

Maternal and Child Emotional Regulation in Paediatric Chronic Pain

Sophia Franks

B.Bus, B.Arts, Grad Dip Psych.

A thesis submitted in full fulfillment of the requirements for the degree of Doctor of
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School of Psychology
Faculty of Arts and Science

Australian Catholic University
Research Services
Locked Bag 4115,
Fitzroy, Victoria 3065

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STATEMENT OF AUTHORSHIP

This thesis contains no material published elsewhere or extracted in whole or in part from a thesis by which I have qualified for or been awarded another degree or diploma.

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All research procedures reported in the thesis received the approval of the relevant Ethics/Safety Committees (where required).

Sophia Franks

Date

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ABSTRACT

Pain is influenced by biological, social, emotional and cognitive factors. Emotions are not simply a consequence of pain but rather a fundamental part of the pain experience. In addition, the social context cannot be isolated when constructing the meaning of the child's pain, and in understanding the influence of mother-child interactions on children's physiology. This research consists of two studies, study one investigated the relationship between anxiety, depression and physical functioning in children and adolescents experiencing chronic pain. The participants were 73 children and adolescents who were referred to either the Children's Pain Management Clinic at the Royal Children's Hospital or the Sydney Westmead Children's Hospital aged between 7-18 years old. The results indicated that these young people were reporting anxiety and depression within the normal range with significant anxiety and depression levels both below prevalent rates found in the normal population. Furthermore, depression but not anxiety was associated with increasing levels of physical disability in children and adolescents. This led to the investigation of the relationship between maternal emotions on children and adolescents' anxiety, depression, somatic symptoms and physical functioning in children and adolescents experiencing chronic pain.

Study two investigated the association of maternal and child emotions in children and adolescents with chronic pain. Participants included 62 mothers and 62 children and adolescents between the ages of 7-18 years (M=13). Mothers' emotional distress (empathy, emotional involvement, and distress) was examined as a significant factor to be associated with children's pain sensitive temperament and functional outcomes (anxiety, depression, somatisation, and physical functioning). Children's perceptual sensitivity and avoidance of sensation, which are components of children's pain sensitive temperament, were investigated in relation to children's ability to regulate emotions. The association between maternal and child emotional regulation and children's functional outcomes was also explored. Mothers completed questionnaires assessing children's somatisation, their own difficulties with having a child with persisting pain and an empathy scale. Mothers also

completed a semi-structured interview by Katz and Gottman (1991) the Meta-Emotion Interview which discusses mothers' awareness of their own and their child's emotions, mothers acceptance of their own and their child's emotions, the regulation of their own and their child's emotions and coaching of their child's emotions. Children and adolescents completed questionnaires measuring anxiety, depression, emotional involvement, somatisation and pain sensitive temperament. The results indicated low maternal emotional regulation was significantly associated with children's depression, anxiety and somatisation scores, whilst children's emotional regulation was associated with children's anxiety and depression, but not with somatisation scores. Maternal emotional distress was associated with children's pain sensitive temperament, emotional distress and reduced physical functioning. Furthermore, emotional regulation in children was associated with children's pain sensitive temperaments. It is proposed that young people with chronic pain may have a biological vulnerability to respond to stress and traumatic events as pain, and pain related symptoms. This biological sensitivity may be associated with children's threshold of pain, whereby children's perceptual sensitivity may be associated with reporting of somatic complaints. Thus, maternal emotions and social factors may be associated with children's somatosensory processing and the chronic pain experience.

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CHAPTER 1 INTRODUCTION

1.1 Introduction

“Pain is a sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (Merskey & Bogduk, 1994). Pain is always subjective, and Mersky and Bogduk (1994) note that many people report pain in the absence of tissue damage or pathophysiological cause, and this usually happens for psychological reasons. Thus, it is important to study psychological processes, which may contribute to pain, distress and disability. This thesis examines the relationship between maternal emotions and children’s emotional distress, somatic sensations and physical functioning in a group of children and adolescents experiencing chronic pain. This overview considers several important aspects in defining pain and introduces one of the most common classifications of pain, as either acute or chronic. Then, this section discusses the importance of maternal and child emotional regulation and how this capacity may influence the sequelae of chronic pain. This section closes with an outline of the objectives of the studies undertaken.

1.1.1 Defining pain

The current definition of pain proposed by the International Association for the Study of Pain (IASP) describes pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage”. This definition has been elaborated to infer that “the inability to communicate verbally does not negate the possibility that an individual is experiencing pain and is in need of appropriate pain-relieving treatment” (Merskey & Bogduk, 1994). This definition highlights the complexity and subjectivity of the pain experience, which consist of sensory, affective and cognitive dimensions. Conceptually, pain is difficult to describe due to its subjective nature, and is typically measured through self-report measures and overt pain behaviours

(McGrath, 1999). The word ‘pain’ almost always implies individual suffering, indicating that the pain experience is more than the physical sensations one experiences; pain is both an emotional and a physical experience. Paediatric chronic pain is the focus of this work which studies the relationship between the mother’s and child’s emotional experience and the child’s level of distress and physical functioning.

There are several important aspects in defining pain. Firstly, pain is a solely subjective experience. Secondly, pain cannot always be explained via medical investigations, or detectable tissue damage. Thirdly, pain is often the primary symptom that motivates people to seek treatment (Turk & Melzack, 2001). Pain is an experience and not a sensation like the senses of sight, smell, hearing, touch and taste, which all have neuroanatomically discrete pathways with specific receptors to allow detection of a stimulus (Russo & Brose, 1998). Pain is not ‘hard-wired’, meaning that stimulation of a nerve ending, for example a needle prick, does not produce a universally experienced response (Russo & Brose, 1998). This is because pain is influenced by biological, social and emotional factors. The meaning and context of the pain for the sufferer can vary, affecting the individual’s experience of pain. Thus, these points are extremely important in undertaking a study in the area of pain as they highlight that pain is influenced by psychological factors and specifically there is an interaction between pain and emotion, influencing the subjective experience of pain.

1.1.2 Acute and chronic pain

One common way to classify pain is to consider it along a continuum of duration. Pain associated with tissue damage, inflammation or a disease process that is of a brief duration, for example days or weeks, is referred to as ‘acute pain’ (Turk & Melzack, 2001). Pain that persists for extended periods of time (months or even years), or pain that is associated with an injury that has not resolved within an expected period of time is defined as ‘chronic pain’ (Turk & Melzack, 2001). Turk (2001) proposes that classifying pain along a continuum is inadequate, as it does not include recurrent pain (for example headaches). Zeltzer, Bursch and Walco (1997) and their colleagues propose the most useful classification of pain problems is the differentiation between acute and chronic pain, both of which will be defined in chapter two.

The determining factors involved in the onset and duration of chronic pain are generally more obscure and complex than acute pain, making medical management and psychological treatment more difficult than acute pain (Berde & Solodiuk, 1993). Therefore, it is important to undertake medical, physical and psychosocial assessments when the aetiology of a child's pain is unclear (Berde & Solodiuk, 1993). Psychological assessments provide an understanding of the child in the context of school and family, help identify possible contributing and maintaining factors in the child and family, and determine if the associated levels of social and physical functioning are grossly impaired (McGrath & Finch, 2003). In addition, assessments provide information on the level of emotional distress in the child, parent and family, preceding, precipitating and following the onset of the pain condition (McGrath & Hillier, 2001). The relationship between emotions and pain is central to this thesis with study one exploring the relationship between young people's anxiety and depression and their associated level of functional impairment and, study two examining the relationship between maternal distress and children's anxiety, depression and physical functioning.

1.1.3 Emotional regulation and pain

Everyone will experience pain at some point in his or her life. What is becoming more evident is how prevalent chronic pain is in children and adolescents. Research studies indicate that as high as one in five children may be presenting with chronic pain conditions (Perquin, Hazebroek-Kampschreur, & Hunfed, 2000). This has led to research over the last decade focusing on specific pain problems in infants, children and adolescents (Bursh, Walco, & Zeltzer, 1998). Current research has provided insights into how children perceive pain, how to assess pain and how to use pharmacological and non-pharmacological therapies more effectively to alleviate pain. Although research has provided empirical evidence for effective treatments for chronic pain problems in children, very little is still known about the predisposing factors that lead certain children to develop debilitating pain problems (McGrath, 1999). Research has tended not to focus on parental emotions in paediatric chronic pain, although it appears that children's development is influenced by the facilitating environment (Shirk & Russel, 1996). Winnicott (1965) stated 'there is no such thing as a baby', meaning the baby cannot exist alone, but is part of a dependent relationship with the mother. Hence, the child's pain needs to be understood within the

social context and interactions with parents. This work considers the effect of maternal emotions on children's pain experience.

Research has identified a multitude of factors that can contribute to both distress and disability associated with chronic pain but as yet little has been undertaken examining the role of affect regulation in this population (McGrath & Finch, 2003). The link between chronic pain and emotional regulation are theoretical and clinical conceptions in their infancy. Although many theorists and practitioners have acknowledged this connection, very little has been written on this topic in mainstream psychology (McDougall, 1985; Schumacher- Finell, 1997; Taylor, Bagby, & Parker, 1997). Chronic pain conditions in children are especially in need of further empirical and theoretical investigation. Theorists have argued that the capacity to manage and regulate affects may impact on one's psychophysiology and may influence tolerance levels of pain (Flor, Furst, & Birbaumer, 1999; Zeltzer, Bursch, & Walco, 1997). This research proposes that maternal emotional regulation may impacts on their child's psychophysiology and thus be associated with the child's pain experience.

Ongoing pain in children is not only distressing for children but also their parents. High levels of emotional distress require the ability to regulate emotions. Emotional regulation is viewed as a developmental process that emerges as a result of both intrinsic features and extrinsic socioemotional experiences, primarily in the context of parent-child interactions (Eisenberg, Cumberland, & Spinrad, 1998). The terms affect regulation and emotional regulation are used interchangeably throughout this thesis. Affect regulation involves the ability to be aware of, identify, and understand one's emotions and how emotions are expressed (Siegel, 1999). Parents have the important role in helping their child to understand and manage emotions and pain. The ability to regulate emotions is learnt through the early interactions between a mother and her child (Siegel, 1999). The physical and emotional proximity provided by parents serves as a regulator for the child's affect (Cassidy & Shaver, 1999). Communication about emotions between a parent and a child directly shapes the child's ability to understand and regulate emotions (Eisenberg, 1998). It is argued in this research that both the mothers' and children's ability to regulate emotions is highly relevant to the child experiencing chronic pain. There is an emphasis on the role of mothers in this study primarily because mothers often tend to be the primary caregivers,

carrying out more of the child-rearing tasks, even if both parents are working. Furthermore, women's nurturing roles are proposed to reinforce pain behaviours (Walker, Garber, & Van Slyke, 1995; Walker & Zeman, 1992). In chapter four the theoretical underpinnings of attachment and social learning theory provide important information regarding the nature of emotional regulation within interpersonal relationships and the ways in which one person's mind and emotions can influence another's.

1.1.4 Scope of the thesis

This thesis describes some of the emotional factors for children and adolescents experiencing chronic pain. This thesis consists of two studies, both investigating the association between emotions and chronic pain in children and adolescents. Study one investigates the association between anxiety, depression and physical functioning in children and adolescents with chronic pain. Research indicates that chronic pain in children and adolescents is associated with higher rates of anxiety and depression (Sifford, 1993). In addition depression has been shown to be strongly associated with functional disability in American children and adolescents with chronic pain (Kashikar-Zuck, Goldschneider, Powers, Vaught & Hershey, 1996). Study one aimed to gather Australian data for children and adolescents with chronic pain to determine if anxiety and depression are greater among this population. Furthermore, the objectives of study one were to determine the relationship between children's and adolescents' self-reports of anxiety, depression and functional disability to examine whether functional disability associated with chronic pain is related to higher levels of anxiety and depression.

The aim of study two was to examine the role of maternal emotions on children and adolescents experiencing chronic pain. Analyses were undertaken to investigate the relationship between maternal emotions and children's ability to regulate affects, children's anxiety, depression and somatic complaints. There has been little research undertaken in the area of chronic pain exploring the relationship between maternal and child emotional regulation on the functional outcomes of children experiencing chronic pain conditions. The functional outcomes are defined in this research as the child's anxiety, depression, somatisation and physical functioning at the time of the initial assessment and prior to

treatment. This current work investigates maternal and child emotions as potential factors contributing to children's pain and functional disability.

Both these studies aimed to further the understanding of significant factors and pathways that lead to physical disability and absenteeism from school for children and adolescents experiencing chronic pain. The increasing prevalence and incidence rates of chronic pain in young people incur financial, social and emotional costs to the individual child, their family and the health care system (Perquin, Hazebroek-Kampschreur, 2000). Understanding perpetuating factors in paediatric chronic pain may reduce health care costs and secondary difficulties as a result of not attending school and withdrawing from physical activity. Outcomes of this study will be used to inform treatment interventions with children and their mothers.

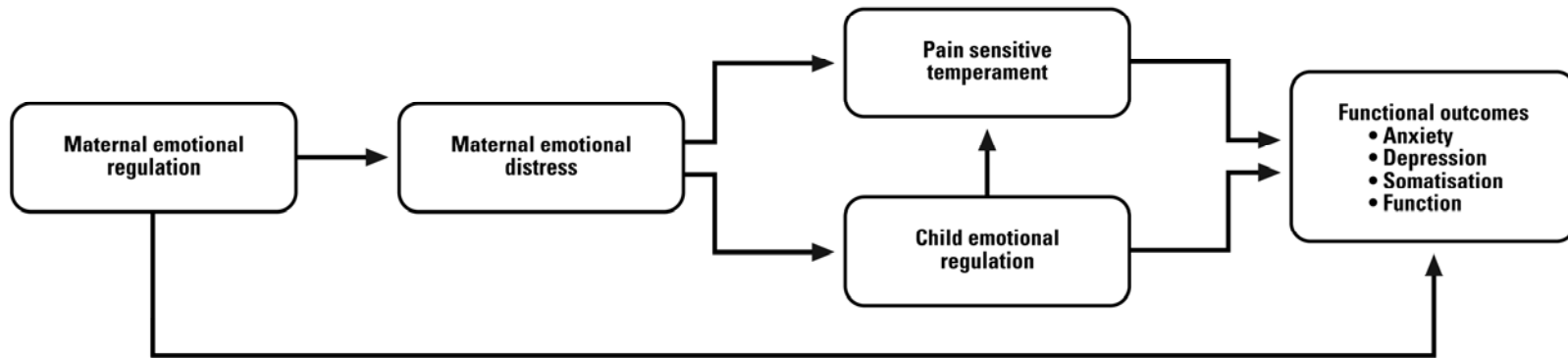
Study one aimed to gather Australian data for children and adolescents with chronic pain to determine if anxiety and depression are greater among this population. Furthermore, the objectives of study one were to determine the relationship between children's and adolescents' self-reports of anxiety, depression and functional disability to examine whether functional disability associated with chronic pain is related to higher levels of anxiety and depression. The specific aims of study two are outlined below:

To investigate the relationship between

- a. maternal emotional regulation and children's anxiety, depression and somatisation;
- b. maternal emotional regulation and maternal emotional distress in the mothers of children that present with persisting pain;
- c. maternal emotional distress and children's pain sensitivity and emotional regulation;
- d. maternal emotional distress and children's anxiety, depression, somatisation and functional disability;
- e. children's emotional regulation and the pain sensitive temperament, avoidance of body sensations and perceptual sensitivity;
- f. children's anxiety, depression and somatisation and their ability to regulate emotions.

The following seven chapters draw together the literature linking emotion and pain in the context of the mother child relationship. The literature commences with a discussion of the classification of chronic pain and considers the impact of chronic pain on children and adolescents and their families. Chapter three outlines the relationship between chronic pain and emotional distress and provides examples of emotional states and chronic pain conditions, for example complex regional pain syndrome, fibromyalgia, irritable bowel syndrome and headaches. Affect regulation is defined in chapter four and highlights the importance of early relationships in the development of affect regulation, drawing on attachment and object relations theory. The focus in chapter five illustrates some of the problems that may arise for the young person who has difficulties regulating emotions. Specifically, emotional regulation is discussed in relation to a lowered pain threshold, hypervigilance to pain and increased perceptual sensitivity and avoidance of sensation. The relationship between emotional regulation and the notion of a pain sensitive temperament is also considered in light of parent-child interactions in this chapter. The review continues with chapter six explaining theoretical perspectives that aid understanding of the complex relationship between parent child interaction and chronic pain. Parent-child interactions are noted to be part of a larger system, the family, and the importance of learning theories in maintaining or perpetuating pain is outlined. Finally, chapter seven focuses on maternal emotional distress as a key factor in the reporting of children's somatic complaints and considers this factor to be associated with children's level of distress and physical functioning in children and adolescents experiencing chronic pain.

Figure 1. Diagram showing the model and proposed pathway



CHAPTER 2 CHRONIC PAIN

2.1 Chronic Pain

This section illustrates further the nature of chronic pain and outlines the associated difficulties it may present for children and families. 'Pain' has traditionally been viewed in medical settings solely as a warning sign of tissue damage, whereby pain has been attributed to noxious sensory input with limited recognition of psychological influences (Robinson & Riley, 1999). The belief that the mind and the body were separate laid the foundation for the biomedical model, proposing that all diseases and physical disorders could be explained by disturbances in physiological processes resulting from injury, bacterial or viral infections (Caltabiono, Bryne, Martin & Sarafino, 2002). The biomedical model, reflecting dualism, produced a dichotomy in classification that identified some diseases as 'psychosomatic' and others as purely 'organic', with the underlying premise that 'disease' is conceptualised as a process accounted for by deviations from the norm of measurable biological markers (Steen & Haugli, 2000). In this paradigm, the mind and body are viewed as separate, implying that there is a distinction between emotions and bodily conditions. In this framework, the patient is therefore considered purely a biological organism, and the aetiology of his or her pain the result of organic consequences (Caltabiono, Bryne, Martin & Sarafino, 2002). This 'mechanistic' approach was devoid of the importance of the subjective meaning in an individual's pain condition, whereby the patient's experience and beliefs were considered diagnostically irrelevant. Western philosophy has significantly influenced a dualistic approach to pain.

Within this 'biomedical' perspective, pain is proposed to have either an organic or a psychological origin (Gatchel & Turk, 1999). The dichotomous nature of viewing pain from a biomedical model, that is, with pain being either organic or psychogenic, is grossly misleading and does not consider adequately the complexity of the pain experience (Caltabiono, Bryne, Martin & Sarafino, 2002). Such a dualistic approach has subsequently shifted to a more integrated biopsychosocial perspective to explain chronic pain conditions. With the shift to the biopsychosocial model it is now widely accepted that social, psychological and biological processes are interrelated in individuals' experience of pain. It is this biopsychosocial perspective that synthesises the reasons why people experience pain in different ways and have different tolerance levels (Keefe & France, 1999).

In order to define different pain syndromes, pain symptoms are classified to aid the process of clinical decision-making for professionals. Clinical diagnoses provide a means of mutual understanding and communication among disciplines which treat chronic pain (Merskey & Bogduk, 1994). Defining pain as organic or psychological implies to parents and professionals that the child's pain is 'all in their head' and the child's pain experience may not be validated. A useful classification system of pain is the distinction between acute and chronic pain. In making the distinction between acute and chronic pain, the duration of pain can vary in order to be considered 'chronic' from one-month, up to a six-month period (Chalkiadis, 2001; Massie, 2000). In order to help define the nature of chronic pain, a description of acute and chronic pain follows. Acute pain can be described as pain of recent onset, limited duration, with usually an identifiable cause (Endler et al., 2003). Acute pain serves as a biological signal in the body, indicating the location, and aetiology of the pain. The American Pain Society (2001) describes chronic pain as repeated or continuous episodes of pain that are experienced either as a component of a well-characterised medical disorder, or by otherwise healthy children in the absence of a well-defined organic aetiology (Merskey & Bogduk, 1994). Chronic pain conditions may also be referred to as 'persisting pain', which characterises the recurrent episodes of pain which are severe enough to interfere with a child's normal activities (Scharff, 1997). In this research, chronic pain has been defined as pain persisting for a three-month duration or extending beyond the expected time of healing (Chalkiadis, 2001; Jay, 1985).

Chronic pain may also alert the clinician that there may be other factors in the patient's life contributing to their pain presentation (McGrath & Hillier, 2001). It is important to consider possible maintaining factors, or secondary gains for the child, and the associated level of social and physical functioning to determine if the associated dysfunction is in excess of what one would expect (Walker, Claar & Garber, 2002). The difference between acute and chronic pain has been likened to the differentiation between 'disease' and 'illness' (Caltabiono et al., 2001). Disease is often used to describe a disturbance in the patient's biology, involving anatomical and physiological derangement. 'Illness' however is defined as encompassing the patient's subjective experience of physical discomfort, emotional disturbance, physical and social limitations (Gatchel & Epker, 1999). Chronic pain can be likened to illness whereby discomfort and reduced physical functioning can affect the child's subjective experience of chronic pain.

2.3 The impact of chronic pain

Research studies frequently discuss the impact of chronic pain in children and adolescents. (Eccleston, Jordon, & Crombez, 2006; Varni et al., 1996; Zeltzer et al., 1997). In a descriptive exploratory study in the United States by Bennett & Huntsman (2000) the impact of chronic pain on children and adolescents was investigated in a small sample of 43 parents of children aged between 7-16 years. Parents reported their children to be experiencing moderate to severe pain, in multiple body locations, occurring at least several days per week with little pain relief. The pain was associated with moderate to severe levels of disability primarily impacting on school attendance, day-to-day activities, sleep and social activities with peers or family.

When considering the impact of chronic pain on children and adolescents it is necessary to consider children's developmental level and social environment. To adequately understand the child's pain, careful consideration needs to be given to the developmental aspects of the child. For example during adolescence young people experience significant cognitive, psychological and social changes as they develop their self-identity and move towards increasing independence. These changes are proposed to impact on the experience and

expression of pain (Craig, 2002). Consequently, any understanding of children's pain must be developmentally sensitive to the social contexts of the child and adolescent.

Epidemiological studies reveal that chronic pain represents a major health problem (Blyth et al., 2001; Crombie, Davies, & Macrea, 1994). Perquin's Dutch study (2000) states that pain is a frequent symptom in children and adolescents. A random survey of more than 6000 children in the Netherlands aged between 0-18 years indicated that 25% of children reported experiencing recurrent or continuous pain for more than three months (Perquin et al., 2000). Perquin's (2000) study only reported the frequency of symptoms and their severity and did not assess if the reported symptoms posed a problem for the young person or restricted their physical functioning. The findings of Perquin's study also indicated that the incidence of chronic pain increased with age, and was significantly higher for girls (with a marked increase occurring between the ages of 12-14 years). Girls were more likely to report chronic abdominal pain than boys, and abdominal pain and headache were the most frequently reported type of pain. Hence, it is unclear if these high prevalence rates of persisting pain are due to pain associated with menarche in females. It is not only possible that one in four children are experiencing pain and emotional distress, but also two in eight parents are equally distressed because their child is in pain. In an American study, more conservative estimates of prevalence rates were reported of pain in children and adolescents varying between 15-20% (Goodman & McGrath, 1991). However, this research report is quite dated now.

There have been very few studies regarding the prevalence of persistent or chronic pain in children and adolescents in Australia (Chalkiadis, 2001). The Blyth (2001) Australian study reported on the prevalence of chronic pain in a randomly selected sample in the adult population, which also included a 16-19 age group. To be eligible to participate in the study subjects needed to be sixteen years of age or above. The results showed a less than 10% prevalence rate for males and females between the ages of 16-19 years of age. This study was a general health survey, so the primary focus was not pain, hence the site and cause of chronic pain was not investigated. Hence, Blyth (2001) suggests that these rates are perhaps underestimated. Furthermore, in Australia there is limited data describing the associated emotional distress and reduced physical functioning for children and adolescents experiencing chronic pain. Hence, study one aims to investigate the association between

chronic pain and anxiety, depression and physical functioning in young people presenting with chronic pain conditions.

Due to the highly variable and subjective nature of pain, the task of collecting epidemiological data is challenging and can lead to varying rates between studies. Two main epidemiological studies by McGrath (1991, 1999) have reviewed the prevalence of children's pain related to disease and trauma. McGrath (1999) proposed the varying estimates between studies were a result of differing definitions and diagnostic definitions of pain, varying methods of case identification, differences in age and gender of the pain population, and the country of origin. McGrath's (1999) study supports the importance of acknowledging the multiplicity of interacting variables. Another major issue regarding the collection of pain information is the confounding impact of subjective pain ratings that include severity and frequency of pain to ascertain information regarding functional disability associated with pain.

There have been few longitudinal cohort studies in chronic pain. Longitudinal studies would help elucidate the long-term future of children experiencing chronic pain, for example do these young people experience pain as adults or do they develop other conditions such as eating disorders, or anxiety disorders? Furthermore, longitudinal studies may also provide information on what happens if children are treated or not treated within a multidisciplinary framework. Many of these questions are not addressed in this thesis as this is a cross sectional study. This work intends to investigate a group of children and adolescents who present with chronic pain conditions. Study one considers the relationship between children's anxiety, depression and function and, study two investigates the association between mothers' emotions on (i) children's pain sensitive temperament, (ii) children's anxiety, depression, function and somatic complaints and (iii) the relationship between children's pain sensitive temperament and children's ability to regulate emotions.

2.4 The cost of chronic pain

The impact of pain and associated dysfunction leads to secondary difficulties for the child and their family (Zelter & Schlank, 2005). Therefore, it is not only the pain experienced by the child, but also the associated secondary difficulties, which impact on the child's pain experience. A child may have a simple injury but may become debilitated by a pain syndrome when physical factors, such as an injury, combine with psychological and social factors to create a complex problem and physical de-conditioning (Turk & Okifuji, 2002). In addition to biological factors, there are social and developmental consequences of persisting pain, such as withdrawal from friends, being bullied from wearing splints or using crutches and in falling behind at school and perhaps repeating years (Criag, 2002).

The additional stress of experiencing functional disability due to chronic pain poses further challenges to the child and also their family who need to accommodate a compromised daily life routine due to the child's reduced functioning (Hunfeld et al., 2001; Palermo, 2000). There are not only physical costs to the child who is experiencing chronic pain but also financial costs to parents who frequently experience lost wages, due to time off work to care for their child, or to attend medical appointments or even the costs of multiple medical investigations (Palermo, 2000). The sequelae of chronic pain can often be uncertain and bear a significant burden for parents, raising stress and anxiety in families. If the emotional component of pain and its associated difficulties are not dealt with effectively, chronic pain could potentially lead to a further reduction in physical functioning.

Increasing disability and school absenteeism are often associated with chronic pain (Palermo, 2000). Palermo states that more school days are missed, due to chronic pain, than any other chronic condition. With prolonged dysfunction and school absenteeism the child may then develop secondary problems regarding school return, peer relationships, social anxiety, depression and low self-esteem (Schanberg et al., 1998). All these factors may impact on the level of distress experienced by the child and their family and can intensify pain perception, and, unless addressed early in treatment, can exacerbate the child's

condition (Zeltzer et al., 1997). Unless both the social context and psychological factors associated with chronic pain are addressed, treatment may be slow and physical functioning further impaired (Craig, 2002). The significant impact of chronic pain on children and families is starting to raise health professional awareness about the severity of this problem.

In summary, within the framework of the biopsychosocial model, predisposing, precipitating or maintaining factors may be attributed to children, parents, or the social environment. Parental and child emotions, for example anxiety, and past experiences are all additive factors that can have a significant impact on chronic pain, making the pain more difficult to control (Zeltzer, Bush, Chen, & Rival, 1997). Chronic pain is complex and, as pain persists, consequences become causes and the origins of the pain become multiple (Bebbington & Delemos, 1996). If psychosocial problems are not identified and addressed, chronic pain can lead to anxiety and depression and functional disability. In addition to this, persistent pain in childhood may have adverse effects on the child's developing nervous system and may lead to increased pain sensitivity and is hypothesised to lead to adult chronic pain problems (Grunau, Whitfield, & Petrie, 1994; Schanberg, Keefe, Lefebvre, Kredich, & Gil, 1998; Walker & Greene, 1989). Therefore, it is important to understand the relationship between children's distress and physical functioning in young people experiencing chronic pain.

2.5 Pain classifications

Chronic pain is not either psychological or organic, but involves biological, social and psychological factors; these aspects reflect a biopsychosocial perspective that is implemented in pain research and clinical best practice (Gatchel & Turk, 1996). This viewpoint postulates that psychological factors are crucial to both pain perception and maintenance (Gatchel & Epker, 1999). However, classification systems used in diagnosing chronic pain do not reflect this conceptual understanding of chronic pain. Additional problems exist in the classification of chronic pain in children and adolescents. Firstly, neither of the two major classification systems, the International Classification of Disease (ICD-10) and Diagnostic and Statistical Manual of Mental Disorders (DSM- IV-TR), have

specific criteria for children and adolescents, perhaps due to the lack of empirical research of children and adolescents with chronic pain; hence adult criteria are applied to this population (American Psychiatric Association, 2000; Fonagy, Target, Cottrell, Phillips, & Kurtz, 2002; Organisation, 1992). This poses a significant problem in classifying chronic pain in young people, as there are many differences between paediatric and adult chronic pain, due to the development and psychosocial context of the child. Hence, adult classifications of pain may not be appropriate to apply to young people with pain.

The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) is the most widely used classification system in psychology and psychiatry. Although the DSM classification has inspired research in psychiatry and medicine it has been criticised for not corresponding to clinical realities (Wise & Birket-Smith, 2002). The ICD-10 (World Health Organisation, 1993) and DSM-IV-TR (American Psychiatric Association, 1994) have similar classifying systems for pain and unexplained physical symptomatology. The other predominant classification system that is used to define pain is the International Association for the Study of Pain (IASP). It seems that classification systems tend to avoid addressing aetiological factors (Trimble, 2004). The Diagnostic and Statistical Manual of Mental Disorders (DSM-II), category 'psychophysiological disorders' was replaced in the DSM-III with 'psychological factors affecting a medical condition'. The earlier definition highlighted the importance of the psychological factors in the aetiology of bodily disorders and symptoms. The redefinition in the DSM-IV TR assigns psychological factors to a secondary role complicating the pre-existing pathophysiologically determined somatic illness (Nemiah, 2000). The question of where to place chronic pain disorders remains confusing. Trimble (2004) classifies chronic pain disorders under the spectrum of somatoform disorders due to several similarities among the conditions. Trimble (2004) argues that despite years of research these disorders fail to have a clear pathological cause. Furthermore, psychological factors play a predominant role in the patient's presentation and perpetuation of pain. A discussion of somatoform disorders follows this section.

Another major problem is the treatment of chronic pain conditions by specialists who fail to see the broader clinical picture. There is often an overlap with many chronic pain presentations with each medical speciality having its own syndrome, for example irritable bowel syndrome in gastroenterology, fibromyalgia in rheumatology, tension type headache

in neurology, temporomandibular joint syndrome in dentistry and chemical sensitivity in allergy medicine. Many patients who present with these pain presentations also have overlapping symptomatology with other somatic diagnosis, whereby symptoms may change or one diagnosis may be replaced with or substituted for another. This raises one of the issues with diagnosis of symptoms and chronic pain that many of the patients may fulfil the criteria for several pain disorders.

One problem of classifying somatoform disorders is that many of the categories exist on a continuum in clinical practice (Wise & Birket-Smith, 2002). A good example is the graduation from normal health anxiety to hypochondriasis (the preoccupation with the fear of having a serious disease based on the misinterpretation of bodily symptoms or bodily functions). Categories do not consider the determinants and social context of the individual's pain, and how these factors are associated with health seeking behaviours, emotional distress and somatic complaints. Taylor et al. (1997) propose that attention should focus less on classification and phenomenology and more on trying to understand the pathological processes (for instance how does affect dysregulation contribute to chronic pain presentations) that underlie pain and functional somatic distress. Despite these criticisms, perhaps, categories are inevitable in diagnosis and classification, as disorders are described as a collection of symptoms, which aid conceptual understanding of presenting pain conditions among professionals. In addition classification is also used for research purposes, ensuring clinical research is comparing oranges with oranges. The next section considers the relationship between chronic pain and emotion in common somatic complaints in children and adolescents. Consideration is given to the role of anxiety and depression in young people with chronic pain conditions. Several chronic pain presentations are reviewed, which are most commonly reported in children and adolescents referred to Children's Pain Management Clinics.

CHAPTER 3 CHRONIC PAIN AND EMOTION

3.1 Emotion and Physiology

The relationship between pain, suffering and the meaning of pain to the individual is not straightforward. Emotional suffering can be transposed and find expression in pain. For example, the semantics of suffering may take on pain metaphors; being humiliated and disappointed may be described as a bruised self-esteem or feeling crushed. The relationship between pain and emotion is complex, and, although distinct, they may be difficult to separate or distinguish. Once an individual develops chronic pain, the ongoing nature of pain can lead to feelings of depression, hopelessness and anxiety about the future, whereby all these factors can amplify the sensory experience of pain (Craig, 1995). Pain and emotion are closely linked physiologically (Bruehl, McCubbin & Harden, 1999). Due to the subjective nature of one's pain experience, pain and emotion are not easily measured and observed according to the conventions of empirical research. Emotion and pain can be inferred from observable facial expressions, posture and behaviour, to provide evidence about the subjective state of the individual and pain behaviour. Emotion and pain are similar in terms of subjective states of the individual that can be measured by self-report inventories and observable pain behaviours. While there are a multitude of determinants that may be contributing to the individual's pain condition, this thesis considers the relationship between emotion and pain.

When one considers the current definition of pain, it is clear that emotion is an essential component of the pain experience, and can influence pain perception (Merskey & Bogduk, 1994). The IASP description of pain as 'an unpleasant experience' highlights the fact that emotions are not simply a consequence of pain, but rather, a fundamental part of the pain experience (Merskey & Bogduk, 1994). Thus, this current definition of pain emphasises and implicates emotion as an intrinsic component of pain. Pain is no longer viewed as simply nociception (i.e. pain associated with a single brief noxious procedure) (Fitzgerald

& Howard, 1993). Pain is a complex perceptual process originating in the brain in response to specific types of sensory messages (Fitzgerald & Howard, 1993). This sensory information is heavily intertwined with perception and emotion (Craig, 1995).

It is well known that a relationship exists between emotional states (e.g., stress, anxiety) and physical changes (e.g., autonomic arousal- increased heart rate, sweaty palms) (Flor et al., 1999). Examples of this interplay between the mind and body can also be seen in the substantial links between stress and disease and the effects of stress on the brain and immune system (Booth & Pennebaker, 2000; McEwan & Norton Lasley, 2002).

Understanding the psychophysiology of chronic pain highlights the interplay between the mind and the body and considers the influence of emotions on physical changes within the body, and their role in chronic pain (Gatchel, 1999). Considering pain from a psychophysiological perspective also gives consideration to the role of emotion in the development and maintenance of pain symptoms, by highlighting the effect of emotions on the arousal of the sympathetic nervous system and muscle tension, both of which exacerbate the experience of pain (Gamsa, 1994). Hence, dichotomies are avoided as one comes to understand the interaction between the brain and the autonomic nervous system. The psychophysiological perspective is also consistent with the biopsychosocial understanding of pain, which recognises that psychological and social factors are not only reactive to biological changes (e.g., depression and social withdrawal in response to a pain disorder), but these factors alter biologic function as well (Gatchel & Turk, 1996).

When a child receives a cut or a burn, the noxious stimulation instantly triggers chemical activity at the site of the injury, called algogenic substances (Fitzgerald & Howard, 1993). The pain the child feels is a reaction to signals transmitted through the body through the activation of peripheral nociceptors via sensory afferent fibres that synapse in the dorsal horn, which then carries the signals to the brain (Caltabioano & Sarafino, 2002). The withdrawal reflex removes the child away from the nociceptive stimulus (Fitzgerald & Howard, 1993). Ascending fibres also influence pain perception and involve pathways and regions of the brain concerned with emotion, the limbic system (Craig, 1995). Thus, psychological factors influence ones's experience of pain.

Zeltzer (1997) highlights that there is no way to separate the emotional and sensory aspects of pain. The 'limbic system' is the part of the brain often referred to as the centre of emotions, and is also activated in response to pain (McEwan & Norton Lasley, 2002). Principally there are two main structures within the limbic system that are both involved with emotion: the hippocampus and the amygdala. The hippocampus is responsible for declarative, episodic memories and memory formation (Panksepp, 1998). Memories with a strong emotional component, elicited by pain, are formed instantaneously due to the processes within the hippocampus (Craig, 1995). The hippocampus works closely with the amygdala, which is activated immediately in response to fear without transmission having to pass through the neurocortex (thinking and processing) (McEwan & Norton Lasley, 2002). This means that threat and hypervigilance in relation to pain can occur as a learned response or subconsciously.

3.2 Somatoform Disorders

Historically, patients with medically unexplained pain or somatic symptoms were given the diagnosis of hysteria, hypochondriasis or melancholia. Freud and Breuer (1895) concluded that hysterical symptoms were caused by unconscious memories of events, which had been accompanied by strong emotions that could not be adequately expressed or discharged at the time of the actual event. They proposed intense emotions cannot be transformed into mental imprints of the experience, which involve episodic or declarative memory. Janet (1907) proposed that memories are 'dissociated' or split off from consciousness and the memory traces or traumas remain unconscious until they are translated into the narrative. Dissociated memories are proposed to interfere with the patient's life and may present as preoccupations, perceptual distortions or somatic complaints (Trimble, 2004).

Hysteria has been renamed and now is described under such terms as somatoform disorders (Trimble, 2004). It appears that redefining these constructs from hysteria to somatoform disorders has failed to transcend the mind-body interactionist view. To depict these aspects researchers and clinicians frequently use the term biobehavioural to emphasise the unity of

biological and psychological process, steering away from terms, such as, psychosomatic or functional disorder (Wood et al., 2000).

Under the DSM-IV-TR patients can be classified as either having pain associated with a general medical condition or one of the five Somatoform Disorders: Body Dysmorphic Disorder, Conversion Disorder, Somatisation Disorder, Hypochondriasis and Somatoform Pain Disorder. The classification of 'Pain Disorder' describes pain as the predominant focus of clinical attention, and medical evaluation uncovers no organic pathology to account for the physical complaints, or when there is related organic pathology, and the physical complaints or resulting social or occupational impairment are grossly in excess of what would be expected from the physical findings, (which is often the case for chronic pain) (Swadi, 2002). Furthermore, psychological factors are judged to have an important role in the onset, severity, exacerbation and maintenance of pain. Thus, classifying according to this system one would think a large number of children and adolescents presenting with chronic pain may be diagnosed as having a 'Pain Disorder'

When diagnostic measures fail to reveal a physical abnormality to account for the child's complaints, it is often postulated that the child is presenting with a functional somatic disorder. The term 'functional' implies that there is abnormality regarding the physical functioning of the body, however, it is not easily detected in terms of gross structural changes (Sharpe, Mayou, & Bass, 1995). Zeltzer and Schlank (2005) describe pain as 'functional' when medical results fail to identify disease and nerve signals have become functionally impaired. Somatic complaints without an apparent physical cause are common among children and adolescents. In fact, medically unexplained pain and bodily dysfunction are the single most prevalent class of symptoms in primary care for both adults and children. The most common complaints in children include headaches, recurrent abdominal pain, musculoskeletal pain, dizziness and fatigue (Swadi, 2002).

Somatoform disorders were introduced by the authors of the DSM-III to describe a number of symptoms and syndromes in which somatic symptoms could be found without evidence of organic disease. The requirement that somatoform disorders have no organic findings is problematic as it creates the illusion that physiological mechanisms are not involved in the development of these disorders, leading to confusion over the classification of functional

physiological disorders, for example fibromyalgia, and recurrent abdominal pain, which are thought to be influenced by emotional states (Taylor et al., 1997). In addition, the DSM criteria are not developmentally sensitive and may therefore lead to an underestimation of the true prevalence of chronic pain conditions in children and adolescents (Lock & Gianmmona, 1999). Research suggests that pain and somatic symptoms show a developmental pattern. Prepubertal children tend to present with recurrent abdominal pain and headaches, whereas adolescents are more likely to complain of musculoskeletal pain (Garber, Walker, & Zeman, 1991; Garber, Zeman, & Walker, 1990).

In Fonagy, Target, Cottrell, Phillips and Kurtz (2002) book “What works for whom? A critical review of treatments for children and adolescents”, Fonagy et al. state prevalence rates for somatisation tend to vary between studies due to the differing definitions, and the measures used in its description; however, reported rates appear to be approximately 11% of girls and 5% of boys. This raises questions regarding the role of gender in pain and somatisation, with research findings supporting higher prevalence rates of somatic symptoms and chronic pain disorders in females, compared to males.

Children who present with headaches, abdominal pain or other somatic complaints are often referred to as ‘somatisers’. Somatisation has been defined by Lipowski (1986) as the conversion of psychological distress into somatic symptoms as a means of communicating worry, anxiety, distress and receiving social support and sympathy. Study one considers the relationship between emotional distress and reduced physical functioning in children and adolescents experiencing chronic pain. This study explores if this population of children and adolescents experiencing chronic pain conditions are reporting clinically significant levels of anxiety and depression and how these rates of emotional distress may be impacting on the young persons’ physical functioning.

The term somatistion tends to imply that patients are actively producing physical symptoms, whether indirectly or through some unconscious motive. Hence, in clinical practice it is suggested that words such as ‘somatisation’ be avoided. ‘Somatisation’, and the term ‘functional’, have been considered flawed in communicating diagnosis and have the connotation of subscribing to dualism of the mind and the body (Sharpe et al., 1995). Although an individual’s chronic pain symptoms may not be associated with

conventionally defined 'disease', physiological assessments have revealed bodily disturbance or pathophysiology in patients experiencing chronic pain, and associated changes in brain function (Flor, Birbaumer, Schugens, & Lutzenberger, 1992; Flor et al., 1997; Sharpe et al., 1995).

Children and adolescents often present with somatic complaints that generally involve pain. Garber, Walker and Zeman, (1991) sampled 540 children and adolescents and found the most common symptoms were headache, low energy, sore muscles, nausea, stomach aches, back pain, blurred vision, with girls again reporting substantially more symptoms than boys. Reporting of somatic complaints has been found to be positively correlated with anxiety and depression and negatively correlated with perceived self-competence (Walker, Garber, & Greene, 1994). Australian prevalence rates of somatisation and pain are lacking, leaving comparisons to be made with such studies as Perquin's (2000) Dutch study. Hence study two aims to provide Australian data on the relationship between emotional distress and somatic complaints in children and adolescents.

There appears to be a relationship between somatic symptoms and school attendance. One study investigated this relationship in a sample of adolescent outpatient school 'refusers' and demonstrated a strong correlation between anxiety, depression and physical complaints (Bernstein et al., 1997). Thus, children who were reporting somatic complaints and not attending school had related anxiety and depression. The results of the Bernstein et al.'s study may have important implications for research in paediatric pain, whereby children frequently miss large amounts of school, and report somatic complaints. Examining the association between reduced physical functioning (for example, school attendance) and emotional distress in children with chronic pain may help to understand the psychosocial factors maintaining chronic pain for these young people. Understanding the association between anxiety and depression may facilitate more rapid psychosocial assessments of chronic pain and avoid unnecessary medical workups and increasing levels of school refusal (Hennington, Zimmermann, & Sattel, 2003).

3.3 Anxiety and Depression

It is estimated that about a third to a half of children with somatisation related disorders present with anxiety and depression (Gerralda, 1999). Studies show that children and adolescents who experience chronic pain have been shown to have higher levels of anxiety and depression than the normal population (Bass, Peveler, & House, 2001; Hennington et al., 2003; Korff & Simon, 1996). Kashikar-Zuck et al. (2001) investigated a group of 73 outpatients in a paediatric chronic pain clinic, using the Children's Depression Inventory (CDI). The participants consisted of outpatients referred to a paediatric pain clinic. The referrals were predominately from specialists with typical primary diagnoses of back pain, abdominal pain and limb pain. Participants were referred to the clinic when other treatments had been unsuccessful. Findings from this sample showed thirteen percent were clinically depressed ($T > 65$), with overall levels of depression falling in the average range (Kashikar-Zuck et al., 2001). These findings indicate these children are not reporting significant levels of emotional distress and contradict the findings that children and adolescents with chronic pain experience higher levels of depression. An alternative hypothesis could be that somatic complaints may be an expression of emotional distress, which was demonstrated in a Norwegian study of adolescents who had been victims of bullying. In a total of 1003 pupils who had reported being bullied there was a strong association with psychosomatic symptoms (headache, stomachache, backache and dizziness). The number of reported symptoms was associated with exposure to bullying (Natvig, Albrektsen & Qvarnstrom, 2001).

In contrast to the Kashikar- Zuck et al. study, Eccleston and colleagues found a clinical sample of adolescents (experiencing complex regional pain, low back pain, recurrent abdominal and musculoskeletal pain) who were referred to a specialised chronic pain clinic, reported anxiety scores twice as large as a non-clinical population, and 70% reported depression above the normal range (Eccleston, Crombez, Scotford, Clinch, & Connell, 2004). Depression was assessed using the CDI, and in comparison the Kashikar-Zuck et al. (2001) subjects were reporting above average levels of depression $M=58.83$. These research findings appear to be inconsistent with the finding of the Kashikar-Zuck et al. study. Thus, it is important to collect Australian data to determine the relationship between

emotional distress and chronic pain in young people. Study one and study two will provide Australian data on the clinical significance of anxiety and depression on children and adolescents who present to a children's pain management clinic.

To make sense of these reported levels of anxiety and depression in children and adolescents experiencing chronic pain it is helpful to have prevalence rates for the general population. It has been suggested that anxiety and depression are both common emotional disorders experienced in pain free children and adolescents, with estimated prevalence rates ranging from 8-22% (Dierker, Albano, & Clarke, 2001). Anxiety and depression represent internalising disorders, as compared to externalising (conduct) problems. It has been suggested that children and adolescents with internalising disorders are less likely to receive mental health services compared to those with externalising or disruptive problems [38.6% versus 56.3%] (Fonagy et al., 2002). Children who are more susceptible to internalising their emotions may present with physical complaints and hence emotional issues may go unrecognised. Prospective studies have shown that many children with abdominal pain continue to complain of additional somatic symptoms and physical disability (Walker, Garber & Greene, 1994). Mulvaney et al., (2006) proposed that identifying psychosocial correlates of long-term risk for physical symptoms and impairment, such as child-reported stress and internalising symptoms, may be useful for treatment planning.

Epidemiological studies of depression in children and adolescents report prevalence rates of 2% in children, and 2-5% in adolescents (Fonagy et al., 2002). Comorbidity of anxiety and depression has been estimated to be between 40-70% with anxiety disorders being more prevalent than depression. It is suggested that there are no gender differences until adolescence, (approximately 14 years), when girls are twice as likely as boys to experience depression and report more somatic complaints than boys. The next section outlines several chronic pain disorders that children and adolescents experience. These chronic pain conditions are described and the research reviewed considering their association with children's and adolescents' emotional distress.

3.4 Chronic Pain Conditions and Emotional Distress

3.4.1 Complex Regional Pain Syndrome (CRPS)

CRPS type I is a chronic pain disorder that usually follows an initiating noxious event (often trivial) and is characterised by spontaneous pain or allodynia (normally nonpainful stimuli such as touch are perceived as painful) and hyperalgesia (mild pain stimuli are perceived as intensely painful) beyond the territory of a single nerve and disproportionate to the inciting event. In addition, there has been evidence of oedema, skin blood flow abnormality, abnormal sudomotor activity in the region of the pain since the inciting event. In order to make the diagnosis the absence of another disorder that could account for the symptoms must be excluded. CRPS type II refers to the same symptoms and signs following nerve injury (Trimble, 2004).

CRPS has been recognised with increasing frequency in children, but to date no epidemiology or community prevalence studies have been conducted (McGrath, 1999). However, a review article from Poland estimated that over the last decade 395 paediatric patients have been identified, aged 18 years or younger with CRPS (Dangel, 1998). Paediatric case reports were rare before 1970 and approximately 331 cases have been identified on Medline from 1970 to 1999 (Lee, 2002). In contrast to adults, there is a marked predominance of presentation in the lower limb in children and adolescents, and may be the result of a trauma or immobilisation of the limb. Emotional stress as a precipitating event is not always identifiable at assessment but often appears to be significantly related to both the development and maintenance of the condition (Grande, Loeser, Ozuna, Ashleigh, & Samii, 2004).

It appears that clinical referrals of CRPS are highest for preadolescents (11-13 years old) and Australian and American prevalence rates show a higher ratio of females compared to males, with estimates ranging from (4:1- 6:1) respectively (Chalkiadis, 2001; Dangel, 1998; McGrath, 1999). CRPS is characterised by intense pain, vasomotor dysfunction, delayed functional recovery and associated trophic changes (Merskey & Bogduk, 1994). Significant factors associated with the development of CRPS in children and adolescents are stress, and

competitive sports and involvement in many extracurricular activities (Wilder, Berde, & Wolohan, 1992). The development of CRPS involves both psychological and physiological systems, and elevated stress may underlie and precipitate the condition. Once CRPS develops, emotional distress can exacerbate symptoms through adrenergic over responding (Bruehl, Herbert, & Harden, 2001; Grande et al., 2004).

CRPS has been the subject of misdiagnosis and misunderstanding, and in the past has been labelled a psychogenic pain condition (Bruehl, Steger & Harden, 2001). Over the last twenty years research has shown that CRPS is a pain syndrome reflecting actual pathophysiology, whereby psychological factors and physiology interact to produce signs and symptoms and the maintenance of the condition (Grande et al., 2004). CRPS is a good example of how chronic pain disorders need to be understood in terms of mind and body interaction and not as a dualistic phenomenon. This is the same pathophysiological process of somatoform disorders, again highlighting the misunderstanding of functional disorders, or chronic pain disorders.

The understanding of stress, as incorporating both psychological and physiological factors is a good example of this relationship between the mind and the body as seen in the development of CRPS (Bruehl et al., 2001; Grande et al., 2004). Although stress has been identified as a precipitating factor in the development of this pain disorder, there are limited studies investigating its relationship in the psychogenesis of this disorder. Case controlled studies are difficult to construct as research findings may vary due to the lapse of the time period between the advent of the stressful event, the development of the pain disorder, the multifactorial nature of precipitants and maintainers and the variability in response to treatment. There are also no prospective follow-up studies in adults and children who have experienced CRPS, so it is difficult to know what happens to these young people as they move to adulthood, and if they face further adjustment difficulties in relation to pain or other psychosocial factors (Bruehl et al., 2001). In particular there are limited research studies, both quantitative and qualitative, which have provided good case histories and assessments of children and adolescents experiencing CRPS.

Studies that have investigated the relationship between stress and CRPS appear to be mainly with adult patients. One research study consisted of a small sample size of 24 adults

experiencing CRPS. The study examined the relationship between CRPS and stress, and results concluded 19 of the patients had experienced stressful life events, within three months prior to the onset of CRPS (Geertzen, Bruijn-Kofman, Bruijn, Weil, & Dijkstra, 1998). Although this relationship appears significant, the sample size is relatively small and relates to adults. Studies specifically relating to children and adolescents who develop this disorder are needed to provide empirical data about the factors that may predispose and maintain CRPS and to determine the significance of the relationship between pain and emotion in CRPS.

3.4.2 Fibromyalgia

Fibromyalgia is a rheumatologic syndrome characterised by chronic widespread persisting pain present for three months or longer and associated with fatigue and poor sleep. Muscle tenderness must be elicited at eleven or more defined points (Winfield, 2000). Much controversy exists among biobehavioural researchers about the aetiology, nature and appropriate treatment for this condition (Kashikar-Zuck, Graham, Huenefeld, & Powers, 2000). Due to the controversy over the diagnosis of this syndrome, and high levels of associated emotional distress of the sufferer, the aetiology for this condition has been framed dichotomously, either as a musculoskeletal pain, or a somatisation condition, as if the former cannot be considered the latter (Morriss et al., 1999).

Studies providing prevalence rates on fibromyalgia in children tend to vary according to the age of the child (McGrath, 1999). Mikkelsen (1999) in a two-stage epidemiological study found that 22 of 1756 (1.25%) children aged between 9-12 years met the criteria for fibromyalgia. The study also showed an association between musculoskeletal pain and emotional and behavioural problems in this group of preadolescents, with these children experiencing significantly more depressive symptoms. This prevalence rate appears quite low, whereas other studies have reported higher rates of fibromyalgia in children aged between 9-15 years (6%) (Buskila, 1995). Fibromyalgia is more likely diagnosed in older adolescents and this may explain the discrepancy in prevalence rates between these two studies. Chronic pain appears to be more common in adolescent girls between the ages of 13-15, with corresponding rates in adult women (Kashikar-Zuck et al., 2000).

There are several hypotheses regarding the underlying emotional factors involved in fibromyalgia. One hypothesis is that the pain is a masked depression and that depressive syndromes and chronic pain share pathogenic mechanisms; hence, emotional factors underlie this pain disorder (Morriss et al., 1999). Another hypothesis is that depression is a consequence of living with fibromyalgia, in this case, emotional factors are due to the pain condition (Raphael, Janal, Nayak, Schwartz, & Gallagher, 2004). Alternatively both hypotheses could be true.

In comparing depression rates for children with fibromyalgia compared to healthy controls, the results are mixed, with the percentages of children experiencing clinical depression ranging from 9-55% (Breau, McGrath, & Ju, 1999). Findings from a clinical pilot study supported the findings that anxiety and depressive symptoms are frequently present in adolescents experiencing fibromyalgia (Vandvik & Forseth, 1994). Vandvik and Forseth also suggested fibromyalgia patients share certain personality characteristics: for example, the setting of very high expectations and standards are frequently observed in this population of chronic pain sufferers. This personality characteristic is also observed and reported in children and adolescents who develop CRPS (Wilder et al., 1992).

3.4.3 Irritable Bowel Syndrome and Recurrent Abdominal Pain

Recurrent abdominal pain and headaches constitute recurrent pain syndromes commonly seen in children and adolescents. Recurrent pain is both acute and chronic, episodes of pain may be followed by symptom-free periods (Scharff, 1997). Irritable bowel syndrome (IBS) is a pain disorder affecting the lower gastrointestinal (GI) tract; symptoms include abdominal pain and altered bowel habits, for example diarrhoea and constipation. IBS is a widespread pain disorder afflicting 9-22% of the American adult population (Sykes, Blanchards, Lackner, Keefer, & Krasner, 2003). In comparison, RAP is defined as at least three episodes of pain occurring within three months that are severe enough to affect the child's activities. It is also common among children and adolescents, affecting between 7-25% of the school-aged children (Blanchard & Scharff, 2002).

In contrast to IBS, RAP does not have a set of symptom-focused diagnostic criteria (Blanchard & Scharff, 2002). There are no structural, biochemical or physiological

abnormalities, although there is some evidence that inflammatory elements may have contributed to the initial onset (Sykes et al., 2003). Like other pain disorders, outcomes from research studies suggest that this group of pain patients is more likely to experience greater levels of emotional distress, especially anxiety and depression, compared to patients with organic GI syndromes (Blanchard & Scharff, 2002; Ingemar, 1999; Ramchandani et al., 2006; Robinson, Alvarez, & Dodge, 1990). The association between abdominal pain and anxiety was demonstrated in a group of African- American adolescents at middle school in the South-East United States. The Revised Children's Manifest Anxiety Scales (RCMAS) was used to assess adolescents' anxiety. Students completed measures of pain and anxiety at the end of grade seven and six months later. Cross-sectional analyses revealed partial mediation of the influence of stress on children's pain was partially diminished after controlling for anxiety (White & Farrell, 2006), thus, demonstrating that the relationship between stress and pain was mediated by anxiety.

RAP appears to be a common somatic complaint amongst school-aged children. Hyams and colleagues (1996) conducted a study in a community-based sample of school children. They reported that 13-17% of school aged children experienced abdominal pain at least weekly, and 14% of high school children met the diagnostic criteria for IBS. Follow-up studies of children who suffer from RAP indicate that this population is at risk for the development of somatic symptoms, continued pain and functional disability in adulthood, perhaps suggesting children who suffer from RAP have poor coping skills (Campo et al., 2001; Lampe et al., 2003; Scharff, 1997). Walker et al. (2006) tested the hypothesis that children who experience RAP differ from well children in their appraisal and coping with daily stressors. Compared to well children, children with RAP were less confident in their ability to change or to adapt to stress and were less likely to use accommodative coping strategies (acceptance and positive appraisal of situations).

The Ramchandani et al. (2006) recent study set out to investigate the course of RAP though early childhood to determine whether RAP is associated with higher rates of anxiety among children and their parents. This was a prospective longitudinal study of children born in England. The main findings of the study were that: girls were more likely to have RAP than boys, children with RAP were more likely to experience headache and limb pain than other children, RAP among children was associated with higher rates of anxiety among children

and higher rates of maternal anxiety and depression. However, several limitations were outlined in the study. The study did not include a detailed assessment of the impact of the child's symptoms. In addition, the measures of the symptoms among children were based on maternal reports; hence, it is possible that increased levels of maternal anxiety might have increased the levels of reporting of children's abdominal pain. Nevertheless, this study provides support for the view that there is a significant relationship between RAP and emotional disorders in both children and their mothers.

Perhaps the inability to regulate distressing emotions contributes to the susceptibility of this group of young people to experience somatic symptoms. Study two investigates the relationship between mothers' distressing emotions and children's somatic complaints and the relationship between maternal and child maternal regulation on children's functional outcomes (anxiety, depression, somatic complaints and physical functioning) in young people experiencing chronic pain to determine if there is a significant relationship between maternal distress and children's anxiety, depression and reporting of somatic symptoms in a group of young people presenting with chronic pain disorders.

Managing distressing emotions or stressful events may impact on children's somatic complaints and the associated level of functional disability. In a one-year follow-up study, Walker, Garber and Greene (1994) identified a relationship between stressful events and ongoing RAP, but only in children whose parents demonstrated high levels of somatic symptoms, or in children who scored low in social competence. The study also showed that children suffering from RAP, compared to healthy controls, tended to stay away from school more often, needed more attention when they were unwell and tended to show more anxiety in various ways. Parents of children experiencing RAP tended to describe their children as anxious, dependent and at the same time non-communicative about their emotional experience (Robinson et al., 1990). The Walker et al. study also highlighted that important triggers for RAP tend to be events concerning the child's interpersonal relationships, for example parental divorce, separation and issues at school. Research studies indicate that children with RAP frequently report more daily stressors than children without RAP (Walker et al., 2006). In addition, the association between daily stressors and somatic symptoms was stronger for children with RAP compared to healthy controls (Walker et al., 2001). One could argue that everyone experiences stressors but not everyone

develops abdominal pain, and therefore perhaps this illustrates there is an important aspect to how these young people manage distressing emotions or regulate their emotions. The next chapter defines affect regulation, explores children's development of affect regulation, and considers the relationship between affect regulation and chronic pain in children and adolescents.

3.4.4 Headaches

Recurrent headaches are the most common somatic complaints in school children and adolescents, as reported by adolescents themselves, parents and also health professionals (Fearson & Hotopf, 2001; Holroyd, 2002). Headache in children and adolescents is also the most widely investigated pain complaint in school-aged children (Larsson, 1999; Martin-Herz, Smith, & McMahon, 1999). Children who suffer from headaches are most likely to experience other types of pain, for example RAP and limb pain (McGrath & Hillier, 2001). The most common types of headaches in children and adolescents are migraine and chronic tension type headaches (CTTH). The International Headache Society (IHS) classification system (1998) provides criteria for the diagnosis of migraine, or chronic tension type headaches.

The understanding of headache has also changed over the last twenty years. It was once thought that tension headaches were solely the result of prolonged muscle contraction affecting pericranial nerves, which reduces the blood flow in affected muscles. The vascular model of migraine postulated that migraine resulted from sudden vasodilatation in the cranial circulation (Holroyd, 2002). Current understanding views headaches to be maintained primarily through dysfunction of the central nervous system. This perspective is consistent with all chronic pain conditions and involves a lower threshold for the transmission of pain signals to the brain (Holroyd, 2002). Again the role of stress is considered important for both migraine and CTTH (Langeveld et al., 1999). Longitudinal data from the National Birth Cohort Study in Great Britain also supported the relationship between stress and headaches in children, and predicted children experiencing these symptoms would experience recurrent headache, physical and psychiatric problems in adulthood (Fearson & Hotopf, 2001).

The prevalence of headaches in children and adolescents has increased over the last twenty years (Sillanpaa & Anttila, 1996). Epidemiological studies have estimated that 75% of children who are 15 years or younger have experienced clinically significant headache, with weekly headaches occurring in more than 15% of 10-17 year olds (Passchier & Orlebeke, 1985). Gender differences also seem apparent, with girls experiencing more headaches than boys, and prevalence rates for both boys and girls increasing during adolescence (Holden, Levy, Deichmann, & Gladstein, 1998). This supports the recurrent findings in the literature on gender and prevalence rates for chronic pain disorders. The prevalence rates for migraine using the IHS criteria vary from 3- 11% (Larsson, 1999).

A comparison of young people who experience chronic daily headaches with children experiencing pain disorders, such as CRPS, and fibromyalgia, suggests that children with headaches do not miss as many school days and hence do not have as much functional disability (Larsson, 1999). Although, compared to individuals with CTTH, adolescents experiencing migraine report lower functioning, and life satisfaction, (Langeveld, Koot, & Passchier, 1999). Hence, migraine headaches appear to be more functionally disabling than chronic daily headaches. The relationship between headache frequency and psychosocial factors, including anxiety, depression, and somatisation and functional status was evaluated in a group of junior high school students (M= 13.7 years). The study consisted of a series of self-report measures and a medical history interview. Students were classified into two groups, frequent headaches (FH) and infrequent headaches (IH). Students in the FH group reported more depressive symptoms, somatic complaints, anxiety and functional disability than in the IH group (Martin-Herz et al, 1999).

As Martin-Hertz et al. have outlined, anxiety and depression have frequently been found to be higher in headache sufferers. Persisting or untreated pain may have consequences for the young person causing sensitisation so that the pain threshold is lowered and the perception of pain increases (McGrath, 1999). This has been demonstrated in several clinical syndromes, for example RAP and arthritis (Alfven, 1993; Walco, 1990). The mechanism of sensitisation may be either biological or may be influenced by psychological factors, such as an increased awareness of somatic sensations (Asmundson, Norton & Norton, 1999). Hence, it is important to research the mechanisms and factors associated with the sequelae of chronic pain to integrate an understanding of biology and psychosocial factors.

The following sections define emotion and affect regulation and discuss theories, which consider the early environment in the development of affect regulation. This is followed by the chapter on affect regulation and chronic pain. This section explores some of the components of sensitisation, for example how emotional distress may be associated with hypersensitivity to pain, increased perceptual sensitivity and avoidance of somatic sensations.

CHAPTER 4 EMOTIONAL REGULATION

4.1 Emotions

Emotions have been described over the centuries by many scholars, dating back to Socrates (470-399 BC), Plato (428-327 BC) and Aristotle (384-322 BC). Emotions are a medium of social exchange, necessary for social bonding and giving meaning and experience to our lives (LaFreniere, 2000). Philosophers and psychologists have been influenced by the theories of Darwin, James, Cannon and Pavlov and the circular question whether emotions originate in the mind or the body. This issue has become a little clearer with the recent surge of literature on neuroaffective science, whereby functional imaging can assess brain activity (LeDoux, 1996; Singer et al., 2004). With the emergence of neuroscientific research the interplay between the mind-body has been highlighted and Descartes' error of mind-body dualism discarded (Panksepp, 1998). Descartes is a symbol for a collection of ideas that the mind, body and brain were related but only in the sense that one cannot exist without the other. Descartes' views have influenced Western sciences that there is a split of the mind from brain and body. This separation between body and mind suggests that physical or emotional pain exists separately from the body and biology (Damasio, 1994).

Emotions are a fundamental component of human experience; however, there is no consensus on the nature of emotion (Cole, Martin, & Dennis, 2004). There are many theories of emotion, and each contemporary theory offers a different definition (Izard, 1977; Lazarus, 1991; Sroufe, 1996). Despite the controversy in defining emotion, theories often cited in the literature on emotional regulation in childhood share a neo-Darwinian influence, viewing emotions as 'biologically prepared capabilities that evolved and endured in humans because of their extraordinary value for survival' (Cole, 2004, p. 319). Siegel (1999) proposed emotion involves complex layers of intrapsychic processes that are in constant interaction with the environment. These interactions involve cognitive processes (the meaning attributed by the individual) and physical changes (for example, autonomic

and cardiovascular). Furthermore, Siegel (1999) considers emotions to represent “dynamic processes created within socially influenced, value-appraising processes of the brain” (p. 123). Thus, the social element and appraisal of emotions influences the experience of emotion. Emotions are essential for survival and have evolved and endured in humans, providing a response system to the environment and carrier of meaning by which experience is understood (Panksepp, 1998). Emotions reflect the perceived value or importance of external or internal events and the allocation of the mind’s attentional resources (Siegel, 1999).

The expression of emotion has an evolutionary function of signalling and communicating to others, and is essential for human adaptation and the bonding process between mothers and infants (Panksepp). Children learn about emotions in the context of their early development with primary caregivers (Winnicott, 1965). Children often look to their parents to infer the meaning of situations, through the mechanism of social referencing (Garber & Dodge, 1991). Hence, there is an evolving emotional and intricate relationship between mothers and their children. The dynamics that operate between this dyad deserve thought and understanding in the area of paediatric pain.

In addition, emotions create a readiness for action and for responding to the environment. Parents’ emotions may therefore provide information to the child about the meaning of and response to situations. There are also similarities across cultures whereby facial and bodily expressions of emotions are similar in human infants; therefore an aspect of emotion is innate and operates before the development of emotional awareness (Darwin, 1872). Humans often use emotions as an essential component of social understanding and relating, whereby facial expressions serve as a type of feedback to the individual and also to others (Tomkins, 1962). Hence, expressed emotion provides a form of communication and is essential for the understanding of oneself and others (Dunn & Brown, 1994).

Definitions of emotion have a common understanding about the interrelated systems involved in emotional responding. The first of these processes involve biological systems, for example the autonomic nervous system (ANS) and psychoneuroendocrine activation. Studies have often used vagal tone (variability in heart rate due to parasympathetic activation), heart rate, and cortisol changes in response to stressful situations as indicators

of emotional responding and temperament (Boyce, Barr, & Zeltzer, 1992; Lewis, 1992; Schechter, Bernstein, Beck, Hart, & Scherzer, 1991). The second response system involves motor and behavioural-expressive indicators of emotional responding, for example facial expressions. Finally, the third aspect of emotional responding involves the individual's subjective experience. In fact the word 'feeling' has been defined as the subjective, cognitive aspect of the emotional response system, or the conscious awareness of the emotions or the affect (Taylor et al., 1997). As emotion is a process, feelings operate at the point at which the person can detect this emotion process.

Hence, emotions are biologically endowed processes that permit extremely quick appraisals of situations to prepare for an equally fast response. Most of this process is automatic and occurs outside one's awareness. Neuroscience is a developing area of research which describes the parts of the brain purportedly involved in the experience of emotion and emotional development (Schore, 2003). LeDoux's (1994) book, 'The Emotional Brain' details many of these findings. LeDoux proposes two emotional response systems in the brain, the first occurring in the amygdala, which is responsible for automatic, unconscious responses of emotion. This is an involuntary emotional process that occurs in response to a stimulus before it is cognitively represented, and is considered to be part of the immediate evolutionary emotional system of the individual. The second occurs in the neocortex and encompasses the individual's past experience and cognitive judgement about the situation. Other regions of the brain are also responsible for emotional response, for example the hippocampus and the crucial interactions that occur between the separate parts of the brain. The limbic system is also responsible for the emotional state of the body, and influences the body via the autonomic nervous system. Siegel (1999) describes the functions of the limbic system as a source of social processing, stimulus appraisal, and mind/body (emotional) arousal. Although some emotional processes occur outside one's awareness, an individual's interpretation, or the meaning of a situation, influences the feeling that is ultimately experienced.

Psychology has tended to view the relationship between cognition and emotion from several perspectives, that is, emotions and cognitions are separate, emotions can control cognitions, and emotions can be controlled by cognitions, or be integrally interconnected with them. Many psychologists, for example Lazarus (1994), have focused their attention

on how cognitions can influence an individual's emotional experience and propose that there is no such thing as an emotional experience without cognition. According to Lazarus, emotional experience is influenced by an individual's interpretation of the situation or even a body sensation, for example anxiety and fear are influenced by the interpretation of the situation, whereby the same event will be experienced differently by individuals (LaFreniere, 2000).

In contrast to LeDoux's primacy of affects theory, Damasio (1994) concurs with Lazarus that emotions cannot exist without cognitions and provides empirical studies supporting the 'somatic-marker hypothesis'. This hypothesis proposes that the brain constantly monitors what is occurring within the body as a means of understanding the internal experience of affects. The signals from the body shape feelings and awareness of changing bodily states: for example tension in our muscles, or in facial expressions provide information, which is used to predict future outcomes of certain events. Somatic markers are generated from learning and experience and are considered secondary emotions used to shape such predictions. The somatic marker hypothesis may provide a useful perspective to view fear avoidance of both young people and adults with chronic pain. In this example the somatic marker may force attention on the negative outcomes of an activity, which is pain. The signal or somatic marker may lead an individual to avoid movement and reduce physical activity. This hypothesis also proposes that there is a biological basis for affective experience in which the body is an essential component. The physiological sensations of affect provide the function for interpreting experience and providing meaning to internal and external events (Siegel, 1999). Theories of emotion also highlight that feelings are open to bias, misinterpretation, and social influences (Siegel, 1999). Hence, one would expect emotion to influence an individual's experience of pain and interpretation of somatic sensations.

LeDoux provides a conflicting view to Lazarus suggesting that emotional responses can occur in the absence of cognitions and although the neural circuits of emotion and cognition are interactive they are also distinct. In addition to this, LeDoux proposes emotional processing is not always conscious, it may occur outside conscious awareness and, in his judgement; feelings emerge as "frills that have added icing to the emotional cake"(1996, p. 302). Hence, LeDoux defines emotions as primarily unconscious mental processes

supporting Freud's psychoanalytic theory of affect which highlights the unconscious mechanisms of defense often used to manage impulse and affect, operating outside one's awareness (Shirk & Russel, 1996).

Emotions create meaning in our lives, although some people have very little awareness of their emotional reactions (Ebling et al., 2001). One could postulate that if an individual were not aware of their internal emotional world, this would also include unawareness of other peoples' emotional states. If there is a lack of awareness of emotional processes, this does not mean there is no emotion: what is lacking is the connection between consciousness and the appraisal-arousal system (Siegel, 1999). Emotional awareness is one component of affect regulation, which is defined in the next section. One recurring situation in paediatric pain is parental interpretation of children's pain and the situation that arises when parents selectively attend to the child's physical complaints and are not aware of the child's underlying emotional needs (Craig, et al., 2004).

4.2 Affect Regulation

There appears to be an increasing theoretical interest in emotions and affect regulation across a wide variety of perspectives, with contributions from developmental theory, psychoanalysis and attachment theory (Eisenberg, 2000; Schmacher-Finnell, 1997; Fonagy, 2001). All these theories converge in the understanding that the development of emotional regulation is embedded in the child's early years of experience and family environment. It could be argued that difficulties in regulating one's affect are an important risk factor for developing psychological and physical disease, somatoform disorder, eating disorders and substance abuse, or even developing chronic pain (Taylor et al, 1997). Affect regulation is an important area of study as it relates to an individual's physiology, behaviour and ultimately good health. In treating children's chronic pain conditions it is hypothesised that mothers' ability to regulate emotions will have an impact on the level of distress experienced by the young person. The next section defines the term affect regulation and considers the relationship between affect regulation, emotional distress and somatic

symptoms. This section is followed by a theoretical section on the influence of the early environment on the development of affect regulation.

4.2.1 Defining Affect Regulation

Affect regulation has been described as part of the broader construct of self-regulation, referring to the autonomous functioning of the individual (Eisenberg & Spinard, 2004). It is important to note that affect regulation is not automatically maintained and is subject to being lost and regained (Taylor et al., 1997). The notion of emotional/ affect regulation is not new, and has been described in various ways as an important element in emotional development (Dunn & Brown, 1991). For example, developmental psychologists have studied children's ability to control impulses, use reflection, tolerate frustration and delay gratification (Eisenberg, 1998). Emotional regulation is proposed to account for how emotions are organised and for the facilitation of other psychological processes, for example, social relationships and focus of attention (Cole et al., 2004). In addition, the role of affect regulation in child development has recently received greater attention due its role in understanding typical and atypical child development (Cicchetti, 1997).

Affect regulation is more than the capacity to control and modulate one's affective response. It has been defined as the modification of emotional arousal to enable the redirection, control and modification of emotionally arousing situations (Cicchetti & Rogosch, 1997). The capacity to regulate emotions impacts on how we are 'affected' by an event, as well as being able to gauge the meaning, significance and importance of the event. Considering another broader definition of affect regulation, Taylor et al. (1997) proposed the following definition: "a process involving reciprocal interactions between the neurophysiological, motor-expressive and cognitive-experiential domains of emotion response systems" (p. 13). Although definitions of affect regulation may vary, one does not need to be aware of affects to regulate them. For example, in the Taylor et al. definition an individual is not necessarily aware of the neurophysiology, motor-expressive and cognitive aspects of emotional arousal. Awareness of emotional processes enables a person to think about their emotional experience, reflect upon and choose possible actions and behaviours. Awareness of emotional processes is essential to understand oneself and others but is not necessary for the mind and body to regulate affects.

Eisenberg and Spinard (2004) also highlight the importance of differentiating between emotions as a regulator of change in others, from one's own ability to regulate affects. In this viewpoint, Eisenberg and Spinard distinguish between external regulation and that which is accomplished by the child. In addition, if this broad definition is used for emotional regulation, then all expressions of emotion on others or the environment are considered emotional regulation. Eisenberg & Spinard (2004) propose the following 'working' definition of emotional regulation

“the process of initiating, avoiding, inhibiting, maintaining, or modulating the occurrence, form and intensity, or duration of internal feeling states, emotion-related physiology, attentional processes, motivational states, and/or the behavioural concomitants of emotion in the service of accomplishing affect-related biological or social adaptation or achieving individual goals” (p. 334).

It may be a complex definition, which incorporates many factors, however it gives no consideration of unconscious processes that may influence the affect or manifestations of an affect. Eisenberg and colleagues argue that the “construct of emotional regulation should only be applied to the relevant internal processes, or overt behaviours that are ‘effortfully controlled’. Further, Eisenberg and colleagues argue that both emotion and self-regulation involve a highly conscious intention to change behaviour, meaning, cognitions, attention and behaviour, and are under the voluntary control of the individual. Eisenberg refers to the less voluntary aspects of this process as the biological or temperamental systems, which may be associated with the autonomic nervous system (ANS) responding and emotional reactivity.

This perspective is inconsistent with Siegel's statement that “there are huge amounts of evidence to support that the conscious self is in fact a very small part of the human mind” proposing that most of the mind is unconscious, and perception, abstract cognition and emotional processes proceed without the involvement of consciousness (1999, p. 263). The involuntary aspects of emotional processing according to Siegel are not just related to the ANS and associated physiology but influence behaviours, thoughts and feelings. It is only at the point at which emotional processes can be linked with consciousness, or awareness, that they can be understood. McGrath & Hillier, (2001) propose it is helpful if young

people are aware of the situational factors responsible for triggering the pain episodes in order to manage their pain. Increasing awareness of emotional processes in the context of social interactions and the environment also increases understanding of oneself and others. Thus, it is through the interactions with the primary caregiver that children come to understand their emotional experiences. Theories addressing the early development of affect regulation are discussed in the later section of this chapter.

Siegel (1999) outlines some of the essential workings of emotion regulation, which aid understanding of this construct. Components of these include: intensity, sensitivity, and windows of tolerance, recovery process, and access to consciousness and external expression. Siegel (1999) describes affect regulation as the ability of the mind to alter the various components of emotional processing, and as a process that develops to regulate states of arousal and activation of emotion. The first component is 'intensity' of emotion; this refers to the body's state of arousal, mediated by the brain through the autonomic nervous system. The brain monitors the state of the body and incorporates emotional meaning from the body's change in physiological state. The second component is 'sensitivity', relating to the threshold of response, or stimulation needed to activate appraisal systems. The parent-child relationship influences the child's capacity to experience and tolerate high levels of tension or arousal (Cicchetti, Ganiban & Barnett, 1991). The next section on the development of emotional regulation will describe the function of the primary caregiver and review the evidence on the developing child's affect regulation.

People also have variable thresholds of tolerance: that is, differing levels of emotion may be comfortable or uncomfortable for the individual, and the intensity of these feelings may then interfere with thinking, behaviour and functioning if arousal moves beyond the individual's threshold of tolerance (Chung & Evans, 2000). Emotional experiences outside the threshold of tolerance lead to activation of the autonomic nervous system (Siegel, 1999). Thresholds of tolerance are a result of temperament, experience and the early caregiver relationship, which will be discussed in more detail in the chapter titled 'Emotional Regulation and Chronic Pain'.

Finally, the last component described by Siegel (1999) as a defining characteristic of affect regulation is emotional expression. Inhibiting or masking emotional expression avoids misunderstanding by others, the experience of shame, and keeps emotions within the child's individual range of tolerance (Ray, 2004). This may be either a conscious process as in the case of suppression, or an unconscious process, like repression. The disadvantage for the child of blocking emotions out of awareness is that the true emotions are not always known; therefore, blocking affective expression may inhibit the access of emotions to consciousness (McDougall, 1985). Furthermore, this form of emotional regulation may be used so often that it becomes part of the child's traits or character (Cicchetti & Rogosch, 1997). Inhibiting, or masking emotions may also be problematic when measuring children's reporting of their levels of emotional distress. If children are not aware of their emotional state they will not be able to report on this. This form of emotional regulation has also been proposed to lead to the development of somatoform disorders (Taylor et al. 2007). Taylor (2007) proposes that emotions which cannot be tolerated and thought about have a tendency to be expressed through the body.

4.2.3 Affect Regulation and Somatic Symptom

Little has been written in the paediatric pain literature about affect regulation and somatic complaints, thus this section reviews the writing in the psychoanalytic field linking deficits in affect regulation with somatic symptoms. Alexithymia is a disorder of affect regulation and is a term often used to explain and describe the impaired ability to verbalise emotional distress. It has been linked to somatoform disorders, substance abuse and eating disorders (Taylor et al., 1997). Alexithymia is related to the regulation of affects, sympathetic hyperarousal, physiological sensations, somatosensory amplification and reporting of physical symptoms (Lumley et al., 2002). It is characterised by a markedly reduced or absent symbolic thinking so that inner attitudes, feelings and wishes are not revealed. Taylor et al. propose that this often results in the communication of psychic distress through physical complaints because of a difficulty verbalising feelings and distinguishing bodily sensations and different emotional states. Therefore, bodily sensations become the words to express emotional distress. McDougall (1991) writes about alexithymic

individuals who have no words for their emotions and thus use the body to express their emotions. Alexithymia can be conceptualised either as a deficit in a person's ability to employ cognitive processes to identify, differentiate or communicate one's affective states, or as a global (trait) impairment in the recognition of emotion (Porcelli, Taylor, Bagby, & De Carne, 1999). It is because of this difficulty in identifying feelings, that individuals focus on the somatic manifestations of emotional arousal, at the same time as they minimise the affective components of emotions, which result in somatosensory amplification and misinterpretation of somatic sensations as signs of physical illness (Lloyd, 1986).

The alexithymia construct has evolved over several decades from clinical cases of patients suffering from psychosomatic diseases. Alexithymia and emotional intelligence are independent constructs, however, they are strongly and inversely related (Parker, Taylor, & Bagby, 2001). Alexithymia is a more narrowly defined construct than Bar-On's (1997) conceptualisation of emotional intelligence. Research studies indicate that individuals who are alexithymic are likely to experience more severe somatic symptoms due to their poor tolerance for discomfort and coping with stressful situations (Taylor et al., 1997). In addition to this, alexithymic individuals are also more likely to amplify the somatic sensations that accompany emotional arousal, as well as any other somatic sensation and to misinterpret these sensations as signs of physical illness (Bach et al., 1996). The anxious focusing of both parents' and children's attention on physical symptoms may thus lead to greater seeking of reassurance from medical services.

Porcelli et al. (1999) propose that alexithymia may be one factor involved in sensitivity in pain altering the processing of afferent signals. Therefore, if this proposition is confirmed one could expect there to be a relationship between affect regulation and a child's pain sensitive temperament. Alexithymia in children and adolescents has not been widely studied, although alexithymia is proposed to be a high risk factor for somatisation in childhood (Natvig, Albrektsen, & Qvarnstrom, 2001). In adult studies alexithymia has been found to be associated with irritable bowel syndrome and gastrointestinal disorders, however, affect regulation or alexithymia have not been widely investigated in school-aged children experiencing chronic pain (Porcelli et al., 1999). Rather, studies of school-aged children report a strong relationship between emotional disturbance and somatic

presentations (Bernstein et al., 1997; Egger, Link, Costello, Erkanli, & Angold, 1999; Fearson & Hotopf, 2001).

Few studies have investigated family factors and the development of alexithymia in children. A prospective study, the Northern Finland Birth Cohort Project, which began at the antenatal phase by collecting comprehensive data on 12,000 children born during 1966 and then 31 years later, assessed alexithymia (using the Toronto Alexithymia Scale TAS-20) in the 6,000 individuals who had not dropped out of the study. Research findings revealed alexithymia in adulthood was associated with being an unwanted child, being born into a family with many children, and a particularly strong association with a rural upbringing, which may suggest some social economic status implications (Joukamaa et al., 2003). Lumley (2002) found that general family pathology and maternal alexithymia was associated with alexithymia in their children. In addition, studies among Japanese students found a negative association between maternal care and alexithymia, and a positive relationship between maternal overprotection and alexithymia (Fukunishi, Hiroyoshi, Yusuke, & Rahe, 1999; Fukunishi & Paris, 2001). In both these findings, fathers' parenting was not associated with the degree of alexithymia in subjects. These findings support that a disturbance in early development, or lack of maternal sensitivity impacts on children's capacity for emotional regulation (Kooiman et al., 2004).

In summary, affect regulation is proposed to impact on chronic pain in several ways. Firstly, the inability to deal with stress situations may lead to dysregulation of the autonomic nervous system. Therefore, individuals may have an impaired ANS response to regulate physiological and psychological consequences of stress (Sherman et al., 2004). Secondly, difficulties with affect regulation may be representative of a deficit in emotional development, whereby the child cannot differentiate between somatic sensations and emotional experience, hence, the child may fear or avoid somatic sensations. The avoidance of physiological sensations means the child is not able to use these body sensations as emotional signals to provide a link between the child's perception of the outer environment and the child's internal world. As children fear increased arousal and somatic sensations, they will experience difficulties tolerating emotions and become distressed. Furthermore, the inability to integrate cognitively the sensations which originate on their body, means that they cannot distinguish between anxiety, discomfort and pain, or symbolise their

physiological experiences by attaching thought to somatic sensations (Traub-Werner, 1990). Hence these sensations are often misinterpreted as symptoms of physical illness.

4.2.2 Affect Regulation and Emotional Distress

Affect regulation has also been linked with other recently introduced constructs like emotional intelligence. Goleman and Gottman, (1997,1998), Salovey and Mayer (1989/1990) have been key authors in the field of emotional intelligence (EI), a term aimed at complementing the traditional view of intelligence; integrating the emotional, social and behavioural contributions to intelligent behaviour (Dwada & Hart, 2000). If an individual obtained a low score on EI they would experience difficulties in the appraisal, description and expression of emotion, the ability to monitor one's own and others' feelings and emotions, the effective regulation of emotion and the ability to use feelings to guide behaviour. Emotional Intelligence describes two subtypes of emotional development, intrapersonal (the ability to access one's own feeling life), and interpersonal (the ability to read the moods, intentions and desires of others). On a continuum, individuals at the lower end of EI could also be described as 'alexithymic'. Taylor (1997) defines the alexithymic construct as comprising "(i) difficulty identifying feelings and distinguishing between feelings and bodily sensations of emotional arousal; (ii) difficulty describing feelings to others, (iii) constricted imaginal processes, and (iv) a stimulus-bound, externally oriented cognitive style" (p. 29). Patients who are described as alexithymic have been found to experience more psychosomatic symptoms and pain (Kooiman et al., 2004; Lumley, Smith, & Longo, 2002; Taylor et al., 1997).

Poor affect regulation is a defining characteristic for many types of childhood psychopathology and has been associated with both internalising (highly inhibited and controlled behaviour) and externalising problems (under controlled or out-of-control behaviour) (Eisenberg et al., 2001). Research also indicates that many children who are highly anxious are more likely to develop recurrent abdominal pain, headaches, and other somatic symptoms (Campas & Thomsen, 1999; Campo et al., 2001; Scharff, 1997). Thus, study two examines the relationship between affect regulation, anxiety and depression in children and adolescents experiencing chronic pain to test the proposed hypothesis that children with low affect regulation will experience higher levels of anxiety and depression.

Furthermore, study two investigates the relationship between mothers' affect regulation and children's anxiety and depression to test the hypothesis that mothers' emotional distress may impact on children's anxiety, depression, somatic symptoms and physical functioning.

There was only one study that could be identified that investigated the relationship between emotional regulation and persisting pain in children (Vaalamo et al., 2002). This Finnish study examined the relationship between self-reported recurrent pain in school-aged children (aged 11-12 years old) and children's emotional regulation, as indicated by rated internalising and externalising disorders. After controlling for past injuries and chronic illness the relationship between recurrent pain and emotional regulation was examined using logistic regression analyses. Results concluded that externalising and internalising behaviours were related to recurrent pain. The authors explained the relationship between emotional regulation and pain via internalising problems leading to sympathetic activity and muscle contraction; and also through pain itself acting as a stressor for the children reducing their life satisfaction. There were several limitations of this study, firstly, its cross sectional design does not allow causal inferences. Secondly, variables that mediate the relationship between pain and emotional regulation were not included in this study, such as parenting style. Thirdly, emotional regulation was measured solely with teacher ratings.

It is difficult to compare research findings when studies use only parent, child or teacher ratings of children's affect regulation, all of which are open to reporting biases.

Furthermore, this study used a multidimensional inventory of children's social behaviour, with three main factors behavioural, emotional and adjustment problems to infer children's affect regulation, instead of collecting more direct data on children's emotional regulation and self-reported anxiety and depression scores. Study two of this research incorporated both children's and mothers' reports of children's affect regulation, and also children's reporting of their own anxiety and depressive symptoms to consider more closely the relationship between affect regulation and emotional distress in children and adolescents experiencing chronic pain.

Zeman et al., (2002) examined the relationship between children's affect regulation and the presence of internalising and externalising symptoms in 121 boys and 106 girls (M=10.9 years). This study collected data on both children's affect regulation and internalising

symptoms as measured by children's reporting of anxiety and depressive symptoms. Results of multiple regression analyses indicated that the inability to identify emotional states and the dysregulation of emotion predicted internalising symptoms. Thus, poor affect regulation appears to be associated with children's reporting of increased levels of emotional distress and somatic symptoms. Hence, it is important to understand how children learn to regulate emotions.

4.3 Development of Affect Regulation

4.3.1 The Role of Early Relationships

This section outlines the theories of object relations and attachment theory in order to understand the influence of mother-child interactions on children's ability to regulate affects. The effect of parental anxiety on infants is starting to emerge in the research literature as a predictor of children's recurrent abdominal pain (Ramchandani et al., 2006). Studies such as this one provide evidence that anxiety in both mothers and fathers predate the occurrence of chronic pain problems in children. Thus, further investigation is warranted into the relationship between parental emotions and children's experience of chronic pain conditions. This section outlines what is known about the influence of parental emotions on children's emotional development in the early years. The theoretical perspectives of attachment and object-relations theories highlight a biosocial understanding of the complexity of emotions, and the impact of early relationships on the child's developing mind, brain, body and experience (Fonagy et al., 2002).

In the past twenty years, the socialisation of children's emotions has become a topic of increased interest in the child development literature (Eisenberg et al., 1999; Fabes et al., 1999). A new body of research has emerged considering the effect of parenting on children's emotional regulation (Eisenberg, 1998; Eisenberg et al., 1998). Parental practices, and the interactions between children and caregivers have been proposed to affect the intensity and regulation of emotions experienced by children (Eisenberg et al., 1998). How parents respond to their child's emotions is not only part of their parenting style, but

impacts on the child's socialisation and expression of emotion (Fabes, Leonard, Kupanoff, & Martin, 2001; Gottman, Katz, & Hooven, 1996).

The early environment is proposed to provide the function of holding and regulating the child's emotions (Winnicott, 1971). The function of parents as an external regulator for children's emotions lays the foundation for the child's later development of their own affect regulation, adaptation to the environment, and subsequent interpersonal relationships (Schore, 2003). Early social relationships may also impact on the child's neurobiological systems, including the physiological component of emotional response systems (Hofer, 1994). Of considerable importance, there appear to be sensitive periods in the development of the infant's central nervous system, which can have a profound impact on the child's neuropsychological as well as behavioural development (Fonagy, 1998). Research indicates that disturbed mother-infant interactions mediated children's behavioural problems and later development (Spangler & Grossman, 1993). There is an abundance of literature that supports these findings (Cicchetti & Rogosch, 1997; Fonagy et al., 2002; Winnicot, 1971).

Furthermore, for some children the risk of depression is partly related to the parent's failure to respond adaptively to the child's emotional signals, resulting in poorly developed strategies for emotional regulation and a lower threshold for the experience of negative emotions (Cicchetti, Ganiban, & Barnett, 1991; Dawson, Hessel, & Frey, 1994). As a result the biological systems involved in emotion are prone to dysregulation and negative affect. Parent-child interactions and maternal sensitivity to child cues have been found to be associated with neonates' pain thresholds and self regulation (Grunau, 2002). Furthermore, Grunau's (2002) research involving pre-term children and the early effects of pain investigates the mother-infant interaction as a critical determinant in the development and regulation of social and emotional competence. Whilst Grunau (2002) highlights the importance of caregiver interaction on the development of self-regulatory behaviour in young children, she argues that very little is known about the caregiver interactions that contribute to the development of these self-regulatory behaviours in children. Clearly studies are needed which contribute to the knowledge and understanding of caregiver interactions that may be associated with functional outcomes (anxiety, depression, function and somatisation), for children and adolescents experiencing chronic pain conditions. One of the difficulties in defining affect regulation has been the lack of a comprehensive theory

to synthesise the complexity of the development of emotional regulation and the importance of social interactions. To explain and understand the relationship between child development, affect regulation and parent-child interaction requires theories that can provide a framework that integrates children's emotional development in the context of human relationships, like attachment and object relations theory.

4.3.2 Object Relations and Attachment Theory

Children's emotional development and behaviour is embedded in the social context of the family. More specifically, the child's everyday experience exists in the context of family relationships and the quality of the child's early interactions. It is these experiences that shape the child's personality structure and influence the way in which the environment is experienced (Fonagy et al., 2002). All parenting encompasses parent-child relations and these relations have been viewed through the lens of different psychological theories, such as 'object relations', 'attachment' and 'social learning'. These theories relate to aspects in the parent-child relationship, from processes within the parent to more observable parts in the parent-child interaction. The internal emotional life of both parents and children, and the interaction that occurs between this dyad, impact on the developing child. Object relations theory provides a valuable perspective in understanding maternal and child emotional factors, which can be applied to the area of paediatric chronic pain. Object relations theory proposes that early relationships influence the child's mental structure and the ability to understand the mental states in others and the self.

The theoretical perspective of object relations in the 1950's considered the relationship between infant and caregiver as a critical factor in establishing the child's internal affect regulation and ability to understand and tolerate emotions. Specifically, the quality of this relationship determined if the child could create an internalised, self-soothing other to help tolerate and understand emotional distress. Contributions from Winnicott (1965), Krystal (1988), and Bion (1962) provided valuable information on the role of this early relationship. Object relations theory sees the child as a personal sphere, which develops and exists within the context of a relationship. Object relations theory holds that humans are basically social beings, existing in the dual world of internal and external relationships and these social relationships influence an individual's adaptation throughout the lifespan

(Gomez, 1998). While Freud explored the mind-body relationship and pathological outcomes of conflicts, object-relations considered the relationship between infant and caregiver as a critical determinant in the child's ability to regulate affects (Schumacher-Finell, 1997).

There is a large body of literature that describes the early parent-child relationship and the level of responsiveness and attunement of mothers to their children (Bion, 1962; Fonagy, 2001; Winnicot, 1971). Attachment and object relations theories both emphasise the first years of life and the relationship between the social environment and development (Fonagy, 2001). In addition, both theories have a common focus on maternal sensitivity in the child's psychic development. Attachment theory describes maternal sensitivity in a variety of ways that involve the behaviour or characteristics of the caregiver, that is, global rating of responsiveness, or personality traits of the caregiver. In psychoanalytic formulations sensitivity is considered in terms of its consequences or organising impact on the child's self-development (Fonagy, 2001). The Kleinian perspective of sensitive caregiving is of a parent who is capable of absorbing and transmitting the infant's psychological experience in a metabolised form (Bion, 1962). The infant then reinternalises what has been transformed and creates an internal representation of these moments of containment by the caregiver. Both attachment and psychoanalytic theories propose that mothers who are sensitive to their children's distress or emotional cues help the child to maintain an optimum level of arousal and influence the development of emotional regulation.

From a developmental perspective, the infant's first challenge is to achieve internal homeostasis (Schor, 2003). At this early stage of the child's development, parents act as the external regulators of the child's emotions, directly influencing the basic functions of the infant. When emotional connections are disturbed through poor parenting or insecure attachments, emotional development may be impaired resulting in emotional dysregulation. Emotional dysregulation may then interfere with cognitive, emotional and social processes, for example attention, self-esteem and social relationships (Kostiuk & Fouts, 2002). It is the repeated processes of 'empathic attunement' and responsiveness of the primary caregiver to the child's emotions that have a major impact on the child's developing self and capacity to regulate emotions. Siegel defines attunement as the 'alignment of states of mind in moments of engagement, during which affect is communicated with facial

expression, vocalisation, body gestures and eye contact' (1999, p70). For parents to be in tune with their child's emotions does not imply just attending to the categorical affect the child may be displaying but the subtle changes in the child's state of arousal. The child's experience of expressing their emotional state and having their primary caregiver perceive and respond to these signals is emotionally containing for the child (Fonagy, 2001).

Healthy attunement involves the parent's sensitivity to the child's signals, involving disengagement and re-engagement depending on the level of arousal and emotional state of the child. This allows the child to be able to utilise this attachment figure to regulate their affect. Ainsworth describes this as 'maternal attunement', whereby a sensitive and responsive parent is necessary for the child to develop into a truly social being (Cassidy & Shaver, 1999). Winnicott also proposed that the mother's ability to tune into her baby was central to every aspect of psychological development and that misattunement between the dyad can impact on the attachment bond (Winnicott, 1965). The parent must be an active agent in helping the child shift from hyperaroused distress states to re-establishing positive affect. Through this process the child begins to understand their intrapsychic experiences and identify emotional experiences without becoming overwhelmed or dysregulated by their physiology. When a child experiences persisting pain the parent is the central agent in helping the child to manage pain, reduced functioning and emotional distress. Hence, it is important to explore maternal emotional regulation and distress as significant factors associated with children's emotional distress, functioning and somatic symptoms in children and adolescents experiencing chronic pain.

The psychoanalyst Bion also wrote about the regulatory and holding function of primary caregivers. Bion conceptualised the early relationship, between mother and child, whereby the function of the mother is to serve as a container for the child's primitive sensations and emotions. Sensitive caregiving would be a parent capable of holding the child's emotional experience, giving meaning to the child's experience and conveying it back to the infant in a way that is both tolerable and meaningful for the infant. Hence, the parent absorbs and transmits the infant's psychological experience. One potential difficulty that may arise between this dyad is if the mother herself is not able to tolerate her own emotions and 'transform the intolerable' for the child (Isaacs-Elmhirst, 1980).

Winnicott (1965) described the concept of the 'holding mother' as a mother who can securely hold the child. If the mother is unable to hold the child's emotions this may then lay the foundation for a lack of basic trust and unthinkable anxieties, such as dread and annihilation. In this situation the mother cannot respond creatively to the child's emotional distress and unknowingly may need to rid herself of the distressing emotions she has encountered. This response or reaction by parents interferes with the child's emotional development and the capacity to understand the cause and effect of emotions (Isaacs-Elmhirst, 1980). These theories can be applied to the area of paediatric chronic pain whereby mothers need to be able to bear the emotional distress of seeing their child in persisting pain and not being able to alleviate their child's pain. If a parent has not been able to act as a container for the child's feelings, the child's tolerance for discomfort and emotional distress may be compromised. Furthermore, this situation may cause the child's distress to escalate. The relationship between maternal containment and child distress can be understood from the theoretical perspectives of Winnicott.

Children continue to learn throughout their development to be able to identify, distinguish, label emotions, and be the bearer and container of feelings. Winnicott (1965) describes sensitive caregiving through the mirror role of the mother: Winnicott proposed that when the baby looks at the mother, who is reflecting back the baby's state, what the baby sees is the mothers' expression of the baby's own self-state (Fonagy, 2001). However, when the mother cannot tolerate the baby's distress and act as a container, the mother may either mirror an escalation of the baby's distress or her defense to ward off these intolerable feelings. Hence, the opportunity for the child to internalise a representation of their mental state is decreased and the child may internalise the mother's distress. This impacts on the child's secure attachment and ability to symbolise, or think about their internal state, ultimately impacting on the development of affect regulation. Hence the mother's distress spills over onto the child and, in contrast to containing the child's emotions, may unintentionally intensify their distress. When a mother is unable to tolerate seeing her child in persisting pain, she may experience anxiety, fear or even guilt. Hence, the child is unable to use the mother as a container for feelings of distress. In fact, the mother's distress may increase the child's anxiety, fear and pain behaviour.

John Bowlby's attachment theory also succinctly addresses the importance of intimate relationships throughout an individual's life. 'Attachment' was initially a new departure from object relations theory and was founded on ethology and systems theory (Karen, 1994). Bowlby's and Ainsworth's work on secure and insecure attachment has been strongly supported through research in mother-infant interactions (Cassidy & Shaver, 1999). Attachment theory has an evolutionary and biological basis and places the mother-child bond at the centre of an evolutionary biobehavioural system that keeps children near their mothers and safe from danger (Kozłowska & Henney, 2002). The attachment behaviours of the human infant (e.g., proximity seeking, smiling, clinging) are reciprocated by adult attachment behaviours (touching, holding, soothing), and these responses strengthen the attachment behaviour of the infant towards the adult (Fonagy, 1999). 'Attachment' refers to the relationship between the infant and the primary caregiver and the term attachment has sometimes been confused with the term 'bonding', which describes the one sided parent's experience of their new infant (Cassidy & Shaver, 1999). Essentially, attachment theory specifies that optimum development for a child is ensured by having reliable care and support from adults around them. Therefore, when the infant cries or smiles the caregiver responds with warmth and consistency. Some researchers classify attachments as secure or insecure (Bowlby, 1969).

Children who have secure attachments have experienced consistent responsiveness and have learnt from their primary caregiver that modulated emotional expression has positive outcomes (Karen, 1994). When the caregiving environment does not include open and flexible emotional communication, infants learn that certain emotions are more acceptable than others. In such circumstances, infants tailor behaviour, cognitions and perceptions to adapt to their caregiving environment to maintain physical proximity and psychological closeness. This type of adaptation is particularly apparent in caregiver contexts in which emotional expression is either suppressed or heightened. Deficient caregiving results in insecure attachment patterns and impeded effective emotional regulation skills. Attachment researchers have classified attachment patterns or styles related to the way the parent and child interact. Studies have found that an insecure-avoidant pattern is associated with maternal insensitivity to infant cues, specifically rejection of the child's proximity seeking, and the insecure-ambivalent attachment style is associated with unpredictable maternal responsiveness.

Research on attachment styles in childhood have indicated that the sensitivity and responsiveness of the primary caregiver to the child's emotional states is one of the determinants of the way the child learns to regulate distressing emotions and of the different strategies used by the child to regulate arousal during interactions and separations from their parents (Fonagy, 2001). Attachment styles have been viewed as reflecting strategies for regulating emotions in interpersonal relationships (Fonagy, 2001). Insecure attachment patterns have been found to be associated with deficits in the ability to self-regulate anxiety, depression and other negative affects (Bowlby, 1969; Shamir-Essakow, Ungerer, & Rapee, 2005; Warren, Huston, Egeland, & Sroufe, 1997). Infants who experience consistent insensitivity in response to their distress cues feel rejected, angry, unworthy of attention and ashamed (Schore, 2003). Emotionally distressing feelings are easily aroused in insecurely attached children compared to securely attached children, since few strategies for dealing with heightened arousal are available to them. Insecurely attached children show deficits in emotion regulation in comparison to those who are securely attached (Cassidy & Shaver, 1999).

Attachment may be a significant factor for children experiencing pain. In times of stress and illness, children and adolescents seek some form of proximity (physical or emotional) with specific others, who are perceived as protective or comforting, so their physiological disequilibrium can be restored (Wood, Klebba, & Miller, 2000). Schore (1994) suggested that contact with a supportive other literally tranquillises the nervous system, rendering the individual less reactive in stressful situations. Therefore, the maintenance of proximity to a caregiver in times of stress is an innate affect regulation device. However, if a parent is emotionally distressed they will not be able to contain or regulate the child's emotions. For example, parental anxiety can interfere with the parent's ability to attune to the child's needs (Odegard, 2005). Hence, it is important to investigate the relationship between maternal emotions and children experiencing chronic pain. For a child who already has an insecure attachment maternal distress may further increase the child's level of emotional distress, and hence increase the child's proximity seeking of the parent. Byng-Hall (1997) suggests that physical proximity does not equate to a healthy parent-child interaction due to factors related to emotional enmeshment and lack of self-other differentiation. For example, looking after a child may become all-consuming for parents and may provide a justification

for maintaining a close bond to the child. In this circumstance it may be difficult for the child to get better, and for both parent and child to relinquish this closeness.

Little has been written on attachment in paediatric chronic pain despite attachment theory proposing that under conditions of physical distress or pain these attachment behaviours may be elicited. Children develop expectancies or working models about their parents' availability to fulfil the roles of protector, provider and emotional regulator. These working models influence how emotions are regulated in times of stress for the child. Therefore, attachment style tends to be intergenerational due to parents differing in their ability to communicate, perceive, and respond to emotional cues, based on their own attachment experiences (Wood et al., 2000).

An insecure attachment pattern may develop due to the mothers' own difficulties in their attachment relationship with their mothers. Parents' own attachment histories serve as strong predictors of children's externalising and internalising disorders (Cowan, Cowan, Cohan, & Pearson, 1996). Furthermore, the attachment relationship appears to play an important role in the development of anxiety disorders in children and adolescents (Warren et al., 1997). Ciechanowski, Walker, Katon and Russo (2002) found an insecure attachment style in adult chronic pain was an important factor in predicting symptom perception, health care utilisation, depression and catastrophising. Ciechanowski, Sullivan, Jensen & Romano's (2003) research also supported these findings for adults with chronic pain. Results indicated that securely attached individuals reported less distress on a total measure of pain. The results of these studies suggest that the early environment and interactions with caregivers have a significant influence on patients' level of emotional distress and symptom reporting. Hence, under stressful conditions such as ongoing pain both the child's and mothers' ability to regulate emotions are hypothesised to be important factors influencing children's functional outcomes. Thus, it is hypothesised that maternal emotional regulation will be associated with children's level of emotional distress

In Von Baeyer and Spagrud's (2003) review of social development and pain in children some important questions are raised regarding attachment in paediatric pain. Firstly, what is the effect of painful experience on attachment, and, secondly, what is the influence of secure and insecure attachment on a child's reaction to pain? Von Baeyer and Spagrud

(2003) suggest that insecurely attached children would respond to pain in a less organised manner making optimal caregiving difficult, and furthermore, painful experiences in childhood may disrupt attachment. Additionally, Von Baeyer and Spagrud (2003) state that the repeated activation of attachment processes in adolescents may encourage dependency and disability. Marvin (1992) proposed one possible developmental pathway for chronic pain in children and adolescents was due to the result of an earlier disorder of child-parent attachment, followed by a crisis of transition during the identified patient's adolescence. This illustrates the importance of considering attachment and the developmental processes of children and adolescents who are experiencing pain. Attachment considers maternal sensitivity and attunement to children's emotions, and purports possible difficulties as a consequence of disrupted attachments. Attachment is not being investigated in this research, however this theoretical perspective highlights the importance of emotional regulation in interpersonal relationships, the interaction between mother and child, how maternal emotional regulation can influence children's later development of mood disorders (Schore, 2003).

In summary, the development of affect regulation is influenced by parents' own ability to regulate emotions, and attunement to the child's emotional experience. The sharing of emotions assists the development of affects and regulating capacities, long before language development takes place in the child. Early in life the caregiver 'mirrors' the infant's affective expressions, and through experience the child comes to understand the links between situation and feeling states. If the parent is misattuned to the child, the child's affect development and attachment style may be disrupted. Hence, object-relations and attachment theory highlight the quality of the parent-child relationship as a determining factor in the child's development of affect regulation. These theories help to understand the importance of mother-child interaction in paediatric chronic pain and how the quality of the caregiver relationship plays a role in influencing the child's emotional regulation and subsequent stress regulatory systems (Fonagy, 1998). Gottman et al. (1996) presented a theoretical model of parental meta-emotions and children's development. In this model Gottman et al. (1996) argue that meta-emotion is related to the inhibition of parental negative affect and the promotion of positive parenting, directly affects children's regulatory physiology and this in turn affects children's ability to regulate emotions. This

next section describes the notion of meta-emotion and reviews the research conducted using this semi-structured interview.

4.4 Meta-emotion

Gottman et al (1997) define meta-emotion as an organised set of emotions and cognitions about own's own emotions and those of others that effect the capacity for emotional regulation. Thus a meta-emotion structure is an organised set of feelings and concepts about feelings. Katz and Gottman (1991) developed the meta-emotion interview capturing parents' philosophies regarding emotions: for example some parents may believe negative emotions are bad and should be controlled and not expressed. Therefore, the way these parents respond to children's displays of emotions may be met with minimisation, ignoring or denying the child's experience of the emotion. What these parental behaviours in fact teach the child is that these emotions are socially not acceptable to express. The child may then suppress these emotions, which has a psychological cost. The child's level of arousal subsequently impacts on the child's experience and expression of emotion, the processing of information and how the child regulates their emotion. The meta-emotion interview was constructed to tap into parents' feelings and thoughts about emotions, paralleling meta-cognition. The construct meta-emotion specifically assessed parents' awareness of their own and their child's specific emotions, their awareness and acceptance of these emotions, and the coaching of these emotions in their child. Although Gottman et al. (1997) do not make reference to parents' reflective functioning, it is proposed that what the meta-emotion interview (MEI) is also assessing is parent's reflective capacity to think about their own and their child's emotional experiences. Thus the MEI involves parent's perspective taking and level of awareness of their own and their child's emotions.

Empirical studies using the meta-emotion interview have tended to focus on parental emotion coaching and awareness of their own, and their child's emotions (Katz & Windecker-Nelson, 2004; Ramsden & Hubbard, 2002). The meta-emotion interview also assesses 'parent acceptance' of their own and their child's emotions, (assessing emotion

expression and regulation) and also ‘emotional regulation’, (assessing parent’s ability to regulate affects, and parent’s perception of their child’s ability to regulate affects). Studies have tended not to focus on the emotional regulation aspect of the interview. There appears to be no rationale as to why this aspect of the interview is not included in Gottman et al. (1996) theoretical model, although much of their theory draws upon parents’ ability to regulate affects. Instead emotion coaching was emphasised in the theoretical model to determine its association with child outcomes variables (for example, peer relation, academic achievement). Emotion coaching of children is based on five main strategies: parents are aware of low intensity emotions in themselves and in their children; they view the child’s negative emotion as an opportunity for intimacy or teaching; they validate their child’s emotion, assist the child in verbally labelling the emotion, problem solve with the child, and discuss goals and strategies for dealing with the situation that led to the negative emotion. Gottman proposed that parents who were more comfortable with emotions would be better able to regulate emotions in themselves and in their children.

Gottman et al. (1996) presented a theoretical model of parental meta-emotions and children’s development. In this model Gottman et al. (1996) argue that meta-emotion philosophy is related to the inhibition of parental negative affect and the promotion of positive parenting. Secondly, meta-emotion directly affects children’s regulatory physiology and this in turn affects children’s ability to regulate emotions. In the Gottman et al. (1996) study parent emotion coaching was directly and significantly related to child achievement, peer relations, child health and physiology, suggesting that parents may be able to influence a child’s physiology by emotion coaching. In addition, this model showed a direct link between child physiology and child illness. Gottman et al. were particularly interested in how parental emotional coaching affects the child’s regulatory physiology (Katz & Gottman, 1991). One reason proposed for this relationship was that the importance of talking about negative emotions while experiencing the emotion may actually produce a soothing effect for the child and may change some aspects of the child’s parasympathetic nervous system. Furthermore, Gottman et al. findings suggested that parents who were more accepting of their children’s emotions, and who helped their children to deal effectively with distress were more likely to have children with higher levels of emotional regulation and social competence.

Gottman et al (1996) were particularly interested in drawing together theories of behaviour and physiology. The meta-emotion research highlights the importance of the following factors: (a) the development of children's abilities in the regulation of emotion, and (b) the development of children's abilities to self-soothe strong and potentially disruptive emotional states, focus attention, and organise themselves for coordinated action in the service of some goal. In addition to this, these abilities in regulating emotions are also proposed to be associated with social competencies (as measured by the Cowan Adaptive Behaviour Inventory (CABI), negative peer scale, CABI antisocial scale, and the DODGE Peer Aggression scale), academic achievement (measured by mathematics and reading comprehension scores), and ability to focus attention. Fundamental to these social skills is the ability to soothe one's self physiologically and to focus attention and to know about the world of emotions, their own and others. The application of meta-emotion to children and adolescents with chronic pain is highly relevant due to the following points. Firstly, meta-emotion as a theory integrates emotion, physiology and parent-child interactions, which are central elements of this research project. Secondly, chronic pain provides a situation in which both parents and children need to be able to regulate high levels of arousal. In particular, parents must be able to tolerate their own levels of personal distress in order to be able to help their child. Studies using the meta-emotion interview have tended to focus on the emotion coaching component of the interview. However, the focus of this work is to investigate the emotional regulation component of the meta-emotion interview and its relationship with children's functional outcomes. It is hypothesised that emotional regulation influences awareness, acceptance and coaching of emotions, hence, it is anticipated that these factors will be highly correlated. There are several similarities between meta-emotion and reflective functioning, they both describe the 1) awareness of emotions in one self and in the other, 2) acceptance of these emotions, identifying and tolerating these feelings in the self and other and 3) ability to reflect upon the experiences of others, 4) reflecting upon one's own ability to regulate emotions.

Gottman et al. (1996) make the assumption that emotion coaching in parents, (high coaching and awareness) is a reflection of parents' ability to regulate emotions. This research, as suggested, is particularly interested in the emotional regulation aspect of the interview, and in order for parents to be able to emotionally coach their children it is proposed that parents need to be able to regulate their own emotions. It is hypothesised that

parents who have difficulties regulating emotions will have greater difficulty being aware of their child's emotions, helping the child to understand the emotion and label their experience. Katz and Windecker-Nelson (2004) supported this hypothesis in a study investigating the differences in awareness and coaching between mothers of children of non-conduct and conduct disorder children. Results indicated that mothers of conduct problem children were less aware of their own emotions and engaged in less emotion coaching with their children than the mothers of children without conduct problems. Hence, in the context of pain, parental regulation is hypothesised to directly impact on children's anxiety and depression, which is linked with the child's chronic pain experience.

Ramsden & Hubbard's (2002) study of 120 fourth grade students and their mothers applied the meta-emotion interview to examine the relations between positive and negative family expressiveness and parental emotion coaching, to child emotional regulation and child aggression. The study did not use the emotional regulation aspect of the interview, and used only a portion of the interview, the acceptance, awareness and coaching variables on the child-focused section of the interview. Emotional regulation was assessed using teacher and mother ratings to create a latent variable describing regulation across settings. Emotion coaching and family expressiveness were not directly related to child aggression. However, both negative family expressiveness and mother's acceptance (emotional expression in relation to the child) of the child's negative emotions were indirectly related to child aggression and mediated by the child's emotional regulation. Hence, maternal emotions impact on the child's emotional regulation and subsequently the child's level of emotional distress. Expression and acceptance of emotions are components of emotional regulation. This findings support the hypothesis that maternal emotional regulation influences children's emotional distress. According to social learning theory children imitate or model their parents' expression of aggression. In addition, these parents may find these behaviours acceptable in their child. According to object relations theory children have not experienced an attuned and containing parent in response to their emotional distress, or an external regulator of their emotions, impacting on the child's development of an internal regulator of affect.

Affect regulation may include a range of factors: awareness, acceptance, expression, and tolerance of emotions. Research studies have investigated the influence of parents'

expression of emotion and children's development of affect regulation, whereby parental expressed emotions can influence the child's state of physiological arousal and expression of affect (Dunn & Brown, 1994; Eisenberg et al., 1998; Ramsden & Hubbard, 2002). Parental expressiveness is defined as a persistent pattern or style in exhibiting nonverbal and verbal expression that often but not always appears emotion related. This pattern is usually measured in terms of frequency and occurrence (Valiente, Fabes, Eisenberg, & Spinard, 2004). Halberstadt, Crisp and Eaton (1999) hypothesised that children exposed to low levels of expressed emotion have the opportunity to observe their parents managing stress and conflict. This in turn leads to greater understanding and regulation of children's emotions. In addition, Halberstadt et al. (1999) hypothesised high levels of expressed emotion in families heightens children's experience of negative emotions and leads to emotional dysregulation. However, there are additional factors that may mediate the relationship between parental expressed emotion and child outcomes, for example child temperament and age. Hence, findings for parental negative expressed emotion have produced some mixed findings in the research literature. The Valiente et al. (2004) study, which investigated a sample of 94 children, aged between 7-12 years of age found a negative relationship between children's stress and coping. This relationship was reduced when parents, (both mothers and fathers), displayed high levels of positive emotion, or high levels of mothers' negative submissive emotion. Therefore, in some situations low levels of expressed negative affect (crying, sulking, expressing sorrow) may provide opportunities for children to observe and understand information regarding emotional expression and situations. However, high levels of expressed emotion may be emotionally dysregulating for the child and be representative of parents' own difficulties with emotional regulation.

Children whose parents encourage emotional expression have more access to their own emotions. Children come to understand the causes of particular emotions, for example happiness, fear and anger. However, children who are exposed to emotional environments with high levels of anger have been shown to experience heightened aggression, reduced empathy and difficulties coping in general across situations (Denham, Zoller, & Couchoud, 1994). High levels of parental anger are a reflection of difficulties with emotional regulation. Maternal anger has been demonstrated to reduce children's emotional understanding of emotion, impacting on children's social and emotional development (Denham et al., 1994).

Parents who have difficulties regulating their emotions or who engage in emotionally reactive parenting may impact on the child's development and future relationships, which may lead to emotional and behaviour problems in the children. Denham et al. (2000) supported this relationship in a study of 82 children who were at risk for development of disruptive behaviour disorders. Findings suggested that parental anger was most influential as a disorganiser of children's behaviour of those already at risk. Parental negative emotions were considered punishing and dysregulating for the child and impacted on the young children's socioemotional development (Denham et al., 2000). Therefore, high levels of expressed negative emotion act as a barrier to parents' responding effectively to their children's emotions and needs.

Findings from the meta-emotion interview propose that talking about emotions contains the child's emotional experience and impacts on the child's autonomic nervous system. It is the sharing and mirroring of emotions within this early relationship that the child's emotional development is influenced (Winnicott, 1965). Family discussions regarding emotions may not only communicate support from parents but may also heighten children's awareness regarding their own emotional states. Parents who are able to discuss the cause and consequences of emotions help their children to understand their emotional experiences. In addition, children who are able to understand their own emotions tend to have a better understanding of others' emotions.

Maternal discussions with children appear to be related to children's understanding of emotion and their ability to communicate affective experiences. For example, Dunn, Brown and Beardsall (1991) found that discourse about feeling states when children were 33 months predicted children's scores on perspective taking at 40 months old. With the child's development of language in the second and third year of life, the child can then communicate or explain their internal state in order to try and elicit comfort from significant caregivers. Family discussion, or parents talking to their children about their feeling states, with explicit conversations around the cause and consequences of feeling states have all been related to children's understanding of emotions (Dunn et al., 1991). In particular, maternal discourse regarding emotions has been found to be an important predictor of children's emotional understanding and expression in preschoolers (Denham et

al., 1994). The ability to talk or communicate about one's internal state is an important and crucial component of affect regulation. Language development or the ability to talk about emotions is a significant milestone for the child to reflect upon and experience the emotion (Dunn & Brown, 1994). Discourse between mother and child allows for a shared meaning and promotes understanding and emotional development in the child. Research studies have indicated that mothers of children with an anxiety disorder spoke less frequently than their child, used significantly fewer words, and discouraged their children's emotional discussions more than did mothers of nonclinical children (Suveg, Zeman, Flannery-Schroeder, & Cassano, 2005).

The initial themes that are discussed for children aged between 18-24 months and their mothers often centre on pain, distress and fatigue (Denham, 1998). For children to be able to communicate about their emotions is one way in which the child attempts to get their needs met, or at least attended to by parents. Hence, communicating distress in the early years for the child is conveyed through the child's physical discomfort in their body. Talking about feelings with an attuned caregiver helps the child understand their internal world and may alleviate any distressing feelings. If children have a limited capacity for understanding and communicating their internal experiences, the child may still focus on fatigue and pain to communicate emotional distress to parents. In addition, talking about feelings helps the child to become more aware of their emotional experiences. However, if parents have their own difficulties tolerating emotions, it may be hard for the parent to then tolerate their child's negative emotions, impeding the child's emotional development. In the child development literature, Fabes et al (2001) highlighted the understanding of parental emotional regulation as an important first step in answering questions regarding the development of emotional regulation, and by what mechanisms children learn to regulate their emotions.

CHAPTER 5 EMOTIONAL REGULATION AND CHRONIC PAIN

5.1 Lowered Pain Threshold and Emotional Distress

Researchers are proposing that the autonomic nervous system is central to the abnormal psychophysiological patterns contributing to the development of chronic pain. It is therefore important to give a brief description of the autonomic nervous system (ANS) (Geertzen et al., 1998; Zautra et al., 1999; Zeltzer et al., 1997). The ANS is comprised of a network of nerve cells that plays a large part in maintaining internal homeostasis by causing contraction of smooth muscles and influencing the function of heart and glands, and in influencing the level of arousal in response to emotional states. The ANS is responsible for the day-to-day vegetative functions of the body, but also prepares the body for the changes needed to face stressful situations. There are many somatic functions that are generated by increased activity of the autonomic nervous system, and these include, sweating, smooth muscle contractions, headaches, muscle pain, and fatigue. The sympathetic nervous system can play a role in nociception and is called Sympathetically Maintained Pain (SMP), whereby altered functioning of the nervous system contributes to a painful hypersensitivity in an affected area of the body, which is seen in the condition complex regional pain syndrome (Chapman, Nakamura, & Flores, 1999). Abnormal skin colour, temperature change, abnormal sudomotor activity and oedema accompany this type of pain and may occur with or without a definable nerve injury. Any stimulus that activates the sympathetic nervous system, even emotion-eliciting, can provoke severe pain (Chapman et al., 1999).

Anxiety, depression, and other negative psychological factors (loss of control, unpredictability associated with pain) all can function as stressors. Individuals have a unique response pattern to stress, based on their temperament and ability to regulate emotions; both these factors will be investigated in this research. Hence, high emotional regulation may attenuate the ANS arousal and may be modulated by pain management

interventions, thus influencing an individual's pain perception. Flor et al. (1997) proposes that if individuals encounter a high number of stressful situations and are unable to reduce the over activation of their physiological system it may become dysregulated. In these circumstances it has been hypothesised that prolonged arousal of the autonomic nervous system may generate and perpetuate pain through increased perceptual sensitivity, with a corresponding reduced pain threshold, where pain signalling becomes abnormal and the brain continues to receive pain signals (Flor et al., 1992; Gamsa, 1994; Zeltzer & Schlank, 2005). Therefore, when an individual experiences ongoing stress, this may lead to psychophysiological disorders or a somatic presentation through dysregulation of the autonomic nervous system (Flor et al., 1992; Flor et al., 1999; Flor et al., 1997; Imbierowicz & Egle, 2003; Kashikar-Zuck et al., 2000).

5.2 Hypervigilance to Pain and Emotional Regulation

It is argued that chronic pain patients are overly sensitive to painful stimuli as well as non-painful stimuli (Flor et al., 1992; Flor et al., 1999). The heightened perceptual sensitivity experienced by chronic pain patients is hypothesised to be a consequence of hypervigilance, threat and ANS arousal experienced by these patients (Crombez et al., 2004). There are several components that are involved in attending to pain i) the continuous scanning for or monitoring of somatosensory information, ii) the automatic attentional shift towards pain, and iii) attention dwelling on pain and difficulty disengaging from it (Crombez et al., 2004). Peters, Vlaeyen and Van Druden's (2000) study operationalised hypervigilance as the faster detection of weak somatosensory information under varying conditions of attention and found no evidence for hypervigilance to somatosensory information for adult patients with fibromyalgia. Alternatively, Crombez et al. defined hypervigilance to pain as a strong inclination to attend to pain at the expense of other environmental information and results from perceiving pain as a threat. Using this definition and in contrast to the Peters et al., (2000) study Crombez et al. study found that patients with fibromyalgia reported more vigilance to pain than chronic back pain patients. Furthermore, vigilance to pain was associated with pain intensity, negative affectivity and

catastrophic thinking about pain. The correlation between negative affectivity and hypervigilance to pain in Crombez et al. (2004) study suggests that there may be a significant relationship between hypervigilance to pain and emotional regulation. Supporting this hypothesis is the findings of Goubert, Crombez and Damme's (2004) study which investigated the relationship between neuroticism and vigilance to pain and found that the effect of neuroticism upon pain vigilance was mediated by pain related fear and catastrophising. Hence, neuroticism was proposed to lower the threshold at which pain was perceived as threatening and at which pain elicits catastrophic thoughts. Thus, it could be argued from this literature that there is a relationship between negative affectivity and attentional processes.

Studies of normative development suggest that attention modulation is a primary regulatory process (Shields & Cicchetti, 1998). Attention and emotion appear to be mutually influencing systems with attention modulation taking an increasingly significant regulatory function as children develop affect effortful control in middle childhood (Shields & Cicchetti, 1998). Hence, as children acquire higher levels of attentional control they can flexibly shift and disengage attention in the service of positive affect regulation, promoting adaptive coping with negative experiences like persisting pain. Zeltzer et al. (1997) proposed that children suffering from pain with poor attentional regulation would experience more pain and distress as their attention will be focused on the pain. Focusing on pain is related to increased pain sensitivity and pain-related distress (Boyer et al., 2005). Chronic widespread pain not only affects self-monitoring mechanisms but also tactile thresholds (Karst et al., 2005)

Once the individual develops a heightened level of perceptual sensitivity and experiences of pain sensations, pain related memories could easily trigger physiological pain responses. A chronic pain cycle often develops due to individuals associating increases of pain with all kinds of stimuli that were originally not associated with nociception. Often the patient enters into a vicious pain cycle between the mind and body where the perceptions of the pain contribute to increased stress, leading to increased tension, frustration and fear which can influence an increase in the experience of the pain, which leads to more distress and so

on. The goal of pain management in part then is to interrupt this cycle and to optimize pain control and enhance psychological well-being (Gatchel & Turk, 1999).

This type of learning is called ‘respondent’, or ‘classical conditioning’ (Turk, 1996). If an acute injury progresses to persistent pain, the individual may avoid an increasing number of situations and develop fear-avoidance associated with pain. Pain may then be exacerbated by conditioned fear of movement leading to avoidance of activity and immobilisation. In this example the avoidance of physical activity and the increased anticipatory anxiety or fear of movement due to pain is one example of classical conditioning (Flor et al., 1985). This vicious cycle of fear of pain, and avoidance behaviour, leads to physical deconditioning (e.g., muscular atrophy, muscle tightness, weight gain, decreased mobility), whereby decreased activity maintains the pain experience and fuels the cycle to continue (Muris, Vlaeyen, & Meesters, 2001). Therefore, avoidance behaviour that occurs after the injured tissue had healed is viewed as a maladaptive response that contributes to disability (Asmundson et al., 1999).

Therefore in chronic pain, stimuli associated with the experience of pain are proposed to excite pain related cells and create a painful experience, even in the absence of painful stimulation from the periphery (Flor et al., 1997). It is important to note that the initial heightened level of perceptual sensitivity is proposed to be due to increased arousal of the ANS. Hence, emotions and the ability to regulate levels of physiological arousal are proposed to be important in both the aetiology and maintenance of paediatric chronic pain and will be investigated in this research. The level of physiological arousal, and difficulties in regulating emotions are proposed to have a significant impact on children’s chronic pain syndromes due to ongoing activation of the ANS and allostasis.

Although the literature has proposed that the dysregulation of the autonomic nervous system may be responsible for both the genesis and maintenance of chronic pain there appears to be little empirical research supporting these claims in the paediatric literature. In addition, if these assumptions are accurate, one could predict that if children and adolescents had difficulties regulating their emotions they would have difficulties with regulating arousal of the ANS, and this may perhaps influence the development and

maintenance of chronic pain conditions. Hence, when a child encounters a high number of stressful situations it may then be difficult to reduce overactivation of the ANS in these situations. The affected physiological system may become dysregulated and homeostatic failure may occur. Furthermore, this level of physiological arousal may impact on pain sensitivity, whereby pain is then registered at a lower threshold prior to the onset of chronic pain (Zeltzer et al., 1997). Studies have demonstrated that chronic pain patients experience greater pain sensitivity compared to healthy controls, due to this lowered pain threshold (Bruehl et al., 1999; Flor et al., 1997). Consequently, even light touch/ pressure (allodynia) can cause pain. It is important to remember that chronic pain is often not indicating damage or pathology in the tissues being touched or moved, despite the individual feeling the sensation of pain; the experience of pain reflects a lowered pain threshold (Hodgkiss, 1997).

5.2 Pain Sensitive Temperament

The last section discussed how negative emotional states can lead to over activation of the ANS. Increases in perceptual sensitivity and physiological arousal reduce the threshold for pain and can exacerbate the pain condition leading to functional disability. Therefore, increased levels of arousal may act as both a precipitant and a perpetuating factor in chronic pain conditions. Perceptual sensitivity is one factor that makes up a child's pain sensitive temperament. Children exhibit individual differences in pain sensitivity and tolerance. These individual differences are thought to result from differences in children's temperament (Thomas & Chess, 1977). Additional factors that measure a child's pain sensitive are the reporting of symptoms, avoidance of sensations and pain tolerance. The relationship between children's emotional distress and pain sensitivity are discussed in this section. In addition, the association between affect regulation and perceptual sensitivity and avoidance of sensation will be outlined following a description of children's pain sensitive temperament.

Thomas and Chess (1977) introduced nine features of temperament: activity, rhythmicity, approach/withdrawal, sensory threshold, intensity of reaction, quality of mood,

distractibility, and attention span/persistence, and adaptability. Although there are many features of temperament, every framework that describes temperament includes a dimension of intensity, distress and emotionality. Rothbart's (1981) model of temperament proposes two basic dimensions that interact with one another; emotional and attentional reactivity and the child's self-regulatory abilities to meet the demands of the environment. The emotional reactivity of children in response to stress or pain, or the child's ability to deal with discomfort or distress is highly significant to the sequelae of pain. Observations in a newborn nursery reveal individual innate differences in children. However, temperament is not only innate but is the result of an interactive process reinforced by parent interaction. The interaction between temperament and parents is bi-directional, whereby a child's temperament may evoke differing parenting responses from parents, and parents may need to modify their parenting due to a child's temperament. As previously discussed, the development of a child's ability to regulate emotion is greatly influenced by the social environment, and particularly the role of parents (Dawson et al., 1994).

Emotional regulation varies from person to person based on development, experience and temperament, which is the inborn characteristics of the child, for example, the child's sensitivity to the environment and intensity of emotional responses. The underlying structures that make up differences in child temperament are emotional, rather than cognitive and are viewed as a psychobiological measurement of stress reactivity (Boyce et al., 1992; Lewis, 1992). Temperament has been defined as constitutionally based individual differences in emotional, attentional reactivity and self-regulation, influenced over time and experience (Boyce et al., 1992). An example of how children vary in their sensitivity is children's differing approaches to novel situations, whereby some children experience emotional and cognitive distress. Apley (1975) found children who experience recurrent abdominal pain to be either highly strung, fussy and excitable or anxious, timid and apprehensive. It has also been hypothesised that abdominal pain represents a symptom between a vulnerable temperament style and environmental stressors (Davidson, 1986). Although temperament is genetically determined it is constantly evolving and is influenced through interactions and experience. Fonagy et al. (2002) argues that it is the "manner in which the environment is experienced that acts as a filter in the expression of genotype and phenotype" (p. 7). Hence, the intrapsychic factors within the child (which develop in the

context of parent-child relationships) moderate the effects of the environment upon the unfolding genetics.

Linking emotion, temperament and 'child health' Kagan, Reznick and Snidman (1988) examined the relationship between temperament and health proposing that inhibited children have a lower threshold for sympathetic activation. To test this hypothesis Chung et al. (1993) investigated the relationship between temperament and symptoms of illness in primary school aged children. In a small sample size of sixteen, analysis of health complaint diaries completed over a four-week period concluded shy children complained of feeling unwell (and parents observed these symptoms), on more days in comparison to a matched control group of non-shy children. In addition to this, shy children made more affective complaints (sadness, loss of appetite, irritability and insomnia) and were observed to experience gastrointestinal upset. Observation and clinical research suggests that young people who develop a chronic pain condition are described as internalisers (versus externalisers) which means these children experience more anxiety and inhibition (Haug, Mykletun, & Dahl, 2004; Langeveld et al., 1999; Meesters, Muris, Ghys, Reumernan, & Rooijmans, 2003).

A diathesis-stress model proposes that some stressors might provoke chronic pain in more vulnerable individuals. Chapter three discussed emotional distress as a significant factor in several chronic pain conditions linking the psychophysiological response of stress and anxiety to the ANS and the development of somatic complaints. A diathesis-stress model of temperament and chronic pain gives consideration to a multifactorial psychobiological perspective that considers the interplay between physiological and psychological factors. The theory contains the following aspects: (1) a physiological diathesis (disposition for a pathological reaction), (2) external or internal aversive stimuli (e.g., stressors) which cause reactions in the sympathetic nervous system and the nociceptive system, activating muscular processes (Frischenschlager & Pucher, 2002). Individual differences exist in terms of sensitivity and reactivity to environmental stimuli (i.e. the threshold for arousal of the autonomic nervous system which can influence pain perception and tolerance) (Zeltzer et al., 1997). In addition, stressors such as family conflict, or transition to high school may precipitate a chronic pain condition in children who are more emotionally and

physiologically sensitive. Furthermore, not only stressful life events but pain itself can become a stressor, maintaining or exacerbating the pain problem.

Of particular interest is the aspect of temperament that is related to physiologic responses to environmental stress, which may set in motion the pathophysiologic events that lead to disease processes (Boyce et al., 1992). Sensory threshold reflects sensitivity to stimulation and may be important in self-regulation. It has been suggested that the observable or behavioural aspects of child temperament are related to underlying patterns of physiological responses to internal and external stress. For example, temperament characteristics of aggression or inhibition are related to autonomic reactivity in children (Boyce et al., 1992). Lewis (1992) provides a model of autonomic reactivity of the nervous system: threshold (i.e., the intensity of the stimulus required to elicit a response), dampening (i.e., the return to baseline following a stimulus) and reactivation (i.e., the predisposition to re-arousal with repeated stimulation). Lewis (1992) claims that these three features of the nervous system make up the underlying processes, which are related to the nine features of temperament. Therefore, children differ in the amount of stimulation necessary to produce positive or negative responses. Temperament is always expressed in responses to an external stimulus and is constantly evolving through experience and parental influences. The child's developing ability to regulate emotions is also a central factor for the dampening of arousal once a response has been elicited. An individual may have a particular temperament predisposing them to potentially nonadaptive stress responses or high levels of emotional distress.

Variations in temperament have been related to pain responses for children undergoing procedures (Bournaki, 1997; Broome, Rehwaldt, & Fogg, 1998; Lee & White-Traut, 1996). A dimension of temperament is the child's threshold, or minimum intensity of a stimulus in order for a child to react (Von Baeyer & Spagrud, 2003). Children with low thresholds are more sensitive to pain and experience greater levels of emotional distress (Chen et al., 2000). However, the relationship between a child's pain sensitive temperament and chronic pain is largely under investigated. Literature suggests both children's temperament and parental characteristics influence a child's response to pain (Broome et al., 1998; Grunau, 2003; Lee & White-Traut, 1996). In terms of assessing a child who has a pain sensitive temperament, researchers have used physiological measures, for example adrenocortical

secretion and changes in the ANS after a stimulus, or other researchers have measured responses to the cold-presser task. Another approach is to administer questionnaires to parents and children assessing different aspects of child temperament and pain responses. The Chen et al. (2000) study was the first to administer the Sensitivity Temperament Inventory for Pain (STIP). The findings of this study demonstrated pain sensitivity to be associated with children's self-reported distress during lumbar punctures. Furthermore, results indicated that children with higher pain sensitivity had parents with greater increases in anxiety over time, suggesting that parental distress may increase a child's pain sensitivity. These findings produced preliminary data on the usefulness of a brief questionnaire (STIP) in paediatric oncology to predict children's distress. This questionnaire has not been used in a chronic pain population to investigate the relationship between children's pain sensitive temperament and emotional regulation and distress, and secondly, the interaction between maternal emotional distress on children's pain sensitivity and emotional regulation. This current research hypothesises that maternal emotions can impact on children's pain sensitive temperaments. Pain sensitive temperament and emotional regulation are influenced by the parent-child relationship through affective mirroring and containment. Furthermore, interactions with caregivers help the child to identify and understand their affective states.

Pain sensitivity is considered a function of temperament, with the most emotionally reactive children exhibiting the greatest responses to pain (Grunau et al., 1994). This is consistent with past research indicating that distress in 5-year old children undergoing immunisation was related to child temperament rather than parent attributes (Schechter et al., 1991). Children who are described as having a pain sensitive temperament experience greater levels of emotional distress in responses to pain and have a lowered threshold for pain tolerance (Chen et al., 2000). Hence, pain sensitivity may be an indicator of children and adolescent's level of emotional distress.

Whilst pain sensitive temperaments have not been widely cited in the paediatric chronic pain literature, the adult chronic pain literature has linked the personality trait 'neuroticism' (one of the big five personality traits as measured by the NEO-PI-R), with emotional distress and pain thresholds (Asghari & Nicholas, 1999). Costa and McCrae proposed that individuals scoring high on neuroticism have the tendency to experience distressing

emotions, and are described as being highly anxious, worried, moody and having a heightened activation of the ANS (Costa and McCrae, 1985). Experimental studies have reported a relationship between high neuroticism in adults and lower pain thresholds, compared to individuals scoring low on neuroticism (Asghari & Nicholas, 1999). Individuals who are high on neuroticism are also likely to be low on emotional regulation. In addition, studies support the relationship between high levels of emotional distress and a lower threshold or tolerance for pain (Lee & White-Traut, 1996; Schechter et al., 1991). Paediatric pain differs considerably from adult chronic pain due to the interactions between children and parents. These interactions influence the child's development of emotional regulation, level of emotional distress and expression of temperament. Therefore, these interactions may be the focus of interventions aimed at increasing mothers' and children's emotional regulation. Hence, these findings emphasise the importance of investigating maternal and child emotional regulation in paediatric chronic pain.

Temperament may determine a caregiver's reactions to the child, and affect how the child interprets and makes sense of life experiences. The ongoing debate regarding nature and nurture and the ways in which a predisposition may unfold across development and the social context is applicable to temperament. A good match between infant and caregiver promotes the child's ability to function within the demands of the environment, without too many impingements that the infant is not yet able to tolerate. Therefore, a situation is promoted where the child is able to regulate and manage brief episodes of discomfort. It is in the context of the caregiver relationship that the child learns to regulate physiological arousal. Hence, a child who has a sensitive temperament and the experience of a caregiver who is not able to respond appropriately to the child's affective states is likely to feel unprotected from unmanageable intensities of emotion (Kraemer & Loader, 1996). The plasticity of both the peripheral and central sensory connections in the developing child means that high levels of distress in infancy and childhood can lead to prolonged structural and functional alterations in pain pathways (Fitzgerald & Beggs, 2001). Adversities early in life can have a profound effect on the developing child's neuropsychological as well as behavioural sequelae (Cicchetti et al., 1991; Fonagy, 1998).

Grunau (2003) outlines that dysregulation as a result of early stress on infants can affect the threshold of pain and emotional reactivity. In addition, Grunau highlights the importance of

caregiver interactions on the development of the child's self-regulatory behaviour, or arousal regulation. Grunau argues that very little is known about particular caregiver factors and their interactions with children, that can contribute to altered outcomes. Grunau (2002) investigated maternal responsiveness and pain response at 8 months of age in low birth weight infants. Results showed that greater maternal responsiveness was associated with a normalised pain response. These results highlight that maternal interactions can influence children's pain sensitivity. Additional findings in a prospective study of low birth weight pre-term infants found that poor maternal sensitivity to child cues in mother-child interaction at age 3 years predicted somatisation scores on children prior to school entry (Grunau et al., 1994). Sensitive caregivers were found to moderate the effects of early exposure to both pain and stress in neonates who have had early exposure to pain. These findings suggest that early interactions with caregivers may alter the expression of pain and temperament in children, and maternal attunement and responsiveness have a significant impact on children's pain tolerance, emotional regulation and somatisation.

In summary, pain sensitivity is considered a function of temperament, with more emotionally reactive children exhibiting more pain behaviours in response to 'everyday pain' (Grunau et al., 1994). There appears to be a relationship between pain sensitivity and emotional reactivity, which is mediated by parental responsiveness to the child. Maternal emotional regulation and maternal emotional distress are therefore proposed to impact on child pain sensitivity, distress and emotional regulation. Thus, the trajectory of pain as either a short-lived episode or a 'pain problem' is dependent on the delicate balance between the child's emotional reactivity and the responses of caregivers that shape the child's ability to self-regulate.

5.3 Perceptual Sensitivity and Avoidance of Sensation

A pain sensitive nervous system includes not only responses to external stimuli but also to internal factors, like feelings. Analysts and therapists have often documented case reports or empirical studies of patients who have generally been afraid of knowing about and experiencing their feelings. If an individual is afraid of experiencing their feelings, then the

feeling cannot operate as a signifier of one's internal state, the feelings cannot be processed, understood or modulated (Krystal, 1988). McGrath (1999) proposes the mechanisms of 'sensitisation' to pain may be biological but they may also be psychological, by means of the child's increased internal awareness of bodily sensation. It has been proposed that causal attributions are of particular importance in paediatric pain because the sensation of pain is influenced by the individual's subjective interpretation of the physiological sensations (Claar & Walker, 1999). This section outlines perceptual sensitivity and avoidance of bodily sensations, as components of children's pain sensitive temperament.

The child's response or reaction to somatic sensations may produce feelings of anxiety and fear. A predispositional tendency that is pertinent to pain perception is anxiety sensitivity (AS). Anxiety sensitivity (AS) refers to the fear of anxiety-related symptoms that are based on beliefs that such sensations have negative somatic, social or psychological consequences, or mean danger. Anxiety sensitivity is a stable psychological dimension that amplifies anxious or fearful responding to a potentially anxiety provoking stimulus. Anxiety sensitivity is based on the individual's perception of bodily sensations that are associated with autonomic arousal and that is associated with health anxiety. This is defined as "health related beliefs and fears based on misinterpretations of bodily signals and signs as being indicative of a serious illness" (Muris et al., 2001). The experience of health anxiety varies from individual to individual and can be conceptualised on a continuum. At one end, the individual experiences little or no concern about body sensations, and at the other, severe or clinically significant health anxiety. The latter is referred to as hypochondriasis and is classified as one of the somatoform disorders. Distinguishing features of severity include the degree of fear, or conviction about having a serious illness, the degree of distress and the interference in functioning. The most commonly reported body sensation is pain. Although AS or health anxiety are not being measured in this research project it is suggested that individuals who have difficulties regulating affect and have a pain sensitive temperament would be susceptible to AS. This is due to the fear and avoidance of sensation, and increased attention to somatic sensations, which are characteristic of individuals who are prone to somatisation. Furthermore, children who have difficulties regulating their emotions are proposed to have difficulties tolerating emotions and associated physiological arousal and therefore tend to avoid physiological sensations. In contrast to avoiding bodily sensations, attending to sensations has a short-term anxiety

reducing effect for health anxious patients (Hadjistavropoulos, Hadjistavropoulos, & Quine, 2000).

Anxiety sensitivity has been investigated in both adults and adolescents experiencing chronic pain as a psychological risk factor for anxiety pathology and chronic pain disorders. Asmundson (1999) has recently proposed that AS may increase the risk of developing high levels of fear of pain, resulting in avoidance behaviour (Zvolensky, Goodie, McNeil, Sperry, & Sorrell, 2001). Children experiencing headaches have been found to be more somatically focused compared to pain free controls. Mikail and Von Baeyer (1990) suggest that an increase in somatic focus may be a reaction to, or a means of coping with, ongoing stress. This finding has been supported in primary school children and adolescents, with data suggesting AS to be a better predictor of fear of pain than trait anxiety (Muris et al., 2001; Muris, Vlaeyen, Meesters, & Vertongen, 2001). As already discussed there is a high degree of comorbidity with chronic pain disorders and anxiety. Specifically, individuals with chronic pain experience higher levels of somatic anxiety and experience heightened attention to bodily sensations. This increased somatosensory attention leads to a higher number of reported non-specific sensations (Peters, Vlaeyen, & Kunnen, 2002). Health anxiety is understood through cognitive behaviour theory as suggesting that individuals misinterpret somatic information as personally threatening. Health anxious individuals not only have a bias to negatively interpret somatic sensations but may be deficient in strategies to protect themselves from health anxiety, and therefore have deficits in emotional regulation (Hadjistavropoulos et al., 2000).

Affect tolerance (not avoidance and fear of body sensations) is necessary for the conscious experience of emotion: the interpretation of feelings. If the feeling cannot be tolerated then the source and meaning of the affect will be lost and a fear of emotions is likely to develop (Krystal, 1988). One of the keys to managing emotions is to recognise if the intensity of the emotion is appropriate to the current event, if however one blocks the physiological sensations in the body then the capacity for reality testing is lost, in addition to using the emotion as an internal cue, reducing self awareness and emotional development, and increasing somatisation and pain.

One hypothesis addressing an underlying commonality among somatic presentations and affect is the amplification and misinterpretation of normal physiological sensations, or muscular aches, which are experienced by everyone. This is commonly seen in affective disorders where the patient develops an increased awareness of, or sensitivity to, physiological arousal however is unaware of the stimulus or emotion, which causes the arousal. Thus, the associated bodily feelings, or sensations are not well understood, or are translated into cognitions or thoughts about the subjective emotional experience and the sensation is regarded as the primary symptom (Krystal, 1988). Therefore, it is not surprising to find children's pain reactivity is a significant predictor of somatisation (Rocha, Prkachin, Beaumont, Hardy, & Zumbo, 2003).

CHAPTER 6 PARENT CHILD INTERACTION AND CHRONIC PAIN

6.1 Theoretical Perspectives

6.1.1 Family Factors

The focus of this research is on the mother-child relationship. Parents are just one component of a larger system, the family. The inclusion of this section in the literature review is considered pertinent to illustrate the influence of others' emotions on the individual's pain. There is a paucity of literature that has addressed the relationship between the emotions of significant others and children's chronic pain. Studies in the family environment of patients with chronic pain describe high levels of emotional distress, emotional distancing, an inability to share feelings, and an intense mutual involvement between family members in the individual's pain (Smith & Friedemann, 1999). How families deal with and express emotions will ultimately influence the way children learn to manage emotions (Minuchin, 1974).

Families in which mothers have chronic pain have described the family as less cohesive, more controlling, less emotionally expressive, and with high levels of conflict (Dura & Beck, 1988). Evidence suggests not only a higher rate of pain among family members but also a congruence of pain symptoms among family members (Craig, 1986; Ehde, Holm, & Metzger, 1990). Furthermore, children of parents with headaches tend to report a greater number of types of pain (Chun, Turner, & Romano, 1993; Mikail & Von Baeyer, 1990). In addition to pain and more somatic complaints in these families, well-controlled studies indicate a significant difference in internalising behaviours between children of parents with headaches compared to children of pain-free parents (Smith & Chambers, 2003). All these aspects of family functioning can be related to difficulties with affect regulation and containment of emotions, so one person's distress is not displaced onto other members of the family, or alternatively where emotions are avoided or cut off from awareness, perhaps

leading to somatic presentations. Differentiation of emotions between family members and between the parent and child systems demonstrates appropriate boundaries in order for the child to develop an individual sense of self, and an understanding of their own thoughts and feelings. Family systems theory extends an understanding of paediatric pain to view pain as not only an individual problem, but also a family style of expressing emotions and relating, and provides a valuable theoretical framework in order to understand the interactional patterns among family members (Minuchin, 1974). Family systems theory considers the family as the primary agent in children's socialisation about health care attitudes and behaviours and consequently a major influence in the way children respond to pain.

Studies indicate that it is not only emotion that is transmitted between family members but also pain (Craig et al., 2004, Mikail & Von Baeyer, 1990). The Walker and Greene (1989) study found somatic complaints and internalising disorders in mothers lead to a greater prevalence of these disorders in their children. Moreover, the prevalence of both internalising disorders and pain in families suggests a relationship between these two factors. The relationship between internalising disorders and persisting pain complaints in both mother and child is often explained in these studies through mothers modelling a preoccupation with somatic complaints and attending to these in their children (Craig, Cox, & Klein, 2002; Craig, Hodson, & Cox, 2004). Modelling influences on children's pain is examined in the section titled 'Learning Theories and Pain'.

Turk, Flor and Rudy's (1987) review of 'Pain and Families' emphasise the transgenerational transmission of family dysfunction in the explanation of the increase in prevalence of chronic pain among families. In the last fifteen years, since the publication of this review article, research has continued to provide evidence on the maintenance or reinforcement of pain behaviour, with social learning theory being the most widely used perspective in understanding paediatric pain (Brace, Smith, McCauley, & Sherry, 2000; Chambers, 2003; Chambers et al., 2002).

Within family systems theory, interactional patterns are emphasised as opposed to the individual's personality variables in the development of psychosomatic disease, postulating that interactional patterns within a family could cause a member to become symptomatic. Specifically, research has linked childhood asthma, diabetes, anorexia nervosa, and

abdominal pain to the level of emotional involvement of family members and the inability of the family unit to express feelings (Minuchin, 1974; Wood, 1994). Minuchin's (1974) theories have been central to the management of families and children who present with psychosomatic symptoms. A number of theoretical preconditions have been proposed in families where the child develops a psychosomatic illness: 1) enmeshment, that is, excessive togetherness in the family with no clear boundaries between generations or subsystems, 2) intergenerational coalitions, rigidity, or a resistance to change, therefore the family operates as a closed system, 3) over protectiveness, whereby family members are highly involved in each other's lives and individual members lack autonomy, 4) a lack of conflict resolution, leaving problems in the family unresolved, and finally, 5) triangulation, referring to a focus on the child or illness which detours family or marital conflict (Turk et al., 1987). These conditions may also be evident in the mother-child relationship making treatment very difficult due to the closed system developed by the parent with the child, and perhaps even with the parent and the medical system.

Although family systems theory highlights the importance of the interactional patterns between family members, it fails to consider the individual system level, for example the child's internal psyche. Exclusion of this level prevents the discovery of pathways and mechanisms by which parents may influence the child's physiology and emotions (Wood, 1993). Whilst family systems theory makes a valuable contribution to understanding pain in families, the underlying processes between the parent and child dyad contributing to the child presenting with symptoms, for example pain, are often poorly explained.

Wood's (1993, 2000) theories address both the family system, and the interactional effects of family members on the physiology of the child in children experiencing inflammatory bowel disease, and recurrent abdominal pain. Research findings indicated that triangulation and marital dysfunction were associated with a physiological index of disease activity in the child. These findings demonstrate the significance of the parental and child unit, and the physiological effect of proximity between children and parents (Flor, Turk, & Rudy, 1987; Payne & Norfleet, 1986). Thus, if the mother is overly emotionally involved in her child's pain, this may reflect underlying difficulties within the marital system, or disrupt the coherence of this unit, and place a physiological burden upon the child.

Wood investigated a 'biobehavioural family model' of paediatric illness. In Wood's model, multilevel interactive systems are considered in which social, psychological and physiological factors converge to influence health and illness. Integrating individual and family systems theory, Wood's research bridges the fields of psychosomatics, paediatrics, behavioural medicine and family systems medicine, with a central focus on the child's immediate and most influential holding environment, the family. One of the central hypotheses of Wood's model is that certain interactional patterns can trigger physiological processes in the child, which may then exacerbate the disease process. Congruent with Wood's hypotheses, this current research investigates the relationship between maternal emotional distress, empathy, and emotional involvement as an interactive process between mother and child that directly influences the child's physiology. Hence, it is hypothesised that the factor maternal emotional distress, (comprised of the variables emotional distress, emotional involvement and empathy) will be associated with children's somatic complaints and reduced physical functioning.

In the biobehavioural family model, Wood replaces the construct of enmeshment from Minuchin's psychosomatic model and replaces it with proximity, and responsivity. Fundamentally, Wood's definition of responsivity describes the level of emotional reactivity between individual family members and also the degree of involvement or separateness between individuals. Thus, moderate levels of responsivity from a parent to a child allow for empathic and desirable responses, whereby the parent understands the child's perspective and feelings but does not take on the child's feelings as their own. High levels of responsivity may exacerbate emotions and physiological resonance, possibly worsening the child's situation. Finally, low levels of responsivity may be part of a general pattern of avoidance or neglect among family members, leaving individuals unsupported and more vulnerable to environmental stressors (Wood et al., 2000). Wood's theories extend the principles of family systems theory to consider some of these pathological processes that may underlie functional somatic symptoms in children and adolescents.

6.1.2 Learning theories

Family factors are emerging in paediatric chronic pain; however there have been limited investigations to test specific family theories in children with chronic pain (Palermo &

Chambers, 2005). There are two dominant theories in which both parent and family factors have been considered in paediatric chronic pain: operant-behavioural theories and social learning theories. This section briefly describes operant and social learning theories. Operant conditioning is a behavioural model of learning, proposing that all overt behavioural responses are significantly influenced by their consequences and the surrounding context in which they occur (Sanders, 1996). Social learning theory focuses on the learning that occurs within a social context. This theory considers that people learn from one another and include such concepts as observational learning, imitation and modelling. Albert Bandura is considered the leading proponent of this theory (Ormond, 1999).

6.1.3 Operant-Behavioural Theory

An operant is a response that operates within the environment. For chronic pain and pain, operants are the observable phenomena of pain: changing posture, pain expressions, requesting medication, decreasing activity and requesting attention (Fishbain, 1994). Parental judgements regarding their child's pain are often influenced by the child's overt pain behaviours, for example crying, asking for medication and the inability to perform daily living skills, as opposed to the child's coping behaviours, i.e., school attendance, participating in family and social activities (McGrath & Hillier, 1996). Pain behaviours are separate from pain perception; however, both these factors influence how the child reacts to pain. Sanders (1996) categorises pain behaviour into the following areas: (1) verbal pain responses, i.e., expressions of hurting, moaning, sighing; (2) nonverbal motor pain behaviours, i.e., limping, using crutches, grimacing and rubbing; (3) general activity level, sitting, lying down; (4) consumption of medication to control pain. Fordyce (1974) has been one of the leading investigators to research psychosocial variables that influence the chronic pain experience and these principles have been used to treat chronic pain. Treatment using operant conditioning and targeting pain behaviour is aimed at changing how the patient verbalises or describes their pain, and also involves observing the patient's functioning. These behavioural methods are often used in treatment programs targeting excess disability and expressions of suffering in the patient.

The fundamental paradigm within the operant conditioning model is that of reinforcement (Sanders, 1994). Reinforcement involves the strengthening of behaviour either by the consequence of a positive condition (positive reinforcement) or the stopping or removal of a negative condition (negative reinforcement). For example, if pain behaviour results in pleasant events for the child this may increase the likelihood of the behaviour occurring again. At a minimum, adults notice pain behaviours, and attention itself can be an extremely powerful reinforcer. In adults experiencing chronic pain, positive attention from spouses to displays of pain are associated with reports of increased pain intensity, and functional disability (Flor, Kerns, & Turk, 1987; Turk, Kerns, & Rosenberg, 1992). Increased attention has also been found to be a significant reinforcer in paediatric pain. Attention can take the form of comments ‘how are you feeling today’, or time spent at home with parents. Research indicates that pain behaviours may be increased through positive reinforcement, or decreased if they are ignored and well behaviours are reinforced (Gamsa, 1994). Therefore, it is equally as important that when the child’s pain is reduced or they display coping behaviours, the parent gives the child appropriate love and attention.

Pain behaviour may also enable the child to escape or avoid something unpleasant, for example learning difficulties at school, bullying or social anxiety. Negative reinforcers are harder to determine, because the unpleasant aspect of a situation is not always evident. For example the child who has a biological cause for their pain may display no apparent social or learning difficulties. However, the child may also hold high expectations, and by missing a lot of school, they may fall behind in their work. Pain behaviours may enable the child to stay home from school and avoid the stress of making up the work, or seeking top marks. Thus, the operant conditioning model states that operants can be influenced by their consequences. Theorists such as Fordyce have used terms such as reinforcers to explain behaviour and the maintenance of pain behaviour (Fishbain, 1994). Reinforcement of children’s pain is widely cited in the research literature (Brace et al., 2000; Craig, 1986; Ehde et al., 1990; Walker et al., 2002).

When comparing reinforcers to secondary gains (the advantage of a symptom once it has occurred), Fishbain (1994) proposes that operationally some secondary gains could be related to reinforcers. However, Fordyce (1974) states that although reinforcers can maintain pain behaviour, they have not necessarily produced the behaviour. Fordyce (1974)

further states that the term secondary gain refers to underlying psychic processes for the generation of pain. This highlights the fundamental difference between operant behaviour theory and psychodynamic formulation: for operant theory the observed behaviour of the individual is a response to reinforcers; by contrast for psychodynamic theory, the observed behaviour has unconscious meaning (Fishbain, 1994). Walker et al. (2002) propose that secondary gain and reinforcers are similar constructs in that they both are consequences hypothesised to maintain symptoms.

Reinforcement theory applied to children's pain behaviour considers parental behaviour as a significant reinforcer of pain and reduced functioning (Walker et al., 2002). Walker and Zeman (1992) were the first to apply the concept of illness behaviour encouragement to the investigation of children with recurrent pain. They concluded that more solicitous responses from parents (for example, frequent attending to pain symptoms, granting permission to avoid activities) toward their children's pain and illness behaviour, were related to higher levels of sick role behaviours in children with recurrent pain. A parent's judgement regarding the seriousness of the child's pain also influences parental reinforcement of the sick role or pain behaviour, for example allowing increased dependency and relief from routine responsibilities (Brace et al., 2000; Walker et al., 1995; Walker & Zeman, 1992). Parental beliefs about their children's pain are one example of how parental factors may mediate reinforcement of children's pain behaviour.

More recent studies have not found a direct relationship between parental solicitousness and measures of functional disability. For example, Peterson and Palermo's (2004) study found a low correlation between parental solicitousness and functional disability in children with headache, arthritis, or sickle cell disease and found that child anxiety and depression were significant moderators of this relationship. Perhaps parental solicitous responses were likely to be emphasised when the child was observed to be more distressed by the parent. Similarly, in an observational study of parent interactions during pain, parent behaviours were not related to functional disability (Reid et al., 2005). These studies indicate that the relationship between parent responses and child pain may be more complex than studies have considered to date (Palermo & Chambers, 2005). These studies raise the notion of 'reciprocal determinism' between parents and children experiencing pain, which is discussed within 'social learning theory'.

6.1.4 Social learning theory

Social learning theory provides an explanatory model for pain based on learning and the social environment. Through modelling and observation of significant others the individual may learn behaviours or ways of responding to stimuli that were previously not in their behaviour repertoire (Sanders, 1996). Hence, children acquire attitudes toward health and pain from their social environment, specifically, parents. Social learning theory also considers observational learning and modelling as central elements to learning within the child's social environment, thus (1) children become predisposed to patterns of responding, and (2), symptoms and physical disability can be influenced by significant others' responses. By observing how parents define and respond to their own episodes of pain, children may learn to interpret symptoms of pain and determine what type of response is appropriate. Some empirical support for this learning mechanism comes from studies that have demonstrated that children with recurrent pain of unknown medical origin are more likely to be exposed to 'pain models' in their daily lives than are children with pain that has an identified organic basis. For example, Osbourne, Hatcher and Richtsmeier (1989) interviewed 20 children with recurrent unexplained pain and 20 children with recurrent explained pain secondary to sickle cell anaemia, as well as their parents, to determine the presence of models of pain or illness behaviour in the child's environment. Results showed that children with unexplained pain identified more pain models than children with explained pain. The results of this study support a social learning theory perspective by showing that pain models are present in the environment of children who develop functional pains.

However, previous research examining modelling influences on children's pain has relied on retrospective, correlational studies. This raises several limitations including the potential for reporting bias, as well as the inability to infer directionality or perhaps unidentified mediating variables. Hence, experimental research is needed to address these limitations. A recent study by Chambers et al., (2002) attempted to overcome these limitations by employing an experimental design to study the effect of maternal behaviour on children's pain experiences. Results concluded that by randomly assigning mothers to interact with their child and behave in accordance with structured roles, maternal behaviour can play a direct role in influencing children's pain experiences.

Social learning has been used to explain abnormal illness behaviour in children and how parent-child interactions may contribute to the socialisation of illness behaviour (Walker & Zeman, 1992). Illness behaviour describes the “manner in which persons monitor their bodies, define and interpret their symptoms, take remedial actions and utilise health care systems” (Trimble, 2004, p. 35). Abnormal illness behaviour is defined by Pilowsky (1997) as the persistence of an inappropriate or maladaptive mode of experiencing, evaluating or acting in relation to one’s ‘own’ state of health.

Although, diverse theoretical models have been used to explore and understand parent-child relationships, the theory relating familial factors to childhood chronic pain that has been the most influential in psychological research has been social learning theory (Palermo & Chambers, 1995). Bandura (1977) has suggested that the most complex human behaviours are learned through a combination of verbal transmission of information and observation of a skilled model. Bandura’s (1977) theory of ‘reciprocal determinism’ proposes behaviour, personal factors, and environmental factors all operate as interlocking determinants of each other. Hence, personal and environmental factors do not function as independent determinants, but determine each other (Bandura, 1977). Social learning theory is also commonly used to help explain how children learn about a variety of psychological phenomena (Ormrod, 2004). Bandura (1977) and Fordyce (1976) both emphasise the importance of ‘learning’ in social interactions. Social learning theory has provided the framework in which parent-child interactions contribute to the development and maintenance of pain.

Parent-child interactions in paediatric chronic pain can be moderated by children’s stage of development, or mediated by children’s psychological factors. Taking a developmental perspective, Walker (1999, 2002) proposed that the impact of social consequences on illness behaviour in children might vary as a function of the child’s level of task development. Walker gives the example of the developmental task of achieving a sense of mastery or competence in middle childhood, proposing some children who feel inadequate may receive relief from responsibility, and for some children this may be rewarding (Walker et al., 2002). This may include being excused from school or social activities. Building on this perspective Walker et al. (2002) investigated the influence of attention,

relief from responsibility and children's perceived competence in 151 children aged 8-18, who experienced RAP. Parents who were referred to a paediatric gastroenterology department were screened for eligibility seven days prior to their clinic appointment. Parents completed questionnaires on the clinic day whilst children were interviewed separately. A second interview with children was conducted by telephone two weeks following the initial interview. Results found low levels of self-worth and academic competence moderated the significant relationship between social consequences (positive attention and activity restriction) and stronger symptom maintenance. Furthermore, negative attention did not predict symptom maintenance.

Walker et al. (2002) propose additional work is needed to determine if the findings are generalisable to children of different ethnic backgrounds. Several limitations were also outlined in regard to the use of self-report measures as subjective measures in contrast to objective measures of social consequences of pain. Objective measures were also suggested for childrens' competences to determine if perceived versus actual competence moderates the effect of social consequences on symptom maintenance.

These studies demonstrate social learning theory provides a useful framework for investigating how parent-child interactions might contribute to the socialisation of children's pain responses. Perhaps it is not only the mothers' modelling of pain and somatic complaints that influences the child's pain but also the mothers' ability to regulate emotions. This next section considers the impact of maternal emotional distress as a factor that may impact on children's pain and functional outcomes.

CHAPTER 7 MATERNAL EMOTIONS

7.1 Maternal Emotional Distress

In general, mothers tend to be the primary caregiver who attends to the child's medical appointments, and usually the mother is the decision maker regarding the child's attendance at appointments. Therefore, maternal appraisals of children's symptoms are an important factor for health care decisions that affect children (Wildman, Stancin, Golden, & Yerkey, 2004). Claar and Walker (1999) examined mothers' attributions for the causes and remedies of their children's abdominal pain, specifically, whether maternal beliefs reflected a dualistic or multidimensional view of pain. The sample consisted of 153 mothers with a child between the ages of 6-18 years who had experienced abdominal pain for at least a one-month duration. Interestingly, about half the mothers in each group (peptic disease or unexplained pain), endorsed both psychosocial and physical factors as important in the aetiology of their child's pain. At one year follow up mothers in both groups tended to maintain and even increased the emphasis of psychosocial factors in children's abdominal pain. It is not always easy for parents to endorse both physical and psychological factors for their child's persisting pain condition, hence, when children present with limb pain and are unable to function, parents often fear the child may have a serious disease, like cancer. When child sensations and complaints of pain do not manifest in physical dysfunction, or are not visible, it may be easier for parents to attribute psychosocial factors. However, when the child is unable to walk and participate in normal activities it is hard for parents to connect psychosocial factors with physical disability.

When children have unexplained somatic complaints and pain, parents also can be fearful and anxious. When parents witness their child in pain, it may provoke a range of different emotions and thoughts, ranging from sympathy, guilt, helplessness and fear. It is therefore not only the child who may experience high levels of stress and anxiety in response to pain

but also parents. When children are diagnosed with a chronic pain syndrome, it is usually the first time that they and their families have encountered pains that may not be directly related to an injury (Gatchel & Turk, 1996). Instead the headache or limb pain experienced by the normally healthy child actually constitutes the disorder. Multiple or conflicting diagnoses, serial referral to medical specialists, multiple scans and blood tests may not show any structural or tissue damage. Parents' belief systems and their understanding of the complexity and range of factors that can contribute to the child's chronic pain may influence the number of specialists and medical consultations attended. As a consequence parents and children experience much uncertainty about the disorder. In addition, parents bring their own meaning to the situation based on their past experiences, unresolved traumas or experiences from their own family of origin. As pain persists, parents may become increasingly anxious, especially when no remediable biological explanation is found, and what parents say and do in response to their child's pain can impact on the child's functioning and level of disability.

Parents who are highly distressed by having a child in pain are more likely to respond to their child supportively than to ignore the pain behaviour (Faucett & Levine, 1991). Children may be excused from responsibility and for misbehaviour, if children exhibit physical symptoms which parents associate with a medical diagnosis (Walker et al., 1995). These factors are crucial to understanding the child's pain experience, since it is parents, and in particular mothers, who are responsible for treatment decisions and adherence to medical regimens. Therefore, parents' understanding and beliefs and level of distress about the underlying reasons for their child's pain impact on the child's sense of control by giving personal meaning to the bodily sensations and discomfort they feel.

Parents influence the meaning of events for the child and to what degree situations elicit emotions. For the child experiencing pain, the meaning of pain is more than the pain itself: the interpretation of pain and sensation is based on prior beliefs, pain experiences and the child's level of distress. Through the process of 'social referencing' children look to their parents to understand events. Social referencing is not the mirroring of the reaction of another but involves "seeking input from others and subsequently using this information to regulate one's own behaviour" (Waldem, 1991, p.70). Social referencing is proposed to be one way in which emotional responses are learned and affect regulation maintained (Garber

& Dodge, 1991). By referencing the reaction of others, children form their own reactions to events. In ambiguous situations, for example, when the child's pain has not been explained or diagnosed, social referencing is suggested as one way in which parental emotions influence children's interpretation of events and body sensations. Consequently, parents have a substantial effect on children's understanding and fear of their pain, influencing the intensity of emotionally arousing situations and the meaning of events for the child. Increasing anxiety in relation to the child's pain and health are significant factors that can contribute to the child's chronic pain and associated pain related disability (Chambers, Criag & Bennett, 2002).

The focus of study two was to investigate the relationship between mothers' emotional distress and children's reporting of somatic complaints, anxiety and depression. In this study there is a focus on mothers as opposed to fathers, as studies have shown that mothers, compared to fathers account for more of the variance in child outcomes (Ramchandani et al., 2006). This finding was also supported by Gottman, Fainsilber-Katz and Hooven (1997) study which found for internalising problems in children, fathers accounted for 30% of the variance and mothers accounted for 56% of the variance. Walker and Greene (1989) also found no association between fathers' distress and child symptomatology, supporting the significance of investigating the interaction between mothers' distress and children's functional outcome in children and adolescents with chronic pain.

Walker and Greene's (1989) well known studies looking at RAP in children found maternal anxiety and somatisation were found to be associated with increased somatic complaints in the children. Walker suggested that it is likely that maternal distress plays a part in the aetiology and maintenance of the children's symptomatology. Current research is now linking parental emotions to children's development of persistent pain problems. In a cohort study in the United Kingdom a group of 5362 subjects were followed from birth until 43 years. This research found persistent abdominal pain in childhood was associated with ill health in parents and higher neuroticism scores in mothers, supporting the interactional effects between maternal emotions and persistent pain in childhood (Hotopf, Carr, Mayou, Wadsworth, & Wessely, 1998). The existence of maternal anxiety prior to children's development of RAP was also recently supported in a longitudinal study in England. The study also showed a link with anxiety and depressive symptoms and somatic

complaints among mothers, with well-validated measures (Ramchandani et al., 2006). These findings point towards maternal distress existing before the emergence of the child's chronic pain and support the relationship between emotional distress and somatic complaints.

Studies also indicate that parental distress is associated with living with a child experiencing persistent pain. In a study, again in the United Kingdom, adolescents with chronic pain and their accompanying parents were investigated to assess both parents' and adolescents' level of emotional distress. Eccleston and colleagues (2004) found that both parents and adolescents (experiencing chronic pain) reported high levels of anxiety and depression. For parents, 40% of the sample had high levels of clinical depression, and 60% had high levels of generalised clinical anxiety. Furthermore, 66% of the parents in the study experienced parenting stress associated with parenting a difficult child. Parent-child interaction effects were demonstrated by the significant relationship between adolescent depression which predicted parenting stress (Eccleston et al., 2004).

Investigating the relationship between parental distress and physical functioning, Eccleston, McCracken and Crombez (2002) concluded that disability in adolescents with chronic pain was accounted for by the adolescents' pain intensity, low mood and also by high levels of parental distress. Adolescent general anxiety and depression had no predictive value on functional ability, and adolescent coping was in fact mediated by parental distress, (77.2% being mothers). The Eccleston et al. study highlights the impact of maternal emotional distress on the adolescents' coping and level of physical functioning. Maternal distress is hypothesised to have a significant impact on children's physical functioning, anxiety and depression. Although the focus of this research is investigating the relationship between maternal emotions and children's functional outcomes, other factors such as poor explanation by doctors can also contribute to and exacerbate parents' emotional distress.

Logan and Scharff's (2005) study investigated children and adolescents diagnosed with RAP or migraine headache to determine the influence of family environment and parental distress on children's ability to function. Parental psychological distress (mothers and fathers) and family control were not statistically significant predictors of functional disability in young people with persisting pain. After controlling for the influence of pain

intensity, family environment and parental distress jointly predicted children's ability to function with pain. The non-significant relationship between parental distress and children's functioning was explained by the authors in the light of the sampling bias of fathers who were willing to take part in the study, when it is mothers who have a primary role in families and hence are therefore more likely to influence children's functioning. These findings are consistent with Walker and Greene's (1989) study, which found that only mothers' and not fathers' distress influenced children's somatic symptoms. Furthermore, Logan and Scharff (2004) raise the impact of conflict and enmeshment in families as important factors in recurrent pain syndromes, which may be associated with children's level of physical functioning.

Naturally mothers will vary in their responsiveness to their child. Mothers with somatic complaints (mother suffering from physical symptoms of at least two years duration for which there had been no adequate medical investigation) have been found to be less responsive, less involved and expressive with their child during play than a control group of healthy mothers (Craig et al., 2004). However, these somatising mothers became more responsive than the control group, whilst playing with a doctor's medical box with their child (Craig et al., 2004). These findings support that some mothers may be able to attend to physical cues but not emotional cues in their child. It has been argued that somatic complaints in children evolve through parents' preoccupation with children's health, and a reduced sensitivity to children's emotional cues (Craig et al., 2004). In addition, Walker & Greene (1989) suggest that mothers' emotional distress interferes with their capacity to reassure their child, and their concern for the child's somatic symptoms may unintentionally reinforce the child's pain and disability. These findings support the relationship between maternal distress and children's reporting of somatic complaints and physical disability. Emotional distress may be associated with children's reporting of somatic complaints and may also be linked with mothers' reporting of somatic sensation in their children. The next section discusses how maternal distress may be linked to mothers' reporting of somatic symptoms in their children.

7.2 Maternal Distress and reporting of child pain

In addition to decision-making, mothers give reports on the child's or adolescent's pain or symptoms. This raises the question as to how reliable maternal reports of children's pain are and what factors may increase the accuracy and usefulness of mothers' assessments and reports of their child's pain? It is known that mothers report observed pain behaviour in their child as they cannot accurately know what the child perceives. It has been estimated that parents give only a fair estimate of their child's pain and their impressions convey only partial information about the child's actual experience and status (Chambers, Reid, Craig, McGrath, & Finley, 1998). It is difficult for parents to gauge children's reports of pain and appropriate levels of activity for their child, despite pain. Although self-report measures of pain are preferred, children are not always able to report their pain due to their developmental level (Chambers et al., 1998). Even though parents are considered the experts on their children, there appear to be conflicting results on the correlation between child and parent reports of pain. As Chambers et al. (1998) highlights, there are multiple factors that contribute to these mixed findings, and for example, the type of pain being assessed, research measures used, and the type of correlation statistics performed.

Garber et al. (1990) found that higher levels of maternal distress were associated with greater mother-child discordance, that is, mothers reported more symptoms than the child themselves. Mothers tended to report both more emotional and somatic complaints in their child. This finding may be explained not only by children's pain behaviour but also parents' emotional distress influencing parents' perceptions about their child's pain. Garber et al. (1990) suggest that mothers who are themselves experiencing emotional distress are more likely to read ambiguous cues in their child as reflecting distress. Furthermore, caregivers who reported greater levels of distress regarding their loved one's pain had less accurate estimates of pain (Redinbaugh, Baum, DeMoss, Fello, & Arnold, 2002). Hence, maternal emotional distress may interfere with mother's ability to be sensitive to their child's internal state or may leave the situation open to bias and misinterpretation.

Garber also suggested that these mothers might project some of their own symptoms onto their child. That is, the mother who is unaware of her internal emotional state or symptoms, perceives the child to be experiencing pain. It is helpful if parents can distinguish between whether the child is experiencing pain or feeling emotional distress or discomfort, and also between the parent's own feelings of distress as separate from their child's experience. Parental misconceptions, fears and inaccurate pain assessments may influence parental involvement in children's pain, hence the importance of pain education for parents and families.

Parents not only feel anxious when their child's pain and dysfunction has not been adequately explained, but many families feel angry, isolated and misunderstood, in conjunction with a sense of grief over the loss of their child's physical functioning (Smith & Friedemann, 1999). Although there are common themes in the emotional reactions of families, when a family member is experiencing chronic pain, each individual or family has their own understanding, expression and tolerance of emotions. The interactional effects between mothers and children in pain may influence the child's pain experience on many levels, emotionally, behaviourally and physiologically (Dolgin & Phipps, 1989). Hence, it is important to understand these influences on children's pain not only at an individual level (for the parent and the child), but also the interactional patterns of this dyad.

The perspective taken in this research is that the emotional and interactional effects between mothers and children can influence the emotional regulation, pain sensitivity and functional outcomes of the child. Whilst it is likely that both child and parental factors will contribute to a referral to a paediatric pain clinic, maternal distress is proposed to be a significant factor determining children's attendance at a specialised pain clinic, and may also impact on parental reports of their child's pain (Wildman et al., 2004). Mothers of children referred to a mental health service have been described as being more prone to anxiety, and depression, and more easily upset by stress; however these trends are less widely known in the paediatric pain literature (Gerralda & Bailey, 1988).

The role of the mother in pain promotion was also demonstrated in a lab-based experimental study of school-aged children's pain experience (Chambers et al., 2002). Mothers were the focus of this research, as mothers are known to reinforce pain behaviours

more than fathers (Craig et al., 2004; Walker & Greene, 1989). Mothers were randomly assigned and trained to interact with their children in one of three ways while the children were exposed to lab-induced cold pressor pain: (a) a pain promoting interaction (reassurance, empathy or mild criticism), (b) a pain-reducing interaction (distraction, humour, coping strategies) and (c) a no training control group (normal interaction). Children's pain experience was then measured via self-reports of pain intensity and affect, pain tolerance and heart rate responsiveness. In summary, girls whose mothers interacted with them in the pain-promoting manner reported more pain than daughters of mothers in the control group. This effect was not significant for boys and maternal interaction had no other significant effects. Maternal interaction in this unusual lab induced pain study only had an effect on the girls' self-reports of pain and not boys. Chambers et al. (2002) proposed that perhaps girls in this study were more aware of their mother's reactions or that girls perceive their mothers as engaging in more illness behaviour encouragement than do boys. These findings indicate the importance of exploring mother-child interactions in chronic pain and are consistent with the research literature indicating a greater ratio of girls presenting with pain and somatic symptoms than boys.

7.3 Maternal Empathy

Empathy is a social emotion and a person expressing empathy in its mature form is able to distinguish between self and other and to recognise another's emotional state (LaFreniere, 2000). Before this ability arises, the precursor of empathy is observed in emotional contagion of negative affect. This can be seen in infancy when babies cry in response to the cries of other babies. This is considered by some theorists as the first stage in the development of empathy (Hoffman, 1984). In the second stage, increases in self-awareness lead one to differentiate more clearly the emotional experiences of oneself and others. Hoffman's third stage is the capacity for perspective taking, that is, becoming aware of another's feelings, which may differ from oneself (Goubert et al., 2005). These stages of the development of empathy help to distinguish between vicariously experienced personal distress (sympathetic concern) and empathy without emotional contagion. Eisenberg et al. (1996) have linked empathy and emotional arousal to prosocial behaviour and propose

optimum arousal is related to prosocial behaviour whereas too high arousal may lead to distress and avoidance of the source. Thus, empathy may either be oriented towards the self (high levels of personal distress) or oriented to others (low levels of personal distress) (Goubert et al., 2005). Study two explores the relationship between maternal empathy, emotional distress and emotional involvement and children's functional outcomes in children and adolescents experiencing chronic pain.

Empathy towards a child in pain may also produce a personal distress reaction in the parent. Eisenberg (1998, 2000) defines personal distress in the context of empathic reactions to others as a self-focused, aversive emotional reaction to another's emotional condition. Empathic reactions towards another, which lead to personal distress, are the consequence of empathic over arousal in response to displays of the other's emotion (Eisenberg, 2000). In contrast to empathy, Eisenberg defines sympathy as feeling sorrow or concern for another and not experiencing the same emotions as that person (Eisenberg et al., 1998).

Emotional distress of parents in response to children's emotions impacts on parents' ability to be empathic to the child, as the parent has difficulties seeing the child as separate from themselves (Flory, 2005). A high level of empathy leading to personal distress and over arousal in response to another's display of emotion diminishes the clear differentiation between the self and the other. This may be particularly problematic in families in which there are no clear boundaries between parent and child, and therefore the psychological or emotional boundaries between the parent and the child become weakened. Eisenberg suggests that individuals who are prone to high levels of empathy leading to personal distress are expected to be low in emotional regulation (Eisenberg et al., 1996; Eisenberg et al., 2000). The relationship between empathy and personal distress are similar to Wood's (1994, 2000) high level of responsivity and proximity, which represents emotional dysregulation in the mother and leads to emotional dysregulation in the child. Hence, empathy leading to emotional distress in the parent may reflect difficulties in their own regulation of emotion and may also be indicative of over involvement or enmeshed relationships, whereby emotions of others are taken on as one's own (Wood et al., 2000).

Research literature investigating maternal empathy in the area of paediatric chronic pain is scarce. A recent study investigated the role of empathy on the brain when a loved one is experiencing pain. Using functional imaging, brain activity was assessed in an observer when a loved one experienced a painful stimulus. The results indicated that empathic experience only activated the components of the brain associated with the affective experience of the loved one, but did not involve the entire pain matrix of the brain. Observers who scored higher on general empathy scales showed stronger activations in the limbic system (Singer et al., 2004). Hence, seeing others in pain elicits the experience of affective distress. Thus, individuals high in empathy may feel the emotional pain of others. These studies need to be replicated to indicate whether empathy is needed to produce a mirror mechanism in the brain of the observer, or if this mirroring of affective distress of others is a result of a lack of differentiation between the self and other, and a difficulty with affect regulation (Miller, 2005). In the latter response to another's pain, whereby the individual may become emotionally distressed the individual loses the capacity to empathise and reflect upon the other's experience.

Illustrated in this review is the importance of investigating emotional regulation in children experiencing chronic pain. The literature review has highlighted the complex and highly entangled nature of pain and emotion, with chapter two outlining the problem of chronic pain which is becoming increasingly prevalent among young people. Chapter three delineates the significant relationship between pain and emotion, giving a brief description of several chronic pain disorders and the relationship between pain, emotion and physiology. Chapter four discussed the development of affect regulation in the context of early relationships with primary caregivers. Following this chapter five linked difficulties with affect regulation with children's sensitivity to pain and reporting of somatic sensations. The literature review concludes with contemplating the relationship between maternal distress and children's functioning in young people experiencing chronic pain conditions.

Considering the literature in the area of chronic pain and what is known about the emotional interchange between mothers and their children study one hypothesised that:

1. Children with chronic pain will experience clinically significant levels of emotional distress
2. Children experiencing both chronic pain and emotional distress will have reduced physical functioning

Study two hypothesised that:

1. Low maternal emotional regulation will be associated with children's anxiety, depression and somatisation
2. Low maternal emotional regulation will be associated with maternal emotional distress
3. Maternal emotional distress (emotional involvement, emotional distress and empathy) will be associated with children's pain sensitivity, and decreased children's ability to regulate emotions
4. High levels of maternal emotional distress will be associated with children's functional outcomes: children's level of anxiety, depression, somatisation and reduced physical functioning.
5. Children who have difficulties regulating their emotions will have greater pain sensitive temperaments, experiencing avoidance of body sensations and increased perceptual sensitivity
6. Children who have difficulties regulating emotions will experience more anxiety, depression and somatisation

CHAPTER 8 METHODS

8.1 Study One

8.1.1 Subjects

The participants were 73 children and adolescents who were referred to either the Children's Pain Management Clinic at the Royal Children's Hospital or the Sydney Westmead Children's Hospital aged between 7-18 years old. Children referred to the Child's Pain Management Clinic were not attending other health care related facilities and had been diagnosed as having a chronic pain syndrome. Chronic pain was defined as pain that has exceeded three-month duration or had extended beyond the expected time of healing. Chronic pain associated with cancer or developmental disorders, for example, cerebral palsy, were not included in this research sample.

8.1.2 Procedure

Subjects on their initial visit were administered the Children's Depression Inventory (CDI) and the Revised Children's Manifest Anxiety Scale (RCMAS). Patients were then classified according to their physical limitation at the time of the initial assessment. Data for anxiety, depression and function were then entered and analysed using a statistical software package for the social sciences (SPSS). Descriptive statistics for the anxiety and depression measures were performed and correlational analyses using Pearsons Product-moment coefficients were conducted to investigate the relationship between anxiety, depression and function.

8.1.3 Measures

Children's Depression Inventory (CDI)

The Children's Depression Inventory (CDI) (Kovacs, 1992) is designed to assess depression in children between the ages of 7 and 17 years and is the most widely used self-report measure for depression in children (Appendix J). The CDI was modelled on the adult equivalent, the BDI (Beck Depression Inventory). To make the measure child specific and understandable, the phrasing, content and format of the BDI have been changed. The CDI consists of 27 child self-report items representing depressive symptoms (e.g., sadness, appetite, sleep problems and concentration difficulties) that are rated on a 3-point scale asking children and adolescents to choose one of three sentences that best describes their experiences over the past two weeks. Each statement is graded in its severity and assigned a numerical value from 0 to 2. Children and adolescents are asked to mark the statement that best describes the way they have been feeling and thinking during the preceding two weeks. Each item consists of 3 choices- (0, 1, or 2). Higher scores indicate increasing severity of symptoms, for example; 0= absence of symptom, 1=mild symptom and 2= definite symptom. Raw scores are converted to T-scores. In general T-scores > 60 are considered above average, and T-scores > 65 are clinically significant. Scores falling at the mean of 50, with a range between 50-60 are considered to be within the average range. The inventory gives a total depression score and measures five additional factors: Negative Mood (NM), Interpersonal Problems (IP), Ineffectiveness (I), Anhedonia (A), and Negative Self-esteem (SE). Total scores can range from 0-54. There is extensive normative and psychometric data available and reported in the CDI manual (Kovacs, 1992). The CDI has been found to have adequate reliability and validity, with reliability coefficients ranging from .71 to .89 indicating good internal consistencies (Kovacs, 1992). Test-retest coefficients have been reported for the CDI in the range of .38 to .87 (Saylor, Finch, Spirito, & Bennett, 1984). Discriminant validity has also been demonstrated for the CDI on assessing differences between youth diagnosed with depressive or dysthymic disorder compared to youth without depression related diagnoses (Saylor et al., 1984). Regarding convergent validity the CDI scores have been found to correlate positively with the Revised Children's Manifest Anxiety Scale (RCMAS) score and negatively with self-esteem measures (Elliot & Tarnowski, 1990). The RCMAS was also used in this research to assess anxiety in these young people.

Children and adolescents suffering from depression often present with somatic complaints, as opposed to being able to verbalise their sad feelings. Emotional distress can then lead to frequent visits to the doctor if there is no narrative for the child to process their feelings. In fact, somatic complaints were reported in 69.2% of children referred for emotional or behavioural problems (Masi et al., 2000). Therefore, there are also frequent overlaps in symptoms between chronic pain and depression, for example, fatigue, sleep problems, reduced energy and anhedonia (Morriss, Wearden, & Battersby, 1997). Individuals with anxiety disorders also frequently present with somatic complaints, for example, physical complaints of nausea, vomiting, dizziness, upset stomach and various aches. Examples of common pain presentations associated with anxiety in children and adolescents include Recurrent Abdominal Pain (RAP), and headache (Sillanpaa & Anttila, 1996; Walker, Garber, & Greene, 1991). Therefore pain may signal that the child or adolescent is stressed, anxious or depressed, however may be reporting only the physical symptoms associated with the emotional distress (Slater, 2003). Hence, in light of these findings the somatic items on the anxiety and depression scales may inflate children's scores. Another difficulty with using self-report measures to assess emotions lies in the assumption that the child has the capacity to identify feelings, can freely express feelings, and competently complete the measure without assistance from parents.

Revised Children's Manifest Anxiety Scale

The Revised Children's Manifest Anxiety Scale (RCMAS) (Reynolds & Richmond, 1985) is a 37-item self-report measure, for children aged between 6-19 (Appendix K). Items are circled either yes or no by the child, depending if the child agrees the sentence "is true" for them. The yes responses are counted to determine a Total Anxiety score (based on 28 items). The RCMAS also provides four subscales labelled: i) Physiological Anxiety (PA), ii) Worry/ Over sensitivity (WO), iii) Social concerns/Concentration (SC), and iv) Lie (L). High scores on the 28 items indicate a high level of anxiety on the relevant subscale. The remaining nine items constitute a Lie subscale. 'Yes' items are counted to give a raw score for each subscale. Raw scores are then converted to Scaled Scores and T-Scores. These are standardised scores with the same mean and standard deviation. This means scales can be interpreted and compared to one another. Such a comparison would not be possible if the scaled scores are not transformed since there is a difference in the number of items

comprising each scale. T-Scores have a mean of 50 and a standard deviation of 10; each of the subscale scores has a mean of 10 and a standard deviation of 3. Thus, scores falling within the normal range fall at 50 with scores 10 above or below representing one standard deviation from the mean. Since the majority of scores fall within one standard deviation of the mean, greater significance is attached to those scores that fall outside this range of scores (i.e., >60T).

The RCMAS is one of the most frequently used self-report measures of manifest anxiety in children and adolescents. The age range for the questionnaire is between 6-19 years, which was well suited to the age range of the specified sample. Reliability coefficients range from .78 to .84 (Reynolds & Richmond, 2000). Sound test-retest reliability has also been reported and ranges between .97 and .68 for 3-week and 9-month retest, respectively, (Reynolds, 1981). The manual and research literature provides evidence for construct, concurrent and predictive validity (Reynolds, 1982; Reynolds & Richmond, 1979). This questionnaire is routinely administered as part of the assessment process in the children's pain management clinic. Due to the routine assessment of this questionnaire and sound levels of validity and reliability in assessing anxiety in children and adolescents the questionnaire was incorporated into the research.

A brief description of the subscales on the RCMAS is provided:

Physiological Anxiety; This is an index of the child's expression of physical manifestation of anxiety. High scores indicate that the child has certain kinds of physiological responses that are typically experienced during anxiety.

Worry/ Oversensitivity; Items contributing to this subscale contain the word 'worry' and indicate that the child is afraid, nervous and oversensitive to environmental pressures. High scores indicate that the child is likely to internalise anxiety.

Social Concerns/Concentration; High scores on this subscale reflect concern about oneself in relation to others or express some difficulty concentrating. Children may have anxiety regarding the expectation of significant others. Major concerns may include they are not as good, effective, or capable as others. This anxiety is thought to interfere with the child's ability to concentrate on academic or assigned tasks.

Lie Scale; Scores may vary from 1-9. Items endorsed reflect a tendency to portray an 'ideal self', that generally is not characteristic of anyone. Children rating high on this scale may

also want to intentionally provide false information. High scores often indicate an inaccurate or inflated view of self.

Function

Patients were classified as either none, mild, moderate and severe according to the Chalkaidis study (2001) classification system. If patients had none of the following they scored none, if patients had one of the following they scores mild, two of the following they scored moderate and if they scored three of the following they scored severe.

- *Missing one or more schooldays per week*
- *Restricted sporting activity*
- *Sleep disturbance two or more nights per week*

However if patients were:

- Missing two or more days of school per week or
- They were no longer able to participate in sport at all or
- If they had daily sleep disturbance

They would be classified to the moderate category. Patients would only need an additional one of the factors outlined in italics to be classified as severe.

8.2 Study Two

8.2.1 Subjects

Children, adolescents, and their mothers referred to the Children's Pain Management Service, Royal Children's Hospital, were eligible to participate in the study. The young people were experiencing chronic pain and were aged between seven and eighteen years of age. Children referred to the Child's Pain Management Clinic were not attending other health care related facilities. Chronic pain was defined as pain that has exceeded three-month duration or had extended beyond the expected time of healing. Chronic pain associated with cancer or developmental disorders, for example, cerebral palsy, were not

included in this research sample. Exclusion criteria were parents from non-English speaking backgrounds and parents with significant psychiatric illness. Non-English speaking parents were not included in the study due to the influence of language and its expression on emotional understanding. Hence, assessing maternal emotion by the semi-structured Meta-Emotion Interview with an interpreter would have been difficult to implement and increased the measurement error.

It was initially anticipated that approximately 100 children experiencing chronic pain and their mothers would be enrolled in the study. The anticipated sample size was not achieved due to fewer numbers of new referrals to the children's pain management clinic meeting the inclusion criteria within the study period. The number of new referrals in sixteen months that met the inclusion criteria was eighty-three.

8.2.2 Procedure

The Human Research Ethics Committees at Australian Catholic University and Royal Children's Hospital granted ethics approval for the study (Appendix A). Mothers and children were invited to participate in the research project when they attended the initial assessment at the pain clinic. As part of the routine assessment at the children's pain management clinic parents and children receive several questionnaires to complete. Children receive the Children's Depression Inventory (CDI), the Revised Children's Manifest Anxiety Scale (RCMAS), and if the child is over the age of eleven the adolescent version of the Paediatric Orthopaedic Society of North America (POSNA). These questionnaires are completed on the day of the assessment prior to the family receiving feedback from the assessment process. As part of the routine assessment process parents complete the parent version of the POSNA. In the recruitment of subjects it was emphasised that participation in the study was voluntary and refusal to take part did not affect treatment in any way. If mothers or children required further explanation or clarification regarding the purpose of the study, the researcher was available. Mothers and their children who chose to participate in the study signed an informed consent form (Appendix B). Children and adolescents over the age of eleven years were considered of age to complete an informed consent form. Consenting mothers were then given an envelope containing three questionnaires, the Paediatric Inventory for Parents (PIP),

Interpersonal Responsivity Index (IRI), Children's Somatisation Inventory (CSI). Mothers were asked to complete these questionnaires either on the day, or to take them home to complete. Questionnaires not completed on the day were returned when the Meta-Emotion Interview (MEI) was completed. Consenting children were also given an envelope containing an additional five questionnaires, the Family Emotional Involvement and Criticism Scale (FEIC), Sensitivity Temperament for Pain (STIP) Bar-On Emotional Quotient-Inventory, Youth Version (Bar-On EQ-I:YV), Children's Somatisation Inventory (CSI). All questionnaires were number coded to ensure confidentiality of participants. Mothers were also required to attend an interview with the researcher that took approximately 40-60 minutes. The MEI was administered as close as possible to the initial assessment process; however this was dependent upon mothers' availability. The plain language statement informed participants that the results from the RCMAS, CDI and POSNA questionnaires that were completed as part of the routine assessment process were also included in the study. The numerical code was written on these questionnaires and forwarded to the researcher. All questionnaires used have acceptable levels of reliability and validity.

8.2.3 Measures

8.2.3.1 Demographics

The Children's Health Questionnaire (CHQ) (Langraf, Abeta & Ware, 1996) is a multidimensional generic health status questionnaire developed for researcher and clinicians interested in measuring health and well-being. The CHQ has a parents and adolescent version. Demographic information was collected from the Children's Health Questionnaire for example, marital status, and level of education, ethnicity and birth order. These items were included in the last section of the parent version of the POSNA, which is routinely administered to parents whose children have been referred to the clinic. (Appendix I).

8.2.3.2 Maternal emotional regulation

Meta-Emotion Interview

Parents' awareness of their own and their child's emotions, acceptance and regulation of their emotions were measured using a semi-structured interview called the Meta-Emotion Interview (MEI) (Katz & Gottman, 1999) (Appendix C). This is a semi-structured interview measuring aspects of parental regulation and the reflective capacity of parents to think about their own and their child's emotions. The MEI measures parents' awareness of their own and their child's emotions and how they respond to their child's emotions. The interview is based on a theoretical model proposed by Hooven et al. (1995) addressing the role of parents in children's emotional development. In order for parents to respond effectively to their child's emotions, parents need to have an awareness of their own and their child's emotions. In addition, parents may either encourage or discourage the expression and understanding of their child's emotion. The model is based on the following assumptions: (a) that parental meta-emotion is linked to both inhibition of parental affect and the facilitation of positive parenting; (b) that it directly affects children's regulatory physiology; and (c) that this, in turn, affects children's ability to regulate their emotions.

Mothers were interviewed separately from their child. The interview was broken into three sections relating to three different emotions, anger, sadness and fear. Each section repeated the same questions for each emotion, for example, "what is it like for you to be sad/angry/fearful"? Each emotion in the interview was broken into two parts: how the mother feels today and how their child feels. Although the questions were slightly repetitive they were addressing different emotions. The coding manual that accompanies the MEI scores the full interview on the following factors: mother's (a) acceptance of their own and their child's emotions, (b) awareness of their own and their child's emotions, (c) regulation of their own and their child's regulation of emotions, and (d) parents' coaching of their child's emotions.

Dimension scores are calculated by taking the mean of all items within a dimension, for example parental awareness= Mean of (A1, A2...A12). The mean of the dimension is then substituted for all answers that are categorised as DK (don't know). Each dimension total

is then created for each dimension (parent awareness, parent acceptance, parent regulation, parent coaching) for each emotion (sadness, anger, fear) yielding a total of 21 scores for parent meta-emotion if the mother's own feelings and her child's feelings are scored separately. Based on past research, studies combine the awareness (own and child's), acceptance (own and child's), regulation (own and child's) and coaching dimensions for the three emotions (sadness, anger and fear) (Ramsden & Hubbard, 2002). Hence, this results in four dimension scores. A description from the MEI manual of the different factors follows.

Awareness-Parent

This dimension taps into parents' awareness of their own emotion processes, for example the ability to distinguish the experience of one emotion from that of another. This factor assesses how conscious are parents of their emotional experiences. The interview asks if parents can give a recent and vivid example of one time that they were sad, and to describe what happened, who was there, what was said and how did they resolve it. Hence, mothers are asked to provide details about the experience of different emotions and their remediation. The interview asks mothers to break down the emotional experience into physiological sensations, thoughts and images during different feeling states.

Awareness-Child

This dimension assesses parents' awareness of their child's emotion. It measures how good an observer and emotion decoder a parent is of their child's emotions, and how reflective parents are regarding their child's emotional life. Coding the interview in this section requires the interviewer to determine if mothers are aware of different emotions in their child and how their child expresses his/her emotions, why the child is feeling this emotion and how the child is soothed.

Acceptance-Parent

In the Acceptance dimension of the Meta Emotion Interview parents are assessed on how comfortable and accepting they are of different emotions. Parents may feel quite differently about different emotions. The seventeen items in this dimension are seventeen

different ways of assessing parents' attitudes towards emotions. The items in this dimension assess whether parents express their emotions, how much they express their emotions and how comfortable parents feel about expressing their feelings in public. Furthermore, this dimension assesses parents' philosophies about sharing emotions with others, and how comfortable parents are talking about emotional expression. Parents' philosophy about the expression and acceptance of emotions may or may not be articulated and, in fact, may not even be conscious. However, the tone of and discourse of the interview is also coded. Sometimes parents don't even realise they have a philosophy of acceptance or emotional expression until they are asked questions about it.

Acceptance-Child

Parents' acceptance of children's emotions can be measured by the direct and indirect ways parents respond to their children's expression of emotions. What a parent does when their child is expressing anger or sadness, and how a parent speaks about their child's expression of emotion, all indicate how accepting a parent is about their child's expression of emotion.

Child Dysregulation

This factor assesses if parents mention any difficulties their child may have had with dealing with this emotions. In the interview parents describe their child's dysregulation by the way their child may either over or under control their emotions. However, it is the parent's beliefs about the child's emotional experience that is articulated in the interview and parents may not be attuned to their child's actual emotional experience. Parents may also report more overt displays of emotion, that is, excessive crying, pessimism, droopiness, depression, destructive tantrums or even violence and may not be able to comment on the more subtle experiences of children's emotions.

Parent-Dysregulation

In coding the first four items in this dimension the coding manual assumes there is no problem if the parent does not mention a problem. Katz and Gottman (1991) describe this part of the interview as an opportunity for parents to mention any reservations or concern they have with an emotion. Items on this dimension assess the frequency, resolution, how

difficult it is to modulate the emotion, the avoidance of the emotion, the lack of appropriate feeling of emotions, and the under or over control of the emotion.

Coaching

Parents who are low on emotion coaching tend to minimise the importance of their child's emotions because of the child's age or limited experience, for example a parent may think 'what does he/she know about sadness?' or when a child has frequent outbursts may think 'All five year olds cry at the drop of a hat'. Alternatively parents low on emotion coaching may minimise the perceived importance of the precipitating event 'a broken toy is not worth crying about'. Parents who are high on emotion coaching are not suspicious of the child's motives for their behaviour or emotions. Furthermore, parents high on emotion coaching teach their child rules and strategies to manage their emotions.

The focus of the MEI was on mothers' reports of their own emotional experiences and mothers' reports of the emotional experience of their child with persisting pain. The author conducted 75% of the interviews and the research assistant the remaining 25%. Mothers' responses were audiotaped for coding purposes. The MEI is semi-structured, however the interviewer was free to clarify and expand answers. Throughout the interview the interviewer listened for codable answers and if the response was unclear then mothers were encouraged to expand upon their answers. Extreme care was taken not to lead mothers for particular responses to questions and probes were limited to clarifying responses. The meta-emotion interview was coded under 7 dimensions, 3 for the parent (awareness, acceptance and regulation), and 4 for the child (awareness, acceptance, coaching and regulation). The range of inter-observer reliabilities for the awareness and coaching scales have been reported between 0.73 to 0.86 (Hooven, Gottman, & Katz, 1995).

The research assistant coded all the interviews and was blind to the hypotheses of the study. Both the author and research assistant were trained in the use of the meta-emotion coding system developed by Hooven (1994). Hooven developed a specific checklist rating system, which has been used in research conducted and supervised by Katz at the University of Washington. Training consisted of listening to pre-coded audiotapes in order to achieve inter-rater reliability with the coding system outlined by Katz and Gottman. Training

interviews were coded until there was consistency between the coder and the training interview coding sheets. Steps were taken from preventing errors between raters: cross validation between raters, extensive discussion and cross marking were implemented. Both raters were trained according the MEI training guidelines and coding sheets. Both raters listened to the interviews and scored these, the coding was then compared and any differences were noted and then coded again according to the MEI scoring guidelines. In total one third of the interviews were cross- marked randomly at different times of the data collection and there were no major discrepancies noted hence invalidating need to perform intraclass or Kappa correlation. Intra-rater reliability was also checked, with at least ten of each rater's own interviews being re-rated, again no major discrepancies were found

The research assistant listened to the entire interview one time before coding, and then additional times as needed to code the interview confidently. Four dimensions of emotion were coded, awareness (own and child), acceptance (own and child), regulation (own and child) and coaching (child). Each of these dimensions was assessed with items that were rated using a 5-point scale (1= Disagree Strongly, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree). Scores for each of these variables were determined by reverse scoring all negatively weighted items and calculating a mean of ratings for each dimension.

8.2.3.4 Maternal emotional distress

Paediatric Inventory for Parents

The PIP (Streisand, Braniecki, & Tercyak, 2001) (Appendix D) was developed as a measurement tool to assess parenting stress relating to caring for a child with an illness. The PIP was developed at the Children's Hospital of Philadelphia within the division of oncology. There is a strong correlation between the PIP and the State-Trait Anxiety Scale .62. Smaller correlations were found between the PIP and the Parenting Stress Index-Short Form (PSI-SF) general parenting subscales .30-.38 (Abidin, 1990). Hierarchical multiple regression models were tested by Streisand et al. (2001) to further assess the validity of the PIP by examining its relation to parental anxiety. After controlling for the effects of i) demographic variables (parental and child age, parental ethnicity, parental education, and illness duration) and ii) parenting stress and iii) parental response bias, Streisand et al.

(2001) concluded that the PIP-F scores accounted for a total of 43% of the variance in parental anxiety (significant change in $R^2=18\%$, $p<.001$). Similarly, the PIP-D score accounted for 45% of the model's anxiety score variance (change in $R^2=20\%$, $p<.001$). Based on these findings the PIP-D mean scores were used and not the PIP-F. Streisand et al. (2001) concluded the PIP has adequate construct validity, and independently correlated with parental anxiety after controlling for other important constructs. Hence, the PIP was considered to be a reliable and valid measure that is significantly associated with general parenting stress and state anxiety. The PIP was chosen, as it is associated with parenting stress and anxiety, but also assesses parents' difficulties in responding to medical procedures, communicating with family members about their child's condition, and how difficult it has been for parents to continue with their role in the family.

Table 1. Means and Standard Deviation of the PIP (N=126) (Streisand et.al 2001)

Scale	<u>PIP Frequency</u>		<u>PIP Difficulty</u>	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
Communication	18.0	6.7	19.8	7.4
Medical Care	16.1	7.1	19.3	7.4
Role Function	20.6	8.1	29.9	9.3
Emotional Function	39.2	14.6	48.4	14.5
Total	94.0	33.3	112.4	35.1

Table 10. shows the means and standard deviations as reported by Streisand et al. (2001) for one hundred and twenty six parents of children (65 boys and 61 girls with a mean age of 12.75 years) who were referred to an oncology service.

Mothers answered 42 items rated on a 5-point Likert scale from 'never' to 'very often'. Each item is answered in terms of frequency and difficulty in the four areas (Medical Care, Communication, Emotional Disturbance, and Role Function) over the last twelve months. Frequency and difficulty scores are calculated separately to determine four factor scores: communication (CM), medical care (MC), emotional disturbance (ED), and role function

(RF). The Communication factor has nine items; examples of items on this factor are 'how difficult has it been speaking to doctors' and 'disagreeing with a member of the health care team'. This factor assesses mother's difficulties with communicating not only with the medical staff about their child's pain but also speaking with their child, their family, feeling confused about information and worrying about how friends and family interact with their child. The Medical Care factor has eight items and examples of items on this factor are 'how difficult has it been for you bringing your child to the hospital/clinic' and 'how difficult has it been for you to make decisions about your child's medical care'. This factor assesses mothers' difficulties with being with their child during procedures and helping their child with the changes in physical functioning. The factor Emotional Disturbance has fifteen items: this factor measures how the child's pain has impacted on the mother's sleep, mood, feelings of helplessness and feelings of uncertainty about the future. Examples of items on this factor are 'how difficult has it been for you seeing your child's mood change quickly' and 'knowing my child is hurting or in pain'. Finally, the factor Role Function has 10 items and assesses how difficult it has been for parents to attend work and attend to the needs of other family members. This item also measures feelings of uncertainty about disciplining their child and changes in their relationship with their partner. Example items for this factor are 'how difficult has it been for you to miss important events in the lives of other family members' and 'how difficult has it been for you to have less time to take care of your own needs'. These factor scores are then added together to form an overall total frequency score (PIP-F) and difficulty score (PIP-D): higher scores indicate parents' increasing frequency and difficulty in the four factors and indicate higher levels of anxiety and stress associated with their child's pain.

The Parenting Stress Index (PSI) is often used in the paediatric pain literature (Eccleston et al., 2004). The PSI is primarily a screening tool for parents who are experiencing stressors consistently related to dysfunctional parenting. This measure comprises three subscales, parenting stress, parent-child dysfunctional interaction and difficult child. Although this measure is a sound instrument of parenting stress, this scale was not used in the composite variable Maternal Emotional Distress (MED). The PSI was considered too broad a measure of parenting stress and MED was aiming to measure a more specific aspect of maternal emotional distress involved with having a child in pain. Furthermore, Streisand et al. (2001) indicate that general measures of parenting stress can be misleading as scores on general

parenting stress have been found to be lower than normative samples for clinical populations.

Interpersonal Reactivity Index

In order to operationalise empathy as a multidimensional construct Davis (1983) developed a 28-item questionnaire, the Interpersonal Reactivity Index, which incorporated both the cognitive and affective dimensions of empathy. Initially Davis developed a bank of 50 items of which some items were taken from existing measures (Mehrabian & Epstein's Questionnaire Measure of Emotional Empathy, 1972; Scotland's Fantasy Empathy Scale, 1978). Factor analysis was undertaken by Davis to extrapolate four major factors of empathy, two cognitive and two affective: Perspective Taking, Fantasy, Empathic Concern, and Personal Distress. Davis (1983) reported standard alpha coefficients for each dimension as follows, PT .73, EC .70, PD .75, F .71. Included in the variable Maternal Emotional Distress was the factor Empathic Concern (EC) from the IRI (Appendix E). The other factors were measured but not used in the path analyses. The validity of the composite variable MED was tested and the factor EC explained the highest percentage of the shared variance on this factor. Findings from Davis (1983) indicate that the EC component was significantly related in a direct association with emotional reactivity and awareness of and concern for the feelings of others. The relationship with the Fantasy component was related to these factors but the association was weaker. For this reason, data was not collected on the Fantasy scale of the IRI and this factor was considered not as specific to the research aims as the EC, PT, PD factors of the IRI. EC has been found to be associated with family adaptability, family cohesion, parent-adolescent communication, parental support, and communicative responsiveness. Furthermore, Davis (1983) also reported that females scored higher on each of the four factors of empathy than males.

The cognitive factor, Perspective Taking, considers an individual's reported tendency to embrace the psychological point of view of another. This factor involves shifting from a self-oriented reaction to others' distress to an other-oriented reaction (for example, "I try to look at everybody's side of a disagreement before making a decision"). The other cognitive factor, Fantasy, is defined as using one's imagination to experience the feelings and actions

of characters in creative works (for example, “I really get involved with the feelings of the characters in a novel”).

The other two factors, Empathic Concern and Personal Distress, are affective in nature. Empathic Concern is an other-oriented component of empathy defined by regard and sympathy for another’s feelings (for example, “I often have tender, concerned feelings for people less fortunate than me”). The affective factor, Personal Distress is a self- orientated response to difficult interpersonal situations of others. Personal Distress involves the experience of another’s distress as if it were one’s own because the individual is incapable of distinguishing the difference (for example, “in emergency situations, I feel apprehensive and ill-at-ease”). Davis (1983) described Personal Distress as a reactive response to another’s condition, rather than a direct replication of another’s affect. Furthermore, it is characterised by a negative tone and self-oriented thought process. In other words, individuals experiencing personal distress as a reaction to another may feel anxious and uncomfortable regardless of the state of mind of the other. Table 2 shows the mean and standard deviations for the components of empathy as measured by the IRI.

Table 2. Means and Standard Deviations (females) for the Components of Empathy as Measured by the IRI (Davis, 1983)

Variable	<u>M</u>	<u>SD</u>
Fantasy	18.75	5.17
Perspective Taking	17.96	4.85
Empathic Concern	21.67	3.83
Personal Distress	12.28	5.01

Family emotional involvement and criticism scale

The Family Emotional Involvement and Criticism Scale (FEICS) was developed by Shields, Franks, Harp, McDaniel and Campbell (1992) from the Camberwell Family Interview (CFI) to overcome the difficulties of lengthy interview and coding procedures

(Appendix F). Expressed emotions (EE) in families refer to family members' feelings about emotional involvement, criticism and hostility. This measure was originally constructed from coding the audiotapes of semi-structured interviews with significant family members from the CFI.

The FEIC is an instrument designed to measure EE in families. The FEIC is a 14-item questionnaire completed by the child, designed to assess two subscales: Perceived Criticism (PC) and intensity of Emotional Involvement (EI). Cronbach's alpha for the two subscales is .82 for the PC subscale and .74 for the EI subscale. Confirmatory factor analysis showed that each item loaded on its proposed factor and not with the other factor. The subscales exhibited correlations and partial correlations with various scales, such as the Family Adaptability and Cohesion Evaluation Scales (FACES) (Olson et al., 1985).

The Perceived Criticism subscale of the FEIC is based on self-reports from respondents. The scale consists of 7 items measuring the intensity of perceived criticism. The EI subscale is also based on 7 items scored on a Likert scale of 1 (almost never) to 5 (almost always); total subscale scores range from 7 to 35. Higher scores represent higher levels of either perceived criticism or emotional involvement in families. Emotional Involvement assesses the degree to which other members of the family take on emotional distress. Comparative data from the original study by Shields et al. (1992) refers to the means for both factors, $M=18.42$ for PC and $M=21.69$ for EI in a preliminary analysis of the validity and reliability of this measure ($N=100$). Alternatively in a sample of patients suffering from Obsessive Compulsive Disorder the FEIC mean scores were reported to be $M=18.8$ for PC, $SD=4.7$ and EI $M=6.19$ (Shanmughai & Suamnt, 2002). The means for Perceived Criticism are similar, however there appear to be considerable differences between populations on the Emotional Involvement scale.

The FACES cohesion factor was considered as an alternative to the EI scale of the FEIC. Olsen (1979) described the use of a circumplex model of family assessment and defined two aspects of family behaviour, cohesion and adaptability. The Cohesion factors of the FACES measure the emotional bonding that family members have between one another and are similar to 'enmeshment' described by Minuchin (1974). The other factor is family adaptability, which measures how far a family permits change. This measure rates families

on the two factors on a four-point axis, defining families as either enmeshed-chaotic, connected-flexible, separated-standard, disengaged-rigid. The FACES inventory has received mixed findings in the literature as a useful instrument in chronic pain. The Brace et al. (2000) study found that this measure did not indicate any significant differences between groups of adolescents (aged between 11 to 17 years) who were experiencing either chronic fatigue syndrome or juvenile rheumatoid arthritis and healthy adolescents on the factors of cohesion, adaptability, or family type. Furthermore, the theoretical framework of this instrument is concerned with assessing the family system and the functioning of this system, as opposed to parent-child interactions.

8.2.3.5 Pain sensitive temperament

Sensitivity Temperament Inventory for Pain

The STIP (Baum, 1994) was developed to assess the extent of pain and anxiety children exhibit in response to invasive medical procedures such as lumbar punctures (Appendix G). Children's differences in terms of sensitivity and reactivity to environmental stimuli are thought to result from differences in children's temperament. The Chen et al. (2000) study was the first to assess pain sensitivity as an aspect of temperament and its relationship to invasive medical procedures. The STIP-C consists of 35 items, completed by the child, who rates items on a four-point scale, ranging from 'a lot like me' to 'not at all like me' relating to factors associated with a child's pain sensitive temperament or nervous system. Items explore individual differences in pain-sensitive or pain-tolerant nervous systems. The questions cover each of the five sensory modalities and contain four factors including Sensation Seeking/ Pain Tolerance, Perceptual Sensitivity, Symptom Reporting, and Introversion/ Avoidance of Sensations. Some examples of the items on the Sensation Seeking/Pain Tolerance factor are "I can stand more pain than most people" and "I love fast and twisting roller coasters". An example item on the Perceptual Sensitivity factor is "I am very sensitive to bad smells from buses and cars", for Symptom Reporting "I get a lot of headaches", and Introversion/ Avoidance of Sensations "When I don't feel well I like to be by myself". Chen et al (2000) describe the STIP as assessing questions from each of the five modalities (for example smell: "I enjoy the smell of flowers or perfume more than other kids", hearing: "loud sounds hurt my ears". The instrument measures an equal

number of positive and negative experiences within each modality. For example, “I like to ride my bike fast down hills” versus “I get sick in my stomach when riding in a car, boat or airplane”. Higher STIP scores indicate greater pain sensitivity. Cronbach alpha scores are reported at .78 and test-retest reliability at .87 (Chen et al., 2000). Chen et al. (2000) developed a parent and child version of the STIP. Preliminary analysis of ratings indicated that the parents and child STIP were not significantly correlated, ($r[36]=.28$, ns). Furthermore, the child STIP was a stronger measure of predicting child anxiety ratings compared to the parent STIP. Based on these findings the child version of the STIP only was used.

At this stage there do not appear to be many alternatives to the STIP. Data on the usefulness of this measure with children and adolescents experiencing chronic pain are also not available at this stage. One of the goals of the Chen et al., (2000) study was to conduct preliminary data on the STIP to test the validity of the STIP as a suitable questionnaire to predict children’s distress during LP’s. It is acknowledged that additional research is needed with much larger samples to determine cut-off values for the STIP that accurately predict which children will develop clinically significant levels of distress. The Chen et al. study provides a first step in demonstrating the validity of using a pain sensitive temperament questionnaire to predict distress in children undergoing a painful procedure. This is a limitation in using the STIP in this study as the STIP has not been widely used with children with chronic pain. Like the Chen et al., study this research represents a first step in providing preliminary research into the usefulness of using the STIP with children and adolescents with chronic pain.

8.2.3.6 Child emotional regulation

Bar-On Emotional Quotient-Inventory, Youth Version

The Bar-On EQ-I: YV (Bar-On & Parker, 2000) consists of 60 items distributed across seven scales that are related to the emotional intelligence of children aged between 7-18 years (Appendix H). The Bar-On EQ-I:YV also includes a scale that assesses item response consistency (Inconsistency Index) which is designed to identify random responding. The Bar-On EQ-I:YV is based on emotional, personal and social intelligence. Emotional

intelligence comprises abilities relating to understanding oneself and others, relating to people, adapting to changing environmental demands and managing emotions. Respondents are asked to rate each item on a five-point Likert-scale. Scales contained in the youth version include, total Interpersonal (A), Intrapersonal (B), Stress Management (C), Adaptability (D) and Emotional Intelligence (E), General Mood (F) Positive Impression (G) and the Inconsistency Index. The Bar-On EQ-I:YV is the first instrument to be published that assesses emotional intelligence in children and teenagers. Factorial validity and construct validity are an ongoing process, but the results to date demonstrate that the scales identify core features of emotional intelligence in children. Test-retest co-efficients range from .77-.88. The total score of the Bar-On EQ-I: YV gives a general indication of how emotionally and socially intelligent the respondent is. A brief description of the scales is presented in Table 3.

Table 3. Scales and Descriptions of Factors in the Bar-On EQ-I:YV

Factor	Description
Intrapersonal Scale	Characterises individuals who understand their emotions, they are able to express and communicate their feelings and needs.
Interpersonal Scale	Characterises individuals who are likely to have satisfying relationships. These people tend to be good listeners and are able to understand and appreciate the feelings of others
Adaptability Scale	Characterises individuals who are flexible, realistic, and effective in managing change. These individuals are good at finding positive ways of dealing with everyday problems.
Stress Management Scale	Characterises individuals who are generally calm and work well under pressure. These individuals are rarely impulsive and can usually respond to a stressful event without an emotional outburst.
Total EQ scores	Describes how effective individuals are in dealing with daily demands and are typically happy.

General Mood Scale	Defines individuals who are optimistic, have a positive outlook and are typically pleasant to be with.
Positive Impression Scale	Measures individuals who may be attempting to create an overly positive self-impression
Inconsistency Index	Measures if there are any considerable inconsistencies in the way individuals have responded to similarly worded items. Individuals may have either misunderstood the instructions, or responded in a careless or random fashion.

Scores of one standard deviation or more above the mean suggest an emotional or social skill that is significantly well-developed. Scores of one standard deviation or more below the mean indicate a significant lack of the specific skills being measured. Scores between 90-109, within the normative range, indicate an adequate level of emotional and social capacity.

8.2.3.7 Functional outcomes

POSNA

The POSNA (Paediatric Orthopaedic Society of North America, 2000) questionnaire has an adolescent and parent version for children over the age of eleven years and a parent version for children under eleven years old (Appendix I). The POSNA is administered to families as part of the assessment process in the children's pain management clinic. Items are scores on a 1 to 4 range. Higher scores are an indication of increased disability. The questionnaire contains 117 items, yielding eight scales that relate to the child's level of physical functioning and mobility. Scales range from 12 items to a single item score, with the Global Functioning Scale (GFS) combining items from four factors. Factors included in the POSNA are the Upper Extremity and Physical Functioning (8 items), Transfer and Basic Mobility (11 items), Sports and Physical Functioning (12 items), Pain and Comfort (3 items), Treatment Expectations (9 items), Happiness Scale (5 items), Satisfaction with Symptoms (1 item). The Global Functioning scale is derived from the Upper Extremity and

Physical Functioning, Transfer and Basic Mobility Scale, Sports and Physical Functioning Scale and the Pain and Comfort Scale. Scores one standard deviation below the mean ($M=50$, $SD=10$) indicate that the child or adolescent is significantly impacted by a disability that greatly restricts the ability to enjoy the usual activities of a young person.

A summary of the eight scales of the POSNA is listed below. The pain/comfort scale measures the level of pain the young person has experienced during the last week. In addition to asking about how much pain the young person has had during the last week, other scales ask, how much the pain has interfered with the child's activities.

The eight scales generated from these instruments are:

- *Upper Extremity and Physical Function Scale*: Measures difficulty encountered in performing daily personal care and student activities.
- *Transfer and Basic Mobility Scale*: Measures difficulty experienced in performing routine motion and motor activities in daily activities.
- *Sports/Physical Functioning Scale*: Measures difficulty or limitations encountered in participating in more active activities or sports.
- *Pain/Comfort Scale*: Measures the level of pain experienced during the past week.
- *Treatment Expectations Scale*: Measures the long term expectations of treatment.
- *Happiness Scale*: Measures overall satisfaction with personal looks and sense of similarity to friends and others of own age.
- *Satisfaction with Symptoms Scale*: Measures the patient's acceptance of current limitations should this be a life long state.
- *Global Functioning Scale*: A general combined scale calculated from the first four scales listed above.

Data was collected for both the Parent/Child and Adolescent versions of the POSNA. Due to the small sample size and the greater number of completed Parent versions, compared to the Adolescent version of the POSNA, the Parent/Child version was used in the statistical analyses. An alternative inventory that was considered to assess physical functioning was the Functional Disability Index (FDI), which is a short self-report measure for children (15 items). This questionnaire measures perceived difficulty in performing a number of common activities in the domains of home, recreation and social interactions. This measure

has been reported to have sound psychometric properties and has been widely used in studies of children with recurrent abdominal pain and paediatric fibromyalgia (Kashikar-Zuck et al., 2001). Although there were advantages in using the FDI, the POSNA was used in the research for the following reasons. The POSNA is a more comprehensive assessment of functional disability than the FDI, as the POSNA includes upper extremities, transfers and mobility scales and how the young person's activities are restricted as a result of pain. The POSNA questionnaires are also collected as part of the routine assessment at the children's pain management clinic.

Children's Depression Inventory (CDI)

A summary of the CDI is given in study one under the section 'Measures'.

Revised Children's Manifest Anxiety Scale (RCMAS)

A summary of the RCMAS is given in study one under the section 'Measures'.

Children's Somatisation Inventory (CSI)

The Children's Somatisation Inventory (CSI) (Walker & Greene, 1989) contains 35 psychophysiological symptoms designed to assess somatic complaints among children. The CSI has two separate versions for parents (CSI-P) and child (CSI-C) perspectives (Appendix L). The scale examines the degree to which the child is bothered by a number of physical symptoms based on a 5-point Likert scale ranging from 0=not at all to 4= a whole lot. A total somatisation score is computed by summing the scores across all items. Three month test-retest reliability for total scores has been shown to be .50 for healthy paediatric patients and .66 for paediatric pain patients (Walker et al., 1991). The parent form of the CSI includes the same symptoms as the CSI and is completed by parents in reference to their child. Internal consistency for the CSI-P is estimated at .86 and the CSI-C .92. The CSI is a widely used measure of children's somatisation derived from the DSM-IV criteria, and from the Hopkins Symptom Checklist. This measure was administered to mothers and their children, who then rated the extent to which the child has experienced each of the 35 somatic complaints in the last 2 weeks on four category scales, ranging from not at all (0) to a whole lot (3). The total score is obtained by summing the individual rating scores; scores

can range from 0-140. The CSI can be used with children aged as young as 7 years old, as it is generally felt that children of this age have sufficient knowledge regarding physical illness.

8.3 Data treatment and analysis

Data entry and cleaning consisted of a number of steps. Each of the response categories on the questionnaires was coded in line with coding manuals supplied for each of the instruments. Data from the 62 usable responses was hand-keyed into a straight text file. Given the relatively small size of the sample, it was possible to double-check the responses. The raw data was read into SPSS 11.5.0 (SPSS, 2002). Univariate, bivariate and multivariate crosschecks were performed to identify anomalous responses, which were corrected through reference to the survey forms. Analysis of the missing data indicated that most was missing completely at random. For the purposes of analysis, a data file was constructed in which all item level missing responses were replaced with means. In order to produce the most unbiased and consistent statistical estimates, reported results were obtained from analysis of the means imputed data file.

Nearly all of the variables were scored using the standard methods documented in the test manuals. The exception was maternal distress, which was assessed using a composite variable developed on substantive grounds. This composite was defined as the sum of the mean of the PIP factors (CM, MC, ED, RF), and the FEIC-EI and IRI-EC. Psychometric methods were used to assure the validity of this composite. The reliability of the composite was 0.85. Principal components analysis suggested that the CM, MC, ED, RF, FEIC-EI and IRI-EC scores were underpinned by a single component, which explained 61.73 per cent of the shared variance. The loadings of all items were greater than 0.35. Although the other variables used in the analysis were taken from calibrated tests, psychometric analyses of their reliability and validity were conducted to assure their properties.

Analysis of the data commenced with descriptive analyses. Descriptive statistics were computed to check the composition of participant sex and age. Descriptive statistics were

also used to explore the distributive properties of the measured variables. This provided initial insight into the results of the empirical work, and a basis for conducting the later multivariate analyses.

The descriptive analysis was followed by explanatory modelling. This involved using path modelling to test the proposed relationships between maternal-child interactions and emotional regulation in children and adolescents experiencing chronic pain. In general, path modelling enables the estimation of structural relationships between observed variables. Unlike structural equation modelling, it does not involve jointly estimating a measurement model along with the structural model. The starting point for a path analysis is a theory about the causal relationships among a set of variables. Figure 1 shows the preliminary model that was formulated which depicts the set of hypotheses outlined in the literature review.

Calculating the number of observations required in multivariate research is complex and depends on a number of pragmatic, substantive and methodological factors. The sample size required for regression depends on the complexity of the model and the purposes of analysis. Many researchers suggest that a sample size of around 100 is required to produce stable estimates for relatively simple multivariate models. In terms of statistical inference, around 400 observations are required assuming simple random sampling. Analyses involving fewer observations are possible, but results should be treated with appropriate caution.

The data available for analysis in the current study was limited by the lower than expected number of relevant referrals to the children's pain management clinic. It is often necessary to conduct research in situations where sample size is limited. Such limitations should not prevent research, but they must be taken into account during analysis and reporting.

The current study was shaped in several ways to account for the sample size constraint. First, rather than analyse the whole model in Figure 1, a series of derived models were specified which were less demanding in terms of sample size requirements. These models involved fewer parameters and hence required fewer observations to estimate stable coefficients. Only structural models were analysed, and measurement models were

excluded to reduce the number of parameters being estimated. This enabled the use of simple linear rather than full structural equation modelling techniques.

Second, analysis of 'effect size' was used to bring a clinical in addition to statistical perspective to the interpretation of parameter estimates. Measures of effect size provide a useful indication of the magnitude of results. It is often necessary to use an approach based on effect size calculations in clinical studies where sample size limitations are often unavailable. The effect size approach (Cohen, 1988) has the benefit of providing estimates of change or correlation in terms of standardised units which can be interpreted in terms of 'clinical' rather than 'statistical' significance. An approach based on magnitude rather than likelihood can be used. This perspective fits well with the current study's intention to analyse the clinically relevant relationships between the specified variables. While the inferential power may be limited, the relationships are still highly useful for other clinicians to review.

Third, continual effort is made to emphasise the heuristic and suggestive rather than conclusive nature of the current results. As the clinical population was limited in size, it is necessary to see the current quantitative analyses as supportive of the overall interpretation developed in this dissertation. That is, the statistical results should be seen as a necessary adjunct to the more substantive forms of analysis. An implication of this is the stated necessity for further replications of the current research. To the extent that sample size limitations are an inherent problem in this area, as they often are in clinical studies, then confidence in the validity of the results could be developed through independent replication of findings.

Several results are reported for each of the path models. First, the results are reported in diagrammatic form. These show the variables being modelled, the relationship between the variables. The numbers next to the arrow which represents the hypothesised effect, are standardised path coefficients. Standardised path coefficients are on the same scale as Pearson product-moment correlations. The coefficient of determination (R^2) is a general measure of effect size which indicates the proportion of variance in the response variable accounted for by the explanatory variables. An estimate of R^2 can be computed in each of the path analysis by squaring the standardised regression loadings.

Below each diagram, a table is included with unstandardised path estimates, standard errors of the path estimates (S.E.), critical ratios (C.R.) and the corresponding p-values (p), used to test statistical significance. The variables, how they were measured and their labels used in the analyses are shown in Table 4. A type one error rate of five per cent has been adopted throughout this study, and the results are flagged with the associated level of statistical significance in mind. To the extent that emphasis is placed on statistical rather than clinical significance, it may be desirable to apply a Bonferroni adjustment and instead compare the observed p-values against an adjusted type one rate which takes into account the number of tests in each model. To do so, the reader can compare the reported p-values against the criterion value of 0.05 divided by the number of estimated paths.

Table 4. Description and Label of Variables Used In Analyses

Variable Label	Measure(s)	Factor
MEI	MEI	Awareness (own + child)
MEI	MEI	Acceptance (own + child)
regul	MEI	Regulation (own+ child)
coach	MEI	Emotion coaching child
regulkid	MEI	Regulation (child only)
paremdf	PIP, FEIC-EI, IRI-EC	Maternal Emotional Distress
cldemreg	Bar-On EQ-I:YV	Child Emotional Regulation
depression	CDI	Depression
anxiety	RCMAS	Anxiety
cstiptt	STIP	Pain Tolerance
cstipps	STIP	Perceptual Sensitivity
cstipsr	STIP	Symptom Reporting
cstipas	STIP	Avoidance of Sensation
cstiptl	STIP	Total score
gfsp	POSNA	Global Function Scale
pcsitl	CSI	Somatisation- parent report
ccsitl	CSI	Somatisation-child report

The distributive properties of the variables were analysed, and they were found to be reasonably normal. This distribution supports the application of parametric statistical procedures.

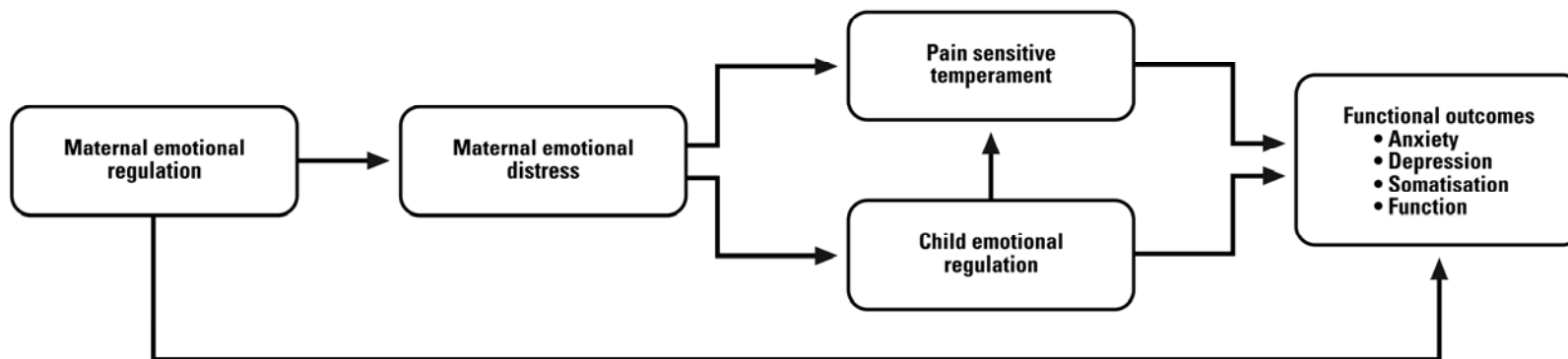


Figure 1. Diagram showing the initial model and proposed pathway

CHAPTER 9 RESULTS

9.1 Study One

The sample consisted of 73 subjects, 63% female 37% male, the mean age was 13.6 and ranged from 8-18 years. Table 5 shows the percentage of children and adolescents who presented at the Royal Children's Hospital, Melbourne and the Sydney Westmead Children's Hospital, Sydney with clinically significant levels of anxiety and depression. Two thirds of the participants scored high on the social desirability scale, which represents children wanting to present in a favourable light and may also influence young people to underreport symptoms.

Table 5. Percentage of Anxiety and Depression Scores clinically significant (>60)

Scale	%
Total depression score	15
Negative Mood	13
Interpersonal Problems	5
Ineffectiveness	5
Anhedonia	32
Self-Esteem	15
Total Anxiety Scores	17
Physiological Anxiety	41
Worry	30
Social Concerns	22
Social Desirability	66

Levels of anxiety ($M= 47.27$, $SD= 11.86$) and depression ($M= 49.74$, $SD= 11.87$) overall fell in the average range. The CDI and RCMAS were moderately correlated ($r=0.57$; $p<0.01$). There was a greater spread in the reporting of anxiety symptoms (min 25 max=70) as compared to the depressive symptoms (min 38, max = 65). Most children reported anxiety one standard deviation below the mean (Mode=40) and most children reported depression within the average range.

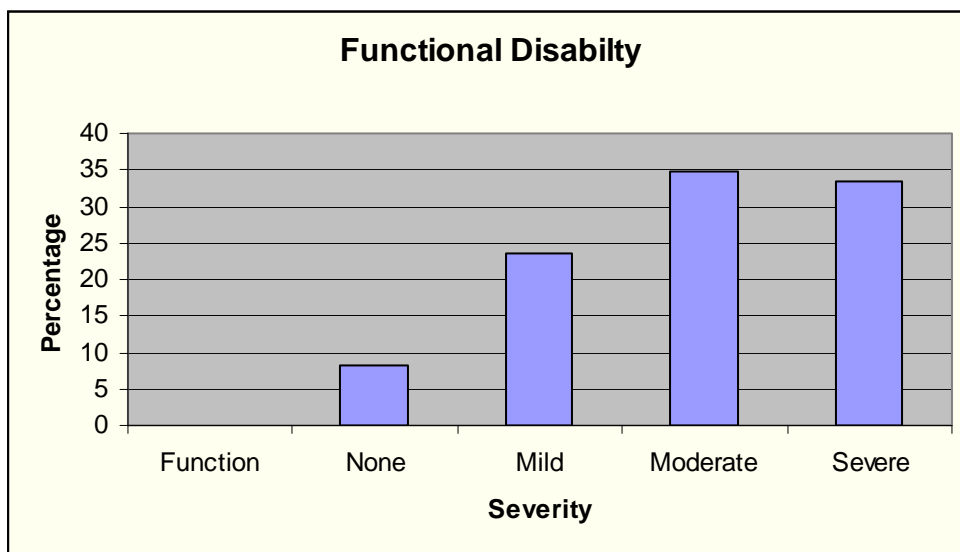


Figure 2. Patients level of functional disability

Most children and adolescents experienced moderate to severe levels of functional disability none ($n=6$), mild ($n=17$), moderate ($n=25$) and severe ($n=24$). The results of one way ANOVAs showed the relationship between anxiety and functional disability was not significant $F(3, 62) = 2.26$, $p=0.09$. However, the functional disability groups differed significantly on the depression scale $F(3, 60) = 4.59$, $p=0.006$. The severe functional disability group was significantly more depressed than the 'none' or 'mild' functional disability groups. Furthermore, the majority of patients who scored significantly on both anxiety and depression occurred in the moderate functional disability category (mild $n=2$, moderate $n=7$, severe $n=6$).

9.2 Study Two

9.2.1 Descriptive statistics

A total of 83 mothers and their children were invited to take part in the study, 10 parents declined and of the remaining 73 subject pairs another 11 mothers and children dropped out of the study due to difficulties attending the interview or completing the questionnaires. In total, the participation rate of people directly approached was 75%. The participants consisted of 62 children and 62 mothers. The mean age of the children was thirteen years old (SD 2.52), and 71% were female.

Table 6. shows the mean age of mothers, their marital and educational status. Approximately half the mothers were tertiary educated and half had completed school. Table 7. shows the correlations between the scaled variables. The correlations which are statistically different to zero have been shown. As elsewhere in this study, a standard criterion value of 5% was set a priori as the type one error rate. The meta-emotion variables acceptance, coaching and awareness were moderately positively correlated with each other. MEI emotional regulation (regul) showed a lower correlation with acceptance, coaching and awareness, suggesting that this was measuring a different aspect of meta-emotion than the other meta-emotion factors. Emotion coaching was moderately positively correlated with the awareness and acceptance of emotions, with a weaker correlation with emotional regulation. Hence, there is a weaker relationship between emotion coaching and emotional regulation than awareness and acceptance of emotions. Emotion coaching is the main variable used in Hooven et al (1995) research to build a theoretical model linking meta-emotion to a range of child development outcomes. Hooven at al. (1995) research did not report on the variable emotional regulation from the MEI. Gottman (1997) explains in the interest of parsimony the number of variables needed to be cut down and the choice of the variable for the modelling was limited to awareness of own emotions, awareness of child's emotions and coaching of emotions for sadness and anger. From Hooven's et al. data set two variables were constructed, Awareness and Coaching.

Table 6. Maternal Demographics

Age (years)	Mean 45	(SD 7.1)	Min =36/ Max =53
Educational Status - Mother			
Tertiary	42%		
High School	49%		
Other	9%		
Marital Status			
Married	88%		
Divorced	12%		
Nationality of Mothers			
Australian	74%		
Other	26%		

Table 7. Correlations Matrix

	accept	aware	regul	coach	regulkid	paremdf	cldemreg	fnloutdp	fnloutax	cstippt	cstipps	cstipsr	cstipas	cstiptl	gfsp	pcsitl
aware	0.56 **															
regul	0.39 **	0.3 *														
coach	0.53 **	0.58 **	0.37 **													
regulkid	0.38 **	0.25	0.93 **	0.34 **												
paremdf	-0.02	0.15	-0.22	0.17	-0.27 *											
cldemreg	0.19	0.15	0.04	0.08	0	0										
fnloutdp	-0.06	-0.04	-0.45 **	-0.02	-0.45 **	0.24	-0.4 **									
fnloutax	0.02	-0.08	-0.34 **	0.02	-0.34 **	0.29 *	-0.32 *	0.74 **								
cstippt	-0.02	0.09	-0.12	-0.05	-0.13	-0.03	-0.22	0.12	0.01							
cstipps	0.18	0.14	0.13	0.26 *	0.08	0.29 *	-0.22	0.22	0.13	-0.07						
cstipsr	-0.14	-0.08	-0.24	0.02	-0.32 *	0.19	-0.25 *	0.43 **	0.45 **	0.16	0.48 **					
cstipas	0.02	-0.09	-0.16	-0.03	-0.08	0.03	-0.47 **	0.22	0.19	-0.02	0.32 *	0.27 *				
cstiptl	0.07	0.09	-0.04	0.15	-0.07	0.18	-0.45 **	0.36 **	0.24	0.5 **	0.74 **	0.64 **	0.51 **			
gfsp	0.13	0.06	0.14	-0.12	0.11	-0.33 **	-0.1	-0.19	-0.2	0	-0.19	-0.12	0.13	-0.09		
pcsitl	-0.02	0.13	-0.25 *	0.18	-0.36 **	0.62 **	-0.15	0.38 **	0.38 **	0.05	0.2	0.35 **	-0.01	0.22	-0.33 **	
ccsitl	-0.16	-0.17	-0.16	0.1	-0.21	0.42 **	-0.17	0.42 **	0.28 *	-0.06	0.32 *	0.42 **	0.16	0.27 *	-0.23	0.57 **

*p<0.05, **p<0.01.

paremdf=maternal emotional distress,cldemreg =child emotional regulation, cstippt= pain sensitive temperament pain tolerance, cstipps= pain sensitive temperament perceptual sensitivity, cstipsr= pain sensitive temperament symptom reporting
cstipas= pain sensitive temperament avoidance of sensation, cstiptl=pain sensitive temperament total score, gfsp=global function scale,
pcsitl=somatisation- parent report, ccsitl=somatisation-child report

Table 8. Significant Correlations ($p < .05$) Between Variables on the MEL.

	SAW	SAC	SRE	SCO	AAW	AAC	ARE	ACO	FAW	FAC	FRE	FCO
SAW		.59	.32	.59	.64	.41	.32	.59	.78	.35		.45
SAC	.59		.34	.52		.36	.45		.35	.38		.38
SRE	.32	.34		.32	.36		.75				.61	.43
SCO	.59	.52	.32		.39			.53	.38	.39		.57
AAW	.64		.36	.39		.44	.35	.60	.71	.31	.43	.37
AAC	.41	.36			.44		.48	.52	.35	.41	.41	
ARE	.32	.45	.75		.35	.48		.32			.63	.47
ACO	.59			.53	.60	.52	.32		.57	.37	.35	.62
FAW	.78	.35		.38	.71	.35		.57		.35	.30	.49
FAC	.35	.38		.39	.31	.41		.37	.35			
FRE			.61		.43	.41	.63	.35	.30			.33
FCO	.45	.38	.43	.57	.37		.47	.62	.49		.33	

SAW=sadness (awareness), SAC= sadness (acceptance), SRE Sadness (regulation), SCO Sadness (coaching), A= anger and F= fear/anxiety

Although emotion coaching was moderately correlated with both the awareness and acceptance factors of the MEI, there was no relationship between emotion coaching and child anxiety, depression, somatisation or physical functioning. Emotional regulation had a moderate negative relationship with child anxiety and depression. This relationship indicates that maternal emotional regulation has a direct relationship with children's level of emotional distress. Therefore, lower levels of maternal emotional regulation are related to increases in children's anxiety and depression scores. These results indicate that maternal emotional regulation is associated with the child's reports of emotional distress. In summary, this research focuses on the variables regulation of own and regulation of child's emotions from the MEI. These findings indicate that the variable emotion regulation (regul) is associated with children's anxiety and depression levels as opposed to how well the parent can emotion coach their child. Alternatively, anxiety and depression in these young people is associated with the mother's reflective capacity regarding her own and her child's ability to regulate emotions.

Mothers' awareness, acceptance, regulation of her own and her child's emotions are measured on the MEI as this assessment tool is measuring mothers' reflective capacity in relation to her own and her child's emotions. Hooven's (1995) model is based on the following assumptions (a) that parental meta-emotion is linked to both inhibition of parental affect, (b) that MEI directly affects children's regulatory physiology, and (c) this in turn affects children's ability to regulate emotion. In considering these assumptions of the theoretical model for assumption (a), none of the MEI variables were related to Maternal Emotional Distress. Due to the non-significant correlation between regul and Maternal Emotional Distress (-0.22), it was decided to analyse mother's own emotional regulation and mothers' reports of her child's emotional regulation. Hence, for the factor emotional regulation this was then divided into the two components to provide more information regarding whether the significant relationships between regul and child anxiety and depression were related to mother's perception of her own ability to regulate emotions or her child's ability to regulate emotions. Furthermore, this would assess if there was a significant relationship between mother's own ability to regulate emotions and the variable Maternal Emotional Distress

Hence in Table 7. the factor reglkid is assessing only the mother’s perception of the child’s ability to regulate emotions. The correlations for both mother’s perceptions of her child’s ability to regulate emotions and her own are presented in a separate table (Table 9). In Table 8 it can be seen that mother’s perception of her child’s ability to regulate emotions (regulakid) was associated with child reports of anxiety and depression, the Symptom Reporting factor on the STIP and maternal reports of children’s somatic complaints (maternal report).

Table 9. Correlations for the MEI Emotional Regulation, Mother’s Perceptions of Her Own and Child’s Ability to Regulate Emotions

Variable	CREG	PREG
Awareness	0.34*	0.41*
Acceptance	0.41*	0.34*
Regulation	0.93*	0.88*
Coaching	0.40*	0.40*
Maternal Emotional Distress	-0.30*	-0.11
Child Regulation	-0.01	-0.01
Depression	-0.53*	-0.41*
Anxiety	-0.36*	-0.31*
Pain Sensitive Temperament	-0.01	0.08
Global Functioning Scale	0.16	0.23
Somatisation (parent report)	-0.39*	-0.13
CREG	1.00	0.65

* $p < .05$

There did not appear to be a correlation between MEI emotional regulation and maternal emotional distress (paremdf) (Table 7). This relationship is analysed further in Table 9. However, maternal emotional distress showed a low positive correlation with child anxiety and depression, and a moderate positive correlation with child somatisation. Hence,

increases in mothers' anxiety, emotional involvement and empathic concern were associated with increases in children's expression of both somatic complaints and emotional distress. The variable Maternal Emotional Distress appears to be associated with decreased physical dysfunction in children. Not only was Maternal Emotional Distress associated with children's functioning but also children's pain sensitive temperament, with a positive correlation between Maternal Emotional Distress and Children's Perceptual Sensitivity.

As anticipated child emotional regulation was negatively correlated with child anxiety and depression. Hooven et al.'s (1995) assumption that parental meta-emotion affects children's regulatory physiology and this in turn affects children's ability to regulate emotions is partially supported in these findings. Both mothers' emotional regulation as measured by the MEI and children's ability to regulate emotions were associated with increased anxiety and depression in children. However, there was no relationship between mothers' emotional regulation directly with children's emotional regulation. Children who had lower scores on emotional regulation had increased scores on anxiety and depression. The correlation table shows that the total scores on the STIP were associated with child emotional regulation. Therefore, children with lower levels of emotional regulation had increased pain sensitive temperaments. Results indicated a negative moderate correlation between children's pain sensitive temperament (STIP), with a higher loading on the avoidance of sensation factor of STIP. The Symptom Reporting factor of the STIP was positively correlated with child anxiety and depression and somatisation. However, there was no relationship between Symptom Reporting as measured by the STIP and the Global Functioning Scale (gfs). In terms of other factors on the STIP that were associated with children's functional outcomes, the Perceptual Sensitivity factor of the STIP showed a positive correlation with somatisation scores. Thus, increases in children's reporting of perceptual sensitivity were associated with the increased reporting of somatic complaints in children. Somatisation scores show a moderate positive correlation with child anxiety and depression. Children's physical functioning was not related to child anxiety, depression or child reports of somatisation, however was associated with mother's reports of children's somatic symptoms.

New variables were created for the MEI emotional regulation, which broke down this factor into mother (PREG) and child (CREG) across each feeling state. These variables are a mother's reports of her own and her child's ability to regulate emotions. Mother's perception of her child's ability in emotional regulation can be related to her own reflective capacity, awareness and tolerance of emotions. Table 8 shows the correlations between CREG and PREG and the variables in the research.

It can be seen in Table 9 that mother's perception of her own emotional regulation and her child's are moderately correlated. Gottman (1997) reported correlations between parent's awareness of their own emotions and awareness of their child's emotions. Correlations in Gottman's (1997) study ranged from .39-.63 for mother's awareness of her own and her child's emotions. The lower correlation of .39 was for mother's sadness, which appeared to be associated with mother's awareness of her child's feeling state. In comparison, to Gottman's correlations the relationship between mother's awareness of her own emotional regulation and her child's is moderate (0.65). However, mother's reports of their children's ability to regulate emotions (PREG and CREG) showed no relationship with children's reporting of their own emotional regulation (-0.01) (Child Regulation). This appears inconsistent considering both CREG and PREG are associated with child anxiety and depression. Mother's awareness of emotions appears to have a stronger relationship with mother's own ability to regulate emotions and mother's acceptance appears to have a stronger relationship with CREG.

In the correlation matrix in Table 7 it can be seen that there is no relationship between the variable Maternal Emotional Distress and children's reports of their own ability to regulate emotion (regul and childreg). Table 8 shows a significant negative relationship between Maternal Emotional Distress and CREG. Hence, mother's perception of children's ability to regulate emotions is related to mother's level of stress, anxiety (as measured by the PIP), emotional involvement and empathic concern for their child. In Hooven's model parent meta-emotion is linked to the inhibition of parental affect. These results indicate that when mothers become increasingly distressed and involved with their child, mothers perceive their child to be less able to regulate their emotions. However, mothers are not associating their own distress and emotional involvement with their own ability to regulate emotions. Alternatively, this relationship could indicate that mothers of children, who are less able to

regulate emotions, become increasingly distressed and involved in their child's pain. If this relationship is bi-directional then the interactions between mothers and children can become a vicious circle, whereby distressed mothers can increase children's distress and increased child distress confirms children's inability to deal with the pain and hence, mothers need to become involved and concerned about their child. It can be seen in the following path analyses that Maternal Emotional Distress is associated with the reporting of children's somatic complaints, children's reporting of their own emotional distress and the child's level of physical functioning.

Table 10. Means and Standard Deviations for MEI

Factor	<u>M</u>	<u>SD</u>
Child-Regulation	8.21	1.24
Parent-Regulation	9.26	1.10
Awareness (Sadness, Anger, Fear)	7.10	0.67
Acceptance (Sadness, Anger, Fear)	6.52	0.41
Regulation (Sadness, Anger, Fear)	5.82	0.68
Coaching (Sadness, Anger, Fear)	3.00	1.24

Maternal Questionnaires

Table 11. Means and Standard Deviations for Factors on the Paediatric Inventory for Parents PIP- Difficulty

Scale	M	SD
PIP-CM	20.14	6.96
PIP-MC	19.65	6.24
PIP-RF	22.34	7.13
PIP-ED	44.65	12.04

C=Communication, MC=Medical Care, RF=Role functioning, ED=Emotional Distress

Examining the current PIP means as displayed in Table 11 in comparison to those reported in Table 1 by Streisand et al. (2001) they are very comparable. In relation to the PIP-F scores reported by Streisand et al. (2001) for both parents and their children who were referred to an outpatient oncology clinic, currently undergoing treatment, as well as those off treatment, the mean scores for communication and medical care were \underline{M} =19.8 and \underline{M} =19.3. These means are almost the same as those reported by participants in this study. Thus, this population of mothers whose children are experiencing chronic pain are reporting the same level of difficulty in communicating about their condition to health care professional, friends and family as mothers whose child has cancer. Furthermore, these mothers are reporting the same level of difficulty in attending to their child's medical care as the Streisand et al. (2001) study of mothers whose children had been referred to oncology. The mothers in this study experienced less difficulty in their role function as compared to mothers whose children were diagnosed with cancer. The Role Function factor assesses how difficult it has been for these mothers to attend to work and the needs of other family members. Finally, the Emotional Disturbance factor assesses how the difficulties of having a child in pain have impacted on mother's sleep, mood, feelings of helplessness and uncertainty about the future. The means reported by mothers in this study are again similar to those reported in the Streisand et al (2001) study. Hence, although persisting pain is not equated to cancer, these mothers are experiencing similar levels of difficulty in the area of Communication, Medical Care and Emotional Function. There is not the same level of disturbance to mother's role function perhaps indicating less time is taken off work and less of an impact on family functioning.

Table 12. Means and Standard Deviations for Mothers' Ratings of Empathy on the IRI

Variable	<u>M</u>	<u>SD</u>
Perspective Taking	18.61	4.49
Empathic Concern	21.50	3.56
Personal Distress	10.34	5.49

The means and standard deviations reported by Davis (1983) as shown in Table 2 are similar to the means reported by mothers in this study. In Davis's (1983) study the sample was 579 male and 579 female college students. Hence, the mothers in this study are reporting similar levels of Perspective Taking, Empathic Concern and slightly less Personal Distress than the means reported by college students in Davis's (1983) study.

Table 13. Correlations Between the PIP-F (frequency) and PIP-D (difficulty) with Significant Correlations From the IRI

PIP	<u>IRI-EC</u>	<u>IRI-PD</u>
CM-F	.38	
CM-D	.45	
MC-F	.31	
MC-D	.39	.31
ED-F	.34	
ED-D	.35	
RF-F	.47	
RF-D	.34	.43

p<.05

Table 13 shows all PIP scores were correlated with the Empathic Concern factor on the IRI. Hence, mothers who were experiencing increasing frequency and difficulty in the areas of medical care, communication, role function and emotional disturbance have increasingly higher levels of empathic concern. As indicated by Davis (1983) empathic concern is significantly related in a direct association with emotional reactivity and awareness of and concern for others. It was proposed that high levels of empathy are related to emotional reactivity and can lead to personal distress. These two factors were combined in association with the Emotional Involvement factors from the FEIC to form a composite variable Maternal Emotional Distress. The mean and standard deviation for the factor Maternal

Emotional Distress (labelled as paramdf), which was composed by the mean of PIP-D factors, FEIC-EI and IRI-ED was $M=25.37$ and $SD=5.88$. This variable was a composite variable and therefore there are no comparison means available for this data. Table 13 also shows significant correlations between mothers' difficulty with Medical Care of their child and Role Disturbance as factors that increase mothers' level of Personal Distress. Thus, issues of Medical Care and attending to the need of the child and family members (Role Disturbance) leads mothers to take on others' stress as their own and they begin to have less differentiation between another's distress and their own.

Table 14. Significant Correlations Between the MEI and IRI

MEI Variable	<u>IRI-PT</u>	<u>IRI-EC</u>	<u>IRI-PD</u>
Coaching-Sadness	.36		
Parent Awareness- Anger			.37
Parent Awareness-Fear			.31
Coaching-Fear	.41		

$p<.05$

IRI-PT= perspective taking, IRI-EC=empathic concern, IRI-PD=Personal distress

Significant Pearson Product Moment correlations between the IRI and the MEI were mothers' emotion coaching and mother's scores on the IRI-PT scale. Thus, mothers who have increasing levels of perspective taking were also high on emotion coaching their child. Hence, mothers who are able to put themselves in their child's shoes and are thus more aware of their child's needs and feelings are better able to identify their child's feelings, validate their child's feelings and help the child to be able to deal with their emotions (emotion coaching). Therefore, perspective taking is associated with emotion coaching in mothers and not mothers' ability to regulate emotions. Although there is a relationship between perspective taking and emotion coaching, emotion coaching was not associated with any of the functional outcomes (anxiety, depression, somatisation and physical functioning). Mother's awareness of her own anger and fear was significantly correlated with increased personal distress on the IRI.

Child Characteristics

Table 15. Means and Standard Deviations for Child Report of Perceived Criticism and Emotional Involvement as Measured by the FEIC, Shields et al., (1992)

Variable	<u>M</u>	<u>SD</u>
Perceived Criticism	17.25	2.96
Emotional Involvement	22.40	4.27

The means reported in this study are comparable to those reported by Shields et al. (1992). Example items on the Emotional Involvement factor are ‘If I am upset people in my family are upset too’, ‘My family knows what I am thinking most of the time’. Using Shields’ et al. means as a guide the mothers in this study were not considered to be emotionally involved or perceived as critical as reported by children and adolescents experiencing the pain.

Table 16. Means and Standard Deviations for the STIP-C

Scale	<u>M</u>	<u>SD</u>
Perceptual Sensitivity	29.6	4.88
Symptom Reporting	12.52	2.26
Avoidance of Sensation	11.42	2.44
Pain Tolerance	28.72	4.42
Total	82.64	8.55

The STIP appears to be a useful measure based on the findings reported in the correlation matrix. Chen et al (2000) study is the only study that has been found to use the STIP and no

means were reported in the findings to indicate if this group of young people experiencing chronic pain has a high pain sensitive temperament compared to other populations. In relation to the STIP and significant relationships on the MEI, emotion coaching of sadness (0.38) and anger (0.33) were associated with increased perceptual sensitivity in children. Thus, coaching children about sadness and anger is related to increases in children's awareness of physiological sensations. Emotion coaching of anxiety was not related to increased perceptual sensitivity.

Table 17. Means and Standard Deviations for the Bar-On EQ-I:YV

Scale	<u>M</u>	<u>SD</u>
A. Intrapersonal Scale	99	14.85
B. Interpersonal Scale	99	17.20
C. Stress Management Scale	98	13.46
D. Adaptability Scale	98	17.41
E. Total EQ	100	14.45
F. General Mood Scale	95	16.50
G. Positive Impression Scale	95	15.16

Participants responses on the Bar-On EQ-I:YV were consistent, with all subjects scoring <10 on the inconsistency Index. Participants' scores on the Bar-On EI-I:YV were in the average range compared to children and adolescents of the same age and gender from the normative sample. Overall these mean scores indicate that this group of young people have adequate emotional and social capacity; that is, these results indicate that these children and adolescents understand their emotions and can communicate and express their needs and those of others. Scores on the Adaptability and Stress Management Scale also suggest that these young people are generally calm and work well under pressure and are flexible and effective in findings ways to manage everyday problems. In addition, these children are fall into the normative rage for the General Mood Scale suggesting that these individuals are optimistic. These findings do not give much information about the way these children express and understand their own feelings and the feelings of others. The CDI total score

was negatively correlated with the Positive Impression scale (G) on the Bar-On EQ I:YV (-.54).

The means for the CDI and RCMAS also fell within the normal range thus demonstrating that children and adolescents were not experiencing above average levels of anxiety and depression. Mean scores for the CDI are presented in Table 18.

Table 18. Means and Standard Deviations for the Factors on the CDI

Factor	<u>M</u>	<u>SD</u>
Negative Mood	49	11.52
Interpersonal Problems	47	5.61
Ineffectiveness	47	8.54
Anhedonia	54	10.52
Self-esteem	49	10.44
Total	50	10.48

There was no relationship between depression and the awareness, acceptance and coaching factors on the MEI. There were moderate correlations between the emotional regulation factor, across all three emotions (sadness, anger, fear) on the MEI and the factors on the CDI.

Table 19. Significant Correlations Between the CDI Factors and MEI Emotional Regulation

Depression	Sad- regul	Anger-regul	Fear-regul
CDITL (Total)	-.35	-.51	-.37
CDINM (Negative Mood)	-.53	-.37	-.33
CDIIP (Interpersonl Prob.)			
CDII (Ineffectiveness)	-.40	-.41	-.32
CDIA (Anhedonia)	-.45	-.53	-.45
CDISE (Self-Esteem)	-.42	-.48	-.43

$p < .05$

Table 19 shows that MEI emotional regulation was associated with all factors of the CDI except Interpersonal Problems (CDI-IP). Therefore, mothers' perception of their own and their children's ability to regulate emotions were associated with children's level of Self-Esteem (CDI-SE), Anhedonia (CDIA), Ineffectiveness (CDII) and Negative Mood (CDINM). The other factors on the MEI awareness, acceptance and coaching were not associated with any of the factors on the CDI.

Table 20. Means and Standard Deviations for the Factors on the RCMAS

Factor	<u>M</u>	<u>SD</u>
Social Concerns	9	2.65
Worry/ Sensitivity	9	2.97
Physiological Anxiety	10	2.35
Lie Scale	11	2.50
Total Anxiety	48	9.55

Table 21. Significant Correlations Between the RCMAS Factors and MEI

MEI	TL	PA	WO	SC	Lie
Sadness-Acceptance					-.31
Sadness-Regulation		-.34		-.32	
Anger-Awareness		-.47			
Anger-Regulation	-.41	-.37	-.39	-.50	
Fear-Regulation	-.31	-.37		-.37	

TL=Total, PA=Physiological anxiety, WO=Worry, SC=Social Concerns

The factors on the CDI were only associated with the emotional regulation factor on the MEI. Some of the factors on the RCMAS were associated with the emotional regulation of sadness, anger and fear. There was a negative relationship between Physiological Anxiety (PA) as reported by children on the RCMAS and emotional regulation across all three emotions. Mother's reports of her own and her child's ability to regulate emotions are related to children's level of physiological anxiety. Mothers' reporting of low levels of emotional regulation is associated with increased physiological anxiety in children. In addition, mother's awareness of her own anger, and her child's anger were associated with increased physiological anxiety in children. This relationship was not significant for the other two emotions, sadness and fear. The emotions anger and fear were related to total anxiety scores, and there was no relationship between total anxiety and sadness. The regulation of anger was negatively associated with both the Worry (WO) and Social Concerns (SC) scales. In addition, the Social Concerns (SC) scale was negatively correlated with the regulation of all three emotions. Finally, the Lie scale (L) was correlated with mother's reporting of her own and her child's accepting of sadness. That is, mothers and their children who are less accepting of feelings of sadness were related to children wanting to present in a favourable light on the RCMAS.

Maternal and Child Questionnaires

Table 22. Means and Standard Deviations for Maternal and Child Self-Report Measures

Measure	Child		Parent	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
Children's Somatisation Inventory (CSI)	27.00	12.91	26.00	13.06
Global Functioning Scale (POSNA)	8.87	18.95	9.87	18.95

The parent/child version of the POSNA and the adolescent version were highly correlated at 0.88. The parent and child version of the CSI were moderately correlated to 0.54. Both the GFS adolescent version (.38) and parent version (.42) were correlated with the emotional regulation of fear on the MEI. Therefore, mother's reports of her own and her child's ability to manage fear and anxiety are correlated with both adolescent and mother reports of increased functioning in the child.

Table 23. Pain Presentations of Subjects

Diagnosis	N	Additional Pain Problems
Chronic Daily Headache/ Migraine	23	5
CRPS	13	5
Conversion Disorder	5	5
Patella dislocation/ subluxation	7	0
Somatoform Pain Disorder	4	4
Abdominal Pain	6	2
Hip pain	1	0
Back pain	4	2
Widespread Musculoskeletal pain	2	2

Table 23 shows the pain presentations of children and adolescents who participated in this research. These findings show a range of chronic pain presentations which are representative of chronic pain syndromes found in childhood and early adolescence. The research literature reports the most commonly reported pain complaints are headaches. These current research findings support the literature; in this research headaches were the most commonly reported pain complaints with 30 percent of participants experiencing chronic daily headaches or migraines.

9.2.2 Path modelling

Results for each of the path analyses are presented below. Firstly, results are presented for part of the conceptual model addressing maternal emotional regulation and children's emotional distress. Secondly, results are presented for maternal emotional distress and children's functional outcomes in Figures 2 and 3 and perceptual sensitivity, Figure 4. Thirdly, the relationship between children's pain sensitivity, emotional regulation and functional outcomes are presented in Figures 5 and 6. Finally, the association between emotional regulation and children's pain sensitivity are shown in Figure 7. While sample size restrictions limited the overall power of the analysis, measures of effect size provide an indication of the magnitude of results. R^2 is a general measure of effect size which indicates the proportion of variance in the response variable accounted for by the explanatory variable. In each of the path analysis, an estimate of R^2 can be computed by squaring the standardised regression loadings.

Maternal Regulation and Child Emotional Distress

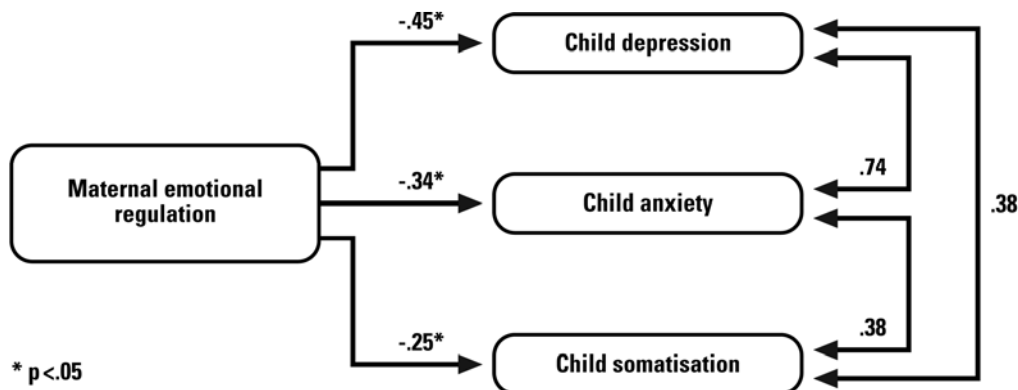


Figure 3. Paths showing the relationship between maternal emotional regulation and child anxiety, depression and somatisation.

Path analyses results show significant pathways between maternal emotional regulation and child anxiety, depression, and somatisation (parent report). The factor Maternal Emotional Regulation was measured by the MEI and included mothers' perceptions of their own and their child's ability to regulate emotions. Hence, Maternal Emotional Regulation assesses mothers' reflective capacity to think about how they and their children manage difficult emotions and is associated with mothers being aware of their own and their children's emotions and being able to identify a range of emotional states in themselves and their children. The paths show that there is a negative relationship between Maternal Emotional Regulation and child somatisation, anxiety and depression. Hence, mothers who perceive themselves and their child to be low on emotional regulation are associated with child reports of anxiety, depression and parent reports of child somatisation. Child somatisation is positively related to child anxiety and depression (.38). There is also a strong relationship between the CDI and RCMAS (.74), signifying that both these measures are assessing underlying emotional distress in children and adolescents. Unstandardised estimates are shown in Table 25.

Table 25 Unstandardised Regression Coefficient Output for Figure 3.

Variable	Variable	λ	S.E.	C.R.	<i>p</i>
Maternal Reg.	Depression	-4.88	1.24	-3.92	0.00
Maternal Reg.	Anxiety	-4.78	1.70	-2.81	0.00
Maternal Reg.	Somatisation (P)	-4.83	2.39	-2.02	0.04

Maternal Emotional Distress and Child Functional Outcomes

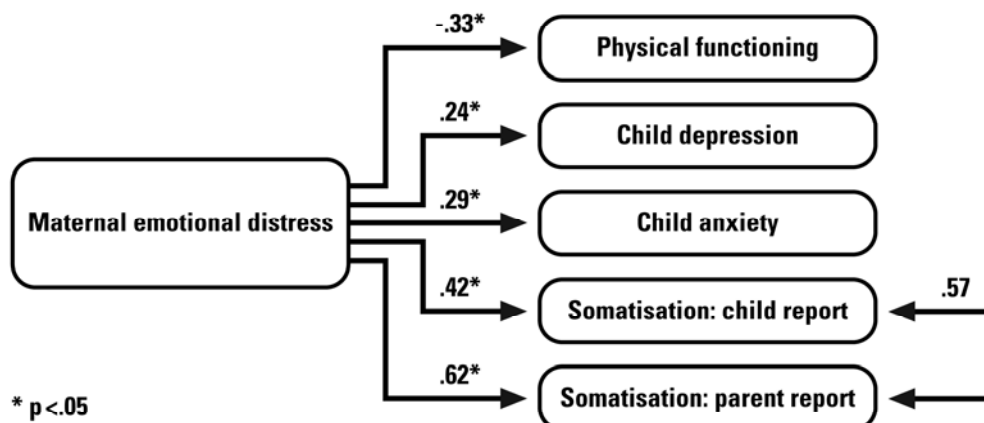


Figure 4. Paths showing a significant relationship between maternal emotional distress and child anxiety, depression, somatisation and physical functioning.

Results show significant relationships between Maternal Emotional Distress and all child variables, anxiety, depression, somatisation and physical functioning. These results suggest that higher levels of empathic concern in association with higher levels of anxiety and emotional involvement with their child are associated with anxiety and depression as reported by children. In addition, Maternal Emotional Distress is positively correlated with

both parent and child reports of child somatisation. Hence, mothers' empathic concern, emotional involvement and anxiety were related to reporting of somatic complaints in children. This relationship was demonstrated differently for mother and child reports of somatisation: Maternal Emotional Distress was more strongly associated (0.62) with maternal perceived child somatisation, whereas the relationship was significant but weaker (0.42) with children's reporting of their own somatisation. These findings suggest that mothers who have anxiety, empathic concern and are emotionally involved with their child's pain are reporting more somatic complaints in their children than children are reporting themselves. Figure 3 also demonstrates that there is a negative relationship between Maternal Emotional Distress and children's physical functioning as measured by parents' reports of the Global Functioning Scale (POSNA). Thus, as mothers become increasingly distressed and concerned for their children, children's level of physical functioning decreases. Unstandardised estimates are shown in Table 26.

Table 26. Unstandardised Regression Coefficient Output for Figure 4.

Variable	Variable	λ	S.E.	C.R.	p
Depression	paremdf	0.30	0.16	1.96	0.49
Anxiety	paremdf	0.47	0.19	2.35	0.01
Somatisation (P)	paremdf	1.37	0.22	6.09	0.00
Function	paremdf	-0.96	0.35	-2.72	0.00

Maternal Emotional Distress and Child Perceptual Sensitivity

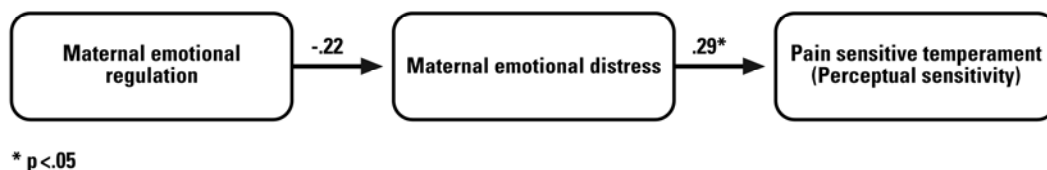


Figure 5. Paths showing the relationship between maternal emotional regulation, maternal emotional distress and the perceptual sensitivity scale of children’s pain sensitive temperament.

Maternal Emotional Regulation as measured by the MEI, incorporates mother’s perceptions of her own and her child’s ability to regulate emotions. These results show there is no relationship between Maternal Emotional Regulation and Maternal Emotional Distress. As the correlations in Table 8 indicate, once the variable Maternal Emotional Regulation was broken into two components (a) mother’s reports of her own and (b) mother’s reports of her child’s ability to regulate emotions there was a significant correlation between mothers’ reports of children’s emotional regulation and Maternal Emotional Distress. Figure 4 also illustrates a positive relationship between Maternal Emotional Distress and Perceptual Sensitivity as measured by the STIP. Thus, mothers who are anxious, empathic about their child’s pain and emotionally involved are associated with children reporting of perceptual sensitivity and awareness about their physiological sensations. Unstandardised estimates are shown in Table 27.

Table 27. Unstandardised Regression Coefficient Output for Figure 5.

Variable	Variable	λ	S.E.	C.R.	<i>p</i>
Paremdf	Regul	-1.94	1.08	-1.79	0.07
Cstipps	Paremdf	0.241	0.10	2.37	0.02

Paremdf=maternal distress, Regul= regulation, Cstipps= perceptual sensitivity

Child Pain Sensitivity and Child Functional Outcomes

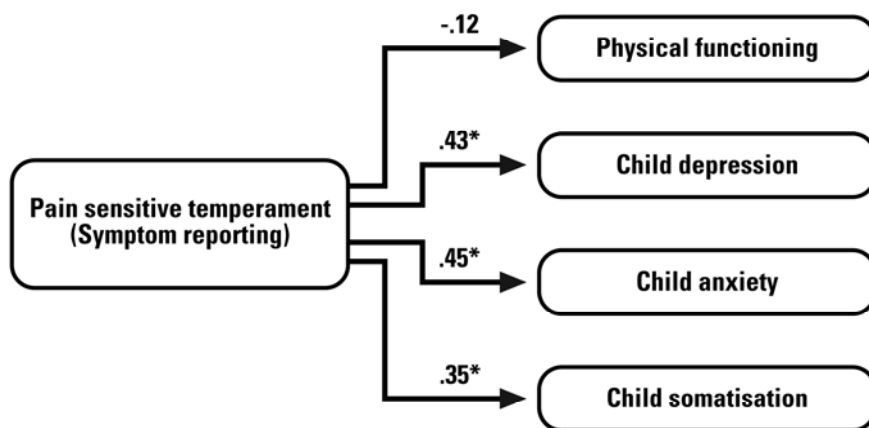


Figure 6. Paths showing the relationship between the Symptom Reporting factor of the STIP and children's physical functioning, anxiety, depression and somatisation.

Results show significant paths between Symptom Reporting as measured by the STIP and child anxiety, depression and somatisation. There was no relationship between Symptom Reporting and children's physical functioning and pain as measured by the Global Functioning Scale (POSNA). The Symptom Reporting Factor of the STIP asks children if they have more headaches, aches and pain than other children and if they often get bruises, cuts and scrapes. The lack of a relationship between Symptom Reporting and the Global Functioning Scale is surprising considering these young people are primarily presenting with persisting pain. Symptom Reporting in children was linked to child depression and somatisation. Moderate positive correlations between Symptom Reporting and child anxiety and depression are demonstrated in Figure 6. These results suggest that children's symptom reporting is associated with reporting of anxiety and depression symptoms. Furthermore, Symptom Reporting was also positively related to somatisation in children, yet with a weaker correlation than for anxiety and depression. Therefore, higher levels of

symptom reporting in children are correlated with somatic complaints in children. These findings indicate that children are reporting more symptoms associated with anxiety and depression as opposed to physical and somatic symptoms. Unstandardised estimates are shown in Table 28.

Table 28. Unstandardised Regression Coefficient Output for Figure 6.

Variable	Variable	λ	S.E.	C.R.	<i>p</i>
Somatisation (P)	cstipsr	2.00	0.69	2.89	0.00
Depression	cstipsr	1.39	0.37	3.70	0.00
Anxiety	cstipsr	1.89	0.48	3.93	1.00
Functioning	cstipsr	-0.91	0.96	-0.95	0.34

Child Emotional Regulation and Child Functional Outcomes

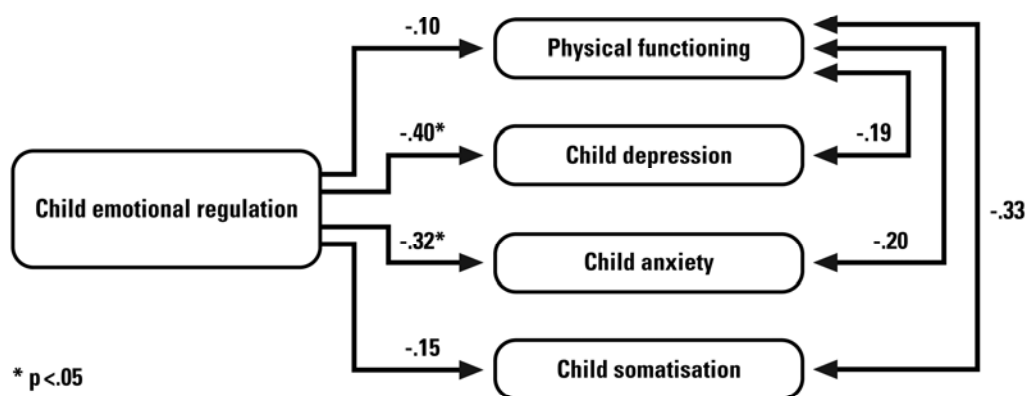


Figure 7. Paths showing the relationship between child reports of emotional regulation and child anxiety, depression and somatisation (parent report).

Child emotional regulation was significantly and negatively associated with children's anxiety and depression, with low levels of regulation increasing anxiety and depression scores. No relationship was found between children's emotional regulation and physical functioning and somatisation. Maternal emotional regulation and not child emotional regulation was significantly related to child somatisation. In Table 8 the components of Maternal Emotional Regulation were broken down into (a) mother's perception of her own ability to regulate emotions and (b) mother's perception of her child's ability to regulate emotions. In this table it can be seen that the significant relationship between Maternal Emotional Regulation and child somatisation is accounted for by mothers' perceptions of their child's ability to regulate emotions and not their own. In summary, the significant relationship between Maternal Emotional Regulation and child somatisation appears to be significant for mothers' reports of children's emotional regulation on the MEI (-.36), as compared to mothers' reports of their own regulation, on the MEI, and child somatisation (parent report), (-.07). Children's emotional regulation and distress appears to be not linked to children's physical functioning, whereas mothers' anxiety and stress as measured by the PIP are correlated. These correlations are shown in Table 29.

Table 29. Significant Correlations Between Factors on the PIP and GFS (POSNA)

	GFS-Parent
CM-Frequency	-.36
CM-Disturbance	-.36
MC-Frequency	-.35
MC-Disturbance	-.35
ED-Frequency	-.37
ED-Disturbance	-.34
RF-Frequency	-.38
RF-Disturbance	-.32

$p < .05$ CM=Communication, MC=Medical Care, ED=Emotional Distress, RF=Role Function

Table 30 does not show any findings for adolescents reporting of their own level of physical functioning as this was not related to factors on the PIP. Hence, mothers' increased levels of anxiety and stress are not associated with adolescents' reporting of their physical functioning. Alternatively, mothers' frequency and difficulty in the areas of communication, medical care, emotional disturbance and role function were all related to mothers' reporting decreased levels of physical functioning in their children. Unstandardised estimates are shown in Table 30 for Figure 7.

Table 30. Unstandardised Regression Coefficient Output for Figure 7.

Variable	Variable	λ	S.E.	C.R.	<i>p</i>
Functioning	cldemreg	-0.15	0.19	-0.75	0.45
Depression	cldemreg	-0.27	0.07	-3.42	0.00
Anxiety	cldemreg	-0.27	0.10	-2.60	0.00
Somatisation (P)	cldemreg	-0.18	0.15	-1.19	0.23

Child Emotional Regulation and Avoidance of Sensation

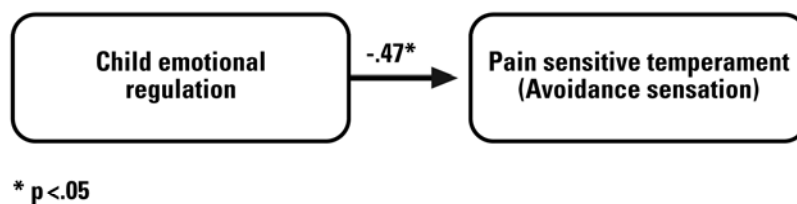


Figure 8. The association between children's emotional regulation and the Avoidance of Sensation factor on the STIP.

Path analysis shows a significant pathway between children's emotional regulation and the avoidance of sensation factor on the STIP. Results indicate that children's emotional

regulation is negatively associated with total scores on the STIP, with the Avoidance of Sensation factor accounting for the majority of the association of these factors. Thus, lower levels of emotional regulation (child report) are associated with children's avoidance of sensations. Avoidance of Sensation assesses children's sensitivity to noise as well as other sensations. Unstandardised estimates are shown in Table 31 for Figure 8.

Table 31. Unstandardised Regression Coefficient Output for Figure 8.

Variable	Variable	λ	S.E.	C.R.	<i>p</i>
cstipas	cldemreg	-1.04	0.25	-4.19	0.00

Cstipas=avoidance of sensation, cldemreg=child emotional regulation

CHAPTER 7 DISCUSSION

Overview

Overall, the aims of study one was to investigate the association between chronic pain and anxiety, depression and physical functioning in young people presenting with chronic pain conditions. This was a preliminary study to study two to investigate emotions in young people experiencing chronic pain and to consider the relationship between emotional distress and physical functioning for this population. The results for study one was consistent with the literature that there are a greater proportion of females compared to males experiencing chronic pain. The median age for the onset on both study one and two appears to coincide with the transition to high school and this is discussed further in the developmental considerations section. In relation to anxiety and depression, 15% were clinically depressed and 17% clinically anxious. Overall, the subjects feel into the normal range for depression and were reporting anxiety levels one standard deviation below the mean and were not significantly associated with reduced functioning. These results were surprising and led to the investigation of emotional regulation and the development of somatic symptoms in children and adolescents and the relationship between maternal and child emotional distress in young people experiencing chronic pain conditions.

Thus, the aims of study two were to investigate the association of maternal and child emotional regulation with children's functional outcomes, determine the interaction between maternal emotional distress on children's pain sensitive temperaments and children's affect regulation, and finally to examine the relationship between children's pain sensitive temperament and affect regulation. In light of the literature review the following hypotheses were tested; firstly it was hypothesised that maternal emotional regulation, as defined by the MEI would be associated with children's anxiety, depression, and somatisation. That is, mothers who have difficulties regulating emotions will be associated to children's anxiety, depression, and somatisation. This hypothesis was confirmed with

results indicating a significant positive relationship between maternal regulation and child anxiety, depression and somatisation.

Secondly, it was hypothesised that there would be a negative correlation between maternal emotional regulation and maternal emotional distress. This hypothesis was not confirmed and a further discussion of these research findings and the implications will follow this summary of the results. Thirdly, it was proposed that maternal emotional distress would be positively correlated with children's pain sensitive temperament and negatively correlated with children's affect regulation. Both these hypotheses were confirmed. The fourth hypothesis was also supported: this predicted a significant positive relationship between maternal emotional distress and children's anxiety, depression and somatisation, and a negative correlation between maternal emotional distress and children's physical functioning. The results supported the fifth hypothesis, which proposed a significant negative correlation between children's pain sensitive temperament and affect regulation.

Finally, it was hypothesised that children who have difficulties regulating emotions would be associated with anxiety, depression and somatisation. The results verified part of this hypothesis. Children's emotional regulation scores were negatively correlated with children's anxiety and depression scores, but not somatisation scores. This chapter discusses the implications of these findings: it reviews the limitations of the research and directions for future research and finally offers some synthesising comments.

7.1 Research findings

Maternal and Child Emotional Regulation

The research findings supported the hypothesis that maternal emotional regulation was positively correlated with children's anxiety, depression and somatisation scores. These findings highlight that there is a significant relationship between mothers' emotions and children's anxiety, depression and somatic complaints. It was unexpected to not find a relationship between maternal and child emotional regulation, especially in light of the significant relationship between maternal emotional regulation and child anxiety and

depression. This research found child emotional regulation to be associated with child anxiety and depression scores. This finding supports the findings in the literature that affect regulation is negatively correlated with anxiety and depression (Eisenberg et al., 2000).

However, there was no relationship between maternal emotional regulation as measured by the MEI and child emotional regulation (Bar-On EQ I: YV). One explanation for this finding may be due to the Bar-On EQ I: YV being a measure of a broader construct of emotional intelligence. The questionnaire measures both the intrapersonal and interpersonal aspects of emotional intelligence. High scores on the Intrapersonal scale are characteristic of individuals who understand their emotions and are able to express and communicate their feelings and needs. High scores on the Interpersonal scale describe individuals who are likely to have satisfying interpersonal relationships. They are considered good listeners who are able to understand and appreciate the feelings of others. In MEI the emotional regulation factor measures the following components, intensity and frequency of emotions, if the emotion has ever been a problem, the control of emotion, the blending of different emotions, the remediation techniques used when the emotions is experienced, and finally the avoidance or lack of an emotional experience. Furthermore, the Bar-On EQ-I: YV not only measures Intrapersonal and Interpersonal scales but also Adaptability, Stress Management, and General Mood.

Another explanation for the non relationship between maternal and child emotional regulation may be that mothers and their children may have different perspectives on children's ability to regulate emotions. Thus, this discrepancy may be the result of misattunements between mothers and their children's ability to regulate emotions. Hence, it is important to look at the components of the emotional regulation factor of the MEI.

Consideration of the components of the emotional regulation factor of the MEI, shows mothers' perceptions of children's ability to regulate emotions assess children's over and under control of emotions, and any difficulties the child has experienced as a result of dealing with intense emotions. There was no relationship between child report of emotional regulation and CREG (mothers' perceptions of children's ability to regulate emotions). The lack of a relationship between these factors suggests that mothers and their children do not share the same perception of the child's affect regulation. This may suggest that these

mothers and children are not attuned to one another regarding the child's affect regulation. Alternatively, either mothers or their children may not be accurately reporting their own ability to regulate emotions. Self-report of emotional regulation may be influenced by factors such as, wanting to present favourably, denial, and a lack of awareness of emotional experiences, beliefs, expectations and emotional distress.

The other component of emotional regulation as measured by the MEI assesses mothers' reports of their own ability to regulate emotions. This factor relies on mothers mentioning if over or under control of emotions has been a difficulty or a problem in the past, or indeed the present. Hence, mothers who may avoid discussing their own difficulties or who may not express this as a problem may bias the findings and lead to the finding of no relationship between PREG and child emotional regulation.

Another explanation why maternal and child emotional regulation were not correlated may be due to children's developing awareness of emotions which impacts on children's ability to accurately answer questions about emotions. Craig (1986) suggests that in general, children's knowledge and understanding about pain is at a low developmental level. Hence, one would also expect children's knowledge and understanding about emotions to still be developing. For children to be able to report on either pain or emotional experiences requires a child to be able to have a mental representation, or cognitive understanding of their physical sensations.

There may be many other factors that have not been discussed which could explain the absence of a relationship between maternal and child emotional regulation, due to the multiple determinants in chronic pain and the interrelationship between pain and emotion. However, it is proposed that children's development impacts on the child's expression and reporting of both pain and emotion. Young children's understanding of emotion tends to be concrete and often based on external events, for example playing a favourite game. As children develop, emotions begin to be associated with internal aspects of the child, for example a sad heart. Feelings then become more abstract and associated with physiological sensations and psychological explanations. Emotions therefore require the child to develop awareness into feeling states.

Emotional Coaching and Emotional Regulation

Another difference between this research and that of Hooven et al. (1995) research which extensively used the MEI is that the focus of this research is on the emotional regulation aspect of the interview as opposed to the emotional coaching component characterising the Hooven work. Hooven's et al. (1995) research linked parents' coaching of children's emotions to a range of children's outcomes (academic achievement, peer relationship and health). In reference to the literature review, parental emotion coaching focuses on: parents' awareness of their child's emotions, parents' acceptance of the child's emotions and the degree to which parents give instruction to their child to manage their emotions. Parents who are high on emotion coaching are more aware of their child's emotions, talk to them about feelings, validate their feelings and help them to experience and manage emotions. Parents considered to be lower on emotion coaching are likely to ignore, deny or distract children from their emotions.

Contrary to Katz and Gottman's (1996) findings, in this research no relationship was found between coaching and children's functional outcomes. Furthermore, there was no association between parents' coaching and children's emotional regulation. As already discussed the only factor from the MEI that was associated with children's functional outcomes was the relationship between maternal emotional regulation and children's anxiety, depression and somatisation. These findings supported hypothesis one, that maternal emotional regulation would be negatively correlated with children's anxiety, depression and somatisation scores.

Meta-Emotion Interview

To understand the scores of mothers on the MEI in this study it is helpful to compare the means with others' studies. Ramsden and Hubbard (2002) administered the MEI with a group of randomly selected mothers of grade four children, who were approximately ten years old in Pennsylvania. Ramsden and Hubbard (2002) reported means for awareness acceptance and coaching as (3.9), (3.08) (3.76), in contrast to the means in this research (7.09), (6.52), (3.00). The current group of mothers appears to be higher on acceptance and awareness of emotion, with similar means being reported for emotion coaching. Mothers in

this research are very accepting of their child's emotions and may almost be hypervigilant to their child's emotional state.

Parents in this research reported difficulty knowing the cause of their own or their child's emotions, and distinguishing between the emotions, anger, sadness or anxiety. As studies have tended not to focus on the MEI emotional regulation factor it is difficult to evaluate the means of this factor, however the data confirm the hypothesis that mothers in this study scored low on the MEI emotional regulation factor. It can be concluded from these findings that the awareness, acceptance, coaching and regulation components of the MEI are correlated. The acceptance and awareness factors of the MEI are aspects of emotional regulation. The results confirm the hypothesis that there is a significant relationship between Maternal Emotional Regulation and children's functional outcomes as compared to the finding of no relationship between maternal coaching of children's emotions and children's functional outcomes. It could also be that coaching by mothers who are unable to regulate emotion themselves is ineffective. Hence, instead of treatment consisting of programs designed to teach parents to emotion coach their children it may be effective to also help parents to manage their own emotional difficulties, which will also impact on the way parents interact with their children. This point will be discussed in more detail in the section on clinical implications of this study

Anxiety and Depression

Mothers' emotional regulation has been discussed as a factor influencing children's anxiety, depression, and somatisation scores. This research also hypothesised (hypothesis six) that children's emotional regulation would be negatively correlated with children's anxiety, depression and somatisation. The results indicated a negative correlation between children's emotional regulation and anxiety and depression scores. There was no relationship between children's emotional regulation and somatisation scores. These findings are discussed in relation to the prevalence rates of anxiety and depression for children and adolescents. The relationship between somatisation, emotional distress and affect regulation is also appraised.

Children's and adolescents' anxiety and depression scores fell within the normal range, and were not clinically significant with only 13% of young people experiencing clinically significant depression and 10% clinically significant anxiety (T score >60). These findings are comparable to the findings of Kashikar-Zuck et al. (2001) who assessed depression and functional disability in paediatric chronic pain. The participants in the Kashikar-Zuck et al (2001) study were similar, comprising 73 paediatric pain patients with a range of chronic pain conditions. The study also used the CDI with results indicating levels of depression were in the average range (M=52.64) with (13%) being clinically depressed (T score > 65). This current study used a T score of 60 to determine clinically significant depression, and when the T score is increased to >65, only 10% of the sample was considered clinically depressed.

Considering that prevalence rates for anxiety and depression in the general population are estimated to be as high as 20% these rates appear quite low. One reason for these low anxiety and depression scores may be due to children having undeveloped language and cognitive skills, which may impact on their expression of emotion, or ability to verbalise emotional experiences. This is only a hypothesis and cognitive testing was not undertaken with this sample. Another hypothesis may be that pain is a manifestation of these young peoples distress.

The prevalence of psychiatric impairment among children and adolescents is high and estimated to be 20% in the general population (Fonagy, 1998). This means many of these young people will suffer from mood disorders, such as anxiety and depression. Anxiety and depression represent internalising disorders, as compared to externalising (conduct) problems. It has been proposed that children and adolescents with internalising disorders are less likely to receive mental health services compared to those with externalising or disruptive problems (38.6% versus 56.3%) (Fonagy et al., 2002). The children in this study were not attending any other health care service.

Children who are more susceptible to internalising their emotions may present with physical complaints whilst their emotional issues may go unrecognised. Supporting this notion is a recent American study showing approximately 7.5% of the adolescent sample reported significant levels of depression, but only 11 to 15% of these children sought help

(Slater, 2003). Consistent with Slater's (2003) findings, Fonagy and Target (1998) proposed that (10-15%) of children and adolescents with psychiatric problems are thought to find their way to receive mental health services. For some children the pain may represent more emotional and painful feelings the child and family is experiencing.

This data shows that it is very difficult for children to articulate their emotional distress and receive treatment. It is common for children to complain of tummy pains as opposed to feeling anxious. It is then the reflective parent who is able to be sensitive to their child's emotional state and to identify the child's tummy pain is related to worried feelings. Hence, parents' awareness of children's emotional states may influence the percentage of children that receive treatment. Pain behaviours may become the more observable aspect of the child's distress. If parents, children and doctors only focus on the physical symptoms of a child's pain, the child may not receive optimal treatment. In this case the emotional aspect of pain may be overlooked and the cause of the child's pain remains unknown, or diagnosed as 'functional' or 'psychogenic pain'. This is often seen in the medical setting, where, for example, a gastroenterology department may not complete a psychosocial history to learn the child's abdominal pain is associated with bullying at school or a learning disability in the child. Hence, in order to understand the child's pain it is equally as important to know about the physical and psychosocial aspects of pain. This means understanding the child's feelings in relation to their pain, school, family, friends and indeed themselves.

Although the research literature describes more general anxiety and affective distress among chronic pain sufferers, Labbe (1999) proposes that when using standardised psychometric measures to test for anxiety and depression the results often appear to be within the normal range. The results of this research are consistent with this observation, whereby mean anxiety and depression scores fell within the normal range, and were not clinically significant. Anxiety and depression are the most common reported forms of psychopathology experienced during childhood and adolescence. Questionnaires used to measure both anxiety and depression have received mixed results in the literature in terms of diagnostic utility. For example, the RCMAS has been criticised for not showing a consistent pattern of discrimination between anxiety disordered-youths and psychiatric controls (Bell-Donan & Strauss, 1990; Hodges, 1990). However, the RCMAS has good

correlations with other measures of anxiety (Reynolds, 1982; Reynolds & Paget, 1983; Reynolds & Richmond, 1978, 1979).

Furthermore, there is a high correlation between RCMAS and depression inventories, suggesting that the RCMAS may tap into a general dimension of emotional distress. In this study the CDI and RCMAS had a strong correlation of .74. This study did not assess the comorbidity of anxiety and depression for the children and adolescents in this sample, due to the small sample size. Such an analysis may have provided some insight into whether children who meet a clinical diagnosis of anxiety also meet a clinical diagnosis of depression. The research literature states that there are high levels of anxiety and depression among chronic pain patients, and the onset of depression often follows that of anxiety. Anxiety often precedes the pain and depression is often described as being associated with the impact of living with persisting pain (Ross, Gullone, Chorpita, 2002). In summary these findings suggest that these young people are not reporting difficulties regulating emotions, or significant levels of anxiety and depression but are presenting primarily with pain. Of significance, is children's anxiety and depression is associated with mother's own affect regulation.

Instruments are needed to improve the detection of anxiety, depression in children and adolescents experiencing chronic pain; assessment may require attentive and well-trained ears as even mothers had difficulties identifying when their child was anxious. Perhaps self-report measures are not the best way to identify emotional disturbance in children. Semi-structured interviews delivered by experienced clinicians who are trained in listening and observing the subtleties of the child's mood, speech, emotional tone and how the child interacts, may provide greater understanding into the relationship between emotional distress and persisting pain. The CDI and RCMAS typically screen for symptoms directly associated with either anxiety or depression as defined by the DSM-IV, and maybe more useful in detecting severe psychopathology in young people. These findings also raise the importance of clinical skills in assessing anxiety and depression.

Another possible explanation for the low scores on the anxiety and depression measures compared to the findings of other studies with a similar population may be due to these children wanting to present in a favourable light in the presence of professionals, parents

and authority figures (Eccleston et al., 2004). Subjects scored one standard deviation above the mean (67 percentile) on the Social Desirability scale (Lie Scale) of the RCMAS. Examining the individual items, children concurred with questions like 'I am always nice', 'I never get angry'. The agreement with these items suggests that these children carry an ego ideal regarding how they should come across or present to others, representing a striving for perfection instead of a more reality based perspective.

The development of children's standards, regarding what is good and bad, may stem from the parents' wishes or expectations for the child. When the child identifies with their parents' standards the child secures the parents' approval and avoids their displeasure. The 'ego-ideal', or the striving for perfectionist standards therefore corresponds to the child's conception of what his/her parents consider to be morally good. Parents convey their standards and expectations to their child by rewarding their conduct, which is in line with their standards. Parents are not always aware of their expectations and desires for their child. Past research has concluded that children presenting with pain disorders and complex regional pain syndrome often have perfectionistic qualities (Kozłowska, 2003).

Taylor et al. (1997) highlighted that some theorists have suggested that high scores on social desirability scales and low scores on measures of anxiety, despite high levels of physiological arousal, may represent 'inhibition'. Inhibition may also involve a suppression of emotional expression. Suppression of emotion may be a conscious defence to regulate emotions or represent a family style of expressing emotions. Suppression assumes an awareness of an internal state. Children with chronic pain are often anxious and sensitive, and although they may not understand or know the cause of their anxiety, may suppress these physiological sensations in the face of high levels of arousal as a way of regulating affect. Children and adolescents in this study, scored higher on the lie scale, 67th percentile, and low on anxiety with a mean score of 48 suggesting that this group of young people may fit the profile discussed by Taylor et al. This finding raises the question of whether these children are able to access their emotional experiences enough to be able to express them in a questionnaire format.

Children may use suppression to avoid the experience of physiological sensations, in addition to not being aware of the connection between emotion and sensation. Pennebaker

(1987) proposed that one of the first goals is to help patients become aware of their internal sensory information, so the patient can accurately evaluate if they are hungry, anxious or distraught. Avoidance and suppression of emotion reduces the young persons' insight into their likes, dislikes, thoughts and feelings and ultimately their sense of self, identity and self-esteem. Long-term inhibition of emotions has been found to heighten autonomic arousal and impact upon the individual's health (Pennebaker, 1982). Conversely, verbal communication of emotional distress reduces autonomic arousal and has been proposed to be a protective function against somatic symptom formation. Children who avoid physiological sensations may never be aware of the emotion in the first instance to be able to then articulate the affective distress and understand what the arousal response was in reaction to.

The finding that only 10% of these young people with chronic pain reported clinically significant levels of emotional distress, raises another question about whether these children and adolescents are somewhat comfortable with their pain, or that there are positive aspects to the child's pain? In other words there may be secondary gains for the child. These children do not appear to be distressed or at least are not reporting feeling distressed living with chronic pain. Hence, the symptom of pain may be providing some relief for the child. Hence, the symptom in some cases may serve a purpose.

One would think the impact of chronic pain on a child and their family to be very distressing, due to many changes in the daily routine and disruptions to family life. If the child is receiving a secondary gain for their pain, the child may present as comfortable with their symptom. What has changed due to pain may be an indicator of underlying difficulties for the child or their family. For example, the child could be relieved from attending school in which daily bullying is occurring. Alternatively, the pain may serve to reduce the child's responsibilities or standards for academic achievement. One of the major changes to the child's life as a consequence of chronic pain is a reduction in school attendance and extracurricular activities. For the adaptive child the absence of these factors may result in a reactive depression, secondary to the pain, or the inability to be able to take part in normal activities. However, being relieved of these activities may allay the socially anxious child who has difficulties adjusting to new situations, or even has learning difficulties, or is being bullied. Hence, it is important to understand the secondary gains for the child. The

secondary gains of pain come into operation once the pain has persisted for a considerable time and serve to strengthen the symptom.

Withdrawal from school, social activities and chores are not reflective of age appropriate expectations and demands of the child. At some point the child will need to return to normal functioning which means returning to school and seeking out friends and activities. It would be expected that this increase in function would initially increase the child's level of distress, depending on the child's fears and level of confidence in managing their pain and the demands of school, friends and general expectations. Both parents' and children's distress often increases during these times and parents need to tolerate a certain amount of discomfort. Often mothers are requesting help and support in order for their child to return to school and to gauge the appropriate level of activity for their child. Parents request support in maintaining family and social relationships and how to manage systems, for example medical and school. However, parents must be able to tolerate their affective distress and perhaps an increase in the child's distress as the child gradually returns to normal functioning, perhaps despite experiencing ongoing pain.

Somatisation

Somatisation as measured by the CSI was positively correlated with anxiety and depression, with both anxiety and depression correlated at .38. Hence, an increase in anxiety and depression is associated with more somatic symptoms in children and adolescents. Depressed and anxious children may be reporting more somatic symptoms or merely the physical aspect of their emotional distress. This would then support the assumption that body symptoms can be an expression of emotional distress, and emotional disorders overlap with physical symptomology.

Alternatively, one could argue that an increase in somatic complaints may lead to high levels of anxiety and depression, however this does not appear consistent with anxiety and depression scores. Although there is a positive correlation between somatisation and anxiety and depression scores, there was no relationship between children's emotional regulation and somatisation. Perceptual sensitivity was positively correlated (.32) with child reports of somatisation. This relationship was not significant for parent reports of child

somatisation. These results highlight the importance of collecting both parent and child measures in clinical research and in clinical assessment. Findings demonstrated a significant negative relationship between somatisation and physical functioning of $-.33$. Hence, an increase in reporting of somatic complaints was associated with reduced physical functioning in the child.

Studies have reported a strong relationship between somatic complaints and anxiety and depressive symptoms, emphasising the reciprocal relationship between physical complaints and emotional distress (Campo et al., 1999). Physical complaints may precede emotional distress or emotional distress may precede somatic complaints (Barkow et al., 2004). This scenario of what comes first, the chicken or the egg, has lead clinicians to focus on maintaining factors in chronic pain, that is, emotional distress as a consequence of living with persisting pain. Parental distress may therefore either be a consequence of having a child in persisting pain or may extend more broadly to include parental distress in the development of the child's pain.

In relation to children's scores on the CSI it is helpful to compare the total mean scores with past research studies. The Meesters et al. study (2003) examined the psychometric properties of the CSI in the Netherlands, with a sample consisting of 479 Dutch school children, of whom 63 children had been referred to a paediatric clinic. The paediatric sample consisted of children and adolescents who did not suffer from a diagnosable physical condition, but all displayed somatic symptoms, and most children experienced pain. The children ranged from 8-16 years with the mean age being 11.72. The mean score on the CSI for the healthy group of children and adolescents was $M=10.16$ ($SD=10.36$). Girls scored significantly higher on the CSI than boys, $M=11.31$ ($SD=11.65$). For the paediatric sample, no gender differences were found on the CSI. Mean scores for the paediatric sample were $M=23.27$ ($SD=18.60$) and $M=19.95$ ($SD=19.12$) for girls and boys respectively. Comparing these findings to the results of the current study, the mean score for children's report on the CSI were $M=26.97$ and $SD=12.91$, indicating considerably higher mean scores than the healthy group of children and adolescents and slightly higher than the paediatric sample. The means of this current sample are similar to the paediatric group of participants in the Netherlands study, where most children experienced pain and were not diagnosed with a medical condition. The CSI is believed to be a useful instrument

to measure somatic symptoms in children and adolescents and in discriminating between healthy children and children who present to paediatric clinics.

The association for anxiety and depression and mothers' reports of child somatisation was the same strength of correlation (.38). Child reports of somatisation were weaker for anxiety (.28) compared to depression (.42). This raises the question of the relationship between somatisation and anxiety. Literature proposes that children with difficulties with affect regulation are more likely to express their distress somatically. Hence, an impaired ability to verbalise distress is thought to cause one to express distress through somatic symptoms (Ebeling et al., 2001). This is also consistent with the perspective that the child's body is the central vehicle of communication until the child is able to symbolise and put into words their emotional experience. This perspective does not only translate to children, but is consistent with individuals who have difficulties regulating emotions, for example in the case of Alexithymia. Alexithymic individuals lack words for feelings or have an impaired ability to verbalise distress which is thought to cause the expression of distress through somatic symptoms (Ebeling et al., 2001). Furthermore, somatisation has also been classified as a defence employed by the child's weak ego.

Defences are believed to ward off or divert affective distress and protect the individual from painful affective states and intra-psyche conflict. Hence, a child who has a flood of negative affect cuts off the feeling aspect of the emotion, leaving the physiological component to manifest as a troublesome sensation and body state (Kraemer & Loader, 1996). If somatisation, or pain is a defense against intolerable feeling states one would expect these children and adolescents to be reporting low levels of anxiety. In addition to secondary gains there may be an internal advantage to the individual having the symptom. In primary gain the symptom may alleviate a conflict, anxiety and expectations as opposed to some social advantage attained as a consequence of pain (secondary gain).

The mean score for anxiety for this group of young people was $M=48$, with a range of 50. Furthermore, results show a weaker correlation between child reports of somatisation and anxiety (.28) compared to somatisation and depression (.42) Parent report of child somatisation was associated with anxiety and depression, both being significantly correlated at (.38). The non-significant relationship between anxiety and somatisation may

suggest that these children are defending against their anxious feelings and that pain and somatic complaints may serve a purpose and subsequently reduce the child's anxiety.

Alternatively, object relations theorists propose that patients who lack adequate psychic structures are forced to express psychic conflict and pain through psychosomatic illness (Schumacher- Finell, 1997). In the absence of these psychic structures or the ability to symbolise affective experiences, patients have to tolerate the physiological aspects of their affective responses, making them more prone to attend to sensation and develop psychosomatic illness. Hence, individuals who are alexithymic may be more prone to hypervigilance of pain and somatic sensations, where physiological sensations and autonomic arousal may be perceived as a threat.

Maternal Emotions

The factor Maternal Emotional Distress was assessed by several instruments to measure mothers' stress and anxiety, emotional involvement and empathic concern. The Paediatric Inventory for Parents measured mothers' difficulties in the following areas, Communication, Medical Care, and Emotional Disturbance and Role Function. Hence, the factor Maternal Emotional Distress was a composite variable defined by the mean score of the above factors, in addition to the mean scores of the Empathic Concern factor from the Interpersonal Reactivity Index and the Emotional Involvement factor from the Family Involvement and Criticism Scale. Results show no relationship between Maternal Emotional Regulation and Maternal Emotional Distress. Hence, hypothesis two was not confirmed.

It was hypothesised that emotional regulation would be negatively associated with emotional distress. The results confirmed this hypothesis for child emotional regulation and anxiety and depression. Children's ability to regulate emotions was associated with levels of anxiety and depression. However, for mothers, the correlation between Maternal Emotional Regulation and Maternal Emotional Distress was not significant. The lack of relationship between Maternal Emotional Distress and Maternal Emotional Regulation may be due to the factor Maternal Emotional Distress not only assessed emotional distress, but

also empathy and emotional involvement. Thus, Maternal Emotional Distress may have been too broad to find a relationship with Maternal Emotional Regulation.

The factor Maternal Emotional Regulation was broken down into two components, CREG (mother's perceptions of children's ability to regulate emotions) and PREG (mother's perception of their own ability to regulate emotions). Results show a significant relationship between CREG and Maternal Emotional Distress $-.30$ and no relationship between PREG and Maternal Emotional Distress $-.11$. Hence, mother's perception of her child's ability to regulate emotions was associated with Maternal Emotional Distress. These findings could be interpreted in several ways. Either, mothers' perception of their child's ability to regulate emotions is associated with mothers' emotional involvement, empathic concern and their own levels of anxiety. Therefore, if a mother feels her child is unable to cope emotionally she may become more involved and anxious about her child.

Alternatively, increases in mothers' anxiety, emotional involvement and empathic concern for their child may decrease mother's perceptions of their children's ability to regulate their own emotions. In this case, mothers' own anxiety and distress may be projected onto the child and perceived as the child's own problems managing difficult emotions.

The results of this study indicate that Maternal Emotional Distress (empathy, emotional distress and involvement) was associated with increases in children's somatisation, anxiety, depression, and a reduction in physical functioning, confirming hypothesis four.

Furthermore, Maternal Emotional Distress increased children's Perceptual Sensitivity (as measured by the STIP). It was hypothesised that Maternal Emotional Distress would be associated with children's pain sensitive temperament. Hence, when mothers are more emotionally involved with their child, are empathic and emotionally distressed this increases the child's awareness of their own somatic sensations. Perceptual Sensitivity was the only significant factor from the STIP associated with Maternal Emotional Distress.

These findings suggest that mothers' emotional distress may be associated with children's pain sensitivity and hypervigilance to somatic sensations through their interactions with their children. These findings confirm hypothesis three. Further, it was also argued that Maternal Emotional Distress would be linked to children's emotional regulation. That is, as mothers become increasingly anxious and involved with their child's pain, reduce the child's ability to regulate emotions. This hypothesis was not supported. The link between

both mothers' and childrens' affect regulation and emotional distress is contradictory. A further examination of mothers' perception of her own and her child's ability to regulate emotions was undertaken.

These findings appear inconsistent for Maternal Emotional Distress and emotional regulation. Mothers are indicating that there is a relationship between Maternal Emotional Distress and children's affect regulation (CREG), whereas, there is no relationship between mothers' reports of their own ability to regulate emotions and Maternal Emotional Distress (PREG). Perhaps mothers are unable to see the connection between their own ability to regulate emotions and their own levels of stress and anxiety. However, mothers may be able to acknowledge this connection in their child; that is, there is a relationship between Maternal Emotional Distress and children's emotional regulation (CREG). This is not the only inconsistent finding when examining parent and child reports. When looking at the findings for somatisation and emotional regulation the results show that there is no association between children's reporting of their own ability to regulate emotions and children's reporting of somatic complaints. Perhaps if there were awareness of emotions there would be no reporting of somatic symptoms. In comparison, when Maternal Emotional Regulation is broken down into CREG and PREG, there is a significant correlation between a mother's perception of her child's ability to regulate emotions and children's somatic symptoms. These findings may also suggest that there may be a lack of awareness in children's ability to associate emotional regulation and somatic symptoms. In much the same way mothers may not be aware that their own affect regulation is associated with empathic concern, personal distress and emotional involvement in their child's pain.

The relationship between emotion and one's perception can be seen in the findings confirming a significant positive relationship between Maternal Emotional Distress and child somatisation (.62 parent report), (.42 child report). Mothers who scored higher on Maternal Emotional Distress reported more somatic symptoms in their child. Maternal distress is proposed to be associated with mothers' reports of child symptoms. Consistent with Garber et al. (1991) it appears that mothers in this study who experienced higher levels of Maternal Emotional Distress reported more somatic symptoms in their child as measured by the parent version of the CSI (.62), compared to child report of symptoms on the CSI

(.42). Emotionally distressed mothers appear to be more open to bias and misinterpretation of child symptoms.

Parents' particular patterns of response to affective distress, and the way parents respond to the child's distress will impact on the child's ability to tolerate anxiety and frustration. Parents' negative reactions to children's displays of emotions may lead children to hide their emotions making them more prone to anxiety and internalising disorders in emotionally arousing situations (Eisenberg et al., 1999). In addition, parental distress in response to children's negative emotions heightens or extends the child's arousal, impacts on the child's emotional security, and does not provide the opportunity for the child to learn about emotions (Eisenberg et al., 1999). Maternal distress in response to children's pain and distress is hypothesised to perpetuate the pain problem, increasing children's level of distress and physical disability.

Maternal distress may therefore impact on maternal reports of their child's pain. Furthermore, Maternal Emotional Distress is significantly associated with children's physical functioning. These findings support the research of Eccleson et al. (2004) who found maternal distress was associated with reduced functioning in adolescents with chronic pain. Although this research is investigating the association of maternal emotions on children's physical functioning one cannot discount that mothers are also distressed due to their child's decreasing physical functioning. Longitudinal research is needed to help identify the causal relationship between variables, and due to the cross sectional design of this study one can not definitely predict the direction of association between Maternal Emotional Distress and functioning or any of the other hypothesised paths. However, it is not uncommon for parental misconceptions, fears and inaccurate pain assessments to effect parental involvement in children's pain. Also, if parents perceive their child to be in pain, the child's activity may be reduced. In addition to this, children look to their parents to understand their pain experience and, as studies show, parental distress is a mediating factor for adolescent coping and directly impacts on physical functioning (Ericsson et al., 2002).

The results of the fourth analysis supported the fifth hypothesis. Maternal Emotional Distress was associated with children's perceptual sensitivity. Therefore, maternal anxiety,

empathic concern and emotional involvement is associated with the child's perceptual awareness of physiological sensations and the possible attribution that there is something to fear or frightening about the physiological sensations. It is hypothesised that Maternal Emotional Distress may increase children's perceptual sensitivity through mother's own increased hypervigilance in relation to the child's somatic complaints, which then increases children's awareness and attending to physiological sensations. However, this cannot be concluded from this preliminary research and perhaps future research may investigate this relationship further. Perhaps mothers attending to, and over reporting symptoms in the child increases the child's awareness of body sensations and leads the child to also over attend to symptoms, attributing all physiological sensations as pain, or a physical symptom. Hence, physiological sensations become something to fear. Perceptual sensitivity was associated with increased reporting of children's somatic complaints (.32). Furthermore, if mothers have empathic concern for their child, are anxious and are emotionally involved with the child it may be very hard for both the mother and their child not to continuously scan for or monitor somatosensory information, automatically shift their attention to pain and somatic complaints, and to not experience difficulties disengaging from the child's somatic complaints. These factors have been associated with hypervigilance to pain (Crombez et al., 2004). Moreover these findings highlight the importance of mother-child interactions in increasing children's perceptual sensitivity.

Considering the concept of social referencing where the child looks to the parent to gauge the meaning of events and the current situation, it may be both confusing and distressing for the child to see a mother who is extremely upset and anxious about their pain. It may be very difficult for the child in this situation not to infer that there is something terribly wrong with them, and that physiological sensations are something to be feared. Both the mother's and the child's distress then impact on the child's somatic symptoms and functioning.

When a parent is displaying high levels of emotional distress in response to their child's pain, that is high levels of empathy, emotional involvement and distress, the child's awareness or perceptual sensitivity of their physiology is raised. If these children then have difficulties regulating affect and avoid physiological sensations, the child may have limited strategies for regulating emotions and may present with somatic symptoms. Children who

are prone to somatic symptoms tend to rely more heavily on external cues to inform them how they should behave or feel in order to maintain physiological equilibrium. However, in this case the external cues from mothers amplify the child's distress, emotional insecurity, perceptual sensitivity and increase the likelihood the child will need to avoid or cut off their feelings. If these children have difficulties tolerating anxiety and fear and avoid physiological arousal, then they may seek out their primary caregivers for emotional and physical security. Hence, when these children seek out both physical and emotional proximity from their caregivers to decrease their emotional distress and the mother is not able to contain the child's aroused physiological state, the mother may further stimulate the child's already heightened physiological state. In this manner the system is maintained whereby the insecure child needs the parent to regulate their emotions; however maternal distress reinforces the child's state of distress.

The research literature discusses the impact of parental socialisation of emotion when parents amplify or maximise the negative affect experienced by the child. For example, matching anger with anger actually fuels or escalates the situation. Or parents may act angrily when a child is sad, which reflect their own inability to cope with the child's emotions or their own. It appears that the mothers who participated in this study are not punitive or punishing of their child's emotions; these parents rarely, on the whole, met their child's distress with anger, however, these mothers often meet their child's distress with high levels of their own anxiety, reducing the capacity to contain their child's distress or for the child to use the parent for emotional security. Parental negative emotions may emotionally dysregulate the child, leaving little scope for the child to learn about emotions.

Therefore mothers who are empathic, emotionally involved and anxious may also create the same environment whereby children do not have the opportunity to understand and learn from their emotional experiences as the child's emotions become blurred with mother's emotions. In the literature review, Wood, Eisenberg and Fabes' research is outlined in relation to parental reactions to children's negative emotions. If a situation occurs whereby parents respond to children's emotions with either anxiety or sadness this is believed to be associated with negative outcomes for children (Eisenberg et al., 1999). In this situation, children are more likely to have difficulties regulating high levels of emotional arousal and are susceptible to mood disorders like anxiety and depression.

Anxiety and emotional distress too, were discussed in the literature review as factors that lead to hypervigilant states of arousal and increase the likelihood a stimulus will be painful. Autonomic arousal and perceiving pain as a threat may lead to hypervigilance of somatic complaints, which can result in pain and disability. Anxiety can either be an exacerbating factor in pain, or a predisposing factor. Children and adults often get pain flare-ups during intense emotions, for example, anger, and anxiety, due to emotions increasing the activation of the sympathetic nervous system. Increased activation of the sympathetic nervous system maintains the individual in a state of physiological arousal. There is less literature on the influence of maternal emotional distress on the child's physiology and physical functioning. These research findings nonetheless suggest that Maternal Emotional Distress is associated with increased perceptual sensitivity, anxiety, depression, somatisation and reduced functioning in children and imply that the emotions of mothers may increase children's arousal of the autonomic nervous system and hypervigilance to somatic symptoms.

Another aspect of the relationship between mothers and children is the attentiveness of some parents to somatic symptoms or illness in their child. In many situations a mother may only be attentive when the child is ill, helpless and dependent. Hence when the child is well and independent, the child may fear the loss of their mother's love and care. It appears that emotional involvement, empathy and distress are factors that are associated with increasing somatic symptoms and decreasing physical functioning in children experiencing persisting pain.

The literature has reported an association between increases in somatic complaints in parents and their children. It is argued that parent-child interactions and early experiences with a somatising parent have been associated with somatic symptoms in children (Craig et al., 2002; Craig et al., 2004). Craig et al. explains these findings through maternal modelling and reinforcement of children's illness behaviours. Furthermore, Walker's et al. (1989) well known study concluded anxiety in mothers also predicted increased somatisation in children and adolescents (Walker et al., 1994). Walker extends a social learning perspective to consider the emotional experience of mothers on children's symptomatology. Another commonly reported study by Dunn-Geier et al. (1986) found that

intrusive mothers were associated with increased pain and dysfunction in adolescents with chronic pain.

The attributions parents have regarding their child's pain underlie many of the health-related behaviours of families and the associated emotional distress. Parents put their children through multiple medical investigations to ensure a diagnosis of cancer has not been overlooked. Moreover, this may also be a way to externalise family dysfunction. When all medical investigations are normal, families have a very difficult time piecing together their understanding of chronic pain. As Claar and Walker (1999) state, beliefs about the causes of illness are an important aspect of illness as they provide personal meaning to bodily discomfort. To be diagnosed with a cancer or a disease can provide more meaning than a diagnosis of chronic pain. For families to understand and make sense of chronic pain, they need to acknowledge the mind-body connection, the influence of beliefs and emotions on biology and attribute a proportion of their child's physiological discomfort to emotional distress. For families who feel out of control, helpless and misunderstood by the medical system this is not an easy task. Under these circumstances it is very difficult for families to move forward and for parents to understand the biopsychosocial aspects of chronic pain. Research has shown that mothers are particularly responsible for making treatment decisions and whether children adhere to treatment regimens (Claar & Walker, 1999). These decisions are based on their beliefs and understanding of their child's pain and symptoms. Hence, it is important to help families understand persisting pain.

Helping parents understand pain means professionals need to gauge what parents are thinking and experiencing in relation to chronic pain, beliefs and emotionally. Scores on the PIP indicate that mothers are experiencing high levels of distress. This measure was originally designed for parents of children who have been diagnosed with cancer, thus mean scores are provided for this population refer (Table 1 p.145). The mean scores for mothers in this current research on the PIP reveal that mothers are experiencing the same level of difficulty in communicating with family, friends and medical staff as parents who have been referred to an outpatient oncology clinic. Furthermore the mean scores on the PIP show that mothers are experiencing comparatively the same level of difficulty as mothers with a child diagnosed with cancer in the areas of medical care and emotional functioning. These findings indicate that these mothers are equally as distressed about their

child's condition as parents with a child diagnosed with cancer. Mothers feel helpless about their child's physical functioning, how to attend to their child's needs and feel uncertain about the future of their child's condition. It is important that health care professionals do not lose sight of the severity of parental distress when their child is experiencing persisting pain and severely reduced physical functioning. It can therefore be seen that maternal emotional distress impacts on the child's emotional distress, somatic complaints and physical functioning. One of the roles of 'mother' is to contain the child's distress. The mother needs to be able to tolerate her own anxiety to help the child regulate his/her emotions and also to reflect back to the child his/her emotional experience.

Some families are disengaged and others over involved. Emotional involvement was one factor that made up the composite variable Maternal Emotional Distress. Past studies suggest that over involvement and a lack of differentiation between parents and children may lead to psychosomatic symptoms in families (Minuchin, 1974). The consequence of an intrusive mother or feelings of impingement mean the child never has the experience of an attuned and containing caregiver, where the child can learn to bind their physiological experience. Taylor et al. (1997) argues that somatisation occurs instead of the cognitive processing of affects, and develops when caregivers have not been able to transform these raw bodily experiences into cognitions for the child.

Pain Sensitive Temperament

Results indicate that the STIP total score was significantly associated with children's emotional regulation (as measured by the Bar-On Emotional Intelligence scale). Specifically, most of the variance was explained by the Avoidance of Sensations factor of the STIP. Therefore, children who have difficulties regulating affects are more likely to have a pain sensitive temperament and avoid physiological sensations. The Symptom Reporting factor of the STIP was associated with children's anxiety, depression and somatisation scores but not the Global Functioning Scale (pain and function), thus, suggesting that what the child is reporting are the physical sensations associated with emotion and not pain and physical functioning. As previously outlined the Perceptual Sensitivity factor of the STIP was linked to Maternal Emotional Distress. Unfortunately Chen's study did not report the mean scores for children using the STIP, so it is hard to

compare the scores on the STIP with other research studies to determine if these young people with persisting pain have high pain sensitive temperaments.

Flor et al. (1999) proposed that chronic pain patients are overly sensitive to painful stimuli as well as non-painful stimuli. The heightened perceptual sensitivity experienced by chronic pain patients is proposed to be a consequence of elevated levels of autonomic arousal and hypervigilance. Hence, it is argued that affect regulation would be an important factor in children's pain sensitive temperaments. Perhaps once the child develops a heightened level of perceptual sensitivity and experiences pain sensations, pain related memories trigger physiological pain responses. Perceptual Sensitivity and Avoidance of Sensation are factors of the STIP, which were associated with Maternal Emotional Distress and children's affect regulation.

Although there are many interacting factors that may influence pain perception and a child's response to pain, child temperament is one factor that has not received a lot of attention in paediatric chronic pain research. However, Grunau's work with neonates investigating pain sensitivity and the moderating effects parents have, has produced relevant findings for the area of paediatric pain. Temperament or features of the nervous system determine a child's sensitivity to the environment, the level of emotional reactivity (intensity of emotional responses), baseline global mood and adaptability to novel situations. A pain sensitive temperament is a recent construct that has not been applied to paediatric chronic pain research. The results of this study also lead to interesting questions regarding the effects mothers can have on children's pain sensitivity.

What is evident from past research findings on oncology patients is that a child's pain sensitive temperament is associated with levels of emotional distress, that is, a child who has a higher pain sensitive nervous system is more likely to experience greater levels of emotional distress (Chen et al., 2000). In this research only the Symptom Reporting factor was associated with emotional distress and somatic complaints. The Symptom Reporting factor of the STIP significantly predicted levels of anxiety, depression and somatisation, with moderate positive correlations between the STIP-SR and these factors. In fact Symptom Reporting was not related to the child's physical functioning. These young people experiencing chronic pain appear to be reporting more symptoms associated with

emotional distress and not reduced physical functioning, perhaps illustrating Lipowski's (1987) definition of somatisation, whereby there is a somatic expression of psychological distress. If there are no words for an emotional experience or the emotion cannot be described or expressed the physiological sensations may be expressed as the symptom. The participants' primary presenting problem is persisting pain, however the reporting of symptoms appear to be associated with emotional and somatic symptoms and not pain and physical dysfunction even though some of the items relate to headaches, aches and pains.

Another significant finding on the STIP was the relationship between children's emotional regulation and the Avoidance of Sensation. The results show a moderate negative correlation between children's emotional regulation and the Avoidance of Sensation factor on the STIP (-.47). Children with difficulties regulating their emotions appear to avoid physical sensations. Therefore, the child may not be aware of the source of the physiological arousal, that is, whether it is due to an external or an internal stimulus. If children have a tendency to avoid physical sensations they may not be able to use bodily sensations to draw on the personal meaning of situations. In this case, the child is likely to see these sensations as a somatic phenomenon without a psychological component. The child who experiences health anxiety, discomfort anxiety or anxiety sensitivity, tends to interpret physiological sensations as dangerous. Interpreting somatic symptoms as something to fear and to avoid, increases anxiety, and in turn increases autonomic arousal, hence increases hypervigilance to pain and somatic symptoms. Affect regulation requires affect tolerance, whereby the child learns to use feelings of anxiety and depression as signals, which can be used to evaluate the situation or guide behaviour.

The child adds meaning to these sensations through subjective interpretation. Some children have an abnormal cognitive processing of emotional and visceral stimuli, or a tendency to perceive somatic stimuli as evidence of disease (Porcelli, 2004). It is normal for people to experience brief episodes of bodily discomfort, or muscular pain after a long day at school, or after playing sport. Some children interpret these sensations as pain or dysfunction. In addition to this, if parents and children have difficulties regulating their emotions they may not be aware of the antecedent to the somatic sensation, or temporary physiological discomfort. Children's avoidance of sensations means they cannot use these sensations for information processing about an event or situation. Increased perceptual

sensitivity means the child focuses on the somatic sensation or the physiological changes that have occurred in the body. Perceptual Sensitivity was linked to increased somatic symptoms as reported by children (.32). Children who focus on pain and physiological sensations may interpret all physiological arousal, even emotional cues as something fearful and to be avoided. According to Lane and Schwartz these children are at the preconceptual level of emotional organisation, whereby emotion is experienced somatically and not psychologically. Although children and adolescents scored within the normal range on the Bar-On EQ-I:YV the range was 52.86, indicating (as to be expected) that children vary in their emotional development.

MacLean (1949) proposed that individuals who are prone to somatisation do not relay emotional information to the neocortex of the brain where emotion can be expressed through the symbolic use of words. Instead distressing emotions are expressed through autonomic pathways, which result in physiological changes that may lead to physical disease (Taylor et al., 1997). Combining this deficit in affect regulation with the child who is born with a sensitive temperament, in the context of parent-child interactions where the mother is unable to respond appropriately to the child's affective states, the child may be unprotected in managing high levels of distress and therefore unable to develop a symbolisation for their affective experiences. Moreover, the results show distressed mothers increase the child's perceptual sensitivity, pain and physical functioning.

Piaget's (1981) theory of cognitive development predated the current research on affect regulation. However, Piaget proposed that affect development follows a course parallel to cognitive development (Taylor et al., 1997). In adolescence as maturational processes unfold the adolescent moves into formal operational thinking, which means the adolescent is faced with the task of integrating more complicated sets of thoughts and ideas about their own and others' feelings. Fonagy et al. (2002) propose that this developmental hypersensitivity to mental states may overwhelm the adolescent's ability to cope with thoughts and feelings except through bodily symptoms or physical action, thus casting doubt on Piaget's theory of affect development following a parallel course to cognitive development. The ability to mentalise or symbolise according to Fonagy et al. (2002) is deeply rooted in interactions with caregivers, and the attribution of mental states of self and

others via a process of mirroring. It is through these interactions that second order thinking or symbolisation is formed in order to understand and regulate affective experiences.

Emotion and cognition are linked in paediatric pain through the child's attention to sensation and pain. Zeltzer et al. (1997) proposed in her presentation of a psychobiological approach to paediatric pain, that there are essentially three key elements involved in pain perception when considering the pain-vulnerable child: i) the child's ability to regulate and focus attention, ii) the rapidity and magnitude of arousal in response to perceived threat, and iii) the memory of past noxious stimuli. These three elements are proposed to determine the child's ability to cope with pain and the level of distress associated with the sensory experience.

These three elements outlined by Zeltzer et al. can be associated with the young person's ability to regulate affects. Firstly, the ability to regulate and focus attention is considered a primary regulatory process (Shields & Cicchetti, 1998). Attention and emotion are considered mutually influencing systems with children developing more control in middle childhood. Furthermore, the shifting and focusing of attention has been associated with affect regulation (Cicchetti & Rogosch, 1997). The Goubert et al. study (2004) study found neuroticism lowered the threshold at which pain was perceived as threatening and hence, associated with pain vigilance. The association between attention and affect dysregulation is a potential area for further enquiry in paediatric chronic pain. Secondly, the magnitude of arousal and perceived threat and hypervigilance to pain and somatic sensations may be influenced by the young person's tolerance and modulation of affect. Thirdly, the level of unprocessed emotion associated with the event will influence the memory of past noxious stimuli. Therefore, affect regulation is proposed to increase a child's pain sensitive temperament through the avoidance of sensations and increased hypervigilance to pain and somatic sensations. Interactions with significant others are also likely to affect a child's pain sensitive temperament. The findings of this study demonstrate the association of mothers' emotional involvement, empathic concern and anxiety with children's perceptual sensitivity.

Developmental Considerations

The age range of participants who were invited to participate in the study was 7-18 years. The mean age of children who participated in the study was thirteen years. It is important to consider the developmental stage of these young people with chronic pain. One of the tasks of middle childhood is to achieve a sense of mastery and competence in the areas of identity formation, individuation and responsibility. Neven (1996) outlines the task of middle childhood as the ability to “tolerate being alone with their thoughts and feelings, in order to be able to negotiate difficult feelings”, for example feeling sad, or having difficult experiences (p.157). Children who are experiencing persisting pain, and restriction from attending activities which they are able to perform, or can gradually build up to, may be reinforced in their belief in their inability to cope and are not provided with the opportunity to be exposed to difficult situations, sadness, hostility, criticism or even failures. Often parents may intervene and fill the gap so the child does not have to experience any of these feelings. In order to not over compensate for the child and to provide appropriate limits, parents need to be able to tolerate their own negative feelings. This may mean that the child is temporarily angry with the parent, or the parent may need to contain their own feelings when they see their child anxious or sad. This is another reason why maternal affect regulation is important in influencing children’s development.

When a child experiences persisting pain, parents may experience increasing challenges to their normal role as parents. Parents of children with chronic pain have been reported to view their child as difficult and view their relationship with their child as dysfunctional (Eccleston et al., 2004). Increased parenting stress has been identified in parents with a child in pain as a result of parents’ inability to help their child and a overly close parent-adolescent relationship (Eccleston et al., 2004). Over involvement or a lack of boundaries between the parent and child subsystems within the family make the setting of appropriate boundaries and limits by parents for the adolescents difficult. Boundaries and limits provide a solid structure for the developing child to be able to test his/her experiences against. If the boundaries are inappropriate or if there is a lack of boundaries and limits then children may develop an unrealistic view of themselves. This also applies when there is a lack of clear boundaries between children’s and parents’ emotions. A child with chronic pain who has low self-esteem and no clear limits set by parents to attend school, does not feel supported

or well equipped to deal with the increasing demands of their school environment. Hence, for parents to support children in this stage of development, parents need to tolerate their own feelings of discomfort and set age appropriate limits and boundaries. This is not an easy task for parents to enforce limits around school and family life when they already feel overwhelmed and guilty that they cannot alleviate their child's pain. In addition, this is usually the time of major life transitions in the adolescent's life with the start of high school and reproductive and sexual maturity. The changing child is faced with psychological, physiological and social changes in the context of persisting pain, adding another layer of complexity for the child and their family.

Another major developmental task of the adolescent is the process of individuation and separation from parents. Some parents may be fearful of their child growing up and increasing their independence, unconsciously desiring to keep them childlike. Parents' tolerance of separation from their child determines the child's capacity to tolerate independence and separation from their parents; the child may not be able to tolerate the separation if the parents are unable to. In addition, if a parent is anxious or preoccupied about the child, it is very hard for the child to operate independently from these feelings and is not free to be or think. A parent's preoccupation with the child may obstruct the possibility of individual experience. In this research the variable Maternal Emotional Distress was associated with increased children's anxiety, depression, somatisation and reduced physical functioning. Moreover empathic concern, anxiety and emotional involvement may not only impact on factors associated with the child's functioning but also the child's development, mastery, competence and independence

The stage of adolescence is sometimes referred to as the second stage of separation-individuation (Blos, 1979; Mahler, 1972). Research literature suggests that difficulties in the child's development that have been unresolved or unnoticed have a tendency to reemerge during this developmental phase. This occurs as there is more independence for the adolescent as they progress into high school, which brings greater expectations and demands upon them, academically and emotionally. The adolescent is particularly emotionally sensitive in this period due to changes in their developing bodies. Early adolescence is also a period in which somatic symptoms may develop in regard to school and social pressures (Bernstein et al., 1997). Walker's (1999) research concluded that a

child is more likely to adopt the sick role if they have a high pain focus, if the family views the child as vulnerable, if the stressors in the child's life are ignored, and when child dependence is encouraged. The findings of this research concur with Walker's conclusions regarding parents' perception of the child's vulnerability and symptoms and the relationship between a high pain focus and emotional stressors in the child's life. The results of this research demonstrate the relationship between increasing maternal distress and mother's perceptions of children's inability to regulate emotions. In addition these findings suggest that pain becomes the focus of attention, distracting from other psychosocial stressors.

The middle years and start of high school carry the pressure of success for the child combined with parents' hopes and dreams for their child to succeed. It appears there are additional pressures that have filtered down in society to the educational system that were not evident in past years. The number of activities children and adolescents undertake is considerably high, for example music, swimming, basketball, running and dancing. Many children are taking extra curricula classes several days a week after school, leaving little time unfilled and the child is kept constantly busy. With the prevalence rates of chronic pain increasing, could it be that there are more complex and demanding social pressures on children and adolescents? With these increased pressures, perhaps children's physiological mechanisms for coping with adversity have not evolved to be able to meet these demands. Stress is essentially an adaptive response, to signal physical danger or harm to the individual not unlike acute pain. Situations arising in which there is severe, prolonged and uncontrollable psychological and physical distress, may contribute to hypervigilant states of arousal. Autonomic arousal is meant to be acute in nature and of limited duration, like acute pain. Ongoing arousal of the ANS may lower the threshold for pain, increase hypervigilance to pain and increase the individual's vulnerability to developing chronic pain and perpetuating chronic pain once it has developed (Imbuerowica & Egle, 2003; Winfield, 2000).

Based on clinical observations there appears to be a large proportion of children and adolescents experiencing chronic pain who have had a recent stressful event. Children's experience of stress is very subjective, just as the chronic pain experience is also highly subjective. Each individual child has a specific way of dealing with stress, and managing

high levels of physiological arousal. A stressor may not just be an external event, but may relate to the child's psychic life. Hence, one's standards for perfection and expectations, conflicts and low self-esteem may all create internal stress for the young person. Consequently, not measuring up to an ego-ideal is an internally stressful experience for the child, and perhaps more so than the actual event. The factor Pain Tolerance as measured by the STIP was significantly correlated with children's self-esteem (.32) and Adaptability as measured by the Bar-On EQ I:YV (.36). Therefore, children's sense of confidence and mastery and belief in their own abilities is associated with children's pain tolerance.

Study one's results showed that 66% of children and adolescents had significant scores on the social desirability scale. A predominant feature is how 'good' these children present; they are compliant to their parents, high achievers in sport or dancing or a range of extra-curricula activities. The other common theme in addition to high achieving attitudes is perceptual sensitivity and fear regarding the duration and disability of the pain. Parental anxieties and fears are often also expressed in their children, and, as the results indicate, impact on physical functioning and somatic complaints. These findings highlight the need to address maternal anxiety and distress in treatment in order to move the child forward emotionally and physically. It is interesting to note that both study one and study two's findings showed children and adolescents overall reporting of anxiety to be in the normal range. However young peoples' anxiety scores were associated with maternal distress and emotional regulation. Directly treating maternal anxieties is not always possible when parents are seeking a medical cure for their child and they continue to pursue more medical investigations.

Whatever the predisposing or precipitating factor that led to these children presenting with chronic pain, the pain has a profound impact on families' lives. Often children have experienced pain for 6-months – 2 years, missed considerable school time, parents have had to leave work, not to mention the numerous investigations and medical appointments, which leaves parents and children feeling as if the situation is hopeless. The endless medical appointments also reinforce the ambiguity of the situation, and a lack of clear direction. This void and uncertainty may be filled by the parents or child's anxieties and lead to abnormal illness behaviour and increased pain and disability.

The relationship between anxiety and functioning is also interesting. Study ones findings indicated that there was not a significant relationship between anxiety and functioning. Walker's (1999) research indicates which children are more likely to find the sick role rewarding and others who find this role aversive. Firstly, there are characteristics both within and external to the child which determine if the position of sick role is adopted by the child. The degree to which the child has been successful in accomplishing the normal developmental tasks will be fundamental to how much the child develops the position of the sick role. This appears to be applicable to the children and adolescents presenting to the Children's Pain Management Clinic who are developing 'a sense of mastery' (Erikson, 1964). Walker (1999) proposes that children who have experienced recent failures and attribute these failures to inadequate ability are more likely to steer away from activities that propose a further threat of failure. In this case the child may find it a relief to be excused from activities. The child may not always be aware of these feelings, or perhaps have mixed feelings regarding restricting activities. Continuing to not attend or reducing normal activity does not alleviate the child's anxiety and avoidance behaviour but further exacerbates the fear of approaching tasks and gaining a sense of mastery and confidence. The threat of being evaluated may also be overwhelming for the child who has not mastered this stage of development or who has very high expectations of achievement, and low self-esteem. These factors are often seen in the presentation of children with headaches and complex regional pain syndrome.

Clinical implications

The findings of this current research links the emotions of mothers to child's anxiety, depression, somatisation and physical functioning and suggest a link between mothers' emotional regulation and children's symptomatology. These preliminary findings bring to mind the importance of not only individual interventions with children experiencing chronic pain but also parent interventions. Working with parents may be focused on exploring the parents' present relationship, their early experiences and histories, in order to determine if there are any links between those factors and the current situation. This does not necessarily mean the treatment plan necessarily includes psychotherapy with parents but that there is a need to recognise the creation of a space for parents to become aware of their own thoughts and feelings and to understand the ways in which these processes may

be impacting on their relationship with their child. This entails exploring the way parents respond to children's pain, and the emotions that are evoked seeing their child in pain.

Moreover, these findings illustrate the importance of developing a trusting relationship with parents to support and enhance the child's treatment of pain. The relationship between maternal emotions and child symptomatology is under-reported in the field of paediatric pain. The nature of the parent-child relationship and parent-child interactions is important to explore to assess and understand children's pain. Very little has been written about the relational aspects in paediatric chronic pain. This is an area of research that deserves further investigation. Detailed case reports may provide insight into the link between emotions in parents and children's symptomatology and how these factors may be addressed in the treatment of parents and children in paediatric chronic pain.

Interventions that address parenting have tended to focus on basic behavioural management training, as opposed to focusing on parental emotions in response to their child. One reason for a focus on behavioural treatment approaches may be the lack of conclusive research demonstrating a link between parental emotion variables and children's outcomes. This research provides preliminary data on the association between maternal emotions and children's somatic symptoms and distress. Research and clinical practice has been shifting from parental behaviours to understanding parental emotions towards children as important aspects in children's emotional and social understanding (Fabes et al., 2001).

These findings suggest that in addition to treatment addressing parental behaviours and teaching strategies, treatment may need to focus on parents' capacity to regulate their own emotions, and how this impacts on children's functional outcomes. This was supported in the results whereby emotion coaching was not linked to children's anxiety, depression and somatic complaints, whereas maternal emotional regulation was negatively associated with children's anxiety and depression. The findings indicate a relationship between maternal emotional distress and children's functional outcomes. Hence in treating children with persisting pain part of the intervention may need to address parental emotional regulation. It may be difficult to treat parental psychopathology if it is the child who has been referred for the treatment of a physical pain problem; this makes psychosocial factors difficult to address in some families. Helping parents and families to understand a biopsychosocial

approach to pain and the importance of parent factors, child factors, and their interaction may be a slow process, and some families who are highly resistant are not ready for change.

7.2 Limitations of Research

Initially, study two was designed to test a larger model of paediatric chronic pain, with the variables outlined in Figure 1. However, the study design needed to be broken down into smaller models because the sample size was too small to allow for a more complex model incorporating all the variables. The initial design of the study included the variable 'attachment' using the 'Relatedness Questionnaire' (Lynch & Cicchetti, 1991). This measure was administered to children and adolescents to determine children's perceptions of the emotional quality, and closeness to their mother and their father. This questionnaire yielded two subscales 'emotional quality' and psychological 'proximity seeking'. The response rate for this questionnaire was extremely low with only 38 children and adolescents completing this measure. Based on the scores of these two subscales children and adolescents were classified as having either, Optimal, Adequate, Deprived or Disengaged attachment styles. Although this data was initially collected, the categorical nature of this questionnaire made statistical analysis difficult and was deleted from the study. Children and parents' attachment is an area still worthy of research. There has been little research investigating attachment in paediatric chronic pain. Findings from adult studies suggest that insecure attachment may provide insight into health seeking behaviour and high levels of emotional distress. The exclusion of attachment in this research is a limitation of the study and warrants further research. Chronic pain and attachment styles may impact on emotional distress and seeking services (Ciechanowski, Walker, Katon, & Russo, 2002). Additionally insecurely attached children are more likely to be emotionally distressed and consequently find their school and social functioning disrupted.

As already stated, a difficulty with using self-report measures to assess emotions lies in the assumption that the child has the capacity to identify feelings, can freely express feelings, and competently complete the measure without assistance from parents. This requires the child to verbalise or describe variations in feeling states. This is often the treatment for

children and adolescents, to help the child “put feelings into words” and help these young people to process emotional experiences, interpret physiological sensations and tolerate discomfort (Shirk & Steven, 1996, p.189). Experiencing emotions is not merely identifying and labelling experiences, but also involves the ability to understand the sources or causes of feeling states. The focus of this research has been on emotional regulation and whilst these findings have produced some interesting results it is important to remember not to reduce psychopathology to one factor. The overextension of unitary models has been raised as a recurrent problem in child treatment and therapy for disorders that may not share the same pathogenic processes (Shirk & Russel, 1996).

Furthermore, children who develop chronic pain are eager to present in a favourable light to others. This idealised self is an inaccurate view children hold of themselves. Children are often unaware that their standards or expectations are unobtainable, which may be the norm within their family, reflecting unrealistic standards or expectations set by the child’s parents. The Lie scale on the RCMAS is reported to reflect this. Reynolds (1983) suggests that the Lie scale is useful in predicting children with anxiety, emotional problems, inadequate peer relationships, problems at school and stressful situations at home. Participants in study one were in the 66 percentile on the Lie scale, indicating that this factor may be useful in identifying psychosocial difficulties. Elevations on this scale may reduce scores on the other factors of the RCMAS as children and adolescents who want to present in a favourable light to others will have bias responses to all test items.

The limitation of using self-report instruments to measure emotions and affect regulation also extends to the use of the Bar-On Emotional Intelligence scale. The Bar-On EQ I:YV employs a broader definition of the construct emotional intelligence to also include adaptability, and responses to stress. This broader definition of emotional regulation may have been a contributing factor to the non-significant correlation between children and mothers’ reports of emotional regulation. Previously the Bar-On EQ-I: YV had not been used in a paediatric chronic pain sample. Although significant negative correlations were found between emotional regulation scores and anxiety and depression scores, there are several reasons why this measure may not be a useful instrument to assess emotional difficulties in a paediatric chronic pain sample. Children and adolescents reported difficulties understanding the scale used, for example, ‘very seldom true of me’ (1),

‘seldom true of me’ (2), ‘often true of me’(3), and ‘very often true of me’ (4). For these young people to answer questions, “it is hard for me to talk about my feelings” and use this scale requires abstract thinking, the ability to take a step back and monitor themselves.

The Bar-On EQ I:YV was the first instrument to be published that assesses emotional intelligence in children and adolescents. In adults, the Toronto Alexithymia Scale (TAS-20) is commonly used to assess affect regulation, however, there is no child or adolescent version. Studies often infer emotional regulation via anxiety and depression scores, hence internalising or externalising is a reflection of difficulties with affect regulation. Cole (2004) raises this as a flaw in research designs in emotional regulation, whereby studies fail to distinguish between emotion and emotional regulation. Hence, this study incorporates measures for both emotion and emotional regulation. The development of a measure or an interview with children or adolescents to assess children’s ability to identify, express, and modulate emotions would be a valuable research and clinical tool. For many years psychologists have struggled to measure internal processes, therefore an emphasis has been placed on empirical observations and behavioural actions. The desire to explain human behaviour in a scientific manner using emotional terms has been difficult to integrate. The definition and measurement of affect regulation in children and adolescents still pose a significant theoretical and methodological dilemma.

An additional limitation of this study is the exclusion of fathers in the research, again due to the feasibility of the study. It was very difficult for mothers, who in most cases were the primary caregiver of the child, to attend the MEI in the context of numerous medical appointments. To ask fathers to also take a morning off work would have lead to a higher number of parents dropping out of the study. The decision to include only mothers, as opposed to fathers, was based on past research by Gottman et al. (1996), who found mothers who completed the MEI contributed to greater variance in child internalising outcomes (.56), compared to fathers (.30). To investigate the proposed hypotheses, direct observation of mothers and children would have provided both sound qualitative and quantitative research, and perhaps a more detailed account of this relationship and its impact on children’s affect regulation, pain sensitivity and functional outcomes. Observation and listening to parent-child interactions may clarify whether deficits in

children's affect regulation point to relationship difficulties with the primary caregiver, who may not be able to tolerate and contain the child's emotions (Lefebvre, 1980).

The participants in this study were patients who have been referred to a paediatric pain clinic and may represent functionally impaired children experiencing persisting pain. Thus, these findings may not be applicable to all children and adolescents experiencing chronic pain. It has been proposed that individuals who are referred to a tertiary care clinic have more mood disorders and pain behaviour (Gerralda, 1999). Alternatively, studies have found no difference in psychological distress between those who seek medical treatment and those who do not (Porcelli et al., 1999). The results of this study indicate that children and adolescents are not experiencing clinically significant anxiety and depression but perhaps their mothers are and it is increasing physical disability in the child that prompts parents' decisions to bring their child to a chronic pain clinic. Perhaps it is important to include in the routine assessment of children and their parents standardised measures to assess psychopathology in parents and previous family history.

Another limitation of this study is the small sample size, and the number of variables, reducing the power of the study and the risk of type 1 errors. Hence, with a larger sample size the effect of the significant paths would be expected to increase. If a larger sample had been possible due to additional funding, increased referrals and time, then subgroups of chronic pain disorders could have been investigated to determine if there were differences between pain conditions. It is still important to conduct research in situations where sample size is limited. Such limitations should not prevent research, but they must be taken into account during analysis and reporting. The current study was shaped in several ways to account for the sample size constraint. First, rather than analyse the whole model in Figure 1, a series of derived models were specified which were less demanding in terms of sample size requirements. These models involved fewer parameters and hence required fewer observations to estimate stable coefficients. Only structural models were analysed, and measurement models were excluded to reduce the number of parameters being estimated. This enabled the use of simple linear rather than full structural equation modelling techniques.

Second, analysis of 'effect size' was used to bring a clinical in addition to statistical perspective to the interpretation of parameter estimates. Third, continual effort is made to emphasise the heuristic and suggestive rather than conclusive nature of the current results. To the extent that sample size limitations are an inherent problem in this area, as they often are in clinical studies, then confidence in the validity of the results could be developed through independent replication of findings.

Chronic pain is multifaceted with multi determinants and although the sample size is low, this is considered less of a limitation than reducing the number of variables to make hypotheses about a complex problem. No control group was used in the study. This was considered in the design of the study, however many of the questionnaires relate specifically to pain and somatic symptoms, and therefore, would not be able to be administered to a group of young people who were not experiencing chronic pain.

7.3 Future Research

Based on the findings of this research further development in a number of areas is warranted. This research has focused on the parent-child dyad and not family functioning, and the role of the father. Both these areas require further investigation in order to understand the complexity of determining factors in paediatric chronic pain. Future research in these areas will extend knowledge regarding the role of the father and the interaction effects between mothers, fathers and siblings on functional outcomes in young people experiencing chronic pain conditions. Moreover, the influence of siblings is an important dynamic that is worthy of future research, for example the competing for resources and attention within a family and somatic complaints. The definition of family is also changing and thus chronic pain has implications for blended families and different cultures within families.

This research makes the assumption that psychosocial stressors or difficulties in modulating high levels of emotional arousal exacerbate the responsiveness of the ANS, and lower the

threshold for pain. Research exploring the temporal relationship between the onset of somatic complaints and emotional disturbance may lead to a greater understanding of the causal mechanisms of pain presentations. If the presence of emotional distress is secondary to somatic symptoms then medically explained and unexplained pain would have equal associations with emotional distress and this does not appear to be the case: psychic distress often leads to somatic presentations (Walker et al., 2001; Walker & Greene, 1989). Chronic pain is often associated with increases in mood disorders. One of the key questions is what comes first, pain and somatic symptoms, or emotional distress. Only prospective longitudinal studies with initially pain free subjects can help to understand the link between temperament, parental factors, somatic complaints and psychopathology. There are few longitudinal studies in chronic pain, which address aetiology and the pathological processes that underlie chronic pain disorders. Consequently, follow up studies in paediatric chronic pain patients will raise clinicians' and researchers' awareness into the physical and emotional functioning of these young people, and if they continue to experience chronic pain conditions or develop other disorders of affect regulation, for example eating disorders, mood disorders or substance abuse.

It is interesting to note that in both studies the percentage of girls presenting with chronic pain was much higher for girls than boys (study 1. 63% and study 2. 70%). This raises questions regarding the role of gender in pain and somatisation. Research findings support higher prevalence rates of somatic symptoms and chronic pain disorders in females, compared to males (Meesters et al., 2003). Unruh (1996) proposes that women report more severe levels of pain, more frequent pain of longer duration than men. Women are more likely to experience recurrent pain, and are at greater risk of being labelled as having a psychogenic disorder. Chambers et al., (2002) experimental study found a significant effect of maternal behaviour on their daughters' pain experiences. Results concluded that by randomly assigning mothers to interact with their child and behave in accordance with structured roles, maternal behaviour can play a direct role in influencing their daughters' pain experiences. Thus the area of gender and chronic pain is an area that warrants further investigation to understand the differences between males and females using a biopsychological perspective

Another area of interest is the relationship between emotional regulation and social competence or social difficulties for children who are experiencing chronic pain. Clinical observations indicate children who experience chronic pain and other somatic complaints often experience difficulties with peers (Natvig et al., 2001). A basic assumption in the literature is that social competence is based on an individual's capacity for affect regulation (Fabes et al., 1999). One must be able to manage emotional arousal in social situations in order to choose adaptive responses or appropriate responses or emotional displays to the specific context.

The social context of children's pain is important to understand before treatment can proceed. Although children may present with the same type of pain, for example headaches, or complex regional pain syndrome, the underlying cause may be different for each child. Research is still needed to determine the relative impact of these contexts for the child with pain, for example school, teachers, peers, family, community and culture. Maybe some of these factors may serve as protective factors for children who may be at risk of developing a chronic pain condition. Although not the focus of this research project, clinical observations note that many children and adolescents presenting to paediatric pain clinics have experienced difficulties with peer relationships and bullying. Palermo (2000) reports children miss more school days due to 'chronic pain' than chronic diseases. Thus, the relationship between school-related issues and persistent pain are creditable factors to investigate when assessing and formulating treatment plans and in developing future research. The influence of school and peer relationships and the difficulties children experience may be important areas to focus treatment in helping children to adhere to a return to school program. The trajectory of chronic pain remains a delicate balance between child and environmental factors and how the parent helps the child to manage developmental tasks and the difficult emotions that surround these events.

7.4 Concluding comments

As children develop there is a shift away from viewing feelings as only being evoked by situations, to recognising that internal processes mediate emotions. Hence, it is important to understand the child's experience of pain. Often the problem with treating chronic pain patients who have complex symptoms, numerous medical investigations and treating clinicians; is to find a reflective space to be able to think about the child's experience so the child may experience emotionally as opposed to only somatically. Chronic pain is not a simple issue. In order for multidisciplinary teams to develop effective treatment plans, clinicians need to be clear about case formulations and clinicians' individual and shared goals.

It appears since the DSM III changed the diagnoses from 'psychophysiological disorders' to the current classification in the DSM IV-TR, the understanding of chronic pain has also become confused and not well understood. Where does chronic pain lie in the classification of somatoform disorders? Current perspectives consider chronic pain as not somatisation but a central sensitisation disorder, incorporating the interaction between psyche and soma. Central sensitisation is proposed to be the result of dysregulation of the automatic nervous system, due to ongoing emotional duress. Hence, is this not the pathological process that underlies somatoform disorders, where distressing emotions find their expression through automatic pathways instead of being able to be reflected upon or spoken about?

Pain is both an emotional and subjective experience. The variation in disability experienced as a consequence of pain appears to be related to emotional distress in children and their mothers. The relationship between pain and emotion is highly significant in perpetuating children's pain problems and careful consideration to both parent's and children's emotions is important. The first step in developing effective treatment is to research what factors are associated with poor functional outcomes. This research makes a contribution to paediatric chronic pain by understanding maternal and child emotional factors, which are associated with children's functioning, pain sensitivity and affect regulation.

In the area of paediatric pain management there has been a significant gap between empirically supported treatments and their implementation in clinical practice. Closing this gap creates an important challenge in paediatric pain treatment. In order to develop interventions of clinical significance, it is helpful to understand children's functioning in the context of their family. The area of paediatric chronic pain involves understanding the complex interaction of physical and psychological factors that limit children's functioning. Current literature from paediatric multidisciplinary pain centres often outlines treatment, detailing components education, pain strategies and cognitive behaviour therapy. It appears the complex nature of emotion and pain and the underlying psychobiological pathways of pain are rarely addressed in the context of the child's development and their family, more specifically, understanding the emotional relationship and interaction between parents and children. It is intended to develop effective treatments from these findings to work with parents and the parent-child relationship in paediatric chronic pain.

Children and adolescents presenting with pain complaints are common: however whether children present to a general practitioner, paediatrician, or psychologist will affect the course of treatment. Different health professionals may have a different understanding of pain in childhood, depending on their knowledge of chronic pain disorders. Thus, conducting research in this area is important to highlight significant issues for assessment and treatment of these conditions. Children can also present with varying levels of functional disability depending on the pain disorder. A common understanding of chronic pain in children is still evolving as research raises health practitioners' awareness and education. Although earlier views emphasised a more dualistic approach to understanding clinical cases, these theoretical perspectives are now considered outdated and replaced by a more integrated mind-body orientation.

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APPENDICES

Appendix A Ethics approval

Appendix B **Parent and participant Information Statement and
Consent Form**

Appendix C Meta-Emotion Interview (MEI) schedule and coding sheets

Appendix D Paediatric Inventory for Parents (PIP)

Appendix E Interpersonal Responsivity Index (IRI)

Appendix F Family Emotional Involvement and Criticism Scale (FEIC)

Appendix G Sensitivity Temperament Inventory for Pain (STIP)

Appendix H Bar-On Emotional Quotient Inventory (Bar-On EQ-I:YV)

Appendix I Paediatric Orthopaedic Society of North America (POSNA)

Appendix J Children's Depression Inventory (CDI)

Appendix K Revised Children's Manifest Anxiety Scale (RCMAS)

**Appendix L Children's Somatisation Inventory (Parent and child
Version)**