Hyer, L. (1986). Treatment expectancy among psychiatric inpatients. *Journal of Clinical Psychology*, 42(4), 562-569.
- Cook, A.J., Brawer, P.A. & Vowles, K.E. (2006). The fear- avoidance model of chronic pain: Validation and age analysis using structural equation modeling. *Pain*, 121(3), 195- 206. doi:10.1016/j.pain.2005.11.018
- Cornally, N. & McCarthy, G. (2011). Chronic pain: The help-seeking behaviour, attitudes, beliefs of older adults living in the community. *Pain Management Nursing*, article in press, 1-12. doi:10.1016/j.pmn.2010.12.006
- Coughlan, G.M., Ridout, K.L., Williams, A.C. & Richardson. P.H. (1995). Attrition from a pain management programme. *British Journal of Clinical Psychology*, 34, 471–479.
- Covic, T., Adamson, B., Spencer, D. & Howe, G. (2003). A biopsychosocial model of pain and depression in rheumatoid arthritis: a 12-month longitudinal study. *Rheumatology*, 42(11), 1287-1294. doi:10.1093/rheumatology/keg369
- Crawford, J.R. & Henry, J.D. (2003). The depression anxiety stress scales (DASS): Normative data and latent structure in a large non- clinical sample. *British Journal of Clinical Psychology*, 42(2), 111-131.
- Crombez, G., Eccleston, C., Vlaeyen, J.W.S., Vansteenwegen, D., Lysens, R. & Eelen, P. (2002). Exposure to physical movement in low back pain patients: Restricted effects of generalization. *Health Psychology*, 21(6), 573- 578.
doi: 10.1037/0278-6133.21.6.573

- Davies, H.T.O., Crombie, I.K., Brown, J.H. & Martin, C. (1997). Diminishing returns or appropriate treatment strategy?-an analysis of short-term outcomes after pain clinic treatment. *Pain*, 70(2-3), 203-208. doi:10.1016/S0304-3959(96)03320-9
- den Boer, J.J., Oostendorp, R.A.B., Beems, T. Munneke, M. & Evers, A.W.M. (2006). Continued disability and pain after lumbar disc surgery: The role of cognitive-behavioral factors. *Pain*, 123(1-2), 45-52. doi:10.1016/j.pain.2006.02.008
- Denison, E., Asenlof, P. & Lindberg, P. (2004). Self-efficacy, fear avoidance, and pain intensity as predictors of disability in subacute and chronic musculoskeletal pain patients in primary health care. *Pain*, 111(3), 245-252. doi:10.1016/j.pain.2004.07.001
- Deville, G.J. & Borkovec, T.D. (2000). Psychometric properties of the credibility/expectancy questionnaire. *Journal of Behavior Therapy and Experimental Psychiatry*, 31(2), 73-86. doi:10.1016/S0005-7916(00)00012-4
- Devine, D. P., & Spanos, N. P. (1990). Effectiveness of maximally different cognitive strategies and expectancy in attenuation of reported pain. *Journal of Personality and Social Psychology*, 58(4), 672-678. doi: 10.1037/0022-3514.58.4.672
- Dysvik, E., Vinsnes, A.G. & Eikeland, O. (2004). The effectiveness of a multidisciplinary pain management programme managing chronic pain. *International Journal of Nursing Practice*, 10(5), 224-234. doi: 10.1111/j.1440-172X.2004.00485.x
- Eccleston, C., Williams, A.C.D.C. & Morley, S. (2009). Psychological theories for the management of chronic pain (excluding headaches) in adults (review) (Issue 2). *The Cochrane Library*: John Wiley and Sons, Ltd.
- Farmer, C., Zaslavsky, A.M., Reynolds, C.F. & Cleary, P.D. (2010). Effects of

- depression treatment on chronic pain outcomes. *Psychosomatic Medicine*, 72(1), 61-67. doi:10.1097/PSY.0b013e3181c2a7a8
- Field, A. (2009). *Discovering statistics using SPSS* (3rd ed.). London: Sage publications
- Finniss, D.G. & Benedetti, F. (2005). Mechanisms of the placebo response and their impact on clinical trials and clinical practice. *Pain*, 114(1-2), 3-6.
doi:10.1016/j.pain.2004.12.012
- Flor, H., Fydrich, T. & Turk, D.C. (1992). Efficacy of multidisciplinary pain treatment centers: a meta-analytic review. *Pain* 49(2), 221-230. doi:10.1016/0304-3959(92)90145-2
- Fordyce, W.E. (1976). *Behavioral Methods for Chronic Pain and Illness*, C.V. Mosby: St. Louis.
- Foster, N.E., Thomas, E., Hill, J.C. & Hay, E.M. (2010). The relationship between patient and practitioner expectations and preferences and clinical outcomes in a trial of exercise and acupuncture for knee osteoarthritis. *European Journal of Pain*, 14(4), 402-409. doi:10.1016/j.ejpain.2009.06.010
- Frank, J. D. (1974). Therapeutic components of psychotherapy: A 25-year progress report of research. *Journal of Nervous and Mental Disease*, 159, 325–342.
- French, D.J., France, C.R., Vigneau, F., French, J.A. & Evans, T.R. (2007). Fear of movement/(re)injury in chronic pain: A psychometric assessment of the original english version of the tampa scale for kinesiophobia (TSK). *Pain*, 127(1-2), 42-51. doi:10.1016/j.pain.2006.07.016
- Geisser, M.E., Haig, A.J. & Theisen, M.E. (2000). Activity avoidance and function in persons with chronic back pain. *Journal of Occupational Rehabilitation*, 10(3), 215-227. doi: 10.1023/A:1026666403039

- Geisser, M.E., Robinson, M.E. & Riley, J.L. (1999). Pain beliefs, coping, and adjustment to chronic pain. *Pain Forum*, 8(4), 161–168. doi:10.1016/S1082-3174(99)70001-2
- Geisser, M.E., Roth, R.S., Theisen, M.E., Robinson, M.E. & Riley, J.L. (2000). Negative affect, self-report of depressive symptoms, and clinical depression: Relation to the experience of chronic pain. *The Clinical Journal of Pain*, 16(2), 110-120.
- Genevay, S., Stingelin, S. & Gabay, C. (2004). Efficacy of Etanercept in the treatment of acute, severe sciatica: A pilot study. *Annals of the Rheumatic Diseases*, 63(9), 1120-1123. doi:10.1136/ard.2003.016451
- Glass, C.R., Arnkoff, D.B. & Shapiro, S.J. (2001). Expectations and preferences. *Psychotherapy*, 38(4), 455-461.
- Good, M.D., Brodwin, P.E. & Good, B.J. (1992). *Pain as Human Experience: an Anthropological Perspective*. Berkeley, CA: University of California Press.
- Goossens, M.E.J.B., Vlaeyen, J.W.S., Hidding, A., Kole-Snijders, A. & Evers, S.M.A.A. (2005). Treatment expectancy affects the outcome of cognitive-behavioral interventions in chronic pain. *The Clinical Journal of Pain*, 21(1), 18-26.
- Goubert, L., Crombez, G., Van Damme, S., Vlaeyen, J.W.S., Bijttebier, P. & Roelofs, J. (2004). Confirmatory factor analysis of the tampa scale of kinesiophobia: Invariant two-factor model across low back pain patients and fibromyalgia patients. *The Clinical Journal of Pain*, 20(2), 103- 110.
- Grabois, M. (2005). Management of chronic low back pain. *American Journal of Physical Medicine and Rehabilitation*, 84(supplement 3), S29- S41.
- Hadjistavropoulos, H. & Shymkiw, J. (2007). Predicting readiness to self-manage

pain. *The Clinical Journal of Pain*, 23(3), 259- 266.

doi: 10.1097/AJP.0b013e31802f67f3

Hassett, A.L., Cone, J.D., Patella, S.J. & Sigal, L.H. (2000). The role of catastrophizing in the pain and depression of women with fibromyalgia syndrome. *Arthritis & Rheumatism*, 43(11). doi: 10.1002/1529-0131(200011)43

Haythornthwaite, J.A., Sieber, W.J. & Kerns, R.D. (1991). Depression and the chronic pain experience. *Pain*, 46(2), 177-184. doi:10.1016/0304-3959(91)90073-7

Hayes, S.C. & Duckworth, M.P. (2006). Acceptance and commitment therapy and traditional cognitive behavior therapy approaches to pain. *Cognitive and behavioral practice*, 13(3), 185-187. doi: 10.1016/j.cbpra.2006.04.002

Henry, J.D. & Crawford, J.R. (2005). The short-form version of the depression anxiety stress scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, 44(2), 227-239. doi: 10.1348/014466505X29657

Hirsch, M.S. & Liebert, R.M. (1998). The physical and psychological experience of pain: the effects of labeling and cold pressor temperature on three pain measures in college women. *Pain*, 77(1), 41-48. doi:10.1016/S0304-3959(98)00080-3

Horvath, P. (1990). Treatment expectancy as a function of the amount of information presented in therapeutic rationales. *Journal of Clinical Psychology*, 46(5), 636-642.

Huijnen, I.P.J., Verbunt, J.A., Peters, M.L., Delespaul, P., Kindermans, H.P.J., Roelofs, J.,...Seelen, H.A.M. (2010). Do depression and pain intensity interfere with physical activity in daily life in patients with chronic low back pain?. *Pain*, 150(1), 161- 166. doi:10.1016/j.pain.2010.04.021

Innervate pain program (n.d.). *Innervate pain management: skills for life*. Retrieved from <http://www.innervate.com.au/innervate-pain-program.shtml>

Jackson, J.L. & Kroenke, K. (2001). The effect of unmet expectations among adults presenting with physical symptoms. *Annals of Internal Medicine*, 134(Supplement 9), 889- 897.

Jensen, M.P. & Karoly, P. (2001). Self-report scales and procedures for assessing pain in adults. In: Turk, D.C., Melzack, R. (eds). *Handbook of pain assessment* (2nd ed.). New York: Guildford Press.

Jensen, M.P., Karoly, P. & Braver, S. (1986). The measurement of clinical pain intensity: A comparison of six methods. *Pain*, 27(1), 117- 126.
doi:10.1016/0304-3959(86)90228-9

Jensen, M.P. & McFarland, C.A. (1993). Increasing the reliability and validity of pain intensity measurement in chronic pain patients. *Pain*, 55(2), 195- 203.
doi:10.1016/0304-3959(93)90148-I

Jensen, M.P., Turner, J.A. & Romano, J.M. (2007). Changes after multidisciplinary pain treatment in patient pain beliefs and coping are associated with concurrent changes in patient functioning. *Pain*, 131(1-2), 38-47.
doi:10.1016/j.pain.2006.12.007

Jensen, M.P., Turner, J.A. & Romano, J.M. (1991). Self-efficacy and outcome expectancies: relationship to chronic pain coping strategies and adjustment. *Pain*, 44(3), 263- 269. doi:10.1016/0304-3959(91)90095-F

Kalauokalani, D., Cherkin, D.C., Sherman, K.J., Koepsell, T.D., Deyo, R.A. (2001). Lessons from a trial of acupuncture and massage for low back pain: patient expectations and treatment effects. *Spine*, 26(13), 1418-1424.

- Kalauokalani, D., Sherman, K.J. & Cherkin, D.C. (2001). Acupuncture for chronic low back pain: Diagnosis and treatment patterns among acupuncturists evaluating the same patient. *Southern Medical Journal*, 94(5), 486-492.
- Katz, W.A. & Rothenberg, R. (2005). The nature of pain: Pathophysiology. *Journal of Clinical Rheumatology*, 11(2 Supplement 1), S11- S15.
doi: 10.1097/01.rhu.0000158686.43637.af
- Kazdin, A.E. (1979). Therapy outcome questions requiring control of credibility and treatment-generated expectancies. *Behavior Therapy*, 10, 81–93.
- Kazdin, A.E. (1980). *Behavior Modification in Applied Settings*. Dorsey Press: Homewood, IL.
- Keefe, F.J., Caldwell, D.S., Baucom, D., Salley, A., Robinson, E., Timmons, K., Beupre, P.,...Helms, M,(1999). Spouse-assisted coping skills training in the management of knee pain in osteoarthritis: Long-term follow-up results. *Arthritis Care & Research*, 12(2), 101-111. doi: 10.1002/1529-0131(199904)12
- Keefe, F.J., Caldwell, D.S., Queen, K.T., Gil, K.M., Martinez, S., Crisson, J.E.,... Nunley, J. (1987). Pain coping strategies in osteoarthritis patients. *Journal of Consulting Clinical Psychology*, 55(2), 208–212.
- Kerns, R.D. & Rosenberg, R. (2000). Predicting responses to self- management treatments for chronic pain: application of the pain stages of change model. *Pain*, 84(1), 49- 55. doi:10.1016/S0304-3959(99)00184-0
- Kirsch, I. (1990). *Changing expectations: A key to effective psychotherapy*. Pacific Grove, CA: Brooks/Cole.
- Kirsch, I. (1997). Response expectancy theory and application: A decennial review. *Applied & Preventative Psychology*, 6, 69- 79.
- Kirsch, I. (1997). Suggestibility or hypnosis: What do our scales really measure?.

International Journal of Clinical and Experimental Hypnosis, 45(3), 212- 225.

doi: 10.1080/00207149708416124

Kirsch, I. (1999). *How expectancies shape experience*. Washington DC: American Psychological Association.

Kirsch, I. & Lynn, S.J. (1999). Automaticity in clinical psychology. *American Psychologist*, 54(7), 504- 515.

Kirsch, I. & Weixel, L.J. (1988). Double-blind versus deceptive administration of a placebo. *Behavioral Neuroscience*, 102(2), 319-323.

Kole-Snijders, A.M.J., Vlaeyen, J.W.S., Goossens, M.E.J.B., Rutten- van Molken, M.P.M.H., Heuts, P.H.T.G., van Breukelen, G. & van Eek, H. (1999). Chronic low-back pain: What does cognitive coping skills training add to operant behavioral treatment? results of a randomized clinical trial. *Journal of Consulting and Clinical Psychology*, 67(6), 931- 944.

Kori, S.H., Miller, R.P. & Todd, D.D. (1990). Kinesiophobia: a new view of chronic pain behaviour. *Pain Management*, 3:35–43.

Koshi, E.B. & Short, C.A. (2007). Placebo theory and its implications for research and clinical practice: A review of the recent literature. *Pain Practice*, 7(1), 4- 20.
doi: 10.1111/j.1533-2500.2007.00104.x

Lackner, J.M., Carosella, A.M. & Feuerstein, M. (1996). Pain expectancies, pain, and functional self-efficacy expectancies as determinants of disability in patients with chronic low back disorders. *Journal of Consulting and Clinical Psychology*, 64(1), 212-220.

Leeuw, M., Houben, R.M.A., Severeijns, R., Picavet, H.S.J., Schouten, E.G.W. &

- Vlaeyen, J.W.S. (2007). Pain-related fear in low back pain: A prospective study in the general population. *European Journal of Pain*, 11(3), 256- 266.
doi:10.1016/j.ejpain.2006.02.009
- Lim, H., Chen, P., Wong, T., Gin, T., Wong, E., Chan, I. & Chu, J. (2007). Validation of the Chinese version of pain self-efficacy questionnaire. *Anaesthesia & Analgesia*, 104(4), 918-923. doi: 10.1213/01.ane.0000255731.24092.a5
- Linde, K., Witt, C.M., Streng, A., Weidenhammer, W., Wagenpfeil, S., Brinkhaus, B., ...Melchart, D. (2007). The impact of patient expectations on outcomes in four randomized controlled trials of acupuncture in patients with chronic pain. *Pain*, 128(3), 264- 271. doi:10.1016/j.pain.2006.12.006
- Linton, S.J. (2000). A review of psychological risk factors in back and neck pain. *Spine*, 25(9), 1148- 1156.
- Logan, D.E. (2003). The importance of nonspecific factors in pain management: Lessons learned from open versus hidden medical treatments [editorial]. *Prevention and Treatment*, 6(1).
- Lousberg, R., Vuurman, E., Lamers, T., Van Breukelen, G., Jongen, E., Rijnen, H., ...Hermens, H. (2005). Pain report and pain-related evoked potentials operantly conditioned. *The Clinical Journal of Pain*, 21(3), 262- 271.
- Lovibond, S. & Lovibond, P. (1995). *Manual for the Depression Anxiety Stress Scales*. (2nd. Ed.) Sydney: Psychology Foundation of Australia.
- McBeth, J., Macfarlane, G.J. & Silman, A.J. (2002). Does chronic pain predict future psychological distress?. *Pain*, 96(3), 239- 245. doi:10.1016/S0304-3959(01)00452-3
- McCracken, L.M. & Eccleston, C. (2005). A prospective study of acceptance of pain

and patient functioning with chronic pain. *Pain*, 118(1-2), 164-169.

doi:10.1016/j.pain.2005.08.015

McCracken, L.M. (1997). 'Attention' to pain in persons with chronic pain: a behavioral approach, *Behavior Therapy*, 28(2), 271–281. doi:10.1016/S0005-7894(97)80047-0

MacDonald, G. & Leary, M.R. (2005). Why does social exclusion hurt? The relationship between social and physical pain. *Psychological Bulletin*, 131(2), 202- 223. doi: 10.1037/0033-2909.131.2.202

Merskey, H.M. & Bogduk, N. (1994). (Eds.) *Classification of Chronic Pain* (2nd ed.). Seattle: IASP Press.

Milling, L.S., Reardon, J.M. & Carosella, G.M. (2006). Mediation and moderation of psychological pain treatments: Response expectancies and hypnotic suggestibility. *Journal of Consulting and Clinical Psychology*, 74(2), 253-262.

Molloy, A.R., Nicholas, M.K., Asghari, A., Beeston, L.R., Dehghani, M., Cousins, M., ...Tonkin, L. (2006). Does a combination of intensive cognitive- behavioral pain management and a spinal implantable device confer any advantage? A preliminary explanation. *Pain Practice*, 6(2), 96-103. doi: 10.1111/j.1533-2500.2006.00069.x

Morley, S. (2008). Relapse prevention: still neglected after all these years. *Pain*, 134(3), 239-240. doi:10.1016/j.pain.2007.12.004

Morley, S., Eccleston, C. & Williams, A. (1999). Systematic review and meta-analysis of randomized controlled trials of cognitive behaviour therapy and behaviour therapy for chronic pain in adults, excluding headache. *Pain*, 80(1-2), 1-13. doi:10.1016/S0304-3959(98)00255-3

Nicholas, M. (1989). Self-efficacy and chronic pain. Paper presented at the British

Psychological Society Annual Conference, St Andrew's, UK.

Nicholas, M. (1994). Pain self-efficacy questionnaire (PSEQ): preliminary report.

Unpublished paper. St. Leonards: University of Sydney Pain Management and Research Centre.

Nicholas, M. (2007). The pain self-efficacy questionnaire: Taking pain into account. *European Journal of Pain*, 11(2), 153-163.

doi:10.1016/j.ejpain.2005.12.008

Nicholas, M.K., Wilson, P.H., Goyen, J. (1992). Comparison of cognitive-behavioral group treatment and an alternative, non-psychological treatment for chronic low back pain patients. *Pain*, 48(3), 339-347. doi:10.1016/0304-3959(92)90082-M

Osborne, T.L., Jensen, M.P., Ehde, D.M., Hanley, M.A. & Kraft, G. (2007).

Psychosocial factors associated with pain intensity, pain-related interference, and psychological functioning in persons with multiple sclerosis and pain. *Pain*, 127(1-2), 52-62. doi:10.1016/j.pain.2006.07.017

Osman, A., Barrios, F.X., Gutierrez, P.M., Kopper, B.A., Merrifield, T & Grittmann, L. (2000). The pain catastrophizing scale: Further psychometric evaluation with adult samples. *Journal of Behavioral Medicine*, 23(4), 351-365.

Osman, A., Barrios, F.X., Kopper, B.A., Hauptmann, W., Jones, J. & O'Neill, E.

(1997). Factor structure, reliability, and validity of the pain catastrophizing scale. *Journal of Behavioral Medicine*, 20(6). 589-605.

Ostelo, R.W.J.G. & de Vet, H.C.W. (2005). Clinically important outcomes in low back pain. *Best Practice & Research Clinical Rheumatology*, 19(4), 593-607.

- Peters, M.L., Vlaeyen, J.W.S. & Weber, W.E.J. (2005). The joint contribution of physical pathology, pain-related fear and catastrophizing to chronic back pain disability. *Pain*, 113(1-2), 45-50. doi:10.1016/j.pain.2004.09.033
- Picavet, H.S.J., Vlaeyen, J.W.S. & Schouten, J.S.A.G. (2002). Pain catastrophizing and kinesiophobia: predictors of chronic low back pain. *American Journal of Epidemiology*, 156(11), 1028-1034. doi:10.1093/aje/kwf136
- Pollo, A., Amanzio, M., Arslanian, A., Casadio, C., Giuliano, M. & Benedetti, F. (2001). Response expectancies in placebo analgesia and their clinical relevance. *Pain*, 93(1), 77-84. doi:10.1016/S0304-3959(01)00296-2
- Price, D.D., Milling, L. S., Kirsch, I., Duff, A., Montgomery, G.H. & Nicholas, S.S. (1999). An analysis of factors that contribute to the magnitude of placebo analgesia in an experimental paradigm. *Pain*, 83(2), 147-156. doi:10.1016/S0304-3959(99)00081-0
- Priest, T.D. & Hoggart, B. (2002). Chronic pain: Mechanisms and treatment. *Current Opinion in Pharmacology*, 2(3), 310-315. doi:10.1016/S1471-4892(02)00164-9
- Roelofs, J., Goubert, L., Peters, M.L., Vlaeyen, J.W.S. & Crombez, G. (2004). The Tampa Scale for Kinesiophobia: further examination of psychometric properties in patients with chronic low back pain and fibromyalgia. *European Journal of Pain*, 8(5), 495-502. doi:10.1016/j.ejpain.2003.11.016
- Roland, M. & Fairbank, J. (2000). The Roland-Morris Disability Questionnaire and the Oswestry Disability Questionnaire. *Spine*, 25(24), 3115-3124.
- Roland, M. & Morris, S. A study of the natural history of back pain. (1983). Part I: development of a reliable and sensitive measure of disability in low-back pain.

Spine, 8(2), 141-144.

Romano, J.M. & Turner, J.A. (1985). Chronic pain and depression: Does the evidence support a relationship?. *Psychological Bulletin*, 97(1), 18-34. doi: 10.1037/0033-2909.97.1.18

Salkind, N.J. (2008). *Statistics for people who think they hate statistics*. (3rd ed.). California: Sage Publications.

Samwel, H.J.A., Evers, A.W.M., Crul, B.J.P. & Kraaimaat, F.W. (2006). The role of helplessness, fear of pain, and passive pain- coping in chronic pain patients. *The Clinical Journal of Pain*, 22(3), 245-251.
doi: 10.1097/01.ajp.0000173019.72365.f5

Santrock, J. W. (2007). *A topical approach to human life-span development* (3rd ed.). St. Louis, MO: McGraw-Hill.

Schiphorst-Preuper, H.R., Reneman, M.F., Boonstra, A.M., Dijkstra, P.U., Versteegen, G.J. & Geertzen, J.H. (2007). The relationship between psychosocial distress and disability assessed by the symptom checklist- 90- revised and roland morris disability questionnaire in patients with chronic lower back pain. *The Spine Journal*, 7(5), 525-530. doi:10.1016/j.spinee.2006.08.016

Severeijns, R., Vlaeyen, J.W.S., van den Hout, M.A. & Weber, W.E.J. (2001). Pain catastrophizing predicts pain intensity, disability, and psychological distress independent of the level of physical impairment. *The Clinical Journal of Pain*, 17(2), 165-172.

Schultz, I.Z., Crook, J., Meloche, G.R., Berkowitz, J., Milner, R., Zuberbier, O.A. & Meloche, W. (2004). Psychosocial factors predictive of occupational low back disability: Towards development of a return-to-work model. *Pain*, 107(1), 77-85. doi:10.1016/j.pain.2003.09.019

- Seminowicz, D.A. & Davis, K.D. (2006). Cortical responses to pain in healthy individuals depends on pain catastrophizing. *Pain*, 120(3), 297-306.
doi:10.1016/j.pain.2005.11.008
- Smeets, R.J.E.M., Beelen, S., Goossens, M.E.J.B., Schouten, E.G.W., Knottnerus, J.A. & Vlaeyen, J.W.S. (2008). Treatment expectancy and credibility are associated with the outcome of both physical and cognitive- behavioral treatment in chronic lower back pain. *The Clinical Journal of Pain*, 24(4), 305-315.
doi: 10.1097/AJP.0b013e318164aa75
- Snow-Turek, A.L., Norris, M.P. & Tan, G. (1996). Active and passive coping strategies in chronic pain patients. *Pain*, 64(3), 455-462. doi:10.1016/0304-3959(95)00190-5
- Sorbi, M.J., Peters, M.L., Kruise, D.A., Maas, C.J., Kersses, J.J., Verhaak, P.F.M. & Bensing, J.M. (2006). Electronic momentary assessment in chronic pain II: Pain and psychological pain responses as predictors of pain disability. *The Clinical Journal of Pain*, 22(1), 67-81.
- Stang, P., Von Korff, M. & Galer, B.S. (1998). Reduced labor force participation among primary care patients with headache. *Journal of General Internal Medicine*, 13(5), 296-302. doi: 10.1046/j.1525-1497.1998.00094.x
- Sullivan, M.J.L., Bishop, S.R. & Pivik, J. (1995). The pain catastrophizing scale: Development and validation. *Psychological Assessment*, 7(4), 524-532.
doi: 10.1037/1040-3590.7.4.524
- Sullivan, M.J.L. & Neish, N.R. (1998). Catastrophizing, anxiety and pain during dental hygiene treatment. *Community Dentistry and Oral Epidemiology*, 26(5), 344-349. doi: 10.1111/j.1600-0528.1998.tb01971.x

- Sullivan, M.J.L., Reesor, K., Mikail, S. & Fisher, R. (1992). The treatment of depression in chronic low back pain: review and recommendations. *Pain*, 50(1), 5-13. doi:10.1016/0304-3959(92)90107-M
- Sullivan, M.J.L., Rodgers, W.M. & Kirsch, I. (2001). Catastrophizing, depression and expectancies for pain and emotional distress. *Pain*, 91(1-2), 147-154. doi:10.1016/S0304-3959(00)00430-9
- Suprina, J.S. (2003). Chronic pain: a case for using an integration model. *Journal of Bodywork and Movement therapies*, 7(3), 184-193. doi:10.1016/S1360-8592(03)00022-6
- Swinkels- Meewisse, E., Swinkels, R., Verbeek, A., Vlaeyen, J. & Oostendorp, R. (2003). Psychometric properties of the Tampa Scale for kinesiophobia and the fear-avoidance beliefs questionnaire in acute low back pain. *Manual Therapy*, 8(1), 29-36. doi:10.1054/math.2002.0484
- Tang, N.K.Y, Salkovskis, P.M., Hodges, A., Wright, K.J., Hanna, M. & Hester, J. (2008). Effects of mood on pain responses and pain tolerance: An experimental study in chronic back pain patients. *Pain*, 138(2), 392-401. doi:10.1016/j.pain.2008.01.018
- Turk, D.C. & Rudy, T.E. (1991). Cognitive factors and persistent pain: A glimpse into pandora's box. *Cognitive Therapy Research*, 16(2), 99-122. doi: 10.1007/BF01173484
- Turner, J.A. & Aaron, L.A. (2001). Pain- related catastrophizing: What is it?. *The Clinical Journal of Pain*, 17(1), 65-71.
- Turner, J.A. & Clancy, S. (1986). Strategies for coping with chronic low back pain:

Relationship to pain and disability. *Pain*, 24(3), 355-364. doi:10.1016/0304-3959(86)90121-1

Turner, J.A., Jensen, M.P. & Romano, J.M. (2000). Do beliefs, coping, and catastrophizing independently predict functioning in patients with chronic pain? *Pain*. 85(1-2), 115-125. doi:10.1016/S0304-3959(99)00259-6

Turner, J.A., Jensen, M.P., Warm, C.A. & Cardenas, D.D. (2002). Catastrophizing is associated with pain intensity, psychological distress, and pain-related disability among individuals with chronic pain after spinal cord injury. *Pain*, 98(1-2), 127-134. doi:10.1016/S0304-3959(02)00045-3

van Hartingsveld, F., Ostelo, R.W.J.G., Cuijpers, P., de Vos, R., Riphagen, I.I. & de Vet, H.C.W. (2010). Treatment- related and patient- related expectations of patients with musculoskeletal disorders: A systematic review of published measurement tools. *The Clinical Journal of Pain*, 26(6), 470-488.
doi: 10.1097/AJP.0b013e3181e0ffd3

Vesela, A. (2001). Chronic low back pain complicated by abnormal illness behaviour: A case study. *The British Journal of Chiropractic*, 5(1-2), 16-19.
doi:10.1016/S1466-2108(01)80009-7

Vlaeyen, J.W.S., de Jong, J., Geilen, M., Heuts, P.H.T.G. & van Breukelen, G. (2002). The treatment of fear of movement/ (re)injury in chronic low back pain: Further evidence on the effectiveness of exposure in vivo. *The Clinical Journal of Pain*, 18(4), 251-261.

Vlaeyen, J.W.S., Kole-Snijders, A.M.J., Boeren, R.G.B. and Van Eek, H. (1995a). Fear

- of movement/ (re)injury in chronic low back pain and its relation to behavioral performance. *Pain*, 62(3), 363-372. doi:10.1016/0304-3959(94)00279-N
- Vlaeyen, J.W.S., Kole-Snijders, A.M.J., Rotteveel, A.M., Ruesink R., Heuts, P.H.T.G. (1995b). The role of fear of movement/(re)injury in pain disability. *Journal of Occupational Rehabilitation*, 5, 235-252.
- Vlaeyen, J.W.S. & Linton, S.J. (2000). Fear-avoidance and its consequences in chronic musculoskeletal pain: A state of the art. *Pain*, 85(3), 317-332.
doi:10.1016/S0304-3959(99)00242-0
- Volkow, N.D., Wang, G., Ma, Y., Fowler, J.S., Zhu, W., Maynard, L., Telang, F.,...Swanson, J.M. (2003). Expectation enhances the regional brain metabolic and the reinforcing effects of stimulants in cocaine abusers. *The Journal of Neuroscience*, 23(36), 11461- 11468.
- Vossen, H.G.M., van Os, J., Hermens, H. & Lousberg, R. (2006). Evidence that trait-anxiety and trait-depression differentially moderate cortical processing of pain. *The Clinical Journal of Pain*, 22(8), 725-729.
doi:10.1097/01.ajp.0000210913.95664.1a
- Wager, T.D. (2005). Expectations and anxiety as mediators of placebo effects in pain. *Pain*, 115(3), 225–226. doi:10.1016/j.pain.2005.03.018
- Warwick, H.M. & Salkovskis, P.M. (1989). Hypochondriasis. In Scott, J., Williams, J. & Beck, A.T. (Eds.), *Cognitive therapy: a clinical casebook*. London: Routledge.
- Weinman, J., Wright, S. & Johnston, M. (2001). *Measures in Health Psychology: A User's Portfolio*. United Kingdom: NFER- NELSON.
- Wicksell, R.K. & Olsson, G.L. (2010). Predicting and preventing chronic postsurgical pain and disability. *Anesthesiology*, 113(6), 1260-1261.

- Williams, A.C., Nicholas, M.K., Richardson, P.H., Pither, C.E. & Fernandes, J. (1999). Generalizing from a controlled trial: the effects of patient preference versus randomization on the outcome of inpatient versus outpatient chronic pain management. *Pain*, 83(1), 57-65. doi:10.1016/S0304-3959(99)00074-3
- Williams, A.C., Richardson, P.H., Nicholas, M.K., Pither, C.E., Harding, V.R., Ridout, K.L.,... Chamberlain, J.H. (1996). Inpatient vs. outpatient pain management: results of a randomised controlled trial. *Pain*, 66(1), 13-22. doi:10.1016/0304-3959(96)02996-X
- Woby, S. R., Watson, P.J., Roach, N.K. & Urmston, M. (2004). Are changes in fear-avoidance beliefs, catastrophizing, and appraisals of control, predictive of changes in chronic low back pain and disability?. *European Journal of Pain*, 8(3), 201-210. doi:10.1016/j.ejpain.2003.08.002
- Worz, R. (2003). *Pain in depression- depression in pain*. Pain Clinical Updates, XI (5). Seattle: International Association for the Study of Pain.
- Zenz, M. & Strumpf, M. (2007). Redefining appropriate treatment expectations. *Journal of Pain and Symptom Management*, 33(2 Supplement 1), S11- S17. doi:10.1016/j.jpainsymman.2006.09.006

Appendix A

Information sheet, Consent form and Ethics Approval Notification

Appendix B

**Psychosocial measures, Pain Intensity rating, and
Treatment Expectancy Questionnaire**

Appendix C

Timetable for participation in the pain management program

Appendix D

Pain demographic information based on sex, pain onset with treatment expectancy and psychosocial variables, and loading plots for the 12-item treatment expectancy questionnaire at pre and post-program

Table D1

Mean and standard deviations of age and pain duration for males and females

	Male \bar{x} (SD)	Female \bar{x} (SD)
Age	43.34(9.92)	42.50(6.98)
Pain duration	55.56(48.62)	46.03(39.91)

Table D2

Analysis of variance on demographic information for males and females

Variable	<i>df</i>	<i>F</i>	<i>p</i>
		Between subjects	
Age	1	.16	.70
Pain months	1	.74	.40
Primary pain site	1	.01	.92
Number of pain sites	1	.04	.85
Pain onset	1	5.13	.03
Error	62		

Note: Statistical significance = $p < 0.05$

Table D3

Kendall correlation matrix for pain onset with treatment expectancy and psychosocial variables

	1.pain onset	2.pre active	3. pre passive	4. DASS	5. PCS	6.TSK	7.RMDQ	8.PSEQ
1.	1							
2.	.18	1						
3.	-.09	.00	1					
4.	.18	-.14	.05	1				
5.	.02	-.16	.18	.42**	1			
6.	-.03	-.20*	.07	.30**	.49**	1		
7.	-.08	-.15	.10	.22*	.27**	.42**	1	
8.	-.05	.16	-.07	-.36**	-.43**	-.36**	-.39**	1

* $p < .05$, ** $p < .01$

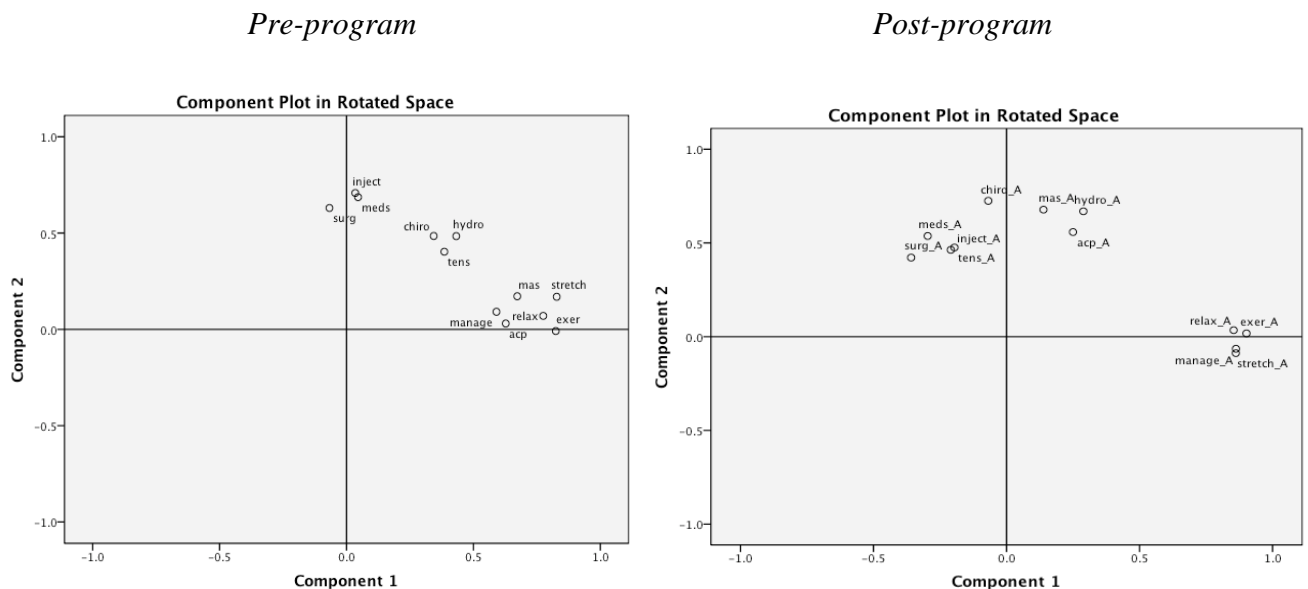


Figure D1. Loading plots for the 12 items of the treatment expectancy questionnaire at pre and post-program