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.....  
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**Anxiety in Young Children:  
Direct and Indirect Connections with Asthma,  
Protective Parenting and Parental Adjustment**

**Submitted by**

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## Summary

The primary aim of this research study was to examine parental and social factors directly and indirectly associated with anxiety in a sample of young children. In addition, the direct and indirect associations between childhood asthma and anxiety were examined. A secondary aim of this research study was to examine whether asthma specific variables, including severity of asthma, management of asthma, and duration since asthma diagnosis, were directly and/or indirectly associated with childhood anxiety. The sample comprised 103 children aged 2 years 5 months to 5 years 11 months and their primary caregivers. Sixty-five children had been diagnosed with asthma and were recruited through the Department of Respiratory Medicine, Monash Medical Centre. Thirty-eight children had never been diagnosed with asthma (or any other chronic illness). The non-asthmatic children were predominantly recruited through child-care centres and kindergartens. The primary caregivers completed a range of standardised psychosocial questionnaires, providing measures on child anxiety, parental psychological adjustment, the nature of the parent's past relationship with their parent, current protective parenting, global stress and coping, social support and details regarding their child's asthma (where applicable). Child anxiety was measured using the anxiety and somatisation subscales of the Behavior Assessment System for Children. As hypothesised, there was strong support for a relationship between parental history of overprotection and child anxiety (as assessed using both the anxiety and somatisation subscales). Parental adjustment and current protective parenting were associated with scores on the child somatisation subscale, but not with scores on the child anxiety subscale. Analyses also indicated a number of indirect pathways associated with child anxiety. As hypothesised, children with asthma had higher levels of anxiety (as measured by both the anxiety and somatisation subscales). Severity of asthma was associated with scores on the somatisation, but not the anxiety, subscale. Multivariate analyses indicated a complex relationship, involving both direct and indirect pathways, between child asthma and anxiety. The role of other asthma specific variables, including asthma severity, duration since diagnosis and perceived management, appeared to have minimal direct or indirect association with child anxiety. While analyses provided some support for the use of the somatisation subscale as an indicator of anxiety in young children, issues associated with the measurement of anxiety and in particular the meaning of somatisation are discussed. The findings from this research are interpreted within an ecological framework and draw largely upon the theory of attachment and the concept of emotion regulation.

## Statement of Authorship

This thesis contains no material that has contributed to the award of another degree or diploma. No information published or written by another person has been included without appropriate citations and acknowledgements in the main text. All research reported in this thesis was approved by the Human Ethic Committee at Monash Medical Centre, Clayton, Victoria, Australia.

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Candidate's Signature: 

Date: 29/06/04

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Reinhild dares me to take risks that are essential for my personal growth. Her complete support through all my endeavours has helped me develop courage and motivation to keep trying new things. In this way, Reinhild has helped me to reach this milestone.

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*"How many hopes and fears,  
how many ardent wishes and anxious apprehensions  
are twisted together in the thread that connects the parent with the child!"*

*(Samuel Griswold Goodrich, 1793-1860)*

# **1      Overview of Anxiety in Children**

## **1.1      Definitions**

### **1.1.1      What are Emotions?**

Emotions have been defined "as biologically based reactions that coordinate adaptive responding to important opportunities and challenges" (Gross & Munroz, 1995, p. 152). Emotions are transient, coming and going within minutes. They cause changes in subjective experience, expressive behaviour and physiological responding. The nature of an expressed emotion, including the associated behavioural and physiological changes, depends upon how a situation is appraised (Gross, 1998; Gross & Munroz, 1995). The response tendencies may be modified or regulated before the emotional response is expressed. The process of emotional responses is dynamic and reciprocal, whereby an emotional response may subsequently influence ongoing emotional responses.

### **1.1.2      What is Anxiety?**

Anxiety is an emotion experienced by all human beings. Research has indicated that symptoms of anxiety are relatively common among children (Bernstein, Borchardt, & Perwien, 1996), with younger children more likely to experience symptoms than older children (Bell-Dolan, Last, & Strauss, 1990). The majority of children exhibit age-dependent anxieties that are considered to be a normal part of emotional development (Gullone, 1996; March & Leonard, 1996). Anxiety may serve as an adaptive and protective reaction to life threatening situations. However, anxiety may also be a maladaptive response to a situation and cause significant impairment to the child's functioning (Manassis & Hood, 1998), sometimes for a long period of time (Bell-Dolan et al., 1990; Ialongo, Edelsohn, Werthamer-Larsson, Crockett, & Kellam, 1995; Najman, Bor, Andersen, O'Callaghan, & Williams, 2000). Thus, for some children anxiety symptoms are more than a developmental transition (Bernstein et al., 1996).

Relative stability of internalising problems such as anxiety and related diagnoses in children aged 2 to 5 years has also been demonstrated in community (Lavigne et al., 1998; Rutter, 1976) and clinic samples (Campbell, 1995). Childhood anxiety may persist if left untreated (Mattison, 1992). However, research has also established that significant anxiety problems during childhood may be relieved with relatively brief psychological interventions (Barrett, Duffy, Dadds, & Rapee, 2001; Elliot, Prior, Merrigan, & Ballinger, 2002; Kendall, 1994; Kendall et al., 1997; Kendall & Southam-Gerow, 1996).

## 1.2 Assessment of Anxiety in Young Children

There are two approaches to the examination of anxiety in children. The dimensional, quantitative approach views problems as occurring along a continuum while the taxonomic approach views problems dichotomously and utilises established diagnostic systems, such as the Diagnostic Statistical Manual (American Psychiatric Association, 1994).

The study of anxiety problems in very young children is difficult and typically studies have not included children younger than four years of age. It has been suggested that the difficulty in examining internalising problems, including anxiety, is due to three factors (Shaw, Keenan, Vondra, Delliquadri, & Giovannelli, 1997). Firstly, there is uncertainty regarding how to objectively measure internal mood states and related symptoms in young children as they lack the cognitive skills and insight to provide self-reports. Secondly, the expression of internalising problems is particularly inconsistent from toddlerhood to the early school-age period. Thirdly, there is no well-accepted theoretical framework that links the discontinuities in the expression of internal mood states across the early developmental period.

Typically, symptoms of anxiety are assessed in combination with other internalising problems, such as depression, somatisation and withdrawal. Whilst measures of specific facets of anxiety have been developed and standardised for school-aged children and adolescents (Ollendick, 1983; Reynolds & Richmond, 1978; Silverman & Albano, 1996; Spielberger, 1973), limited comparable measures are available for children less than 5 years.

The majority of research into childhood anxiety has used dimensional assessment tools such as the Child Behaviour Checklist (CBCL) (Achenbach, 1991). The CBCL was developed using an American sample and provides a measure of anxiety/depression in children as young as 2 years. Until the very recent development of DSM-IV subscales using the CBCL items (Achenbach, Dumenci, & Rescorla, 2003), the CBCL was limited because it did not separate the constructs of anxiety and depression.

The Behavioral Assessment System for Children (BASC) (Reynolds & Kamphaus, 1998) was also developed on an American sample and has a DSM orientation. On the BASC, symptoms of anxiety and depression are separated and scores are produced for the two subscales. The authors also suggest use of the somatisation subscale to assess anxiety.

Australian researchers have recently further refined the concept of childhood anxiety by proposing five anxiety factors (Spence, Rapee, McDonald, & Ingram, 2001). They devised a parent-completed questionnaire comprising 28 items, which measured five anxiety dimensions, including generalised anxiety, social phobia, separation anxiety, fears of physical injury and obsessive compulsive disorder in the respondent's child. The scale was developed using an Australian sample of 755 children aged 31 to 83 months. Confirmatory factor analyses provided good support for the five factors of anxiety, though the factors were intercorrelated. As somatisation is usually considered an alternative expression of anxiety in children, a possible limitation of this scale is the exclusion of questions identifying somatic symptoms.

### 1.2.1 Somatisation as an Expression of Anxiety in Children

Reports of anxiety have been shown to differ across informants (Bell-Dolan et al., 1990). Due to the internal nature of anxiety, it has been suggested that mothers may underestimate their children's anxieties (Bell-Dolan et al., 1990). The measurement of anxiety in very young children through inquiry regarding typical anxiety symptoms may fail to take the developmental level of the child into account (Rundell, 2000). For example, though young children may experience anxiety they have limited cognitive awareness, understanding and skill to verbally express their anxiety (Pavuluri & Luk, 1998). As previously alluded to, children may express their anxiety somatically (Last, 1991; Reynolds & Kamphaus, 1998; Schniering, Hudson, & Rapee, 2000; Tonge, 1994). The following physical symptoms may be indicative of anxiety in a young child: thinness, feverishness, sweating, fainting, vomiting, headaches and migraines, bodily aches and pains, increased frequency of micturition and constipation (Winnicott, 1987).

Somatic complaints are common among children and adolescents (Egger, Angold, & Costello, 1998; Egger, Costello, Erkanli, & Angold, 1999; Masi, Favilla, Millepiedi, & Mucci, 2000). Some standardised instruments used to measure symptoms of behavioural and emotional problems in very young children include an array of somatic problems. For example, the CBCL (Achenbach, 1991, 1992) includes a Somatic Complaints subscale which comprises the following items: feeling dizzy, overtired, aches or pains, headaches, nausea, problems with eyes, rashes or skin problems, stomach aches or cramps and vomiting. Similarly, the Somatisation subscale of the

BASC (Reynolds & Kamphaus, 1998) includes the following items: makes frequent visits to the doctor, complains about health, has fevers, uses medication, has headaches, complains of pain, complains of being cold, gets colds, has stomach problems, has ear infections, complains of shortness of breath, complains of dizziness, vomits and has allergic reactions.

Despite some methodological shortcomings, numerous studies have provided compelling evidence to suggest a strong association between somatisation and behavioural and emotional problems including anxiety, depression and hyperactivity in children and adolescents (Bernstein et al., 1997; Egger et al., 1998; Egger et al., 1999; Last, 1991; Livingston, Taylor, & Crawford, 1988).

Research has examined a variety of somatic complaints, including headaches, musculoskeletal problems and stomach aches as possible expressions of internalising problems including anxiety and depression, as well as externalising problems including hyperactivity, conduct problems and aggression (Bernstein et al., 1997; Egger et al., 1998; Egger et al., 1999; Last, 1991; Steinhausen, Winkler Metze, Meier, & Kannenberg, 1997). Somatisation has also been examined in relation to childhood psychiatric diagnostic categories (Egger et al., 1998; Egger et al., 1999; Last, 1991; Livingston et al., 1988). In their review of research related to anxiety disorders in children and adolescents, Schniering, Hudson and Rapee (2000) noted the presence of somatic symptoms among children with anxiety disorders. For example, sleep disturbance has been associated with separation anxiety disorder. Schniering et al. (2000) also noted that a diagnosis of generalised anxiety disorder requires at least one symptom of physiological disturbance or somatic complaints related to the worry.

Results of studies provide strong support for a relationship between somatic symptoms and general internalising problems (such as anxiety and depression) and specific disorders (such as separation anxiety disorder, panic disorder, school refusal, depressive disorder) (Bernstein et al., 1997; Last, 1991; Livingston et al., 1988; Masi et al., 2000). These associations remain significant across a variety of ages and appear strongest for girls, whilst in boys somatic complaints are most strongly associated with externalising symptoms and disorders (Egger et al., 1998; Egger et al., 1999).

Research has involved a broad age range of children and adolescents, such as 9 to 13 years (Egger et al., 1998; Egger et al., 1999), 12 to 18 years (Bernstein et al., 1997), 6 to 12 years (Livingston et al., 1988), and 5 to 18 years (Bell-Dolan et al., 1990) and both inpatient and

outpatient psychiatric samples. Some have included non-disordered comparison groups (Mcvey, 2002; Muris, Merckelbach, & Meesters, 2001; Wong, 2000). Whilst there appears to be no research that has examined the relationships between anxiety and somatisation in very young children, it seems plausible that reports of somatisation in very young children are indicative of anxiety. As previously mentioned, young children may lack the abilities to be aware of cognitions, and therefore are unable to verbalise thoughts related to anxiety. Instead, very young children may express their anxiety through physical symptoms, which are not accounted for by a medical condition.

While somatic symptoms may reflect emotional problems they may also be solely due to discrete medical problems (Rundell, 2000). For example, some items on somatisation subscales (difficulties breathing, allergies, makes frequent visits to the doctor, and takes medication) may be confounded with asthma symptoms and hence children with asthma could receive artificially inflated scores. In a study of quality of life in children with asthma, pain and discomfort were associated with asthma severity (Sawyer, Spurrier et al., 2001). It is therefore important to assess a range of biopsychosocial factors when attempting to understand the meaning of somatic problems.

Another issue is that the meaning of somatisation may be different for children with an illness compared to healthy children. There is some empirical evidence to suggest that early learning experiences may contribute to somatisation. Using a sample of over 800 adult subjects, Whitehead, Winget, Fedoravicius, et al. (1982, cited in Ehlers, 1993) demonstrated an association between a recollection of receiving special parental attention (e.g. given toys or special food) when unwell during childhood and somatic problems during adulthood (as evidenced by seeking medical help, missing work due to illness). According to instrumental learning, an individual's behaviour is 'instrumental' to getting something that he/she wants (positive reinforcement) or removing something that he/she does not want (negative reinforcement) (Watt, Stewart, & Cox, 1998). Reinforcement increases the probability that the behaviour will occur again in the future, whilst punishment decreases the chance that the behaviour will occur again in the future. Children with asthma who complain about physical problems are likely to gain parental attention and care, as the parent may be concerned that their child's health is at risk (more so than parents of non-asthmatic children). A parental response of concern and care acts as positive reinforcement for somatisation, thus increasing the likelihood that the child will make physical complaints in the future (possibly when feeling anxious). On the other hand,

according to learning theory, when a parent does not respond to a child's physical complaints, the child is less likely to make somatic complaints.

Clearly, the meaning of somatisation among young children is complex. There is reasonable evidence to indicate that somatisation, as least in part, is reflective of anxiety. However, it is important not to overlook the other possible functions of somatisation. Somatisation may also be an expression of other behavioural or emotional problems, such as depression, and serve to gain parental assistance in the regulation of the distressing emotion. The health status of the child may also impact on the meaning of somatisation.

### 1.2.2 Temperament and Anxiety in Young Children

Temperament is a characteristic that is reflected in, and inferred from, the style of behaviour manifested from an early age (Goldsmith et al., 1987; Rothbart, 1986). It is regarded as a biologically based disposition that is relatively stable across time, although not immutable. Environment may potentially influence development of temperament (Konchanska, Murray, & Coy, 1997; Prior, Sanson, & Oberklaid, 1989).

A large body of research has focused on temperamental characteristics, including high reactivity, low activity levels and inhibition in young children (Garcia-Coll, Kagan, & Reznick, 1984; Kagan, Reznick, Clarke, Snidman, & Garcia-Coll, 1984; Kagan & Snidman, 1999; Prior et al., 1989; Thomas & Chess, 1977). This research focus may be partly due to the difficulties associated with the assessment of emotional problems, such as anxiety, in very young children. Temperamental characteristics are possibly more easily operationalised. For example, the assessment of temperamental inhibition typically inquires about the child's approach/withdrawal tendencies. Temperamental characteristics during the first few years of life, particularly inhibition, have been associated with high levels of anxiety and linked with the development of anxiety problems (Lavigne et al., 1996; Prior, Sanson, Smart, & Oberklaid, 1999; Sanson, Pedlow, Cann, & Prior, 1997; Shaw et al., 1997).

Temperamentally inhibited children have "an initial tendency to withdraw, to seek a parent, and to inhibit play and vocalisation following encounter with an unfamiliar person" (Kagan et al., 1990, p. 72). Temperament theorists have postulated that children with this tendency, that

is, to be behaviourally inhibited, are more likely to develop anxiety problems than uninhibited children (Garcia-Coll et al., 1984; Kagan et al., 1984; Kagan & Snidman, 1999; Thomas & Chess, 1977). Kagan (1999) postulated that by adolescence about one third of children with a temperamental bias of behavioural inhibition will show signs of serious anxiety. When initially faced with a new situation, a child may experience uncomfortable symptoms of anxiety. Whilst avoidance of novel situations initially decreases anxiety, the child has less opportunity to develop effective coping strategies. The child may therefore continue to exhibit avoidance and inhibited behaviour when faced with new and unfamiliar situations. Consequently, the child may continue to experience symptoms of anxiety (Manassis & Bradley, 1994). It is important to acknowledge that behavioural inhibition may be a reflection of anxiety, rather than a precedent of anxiety.

### 1.3 The Problem of Anxiety in Young Children

Community-based studies within Australia and internationally have estimated the prevalence of anxiety disorders to range from 2% to 10% in children and adolescents (Anderson, Williams, McGee, & Silva, 1987; Bird et al., 1988; Costello, 1989; Offord et al., 1987; Rutter, 1976; Sawyer, Arney et al., 2001; Velez, Johnson, & Cohen, 1989; Zubrick et al., 1995). Within the past few years, Australian researchers have conducted large-scale prevalence studies of behavioural and emotional problems among children and adolescents (Sawyer, Arney et al., 2001; Zubrick et al., 1995). These studies utilised the CBCL, from which an estimate of the prevalence of internalising problems (including anxiety/depression and somatisation) was obtained. Though children less than 4 years were not included, these studies provide some indication of the problem of anxiety within Australian young people.

The Child and Adolescent Component of the National Survey of Mental Health and Wellbeing (Sawyer, Arney et al., 2001) was conducted with a sample of 4083 children and adolescents (2082 male, 2001 female), representative of Australian children and adolescents aged 4 to 17 years. One of the study aims was to estimate the proportion of Australian children and adolescents with specific mental health disorders, using the CBCL (Sawyer et al., 2000). Of those households identified as having an eligible child, 86% agreed to participate, giving a response rate of 70%. Analyses revealed limited response biases. Prevalence estimates of anxiety/depression, somatisation, and internalising problems (Sawyer, Arney et al., 2001) are reported in Table 1. Using the recommended CBCL cutoffs (Achenbach, 1991), 573 children were identified as having a clinically significant mental health problem, whilst a further 500 were classified as having 'sub threshold' problems. Importantly, a clinical level of somatic complaints was the most commonly identified CBCL syndrome.

Table 1 The Child and Adolescent Component of the National Survey of Mental Health and Wellbeing: Prevalence (%) of Internalising Problems, Somatic Complaints, and Anxiety/Depression in 4 to 17 Year Old Children (Sawyer, Arney et al., 2001)

CBCL Scale	Total % (N = 4083)	Males (n = 2082)	Females (n = 2001)
Internalising problems	12.8 (473 989)*	14.5	11.1
Somatic complaints	7.3	8.4	6.1
Anxious/depressed	3.5	3.9	3.2

\*Population estimate

Similar prevalence estimates were obtained in the Western Australian Child Health Survey (WACHS), a comprehensive study of the prevalence of mental health problems among 2,737 children aged 4 to 16 years living in Western Australia (Garton, Zubrick, & Silburn, 1995). A range of measures was used to screen for mental health morbidity, including the CBCL (completed by the parent), Youth Self Report Form (YSR, completed by the child) and the Teacher Report Form (TRF, completed by the teacher). The YSR and TRF are parallel forms of the CBCL. The main WACHS survey was conducted in 1993. Analyses yielded an overall prevalence of nearly 18% for mental health morbidity, based on parental or teacher report (Zubrick et al., 1995). Morbidity on the anxiety/depression and somatic complaints syndromes are reported in Table 2.

Table 2 WACHS: Prevalence (%) of Somatic Complaints and Anxiety/Depression By Gender and Age (Zubrick et al., 1995)

	Sex		Age group (years)		
	Males	Females	4-11	12-16	All children
Somatic Complaints	7.0	3.1	4.7	5.6	5.0
Anxiety/Depression	4.7	2.6	3.0	4.8	3.6

Whilst these studies indicate that anxiety may be relatively common among children and adolescents, relatively few studies have examined the prevalence of anxiety (Shaw et al., 1997; Spence et al., 2001), or even the broader construct of internalising problems (Briggs-Gowan, Carter, Moye Skuban, & McCue Horowitz, 2001; Lavigne et al., 1996), in children younger than 5 years. The relative paucity of research examining anxiety in very young children is largely due to measurement difficulties and a lack of anxiety-specific questionnaire measures.

A summary of large community-based studies using samples of very young children is presented in Table 3. The Behavioural Screening Questionnaire (Richman & Graham, 1971), used by some of the studies, provides a measure of total problems, with two items specific to anxiety. The range of prevalence estimates of internalising problems across these studies was broad, but provide general consensus that clinically significant internalising problems may be detected in children as young as 12 months.

Recently, Spence et al. (2001) examined the level of anxiety problems across five dimensions in a sample of 755 children aged 31 to 83 months. The children were recruited through kindergartens and preschools in major metropolitan areas of Sydney and Brisbane, Australia. A 28-item anxiety scale, to be completed by parents, was developed specifically for the study, with items pertaining to generalised anxiety, separation anxiety, social anxiety, obsessive-compulsive disorder and fears of physical injury. No gender differences were demonstrated for the total symptom score or factor scores. Significant age differences were reported, whereby 3 year old children had higher levels of anxiety than 4 and 5 year old children.

Spence et al. (2001) also examined the prevalence of a range of anxiety symptoms by determining the percentage of children who were rated by their mothers to demonstrate an anxiety symptoms "quite often" or "very often". The prevalence of symptoms ranged from 0.4% for an item assessing generalised anxiety to 17.8% for two items assessing fears about physical harm. The prevalence of each specific anxiety symptom is reported in Table 4. It is noteworthy that items pertaining to cognitions were less frequently endorsed than items that may be more directly observable through behaviour.

Table 3 Summary of Empirical Studies Examining Anxiety in Young Children

Study	Sample size	Age	State, Country	Outcome measure	Prevalence
Richman, Stevenson and Graham (1975)	657	3 years	London Borough	Behaviour Screening Questionnaire (Richman & Graham, 1971)	7.0% Total behaviour problem 2.6% 'worrier' 12.8% 'fearful'
Earls (1979)	100	3 years	Rural community, USA	Behaviour Screening Questionnaire (Richman & Graham, 1971)	24.0% Total behaviour problem 8.0% 'worrier' 14.0% 'fearful'
Cornely and Bromet (1986)	565	2 years 6 months to 3 years 6 months	Pennsylvania, USA	Behaviour Screening Questionnaire (Richman & Graham, 1971)	11.3% Total behaviour problem 3.7% 'worrier' 41.0% 'fearful'
Larson, Pless and Miettinen (1988)	756	2 to 3 years	Montreal, Canada	Child Behavior Checklist (Achenbach, 1992)	4.0% Somatic problems 1.2% Withdrawal 3.2% Sleep problems
Stallard (1993)	1170	3 years	United Kingdom	Behaviour Screening Questionnaire (Richman & Graham, 1971)	10.0% Total behaviour problem 3.11% 'worrier' 0.82% 'fearful'
Lavigne (1998)	3860	2 to 5 years	Chicago, USA	Child Behavior Checklist (Achenbach, 1992)	3.7% Internalising problems 2.0% DSM-III-R Anxiety Disorder
Briggs-Gowan, Carter, Moya Skuban and McCue Horowitz (2001)	1280	12 to 42 months	New-Haven, USA	Child Behavior Checklist (Achenbach, 1992)	3.9% internalising problems (sub-clinical) 2.8% internalising problems (sub-clinical)

Table 4 Percentage of Children Aged 3 to 5 Years ( $N = 510$ ) Receiving Mother Rating of "Quite Often True" or "Very Often True" for Each Anxiety Item (Spence et al., 2001)

Anxiety Item	%
24. Is frightened of dogs	17.8
26. Is afraid of the dark	17.8
13. Is scared of thunder storms	13.2
6. Is reluctant to go to sleep without you or to sleep away from home	12.7
20. Is afraid of insects and/or spiders	10.6
11. Is afraid of meeting or talking to unfamiliar people	9.8
17. Is nervous of going swimming	8.3
23. Is afraid to go up to a group of children and join their activities	7.7
15. Is afraid of talking in front of the class (preschool group) e.g. show and tell	5.9
22. Becomes distressed about your leaving him/her at preschool/school or with a babysitter	4.5
2. Worries that he/she will do something to look stupid in front of other people	4.3
3. Keeps checking that he/she has done things right (e.g., that he/she closed a door, turned off a tap)	4.0
7. Is scared of heights (high places)	4.0
1. Has difficulty stopping him/herself from worrying	3.9
12. Worries that something bad will happen to his/her parents	2.8
4. Is tense, restless or irritable due to worrying	1.2
5. Is scared to ask an adult for help (e.g. a preschool or school teacher)	2.4
28. Asks for reassurance when it doesn't seem necessary	2.4
8. Has trouble sleeping due to worrying	1.6
9. Washes his/her hands over and over many times each day	1.4
10. Is afraid of crowded or closed-in places	1.8
18. Has to have things in exactly the right order or position to stop bad things from happening	1.6
16. Worries that something bad might happen to him/her (e.g. getting lost or kidnapped), so he/she won't be able to see you again	1.4
21. Has bad or silly thoughts or images that keep coming back over and over	1.2
25. Has nightmares about being apart from you	1.2
19. Worries that he/she will do something embarrassing in front of other people	1.0
27. Has to keep thinking special thoughts (e.g., numbers or words) to stop bad things from happening	1.0
14. Spends a large part of each day worrying about various things	0.4

Lavigne, Gibbons, Kaufer-Christoffel, et al. (1996) examined the occurrence of psychiatric disorders in preschool children. A community sample of 3,860 children aged 2 to 5 years inclusive was recruited through paediatricians in Chicago, USA. Mothers completed the CBCL. Prevalence rates of CBCL scores above the 90<sup>th</sup> percentile were obtained for total problems, 'pure' internalising problems, 'pure' externalising problems, and comorbid internalising and externalising problems. Pertinent to the current study, there was an overall prevalence rate of 3.7% for 'pure' internalising problems and 3.3% for comorbid internalising/externalising problems. Rates of internalising problems increased from 2 to 3 years, whilst rates of comorbid problems increased from 3 to 4 years.

Further information was obtained for a sub-sample of 166 children who scored above the 90<sup>th</sup> percentile on the CBCL. Analyses revealed that DSM-III-R (American Psychiatric Association, 1987) Disruptive Disorders were most prevalent, with Oppositional Defiant Disorder (16.8%) the most frequent diagnosis. Approximately 2% of the children were diagnosed with a DSM-III-R Anxiety Disorder.

The prevalence of infant-toddler social-emotional and behavioural problems was recently examined using a random sample of 1280 healthy children and parents recruited through birth records in North America (Briggs-Gowan et al., 2001). Forty-two percent of the children were aged 12 to 23 months, and 52% of children were aged 24 to 36 months. The prevalence of internalising problems for children aged 24 months and older was 3.9% (sub clinical range) and 2.8% (clinical range). The prevalence of externalising problems for children aged 24 months and older was 6.2% (sub clinical range) and 3.1% (clinical range).

These results suggest that anxiety disorders are less prevalent than disruptive disorders in children aged 2 to 5 years. However, it appears that symptomatology of internalising problems (which includes anxiety problems) is as prevalent as symptomatology of externalising problems. Furthermore, the prevalence of symptomatology does not appear to decline with age. Whilst many children experience varying levels of anxiety, there is a small proportion of children who experience severe levels of anxiety that may impede their current functioning and further psychological, intellectual and social development.

## 1.4 Theoretical Framework for Understanding Anxiety

### 1.4.1 What is Emotion Regulation?

Emotional regulation refers to an individual's attempt to influence the expression of emotions (Gross, 1998; Gross & Munro, 1995) in regard to the intensity, duration, onset and latency. (R.A. Thompson, 1994). The development of emotion regulation begins in infancy and is viewed as the essential ingredient for adaptive social-emotional development (Crockenberg & Leerkes, 2000). Thus, children with limited or maladaptive emotional regulation skills may experience emotional problems, such as anxiety. Emotional regulatory processes are involved in the expression of both positive and negative emotions. An individual's attempt to regulate emotions may occur through either conscious or unconscious processes (Gross, 1998; Gross & Munro, 1995) and also through a variety of external influences (R.A. Thompson, 1994). Gross (1995) and Gross and Munro (1998) identified two major forms of emotion regulation: antecedent focused and response-focused.

Authors have categorised various types of emotion regulation strategies (Eisenberg, 1998; Gross, 1998; Gross & Munro, 1995), for example, regulation of emotion, regulation of emotion-related behaviour and regulation of the context itself (Eisenberg, 1998). Regulation of emotion is operationalised as shifting and focusing of attention. Regulation of emotion-related behaviour mainly concerns behavioural inhibition and impulsivity. Regulation of context regards the selection and modification of situations. The degree to which a child or adult is able to regulate the emotion, the emotion-related behaviour and the context is associated with mental health (Eisenberg, 1998). Children able to adaptively regulate emotions, emotionally driven behaviour and stressful situations are less vulnerable to behavioural and emotional problems as they have a broader range of regulatory modes (Eisenberg & Fabes, 1992). Importantly, young children are partly reliant on the parent to assist in using emotion regulation strategies. The following case example illustrates the effectiveness of different emotion regulation skills in reducing anxiety:

Mary is the mother of 4 year old Sasha. Sasha attends kindergarten 3 days a week and suffers from mild asthma, which is typically well

managed. Sasha was invited to a birthday party by her best friend at kindergarten, which was to be held at a fun park. Mary was very worried about letting Sasha attend the party, because she feared for Sasha's safety as she might have an asthma attack, induced by high levels of play at the fun park. For a few days, Mary ruminated about the possible adverse consequences of Sasha attending the party. At this point she decided Sasha was not allowed to attend the party. In response, Sasha protested and Mary then felt guilty. Mary attempted to control the situation by asking the mother of Sasha's friend to hold the party at a garden to reduce the risks associated with physical activity. The mother of Sasha's friend said this was not possible, but reassured Mary that she would keep a close watch on Sasha. Finally, Mary decided to allow Sasha to attend the party. Though she felt anxious, she also felt happy that her daughter could enjoy a special outing. Whilst at the party, Mary went out for lunch with a friend, which distracted her from her worrying thoughts about Sasha. Whilst she still felt a little nervous, she was able to enjoy herself as well.

#### 1.4.1.1 *Emotion regulation and anxiety*

Emotion regulation is used to maintain comfortable mood states and thus is an essential feature of mental health (Gross, 1998; Gross & Munro, 1995; Kopp, 1989). Individuals competent in emotion regulation are considered resistant to developing mental health problems (Gross, 1998; Gross & Munro, 1995; Kopp, 1989). Conversely, individuals lacking developmentally appropriate emotion regulatory strategies are vulnerable to mental health problems, as they may not be able to successfully regulate distressing emotions. Dysregulation of emotions may lead to poor mental health such as depression or anxiety. Importantly, dysregulation of emotions may arise when an individual has either extremely high levels of regulation (e.g. inhibit all emotional expression) or extremely low levels of regulation (e.g. extreme emotional expression) (Eisenberg, 1998).

As the preceding case demonstrates, different emotion regulation strategies result in varying types and intensities of emotions. The same principle applies to children: children prone to

emotional dysregulation may consequently be at risk for internalising problems, including anxiety (Eisenberg, 1998; Rubin, Coplan, Fox, & Calkins, 1995; Shaw et al., 1997). More specifically, children with poor regulation of emotion (i.e. unable to shift their attention to reduce distressing emotion), and who highly regulate both emotion-related behaviour (i.e. behaviourally inhibited) and context (i.e. avoid or withdraw from situations) are at risk for internalising problems.

#### 1.4.2 The Developmental Course of Emotion Regulation

The ability to regulate emotions develops over time (Eisenberg, 1998; Gross, 1998; Gross & Munroz, 1995; Kopp, 1989). Initially, infants rely heavily on their caregiver to regulate emotions, through feeding, changing of wet clothes, soothing the child, appropriate situation selection, and provision of facial and voice cues to help the child interpret their world. The balance, between being regulated by others and by self, changes as the infant grows, begins to develop internal resources for emotion regulation (Eisenberg, 1998), and over time becomes increasingly responsible for his or her emotional well-being (Sameroff & Fiese, 2000).

Healthy development of emotion regulation begins as the caregiver responds appropriately to the infant's emotional expressions. Through interactions with the parent, over time the infant learns many important lessons. The infant learns that it is in fact acceptable to express emotions. Infants learn to respond to their caregiver's attention through smiling, eye contact and vocalisations. In turn, the parent is motivated to reciprocate and satisfy the infant's needs. Infants learn basic attention deployment strategies to regulate their emotions, such as shifting their gaze, and sucking and grasping an object (Dodge, 1989; Gross, 1998; Gross & Munroz, 1995; Kopp, 1989; R.A. Thompson, 1994).

As children develop motor abilities to self-locomote, their ability to self-regulate emotions, through increasing independence, also develops (Gross, 1998; Gross & Munroz, 1995; R.A. Thompson, 1994). The ability of being able to physically approach or withdraw from a situation, and to modify a situation through one's behaviour, allows the child to develop the concept of intentionality and control (Dodge, 1989), thereby increasing autonomy in emotion regulation.

The development of language and cognitive skills provides opportunity for further acquisition of more sophisticated emotion regulatory strategies (Eisenberg, 1998; Gross, 1998; Gross & Munro, 1995; Kopp, 1989). The child becomes increasingly able to follow verbal cues from self and others to modulate their emotional response and plan their behaviour to regulate emotions (Kopp, 1989). Usually, by late childhood and early adolescence, the child's cognitive abilities allow potentially powerful forms of emotion regulation.

In sum, the acquisition of adaptive emotion regulation is a developmental progression. A developmental perspective implies that competent acquisition of skills within a stage promotes an easier transition to and greater likelihood of subsequent adaptive development (Sameroff & Fiese, 2000), while the occurrence of problems or difficulties within a stage may hamper subsequent development.

#### **1.4.3 Attachment Theory as a Framework for Understanding the Development of Emotion Regulation**

The development of emotion regulation occurs within the context of early attachment relationships (Eisenberg, 1998; Kopp, 1989; A. B. Thompson, Curtner, & O'Rear, 1994; Zeanah, Boris, & Larrie, 1997). Attachment is a term used to describe the enduring and stable affectional tie that unites an infant and caregiver (Ainsworth, Bellar, Waters, & Wall, 1978; Bowlby, 1969; R. A. Thompson, 1998). The type of attachment that a child develops with his or her mother has been shown to impact on subsequent emotional development and relationships. Based on early experiences with the caregiver, infants develop internal representations of relationships ('internal working model') that permit the infant to predict caregiver behaviour, and to guide future interactions with others (Hinde, 1983; Rutter, 1995; Sroufe, 1988; R.A. Thompson, 1998). The internal working models of parents formed during their own childhood (though possibly modified over time) will affect their impression of their child's emotions and behaviours and the way that they respond to and behave towards their child (Crockenberg & Leerkes, 2000).

Bowlby postulated that an internal working model that guides a caregiver to behave in an inconsistent manner places the child at risk for subsequent emotional and behavioural difficulties (R.A. Thompson, 1998). However, the internal working model is not considered immutable. For example, an internal working model that guides an individual to interact in

inconsistent manner with others may be modified by experiences of positive interactions and supports (Belsky & Nezworski, 1988).

Research regarding parent-child attachment has identified secure and insecure types of attachment (Ainsworth et al., 1978; Campos, Caplovitz-Barrett, Lamb, Hill-Goldsmith, & Stenberg, 1983; R. A. Thompson, 1998). A detailed discussion of the various types of attachment patterns is beyond the scope of the current thesis. An infant with a secure attachment to the caregiver is more likely to develop adaptive emotion regulatory strategies. A caregiver who supports the child's exploration by responding consistently and appropriately to the infant's signals of distress, promotes development of a secure attachment. In turn, this sense of security will act as a positive influence on the child's expanding repertoire of emotion regulatory strategies (Eisenberg, 1998; Kopp, 1989).

Conversely, a caregiver who is unlikely to respond or who responds inconsistently or inappropriately to the infant's distress signals promotes the development of an insecure attachment. Consequently, the infant may develop less effective emotion regulatory strategies (Eisenberg, 1998) and be vulnerable to emotional problems such as anxiety (Bernstein et al., 1996; Shaw et al., 1997). It is important to note at this point that the attachment system is likely to be activated during stressful situations, such as when a child is ill. Some children with insecure attachments may be prone to unexplained medical symptoms (Feeney, 2000). Research has suggested that parental response to a child's complaints of physical problems in an overindulgent manner is likely to be indicative of an insecure (anxious type) attachment style (Bowlby, 1969). For example, overprotective parenting may occur towards a child who suffers from a chronic illness. This style of parenting may impede development of independent emotion regulation. Incapable of reducing one's own distress, a child who feels anxious may learn to gain assistance from the caregiver by expressing his/her anxiety through complaints about health.

#### 1.4.3.1 *Maternal sensitivity*

Caregiver sensitivity is central to the quality of the child's attachment security (Egeland & Erickson, 1999; R. A. Thompson, 1998). Maternal sensitivity can be defined as "the mother's ability and willingness to perceive the infant's communications as reflected in his behaviour,

emotional expression, and vocalisations, see and interpret them from the infant's point of view, and respond to them promptly and appropriately according to the infant's developmental and emotional needs" (Grossman & Grossman, 1991, p.97). Sensitive responses include promptly increasing or reducing contact, in response to the child's emotion and behaviour. Insensitive responses are characterised by a lack of response, a poorly timed response or an intrusive response (Crockenberg & Leerkes, 2000).

During the first few months of life, infants seek proximity to or contact with their attachment figure through signals such as crying and smiling. As the infant is limited by locomotor incapacities, the infant must rely on the adult to respond to their signals. Infants tend to form secure attachments to people who consistently and appropriately respond to their signals, and thereby protect them during anxiety-provoking situations (Belsky & Isabella, 1988; Campos et al., 1983; Rutter, 1995; Sroufe, 1988).

Caregiver affect will impact on the degree to which the caregiver is sensitive to her child's emotions. If a caregiver is experiencing emotional distress, they may be less sensitive to the emotions of her infant or young child, less capable of accurately interpreting the infant's emotions and therefore less likely to interact with the infant. The child may therefore remain in a heightened state of emotional arousal with limited opportunity to develop methods for regulating emotions. In addition, a caregiver experiencing difficulty managing his or her own heightened levels of emotional distress may model unhelpful techniques for emotion regulation (Crockenberg & Leerkes, 2000; A. B. Thompson et al., 1994). Young children, who spend a majority of their time with their caregiver, may therefore learn similarly unhelpful methods for emotion regulation.

The infant and young child refers to the caregiver for emotional guidance and in doing so, the child learns how the parent evaluates situations and regulates their own emotions. It is this learning experience that then guides the child's own emotion regulation (Crockenberg & Leerkes, 2000). Thus, infants and young children exposed to a caregiver with an emotional disorder are vulnerable to having difficulties with their own emotion regulation and may develop subsequent emotional and/or behavioural problems.

#### 1.4.4 Transactional Model and an Ecological Approach to Child Anxiety

Importantly, the development of emotion regulation is influenced by many factors (Calkins, 1994; Eisenberg, 1998; Eisenberg & Fabes, 1992; Kopp, 1989; Sameroff & Fiese, 2000; Zeanah et al., 1997). The child is embedded within a social context. Development is influenced by the interplay between the child's characteristics and situational factors. This idea is encapsulated within the transactional model, which assumes that developmental outcome (e.g. emotional adjustment) is a function of the dynamic interactions between the individual and his or her experiences within the family and social context (Patterson, 1982; Sameroff & Fiese, 2000).

The associations between parenting sensitivity and attachment security are only of moderate strength (R. A. Thompson, 1998). Other factors clearly play a role in shaping the infant's attachment security. Of paramount importance is the influence of child characteristics on maternal behaviour. Thus, the interactions between the child and mother are bi-directional (Campos et al., 1983; Crockenberg & Leerkes, 2000). For example, a child who displays ambivalent behaviour toward a sensitive parent may lead the parent to become less sensitive, which in turn may exacerbate the child's ambivalence.

Belsky (1984) outlined an ecological model for the organisation of a range of psychosocial factors in relation to parenting. The model incorporates the potential influences of parent characteristics (e.g. psychological well-being, developmental history), child characteristics (e.g. temperament, age, gender, chronic illness), and social characteristics (e.g. social support, life experiences). Thus, in order to understand child anxiety, it is necessary to examine the accumulation of risk factors and the presence or absence of protective factors. An accumulation of risk factors (e.g. parental overprotection, adverse life events, life stressors and poor parental social support), which may impact on and interact with one another, may influence the development of emotion regulation and emotional and behavioural problems (Sameroff & Fiese, 2000; Zeanah et al., 1997). This process has been demonstrated in key epidemiological research studies, such as the Isle of Wight Study (Rutter, 1976, 1979), whereby an accumulation of risk factors, rather than any one specific risk factor, was predictive of childhood psychological problems (Peck, Sameroff, Ramey, & Ramey, 1999, Sameroff & Fiese, 2000).

Despite this knowledge, few research studies have adopted an ecological perspective during the planning stages and instead have identified risk factors from the data collected (Sameroff &

Fiese, 2000). Furthermore, few research studies have extensively examined the associations between a number of psychosocial factors and *anxiety* in very young children.

## 1.5 Factors Associated with Anxiety in Childhood

Genetic and familial studies suggest that children of individuals with a psychiatric history are genetically vulnerable to anxiety disorders (Bell-Dolan et al., 1990; Eley & Stevenson, 1999; Manassis & Bradley, 1994; Manassis & Hood, 1998). However, not all children with a family history of mental health problems develop mental health problems. Though genetic factors may make a child vulnerable to anxiety and other emotional problems, environmental factors appear to play an important role in the gene expression (Eley & Stevenson, 1999; Shaw et al., 1997). Thus, as suggested by the transactional model, the interaction between intrinsic and extrinsic factors will determine whether or not a child will develop significant emotional problems.

### 1.5.1 Child Temperament

Many theorists postulate that temperament, or behavioural style, is a biological disposition, which predisposes how a child will behave in a specified situation (Buss & Plomin, 1984; Kagan, 1994; Kagan et al., 1984; Kagan & Snidman, 1999; Kagan, Snidman, Zentner, & Peterson, 1999). Such theorists claim that a child's temperament may influence the development of emotion regulation. For example, a child with a tendency to withdraw from unfamiliar situations may have fewer opportunities to develop methods for self-regulation of emotions (Eisenberg & Fabes, 1992). Additionally, temperamental dimensions, such as approach-withdrawal and reactivity, have been repeatedly linked with the development of anxiety during childhood, adolescence and adulthood (Kagan & Snidman, 1999; Prior, Sanson, Smart, & Oberklaid, 1999).

The effect of temperament on emotion regulation is not necessarily a direct effect (Kagan, 1994). The interaction between the caregiver's behaviour and the child's temperament is a potentially powerful factor impinging on the development of emotion regulation (Crockenberg & Leerkes, 2000; Sameroff & Fiese, 2000; Thomas & Chess, 1977; Thomas, Chess, & Birch, 1968). A child's temperament may elicit particular responses from the parent, and thus influence the effectiveness of certain regulatory responses. For example, with encouragement from the caregiver, a reactive and avoidant child may begin to explore the environment and thus expand his or her opportunities to learn appropriate emotion regulatory strategies. However, caregiver

behaviours, such as overprotection, may reinforce the child's behavioural tendency to withdraw from new situations, thus heightening vulnerability for emotional problems such as anxiety. It is noteworthy that the level of parental protection is related to the developmental level of the child, whereby parental protection will reduce with increasing child age

For example, a 2 year old child will require a greater level of parental protection than a 5 year old child, as the younger child may be less aware of environmental threats (e.g. sharp corner on a table). It is therefore important to implement statistical control for the child's age in empirical investigations.

## 1.5.2 Protective Parenting

### 1.5.2.1 *Theoretical link between parenting and child anxiety*

The parent-child relationship has been highlighted as a central factor associated with the development and maintenance of significant child anxiety problems (Hudson & Rapee, 2001; Manassis & Hood, 1998). Based on early experiences with the caregiver, infants develop internal representations of relationships which are used to predict caregiver behaviour and to guide future behaviours and interactions with others (Bowlby, 1969; Crockenberg & Leerkes, 2000; Hinde, 1983; Rutter, 1995; Sameroff & Fiese, 2000; Sroufe, 1988; R. A. Thompson, 1998). Accordingly, for example, a parent who recalls being raised in a highly protective and controlling manner becomes predisposed to behave similarly towards his or her own child. Bowlby (1977) postulated that incompatible working models (arising from inconsistent caregiver behaviour) place the child at risk for later psychopathology (R. A. Thompson, 1998).

As the infant grows into toddlerhood, new challenges emerge for the mother-child relationship. For adaptive emotion regulation to develop, the parent needs to be attuned to the child's changing needs, such as the need for increasing autonomy (Crockenberg & Leerkes, 2000; Patterson, 1982; Seifer & Dickstein, 2000). Parents who were raised in a controlling manner may have difficulty adapting to their child's natural urge for more autonomy and will increase their efforts to maintain control over the child.

Recently, Rapee (2001) proposed a model of anxiety development, which emphasised the reciprocal nature of a parent-child relationship. The model postulates that children vulnerable to anxiety will display higher levels of emotional arousal, which the parent will try to reduce through increased involvement and greater protective parenting. An assumption of this model is that parents of the anxious children will also have relatively high levels of anxiety, which may exacerbate the degree to which they protect their child. Whilst parental involvement and protection may reduce a child's immediate level of anxiety, it is generally thought to increase the child's perception of threat, reduce the child's internal sense of control over the threat and increase the child's avoidance of threats, thus leading to higher levels of anxiety. "That is, a parent who protects their child from stressful experiences or who takes control in stressful situations may teach their child that the world is a dangerous place from which they need protection and over which they have no control" (Hudson & Rapee, 2001, p. 1412). A more adaptive response may be one in which the parent guides the child through the experience, using it as a learning opportunity (Crockenberg & Leerkes, 2000). Importantly, a parent who attempts to exert more control may also be met with greater non-compliance in the child, thus setting the scene for coercive interactions and increasing risk for child behavioural and emotional problems (Patterson, 1982).

#### 1.5.2.2 *Styles of parenting*

Child developmentalists have attempted to delineate between parenting practices and styles. Parenting practices refers to *what* the parent does (e.g. instructs the child to put toys away), whilst parenting style refers to *the emotional climate* within which the parent uses his/her parenting practices (e.g. use of negotiating, use of a warm or controlling tone of voice) (Darling & Steinberg, 1993). In line with attachment theory, parenting style may be considered reflective of the parent's internal working models.

A review of research examining associations between parenting and the development of anxiety and depression (Rapee, 1997) identified two main parenting styles, which were labelled 'Rejection' and 'Control'. 'Rejection' describes behaviours and attitudes related to rejection and criticism at one end of the continuum and acceptance and warmth at the other end of the continuum. Parental warmth may provide the child with the confidence, trust and security to explore their surroundings (Chen, Liu, & Li, 2000), thus fostering the development of adaptive

emotion regulation. Rejection and criticism may be conceptualised as negative or hostile parental feelings towards the child. Associations have been shown between parental rejection and criticism and aggressive and other behavioural problems in children (Patterson, 1982; Patterson, Reid, & Dishion, 1992).

The second factor, 'Control', describes behaviours related to parental control or protection (or overcontrol at the extreme) of the child at one end of the continuum, with autonomy at the other end of the continuum. This factor conceptualises parental behaviours that serve to protect the child from harm, but may also have the effect of directing the child and reducing adaptive development of individuality. Levy (cited in Thomasgard & Metz, 1997) outlined four characteristic dimensions of the concept of parental overprotection as: 1) excessive physical or social contact, 2) prolonged infantilisation, 3) active discouragement of independent behaviour and social maturity, and 4) either dominating excess or an overindulgent absence of parental control (i.e. rigid over-regulation or poor limit-setting).

Whilst a certain degree of control and protection are necessary for children to develop appropriate social skills, excessive levels may interfere with the development of emotion regulation. Importantly, the level of parent control and protectiveness needs to be appropriate to the developmental stage of the child (Chen et al., 2000; Thomasgard, Metz, Edelbrock, & Shonkoff, 1995). A parent who is highly concerned for the child's well-being may not adjust their degree of control and protectiveness in relation to the child's development. Thus, the opportunities for the child to develop social skills, self-confidence and adaptive emotion regulation may be reduced (Chen et al., 1998; Roselind et al., 2000).

#### 1.5.2.3 *Measures of parenting*

Numerous measures of parenting exist, many of which have been developed specifically for the study in which they were used (Rapee, 1997). Measures of parenting typically utilise a questionnaire approach and rely on retrospective recall.

The Parental Bonding Instrument (PBI) (Parker, Tupling, & Brown, 1979) is one of the most widely used measures of childrearing. It was designed to measure the quality of the parent-child attachment or 'bond', and provides scores on factors related to rejection and control. This questionnaire is given to adult offspring and relies on their retrospective recall of how they

were reared. That is, it assesses the offspring's perception of their parents' childrearing patterns. Parker (1983) suggested classifying parental behaviour on two dimensions, named 'Care' (an inverse measure of 'rejection') and 'Control' or 'Overprotection'. Care refers to parental interest, sensitivity, caring and love. Parents who display high levels of care are able to communicate with, express affection to, and promote closeness with their child. Control/overprotection refers to strictness, demands and punishment. Parents who were perceived as using high levels of control did not allow or show respect for personal growth, development and independence of the child.

A less common approach to measuring parenting is to directly ask parents about their own parenting behaviours or attitudes towards parenting (Rapee, 1997). This approach is limited as the items often have negative connotations (e.g. Bavolek, 1984; Block, 1965; Cohler, Weiss, & Grunebaum, 1970; Loyd & Abidin, 1985), thereby increasing the likelihood of response bias. Nevertheless, a measure of current parenting behaviours avoids some of the limitations in retrospective recall. Some measures of current parenting of very young children have attempted to overcome limitations associated with self-report measures (Fox & Bentley, 1992; Thomasgard, Metz et al., 1995). The Parenting Inventory (Fox & Bentley, 1992) for parents of young children aged 1 to 4 years comprises a total of 100 items to provide a measure of parental expectations, discipline and nurturing. The Parent Protection Scale (Thomasgard, Metz et al., 1995), developed for children aged 2 to 5 years and 5 to 10 years, comprises 25 items and provides a measure of protection. Both these scales attempt to capture developmental aspects of parenting and do not include negatively framed items.

An indicator of parenting may also be derived through observations of family interactions. A number of studies have used the construct of Expressed Emotion (Gartland & Day, 1999; Hermanns, Florin, Dietrich, Rieger, & Hahlweg, 1989; Kavanagh, 1992; F. S. Wamboldt, Wamboldt, Gavin, Roesler, & Brugman, 1995), which is assessed through observation of family interactions, and may provide a measure of parental dimensions reflective of rejection (critical comments) and control (over-involvement). Many authors have developed constructs related to the parental dimensions of control/protection and rejection specifically for their study (e.g. Pettit & Bates, 1989).

#### 1.5.2.4 *Empirical associations between parenting and child anxiety*

Many studies have examined the association between childrearing patterns and anxiety. A link has been demonstrated between parental rejection, overprotection and parental psychopathology, in particular depression, dysthymia and anxiety disorders (e.g. Alnaes & Torgersen, 1990; Parker, 1983; Parker et al., 1979; Rohner & Rohner, 1980). In contrast there has been less examination of the link between parental overprotection and child psychopathology. Unfortunately, the empirical studies within this area are inconsistent in relation to methodology, measures and theoretical basis. With this limitation in mind, Rapee (1997) provided a thorough review of this research and attempted to provide some general conclusions.

##### 1.5.2.4.1 Retrospective studies: associations with anxiety in adults

The majority of studies examining the association between parenting and anxiety have compared subjects clinically diagnosed with an anxiety disorder and non-clinical subjects on retrospective recall of how they were parented (Rapee, 1997). Typically, the PBI (Parker et al., 1979) has been used to provide a measure of parental history of perceived parental control and care.

Results generally indicated that subjects clinically diagnosed with an anxiety disorder perceive their parents as having reared them in both a more controlling, and to a lesser degree, more rejecting manner than non-clinical subjects (see Rapee, 1997 for a review).

There is some evidence to suggest that individuals with comorbid depression and anxiety are more likely to recall being reared in a rejecting and controlling manner than individuals with anxiety or depression alone (Alnaes & Torgersen, 1990). Alnaes and Torgersen used the PBI to examine the differences in perceived experiences of parenting between adults with mixed anxiety-depressive disorder ( $n = 36$ ), pure major depressive disorder ( $n = 55$ ), pure anxiety disorder ( $n = 84$ ) and other mental disorders ( $n = 97$ ). Analyses revealed that males with mixed anxiety-depression were more likely to have a perception of receiving low care and high protection from both mothers and fathers. Females recalled this pattern of bonding with regard to fathers, but not mothers.

Leon and Leon (1990) conducted a comparison study of perceptions of recalled parenting using the PBI. The sample comprised 60 patients with panic disorder, 30 patients with generalised anxiety disorder, 30 patients with depression, and 30 healthy controls. A striking difference was found between the groups. A significant portion of the non-clinical group recalled receiving optimal parenting (high affection, low control). Conversely, a significant portion of each of the clinical groups recalled being recipients of affectionless control (low affection, high control). There was no significant difference between the clinical groups. Interestingly, the depressed group scored significantly higher on a measure of anxiety than the generalised anxiety group. Thus the depressed group may actually represent a group of adults with mixed anxiety-depression. However, unlike the study by Alnaes and Torgersen (1990), no difference in perceived parenting was found between the depressed (anxious-depressed) group and the generalised anxiety group.

Correlational studies, using non-clinical samples, have suggested that severity of anxiety is linearly related to the degree of controlling and rejecting parenting behaviour. Studies have also shown a link between having depression as an adult and being a recipient of rejecting, and to a lesser extent, controlling parenting (Mancini, D'Olimpio, Prunetti, Didonna, & Del Genio, 2000; Parker et al., 1979; Rapee, 1997). This association is present for both clinical and non-clinical subjects.

Nevertheless, results of correlational studies have been more equivocal than group comparisons. For example, Mancini, D'Olimpio, et al. (2000) reported a correlation of .33 between a history of being raised in a protective manner (according to the PBI) and state anxiety in a sample of 95 female adults. However, the association did not attain significance in the sample of males ( $n = 80$ ) or males and females combined. The magnitudes of the correlations have generally ranged from .20 to .30, which is indicative of the importance of other psychosocial factors.

#### 1.5.2.4.2 Perceptions of current parenting: associations with anxiety in children

As Rapee (1997) highlights, many studies are limited by the reliance on retrospective recall regarding parenting. A few studies have attempted to examine the associations between child/adolescent anxiety and their perceptions of how they are being parented (Kohlmann, Schumacher, & Streit, 1988; Perry & Millimet, 1977; Stark, Humphrey, Crook, & Lewis, 1990).

Results have been equivocal. Stark, Humphrey, Crook and Lewis (1990) reported that a small sample of 10 children aged 9 to 14 years diagnosed with an anxiety disorder reported being raised in a more rejecting and controlling manner than non-clinical subjects. Conversely, Perry and Millimet (1977) reported no difference on measures of perceived control, freedom, warmth or love between 14 year olds with high levels of anxiety versus low levels of anxiety. As suggested by Rapee, the difficulties associated with child questionnaire measures may account for the discrepant findings.

Few studies have examined the association between parenting and child adjustment by directly questioning parents of children (Rapee, 1997). A reason for this may be that measures of current parenting practices tend to have strong negative connotations, thereby reducing the likelihood of honest responses (Rapee, 1997). Nevertheless, research findings generally support a link between measures of controlling parental behaviour and anxiety in children.

In an attempt to minimise socially biased responses in relation to parenting, Rubin and colleagues devised a more behavioural measure of maternal control (Rubin & Mills, 1990; Rubin, Mills, & Rose-Krasnor, 1989). This measure assessed maternal beliefs about the use of 'power-assertive' (similar to 'controlling') strategies in given situations. Based on interview data, mothers were categorised as being high (use of punishment, strong commands and threats), moderate (reasoning, modelling and gentle directions) or low (non-directive) on power assertion.

Using a sample of 58 preschool aged children and their mothers, Rubin, Mills and Rose-Krasnor (1989) reported that children of mothers who used high-power assertive strategies were more likely to display assistance-seeking behaviours and to approach teachers for social interaction. These children were more likely to be rated as fearful-anxious by teachers. Similarly, Rubin and Mills (1990) found that high-power assertive parenting strategies were significantly associated with child anxiety and withdrawal in a sample of 121 mothers and their 4 year old children. Generalisability of these findings however is limited because only six children were classified as anxious/withdrawn.

Studies addressing the association between parenting practices and child inhibition have been conducted (Chen, Dong, & Zhou, 1997; Chen et al., 1998; Chen et al., 2000; Chen, Rubin & Li, 1997). Behavioural inhibition reflects characteristics including anxiety, an inability to express one's self, social immaturity and incompetence (Chen et al., 1998; Rothbart & Bates, 1998; Rubin,

Coplan et al., 1995; Rubin, Stewart, & Chen, 1995). Some parenting practices may impede the development of socialisation and assertiveness skills, thus making the child vulnerable to anxiety and other emotional and behavioural problems.

Chen and colleagues have examined the associations between behavioural inhibition and parenting attitudes in a sample of 108 Canadian and 150 Chinese parents and their 2 year old children (Chen et al., 1998). Mothers completed a Q-Sort to provide a measure of parenting attitudes regarding encouragement of independence, protection and concern, punishment orientation, acceptance and rejection. Ratings of child inhibition were made from laboratory observations of mother-child interactions and behaviours. Among the Canadian sample, punishment, protection and concern were significantly associated with child inhibition.

Whilst many studies have demonstrated associations between parenting (particularly control/protection) and child emotional problems (such as anxiety, withdrawal, etc.), some contrasting evidence also exists (e.g. Bowen, Vitaro, Kerr, & Pelletier, 1995). Bowen et al. (1995) examined the significance of maternal overprotection and child shyness during kindergarten as predictors of internalising problems during fifth grade. The sample comprised 144 boys and 125 girls. A measure of child anxiety-withdrawal was obtained from both teachers and peers during kindergarten and grade 5. Mothers completed a 43-item questionnaire, the Parental Child-Rearing Attitude Questionnaire (Falender & Mehrabian, 1980). The arousal-nonarousal subscale, which describes the level of socioemotional experiences and stimulations that the parent allows the child, was used to provide a measure of parental overprotectiveness. Analyses indicated that teacher and peer ratings of shyness and popularity during kindergarten were predictive of anxiety-withdrawal in grade 5. Surprisingly, maternal overprotection was not directly or indirectly associated with child anxiety-withdrawal for girls. For boys, maternal overprotectiveness appeared to protect unpopular boys from becoming anxious-withdrawn in grade 5. This finding was the opposite of the hypothesised relationship, in which protectiveness was anticipated to exacerbate the risks associated with shyness. The authors suggested that high levels of maternal protection might serve as a regulator of the child's anxiety, thus allowing him to slowly encounter new situations knowing the mother is there to protect him. Mothers may be less concerned about shyness among girls, which may be viewed as socially acceptable, and thus less likely to become protective in an effort to help them overcome their problem (Bowen et al., 1995).

#### 1.5.2.4.3 Observations of parenting: associations with child anxiety

Cowan, Cowan, Cohn and Pearson (1996) examined associations between parental attachment history, current parenting, marital relationship and child internalising and externalising problems. Using a non-clinical sample ( $n = 27$  mothers and  $n = 27$  fathers with children aged 3 years 5 months), laboratory observations of parent-child dyads were conducted with ratings made on 15 items to provide the following measures: parental negative affect (anger, coldness and displeasure) towards the child, warmth-responsiveness towards the child, engagement (interactive, confident in parental role) and structure (provides structure and communicates clearly about task). An overall positive parenting score was calculated. At this point parents also completed measures regarding their attachment history and marital quality. Approximately two years later teachers completed a school-based measure of child internalising problems relative to their peers. Based on maternal report, an association was demonstrated between attachment history and child internalising problems, and current parenting and child internalising problems. The association between attachment history and current parenting was mediated by marital support. Similar but weaker associations were demonstrated using paternal measures.

Pettit and Bates (1989) assessed the continuity of parent-child interaction styles over a period of 4 years and the relationship between interaction styles and the development of child internalising (and externalising) problems. This study by Pettit and Bates was part of the Bloomington Longitudinal Study of 120 parents and their 6 month old infant. Home observational data regarding family interactions and questionnaire data on child behavioural and emotional adjustment were collected for 111 families when the child was 6 months, 13 months, 24 months and 36 months old. Of these families, 29 were selected for follow-up when the child was 4 years old. The 29 families selected represented high, low, and midrange levels of family functioning. Whilst selection of families at extremes may be useful in highlighting the associations between parenting practices and child adjustment (Belsky, 1984; Pettit & Bates, 1989), this approach may also unduly magnify the relations and possibly lead to misinterpretation of findings.

In this follow-up mothers completed the CBCL (Achenbach & Edelbrock, 1983), which was used to provide a measure of social withdrawal. Family interactions at home were coded to provide

measures of control, social contact and teaching. Observations of maternal positivity (affectionate contact, affectionate teaching, verbal stimulations) toward the child when the child was aged 6 months, 13 months and 24 months and maternal negativity (restrictive control and coerciveness) towards the child when the child was aged 13 and 24 months were moderately associated with child social withdrawal at age 4 years. However, observation of maternal control when the child was 4 years was not significantly associated with child social withdrawal at 4 years (correlation -.20). Taken together, analyses suggested that both the *absence of positive* parental behaviours and the *presence of negative* parental behaviours are important determinants of child social withdrawal (and aggression).

Dumas, LaFreniere and Serketich (1995) observed parent-child interactions using a randomised-stratified sample of preschool children, selected from a representative sample of 994 children from 60 preschool classrooms within metropolitan Montreal. Using teacher report, 42 children were classified as competent, 42 children were classified as aggressive and 42 children were classified as anxious. Maternal aversive control (criticism, punishment, intrusion, etc.) was found to be highest in the sample of anxious children. Interestingly, these children tended to respond with high levels of non-compliance. The interactive nature of parental control and child noncompliance may limit development of the child's adaptive coping strategies and pro-social behaviour (Dumas et al., 1995), and potentially place them at risk for ongoing anxiety problems (and possibly the development of other behavioural and emotional problems).

#### 1.5.2.4.4 Associations between past and current parenting practices

As previously theorised, the manner in which individuals are raised will likely influence the way they raise their own child. For example, a person raised in a protective manner is likely to become a protective parent. However, psychosocial factors are also theorised to play an important role in the way a parent behaves towards his or her child. For example, in line with attachment theory, Belsky (1984) proposed that the presence of social support could mitigate the adverse effects of insecure early attachment relationships on subsequent parenting.

A study using a community-based sample of 73 mothers and their 5 to 7 years old children recruited through kindergartens and schools provided support for an association between attachment history and current parenting (Meyers, 1999). A range of data was collected using standardised questionnaires, semi-structured interviews and observations. The data included

demographic information, retrospective maternal attachment security, depressive symptomatology, perceived social support, marital satisfaction, child temperament, child prosocial behaviour and current parenting styles, including maternal control, involvement and warmth, which provided an overall measure of authoritativeness.

The results lend support to the existence of internal working models, which influence relationships and highlight the powerful effect early attachment histories have on current parenting. Analyses indicated that attachment history was directly related to current parenting. However, perceived high levels of social support did not seem to mitigate the effects of early attachment relationships. Importantly, as outlined in Belsky's ecological model (1984), a number of other psychosocial factors, including marital satisfaction, child behaviour and socioeconomic status were independently associated with current parenting.

In contrast, Thomasgard and Metz (1996) did not demonstrate an association between past and current protective parenting. Thomasgard and Metz assessed the degree of association between perceptions of being raised in a protective manner and current protective parenting for 114 parents of children aged 2 to 5 years. Contrary to expectations, an intergenerational link between protective parenting was not shown. Moreover, no significant associations were obtained between parental protective behaviour and child emotional or behavioural problems (measured using the CBCL). It is noteworthy that the two year follow-up data indicated relative instability over time in reported current protective parenting, which may be reflective of the developmental stage of the child. Certain parental protective behaviours may decline as the child develops, and also as the parent gains experience in caring for a child.

#### 1.5.2.5 *Limitations of studies*

Most of the studies on this topic are retrospective. Reports of parenting may be biased by factors such as the informants' psychological state. Nevertheless, it has been said that it is not past experiences per se but the present interpretation of past experiences that influences current behaviour (Elder, Caspi, & Downey, 1986). Thus, whether or not a mother has a distorted interpretation of the way she was parented may not be particularly relevant because it is the internalised perceptions that influence current behaviour.

The inconsistent findings across studies may be due to differences in methodology, measures, and the variables included. Further empirical investigation is required to understand the inter-relationships between an array of psychosocial factors and protective/controlling parenting of young children, and the relationship with childhood anxiety.

### 1.5.3 Parental Adjustment

#### 1.5.3.1 *Theoretical links between parental adjustment and child anxiety*

As previously discussed, the parent-child relationship is believed to be a central factor in the development of anxiety in children. The preceding section discussed the role of parenting which is inherent in the parent-child relationship. Parental psychological adjustment is also an important aspect associated with the parent-child relationship.

Attachment theory highlights the importance of maternal sensitivity to the development of a secure relationship (Bowlby, 1969). Parents need to be aware of their child's physical and emotional needs in order to appropriately satisfy them. A parent who is experiencing heightened levels of psychological distress may be less attuned to the needs of their child. The parent may therefore be less capable of behaving in ways to maximise their child's well-being. Rapee's (2001) model of the development and maintenance of anxiety in children highlights the inter-relationships between parental behaviour, parental adjustment and child anxiety, and suggests that the function of parental overprotection may be to reduce their own anxiety as well as their child's anxiety. For example, a parent with high levels of anxiety might become overprotective as a means to reduce their own anxiety, even though this method of emotion regulation may be less beneficial to the child. It is also noteworthy that a heightened level of psychological distress, irrespective of the type of emotional problem (e.g. anxiety, depression) may impair a parent's capacity to be sensitive to his or her child's needs, thus potentially having a negative impact on the child's emotional development.

A parent with heightened levels of emotional distress (e.g. anxiety, depression) may not only be less sensitive to the child's needs but also have difficulty regulating their emotions in the presence of the child. Children as young as 12 months (Gunnar & Stone, 1984) may interpret and appraise situations using information gathered from parental expressions. This process of

emotional communication, termed social referencing (Feinman, 1992), assists in the development of strategies for emotion regulation. For example, a parent who displays an expression of fear as a dog approaches them conveys the message that dogs pose a threat to one's well being. The young child might internalise this message and also begin to fear dogs. Very young children with limited experience may be particularly vulnerable to the effects of modeling, as the parent is a key figure with whom the child interacts.

#### 1.5.3.2 *Empirical studies*

The majority of research examining the associations between parental and child and adolescent anxiety have focused on the role of modeling in the development of fears and phobias (Beidel & Turner, 1997; Gerull & Rapee, 2002; Merckelbach, Muris, & Schouten, 1996; Muris, Steerneman, Merckelbach, & Meesters, 1996; Roselind et al., 2000).

Gerull and Rapee (2002) investigated the influence of maternal modeling of fear on the acquisition of fear and avoidance in a sample of 30 toddlers aged 15 to 20 months. Results demonstrated that maternal expression of fear or disgust in the presence of a novel object led to the child demonstrating avoidance in relation to that object. This association was stronger for girls than boys. Subsequent maternal positive expressions in relation to the object did not lead to toddler avoidance of the object, irrespective of child gender. The associations persisted for up to 10 minutes, despite mothers no longer demonstrating negative expressions.

Biedel and Turner (1997) examined the rate of anxiety disorders among a sample of 129 American children aged 7 to 12 years; 48 had parents with no psychiatric diagnosis, 28 had a parent with an anxiety disorder, 24 had a parent with major depression and 29 had a parent with comorbid anxiety and major depression. Analyses indicated children were more likely to have an anxiety disorder if their parent also had an anxiety disorder only. Children of parents with depression or comorbid anxiety-depression were at risk for a broader range of psychological problems, not just anxiety. Importantly, middle or high socio-economic status appeared to act as a buffer for child psychological problems in the presence of parental psychopathology. Thus, there appears to be a cumulative effect, whereby low SES and parental psychopathology places a child at greater risk of psychological problems than the presence of each individual risk factor.

Roselind, Wittchen, Hofler, et al. (2000) reported a strong association between parental and adolescent social phobia in a sample of 1047 adolescents aged 14 to 17 years who participated in the Early Developmental Stages of Psychopathology study in Munich (and surrounding countries). Adolescents of parents with a history of social phobia were 4.7 times more likely to have social phobia than adolescents of parents without a history of social phobia. Other forms of parental psychological problems, including depression, an anxiety disorder, or alcohol use disorder, were also associated with an increased risk of adolescent social phobia. Associations between parental overprotection and rejection and adolescent social phobia, before and after controlling for parental psychological problems, were also demonstrated.

A large study conducted by Mathiesen, Tambs and Dalgard (1999) serves as a reminder of the potential bi-directional relationship between parental and child adjustment. Using a sample of 921 Norwegian mothers with 18-month-old children, the association between child behavioural and emotional problems and parental anxiety and depression was assessed (in addition to social factors, which are discussed in a subsequent section). Regression analyses indicated that after controlling for the social factors, child adjustment was strongly associated with maternal mental distress. In particular, problems with children's eating, sleeping, disobedience and worry were significantly associated with maternal symptoms of distress. The authors suggested that child behavioural and emotional problems are common during the second year of life and that such problems will likely cause additional strain on the parent. However, as the study is cross-sectional, it is possible that the mother's mental distress may have affected the child at a much earlier stage.

A study ( $N = 3,860$ ) by Lavigne et al. (1996) found that internalising problems as measured by the CBCL were associated with older age and minority status. Comorbid internalising and externalising problems were correlated with being older, minority status, male, low SES, smaller family size, temperamental high activity level, temperamental low persistence and low child IQ. The temperamental characteristic of low activity was associated with high levels of internalising problems. Contrary to the hypothesis, family social environment, parental psychological adjustment and life events were not associated with internalising problems.

Abidin, Jenkins and McGaughey (1992) provided empirical support for an association between parental adjustment (depression and self competence) and child anxiety-withdrawal. Using a sample of 94 subjects, Abidin et al. assessed the relative significance of child gender, life-events,

child temperament, maternal depression, maternal competence and marital support in the prediction of anxiety-withdrawal in young children. The psychosocial variables were assessed using the Parenting Stress Index (Abidin, 1983) when the children were aged between 6 and 12 months and subsequently when the children were aged 4 years 6 months. Child anxiety-withdrawal at 4 years 6 months was assessed using the Revised Behavior Problem Checklist (Richman & Graham, 1971). Analysis using hierarchical regression showed that maternal characteristics were the only significant predictors, explaining 15% of the variance in child anxiety-withdrawal at 4 years 6 months. Life stress, child gender, child temperament, and husband support were not uniquely associated with child anxiety-depression. Unfortunately, Abidin et al. did not examine the potential mediating and moderating roles of the psychosocial factors.

In relation to child somatisation, equivocal findings have been reported. Some studies have shown that compared to well-adjusted parents, parents with poor psychological adjustment report greater levels of somatic problems in their children (Last, 1991), although these relationships have not reached significance in other studies (Bernstein et al., 1997).

#### 1.5.3.3 *Subjectivity of parental reports*

The potential bias of parental adjustment on reports of child adjustment is well researched (Bates & Bayles, 1984; Engel, 2000; Krain & Kendall, 2000; Najman et al., 2001; Richters & Pellegrini, 1989). Some research has suggested that maternal reports of child behavioural problems are influenced by the mental state of the mothers (Bates & Bayles, 1984; Engel, 2000; Najman et al., 2001; Richters & Pellegrini, 1989). For example, parents with poorer psychological adjustment may focus more heavily on and report more problematic child behaviours and emotions. In contrast, parents with very good psychological adjustment may view their child in a particularly positive manner and minimise problems. A study by Krain and Kendall (2000) indicated that parental depression, but not anxiety, may influence parental reports of anxiety in children aged between 7 year 6 months and 15 years ( $N = 238$ ).

A large Queensland longitudinal study ( $N = 8,556$ ) beginning in pregnancy examined potential biases in maternal reports of child behavioural and emotional problems, using the CBCL (Najman, Williams, Nikles, et al., 2001). When the children were 14 years old, 5277 mothers

and children completed the CBCL and YSR, respectively. Mothers also completed a self-report measure of anxiety and depression.

The study reported an association between maternal depression/anxiety and maternal reports of child internalising and externalising problems. Maternal depression/anxiety and child reports of internalising and externalising problems did not show such a strong association. Overall, 43 to 46% of mothers agreed with their children about the levels of internalising problems. There was an agreement rate of 46% to 47% for externalising problems. Mothers with 'normal' levels of anxiety/depression reported fewer internalising and externalising problems for their child, than did the children themselves. In contrast, mothers with clinically significant levels of anxiety/depression reported more internalising and externalising problems of their child, than did the children themselves.

Najman et al. (2001) conducted a sensitivity/specificity analysis on child 'case' identification using the CBCL compared to the YSR. Overall, mothers and children demonstrated poor agreement on clinically significant levels of child internalising, externalising and total problems. For mothers who were not emotionally impaired ( $n = 4,108$ ), agreement with YSR for child case identification was 20% to 25%. Mothers with 'borderline' ( $n = 654$ ) levels of anxiety/depression agreed more with their children in regard to child case identification. However, more mothers with 'borderline' anxiety/depression also identified their child as a case when the child did not identify him/herself as a case. A similar pattern emerged when the mothers had clinically significant levels of anxiety/depression ( $n = 515$ ). Thus, increasing sensitivity (agreement between mother-child reports of child case) was associated with a reduction in specificity (agreement in mother-child reports of child non-case).

A study by Cobham, Dadds and Spence (1999) provided some evidence to suggest that maternal anxiety may influence maternal reports of child internalising problems (according to the CBCL). Within this study, there was a group of 33 children aged 7 to 14 years diagnosed with an anxiety disorder. Of these children, 16 had mothers who also scored within the clinical range of self-reported anxiety. Mothers with higher levels of anxiety (rated using the State-Trait Anxiety Inventory) perceived their child to have higher levels of internalising problems than mothers with lower levels of anxiety.

#### 1.5.3.4 *The cyclical pattern between parenting and psychological adjustment*

A life-course hypothesis of intergenerational continuity has been proposed (Caspi & Elder, 1988; Elder et al., 1986). This hypothesis suggests a cyclical pattern, whereby parental instability (e.g. anxiety or depression) results in unfavourable parenting styles (e.g. overcontrol or rejection), which in turn lead to similar affective problems and interaction styles in the following generation (Elder et al., 1986; Whitbeck et al., 1992). The process may then be repeated in a cyclical way. As previously outlined, individuals who are depressed or anxious have a tendency to negatively distort reality and focus on objective stressors. Mothers who are depressed or anxious may therefore negatively interpret their child's behaviour, selectively attend to negative child behaviour or have a lower tolerance for negative child behaviour and subsequently become more controlling and punishing or avoid interactions, with further impact on the child's behaviour and adjustment.

A transactional model of interaction may be used to understand the impact of maternal psychological functioning and parenting on child development and adjustment (Chen, Rubin et al., 1997; Lewis, 1990; Shaw & Bell, 1993). Children whose parents experience poor psychological functioning are likely to be raised in a stressful and maladaptive environment. This environment may elicit more negative emotionality in the child, and behaviour that is less controllable, manageable and persistent. Following this, the child's 'difficult' temperament may elicit feelings of irritation, dissatisfaction and related feelings of stress, anxiety and depression in the parent (Chen, Rubin et al., 1997; Sanson & Rothbart, 1995). Additionally, other child characteristics such as gender, age and health status may interact with parenting practices. For example, it has been suggested that parenting practices may have a greater impact on girls than boys, as girls who are considered to be more involved in family activities (Chen, Rubin et al., 1997).

A particularly impressive study, utilising retrospective and prospective data, examined the cross-generational continuity of parental rejection and depressed affect (Whitbeck et al., 1992). The sample comprised 451 intact families with a child in early adolescence. Structural equation modelling revealed a relationship between perceived parental rejection and depressed affect for both adults and adolescents. Moreover, results supported the claim that perceived parental rejection from one generation is associated with depressed affect in the second generation, which in turn leads to parental rejection and subsequent depression in the third generation.

The study by Whitbeck et al. (1992) extends the intergenerational transmission of problem behaviours hypothesis (Caspi & Elder, 1988; Elder et al., 1986) to include depressed affect. Unfortunately, the study by Whitbeck and colleagues failed to measure other parenting styles (e.g. control) and other emotional problems (e.g. anxiety). However it is likely that a similar cyclical pattern exists.

Najman, Bor, Andersen, et al. (2000) used a sample of 5296 mothers involved in the Mater University of Queensland Study of Pregnancy to examine the relative predictive significance of a range of biopsychosocial factors on child problems at age 2 to 4 years. The factors included maternal mental health and controlling parenting style, child and maternal physical health, maternal lifestyle (e.g. smoking habits, alcohol consumption), partner antisocial behaviour, dyadic satisfaction and adjustment and SES. The women were recruited at 18 weeks gestation, re-interviewed at 3 to 5 days after the birth of their child, and again when the child was 6 months, 5 years and 14 years.

A measure of child behaviour and mental health between the ages of 2 and 4 years was based on maternal retrospective reports of difficult or troublesome behaviour using a scale of 1 (never) to 4 (often). Troublesome behaviour included irregular sleeping habits, irregular bowel/eating habits, difficult behaviour, messy or dirty, tantrums and disobedience, and restlessness at meal times. Responses were summed, with higher scores reflecting more troublesome behaviour. Whilst Najman et al. reported that the score on this scale was predictive of CBCL scores at age 14 years, unfortunately the measure used was not standardised and contained very few problem behaviours (let alone symptoms of anxiety, although a couple of somatic problems were included).

A standardised self-report measure of maternal anxiety and depression was obtained at 2 to 5 days, 6 months and 5 years after the child's birth. A measure of current (i.e. when children were aged 14 years) anxiety, depression and subjective stress was also obtained. Mothers were categorised as anxious (16.3%), non-anxious, depressed (6.8%), non-depressed, and subjectively stressed (11.1%) or not stressed.

A measure of controlling parenting style was obtained at 5-year follow-up (when the child was aged approximately 5 years). Mothers were classified as highly controlling (11.1%), moderately controlling (75.2%) or low on controlling (13.7%). The classification was based on responses to the following items: 1) supervise their child's activities very carefully; 2) expect child to do as

told without explanation; 3) watch everything child does; 4) expect child to do as told immediately; 5) believe strict discipline is good. Mothers were also categorised as allowing their child to have a little unsupervised freedom (8.9%), some supervised freedom (83.8%), or a lot of supervised freedom (7.3%). These classifications were based on responses to 5 items about the age mothers would allow their child to engage in a variety of unsupervised socially related activities (e.g. go out, stay home alone, drink alcohol). Finally, maternal discipline style was also assessed at 5 year follow-up. Mothers were presented with five situations (refuse to clean up room, take something belonging to another, making fun of a crippled person, touching hot stove, being non-compliant and consequently breaking something). For each situation, mothers were required to indicate which discipline strategy they would use (smacking the child, use explanation or reasoning, or take away something the child enjoyed).

Analysis indicated that concurrent maternal mental health (in particular maternal anxiety) was the strongest predictor of child behaviour problems at age 2 to 4 years. Maternal subjective stress was also strongly associated with child adjustment. Mothers who provided their child with greater levels of freedom reported fewer problem behaviours. Similarly, mothers who reportedly used withdrawal punishment behaviours reported fewer child problems.

A logistic regression analysis (with child troublesome behaviour as the dichotomous outcome variable) indicated the following variables as unique predictors: dyadic adjustment, maternal anxiety, maternal subjective stress, baby wanted and mother ill during pregnancy. A child was more likely to be categorised as having troublesome behaviour if the parent reported subjective stress and anxiety (2.2 times more likely with reported stress and 1.9 times more likely with reported anxiety). Child-rearing factors were not associated with child adjustment status after controlling for the other psychosocial factors. Importantly, Najman et al. (2000) emphasised that a large proportion of the variance in troublesome behaviour could not be explained by the risk factors. The authors have not reported any analysis concerning mediating and moderating relationships between the psychosocial variables. A clear weakness of this study is the use of retrospective recall to measure child behaviour problems.

Barling, MacEwen and Nolte (1993) tested a model that delineated a predictive relationship between maternal psychological well-being and parenting behaviours, and subsequently between parenting behaviours and child internalising and externalising problems. The final sample comprised 187 mothers of children aged 2 to 3 years.

Psychological well-being was measured using a 12-point scale of positive and negative mood over the past month. Child internalising and externalising problems were assessed using the CBCL. Parenting behaviour was assessed using an unpublished self-report questionnaire of rejecting (maternal withdrawal and avoidance of the child), punishing (active disapproval, criticism, and efforts to chastise and discipline of the child) and positive behaviours (maternal reactions that are encouraging and accepting of the child); controlling or protective parenting was not assessed.

Confirmatory path analysis revealed that maternal negative mood predicted both rejecting and punishing parenting. In turn, rejecting and punishing parenting behaviour significantly predicted child externalising and internalising problems. Additionally, maternal negative mood directly predicted child externalising and internalising behaviour.

This study is among the few to examine the relationships between self-reported maternal well-being and parenting and child behavioural and emotional problems in very young children. The majority of research utilises older samples. The measure of parenting has not been widely used, therefore limiting generalisability across samples. Further, the study failed to measure controlling/protective parenting, which has been identified as an important factor related to child internalising problems such as anxiety and depression.

A similar study by MacEwen and Barling (1991) examined the relationships between maternal well-being and parenting style and behavioural and emotional problems in a sample of 147 school-aged children (mean age 8.2 years). Using path analysis, MacEwen and Barling identified a direct effect of maternal negative mood on rejecting and punishing behaviour. In turn, a rejecting style of parenting was shown to have a direct effect on child anxiety, whereby rejecting parenting was associated with higher levels of child anxiety. Similarly, punishing parenting behaviour directly affected child externalising problems. High levels of punishing parenting were associated with higher levels of conduct problems and inattention. Patterson's (1982) description of the coercive style of interactions can be used to understand these relationships. As previously discussed, mothers with a negative mood may withdraw from their children, and/or exhibit less tolerance for aversive behaviour and thereby become more punishing even of previously acceptable behaviours.

Associations between controlling/rejecting parenting and anxiety have also been demonstrated among samples of school-aged children and adolescents (Muris, Meesters, Merckelbach, & Hulsenbeck, 2000; Muris & Merckelbach, 1998; Roselind, 2000).

The findings from the discussed studies may be limited as the questions assessing parenting practices generally have negative connotations. Thus, parents may be more likely to respond in a socially desirable fashion. Furthermore, both parenting and maternal psychological adjustment were based on maternal reports, thus introducing the possibility of bias.

#### 1.5.4 Social Factors

##### 1.5.4.1 *Theoretical links between social factors and child anxiety*

An ecological approach to understanding anxiety in young children needs to incorporate social factors (Belsky, 1980; Bronfenbrenner, 1977), such as life events, daily stressors, and social support.

Life events and daily stressors may be disruptive to the development of adaptive emotion regulation. Significant life events and ongoing stressors may create heightened levels of parental distress and consequently reduce the parent's capacity to respond sensitively to their child. Exposure to stressful life events may weaken a parent's capacity to effectively handle daily situations and hence may disrupt parenting practices. In turn, this may be detrimental to the development of adaptive emotion regulation within the child.

The level of emotional support that the parent receives may influence the impact of significant events and stressors on the child (Spence & Dadds, 1996). In order to sensitively and consistently respond to a child's need, the parent must have his or her own emotional needs satisfied (Erickson & Egeland, 1999). Support received from family, friends, and professionals may help the parents manage their own emotions and provide them with a sense that they are able to cope with life's demands. Parents who believe they are coping well and who feel competent in their parental role may be more capable of satisfying their child's emotional and social developmental needs (Raver & Leadbeater, 1999; Teti & Gefland, 1991). In turn, this

confidence fosters healthy parent-child interactions and the development of healthy child adjustment (Erickson & Egeland, 1999).

#### 1.5.4.2 *Empirical studies*

##### 1.5.4.2.1 Life events and psychopathology in adults

Stressful life events have been defined as events that require a significant re-adjustment in one's life in order to manage the event (Holmes & Rahe, 1967). A vast majority of research has established that stressful life experiences can have adverse effects on those who experience them, including psychological distress and psychiatric disorder (Sandberg, McGuinness, Hillary, & Rutter, 1998; Turner & Wheaton, 1995).

The relationship between life events and psychological wellbeing among adults has been examined through use of both community and case controlled studies and has generally relied on retrospective reports. Research has shown that events perceived as undesirable or negative are particularly powerful predictors of psychological problems (Kessler, 1997). Thus, checklists usually consist of events perceived by society as being negative.

The most commonly investigated outcome of life events is depression (Kessler, 1997). Paykel, Myers, Dienelt, et al. (1969) were among the first to conduct a controlled comparison of the relationship between life events and depression. They examined the frequency and types of life events experienced by 185 adults prior to admission to a psychiatric facility for depression. Life events were assessed using a list of 33 modified events originally derived by Holmes and Rahe (1967). Events related to employment, health, familial, marital and legal issues. All events were evaluated as being undesirable by American society, except for three events (engagement, marriage, promotion). Analysis showed that depressed subjects reported nearly 3 times as many life events in the six months prior to the onset of depression than a community sample of 185 healthy adults.

Research has also examined the association between life events and anxiety in adults. Generally, research has shown that life events precede the onset of anxiety disorders, thereby suggesting that life events have an etiologic role. For example, Lteif and Mavissakalian (1995) examined characteristics of life events within the past year of 187 adults aged from 18 to 64

years, who had been diagnosed with panic disorder and agoraphobia with panic. Subjects rated the occurrence of 104 life events and the desirability of endorsed events. Interpersonal conflicts and serious illness were among the predominant categories of endorsed life events. The number and degree of undesirability of life events were significantly related to severity of both anxiety and depressive symptomatology.

The results of these studies suggest that adverse life events may precipitate the onset of internalising problems. However, conclusions regarding causality cannot be made, as the studies were retrospective. Informant biases may have inflated the number of life events reported.

#### 1.5.4.2.2 Empirical associations between parental life events and child adjustment

The link between undesirable life events experienced by parents and psychological problems in children has received some support. (Abidin et al., 1992; Najman et al., 2000; Shaw et al., 1997).

Shaw, Keenan, Vondra, Delliquadri and Giovannelli (1997) attempted to identify antecedents of internalising problems in 82 high-risk preschool children, using the construct of emotion regulation to guide their study. The sample was followed from infancy to 5 years. A measure of child temperament (negative emotionality) was obtained 4 times during the first two years using the Infant Characteristics Questionnaire. The Strange Situation was used to assess attachment at 12 and 18 months. Internalising problems (including anxiety/depression) were assessed using the CBCL when the children were aged 3 and 5 years. Parental conflict and parenting daily hassles were assessed at 24 months, using the Child Rearing Disagreements Scale and Parenting Daily Hassles Scale respectively. Adverse life events were assessed at 15 months using the Life Experiences Survey, whereby parents indicated whether they had experienced an event in the past 3 months, the perceived nature of the event and the impact of the event on their lives.

Negative life events reported by the mother when the child was aged 15 months were shown to be a significant independent predictor of scores on the Internalising Scale, and the Depression/Anxiety factor at age 5 years. The lack of interaction with the other factors, suggests that negative life events have a direct impact on the development of internalising problems in young children. Unfortunately this study did not incorporate measures of parental

psychological adjustment or social support, which may affect the relationship between life events and child adjustment. Other significant predictors of internalising problems at age 5 years included infant negative emotionality, insecure attachment, parental conflict and internalising problems at 2 years. The strong associations need to be interpreted with caution, as mothers were the sole informants and their perceptions may be biased. However, Shaw et al. (1997) argued that the use of a hierarchical regression analysis theoretically meant that the bias in the mother's reports would have been accounted for by the first maternal report entered. Thus, if mothers were entirely biased reporters, then the addition of mother reports of life events, infant difficulty and internalising problems would not have significantly added to the prediction of internalising problems at age 5 years.

Few studies that have examined the impact of life events on child psychological outcome have employed samples of children less than 5 years of age. Lavigne, Gibbons, Christoffel, et al. (1996) examined correlates of psychiatric disorders in preschool children aged from 2 to 5 years. From a sample of 3,860 children seeing a paediatrician within Chicago, 116 children were rated by their mothers as equal to or above the 90<sup>th</sup> percentile on the CBCL total problem score. This sub-sample was matched on age, sex and race with 116 children who received low CBCL total problem scores. Measures of parental psychological adjustment, family social environment, and life events were obtained. In addition to the CBCL ratings, trained clinicians made DSM-III-R diagnoses. Logistic regression analyses revealed that surprisingly, family and maternal factors and life events were not associated with child CBCL scores or diagnoses. The authors suggested that this lack of an association was because a community sample was used as opposed to a sample referred for specific behavioural or emotional problems. Indeed, it is likely that the association between social factors, such as life events, and child psychopathology is strongest amongst clinically referred children. However, the lack of support for the previously identified correlates may be due to the failure to examine these factors as potential mediators or moderators.

Similar findings have emerged in an Australian study using a slightly older sample. The Australian Temperament Project is a large-scale, prospective longitudinal study of the emotional and behavioural development of children. The Project began in 1983 and comprised 2443 mostly Caucasian infants across the state of Victoria, Australia (Sanson, Prior, & Oberklaid, 1985). A case-controlled study identified 186 children at age 11 to 12 years who were 'at-risk' of behavioural and emotional problems (Prior, Sanson, Smart, & Oberklaid, 1999). A comparison

sample included 97 'not at-risk' children. The two groups were compared on a range of psychosocial factors, including life stressors (assessed using an adapted version of the Life Events Questionnaire; Smith, 1992). This questionnaire includes 20 statements covering the experience and impact of specific negative life events over the last 12 months, including financial problems, life changes and losses and family events. Based on maternal ratings, life stresses significantly differentiated the two groups, whereby mothers of at-risk children reported more life stressors than mothers of the comparison children. Fathers of at-risk children also reported a significantly greater number of life stressors than fathers of the comparison children.

Goodyer, Wright and Altham (1988) investigated the association between anxiety and depression in children aged 7 to 16 years and their mothers' perceived social support, the presence of maternal distress and undesirable stressful life events. The sample comprised a clinical group ( $n = 100$ ) and a matched control group ( $n = 100$ ). Subjects within the clinical group were classified as "anxiety dominant" or "depressive dominant". Recent stressful life events were measured using the Newcastle Child and Family Life Events Schedule, which asked mothers about events (e.g. accident, illnesses, marriage, family, bereavement, employment, legal and natural disasters) in the 12 months prior to the onset of their child's disorder. Life events were coded dichotomously (no event endorsed versus at least one event endorsed). Results of logistic regression analysis showed that a child was 5 times more likely to be in the clinical group (anxious or depressed) if he/she had experienced a recent life event, thus suggesting that the experience of stressful life events may increase vulnerability to emotional problems.

The design of these studies (Goodyer et al., 1988; Prior, Sanson, Smart, & Oberklaid, 1999) likely maximised the differences between the two groups of children. Thus, the strong association reported between life stressors and child adjustment may be magnified.

Contrasting findings were obtained by Steinhausen (1983) who examined life events in a sample of 36 children aged 5 to 8 years with cystic fibrosis. The study also included three matched samples of 36 children with bronchial asthma, 36 children with inflammatory bowel disease and 36 children with no physical illness. There was no association between child psychopathology and the number of events experienced by the mothers during the previous 6 months, the number of undesirable events during the last 6 months, and the total weighted score of events

during the last 6 months. Possible explanations for the lack of significant association include the small sample size and exclusion of factors such as parental adjustment, social support and parenting.

#### 1.5.4.2.3 Social factors and parenting

Research has linked mothers' experience of undesirable life events to poorer parenting practices, including affectively distant, resistant and punitive parenting. Maternal behaviours including tension, low levels of nurturance, lack of spontaneity and limited responsiveness have also been shown in mothers who have experienced stressful life events (Ge, Conger, Lorenz, & Simons, 1994; McLoyd, 1995). It is possible that parents may attempt to gain a sense of control following, or during the experience of, an adverse event by exerting more control or protection when interacting with their child. The need for increased control may be particularly strong when there is a perceived threat to an individual's well being (e.g. child diagnosed with asthma).

Ge, Conger, Lorenz and Simons (1994) attempted to overcome limitations of past research by examining the role of mediating processes in the relationship between parental life events and depression in a sample of 451 seventh graders and their parents. Fathers and mothers separately indicated whether any of 35 negative events had occurred to them, a family member or friend during the past 12 months. The negative events included financial problems, work-related problems, illness or injury, and social network problems. The total number of life events was used but subjective ratings of the impact of the events were not obtained. Harsh inconsistent parenting and parental depressive symptoms were found to be mediating factors. Structural equation modelling provided support for an indirect relationship between life events experienced by parents and child depression. The first link was a positive association between life events and parental depression. In turn, parental depression affected parenting practices, whereby more depressed parents were rated as using harsher and inconsistent parenting. These parenting practices were then linked with depressive symptoms in the children.

The previously discussed case-controlled study conducted by Prior et al. (1999) also examined the association between parenting factors and child adjustment. They found that mothers of at-risk girls experienced a significantly greater number of stressful life events and used significantly less inductive reasoning, more punishment and less warmth when parenting.

Mothers of at-risk boys used significantly less warmth. The association between life stressors and parenting within each sample was not reported. However, it is highly likely that parents who experience life stressors may also use less adaptive parenting practices.

Webster-Stratton and Hammond (1988) examined the relationship between maternal depression and life stress, parenting behaviours and internalising and externalising problems (based on CBCL) in children aged 3 to 8 years. The sample comprised 49 non-depressed and 46 depressed mothers and their children who had been referred to a clinic for conduct problems. Depressed mothers were twice as likely as non-depressed mothers to have experienced negative life events (such as unemployment, financial problems or death in the family) in the preceding year. There was a trend for depressed mothers to smack their child more often than non-depressed mothers. Depressed mothers were observed to be significantly more critical of their child than non-depressed mothers, and rated their children as having significantly more externalising and internalising behaviour problems. The impact of life events on parenting practices may be mediated by the psychological state of the parent (Conger, McCarty, Yang, Lahey, & Kropp, 1984; Ge et al., 1994; R. D. Taylor, Roberts, & Jacobson, 1997). As outlined, a strong association exists between undesirable life events and emotional adjustment in adults. Research has also revealed that negative psychological states such as depression and anxiety may have significant implications for parenting (McLoyd, 1995). Thus, parents who experience a greater number of undesirable life events may be at greater risk of emotional problems and thereby at greater risk of engaging in unfavourable parenting practices.

Conger, McCarty, Yang, et al. (1984) assessed the mediating role of maternal psychological characteristics on the association between environmental stressors and the behaviour of mothers towards their children. The following demographic characteristics were conceptualised as the environmental stressors: younger maternal age at birth of first child, low family income, low level of education, increased number of children, receiving public assistance and one-parent families. The sample comprised 74 families with at least one child. Thirty-eight of the families had a child in preschool, whilst 36 had a child in elementary school. Hierarchical regression analysis suggested that chronic stressors had both a main and mediating effect on maternal behaviours towards the child.

Taylor, Roberts and Jacobson (1997) examined the mediating role of psychological distress on the association between undesirable life events and parenting practices of 79 African-American

mothers of adolescents. Stressful life events were assessed using the Psychiatric Epidemiology Research Interview Life Events Scale (Dohrenwend, Krasnoff, Askenasy, & Dohrenwend, 1978) which requires informants to indicate whether any of 35 different events had occurred within their family in the past year. Scores were obtained for four factors (family disruption, work-related stress, health problems and relationship problems). An assessment of maternal depression and self-esteem was obtained. Parenting factors assessed were acceptance and lax control. Analysis provided support for the mediating role of maternal self-esteem, whereby family disruption was associated with self-esteem, which in turn was associated with mothers' acceptance (but not lax control) of their child. A similar result was found for the relationship between work related stress and acceptance. Surprisingly, psychological distress did not mediate the relationship between life events and parenting.

#### 1.5.4.3 *Limitations associated with studies*

A difficulty in examining the impact of life events on children is the confounding influence of psychological state. Consistent with a well-accepted theory of depression (Beck, 1982), individuals with heightened distress may have more negative thought processes and thereby interpret situations more negatively than well-adjusted individuals. Thus, the associations between the social factors and adjustment may be a result of shared method variance involved when ratings are obtained from one informant only (Ge et al., 1994). The majority of research studies have focused on the broader constructs of internalising and externalising problems in children, rather than anxiety. Models guiding research of child emotional adjustment emphasise an ecological perspective (Belsky, 1980, 1984; Bronfenbrenner, 1977). However, few studies have examined the complex inter-relationships among the psychosocial factors and anxiety in very young children.

#### 1.5.5 **Summary of Psychosocial Factors Associated with Child Anxiety**

Thus far, the relationship between a range of psychosocial factors and anxiety has been discussed. The literature review indicates that parental protection/control may impinge on a child's development of autonomous behaviours for effective emotion regulation. Parental adjustment also plays a role. Parents with heightened levels of distress may have reduced

resources to assist their child in developing adaptive techniques for emotional regulation. The importance of social factors on a child's emotional adjustment, particularly via the parent's adjustment, has also been highlighted.

Child factors may also be associated with anxiety. The physical health of the child deserves consideration in relation to child anxiety. Caring for a young child with a physical illness may impact on parental adjustment and parenting behaviours, which may then be associated with the child's emotional adjustment. The next section discusses the direct and indirect associations between childhood asthma and anxiety.

## **2            Overview of Asthma**

### **2.1            The Problem of Asthma**

#### **2.1.1            Definition and Prevalence**

Asthma is a chronic and often debilitating condition characterised by sensitive airways in the lungs. Certain triggers cause the lining of the airways to become inflamed and swollen. The muscles around the airways tighten and excess mucus is produced. The airways therefore narrow, resulting in a reduction of the flow of air in and out of the lungs. The main symptoms of asthma are coughing, shortness of breath, tightness in the chest and wheezing (a high pitched raspy sound of breathing) (Asthma Australia, 2003).

The estimated prevalence of asthma in Australia is approximately 10%, with over two million sufferers nationally and 600,000 sufferers in Victoria (Asthma Victoria, 2001). The peak age of diagnosis of asthma is between two and four years. The prevalence of asthma in children is growing at approximately 1% each year (Asthma Victoria, 2001). The prevalence of asthma among school children in New South Wales doubled between 1982 and 1992 (Downs et al., 2001). Asthma is considered to be the most common chronic illness, with up to 25% of children, 14% of adolescents and 10% of adults having asthma at some point in their life (Asthma Australia, 2003). According to Asthma Victoria (2001), over 700 people living in Australia die each year from asthma; 200 of these are in Victoria. It is believed that over half of these deaths are preventable with improved asthma management.

#### **2.1.2            Cost of Asthma**

The cost of asthma to the Australian community is approximately \$585 to \$720 million per annum. Yearly, the cost to companies through absenteeism of those with asthma is \$110 million and through carer absence is \$120 million (Asthma Australia, 2003).

The cost for children with asthma and their families is also of paramount importance. A chronic illness such as asthma may cause significant disruption to a child's social, emotional and cognitive development. Asthma is one of the most common reasons for childhood hospital admission and absenteeism from school (Asthma Australia, 2003). In young children a diagnosis of asthma may interact with a variety of psychosocial factors, including parental adjustment, parenting, general life difficulty and social support, which may then disrupt early parent-child relationships and place children at risk for emotional problems.

### **2.1.3 Degrees of Asthma Severity**

Asthma is typically categorised as mild, moderate or severe (Asthma Australia, 2003). A large proportion of children with asthma will have mild asthma. Typically, those with mild asthma experience coughs and wheezes, but they are generally able to play happily, feed well and have undisturbed sleep. Children with mild asthma rarely require regular preventive treatment, but rather reliever treatment of the asthmatic episode only. Approximately 25% of children with asthma have moderate asthma, whereby they experience symptoms on most days. They are usually unable to run and play without wheezing or coughing and sometimes wake at night. Medication is required on most days for children with moderate asthma. A small minority of children have severe asthma. Children with severe asthma are often too restless to sleep or play, and may be too breathless to talk or feed. They generally require treatment three or more times a day. Importantly, individuals diagnosed with mild or moderate asthma may experience a severe attack of asthma.

### **2.1.4 Treatment and Management of Asthma**

Asthma is best controlled through the use of medications. Medications generally fall within three categories: preventer, reliever and symptom controller (Asthma Australia, 2003). Preventer medications are taken daily. They are used to make airways less sensitive, reduce redness and swelling and dry up mucus inside the airways. In children, inhaled corticosteroids are commonly used as a preventer medication. Inhaled corticosteroids provide great benefit to children with asthma, allowing them to enjoy life. The main concern with use of these types of

medication in pre-pubertal children is potential growth impairment, though there is little empirical support to justify this concern (National Asthma Council Australia, 2002). Relievers are used to provide immediate relief from asthma symptoms, by relaxing the muscles surrounding the airways, making the airways wider and thus breathing easier. Symptom controllers (which should not be used during an asthma attack) are used to help relax muscles surrounding the airways for up to 12 hours.

## 2.2 Theories for Understanding Asthma

### 2.2.1 A 'Vulnerable Personality'

Early theorists outlined a linear model to explain asthma in children (e.g. Cannon, 1920, cited in Minuchin et al., 1975). The linear model postulated that an individual's life situations caused certain emotional responses, which in turn caused a bodily illness. That is, 'vulnerable' individuals were predisposed to bodily illnesses, such as asthma.

A person with a 'vulnerable personality' was considered to have qualities such as timidity and shyness, high levels of anxiety, lack of self-confidence, immaturity and a deep-seated dependence on the mother (for an overview, see McNicol, Williams, Allan, & McAndrew, 1973). Stemming from this idea, theorists have even posed the question that asthma is a psychosomatic disorder of psychological etiology, rather than a discrete medical disorder of biological etiology (Graham, Rutter, Yule, & Pless, 1967).

### 2.2.2 The Psychosomatic Family Model

The next theory (Meijer, 1981; Minuchin et al., 1975) proposed that a dysfunctional mother-child relationship was the cause of, and a maintaining factor for pediatric asthma. Asthma symptoms, such as wheeze, were postulated to reflect underlying psychological difficulties, in particular parent-child separation and individuation difficulties (Alexander, 1950; French & Alexander, 1941; Meijer, 1981; Minuchin et al., 1975). Minuchin, Baker, Rosman, et al. (1975) proposed the Psychosomatic Family Model (PFM). In contrast to the linear model, the PFM was considered as an open systems model. The model postulated that certain types of family organisations are related to the development of psychosomatic symptoms, which then have a homeostatic function, serving to maintain harmony within the family. For example, a mother may report her son's onset and exacerbations of asthma to coincide with times of marital conflict. According to the open systems model, the child's asthma symptoms serve the function of reducing marital conflict, as the parents' focus turns to relieving their child's illness. Parental

diversion from the argument to the boy's health inadvertently reinforces and maintains the boy's asthma symptoms. Later, when familial homeostasis is threatened, the boy may again suffer an asthma attack.

### 2.2.3 An Ecological Approach

Early research supporting the theories that asthma is a psychosomatic illness is scant and methodologically flawed. Not all patients with asthma demonstrate qualities associated with a vulnerable personality. Likewise, not all children with asthma are embedded within a family with conflict. Whilst the causes of asthma still remain largely unknown, the following triggers have been identified: colds and flu, exercise, inhaled allergens, cigarette smoke, changes in temperature and weather, some foods and preservatives and certain drugs (Asthma Australia, 2003). Furthermore, it is now recognised that asthma occurs as a result of the interaction between a number of genes (Mrazek, 2003).

Thus, though young children may respond to emotional experiences in a physical manner, it is now accepted that asthma is a discrete biological disease that does "not reside in the 'child's head'" (Mrazek, 2000, p. 430). Asthma has been conceptualised as an interaction between the mind and body; it is not caused by individual factors alone, nor as a chronic illness is it the sole cause of emotional or behavioural difficulties (Richards, 1994). Rather the two are related in a complex manner; perhaps most accurately depicted as cyclical, with several factors serving as mediators and moderators (Mrazek, 2000; Mrazek, Schuman, & Klennert, 1998).

According to Mrazek (2000), the onset and course of asthma can be explained through the complex interaction between genes and environmental experiences. To illustrate, a child may have a genetic predisposition to asthma but this does not guarantee that he will develop asthma. Environmental factors will influence initial presentation and course of the illness (Mrazek, 2003).

## 2.3 Asthma as a Risk for Anxiety in Young Children

### 2.3.1 Theoretical Links between Asthma and Anxiety in Children

Despite rejection of early theories that argued that asthma is a psychosomatic illness, numerous studies have examined the relationship between asthma and behavioural and emotional problems in children. A shared genetic component between asthma and anxiety may partially explain an association between these illnesses, as the 'activation' of a particular gene may increase vulnerability for both asthma and anxiety. Asthma and anxiety have been postulated to both emerge due to "dysregulation of physiologically critical biochemical pathways ... regulated by networks of genes" (Mrazek, 2003, p. 460). Indeed, asthma and anxiety may share physiological characteristics, such as chest discomfort or tightness, dyspnea, and hyperventilation (Carr, 1999; Carr, Lehrer, & Hochron, 1992). Irrespective of whether or not asthma and anxiety are genetically linked, the threshold for gene expression varies among individuals and may depend on the interaction with psychosocial factors.

Attachment theory serves as a useful basis for understanding the hypothesised associations between asthma and anxiety in young children. Parmelee (1989) outlined the importance of early relationships in the context of an illness, whereby successful adaptation to an illness on behalf of the parent and child fostered the development of adaptive emotion regulation. Conversely, adaptation difficulties placed the child at risk for emotional problems.

A diathesis-stress model has been used to explain depression in pediatric chronic illness (Burke & Elliot, 1999). According to this model, chronic illness is viewed as a stressor that could increase the vulnerability to other stressors, and either alone or in combination with other stressors, lead to depression. The relationship between anxiety and asthma may be similarly conceptualised. Asthma can be a potentially life threatening condition. Parents of a young child with asthma may have additional responsibilities and worries concerning their child. In order to manage their own anxiety, parents may adopt a particularly controlling or protective parenting style. Thus, the impact of asthma on the parent-child interaction may adversely effect the child's development of emotion regulation, placing the child at risk for emotional problems such as anxiety (Klinnert, McQuaid, McCormick, Adinoff, & Bryant, 2000).

### 2.3.2 Behavioural and Emotional Problems in Children with a Chronic Illness

#### 2.3.2.1 *Limitations of studies assessing comorbidity*

Numerous studies have examined associations between asthma and behavioural and emotional problems in children (Mrazek, 2003). However, very few studies have included the construct of anxiety (as opposed to anxiety-depression or internalising problems) and furthermore, even fewer studies have included children younger than the age of 4 years.

The studies involving children and adolescents aged up to 18 years generally provide support for the hypothesis that young people with a chronic illness have higher levels of anxiety (or the more commonly examined construct of internalising problems) compared to healthy peers. However, there are great variations in the outcomes regarding the severity and prevalence of comorbidity, and indeed, some studies report no significant associations between asthma and anxiety (Mrazek, 2003).

Mrazek (2003) identified four main reasons to account for the lack of precision among the multiple research studies. Firstly, the expression of asthma symptoms varies greatly among individuals. Children in the asthmatic samples are therefore likely to vary according to a range of asthma-specific variables.

Secondly, anxiety disorders are very complex and the expression of anxiety varies greatly among individuals. Both these factors may contribute to difficulties in accurate assessment and diagnosis.

Thirdly, cross-sectional studies using observational methods fail to capture the course of both asthma and anxiety over time, and thus limit the accuracy of measured association between the illnesses.

Finally, the instruments used to measure asthma and anxiety may be limited in regard to validity and reliability. Reports of asthma status typically are not highly reliable. Identification of asthmatic status has often relied on parental report, without a professional or objective judgment. The majority of studies have used the CBCL, which fails to separate the construct of anxiety from depression or internalising problems. Also, the informants who rate the presence of emotional problems vary across studies. The level of behavioural and emotional problems

reported seems to vary according to the informant and type of measurement method used (Ortega, Huertas, Canino, Ramirez, & Rubio-Stipec, 2002; Rietveld & Colland, 1999; Stawski et al., 1995), with parents typically reporting higher levels of problems than children.

Other reasons for lack of precision regarding associations between asthma and anxiety involve other methodological issues. For example, many studies comprise relatively small samples and include broad age ranges, and so ignore developmental issues.

#### 2.3.2.2 *Prevalence studies*

Epidemiological research has suggested that behavioural and emotional problems are more prevalent in children and adolescents who suffer from a chronic illness, compared to their healthy peers (Graham et al., 1967; Newacheck & Stoddard, 1994; Pless & Roghmann, 1971).

A number of epidemiological studies have provided information concerning the prevalence of asthma. The National Survey of Health and Development was conducted with a representative sample of children born in England, Wales, and Scotland (Douglas, 1958, cited in Pless & Roghmann, 1971). The participants were recruited at birth in 1946, and were followed up at repeated intervals over 15 years on a number of psychosocial and physical variables. The total sample included 5,300 individuals, of which 537 were identified as having a physical illness. The Isle of Wight Study examined a total population of 3,271 children aged 9 to 11 years living in the Isle of Wight, England (Rutter, 1976; Rutter, Tizard, & Whitmore, 1970). One-hundred and sixty-seven children were identified as having a disability (73 with asthma) and were compared to a random sample of the 147 healthy children aged 9 to 11 years living in the same area on a range of psychosocial variables. The Rochester Child Health Survey was based on 1,756 children under 18 years living in a New York county (Pless & Roghmann, 1971). Seventeen hundred children were initially included, of which 350 were reported by parents to suffer serious symptoms of a physical disorder. Confirmation of physical disorder was made for 206 of these children during a clinical interview. The survey used a matched control group of 190 healthy children.

Pless and Roughman (1971) reported observations of the three epidemiological studies outlined above. They reported prevalence estimates of chronic illness to range from 6% in the Isle of Wight study to 10% to 20% in the Rochester Child Health Survey and National Survey

(depending on criteria used to define a physical illness). In each study, asthma was identified as the most commonly reported or identified illness. Assessment of psychological problems varied across the epidemiological studies and included psychological tests, interviews and checklists of behavioural and emotional symptoms, completed by the child, parents, and teachers.

Across the epidemiological studies a greater proportion of children with a physical illness were observed to have either a psychiatric disorder or neurotic or antisocial behavioural patterns than children in the general population (Pless & Roghmann, 1971). Prevalence estimates of psychological problems ranged from 17% for the chronically ill and 7% for healthy children (Rutter, 1976; Rutter et al., 1970) to approximately 25% for the chronically ill and 17% for healthy children (Douglas, 1958 & 1964, cited in Pless & Roghmann, 1971). The presence of psychological problems appeared to vary according to the type and duration of the illness, and to a lesser extent the severity (Pless & Roghmann, 1971). Examination of prevalence estimates reported in Pless and Roughman (1971) suggests a greater discrepancy between chronically ill and healthy children when assessment was based on parent report, as opposed to self-report. Importantly, these estimates may overestimate problems among asthmatic children; only 10.7% of asthmatic children in the Isle of Wight study met criteria for psychiatric disorder based on parent report (Graham et al., 1967). This prevalence was not statistically greater than healthy children and was deemed trivial (Graham et al., 1967). Other studies, however, have suggested a greater incidence of behavioural and emotional problems through use of child report (Stawski et al., 1995).

An epidemiological study (McNicol et al., 1973) conducted in Melbourne, Australia, reported that children with continuing severe asthma at age 14 years were identified as having increased behavioural and emotional problems compared to children with mild or moderate asthma and healthy children. In particular, children with severe asthma were observed during clinical examination and interview to have higher levels of anxiety. The children with severe and continuing asthma were observed to ask for explanations and require more reassurance during clinical examination, to be restless during interview with the social worker and to be rated as worriers by their classroom teacher. In comparison to healthy children, children with severe and continuing asthma were also considered to be more socially immature, demanding of their mother's attention, aggressive towards their mother and more resistant to medical intervention.

There are a few reasons why care must be taken when interpreting the findings from these epidemiological studies. Firstly, measures of psychological problems, diagnosis of illness and illness characteristics vary across studies. Secondly, children with asthma alone were not compared to healthy children or children with other illness. Thirdly, the level of statistical analysis was quite basic.

More recently, the United States of America Bureau of the Census for the National Centre for Health Statistics conducted a nationwide survey to collect health status information (Newacheck & Stoddard, 1994). This survey, the National Health Interview Survey, collected information on 17,110 children less than 18 years of age. Findings showed that emotional or behavioural problems were present in 8% of children with one chronic condition, compared to 5.2% of healthy children. The Methods for the Epidemiology of Child and Adolescent Mental Disorders study (Lahey et al., 1996) examined rates of psychiatric disorders, assessed by child and parent diagnostic interviews in an ethnically diverse community sample of 1285 North American children aged 9 to 17 years. Asthma history was based on parent report. Compared to children with no asthma history, a significantly greater proportion of children with a history of asthma were diagnosed with an anxiety disorder, but not a depressive or disruptive disorder. This association remained, even after controlling for socio-demographic characteristics, including age, sex, family income, psychiatric co-morbidity, and study site (Ortega et al., 2002). Measures of parenting and parental adjustment were not included in this study.

A recent study conducted in Adelaide, Australia, used a sample of children recruited through a random sample of 59 schools (Sawyer, Spurrier et al., 2001). A total of 236 out of 4494 children were identified as having asthma, using the International Study of Asthma and Allergies in Childhood Questionnaire. The Asthma Severity Index (Rosier et al., 1994), completed by parents, revealed that 136 children had mild asthma and 100 children had moderate or severe asthma. The children with asthma were compared to 4509 children who participated in the National Child and Adolescent Mental Health Survey (Raphael, 2000). Children in the comparison sample were aged 4 to 17 years, while children in the asthmatic sample were aged 8 to 13 years. Children with asthma were compared to the comparison sample on child and parent reports of dimensions of quality of life measures, including mental health (self-esteem, emotional problems, behavioural problems), physical activities and social functioning. According to parents, children with mild and moderate/severe asthma had significantly poorer quality of life with regard to physical activities and social functioning than the community

sample. The effect sizes of the differences were regarded as large when comparing the moderate/severe asthmatic group and moderate when comparing the mild asthmatic group to the community sample. Similar results, though with medium effect sizes, emerged when using child report.

The relationship between demographic characteristics, family functioning, illness severity and the child quality of life domains were assessed, firstly using bivariate analyses. Children living in one-parent families were perceived by parents to have greater emotional and behavioural problems than children living with both parents. Emotional and behavioural problems were also seen to be greater among children whose fathers did not complete secondary school or were unemployed. Independent parent and child reports indicated poorer emotional and behavioural adjustment among children with moderate/severe asthma relative to children with mild asthma. Family functioning was associated with poorer mental health in the child (based on parent and child report), but not with physical health (Sawyer, Spurrier et al., 2001).

Regression analyses were subsequently conducted using the asthmatic sample in order to assess the strength of relationships between quality of life domains and demographic, illness and family functioning factors. The regression analyses controlled for factors (family composition, paternal education, illness severity, family functioning) that had significant unadjusted relationships with child quality of life. The following factors continued to be significantly associated with child emotional and behavioural problems: family composition (based on parent report), illness severity (based on parent and child report) and family functioning (based on parent and child report) (Sawyer, Spurrier et al., 2001).

Some studies have explored morbidity of emotional and behavioural problems in asthmatic children and adults. For example, Varnos and Kolbe examined the prevalence of anxiety and depression among asthmatic patients aged from 14 to 76 years recruited from a hospital-based asthma clinic. An estimated 19% of patients had clinically significant anxiety problems. Importantly, the participation rate was relatively low in this study, with only 80 out of the 235 patients approached agreeing to participate. Response bias analyses were not reported.

In sum, more recent large-scale research efforts provide some support for an increased prevalence of behavioural and emotional problems among children with a chronic illness, as opposed to healthy children. However, it remains unclear whether this finding is relevant to young children with asthma (Klinnert et al., 2000). Clearer specification of the degree and type

of behavioural and emotional problems in children with asthma and greater understanding of the complexity of the potential associations are required (McQuaid, Kopel, & Nassau, 2001).

### 2.3.2.3 *Correlational studies*

Equivocal findings have been reported from studies examining the links between anxiety (or more typically the broader construct of internalising problems or anxiety/depression) and asthma in children (Butz & Alexander, 1993; Carr, 1999; Carson & Schauer, 1992; Kashani, Koenig, Shepperd, Wilfley, & Morris, 1988; Klinnert et al., 2000; Meijer, Griffioen, van Nierop, & Oppenheimer, 1995; Mrazek, 1994; Mrazek et al., 1998; Stawski et al., 1995; Vila et al., 1999; Vila, Nollet-Clemencon, de Blic, Mouren-Simeoni, & Scheinmann, 1998, 2000; M. Z. Wamboldt, Weintraub, Krafchick, Berce, & Wamboldt, 1995; M. Z. Wamboldt, Weintraub, Krafchick, & Wamboldt, 1996).

In line with the current study, Klinnert, McQuaid, McCormick (2000) argued that theoretically, the presence of emotional and behavioural problems could be re-interpreted as poor emotion regulation. Having a serious illness, such as asthma, was postulated to disrupt development of adaptive emotion regulation, which would then result in emotional and behavioural problems. Klinnert, et al. used a multimethod assessment approach to examine behavioural and emotional adjustment in 6 year old healthy children ( $n = 22$ ) and asthmatic children ( $n = 81$ ). The study demonstrated sound methodological aspects. A diagnosis of asthma was confirmed using lung function tests, while an allergist used information gathered from medical histories and clinical presentations to make judgments regarding asthma severity. A parent completed the CBCL as a measure of behavioural and emotional problems and children participated in a semi-structured interview designed to provide self-report and observed measures of internalising and externalising problems. Emotion regulation was assessed via observations of the child alone and interacting with the experimenter or mother. The summary measure of the child's ability to regulate his/her own emotions comprised scores for positive affect, negative affect, withdrawal and engagement, while the mother's ability to regulate her child's emotions was measured according to dimensions of emotional support, emotional invalidation, physical nurturance, affective attunement and control.

Based on maternal reports, children with asthma were reported to have higher levels of internalising problems than children without asthma. However, child reports did not reveal

significant group differences. Furthermore, there was no difference between children with and without asthma according to the observed measures of emotion regulation. Some associations between behavioural/emotional problems and affect regulation were demonstrated. Child-reported difficulties were associated with the child's ability to regulate his or her own negative affect. Parental report of externalising problems was associated with the child's ability to regulate his/her affect in the presence of the parent and also with observed parental negativity. The finding that maternal regulation of the child's affect was not associated with levels of internalising problems may indicate the immediate or short-term benefits of maternal affect regulation involving controlling behaviours. For example, a parent observed to be controlling might have the effect of immediately reducing child anxiety. (The measure of maternal regulation, however, included additional components to control.)

Vila, Nollet-Clemencon, de Blic, et al. (1999) identified 32 out of 92 asthmatic children (aged 8 to 17 years), recruited through an outpatient pediatric department in Paris, as having an anxiety disorder using DSM diagnostic interviews. Children identified as having an anxiety disorder scored significantly higher on the parent-completed CBCL internalising and total scores and a standardised self-report anxiety specific questionnaire. The majority of these asthmatic children ( $n = 82$ ) were also compared to a matched (according to SES, age and sex) comparison sample of healthy children recruited through a French school in the same community (Vila et al., 2000). Children completed questionnaire measures of anxiety, depression and self-esteem. Parents completed the CBCL to provide a measure of child social competence and level of behavioural and emotional problems. Group comparisons revealed that children with asthma reported significantly higher levels of anxiety and fear (Vila et al., 2000) and parents of these children reported greater levels of hyperactivity (Vila et al., 1998) than parents of children without asthma, while there was no group difference on the measures of depression or self-esteem, or other externalising behaviour problems. In comparison, Eski et al. (1995) using a sample of 30 asthmatic children (aged 4 to 16 years) found that parents perceived their children as having greater problems than a sample of 60 healthy children as measured by the CBCL broadband scales. Furthermore, children with asthma were revealed to have a greater number of somatic symptoms and aggressive behaviours.

Using a sample of very young children, Mrazek, Anderson and Strunk (1984) compared parental reports of behavioural and emotional problems in asthmatic and healthy children aged 36 to 72 months. There were 26 children in each group. Despite the severity of the child's

asthma, Mrzaek, et al. reported that the children with asthma were perceived to have more emotional disturbance, including sleep difficulties, fearfulness and depressed mood.

MacLean, Perrin, Gortmaker, et al. (1992) examined psychological adaptation in 81 children (aged 6 to 14 years) with asthma. Child psychological adaptation was assessed using the CBCL and compared to the CBCL normative sample. Children in the asthmatic sample were perceived by parents to have a significantly greater number of behavioural and emotional problems than children in the normative sample, with 15% of children having clinically significant levels of internalising problems (11.5% total problems and 12% externalising problems). These rates are more than twice the rates found among children without an illness (Pless, 1984).

The authors removed items obviously confounded with asthma ('allergies' and 'asthma') from the internalising broad-band scale. However, the authors cautioned that other somatic items not removed from the internalising scale may be reflective of asthma. Thus, the elevated internalising score for the asthmatic sample may reflect the child's medical illness rather than emotional problems. However, it is unlikely that the other somatic problems included on the CBCL are reflective of asthma symptoms (McQuaid et al., 2001). Elevations were also identified on the somatic, depressive and hyperactive scales. This is one of the few studies to examine the CBCL second-order factors for asthmatic children.

The discussed findings highlight the inconsistent findings according to parent or child reports. Contrary to many empirical studies using parent reports, many assessments using child reports do not suggest that asthma is associated with greater emotional and behavioural problems (Padur et al., 1995; Rietveld & Colland, 1999). The majority of studies have conducted simple group comparisons between children with asthma, healthy children and/or children with another chronic illness. For example, Rietveld and Colland (1999) compared 25 asthmatic children to 25 healthy children aged 10 to 12 years on levels of anxiety and depression. Independent t-tests revealed no significant differences between the children on self-report measures of anxiety and depression. Similarly, Padur, Rapoff, Houston, et al. (1995) demonstrated that a sample of 25 children and adolescents aged 8 to 16 years reported similar levels of symptoms of depression and anxiety to children with diabetes, cancer and no illness.

Studies examining the association between asthma and anxiety in children younger than 4 years are very limited. The following very brief overview of temperament research may provide

additional insight regarding the associations between emotional problems and asthma in very young children.

Similar to research examining emotional and behavioural difficulties and asthma, equivocal findings have been reported regarding temperamental characteristics and asthma (Kim, Ferrara, & Chess, 1980; Priel, Henik, Dekel, & Tal, 1990; Sarafino, 2000; Smorvik & Faleide, 2002). Kim, Ferrara and Chess (1980) found that children with asthma were perceived by parents to be more irregular, less adaptable and less persistent than healthy children or children with allergies. The authors suggested that 'slow to warm up' babies were likely to find novel situations stressful and their stress response was possibly linked with asthma. Priel, Henik, Dekel, et al. (1990) noted that wheezy babies were perceived by parents to be more active than non-wheezy babies. However, having a wheeze does not guarantee a diagnosis of asthma; indeed many infants who experience wheeze do not develop asthma.

Other studies have reported no associations between early temperament and asthma in children. Parental retrospective recall of early temperament revealed no significant differences between children aged 4 to 7 years with and without a diagnosis of asthma (Sarafino, 2000). A longitudinal investigation revealed that children with asthma diagnosed at age 7 to 9 years did not differ on parental ratings of temperament at 3 to 5 years (Smorvik & Faleide, 2002). Interestingly, the temperamental characteristics of approach-withdrawal and inhibition, which have been repeatedly linked to anxiety (Kagan et al., 1984; Kagan & Snidman, 1999; Kagan et al., 1999; Rubin, Stewart et al., 1995), have not been associated with asthma in babies and toddlers.

The limited number of studies that have examined the relationship between temperamental factors and asthma in young children are fraught with methodological problems, including small sample size, lack of standardised measures, sole reliance on parental report for asthma diagnosis and retrospective designs.

Empirical research, using various research methods, each with relative limitations, has produced inconsistent findings. Thus, it is difficult to arrive at sound conclusions regarding the link between pediatric asthma and psychological functioning. McQuaid, Kopel and Nassau (2001) attempted to delineate the findings of empirical research through use of a meta-analysis. To date, this is the only meta-analysis specific to emotional and behavioural problems in children with asthma. A total of 78 studies (in English language) from 1975 were identified. Of these, only 26 studies (28 samples,  $N = 4,923$ ) were deemed methodologically acceptable for

inclusion in the meta-analysis. Inclusion of a study in the meta-analysis did not require documentation of physician diagnosis of asthma. Thus, some studies relied only on parental report. The average age of children with asthma across studies was 8.4 years ( $SD = 2.0$  years; range 4 to 17 years). Most commonly, maternal reports were used to assess child psychological functioning. Only 11 of the 26 studies categorised asthma severity according to an objective criterion such as medication regimen and activity limitation.

Nineteen of the 26 studies included a standardised measure of global adjustment difficulties (e.g. CBCL). The meta-analysis revealed that children with asthma had more overall behavioural and emotional difficulties, internalising problems, and to a lesser degree externalising problems, relative to comparison groups (healthy children, norms). Internalising symptoms appeared to increase with increased asthma severity. Analysis of the 7 studies that used standardised measures of anxiety revealed that children with asthma did not have elevated levels of specific anxiety symptoms. Similarly, depression was not significantly more common in children with asthma.

McQuaid et al. (2001) noted empirical limitations of studies included in the meta-analysis (despite exclusion of numerous studies due to methodological inadequacies). In particular, the majority of the studies used the CBCL to provide a measure of behavioural and emotional problems. Whilst this is a well-validated measure, valid use within chronically ill samples has been questioned (E. C. Perrin, Stein, & Drotar, 1991), because the somatic complaints subscale, which forms part of the internalising scale, includes items that may be actual illness symptoms. Only some researchers (e.g. Padur et al., 1995) diligently remove potentially confounding items. Nevertheless, according to McQuaid et al. (2001), the inclusion of such items is unlikely to account for the higher levels of internalising problems in children with asthma compared with children without asthma:

"... a review of items that may be spuriously elevated for children with chronic illnesses suggests that these items are unlikely to be elevated for children with asthma, because they are not commonly reported as asthma symptoms or side effects of asthma medications (e.g., aches or pains, headaches, nausea, or problems with eyes). Therefore, to cause a spurious elevation in the group as a whole, the symptom would first have to occur across a wide range of children with asthma and then be

considered by parents or other raters to have nothing to do with their illness. Hence, although it is possible that this methodology may have caused some minor increase in behavioral symptom scores, it is unlikely to account for the overall pattern of findings." (p. 436).

McQuaid et al. (2001) concluded that whilst the meta-analysis indicated elevated levels of behavioural and emotional problems among children with asthma, one key question remains: "What accounts for the association between asthma and difficulties in behavioural adjustment?" (p. 437). Despite theoretical models (e.g. Belsky, 1980; Bowlby, 1969) which address the complex relationships between psychosocial factors and psychological adjustment, few studies have provided a model to explain the differing patterns of adjustment among children with asthma. This omission has occurred despite recommendations that general psychosocial factors are included in investigations with chronically ill samples (Lavigne & Faier-Routman, 1993; Lavigne & Faier-Routman, 1992; McQuaid et al., 2001). The inclusion of such factors permits investigation of the relative contribution of illness factors after accounting for psychosocial factors, providing the number of subject-to-variable ratio is adequate (Holden, Chmielewski, Nelson, & Kager, 1997; Lavigne & Faier-Routman, 1993; Lavigne & Faier-Routman, 1992).

## 2.4 Factors Associated with Anxiety in Children with Asthma

### 2.4.1 Illness Characteristics and Childhood Anxiety

Illness characteristics, including severity, age of onset, duration of illness, and timing and duration of first hospitalisation, may be related to the psychological well-being of the asthmatic child (Mrzcek, 1986; Mrzcek et al., 1998).

#### 2.4.1.1 *Illness severity*

Various studies have shown that the association between asthma severity and behavioural and emotional problems is linear (Graham et al., 1967; Gupta, Mitchell, Giuffre, & Crawford, 2001; Silverglade, Tosi, Wise, & D'Costa, 1993; Vila et al., 1998; M. Z. Wamboldt, Fritz, Mansell, McQuaid, & Klein, 1998; M. Z. Wamboldt et al., 1996), curvilinear (children with mild or severe asthma identified as having poorer emotional well-being) (Eiser, Eiser, Town, & Tripp, 1991b; MacLean et al., 1992; J. M. Perrin, MacLean, & Perrin, 1989; M. Z. Wamboldt et al., 1998), and non-existent (Eski et al., 1995; Kashani et al., 1988). A linear relationship makes logical sense. Severe asthma is associated with the experience of more frequent and intense symptoms compared to moderate asthma (Asthma Australia, 2003). Similarly, moderate asthma is relatively severe compared to mild asthma. Accordingly, a more severe illness may be more disruptive to a child and his/her family on a daily basis, which may have direct and/or indirect adverse effects on the child's emotional adjustment. A non-existent or curvilinear relationship may be understood due to the instability of asthma and the varying degrees to which asthma is controlled. Irrespective of asthma severity, all children with asthma may experience the onset of potentially life-threatening asthma attacks, which may lead to heightened baseline levels of anxiety.

Padur et al. (1995) investigated the role that functional status may have in psychosocial adjustment in a sample of 25 children with asthma compared to 25 children with diabetes, 25 children with cancer, and 25 healthy children. The children were aged 8 to 16 years. Psychosocial adjustment was measured using the CBCL and the Child Depression Inventory.

Importantly, CBCL somatisation items potentially confounded with illness were excluded from analyses. This study included a simple measure of functional status, based on parental report of the degree to which their child's activities and play were limited during the week preceding participation in the study. Similar to other studies (e.g. Klinnert et al., 2000), children with asthma were reported by parents to have greater emotional problems compared to the comparison samples (Padur et al., 1995). After controlling for functional status, the differences between asthmatic children and the comparison samples failed to reach statistical significance. Thus, functional status might mediate the relationship between asthmatic status and psychosocial adjustment, whereby asthmatic children with greater functional impairment are perceived by parents to have poorer psychosocial adjustment.

A study by Meijer and colleagues (Meijer et al., 1995; Meijer & Oppenheimer, 1995) examining psychosocial factors in 70 children aged 9 to 15 years with controlled and uncontrolled asthma revealed children with controlled asthma self-reported significantly fewer neurotic-somatic complaints, assessed using the Amsterdam Biographical Questionnaire for Children (van Dijk & Wilde, 1982; cited in Meijer et al., 1995 and Meijer & Oppenheimer, 1995), than children with uncontrolled asthma.

The study by Klinnert et al. (2000), which used a sample of 81 6-year-old children with asthma and 22 controls, did not find a significant association between asthma severity and parent or child reported emotional/behavioural difficulties. However, based on observations, children with severe asthma (according to prescribed medication) had higher levels of behavioural emotional difficulties, poorer affect regulation (in the absence of parents) and expressed more negative affect during parent-child interactions than children with mild asthma. The parents' ability to regulate the child's emotions and their own negativity during interactions with their child did not vary according to asthma severity. Klinnert et al. (2000) also assessed asthma severity using symptom ratings. Analyses revealed greater symptom frequency was associated with self-reported (but not parent-reported) behavioural and emotional problems and emotion regulation difficulties.

In the previously described meta-analysis conducted by McQuaid et al. (2001) only eight studies had used a consistent strategy for quantifying disease severity, with parental report of behavioural and emotional problems using the CBCL. Generally, the overall level of behavioural and emotional problems and internalising problems was linearly associated with

asthma severity, with the level of problems increasing with asthma severity. Importantly, there was considerable overlap between the groups, and the effect size of the difference in levels of problems between children with mild asthma and no asthma was particularly small.

There are a number of possible explanations that could account for the equivocal results regarding the association between asthma severity and psychosocial factors. Some studies have utilised children who are under the care of respiratory specialists (Richards, 1994), which may impact on the child's physical and emotional adjustment. Firstly, a specialist will be able to specifically tailor and monitor the asthma treatment and management. Thus, severe asthma could have a better chance of being very well managed. Secondly, parents may feel more supported, better equipped and more confident about caring for an asthmatic child. These factors may serve to reduce anxiety within the child. Thirdly, the asthma may have less impact on the child's activities, thus promoting normal socio-emotional development. In contrast to this hypothesis, parents of children referred to a specialist clinic might be more inclined to perceive their child as having greater problems and impairment (Padur et al., 1995). Children with asthma are generally referred to a specialist when the pediatrician or local general practitioner is unable to adequately treat the child's asthma.

Methodological inconsistencies between studies, including differences in informants and measures of asthma severity and behavioural and emotional problems, may also contribute to equivocal findings. For example, severity based on medication type and dosage has been shown to be unrelated to behavioural and emotional difficulties, while functional severity of symptoms and functional status, which may possibly reflect the intractability (or uncontrollability) of the child's asthma, has shown positive associations with emotional and behavioural problems (Klinnert et al., 2000; Padur et al., 1995).

#### 2.4.1.2 *Age of onset and illness duration and multiple hospital visits*

Visits to the hospital emergency department and/or hospital admissions for the young child may be an additional psychosocial burden for an ill child and his/her family (Lavigne & Faier-Routman, 1992; Minde, 2000). For some families, the additional stress of being hospitalised may exceed their coping 'threshold', resulting in a maladaptive response. Some caregivers may have difficulty modulating their own distress, and consequently be less sensitive to their child's emotional needs. Being separated from the parent due to hospitalisation may be very frightening

for a young child and reduce his or her sense of control and predictability over their life (Minde, 2000). These factors may threaten the security of the child's attachment to his or her caregiver and thus place the child at risk for poor emotion regulation and subsequent anxiety problems. This process may be more likely to occur for children who are diagnosed early in life when they are still relatively dependent on their parent for emotion regulation.

Very young children are likely to be emotionally and cognitively unprepared to adapt successfully to the onset of a serious illness such as asthma (Klennert, Mrazek, & Mrazek, 1994; Mrazek et al., 1998). The combination of limited degree of language in very young children, lack of cognitive understanding of the illness, and potentially higher levels of distress within the parent, may disrupt the development of effective emotion regulatory skills. Thus, early onset of asthma may place the child at greater risk for emotional problems (Meijer et al., 1995; Mrazek, Klennert, Mrazek, & Macey, 1991; Mrazek et al., 1998). In contrast, children with later-onset asthma may have a greater understanding of their illness and be more able to effectively communicate their distress and receive support from their parent (Mrazek et al., 1998).

The role of early-onset asthma in the development of behavioural and emotional difficulties was examined in a longitudinal study of 150 children at genetic risk for asthma (Mrazek et al., 1998). Mothers diagnosed with asthma provided information through semi-structured interviews conducted when their child was aged 2, 3, 4 and 6 years. Mothers completed the Behavioural Screening Questionnaire (Richman & Graham, 1971) to provide a measure of behaviour problem areas common in preschool aged children. At age 6 years, 14 children were categorised as having early-onset asthma (diagnosed before age 3 years) and 10 were categorised as having late-onset asthma (diagnosed between ages 3 and 6 years). The remaining 126 children were categorised as asthma-free. Analysis of variance revealed that children with early-onset asthma were at greater risk for behaviour problems at ages 2 years, 4 years and 6 years than children with later onset asthma or asthma-free children. Similar to earlier results reported by Mrazek et al. (1984), the pattern of problems among children with early-onset asthma included sleep difficulties, depressed mood and a trend for fearfulness. Mrazek (1984) suggested that a link between depressive affect and early-onset asthma may be indicative of a shared genetic mechanism underlying both these problems. It is also likely that early-onset asthma is more disruptive to the development of emotion regulation skills, possibly associated with having a parent with heightened levels of psychological distress and being a recipient of protective parenting from a very early stage of their development.

Whilst the longitudinal design of the study by Mrazek et al. (1998) is impressive, the number of children identified as having early-onset and later-onset asthma was very small, thus limiting generalisability to other samples. Furthermore, the authors failed to incorporate a range of other psychosocial measures, including parenting and parental adjustment, which are theorised to be associated to child adjustment (Belsky, 1980).

Eski, Molzan, Savasir and Güler (1995) reported no association between duration since diagnosis (or illness severity) and internalising, externalising and total problems (rated using the CBCL) in a sample of 60 children with asthma aged 4 to 16 years.

Early work suggested that multiple hospital admissions during the first three years of life place the child at significant risk for psychiatric disorders and behavioural difficulties during early adolescence (Douglas, 1975; Quinton & Rutter, 1976). More recent studies provided support for this claim (Fahrenfort, Jacob, Miedena, & Schweizer, 1996; Mrazek, 1984). For example, a sample of 40 children hospitalised at least twice before the age of 5 years were rated as having significantly greater behavioural and emotional disturbance at age 7 years than a sample of 73 control children who had not been hospitalised. Similarly, a clinical investigation conducted by Mrazek (1984) revealed that children with asthma who had experienced multiple hospitalisations between the age of 2 and 4 years were more likely to be perceived by parents as having behavioural problems compared to children with severe asthma who had not been hospitalised.

Conversely, Butz and Alexander (1993) did not demonstrate associations between illness characteristics, including the number of hospitalisations and activity limitations, and child anxiety. Butz and Alexander conducted a follow-up study in which 155 children aged 7 to 12 years who presented at an emergency department for asthma were interviewed 3 to 5 days later and then again another 8 weeks later. The children were asked to state whether they felt calm, upset, angry, panicked or depressed at the beginning of the asthma attack that had led to the ER visit. Sociodemographic characteristics, including parental smoking, child's medication, and mother's perception of asthma severity were collected from the mother. At the 8-week follow-up visit, information was obtained on illness characteristics, including the number of hospitalisations/Emergency Room (ER) visits and activity limitations since the target ER visit. Regression analyses identified only the frequency of asthma attacks to be associated with child state anxiety. Other illness characteristics were not associated with child state anxiety.

### 2.4.2 Parenting and Paediatric Asthma

More than two decades ago, there was a view that dysfunctional family patterns were the main cause of asthma and that asthma was actually a psychosomatic illness (e.g. Minuchin et al., 1975). It is now accepted that asthma is a biological entity with a genetic component (Mrazek et al., 1991). Nevertheless, the family's use of adaptive and maladaptive coping strategies and parental behaviours may affect the onset and course of asthma (C. Baron, Veilleux, & Lamarre, 1992; P. A. Gustafsson, Bjorksten, & Kjellman, 1994; Meijer et al., 1995; Meijer & Oppenheimer, 1995; Mrazek et al., 1991).

Early theories within the pediatric and psychiatric field characterised the families of children with asthma along two dimensions: cohesion and adaptability (Minuchin et al., 1975; Olson, Sprenkle, & Russel, 1979). Cohesion is characterised by equilibrium between intimacy and autonomy. At one extreme of the cohesion dimension is enmeshment - family members become over involved and overprotective with one-another, thus stunting the child's development of independence, which is crucial to their emotional development. At the other extreme, cohesion is characterised by lack of involvement and disengagement between family members. Adaptability refers to the ability of the family to deal with stress and change. Families functioning at one extreme along the dimension of adaptability can be characterised as rigid; they display limited ability to change rules and behaviours in order to cope with change. In contrast, families at the other end of the continuum may be chaotic, demonstrating lack of structure and routines, and thus hampering the family's ability to cope with everyday events and new situations. Cohesion and adaptability seem to capture aspects of parental control and protection and parental rejection.

Parents of children with asthma are encouraged to be vigilant for symptoms of an asthma attack (Asthma Victoria, 2001) because symptoms may be life threatening. However, some parents may become hyper-vigilant and overprotective of their child (Carson & Schauer, 1992; Eski et al., 1995; Hookham, 1985; Padur et al., 1995; Schobinger, Florin, Reichbauer, Lindemann, & Zimmer, 1993; Schobinger, Florin, Zimmer, Lindemann, & Winter, 1992). Protection may be seen in parental behaviours such as supervision of a child's activities, fostering dependence of the child on the parent, and taking control by doing things that the children are capable of doing for him or herself (Thomasgard, Metz et al., 1995).

Parental overprotection (and to a lesser degree, parental rejection) of a young child is typically said to disrupt the normal developmental process and place the child at risk for emotional problems, such as anxiety (Parker, 1983; Parker et al., 1979; Rapee, 1997). If children with asthma are raised in a relatively overprotective manner, they may be particularly vulnerable to anxiety via a pathway of the parenting received. At this point it is important to recognise the bi-directional nature of influence between the parent and child. For example, characteristics of the child (such as the way a child expresses him/herself) will also influence parenting (Patterson, 1982; Rapee, 2001). According to Rapee (2001), children vulnerable to anxiety will display higher levels of emotional arousal, which the parent will try to reduce through increased involvement and greater protective parenting.

The concept of the 'vulnerable child syndrome' (Green & Solnit, 1964) may also explain associations between parental protection and child asthma. A parent who feels capable of caring for a healthy child may feel overwhelmed by caring for an ill child (Sameroff & Fiese, 2000). Hypothesised clinical outcomes of these families include child infantilisation, parental overprotection and overindulgence, child psychosomatic illness and school underachievement (Green & Solnit, 1964; Thomasgard, Shonkoff, Metz, & Edelbrock, 1995). Green and Solnit (1964) first proposed the concept of the vulnerable child to depict children whose parent held unfounded beliefs that their child was at risk for terminal illness. Such beliefs, which may be markedly discrepant with their child's actual health, growth and development, may result in parental feelings of guilt and difficulties in limit-setting or the promotion of early autonomous behaviour within the child.

It has also been suggested that family characteristics such as rigidity, overprotectiveness and strict adherence to family rituals may actually serve to protect the ill child (Eiser et al., 1991b; Markson & Fiese, 2000; Meijer & Oppenheimer, 1995). These characteristics may provide a sense of structure and safety to the child's life that may otherwise be relatively unpredictable and disrupted by their illness. In turn, this parenting style may promote healthy emotional development and adjustment. Additionally, a rigid and controlling family environment may enable stricter adherence to medical regimens, particularly for young children (though as a child's need for autonomy strengthens, he/she may demonstrate greater levels of non-compliance toward the parent, in relation to asthma management).

The theoretical association between parenting factors and child asthma in relation to child psychological adjustment has received little empirical attention. Those studies that have been conducted have employed basic group comparisons with the hypothesis that asthmatic status is a risk factor for emotional problems, without further exploration of the pathways by which emotional problems may arise in children with asthma (Bleil, Ramesh, Miller, & Wood, 2000).

#### 2.4.2.1 *Approaches to empirical studies of parenting and asthma*

A variety of approaches have been used to examine the degree of protectiveness of parents who have a child with asthma. Some studies have assessed the patterns of family interactions in terms of cohesiveness and adaptability through observations; some have used specific measures of overprotectiveness. The construct of expressed emotion, involving parental criticism and over-involvement towards the child, has also been used to examine parenting of children with asthma (Gartland & Day, 1999; Hermanns et al., 1989; Schobinger et al., 1993; Schobinger et al., 1992; F. S. Wamboldt et al., 1995). Whilst parental criticism may reflect parental rejection of their child, it may also reflect a parent's attempt to control the child.

##### 2.4.2.1.1 *Empirical studies with parenting as the outcome variable*

Support for the hypothesis that parents of children with a chronic illness have a tendency to be more overprotective, and more rejecting than parents of children without a chronic illness stems from epidemiological and cross-sectional studies dating back to mid 1900's (P. A. Gustafsson et al., 1994; P. A. Gustafsson, Kjellman, Ludvigsson, & Cederblad, 1987; McNicol et al., 1973; Pinkerton, 1967 & Rees, 1956, cited in McNicol et al., 1973; Schulz, Dye, Jolicoeur, Cafferty, & Watson, 1994; M. Z. Wamboldt et al., 1996).

The epidemiological study conducted by McNicol, (1973) which used a sample of Melbourne children, provided evidence that mothers of children with continuing asthma had greater concern to protect their child with respect to health, physical security and social activities than parents of children without continuing asthma.

Some studies have referred to patterns of family functioning. For example, a prospective study following children with a family history of allergy over their first 18 months of life suggested

that dysfunctional family interactions were a result of wheezing during infancy and other life stressors (P. A. Gustafsson et al., 1994). However, somewhat unexpectedly, dysfunction was characterised by disengagement rather than overprotectiveness and involvement.

Some studies using the construct of expressed emotion have shown parents of children with asthma to be more critical than parents of healthy children (e.g. Hermanns et al., 1989), whilst other studies have found no associations between parental criticism and over-involvement and asthma severity (Gartland & Day, 1999; F. S. Wamboldt et al., 1995). Contrasting results may be attributed to the varied methodology (e.g. the measure of expressed emotion may be obtained using questionnaires or observations). Studies using the construct of expressed emotion are often limited by small sample sizes, crude measures of asthmatic status (e.g. school absenteeism) and non-inclusion of comparison samples (T. L. Campbell, 1993). Due to the non-inclusion of other psychosocial factors, the studies do not provide insight into the reasons why parental criticism was more common among the asthmatic families studied. The non-inclusion of a measure of child behaviour and emotional adjustment has also prevented an analysis of the interactions between emotional adjustment, parenting and asthma.

Other studies have used questionnaire measures of parental overprotection. For example, a study conducted by Thomasgard and Metz (1997) used a sample of 280 parents with children aged 5 to 10 years recruited from a health maintenance clinic in Massachusetts to examine correlates of parental overprotection and parental perception of increased child vulnerability and child illness. The sample comprised children with no illness, and children with asthma, allergies or ear infections.

Interestingly, analyses revealed that parental overprotection was not associated with current or prior medical illness in the child. Conversely, parental perceptions of child vulnerability were significantly associated with child illness status. Importantly, 35% of parents who considered their child vulnerable were also classified as overprotective, whilst only 13% of parents who did not consider their child vulnerable were classified as overprotective. A related study of 895 parents with children aged 2 to 5 years (Thomasgard, Shonkoff, Metz and Edelbrock, 1995) found that 20% of parents who considered their child vulnerable were overprotective. Interpretations of this significant finding must be tentative, as only a small number of children were classified as vulnerable. Further, a Pearson  $r$  correlation between vulnerability and overprotection was of small magnitude ( $r = .17$ ). Thus, overprotective behaviour is not

necessarily contingent upon the child having a current or prior serious medical illness. Rather, parental overprotection may be more closely related to parental characteristics such as anxiety (Thomasgard & Metz, 1996; Thomasgard, Shonkoff et al., 1995). Unfortunately, this hypothesis was not tested.

When attempting to understand the parenting behaviours among parents of children with a chronic illness, it may be more useful to consider the illness parameters (including poor prognosis, instability, greater degree of physical impairment), which make the child more vulnerable, rather than the type of illness (e.g. asthma, cancer) (Dolgin, Phipps, Harow, & Zeltzer, 1990). Dolgin, Phipps, Harow, et al. (1990) examined parenting behaviours among 30 children with a non-life threatening chronic illness (15 with asthma, 15 with seizure disorders), 30 children with a life-threatening illness (cancer) and 28 healthy children. The children were aged between 5 and 13 years. Irrespective of illness type, parents of children who had a poorer prognosis, an unstable illness and physical impairment, tended to be less punitive, and foster dependency more, than parents of healthy children. Univariate analyses also revealed that across the entire sample, more use of forceful parenting and less modeling and reassurance was associated with both higher maternal generalised anxiety and higher child self-reported medical fears and trait anxiety. Multiple regression analysis rendered the contribution of parenting strategies less significant when maternal anxiety was included in the model. Dolgin, et al. commented that other unmeasured factors, such as life stresses, might mediate the relationships between parenting, parental anxiety and child anxiety.

One of the few studies to examine parenting factors in preschool aged children with asthma used a sample of 37 families with a child aged between 33 and 75 months (Eiser, Eiser, Town, & Tripp, 1991a). The children had been diagnosed with asthma at a mean age of 16.52 months. The study also included a healthy comparison sample of 37 children. Based on open-ended pilot interviews conducted with 10 mothers, Eiser and colleagues devised an 11-item questionnaire measure of different discipline strategies and perceived effectiveness, which was completed separately by each mother and father participant. A measure of parental involvement was obtained by having each parent state the frequency with which they played with and read to their child and helped their child dress in the morning, undress at night, bath and go to bed. Parent-child interaction was operationalised using parental ratings of 16 parent-child situations. Parents also completed the Vineland Social Maturity Scale, which included items such as enjoys life, mixes with other children, demands attention and catches colds easily.

Group comparisons revealed that parents of the children with asthma perceived their child as less healthy and more vulnerable to catching colds and other illnesses than parents of the healthy children. Children with asthma were perceived by mothers to be more difficult when shopping and perceived by fathers to be more difficult at bedtime than the healthy children. No significant differences were found between the asthmatic and healthy children on measures of parental involvement, discipline practices, perceived effectiveness of discipline practices or child social maturity. A related study showed few differences between children with mild asthma ( $n = 19$ ) or moderate asthma ( $n = 18$ ) in relation to parental involvement or discipline practices (Eiser et al., 1991b).

It is also useful to consider parental experience of asthma in relation to current parenting. Prior parental experience of asthma may impact on a parent's ability to cope with having a child with asthma (Morey & Jones, 1993), which may be seen via the parent's interaction with the child. Intuitively, past experience of the disease might improve the mothers' confidence that she is able to care for a child with asthma. Morey and Jones (1993) conducted a study to determine whether mothers' personal experience of asthma had any influence on the psychosocial impact of her child's asthma. The sample comprised 124 families with an asthmatic child aged between 5 and 11 years. Families where the child had been diagnosed with any other chronic condition (e.g. Down's Syndrome, epilepsy), were excluded from the study. Families with a second child with asthma who was within the age range 5 to 11 years were also excluded from the study.

A postal questionnaire was used to gather data on maternal prior experience of asthma including whether she had ever had asthma and/or any contact with an asthma sufferer in her childhood. A measure of psychosocial impact of the child's asthma was obtained through a modified version of the Psychosocial Impact Questionnaire (Staudenmayer, 1981). This questionnaire consists of 37 statements in five categories: manipulation, emotional distress, family communication, overprotectiveness, and interference.

The results of the study by Morey and Jones (1993) suggested that past maternal contact with people with asthma or personal experience of asthma was negatively associated with family communication. No association between past maternal contact and other variables was found. Morey and Jones failed to examine the *quality* of past maternal experience of asthma. Mothers with positive experiences with asthma may be better equipped to cope with their child's asthma, thereby limiting any negative psychosocial effects. Similarly, mothers who had

negative experiences of asthma may not cope well if their child has asthma, thus increasing the likelihood of a negative psychosocial impact. However, no research has examined the effects of positive and negative maternal experiences of asthma on the psychosocial impact of her child's asthma.

Overall, these results provide mixed support for the widely held assumption that parents of asthmatic children have different parenting strategies to parents of healthy children. Many studies are limited by the relatively small samples and use of unvalidated and unstandardised questionnaires.

#### 2.4.2.1.2 Empirical studies with child adjustment as the outcome

Recently, Bleil, Ramesh, Miller, et al. (2000) attempted to define the pathways by which emotional problems, specifically symptoms of depression, arise in children and adolescents with asthma. The focus of the study conducted by Bleil and colleagues differs somewhat to the current thesis (Bleil, et al. assessed depression as opposed to anxiety and the child's perceived attachment to the parent as opposed to overprotective parenting). Nevertheless, the theoretical underpinning of their study is in line with the current thesis.

Bleil et al. (2000) examined the role of attachment status (secure versus insecure) as a potential mediator or moderator between functional severity of asthma and depressive symptoms in a sample of 55 children and adolescents aged 8 to 17 years diagnosed with asthma. A moderating relationship would mean that a secure attachment would buffer, whilst an insecure relationship would exacerbate, the impact of poor functional status on depressive symptoms (B. L. Wood, 1994). Alternately, a mediating relationship would suggest that poorer functional status would negatively affect the parent-child attachment, placing the child at greater risk for emotional problems. In consideration of the current thesis, asthmatic status/severity may serve to heighten parental protection, which may increase the child's anxiety level.

The participants were recruited through an allergist's private practice and an allergy and immunology clinic of a children's hospital located in the north-east of the United States of America. The child completed standardised measures of child depression and perceived relatedness (resembling attachment) to the parent. A parent also completed a measure of child depression and asthma functional status and provided demographic data (age, gender, race,

educational level). The child's physician completed a measure of asthma severity. A series of multiple regression analyses were conducted to test the mediating and moderating role of the child's perception regarding his/her relatedness to the parent. The demographic variables were not related to child depressive symptoms. The results provided support for a mediating relationship, in that greater functional severity of asthma was related to poorer child-to-parent relatedness, which in turn was related to more depressive symptoms. A moderating relationship was not supported. A secure relatedness did not buffer, nor did an insecure relatedness exacerbate, the adverse impact of poor functional status on depressive symptoms.

The study by Bleil, et al. (2000) used a broad age range, thereby limiting the generalisability of findings. Also, only one pathway between child illness and emotional problems was examined. Nevertheless, the relatively sophisticated data analytic technique ensured a valued contribution to the chronic illness literature.

Markson and Fiese (2000) also highlighted the importance of considering family stressors when examining the associations between anxiety and asthma. Forty-three families with an asthmatic child aged between 6 and 12 years and 43 families with a healthy child completed standardised measures pertaining to child anxiety, parenting stress, child and family health and family rituals. Group comparisons revealed that family rituals did not differ between the asthma and healthy samples. However, family rituals appeared to moderate or buffer the impact of multiple indicators of family health on anxiety within the child. Family rituals may be indicative of a high level of control and rigidity and, as previously suggested, this type of family interaction may provide children with asthma with a sense of stability and safety.

Overprotection by the parent may serve to fulfill parental dependency needs. Meijer (1981) compared a sample of 30 asthmatic children with 30 healthy children aged 6 to 11 years on psychosocial factors. Analyses revealed that mothers of asthmatic children viewed their child as significantly more dependent than mothers of healthy children. Furthermore, the mothers of the asthmatic children were shown to have higher levels of depression and greater dependency needs than the mothers of the non-asthmatic children. Inter-generational data showed that maternal grandfathers were viewed as significantly more rejecting and maternal grandmothers were viewed as significantly more overprotective by the mothers in the asthmatic sample compared with mothers in the non-asthmatic sample. Further analyses were based on children categorised as high-dependent or low-dependent. Mothers of low-dependent asthmatic

children perceived their children as hostile and anxious-depressed, whilst the low-dependent asthmatic children viewed their mothers as more overprotective and indulgent. Furthermore, the mothers of low-dependent asthmatic children were significantly more depressed than mothers of low-dependent non-asthmatic children or mothers of high-dependent asthmatic children, which suggests that the dependency needs of low-dependent asthmatic mothers are not being met. Meijer suggested that the results support the notion that pediatric asthma is associated with a strong dependency need.

Similar findings were reported by C. Baron, Veilleux and Lamarre (1992) in a clinical study of 34 children (10 to 15 years) with asthma. Based on clinical psychiatric interviews, the children were classified as either 'overanxious' ( $n = 10$ ), 'normal' ( $n = 15$ ) or 'non-anxious' ( $n = 9$ ). Information regarding family cohesion and adaptability, parental acceptance of the illness and socioeconomic factors was obtained through observation and a semi-structured clinical interview with the child and parent. Analyses indicated that the majority of the overanxious children were overly dependent on their parent/s for treatment of their asthma and came from family environments characterised as rigid, overprotective and enmeshed. Interview data indicated that parental overprotection served to regulate anxiety in both the parent and the child.

#### 2.4.2.1.3 Empirical studies with asthma as the outcome

Studies examining the role of psychological factors as contributors to the emergence of asthma symptoms (Carson & Schauer, 1992; Klinnert et al., 1994) may provide some insight regarding parenting styles of parents of young children with asthma. Retrospective and prospective studies have produced equivocal findings regarding the relationship between life stressors and the onset of asthma (Horwood, Fergusson, Hons, & Shannon, 1985; Klinnert et al., 1994; Levitan, 1985; Teiramaa, 1986).

A longitudinal prospective study of a cohort of 150 children at genetic risk for developing asthma (parent/s diagnosed with asthma), recruited through the National Jewish Center for Immunology and Respiratory Medicine in metropolitan Denver, examined associations between psychosocial factors and onset of asthma (Klinnert et al., 1994; Mrazek et al., 1991). At the time of recruitment, 14 mothers no longer experienced asthma symptoms. The study also recruited a comparison sample of 30 families in which neither parent had ever been diagnosed with

asthma. Parents completed the Minnesota Multiphasic Personality Inventory, the Dyadic Adjustment Scale (Spanier, 1976) and the Family Inventory of Life Events (McCubbin, Patterson, & Wilson, 1983) during the final trimester of pregnancy. Both samples were predominantly middle class and scored within the normal range on the Minnesota Multiphasic Personality Inventory, though asthmatic mothers were identified as being significantly more socially introverted than non-asthmatic mothers.

Mothers participated in a second interview three weeks after the baby was born. The interview comprised questions, specifically designed for the study, which inquired about the mother's degree of parental sensitivity and competence and ability to modulate her child's experience. Based on responses, parents were categorised as either having minimal or no subjective difficulties in all parenting spheres ( $n = 98$ ), or as having either moderate or severe difficulties ( $n = 52$ ). Inter-rater reliability was 76%. Parenting difficulties did not differ between mothers with a history of asthma compared to mothers with no asthma history. Mothers also provided information regarding their ability to cope with stressors unrelated to parenting (e.g. family relationships, economic realities, changing life circumstances). Parents were categorised as either coping and functioning well ( $n = 83$ ) or demonstrating problematical coping in at least one domain ( $n = 67$ ). Inter-rater reliability for the coping measure was excellent. At the 3-week interview, mothers also completed the Quality of Relationship Scale (Klennert, Mrazek, & Mrazek, 1992), which was used to measure a mother's perception of the emotional support she receives from her partner.

Child health status was monitored from birth to 3 years (Klennert et al., 1994), through documentation of the occurrence of wheezing and respiratory illnesses. When the children were aged 3 years, 14 of the 150 children with a genetic predisposition to asthma had been diagnosed with asthma. A diagnosis of asthma was defined by two or more episodes of wheezing, observed and documented by the physician, with the occurrence of at least one episode of wheezing in the absence of a respiratory infection (Klennert et al., 1994). By age 3 years, 19 children had experienced recurrent episodes of wheezing associated with respiratory infection (and thus violated criteria to be categorised as asthmatic) and 24 children had experienced a single wheezing episode (Klennert et al., 1994). The remaining 92 children had never experienced a wheezing episode.

Analyses indicated associations between parenting difficulties when the child was 3 weeks old and asthma onset by 3 years of age. Sixty-four percent of parents of children with asthma were identified as having difficult parenting compared to 36% of the parents of non-asthmatic children. Importantly, the parenting risks rating comprised maternal perception of support received from her partner. A moderate to strong correlation ( $r = .56$ ) between a separate clinician rating of marital relationship and parenting risk suggested that indeed, perceived support was a significant component of parenting risk.

Drawing on the stress and coping literature, Klinnert et al. (1994) suggested that parenting acts as a moderator between life stressors and the child's physical well-being. The impact of life stressors on very young children needs to be considered within a developmental context. According to adult stress literature, potentially adverse effects of life events on psychological adjustment may be buffered by the presence of social support (S. Cohen & Wills, 1985). Drawing on this literature, the effects of life stressors on young children may be mediated by the parents' capacity to protect the young child from the stressor which would depend on their ability to manage their own psychological state (Klinnert et al., 1994). The interaction between parenting, stresses and psychological well-being in very young children may be influenced by parents' psychological status and ability to cope while concurrently assisting the child to modulate his or her emotions (Klinnert et al., 1994; Mrazek et al., 1991).

Indeed, analyses (Klinnert et al., 1994) indicated support for parenting as a moderator between life stressors and asthma onset in young children. Participants were categorised according to stress level (high versus low) and parenting risk (high versus low). Logistic regression analysis indicated that neither maternal stress nor parenting risk were independently associated with child asthmatic status at 3 years. However, the interaction between stress and parenting was significant. Adequate parenting appeared to protect children with stressed mothers from developing asthma, while children were more likely to have asthma by 3 years if their mother reported high levels of stress and was classified as high parenting risk.

A strength of the above study by Klinnert and colleagues (1994) is the use of a prospective design. The lack of standardised parenting and behavioural measures could be regarded as a weakness of the study (though the authors indicated that the ratings were made by clinicians trained in the area of early infancy and parent-child relationships). Furthermore,

dichotomisation of the variables (stress and parenting risk) is a relatively insensitive measurement technique.

Another prospective study used a quasi-experimental design to determine whether parents of children who had developed asthma by the age of 7 to 9 years differed from parents of children without asthma with respect to marital functioning, child care style and early parental behavioural characteristics during the child's infancy (Askildsen, Watten, & Faleide, 1993). A stratified sample of 161 Norwegian infants (who formed part of the sample for the Psychosocial Risk for Allergic Development project) was followed up when the children were aged 7 to 9 years in order to determine asthmatic status. The response rate was 69%, providing a sample of 111 families for follow-up.

During infancy, parents participated in a semi-structured interview and completed Spanier's Dyadic Adjustment Scale (Spanier, 1976) to provide a measure of marital quality. The authors made strong judgments based on material gathered during the open-ended interviews, for which inter-rater reliability estimates have not been reported. In particular, the authors described mothers of children who developed asthma by middle childhood to have a marked tendency to "regulate, 'shape' and even invade the child" (p. 96), perhaps to satisfy their own dependency need and/or protect their child who they might perceive as vulnerable. In contrast, the mothers of children who did not develop asthma were depicted as being less regulating and more facilitating, adapting routines to cater for the child's needs. Marital quality was not predictive of asthmatic status. Interestingly, mother and fathers of children with asthma showed greater agreement on marital quality than mothers and fathers of children without asthma. Askildsen et al. (1993) suggested that while the mother-father agreement within the asthmatic families of marital quality may reflect marital harmony, the agreement may be indicative of a family environment in which *disagreement* is not tolerated. In line with the family psychosomatic model (Minuchin et al., 1975), the authors strongly suggested that psychosocial factors are responsible for the development of asthma, especially since previous analyses showed that parental smoking habits, housing and environmental factors were not predictive of asthmatic status (Watten, 1992, cited in Askildsen, et al. 1993).

In consideration of previous research findings, the relationships between life events/stressors, asthma and anxiety may be bi-directional. Young children exposed to life stressors and problems within the family (such as parental distress and marital conflict) may have

experienced high levels of distress. The distressed child may cry intensely and frequently, which may create difficulties with breathing and potentially activate asthma (Klennert et al., 1994). The child's health problems may further heighten parental stress levels and the parent may have increased difficulty assisting the child with his/her own emotion regulation. In turn, the child will be placed at risk for emotional problems such as anxiety.

### 2.4.3 Maternal Psychological Adjustment

Children with asthma may be at heightened risk for anxiety problems because child asthma may contribute to parental distress. As previously discussed, parents who experience heightened levels of psychological distress may be less sensitive to their child's needs (Bowlby, 1969) and may model ineffective techniques for emotion regulation (Olson et al., 1979), which in turn may be detrimental to the child's emotional development and functioning.

Parents of children with asthma may experience greater levels of psychological distress than parents of healthy children. The responsibility associated with medical regimens may be particularly burdensome and leave some parents with less time and energy to effectively manage their usual daily responsibilities and engage in activities that serve to promote their own well-being. In turn, this may have a negative impact on the psychological well-being of both the parent and child (Frankel & Wamboldt, 1998; Svavarsdottir, McCubbin, & Kane, 2000).

Research has provided some support for the position that parents of ill children may also be at increased risk for psychosocial problems (Carson & Schauer, 1992; Hamlett, Pellegrini, & Katz, 1992; M. Z. Wamboldt et al., 1996), including limited social interactions and feelings of helplessness and despondency (Canning, Hanser, Shade, & Boyce, 1993; Carson & Schauer, 1992; Hamlett et al., 1992; McNicol et al., 1973; Schulz et al., 1994). However, some contrasting results have emerged, whereby parents of children with an illness have not demonstrated poorer psychological adjustment than parents of children without an illness (e.g. Gupta et al., 2001).

Svavarsdottir, McCubbin and Kane (2000) collected information on parenting difficulties and psychological well-being from parents of 76 asthmatic children aged 1 month to 6 years. As theorised, the majority of mothers experienced fatigue related to increased responsibilities. The

chronicity of pediatric asthma may place some parents at risk for psychological problems, including depression and anxiety, particularly in the presence of other risk factors, including low social support and other stressful life events.

A measure of parental health functioning was used in a study of the relationship between asthma severity and psychological problems in 337 asthmatic children aged 7 to 19 years (M. Z. Wamboldt, Fritz, Mansell, et al., 1998). As with many other studies, parent report, but not child self report, of internalising problems (measured by the CBCL) was positively associated with asthma severity. It is noteworthy that the mean level of internalising problems was not in the clinical range according to standardised norms. Regression analysis revealed that compared to asthma severity, parent report of their own physical symptoms accounted for a greater proportion of the variance in child internalising symptoms. The authors suggested that having a child with severe asthma might lead to elevated levels of parental distress, which is then reflected in reports of child internalising problems. While physical symptoms may be indicative of emotional distress, M. Z. Wamboldt et al. (1998) did not assess 'typical' symptoms of anxiety or depression in the parent. Other limitations of this study are the broad age range of the children and the lack of a healthy comparison group (though comparisons were made to standardised norms).

A study by Butz and Alexander (1993) using a sample of 155 children aged 7 to 12 years who presented at an emergency department for asthma, indicated that illness characteristics, such as the age at which a child is diagnosed with asthma may be related to parental anxiety. Compared with mothers of children diagnosed after their first birthday, a significantly greater proportion of mothers whose child was diagnosed before their first birthday had higher levels of trait anxiety. Continued vigilance due to caring for a child with an unpredictable illness, associated with a potentially greater number of daily disruptions, may explain higher levels of anxiety in mothers of children with early-onset asthma (Butz & Alexander, 1993).

Conversely, a study of 40 children with asthma, 39 children with congenital heart disease and 39 children with cancer revealed parents of children with asthma or cancer to be no more anxious than parents of healthy children (Gupta et al., 2001), as measured by self-report. However, the level of parental anxiety was positively correlated with parental report of child internalising problems and child self-reported anxiety.

Few studies have adopted an ecological perspective, which incorporates factors such as parental adjustment and social support, in the examination of associations between asthma and anxiety in children. Very few studies have examined the psychological well-being of the parents of asthmatic children under the age of 5 years.

#### 2.4.4 Life Events, Stress and Social Support

The occurrence of significant life events, particularly those perceived as negative life events, is theoretically and empirically associated with emotional problems in adults and children (Belsky, 1980; Bronfenbrenner, 1977; Sherbourne, 1988; Sherbourne, Meredith, Rogers, & Ware, 1992). The occurrence of significant life events places demands on individual and family resources to adapt well. The onset of asthma may be considered a negative life event, often with a chronic course. In line with a stress and coping model (MacLean et al., 1992), caring for a child with asthma may be particularly stressful, which may subsequently limit the availability of and access to tangible and emotional resources (e.g. finances, time, energy, social support) (Sandberg et al., 1998) that assist in coping with additional life events.

Literature has identified the importance of social support to buffer the impact of negative life events on individuals and families (Cosper & Erickson, 1985; Unger & Powell, 1980). Sources of support for parents of children with asthma may include relatives, friends, treating specialists and other professionals. Parents of children suffering a chronic illness may actually rely more heavily on support from their child's specialist (Hobfoll & Lerman, 1989; Pelletier, Godin, Lepage, & Dussault, 1994). Talking to someone about problems, or merely knowing that someone is 'there' for the parent to turn to for support, may assist in reducing parental emotional distress. Despite the well-documented finding that social support may buffer the impact of negative life events at an individual and family level, the level or adequacy of perceived support received by parents of children with asthma has not been a focus of empirical research (Hamlett et al., 1992).

There is some empirical evidence to suggest that compared with parents of children without asthma, parents of children with asthma receive less support and would like more support than they receive (Hamlett et al., 1992; Pelletier et al., 1994). Findings from a study of 213 children and adolescents with either asthma or diabetes suggested that parents wanted greater levels of

emotional support and encouragement regarding their ability to care for their ill child, as well as more practical information on how to care for their child (Pelletier et al., 1994).

The association between life events/stressors and emotional adjustment in children with asthma has received some empirical attention. MacLean, Perrin, Gortmaker et al. (1992) examined the significance of life events and illness severity as predictors of child adjustment (measured using the CBCL) in 81 children (aged 6 to 14 years) with asthma. The amount of positive and negative life change reported by the children was similar to normative values. There was a curvilinear association between illness severity and overall behavioural and emotional adjustment. Multiple regression analyses identified negative life events as making a significant contribution to internalising problems after controlling for illness severity. However, illness severity was not associated with child adjustment after controlling for life events. Gaps in this research include the exclusion of measures assessing two potentially key mediating variables: social support and parental psychological adjustment.

Frankel and Wamboldt (1998) examined the contribution of illness severity, socioeconomic status, social support, child emotional characteristics, parental physical health, family functioning, and maternal psychological distress on the impact of the child's asthma on the family. The non-random sample of 70 children with asthma (mean age 11.8 years; range 6 to 12 years) was recruited through inpatient and outpatient treatment programs at a tertiary care respiratory centre. The level of child anxiety measured using the parent and child reports on the Revised Children's Manifest Anxiety Scale (Reynolds & Richmond, 1978) was significantly associated with parental emotional distress. The mean level of parental emotional distress, as measured by the Parenting Stress Index (PSI), was two standard deviations higher than the PSI normative sample of 2299 non-patient adults. Moreover, parental emotional distress and perceived social support were salient predictors of the level of disruption the child's asthma had on the family. The results suggest that the impact of a chronic stressor, such as asthma, on the family is increased among families who reported lower levels of support and greater emotional distress. The role of social support as a mediator or moderator between illness characteristics and parental emotional distress was not examined.

Hamlett, Pellegrini and Katz (1992) demonstrated that mothers of children (aged 6 to 14 years) with asthma ( $n = 17$ ) compared to mothers of children with diabetes ( $n = 13$ ) or no illness ( $n = 30$ ) reported poorer social support and a greater number of negative life events within the past

12 months. Children with asthma had a higher mean level of internalising problems (according to the CBCL) than the healthy children. There was no difference in levels of internalising problems between the children with asthma and the children with diabetes. Hierarchical regression analyses revealed that the diagnosis of asthma and maternal perceived inadequacy of social support accounted for 17% of the variance in child CBCL internalising problems. Parents may have less time to receive social support due to the increased demands of caring for a child with asthma. Reduced social support may contribute to heightened parental distress, which may be detrimental to the child's emotional adjustment. This link was not examined. Despite the use of hierarchical regression to specify the independent contributions of variables to explaining child adjustment, the results of this study must be interpreted with caution as the subject to variable ratio in the analyses was particularly low (Tabachnick & Fidell, 1996). Also, the order that variables were entered into the regression analysis precluded assessment of whether asthmatic status added to the prediction of internalising problems *after* accounting for the psychosocial factors.

D. Gustafsson, Olofsson, Andersson, et al. (2002) examined the prevalence of psychosocial problems and relationships between illness severity and psychosocial problems in a non-random outpatient sample of 139 children aged 4 to 13 years (mean 9.4), diagnosed with asthma. A cluster analysis on illness-related questions (medication type, dosage, visits to emergency department, school absences and disturbed sleep) was conducted to categorise children according to illness severity. Psychosocial problems were assessed across a number of domains (including economy, health, leisure, social contact, asthma knowledge), using a questionnaire designed specifically for the study. In particular, 39% of parents indicated that asthma contributed to economic burden, 36% of parents indicated that their child's asthma resulted in less social contact with friends and relatives, and 30% of parents experienced having to cancel appointments with friends which they felt negatively affected their relationships. Greater illness severity was associated with reduced social contact for the parents and children, as well as increased psychological tension in the family.

In contrast, Sandberg, McGuinness, Hillary and Rutter (1998) indicated that a sample of 94 children with asthma (aged 6 to 13 years) did not experience a greater number of life events and chronic adversities compared to a community control group ( $n = 26$ ). Moreover, both these groups experienced significantly fewer life events and chronic adversities compared to a sample of 99 children attending a psychiatric clinic. The type of life events assessed pertained to losses,

problems with family and peer relationship, moves, changes in the household, family separations, illnesses, traumatic incidents, and marital events. Assessments were based on child and parental interviews.

In sum, studies examining the association between life events, social support and emotional adjustment in children with asthma have produced mixed findings. Some studies have obtained reports of negative life events occurring in the children's life. Others have focused on the parent's life. Many studies are theoretically limited due to the exclusion of many psychosocial factors that may serve a mediating/moderating role between the occurrence of negative life events, social support and adjustment. Further research is required. Nevertheless, studies that have been conducted offer some insights into the complex relationships.

## 2.5 The Importance of Understanding Anxiety in Children with Asthma

While asthma cannot be cured, it can be managed. Non-compliance to treatment and poor management of symptoms is a major risk factor associated with deaths in children with asthma (Cerveri et al., 1999). It is important to examine the effect of a range of psychosocial and medical factors on treatment compliance and management (Cerveri et al., 1999; Davis & Wasserman, 1992; Gartland & Day, 1999; Gebert et al., 1998; Marne, 1998; McQuaid, Kopel, Klein, & Fritz, 2003; Meijer et al., 1995; Meijer & Oppenheimer, 1995; Riley et al., 1993).

Functional morbidity, which refers to the impact that asthma symptoms have on an individual's life (e.g. night waking, reduced activities), may be used as an indication of the degree to which a child's asthma is managed (Klennert, McQuaid, & Gavin, 1997). A number of psychosocial factors have been implicated in the functional morbidity and management of asthma in adults and children (Gebert et al., 1998; Klennert et al., 1994; Mrazek et al., 1991; Weil et al., 1999), though some results are equivocal (Klennert et al., 2000).

A large-scale study conducted by Weil, Wade, Bauman, et al. (1999) showed that clinically significant behavioural problems were associated with poorer functional health status in children with asthma. Similarly, Gebert, Hummelink, Konning, et al. (1998) found that in a sample of 81 asthmatic children aged 7 to 14 years, child anxiety significantly predicted self-management of symptoms.

Klennert et al. (2000) examined the significance of emotion regulation and child behavioural and emotional problems as predictors of asthma symptom levels in a sample of 6 year old children ( $n = 82$ ) with asthma. Mixed findings emerged. Hierarchical regression analyses revealed that emotion regulation accounted for almost 5% of the variance in asthma symptom levels (after accounting for asthma severity, based on medication level), with poorer emotion regulation associated with greater symptom levels. Unexpectedly, lower levels of child reported behavioural and emotional problems were associated with higher asthma symptom levels (accounting for approximately 7% of the variance). Parent report of child behavioural and emotional difficulties did not account for a significant proportion of the variance in asthma symptoms levels.

Vamos and Kolbe (1999) conducted regression analysis to examine the contribution of emotional state (anxiety and depression) and perceived social support in explaining the level of asthma knowledge in a sample of 80 asthmatic patients aged 14 to 76 years. The authors suggested that asthma knowledge (e.g. response taken during two hypothetical evolving attacks) might reflect management skills. The psychosocial factors did not explain a significant proportion of the variance in asthma knowledge.

Family interactions and parenting styles have also been implicated in the development of asthma (Klinnert et al., 1994; Mrazek et al., 1991) and symptom levels (Christiaanse, Lavigne, & Lerner, 1989; Manne, 1998). As previously noted, while parental overprotection and control have been implicated in the development of anxiety in children, a rigid parental attitude and high level of interdependence may actually be related to better control of asthma (Meijer et al., 1995). For example, Meijer and colleagues (Meijer et al., 1995; Meijer & Oppenheimer, 1995) showed that parents of children aged 9 to 15 years with controlled asthma functioned in a more rigid manner than parents of children with uncontrolled asthma. Based on their research findings, Meijer and colleagues (1995) proposed an excitation-adaptation model of pediatric chronic-illness. This model proposes that two circular processes relate to the child's asthma controllability. These are: 1. compliance to medication regimes by the parent and child, and 2. psychosocial factors, such as parental rigidity and overprotectiveness, which may influence treatment compliance.

The effects of rigid family functioning, which may be indicative of highly protective or controlling parenting, on the management of asthma may change as the child develops. With increasing age, children develop a need for greater levels of autonomy from the parent. Parents who have demonstrated relatively high levels of control, perhaps as a means to ensure their child's asthma is well managed, may have difficulty allowing their child to develop independence and consequently the child may become resistant to parental control and protection. It is therefore reasonable to expect difficulties with physical care to become problematic as the child matures (Eiser et al., 1991a, 1991b). Indeed, empirical research indicates that high levels of child behavioural and emotional problems in children interact with family conflict to predict non-compliance to treatment (Christiaanse et al., 1989; Manne, 1998). Longitudinal research is required to examine the ongoing impact of parenting and family factors on the management of asthma in children.

Parental adjustment may also contribute to poor asthma management. Parents with high levels of psychological distress may be less sensitive to their child's physical needs. As previously discussed, parents may attempt to regulate their own distress through their interactions with their child. In the situation of a medical stressor, parents may use a repressive cognitive style (i.e. denial) in an effort to reduce their own anxiety. In turn, however, this may be detrimental to the management of their child's asthma. Indeed, Weinberger (1991, cited in Klinnert et al., 2000) reported an association between asthma and a repressive cognitive style. A similar association may be observed among parents of very young children with asthma, as parents are largely responsible for the management of their child's asthma.

The contribution of welfare and insurance status (which may be indicative of socioeconomic status), parental mental health, barriers to care and sociodemographic characteristics towards explaining child asthma symptoms was examined in a sample of 386 children aged 2 to 12 years (P. R. Wood et al., 2002). The majority of the children were male, and half were under the age of 6 years. The Asthma Functional Severity Scale (Rosier et al., 1994) provided the outcome measure of asthma symptoms. Analyses revealed that poorer parental mental health corresponded to more barriers to caring for the child, more hospital visits, more severe asthma attacks and more child asthma symptoms. Furthermore, compared to parents on welfare, parents who had applied for but had been denied welfare assistance had significantly poorer mental health and their children experienced more asthma symptoms. Similar relationships have been reported in other studies (Bartlett et al., 2001; Wade, Weil, Holden, & al, 1997; Weil et al., 1999).

Other barriers to illness management may include the occurrence of stressful life events and poor social support (Sherbourne et al., 1992). As previously discussed, research has suggested a link between negative, chronic life events and severe asthma (e.g. McNicol et al., 1973). Recently, Mrazek and colleagues (2000) developed a prevention program for parents of young children genetically at risk for asthma. The program included an educational module, a hypoallergic diet module and an emotional well-being module. In relation to the emotional well-being module, through home-visits, mothers are provided with assistance in how to respond to their infant in a sensitive manner and with management of child-care and family issues. Preliminary analyses suggest a low incidence of wheezing and lower frequency of asthma diagnosis among the 140 children enrolled in the study.

Though the association between psychosocial factors and asthma morbidity requires further elucidation, it is likely that child emotional problems and family variables may play an important role in the functional status of children with asthma. An understanding of anxiety in young children may ultimately lead to improved management of asthma, as well as the development of mental health.

### 3 The Current Study

#### 3.1 Rationale, Aims and Hypotheses

##### 3.1.1 Rationale

In Australia 2% to 10% of children and adolescents aged from 4 to 20 years are estimated to suffer from an anxiety disorder (Anderson et al., 1987; Bird et al., 1988; Costello, 1989; Offord et al., 1987; Sawyer, Arney et al., 2001; Velez et al., 1989; Zubrick et al., 1995). There are indications that internalising problems occur at younger ages (Lavigne et al., 1996; Zubrick, Silburn, Burton, & Blair, 2000). Relative stability of internalising problems and related diagnoses in children aged 2 to 5 years has also been demonstrated among community (Lavigne et al., 1998) and clinic samples (S. B. Campbell, 1995). However, as the literature review indicates, the study of anxiety per se in children younger than 5 years of age has been neglected (Spence et al., 2001). Rather, research has used samples of older children and has tended to take a broader perspective, with the focus on internalising problems, which typically combines a range of symptoms indicative of anxiety, depression and withdrawal (Spence et al., 2001).

Whilst some risk factors for anxiety in school aged children and adolescents have been identified (Spence & Dadds, 1996), risk factors for anxiety in very young children remain unclear. No studies of children below 3 years have been identified that have measured anxiety problems using a standardised measure and associated correlates, including asthma. The current study addresses this research gap. The identification of correlates of anxiety in very young children may allow for early identification of children at risk for anxiety and subsequently provide the potential for preventative intervention. Furthermore, as psychosocial factors, including child emotional problems and family factors, have been implicated as risk factors for poorer functional morbidity (e.g. Klinnert et al., 2000; Mrazek et al., 1991), then an understanding of anxiety in the context of a chronic illness such as asthma may be particularly important.

### 3.1.2 Aims and Hypotheses

Figure 1 depicts a conceptual model, which illustrates the proposed relationships between childhood asthma, psychosocial variables and child anxiety.

#### 3.1.2.1 *Factors associated with child anxiety*

The primary aim of this research study was to examine parental and social factors directly associated with anxiety in a sample of children aged 2 years 6 months to 5 years 11 months. The research hypotheses, with child anxiety (measured using anxiety and somatisation subscales) treated as the outcome variable, included:

1. Child somatisation is associated with child anxiety.
2. Parental history of overprotection is associated with child anxiety.
3. Current protective parenting is associated with child anxiety.
4. Parental overall adjustment is associated with child anxiety.

#### 3.1.2.2 *Factors associated with risk factors for child anxiety*

A second aim of the current research study was to examine factors associated with current protective parenting and parental adjustment, which have been implicated as important factors in relation to child anxiety.

With current protective parenting treated as the outcome variable, the following hypotheses were assessed:

1. Parental history of overprotection is associated with current protective parenting.
2. Parental overall adjustment is associated with current protective parenting.
3. Global life stress, parental coping and social support, are associated with protective parenting.

With parental overall adjustment treated as the outcome variable, the following hypotheses were assessed:

1. Parental history of overprotection is associated with parental overall adjustment.
2. Global life stress, parental coping and social support are associated with parental overall adjustment.
3. Parental history of asthma is associated with parental overall adjustment.
4. Parental asthmatic status is associated with parental overall adjustment.

#### 3.1.2.3 *Pathways between psychosocial factors and child anxiety*

A third aim of the current study was to examine pathways leading to child anxiety, current protective parenting and parental overall adjustment. Hypotheses included:

1. Parental overall adjustment mediates the relationship between parenting and social variables (parental history of overprotection, global life stress, coping, social support) and child anxiety.
2. Current protective parenting mediates the relationship between parental and social variables (parental history of overprotection, parental overall adjustment, global life stress, coping, social support) and child anxiety.
3. Social support moderates the relationship between parental history of overprotection and child anxiety.
4. Parental overall adjustment mediates the relationship between the social variables (global life stress, coping, social support) and current protective parenting.
5. Social support moderates the relationship between parental history of overprotection and current protective parenting.
6. Social support mediates/moderates the relationship between parenting and social variables (parental history of overprotection, global life stress, coping) and parental overall adjustment.

#### 3.1.2.4 *The role of child asthma*

The fourth aim of the current study was to examine the relationship between child asthma and child anxiety, protective parenting and parental overall adjustment (see Figure 1). With child anxiety/somatisation treated as the outcome variable, the following hypotheses were assessed:

1. Children with asthma will have higher levels of anxiety than children without asthma.
2. Child asthmatic status/asthma severity is associated with child anxiety after controlling for the parental and social factors.
3. Current level of protective parenting mediates the relationship between child asthmatic status/asthma severity and child anxiety.
4. Parental overall adjustment mediates the relationship between child asthmatic status/asthma severity and child anxiety.
5. Child asthmatic status/asthma severity moderates the relationship between parental history of overprotection and child anxiety.

With current protective parenting as the outcome variable, the following hypotheses were assessed:

1. Child asthmatic status/severity is associated with current protective parenting.
2. Asthma management is associated with current protective parenting.
3. Asthmatic status/severity moderates the relationship between parental history of overprotection and current protective parenting.
4. Parental overall adjustment mediates the relationship between child asthmatic status/severity and current protective parenting.

With parental adjustment as the outcome variable, the following hypotheses were assessed:

1. Child asthmatic status/asthma severity is associated with parental overall adjustment.
2. Management of asthma is associated with parental overall adjustment.
3. Duration since asthma is diagnosis is associated with parental overall adjustment.
4. Number of consultations with a physician is associated with parental overall adjustment.
5. Global life stress, coping and social support mediate the relationship between child asthmatic status/severity and parental overall adjustment.
6. Social support moderates the relationship between child asthma status/severity and parental overall adjustment.

3.1.2.5 *Correlates of asthma severity*

A final exploratory aim of the current study concerned the prediction of asthma severity. In particular, the importance of the following variables was assessed:

1. Parental history of overprotection.
2. Current protective parenting.
3. Parental overall adjustment.
4. Child anxiety/somatisation.

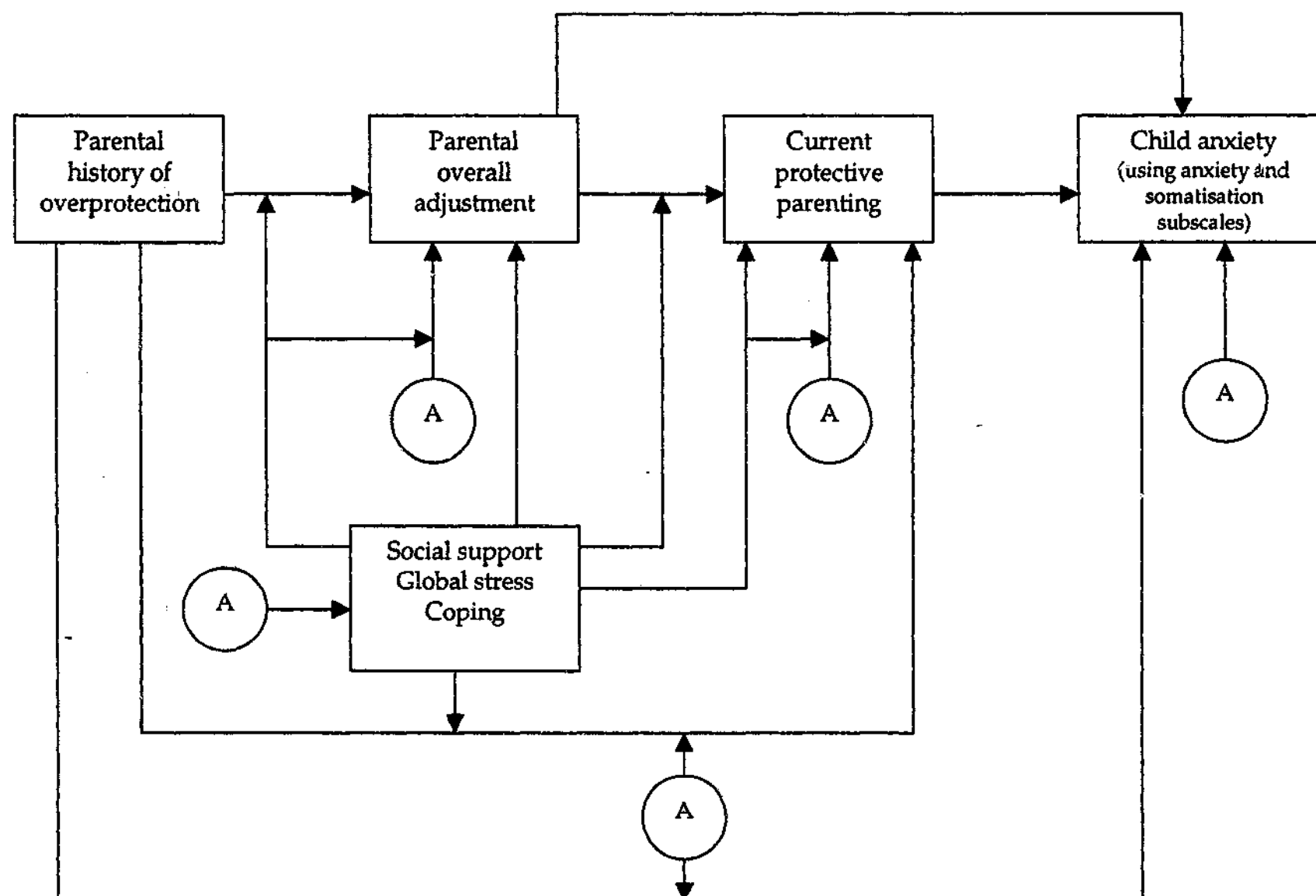


Figure 1 Proposed pathways between psychosocial factors and childhood anxiety/somatisation (Note: 'A' refers to asthma)

## 4 Method

### 4.1 Participants

The final sample comprised 103 children and their primary caregivers (84.5% biological mother, 14.5% biological father, 1.0% other). Whilst 110 caregivers agreed to participate, 7 were excluded due to the reasons outlined below.

Sixty-seven children had been diagnosed with asthma by either a pediatrician/local general practitioner or pediatric respiratory specialist. Two children were excluded from the final analysis due to having a developmental disability, leaving a final sample of 65 children with asthma.

The remaining 43 children had never received a diagnosis of asthma or any other chronic illness. Five children were excluded from the final sample: one child had received psychological intervention for an anxiety disorder, and four children were siblings of children recruited within the asthmatic sample. This left a final sample of 38 non-asthmatic children.

Characteristics of the children are presented in table 5. There was no significant mean age difference between the asthmatic children and non-asthmatic children (49.88 months versus 49.21 months,  $t(101) = -0.77$ ,  $p > .10$ ). Fisher's Exact Test of Independence indicated that the proportion of males to females did not significantly differ between the asthmatic sample and non-asthmatic sample ( $p > .05$ ). Forty-one (63.1%) of the children with asthma were male, whilst there were 17 (44.7%) males without asthma.

There was no significant group differences regarding the number of siblings of study child ( $t(101) = -0.57$ ,  $p > .10$ ), birth placement of the study children ( $\chi^2(4) = 1.93$ ,  $p > .10$ ), whether or not the child regularly spends time in care of someone other than the primary caregiver (Fischer's Exact Test of Independence:  $p > .05$ ), or the number of hours in care ( $t(101) = -0.45$ ,  $p > .10$ ).

Compared to the non-asthmatic sample, the asthmatic sample had been admitted to hospital a significantly greater number of times ( $t(94.98) = -3.90$ ,  $p < .001$ ). However, the groups did not differ according to age ( $t(47) = -0.47$ ,  $p > .10$ ) or duration of stay ( $t(50) = -0.56$ ,  $p > .10$ ) at first

hospital admission. A seemingly large proportion of hospital admissions of the asthmatic sample were related to asthma and respiratory problems (see Table 5). There was no significant difference regarding the proportion of asthmatic and non-asthmatic children who lived with a parent who smoked (Fischer's Exact Test of Independence:  $p = .10$ ).

Table 5 Demographic and Social Characteristics of the Children within the Total Sample ( $N = 103$ ), Asthmatic Sample ( $n = 65$ ) and Non-asthmatic Sample ( $n = 38$ )

Variable	Total	Asthmatic	Non-asthmatic
Number of siblings	<u>M (SD)</u> 1.22 (0.89)	<u>M (SD)</u> 1.26 (.87)	<u>M (SD)</u> 1.16 (.92)
At least one siblings has current or past asthma	<u>N (%)</u> 36 (35.0)	<u>n (%)</u> 29 (44.6)	<u>n (%)</u> 7 (18.4)
Birth placement of study child	<u>N (%)</u>	<u>n (%)</u>	<u>n (%)</u>
First born	46 (44.7)	30 (46.2)	16 (42.1)
Second born	37 (35.9)	22 (33.8)	15 (39.5)
Third born	14 (13.6)	8 (12.3)	6 (15.8)
Fourth born	4 (3.9)	3 (4.6)	1 (2.6)
Fifth born	2 (1.9)	2 (3.1)	0 (0.0)
Attends form of child care	<u>N (%)</u>	<u>n (%)</u>	<u>n (%)</u>
Child care/preschool	95 (92.2)	59 (90.8)	36 (94.7)
Relative/friend	71 (74.7)	41 (64.5)	30 (83.3)
Child care/preschool + Relative/friend	5 (5.26)	4 (6.8)	1 (2.8)
Other	14 (14.7)	9 (15.3)	5 (13.9)
Hours/week in care	<u>M (SD)</u> 17.83 (12.41)	<u>M (SD)</u> 18.25 (13.17)	<u>M (SD)</u> 17.11(11.13)
Frequency of hospital admissions	<u>M (SD)</u> .91 (1.36)	<u>M (SD)</u> 1.23 (1.55)	<u>M (SD)</u> .37 (.66)
	<u>N (%)</u>	<u>n (%)</u>	<u>n (%)</u>
Zero hospital admissions	67 (64.1)	40 (36.9)	27 (71.1)
One hospital admission	33 (32.0)	24 (36.9)	9 (23.7)
Two hospital admissions	18 (17.5)	16 (13.8)	2 (2.6)
Three hospital admissions	3 (2.9)	2 (3.1)	1 (2.6)
Four hospital admission	1 (1.0)	1 (1.5)	0 (0.0)
Five hospital admission	2 (1.9)	2 (3.1)	0 (0.0)
Six or more hospital admissions	3 (2.9)	3 (4.6)	0 (0.0)

Table 5 cont.

Variable	Total	Asthmatic	Non-asthmatic
Reason for first admission	<u>N</u> (%)	<u>n</u> (%)	<u>n</u> (%)
Asthma	14 (13.6)	14 (35.0)	0 (0.0)
Respiratory infection	15 (14.6)	11 (27.5)	4 (44.4)
Grommets	5 (4.9)	3 (7.5)	2 (22.2)
Associated with premature birth	1 (1.0)	1 (2.5)	0 (0.0)
Eczema / allergy	2 (1.9)	2 (5.0)	0 (0.0)
Other	14 (13.6)	9 (22.5)	5 (55.6)
Age in months at first admission	<u>M</u> ( <u>SD</u> ) 19.40 (13.99)	<u>M</u> ( <u>SD</u> ) 19.91 (14.88)	<u>M</u> ( <u>SD</u> ) 17.64 (10.76)
Duration of stay in days for first admission	<u>M</u> ( <u>SD</u> ) 2.25 (7.11)	<u>M</u> ( <u>SD</u> ) 3.05 (8.77)	<u>M</u> ( <u>SD</u> ) .87 (1.82)
Reason for second admission	<u>n</u> (%)	<u>n</u> (%)	<u>n</u> (%)
Asthma	9 (8.7)	9 (56.3)	0 (0.0)
Respiratory infection	3 (2.9)	3 (18.8)	0 (0.0)
Grommets	3 (2.9)	2 (12.5)	1 (50.0)
Associated with premature birth	0 (0.0)	0 (0.0)	0 (0.0)
Eczema / allergy	0 (0.0)	0 (0.0)	0 (0.0)
Other	3 (2.9)	2 (12.5)	1 (50.0)
Age in months at second admission	<u>M</u> ( <u>SD</u> ) 32.09 (16.93)	<u>M</u> ( <u>SD</u> ) 29.25 (15.192)	<u>M</u> ( <u>SD</u> ) 52.00 (19.799)
Duration of stay in days for second admission	<u>M</u> ( <u>SD</u> ) 0.50 (1.56)	<u>M</u> ( <u>SD</u> ) 0.76 (1.92)	<u>M</u> ( <u>SD</u> ) 0.05 (0.23)
Suffers from allergies	<u>N</u> (%) 29 (21.2)	<u>n</u> (%) 21 (32.3)	<u>n</u> (%) 8 (21.1)
Parent smokes at home	<u>N</u> (%) 17 (16.5)	<u>n</u> (%) 14 (21.5)	<u>n</u> (%) 3 (7.9)
Birth Continent	<u>N</u> (%)	<u>n</u> (%)	<u>n</u> (%)
Australia / Oceania	98 (95.2)	63 (96.9)	35 (92.1)
Asia	4 (3.9)	2 (3.1)	2 (5.3)
Other	1 (1.0)	0 (0.0)	1 (2.6)

Note. M = Mean; SD = Standard deviation

Characteristics of the parents are presented in Tables 6 and 7. Overall, the average age of the mothers and fathers were 35.86 years ( $SD = 4.76$ , range 24-52 years) and 37.95 years ( $SD = 5.74$ , range 22-59 years), respectively. The average age of mothers of asthmatic children was 36.22 years ( $SD = 4.93$ , range 24-48 years) and of non-asthmatic children was 35.65 years ( $SD = 4.49$ , range 28-52 years). The average age of fathers of asthmatic children was 37.37 years ( $SD = 5.41$ , range 22-50 years) and of non-asthmatic children was 38.93 years ( $SD = 6.21$ , range 29-59 years). One father of an asthmatic child was deceased. The differences in maternal ( $t(101) = -0.58$ ,  $p > .10$ ) and paternal ages ( $t(100) = 1.34$ ,  $p > .10$ ) between the two groups were not significant.

Socioeconomic status was based on occupational prestige (Daniel, 1983). Scores could range from 1 to 7, with a low score indicating high status. Scores for the total sample were normally distributed, ranging from 1.7 to 6.40 ( $M = 3.77$ ,  $SD = 1.02$ ). The mean occupational prestige score for the asthmatic sample was 3.84 ( $SD = 1.06$ ). The mean score for the non-asthmatic sample was 3.65 ( $SD = .95$ ). The group difference was not statistically significant ( $t(101) = -0.91$ ,  $p > .10$ ).

Table 6 Demographic and Social Characteristics of the Mothers within the Total Sample ( $N = 103$ ), Asthmatic Sample ( $n = 65$ ) and Non-asthmatic Sample ( $n = 38$ )

	Total sample	Asthmatic	Non-asthmatic
	$N$ (%)	$n$ (%)	$n$ (%)
<b>Marital Status</b>			
Married	89 (86.4)	53 (81.5)	36 (94.7)
Separated or Divorced	4 (3.9)	3 (4.6)	1 (2.6)
Defacto	4 (3.9)	3 (4.6)	1 (2.6)
Single	5 (4.9)	5 (7.7)	0 (0.0)
Missing	1 (1.0)	1 (1.5)	0 (0.0)
<b>Education</b>			
Incomplete high school	11 (10.7)	8 (12.3)	3 (7.9)
Completed high school	22 (21.4)	14 (21.5)	8 (21.1)
Completed certificate/diploma/trade	21 (20.4)	14 (2.5)	7 (18.4)
Incomplete tertiary	8 (7.8)	5 (7.7)	3 (7.9)
Completed undergraduate degree	27 (26.2)	18 (27.7)	9 (23.7)
Completed higher degree	14 (13.6)	6 (9.2)	8 (21.1)
Employed	62 (60.2)	39 (60.0)	23 (60.5)
<b>Household Income per Year</b>			
Under \$15 000	3 (2.9)	3 (4.6)	0 (0.0)
\$15 001 - \$25 000	5 (4.9)	5 (7.7)	0 (0.0)
\$25 001 - \$35 000	6 (5.8)	5 (7.7)	1 (2.6)
\$35 001 - \$45 000	9 (8.7)	6 (9.2)	3 (7.9)
\$45 001 - \$55 000	12 (11.7)	6 (9.2)	6 (15.8)
Over \$55 000	61 (59.2)	34 (52.3)	27 (71.1)
Missing	7 (6.8)	6 (9.2)	1 (2.6)
<b>Birth Continent</b>			
Australia / Oceania	79 (76.7)	53 (81.5)	26 (68.4)
North America	1 (1.0)	0 (0.0)	1 (2.6)
Europe	6 (5.8)	3 (4.6)	3 (7.9)
Africa	3 (2.9)	1 (1.5)	2 (5.3)
Asia	8 (7.8)	4 (6.2)	4 (10.5)
Middle East	6 (5.8)	4 (6.2)	2 (5.3)

Table 7 Demographic and Social Characteristics of the Fathers within the Total Sample (N = 103), Asthmatic Sample (n = 65) and Non-asthmatic Sample (n = 38)

	Total sample	Asthmatic	Non-asthmatic
	<u>N</u> (%)	<u>n</u> (%)	<u>n</u> (%)
<b>Marital Status</b>			
Married	90 (87.4)	54 (83.3)	36 (94.74)
Defacto	5 (4.9)	3 (4.6)	2 (5.26)
Separated or Divorced	3 (2.9)	3 (4.6)	0 (0.0)
Single	4 (3.9)	4 (6.2)	0 (0.0)
Missing	1 (1.0)	1 (1.5)	0 (0.0)
<b>Education</b>			
Incomplete high school	16 (15.5)	10 (15.4)	6 (15.8)
Completed high school	18 (17.4)	10 (15.4)	8 (21.1)
Completed certificate/diploma/trade	20 (19.4)	12 (18.46)	8 (21.1)
Incomplete tertiary	6 (5.8)	5 (7.7)	1 (2.6)
Completed undergraduate degree	25 (24.3)	17 (26.2)	8 (21.1)
Completed higher degree	16 (15.5)	9 (13.8)	7 (18.4)
Missing	2 (1.9)	2 (3.08)	0 (0.0)
Employed	101 (99.0)	64 (98.44)	37 (97.37)
<b>Birth Continent</b>			
Australia / Oceania	76 (7.4)	47 (72.3)	29 (76.3)
Europe	12 (11.7)	8 (12.3)	4 (10.5)
Africa	3 (2.9)	1 (1.5)	2 (5.3)
Asia	8 (7.8)	6 (9.2)	2 (5.3)
Middle East	4 (3.9)	3 (4.6)	1 (2.6)

## 4.2 Measures

### 4.2.1 Behavior Assessment System for Children

The Parent Rating Scale (Preschool Version) of the Behavior Assessment System for Children (BASC) (Reynolds & Kamphaus, 1998) provides a comprehensive measure of a child's adaptive and problem behaviours in community and home settings. The Preschool Version of the BASC comprises 105 items, describing behaviours and emotions of young children. Parents are instructed to indicate the frequency of occurrence of each item within the last 6 months, using a four-point Likert-type scale (1 = never, 2 = sometimes, 3 = often, 4 = almost always). A copy of the BASC is included in Appendix A.

The BASC yields 10 subscales, two of which are relevant to the current study: anxiety and somatisation. As anxiety in very young children may be manifested in a variety of forms, thus complicating the assessment of anxiety, the authors of the BASC recommend that the somatisation subscale is considered in addition to the anxiety subscale to obtain a more comprehensive assessment of anxiety in children 5 years and younger (Reynolds & Kamphaus, 1998). Reynolds and Kamphaus (1998) define the BASC measure of anxiety as, "the tendency to be nervous, fearful, or worried about real or imagined problems" (p. 48). The measure of somatisation is defined as, "the tendency to be overly sensitive to and complain about relatively minor physical problems and discomforts" (p. 48).

The items comprising the anxiety and somatisation subscale are presented in Table 8. The somatisation scale was modified for use in the current study; items that potentially could be confounded with a diagnosis of asthma are excluded (asterisked in table). For example, shortness of breath is a symptom of asthma and children with asthma are likely to experience frequent colds and possibly allergic reactions (Asthma Australia, 2003). Approximately 88% ( $n = 57$ ) of the children with asthma were on daily preventative medication, whilst 12% ( $n = 8$ ) of the children used reliever medication only (Ventolin) to manage asthma symptoms. A medical professional monitored medication regimens on a regular basis.

Table 8 Items Comprising the Anxiety and Somatisation Subscales

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**Anxiety**

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- 3. Is too serious.
- 14. Worries about what parents think.
- 24. Is afraid of dying.
- 36. Says, "I'm not very good at this."
- 47. Says, "I'm afraid I will make a mistake."
- 57. Gets very upset when things are lost.
- 69. Is nervous.
- 80. Worries about things that cannot be changed.
- 90. Worries.
- 102. Worries about what teachers think.
- 113. Says, "It's all my fault."
- 123. Is fearful.

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**Somatisation**

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- 9. Makes frequent visits to the doctor.\*
- 20. Has headaches.
- 29. Has stomach problems.
- 33. Vomits.
- 42. Complains about health.
- 53. Complains of pain.
- 62. Has ear infections.
- 66. Has allergic reactions.\*
- 75. Has fevers.
- 86. Complains of being cold.
- 95. Complains of shortness of breath.\*
- 108. Uses medication.\*
- 119. Gets colds.\*
- 128. Complains of dizziness.

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\*Excluded from subscale for current study.

The majority of research studies relevant to the current study have used the CBCL to measure internalising problems, or anxiety/depression, rather than anxiety *per se*. The overlap of anxiety and depression symptoms is a clear limitation on many questionnaire measures (Brady & Kendall, 1992), such as the CBCL. The choice of the BASC, rather than the CBCL, to measure the main outcome variable was based on the psychometric advantages of the BASC relative to the CBCL. Most importantly, the BASC separates the constructs of anxiety and depression onto two subscales, with no item overlap. Despite reported correlations between anxiety and depression, separation of the constructs may assist in greater differentiation of the two problems (Kamphaus & Frick, 1996). Until very recently, the CBCL did not provide separate measures of anxiety and depression constructs (Achenbach et al., 2003).

The BASC normative sample relevant to the current study comprises 159 children aged 2 years 6 months through 2 years 11 months, 400 children aged 3 years through 3 years 11 months and 309 children aged 4 years through 5 years 11 months. The sample was recruited through daycare programs, preschools and primary schools in various locations around the United States of America. Significant age differences emerged between the anxiety subscale raw scores, thus justifying the calculation of separate norms on these two subscales for children aged 2 years 6 months through to 2 years 11 months and 3 years through to 3 years 11 months. Within the normative sample of children aged 4 to 5 years 11 months, females were rated as having significantly greater levels of anxiety than males. Furthermore, females scored significantly higher on the overall level of internalising problems (which includes the somatisation and anxiety subscales).

Internal consistency reliabilities were computed for children aged 2 years 6 months through 2 years 11 months, 3 years through 3 years 11 months, and 4 years through 6 years 2 months. Coefficients for the anxiety and somatisation subscales are listed in Table 9. It is noteworthy that the reliability coefficients of the anxiety subscale were better for the older two samples. This difference may reflect the difficulties associated with the measurement of anxiety in very young children. Reported test-retest correlations for children aged 4 years to 6 years 2 months are .81 for the anxiety subscale and .82 for the somatisation subscale. Test-retest reliability was not reported for the children aged 2 years 6 months through 3 years 11 months. Within the sample of children aged 4 years to 6 years 2 months ( $N = 67$ ), inter-rater reliability between mothers and fathers was .42 for anxiety and .41 for somatisation. Within the sample of

children aged 2 years 6 months through to 3 years 11 months ( $N = 90$ ), inter-rater reliability between mothers and fathers was .47 for anxiety and .73 for somatisation.

Table 9 Internal Consistency Coefficients for BASC Subscales across Three Age (Years-Months) Groups

	2-6 to 2-11 $n = 159$	3-0 to 3-11 $n = 400$	4-0 to 6-2 $n = 309$
Anxiety	.63	.72	.73
Somatisation	.78	.77	.74

A covariance structure analysis and subsequent principal-axis factor analysis, with varimax rotations, identified and confirmed the factor structure of the BASC for children aged 4 years to 6 years 2 months. Importantly, this included an anxiety subscale separate from the depression subscale. Construct validity for use of the BASC with children aged 2 years 6 months through 3 years 11 months was obtained by comparing the factor structure of children within this age range with the factor structure obtained with children aged 4 years to 6 years 2 months. No significant differences in factor structure were identified between the two age groups.

Support for construct validity of the BASC was obtained through correlations with the Child Behavior Checklist (Achenbach & Edelbrock, 1983), using a sample of 30 children aged 4 years to 6 years 2 months. In particular, the correlation between the BASC anxiety and CBCL anxiety/depression subscale was .66, whilst the correlation between the BASC somatisation and CBCL somatic complaints subscales was .55.

As a relatively new instrument, the preschool version of the BASC has not been widely used. However, the primary school aged version of the BASC has been standardised on a sample of 3,210 children and has been used with samples of chronically ill children (Challinor, 1998; Shelby, Nagle, Barnett-Queen, Quattlebaum, & Wuori, 1998; Youssef 1999). Adequate concurrent validity, convergent validity, criterion-related validity and internal consistency have been shown (Doyle, Ostrander, Skare, Crosby, & August, 1997; Merenda, 1996; Reynolds & Kamphaus, 1998).

#### 4.2.2 Parent Bonding Instrument

The Parent Bonding Instrument (PBI) (Parker et al., 1979) is a widely used instrument, developed to assess how a person's parent/s behaved towards him/her during the first 16 years of life. The PBI yields two factors: care and overprotection. A copy of the PBI is included in Appendix B.

Prior to the development of the PBI, research indicated that parent behaviours towards the child could generally be explained along two dimensions: care and overprotection (Parker et al., 1979; Raskin, Boothe, Reatig, Schulterbrandt, & Odle, 1971; Roe & Siegelman, 1963; Schaefer, 1965). Development of the PBI initially involved a pilot study, in which 50 fifth year medical students completed 114 items generated from clinical notes and literature. Revisions were made to the items and the inventory was administered to 34 psychiatric nurses and 19 medical students. Factor analysis was used to reduce the inventory to 48 items. The validation study comprised a mixture of medical students, psychiatric nurses, technical college students and parents ( $N = 150$ , 71 males). The mean age of respondents was 25 years.

Factor analysis, with varimax rotation, eventuated in a two-factor scale with 25 items. The first factor, labeled 'care', consists of 12 items. Scores can range from 0 to 36. High scores indicated affection, emotional warmth, empathy and closeness, whilst low scores reflected emotional coldness, indifference and neglect. The second factor, 'overprotection', consists of 13 items. Scores can range from 0 to 39. High scores on this factor reflected control, overprotection, intrusion, excessive contact, infantilisation and prevention of independent behaviour. Low scores indicate an acceptance of independent behaviour and autonomy. Respondents rate each item on a 4-point Likert scale, indicating how well each item describes the index parent (0 = very like, 1 = moderately like, 2 = moderately unlike, 3 = very unlike).

Acceptable test-retest reliability and validity have been shown in a variety of subject populations and settings (Main, Kaplan, & Cassidy, 1985; Parker, 1983). Parker et al. (1979) reported three-week test-retest correlation coefficients of .76 and .63 for the 'care' and 'overprotection' dimensions, respectively. Split-half reliability was .88 for the 'care' dimension and .74 for the 'overprotection' dimension. Two of the authors independently conducted interviews with 65 subjects from the initial validation sample. Each subject was independently assigned a 'care' and 'overprotection' score for each parent. Inter-rater reliability was

satisfactory (.85 for 'care', and .69 for 'overprotection'). Correlation coefficients with the PBI scales indicated satisfactory concurrent validity (ranging from .77 to .78 for 'care' and .48 to .51 for 'overprotection').

Using the validation sample, Parker et al. (1979) reported mean scores of 24.9 for 'care' and 13.3 for 'overprotection', with mothers perceived as being significantly more caring and overprotective than fathers. Scores on each dimension did not differ according to the sex of the respondent.

Parker et al. (1979) generated general population norms using a sample of 410 patients attending three general practitioners in Sydney. The authors considered the location of practitioners would ensure a representation of diverse social classes. Analyses revealed no clear association between social class and parental care and overprotection. No association was found between the age of respondents and parental care and overprotection. As with the validation sample, mothers were perceived as more caring and overprotective than fathers. Again, the sex of respondent was not associated with scores on either dimension. Scores on each dimension had a moderately negative correlation, suggesting that the scales are not independent.

The PBI has been used in Australian research. MacKinnon, Henderson, Scott and Duncan - Jones (MacKinnon et al., 1989) used the PBI in a 2-wave community survey of 386 adults, drawn from the electoral register in Canberra. The sample was randomly divided into four and followed up at varying intervals of 4, 11, 21 and 34 weeks. The mean age of respondents was 40 years (range 18 to 87 years) and 58% of respondents were female. Analyses confirmed the factor structure of the PBI, indicating two dimensions, which were moderately correlated, as identified by Parker et al. (1979). Test-retest correlations were strong for both dimensions (ranging from .89 to .95 for 'care' and .74-.89 for 'overprotection'), regardless of the time between interviews (MacKinnon et al., 1989).

A large body of research supports a link between overprotective parenting and the development of anxiety problems (see Rapee, 1997 for a review of studies). Furthermore, the nature of parent-child relationship is thought to impact on subsequent relationships. Thus, in relation to the current study, only the PBI overprotection factor is used.

#### 4.2.3 Parent Protection Scale

The Parent Protection Scale (PPS) (Thomasgard, Metz et al., 1995; Thomasgard, Shonkoff et al., 1995) is a 25-item scale designed to assess specific parental behaviour related to child autonomy, individuation, and separation. A 4-point Likert-type scale (0 = never, 1 = sometimes, 2 = most of the time, 3 = always) is used to indicate the frequency of a parenting behavior depicted in each item. Items 5, 6, 10, 14, 16, 19 and 25 are reverse coded. Summing all 25 items derives a total score; higher scores indicate greater levels of protective parenting. A copy of the PPS is included in Appendix C.

Factor analyses based on a normative sample of 892 parents of 2 to 5 year old children suggested four subscales: supervision, separation problems, dependence, and control. Subscale scores are obtained by summing respective items. Thomasgard and Metz reported low intercorrelations between the four subscales (.10 to .28), with the exception of the separation problems and dependence subscales (.50) which have two common items.

Items for the PPS were drawn from research literature and clinical experience. The initial item pool consisted of 27 items hypothesised to reflect dimensions of protective parenting behaviours. Review of frequency plots during the development stage indicated negligent association between two items and the total score, resulting in removal of these two items from the final scale. Normative data was derived from two samples of parents in Massachusetts, United States of America. Sample A comprised 892 parents of children aged 2 to 5 years attending the pediatrician. The sample was unrepresentative of the general population, with 92% being white, 84% married, 43% middle and 45% upper socioeconomic status. Ninety-percent of the respondents were mothers. Sample B comprised 280 parents, with a child aged 5 to 10 years, also patients of the pediatrician. Family demographics were consistent with those of Sample A.

Using the normative sample, a cut-off score of greater than 1 standard deviation above the mean of the total score distinguishes overprotective from non-overprotective parenting (Thomasgard, Metz et al., 1995). As seen in Table 10, the mean level of protective parenting and cutoff score for the identification of overprotective parenting reduce with child age. There were no significant associations between protective parenting and sex of the child.

Table 10 Means Scores (M), Standard Deviations (SD) and Cutoff Scores by Age for Overprotective Parenting (N = 1,172)

Age in months	<u>M</u>	<u>SD</u>	Cutoffs*
22-27	35.6	6.2	41
28-33	34.0	5.4	38
34-39	33.5	5.4	38
40-45	32.8	4.8	37
46-51	31.5	5.4	36
52-59	32.0	4.9	36
60-72	30.9	4.7	35
73-84	30.0	5.4	35
85-96	28.7	4.9	32
97-108	27.6	6.5	32
109-120	28.0	4.8	32
121-132	25.6	4.5	29

\*Upper limit of normative range

Acceptable internal consistency, test-retest reliability and clinical validity have been established. Thomasgard, Metz et al. (1995) reported an internal consistency coefficient of .73 for the entire scale on the total normative sample of 1172 parents of children aged 2 to 10 years, 892 of whom had a child aged 2 to 5 years. The internal consistency of the four subscales was less adequate, ranging from .51 to .64 for the normative Sample A. Three to 5 week test-retest of the total score for a sample of 29 parents was excellent (.86), with no significant change in the mean values for the total PPS score or for any of the four subscale scores (Thomasgard, Metz et al., 1995).

Criterion validity was assessed. Mental health professionals provided clinical judgments regarding the presence of absence of parental overprotection among clients. Thirty-four parents were recruited; 17 judged to be overprotective and 17 not overprotective. Groups were matched according to child age, sex and race. Subsequently, the parents completed the PPS. Criterion validity was assessed by comparing the PPS total score with the clinicians' judgments of parental overprotectiveness (Thomasgard, Metz et al., 1995). Use of criterion-referenced clinical history resulted in 71% sensitivity, 94% specificity and 92% positive predictive value.

#### 4.2.4 General Health Questionnaire

The 28-item General Health Questionnaire (GHQ) (G. Goldberg, 1978) was employed to assess the level of psychological functioning of the participating parent. The GHQ has been used extensively within Australia in clinical and research settings (Smith, 1992; A. W. Taylor et al., 2000).

The GHQ was initially comprised 60 items and was designed as a screening tool for the identification of psychiatric disorders in community settings. Using principal components analysis a 28-item version of the GHQ was deducted from the 60-item version (G. Goldberg, 1978).

The GHQ includes four subscales, anxiety and insomnia, somatic symptoms, social dysfunction, and severe depression, as well as a total severity score. Each subscale comprises 7 items describing symptoms. The respondent is required to indicate his/her experience of a particular symptom within the past few weeks using a Likert-type 4-point severity scale. A copy of the GHQ is included in Appendix D.

As discussed in the literature review, parental anxiety and depression has been associated with anxiety in children. Whilst the GHQ comprises separate anxiety/insomnia and depression subscales, the current study used the total severity score. Items comprising the somatic and social dysfunction subscales may also be indicative of mood problems, including anxiety and depression. Furthermore, as the literature suggests (Abidin et al., 1992; Beidel & Turner, 1997; Gerull & Rapee, 2002; Merckelbach, Muris, & Schouten, 1996; Muris, Steerneman, Merckelbach, & Meesters, 1996; Roselind et al., 2000), a range of mental health problems among parents may be associated with child anxiety. Use of the total severity score is therefore deemed to be most informative.

The GHQ may be scored in a number of ways, two of which will be used in the current study. Using the Likert-type scale (0-1-2-3) responses are summed to provide a score for each subscale (range from 0 to 21) and the total severity score (range from 0 to 84). G. Goldberg (1978) reported higher correlations between the GHQ subscales and an independent clinical measure when using this method as opposed to a variant (0-0-1-2).

D. P. Goldberg and Hillier (1979) recommend using bimodal scoring (0-0-1-1) when the aim is to identify whether an individual has clinical levels of psychological symptoms. This method of scoring will be used in the current study for descriptive purposes.

Using the Likert-type scoring method (0-1-2-3), D. P. Goldberg and Hillier (1979) reported a high correlation (.76) between the GHQ total score and overall clinical assessment (based on psychiatric interview) and .67 for the anxiety and insomnia subscale, indicating good validity for the scales. These associations were based on a sample of 200 adults from the original validity study. Using the same sample, D. P. Goldberg and Hillier also reported excellent sensitivity and specificity estimates using the GHQ, with a cutoff total score of 5/6 (using the bimodal scoring) as at-risk/clinical levels of psychological symptoms.

#### 4.2.5 Life Events Scale

The Life Events Questionnaire (Smith, 1992) comprises 20 statements covering specific life events including losses (e.g. illness, death of a loved one) and life changes (e.g. change of house) within the past 12 months, and chronic undesirable events (e.g. illness, relationship problems, financial problems). The three categories (loss, change and chronic events) were identified from an extensive literature review on measures of life stressors. Respondents are asked to grade the impact (neutral, positive or negative) on the family for each event that had occurred. A copy of the Life Events Scale is included in Appendix E.

The Life Events Scale was developed on a sample of 72 families identified to be at risk of experiencing high levels of stress. The families, drawn from the Australian Temperament Project (Prior et al., 1989), which focused on child temperament and development, were a representative sample of Victorian families ( $N = 2443$ ) each with at least one young child, initially recruited in 1983. Fourteen percent of the sample reported no losses and 8.9% reported no changes within the past year. Approximately 13% reported no chronic event. Single parent families reported the highest level of current negative life events. The highest proportion of negative responses was for the experience of loss, particularly of health or a significant other, followed by events referring to money worries and child problems. These problems had been present for more than 12 months. Long-term illness or disability with a negative impact was the next most frequently endorsed chronic problem.

Acceptable levels of reliability and validity have been established (Smith & Prior, 1995). Reliability estimates, based on inter-parent agreement of 50 families, ranged from .54 (long illness, disability) to 1.00 (loss of health, loss of money) and overall, inter-parent agreement was moderately high.

#### 4.2.6 Global Stress and Coping

Two items which form part of the Life Events Questionnaire (Smith & Prior, 1995), ask parents to provide a global rating of perceived stress and perceived coping. For both indices, parents use a 5-point Likert-type scale. For perceived global stress, a score of 1 indicated 'no problems or stresses' whilst a score of 5 indicated 'most difficult and stressful'. For coping, a score of 1 indicated 'not at all' whilst a score of 5 indicated coping 'extremely well'. The items assessing global stress and coping are included in Appendix E (Questions 4 and 5, respectively).

In the previously reported study (Smith & Prior, 1995), global stress was significantly negatively correlated with global coping (-.53). Furthermore, ratings of stress and coping were significantly correlated with the number of undesirable (.57 and -.37), but not desirable (.07 and .08), life events. The total number of life events was correlated with global stress (.45) but not global coping (-.17). Inter-rater reliability coefficients of .98 for stress and .93 for coping between 32 mothers and clinician has been reported (Smith & Prior, 1995).

#### 4.2.7 Social Support Scale

The Social Support Scale (Henderson, Duncan-Jones, McAuley, & Ritchie, 1978) is an Australian 15-item measure of perceived social support, which requires the respondent to indicate a level of agreement with statements concerning social support received from family members and friends. The scale was designed to assess an individual's perception of the availability and satisfaction with his or her social interactions. Responses are made using a 5-point Likert-type scale, ranging from 'strongly agree' to 'strongly disagree'. An index of perceived social support is obtained by summing the 15 items. A copy of the Social Support Scale is included in Appendix F.

The Social Support Scale was initially administered to a sample of 50 adult psychiatric patients (20 male), recruited through two Health Centres and an inpatient psychiatric unit in Canberra, and 50 non-asthmatic adults matched on gender, age, marital status and occupation also living in Canberra. Chronbach alpha indicated excellent reliability estimates for the psychiatric group (.87) and the control group (.83).

#### 4.2.8 Asthma Severity

##### 4.2.8.1 *Physician rating*

The treating medical professional provided a rating of asthma severity, according to prescribed medication and symptom presentation. The Head of Respiratory Medicine, Monash Medical Centre, provided professional advice on the criteria to define asthma severity, in accordance with National Asthma Council guidelines (National Asthma Council Australia, 2002). Children were classified as having mild asthma if they were on no medication or only reliever medication (Ventolin) as required, moderate asthma if prescribed fluticasone propionate (FP)  $\leq 250$ mg/day or beclomethasone dipropionate (BDP)  $\leq 500$ mg/day (or equivalent), and severe asthma if prescribed a daily dosage of FP  $> 250$  or BDP  $> 500$  (or equivalent). FP and BDP are inhaled corticosteroids, and considered the main preventive therapy for asthma.

The treating professional also provided information regarding the number of times they had seen the child for asthma-related problems and the age at which the child was diagnosed. In line with the Asthma Functional Severity Scale (Rosier et al., 1994) completed by parents, the treating professional also indicated which of the following asthma symptoms the parent reported during the most recent consultation: persistent cough, shortness of breath, wheezing, waking at night with cough or wheeze, and other. A copy of the physician questionnaire is included in Appendix G.

#### 4.2.8.2 *Parent rating*

The Asthma Functional Severity Scale (Rosier et al., 1994) is a 6-item measure, designed as a descriptive tool to assess the degree of asthma severity. For the current thesis, one item (assessing the degree of impairment at school) was deemed not applicable to the sample and thus was excluded from the scale, leaving a 5-item measure. A copy of the Asthma Functional Severity Scale (modified for the current study) is included in Appendix H (Questions 5 to 9).

Development of the Asthma Functional Severity Scale began in 1989. A screening questionnaire on wheeze and respiratory symptoms associated with asthma was mailed to parents of 10,198 children in Years 2, 7, and 10. Response rate was 90%. The children were randomly selected from government and non-government schools within the Melbourne metropolitan area.

Based on the screening questionnaire, parents of children identified as having experienced wheezing or an asthma attack in the past 12 months were subsequently invited to complete a second 18-item questionnaire on asthma morbidity and treatment. The children were also tested for pulmonary function. A 65% response rate was obtained ( $N = 1,267$ ). Factor analysis using the principal components method of factor extraction, in addition to conceptual analysis, resulted in a 6-item scale, assessing frequency of episodes, intensity of episodes, frequency of symptoms between episodes and intensity of impairment between episodes.

Goodness of fit statistics were excellent (Rosier et al., 1994). Item reliability of the scale was .89. Some support for validity was obtained through a modest association between severity scale and functional disability and burden of care. Furthermore, the majority of children who experienced 'episodic symptoms' scored low on the scale, whilst children with 'persistent symptoms' were more likely to score high on the scale. The Asthma Functional Severity Scale has been used in recent Australian studies and with children as young as 2 years (Sawyer, Spurrier et al., 2001; P. R. Wood et al., 2002).

#### **4.2.9 Management of Asthma**

Given the primary aim of the current study and the large number of questionnaires to be completed by parents, a standardised measure of asthma management was not employed. Instead, parents and the treating professionals were asked to rate their perception of the degree to which the child's asthma is successfully managed on a scale of 1 (poorly managed) to 5 (easily managed). (Refer to Appendix G, Question 7, and Appendix H, Question 13.)

#### **4.2.10 Past Experience of Asthma**

Parents were asked to indicate if they knew anyone (including themselves) who suffered from asthma when they were growing up. Where applicable, the parent indicated the relation of the people who suffered asthma to themselves and rated their prior experience of asthma as negative, positive, or neutral. Parents who had been diagnosed with asthma were asked to indicate the age at which they were diagnosed, and their current asthmatic status (see Appendix H, Questions 27 to 30 and Questions 38 to 41).

#### **4.2.11 Socioeconomic Status and Demographic Data**

Standard demographic data including maternal and paternal education and occupation, marital status, income, living situation, use of child-care, and number and birth order of children was obtained (see Appendix H).

The Daniel Scale of Occupational Prestige (Daniel, 1983) was used to code parent's occupation and provide an indicator of family socio-economic status. The Daniel Scale is a widely used Australian instrument, where occupations are coded on a scale between 1 and 7, with 1 being high prestige and 7 being low prestige. The occupation with the greater prestige in the family was used. In the case of the child living with one parent only, the occupation status of that parent was used.

### 4.3 Procedure

#### 4.3.1 Sample Recruitment

The majority of the sample of children with asthma was recruited through a private asthma clinic at Respiratory Medicine, Monash Medical Centre, from April 2002 through to January 2003. The treating specialist initially invited the parents to participate in a research project about the relationship between asthma and anxiety in young children. Interested parents were referred to the researcher in the waiting room, who then provided further detail regarding the nature of the study. At this point 65 out of 71 parents agreed to participate, a response rate of 91.5%. Six parents did not participate because of limited time.

Parents completed the questionnaires in a private consulting room at the time of recruitment or at an alternative time and location (e.g. their home or workplace). The majority of parents chose to participate at a subsequent date at their home. After parental verbal consent for study participation was obtained, the treating professional completed the questions regarding the child's asthma.

The majority of children in the control group were recruited through child-care and kindergarten centres located near Monash Medical Centre and in the eastern suburbs of Melbourne during September 2002 through February 2003. A flyer was distributed to all eligible families. Attached to each flyer was a removable slip for the parent to write his/her name and contact details. Parents interested in participating were asked to place the completed slips in a sealed box at the counter of each centre. The researcher telephoned interested parents to explain the project. All telephoned parents agreed to participate in the study and a time was scheduled for the researcher to visit the parent at work or home for data collection.

At one child-care centre/kindergarten, parents were personally approached by the researcher and invited to participate in the study. Parents who were interested provided their contact details. The researcher subsequently telephoned the parents and scheduled a time to visit the parent for data collection. There was a 100% participation rate of telephoned parents.

#### 4.3.2 Data Collection

At the time of data collection, parents were briefed on the study and provided with an information sheet. Parents were asked to sign the consent form prior to commencement of questionnaire administration. The questionnaires were completed in the following order:

- Child asthma history and demographic data
- Maternal demographic data
- Paternal demographic data
- Behavior Assessment System for Children
- Parental Protection Scale
- Social Support Scale
- Life Events Questionnaire
- Parental Bonding Instrument
- General Health Questionnaire

Completion of the questionnaire booklet took approximately 50 minutes.

#### 4.3.3 Data Entry and Analysis

The researcher entered all data into SPSS Version 9.0 for statistical analyses. A power analysis was conducted to determine the optimal number of subjects required to assess the proposed hypotheses (outlined in Sections 3.1.2.1, 3.1.2.2 and 3.1.2.3) using regression analyses. With an alpha level of .05 and 75% power to detect an  $R^2$  as small as .13 (a medium effect size) (J. Cohen & Cohen, 1983), the analysis indicated a total sample size of 95 to be sufficient to allow testing of the hypotheses being analysed using regression analyses. For regression analyses, whereby asthmatic status is treated as an independent variable, a minimum of 15 subjects is required in each group (hypotheses outlined in Sections 2.1.2.4).

Preliminary analyses were conducted to identify differences across asthmatic status in gender, age, socio-economic status and age of asthma diagnosis. Where differences were found, these variables were treated as covariates in subsequent analyses.

Pearson  $r$  correlations were used to provide an initial assessment of the hypotheses, where both the independent and dependent variable were continuous. Group comparisons were conducted when the independent variable was categorical.

Multiple regression analyses were used to provide a more stringent test of the associations between the variables, by assessing the significance of the proportion of variance in the dependent variable explained by each independent variable. The contribution of child asthmatic status to explaining the variance in the dependent variables was assessed using hierarchical regression analyses. J. Cohen and Cohen (1983) have detailed the advantages associated with utilising hierarchical multiple regression analyses in order to clarify complex relationships implicit to correlational data. A hierarchical model allows specification for the unique contribution of each independent factor. The assessment of mediators and moderators was conducted using the procedure outlined by R. M. Baron and Kenny (1986). An overview of the procedure is presented in the results section.

#### 4.3.4 Ethics Approval

The Southern Health Human Research Ethics Committee B granted ethical approval for the research project on 08 April 2002 (Project No. 02014B).

## 5 Study Results

### 5.1 Descriptive Statistics

This section presents the reliability analyses and descriptive statistics on the variables used in the bivariate and multivariate analyses.

#### 5.1.1 Behavior Assessment System for Children

Alpha coefficients of internal consistency for the BASC anxiety and somatisation subscales are reported in Table 11. For the entire sample, internal consistency of the anxiety subscale was excellent and better than the internal consistency for the BASC normative sample (Reynolds & Kamphaus, 1998).

Internal consistency of the original BASC somatisation subscale for the total and asthmatic samples was comparable to the normative sample, whilst internal consistency for the non-asthmatic sample was slightly lower than the normative sample. As previously discussed, the somatisation subscale was revised for use in the current study. The reliability analysis indicated that the additional removal of item 62 (has ear infections) improved internal consistency from .75 to .79 for the entire sample, .53 to .61 for the non-asthmatic sample, and .73 to .77 for the asthmatic sample. Based on this improvement and the theoretical consideration that ear infections are unlikely to be reflective of child anxiety, this item was removed from the subscale. The revised somatisation subscale (with 'ear infections' removed) demonstrated very good internal consistency for the entire sample, thus supporting its use in the current investigation.

For the asthmatic sample, internal consistency of the revised somatisation subscale improved compared to the original somatisation subscale. Internal consistency for the original and revised somatisation subscales and the anxiety subscale were lower for the non-asthmatic sample compared with the asthmatic sample. This difference was not deemed problematic, as no analyses were conducted using the non-asthmatic sample only.

Table 11 Internal Consistency of the BASC Anxiety and Somatisation (Original and Revised) Subscales for the Total Sample, Asthmatic Sample and Non-asthmatic Sample

Dimension	US Norms (Reynolds & Kamphaus, 1998)			Total sample (N = 103)	Asthmatic (n = 65)	Non-asthmatic (n = 38)
	2.6-2.11 years	3.0-3.11 years	4.0-5.11 years			
Anxiety	.63	.72	.73	.82	.85	.71
Somatisation - Original	.78	.77	.74	.82	.74	.67
Somatisation - Revised	—	—	—	.79	.77	.61

#### 5.1.1.1 Mean level of anxiety and somatisation

The means and standard deviations for the BASC anxiety and the revised somatisation subscales are reported in Table 12. The non-asthmatic sample demonstrated similar mean levels of anxiety to the normative sample (Reynolds & Kamphaus, 1998). In contrast, the asthmatic sample demonstrated elevated levels of anxiety than the normative sample (Reynolds & Kamphaus, 1998). The level of somatisation in the current sample could not be compared to the normative sample, as the subscale was revised for use in the current study.

Table 12 Means T Scores (M) and Standard Deviations (SD) of the BASC Anxiety Subscale and Mean Raw Scores for the Somatisation Subscale (Revised)

Dimension	US Norm (Reynolds & Kamphaus, 1998)		Total sample (N = 103)	Asthmatic (n = 65)	Non-asthmatic (n = 38)
	2.6-3.11 years	4.0-5.11 years			
Anxiety					
M	50.10	51.40	55.01	57.14	51.37
SD	9.60	9.40	13.50	14.83	10.00
Somatisation					
M	—	—	3.67	4.74	1.84
SD	—	—	3.21	3.36	1.85

#### 5.1.1.2 *At-risk clinical levels of anxiety, somatisation and anxiety-somatisation*

At-risk levels of clinical anxiety was defined as a t-score greater than 59 (Reynolds & Kamphaus, 1998). Accordingly, 34% of the children ( $n = 35$ ) were identified as having at-risk levels of anxiety. Due to modification of the somatisation subscale, the normative cut-off score for somatisation (Reynolds & Kamphaus, 1998) was not applicable to the current study. The distribution of the anxiety t-scores was used to guide selection of the cut-off points for the somatisation subscale. On the anxiety subscale, a t-score of 60 was at the 72<sup>nd</sup> percentile. Thus, at-risk somatisation was defined as greater than the 72<sup>nd</sup> percentile (i.e. a raw score  $\geq 5$ ). Approximately 29% of the children ( $n = 30$ ) were identified as having at-risk levels of somatisation.

Fisher's exact test indicated a significant overlap in the proportion of children identified with at-risk levels of anxiety and somatisation (one-sided  $p < .01$ ). Approximately 16% of the children ( $n = 16$ ) were at-risk for both anxiety and somatisation. Approximately 14% of the children ( $n = 14$ ) were at-risk according to the revised somatisation subscale only, and 18% of the children ( $n = 19$ ) were at-risk according to the anxiety subscale only. Approximately 52% of the children ( $n = 54$ ) were not at-risk for either anxiety or somatisation.

#### 5.1.1.3 *Prevalence of anxiety symptoms*

To allow for a comparison on the prevalence of anxiety symptoms with a recent Australian study (Spence et al., 2001), the proportion of children rated by parents to have each anxiety and somatisation problem item 'often' or 'almost always' were computed, as seen in Table 13. On items pertaining to worries, Spence, et al. reported prevalence (defined as 'quite often' or 'very often true') of 1.0 to 4.3, whilst the prevalence of worries (defined as 'often occurs' or 'almost always' occurs in the current study) in the current sample ranged from 6.8 to 19.4. On items assessing fears, Spence, et al. reported prevalence estimates ranging from 4.0 to 17.8 compared to 14.6 for the current sample. On face value it appears that general worries were higher among the current sample compared to Spence's sample, while levels of fears were comparable.

Table 13 Proportion of Children Rated as 'Often' or 'Almost Always' for Each Anxiety Item

Anxiety Item	% ( <u>n</u> ) 'Often' or 'Almost Always'		
	Total sample ( <u>N</u> = 103)	Non-asthmatic ( <u>n</u> = 38)	Asthmatic ( <u>n</u> = 65)
3. Is too serious.	12.6 (13)	13.2 (5)	12.3 (8)
14. Worries about what parents think.	19.4 (20)	10.5 (4)	24.6 (16)
24. Is afraid of dying.	8.7 (9)	5.3 (2)	10.8 (7)
36. Says, "I'm not very good at this."	6.8 (7)	2.6 (1)	9.2 (6)
47. Says, "I'm afraid I will make a mistake."	5.8 (6)	0.0 (0)	9.2 (6)
57. Gets very upset when things are lost.	26.2 (27)	23.7 (9)	27.7 (18)
69. Is nervous.	4.9 (5)	2.6 (1)	6.2 (4)
80. Worries about things that cannot be changed.	6.8 (7)	5.3 (2)	7.7 (5)
90. Worries.	10.7 (11)	2.6 (1)	15.4 (10)
102. Worries about what teachers think.	12.6 (13)	7.9 (3)	15.4 (10)
113. Says, "It's all my fault."	1.0 (1)	2.6 (1)	0.0 (0)
123. Is fearful.	14.6 (15)	18.4 (7)	12.3 (8)
Somatisation Item			
20. Has headaches.	0.0 (0)	0.0 (0)	0.0 (0)
29. Has stomach problems.	6.8 (7)	0.0 (0)	10.8 (7)
33. Vomits.	7.8 (8)	0.0 (0)	12.8 (8)
42. Complains about health.	4.9 (5)	0.0 (0)	7.7 (5)
53. Complains of pain.	5.8 (6)	2.6 (1)	7.7 (5)
75. Has fevers.	7.8 (8)	0.0 (0)	12.3 (8)
86. Complains of being cold.	11.7 (12)	7.9 (3)	9 (13.8)
128. Complains of dizziness.	0.0 (0)	0.0 (0)	0.0 (0)

### 5.1.2 Parental Bonding Instrument

The 'overprotection' dimension of the PBI demonstrated excellent internal consistency for the non-asthmatic, asthmatic and total samples (see Table 14), providing strong support for its use in the current study. Parents within the total sample reported being raised in a slightly less protective manner compared to the normative validation sample (Parker, 1983). Parents of children within the non-asthmatic sample also reported being raised in a less protective manner than the normative sample, whilst parents within the asthmatic sample reported being raised in a relatively similar manner than the normative sample.

Table 14 Internal Consistency Estimates ( $\alpha$ ), Means ( $M$ ) and Standard Deviations ( $SD$ ) of the PBI Control Subscale for the Total Sample, Asthmatic Sample and Non-asthmatic Sample

Sample	$\alpha$	$M$	$SD$
Normative (Parker, 1983)	--	13.30	--
Non-asthmatic ( $n = 38$ )	.85	9.32	5.97
Asthmatic ( $n = 65$ )	.87	12.75	8.02
Total ( $N = 103$ )	.87	11.49	7.49

### 5.1.3 Parent Protection Scale

Alpha coefficients of internal consistency estimates were similar to those provided by Thomasgard and Metz (1995), and indicated good reliability of the PPS total score (Table 15). The internal consistency estimates of the PPS subscales were less adequate (though similar to the normative sample (Thomasgard, Metz et al., 1995)), demonstrating some inconsistency in responses. It is noteworthy that the internal consistency estimates for each subscale (and the total score) within the asthmatic sample were lower than the estimates for the normative and non-asthmatic samples. Nevertheless, internal consistency of the total PPS score was adequate and was thus selected for use in the main set of analyses.

Table 15 Internal Consistency ( $\alpha$ ) of the Parent Protection Scale for the Total, Asthmatic and Non-asthmatic Samples

Sample	$\alpha$				
	Supervision	Separation	Dependence	Control	Total
Normative ( $N = 1172$ ) (Thomasgard, Metz et al., 1995)	*	*	*	*	.73
Non-asthmatic ( $n = 38$ )	.68	.60	.59	.64	.79
Asthmatic ( $n = 65$ )	.64	.51	.53	.40	.62
Total ( $N = 103$ )	.67	.55	.55	.51	.71

\* Internal consistency ranged from 0.51 to 0.64; estimates for specific subscales not provided.

The mean levels of total protective parenting were 29.81 ( $SD = 6.57$ ,  $N = 103$ ) for the total sample, 30.86 ( $SD = 6.12$ ,  $n = 65$ ) for the asthmatic sample and 28.00 ( $SD = 7.01$ ,  $n = 38$ ) for the non-asthmatic sample. As seen in Table 16, the mean level of protective parenting appeared lower in the non-asthmatic sample compared to the normative sample across the majority of age categories. The mean level of protective parenting appeared lower in the asthmatic sample compared with the normative sample for the youngest and second eldest age categories only.

Table 16 Means ( $M$ ) and Standard Deviations ( $SD$ ) of Total Protective Parenting by Age Group for the Current Sample and the Normative Sample (Thomasgard, Metz et al., 1995)

Age (months)	$M$ ( $n$ )				$SD$			
	Norms	No asthma <sup>a</sup>	Asthma <sup>b</sup>	Total <sup>c</sup>	Norms	No asthma <sup>a</sup>	Asthma <sup>b</sup>	Total <sup>c</sup>
28-33	34.0 (134)	32.0 (3)	29.8 (5)	30.6 (8)	5.4	3.00	2.95	2.97
34-39	33.5 (159)	29.4 (5)	32.0 (8)	31.0 (13)	5.4	10.46	7.96	8.67
40-45	32.8 (118)	27.8 (6)	33.3 (12)	31.4 (18)	4.8	5.12	6.03	6.18
46-51	31.5 (134)	31.7 (7)	31.3 (9)	31.5 (16)	5.4	5.19	6.44	5.74
52-59	32.0 (162)	25.8 (9)	28.4 (17)	27.5 (26)	4.9	5.65	5.48	5.57
60-72	30.9 (71)	25.0 (8)	31.2 (14)	29.0 (22)	4.7	8.80	6.28	7.72

<sup>a</sup>  $n = 38$

<sup>b</sup>  $n = 65$

<sup>c</sup>  $N = 103$

#### 5.1.4 General Health Questionnaire

Excellent internal consistency of the GHQ total scale was obtained for the entire, asthmatic and non-asthmatic samples (see Table 17). The mean GHQ total severity score is also presented in Table 17. The inter-correlations between the GHQ subscales are presented in Table 18. It is interesting to note that the strongest significant association was between the anxiety/insomnia subscale and the somatisation subscale.

Table 17 Internal Consistency, Means (M) and Standard Deviations (SD) of the GHQ Total Score for the Total, Asthmatic and Non-asthmatic Samples

Sample	Total score		
	$\alpha$	<u>M</u>	<u>SD</u>
Normative (G. Goldberg, 1978)	.76	--	--
Non-asthmatic ( <u>n</u> = 38)	.85	19.84	7.87
Asthmatic ( <u>n</u> = 65)	.90	18.85	9.56
Total ( <u>N</u> = 103)	.88	19.21	8.94

Table 18 Inter-correlations between the GHQ Subscales

Subscale	1.	2.	3.	4.
1. Somatic complaints	--	.58****	.27**	.40****
2. Anxiety/insomnia		--	.32***	.34***
3. Social dysfunction			--	.26*
4. Depression				--
* $p < .01$	** $p = .005$	*** $p = .001$	**** $p < .001$	

Using bimodal scoring and a cut-off of 4/5 for the total GHQ score, as recommended by D. P. Goldberg and Hillier (1979), participants were classified as having either non-clinical or clinical levels of psychological adjustment problems. As seen in Table 19, a slightly smaller proportion of parents in the current study were classified with clinical levels of psychological problems compared to the normative sample. Interestingly, a larger proportion of parents within the

non-asthmatic sample were classified with clinical levels of problems than parents in the asthmatic sample.

Table 19 Proportion (Number) of Parents with Non-Clinical and Clinical Levels of Psychological Problems

Sample	Non-Clinical	Clinical
Normative ( $\underline{n}$ = 200) (G. Goldberg, 1978)	42.00 (84)	58.00 (116)
Non-asthmatic ( $\underline{n}$ = 38)	52.63 (20)	47.37 (18)
Asthmatic ( $\underline{n}$ = 65)	63.08 (41)	36.92 (24)
Total ( $\underline{N}$ = 103)	59.22 (61)	47.78 (42)

#### 5.1.5 Life Events Questionnaire

##### 5.1.5.1 *Number of life events and global stress*

Table 20 presents the mean number and standard deviations of life events reported by the non-asthmatic, asthmatic and total samples. Items pertaining to illness events (loss of health, long illness or disability) were excluded from the scale, as the baseline of life events within families with an asthmatic child was elevated compared to families with a non-asthmatic child. Thus, the original measure of life events was confounded by asthmatic status. Excluding these two items, possible scores on the total number of life events could range from 0 to 19. Overall, only 3.9% ( $\underline{n}$  = 4) of the sample reported no recent life events, while 33.0% ( $\underline{n}$  = 34) reported no life event with a negative impact within the past 12 months.

Table 20 Means (M) and Standard Deviations (SD) for the Life Events (Within Past 12 or More Months) for the Non-asthmatic, Asthmatic and Total Sample

Sample	Life events		Life events with negative effect	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
Non-asthmatic ( <u>n</u> = 38)	3.55	2.06	1.24	1.53
Asthmatic ( <u>n</u> = 65)	4.20	2.29	2.11	1.87
Total ( <u>N</u> = 103)	3.96	2.22	1.79	1.80

Responses to the global stress score ranged from 1 to 5, with increasing scores reflective of greater difficulty. The mean levels of global stress were 2.39 (SD = .76) for the non-asthmatic sample, 2.66 (SD = .85) for the asthmatic sample, and 2.56 (SD = .83) for the total sample. Frequency distributions are reported in Table 21.

Table 21 Percentage (Number) of Responses on the Global Stress Score for the Non-asthmatic Sample, Asthmatic Sample and Total Sample

Number of problems/stresses	Non-asthmatic ( <u>n</u> = 38)	Asthmatic ( <u>n</u> = 65)	Total ( <u>N</u> = 103)
None	7.89 (3)	0.00 (0)	2.91 (3)
A few	52.63 (20)	53.85 (35)	53.39 (55)
Some	31.58 (12)	30.77 (20)	31.07 (32)
Many	0.00 (0)	10.77 (7)	9.71 (10)
Very many	7.89 (3)	4.62 (3)	2.91 (3)

The life events scale and global stress score were moderately correlated (see Table 22). For two reasons, the measure of perception of global stress was selected over the life events scale for use in the main analyses: 1) the global stress score was less skewed than the life events scales; and 2) the life events scale relies heavily on retrospective recall and is therefore likely to be inaccurate, while the rating of global stress provides insight on parental perception of current life difficulty.

Table 22 Pearson *r* Correlations between the Life Events Scale and Global Stress Score (*N* = 103)

Variable	1.	2.	3.
1. Life events	—	.77*	.36*
2. Events with negative effect		—	.39*
3. Global stress			—

\**p* < .001

#### 5.1.5.2 Perceived coping

Responses to the perceived coping item could range from 1 to 5, with increasing scores reflective of better coping. The mean levels of perceived coping were 3.66 (*SD* = .63) for the non-asthmatic sample, 3.57 (*SD* = .71) for the asthmatic sample, and 3.60 (*SD* = .68) for the total sample. Frequency distributions are reported in Table 23.

Table 23 Percentage (Number) of Responses of Coping for the Non-asthmatic, Asthmatic and Total Samples

Rating	Non-asthmatic ( <i>n</i> = 38)	Asthmatic ( <i>n</i> = 65)	Total ( <i>N</i> = 103)
Not at all	0.0 (0)	0.0 (0)	0.0 (0)
A little	0.0 (0)	4.6 (3)	2.9 (3)
Fairly well	42.1 (16)	41.5 (27)	41.7 (43)
Very well	50.0 (19)	46.2 (30)	47.9 (49)
Extremely well	7.9 (3)	7.7 (5)	7.8 (8)

#### 5.1.6 Index of Social Support

The Index of Support Scale (Henderson et al., 1978) demonstrated excellent internal consistency for the entire sample ( $\alpha = .88$ ), asthmatic sample ( $\alpha = .88$ ), and non-asthmatic sample ( $\alpha = .87$ ). On average, the parents reported high levels of social support (Mean = 1.81, *SD* = 0.52, *N* = 103), with scores ranging from 1 to 4 (higher scores indicate less support). The

mean scores were 1.83 ( $SD = 0.55$ ,  $n = 65$ ) for parents of asthmatic children and 1.78 ( $SD = 0.47$ ,  $n = 38$ ) for parents of non-asthmatic children.

### 5.1.7 Asthma Severity and Management

#### 5.1.7.1 Functional severity of asthma

A measure of functional severity of asthma for each subject was obtained by summing parental responses on five individual items relating to symptoms of asthma. Alpha coefficients of internal consistency, means and standard deviations are reported in Table 24. Internal consistency for the asthmatic sample was very good, though lower than the normative sample. The poor internal consistency for the non-asthmatic sample reflected the low variability in item responses. The functional severity of asthma scale was positively skewed for the non-asthmatic sample and normally distributed for the asthmatic sample. Taken together, these results provide support for the use of the functional severity of asthma scale with the asthmatic, but not the non-asthmatic sample.

Table 24 Internal Consistency Coefficients ( $\alpha$ ), Means ( $M$ ) and Standard Deviations ( $SD$ ) for the Functional Severity of Asthma

Sample	$\alpha$	$M$	$SD$
Normative ( $N = 1,267$ ) (Rosier et al., 1994)	.89	--	--
Non-asthmatic ( $n = 38$ )	.32	0.97	1.28
Asthmatic ( $n = 65$ )	.72	8.12	4.84
Total ( $N = 103$ )	.84	5.49	5.23

#### 5.1.7.2 Physician severity rating

For the asthmatic sample, the physician rated the child's severity of asthma according to type of medication. Eight children were reported to have mild asthma and 57 to have moderate asthma. The mean level of functional severity of asthma was significantly higher for the group

of children with physician rated moderate asthma compared to children with physician rated mild asthma;  $t(63) = -2.25, p < .05$  (see Table 25).

Table 25 Means (M) and Standard Deviations (SD) of Functional Severity of Asthma for Children with Physician Rated Mild and Moderate Asthma

Asthma Severity	<u>M</u>	<u>SD</u>
Mild ( <u>n</u> = 8)	4.63	2.00
Moderate ( <u>n</u> = 57)	8.61	4.93

### 5.1.7.3 Asthma management

Frequencies of parental and physician perception of how well the child's asthma was managed is presented in Table 26. Pearson Chi Square Test of Independence indicated poor overlap between physician and parent rating of asthma management ( $\chi^2(8) = 9.23, p > .05$ ). However, the low frequency count in many cells limited the reliability of the test. To avoid the problem of low cell frequency counts, the data was collapsed into two categories: managed no more than half the time, and managed most of the time or completely managed. Fisher's Exact Test indicated good overall agreement ( $p = .24$ ; a  $p$  value  $> .05$  indicates significant agreement), with agreement between physician and parent perception regarding asthma management for 49 children, and disagreement for only 14 children (see Table 27).

Table 26 Frequency (%) of Perceived Asthma Management According to Parents and Physicians (N = 65)

Rating	Respondent	Physician
Poorly managed	0 (0.0%)	4 (6.2)
Managed less than half the time	0 (0.0%)	2 (3.1)
Managed half the time	6 (9.2%)	4 (6.2)
Managed most of the time	45 (69.2%)	18 (27.7)
Completely managed	14 (21.5%)	35 (53.8)
Missing data	--	2 (3.1)

Table 27 Frequency Counts for Physician Perception of Asthma Management by Parent Perception of Asthma Management ( $N = 63$ )

Physician rating	Parent Rating		Total
	Managed half the time or less	Managed at least most of the time	
Managed half the time or less	2	8	10
Managed at least most of the time	4	49	53
Total	6	57	63

Note. Physician rating missing for two subjects.

#### 5.1.8 Parental History of Asthma

Thirty-two (49.23%) of the asthmatic subjects and 8 (21.05%) of the non-asthmatic subjects had at least one parent who had been diagnosed with asthma at some point during their life. Fisher's Exact Test revealed that a greater proportion of the asthmatic sample had at least one parent who had been diagnosed with asthma at some point during their lifetime ( $p < .005$ ).

## 5.2 Correlates of Child Anxiety

This section presents analyses using the entire sample ( $N = 103$ ) relating to the following hypotheses:

1. Child somatisation is associated with child anxiety.
2. Parental history of overprotection is associated with child anxiety/somatisation.
3. Current protective parenting is associated with child anxiety/somatisation.
4. Parental overall adjustment is associated with child anxiety/somatisation.

### 5.2.1 Preliminary Analyses

#### 5.2.1.1 *Covariates*

This set of analyses was to determine whether child age, child gender, weekly number of hours in child care and family socioeconomic status needed to be specified as covariates in the main set of analyses where child anxiety or somatisation was the dependent variable. A significance level of .05 was used.

Details of analyses are reported in Appendix I. The analyses indicated a significant positive relationship, though of small magnitude (J. Cohen & Cohen, 1983), between child age and anxiety. Child age was therefore included as a covariate in analyses where anxiety was the dependent variable. No other variables needed to be specified as covariates in analyses with child anxiety or somatisation as the dependent variable.

#### 5.2.1.2 *Assumptions*

The measure of child anxiety was normally distributed but the measure of child somatisation demonstrated a positive skew. A transformation was not undertaken, as regression analyses only require normality of residuals, which was generally satisfied. Results of evaluation of assumptions of normality, linearity and homoscedasticity of the residuals on the variables for

the regression analyses predicting child anxiety and somatisation indicated minimal violations.

With the use of a criterion value of  $p < .001$  for Mahalanobis' distance (Tabachnick & Fidell, 1996), no multivariate outliers among the cases were identified. The assumption of normality of residuals was not violated. No suppressor variables were detected and there was no missing data.

## 5.2.2 Bivariate Analyses

### 5.2.2.1 Anxiety

Pearson  $r$  correlations were computed as a preliminary test of the relationships between child anxiety, parenting factors and parental overall adjustment (see Table 28). As expected, the correlation between child anxiety and parental history of being raised in an overprotective manner was significant and of moderate strength. There was a trend for an association between child anxiety and current protective parenting. However, child anxiety was not significantly associated with parental overall adjustment.

Table 28 Pearson  $r$  Correlation Coefficients between Past and Current Parenting Factors, Parental Overall Adjustment and Child Anxiety, Controlling for Child Age ( $N = 103$ ,  $df = 100$ )

Variable	1.	2.	3.	4.
1. Child anxiety	--	.34****	.18*	.10
2. Parental history of overprotection		--	.26***	.21**
3. Current protective parenting			--	.24***
4. Parental overall adjustment				--

\* $p = .067$

\*\* $p < .05$

\*\*\* $p = .01$

\*\*\*\* $p < .01$

### 5.2.2.2 Somatisation

Pearson  $r$  correlations were computed as a preliminary assessment of the relationships between child somatisation, parenting factors and parental overall adjustment (see Table 29). As child age was significantly associated with current protective parenting, it was also included as a covariate.

As hypothesised, child somatisation was significantly associated with parental history of being raised in an overprotective manner and parental overall adjustment (though the strength of the associations were weak). Contrary to the hypotheses, child somatisation was not significantly related to current protective parenting.

Table 29 Pearson  $r$  Correlation Coefficients between Past and Current Parenting Factors, Parental Overall Adjustment and Child Somatisation, Controlling for Child Age and Child Anxiety ( $N = 103$ ,  $df = 99$ )

Variable	1.	2.	3.	4.
1. Child somatisation	--	.25**	.03	.22**
2. Parental history of overprotection		--	.21**	.19*
3. Current protective parenting			--	.22**
4. Parental overall adjustment				--

\* $p = .06$

\*\* $p < .05$

### 5.2.3 Multivariate Analyses

It is possible that the interrelationships between the parental factors may have influenced the bivariate associations with child anxiety and somatisation. Thus, multiple regression analyses were performed to determine the association between each independent variable and child anxiety and somatisation, after controlling for the other independent variables in the analysis.

The regression Tables 30 and 31 display the regression coefficients ( $B$ ), standard error of the regression coefficients ( $SE\ B$ ), standardised regression coefficients ( $\beta$ ), the test statistic for each predictor ( $t$ ) and the associated significance level ( $p$ ).

### 5.2.3.1 *Anxiety*

The following variables were entered for the prediction of anxiety: child age (covariate), parental history of overprotection, parental overall adjustment and current protective parenting. Results of the regression analysis are presented in Table 30.

As a set, the parental variables explained a significant, though very modest, proportion of the variance in child anxiety ( $R^2 = .19$ ; Adjusted  $R^2 = .16$ ;  $F(4, 97) = 5.62$ ,  $p < .001$ ). Further support was provided for a relationship between parental history of being raised in an overprotective manner and child anxiety. Review of the standardised coefficients indicated that an increase in the degree to which the parent was raised in an overprotective manner was associated with an increase in child anxiety. In contrast to the bivariate analysis, there was no tendency for current protective parenting to be associated with child anxiety after controlling for the other variables. The independent contribution of parental adjustment was not significant.

Table 30 Summary of Multiple Regression Analysis for Variables Predicting Child Anxiety from Child Age, Parental History of Overprotection, Current Protective Parenting and Parental Overall Adjustment ( $N = 103$ )

Independent Variable	$B$	$SE\ B$	$\beta$	$t$	$p$
Child age (months)	.134	.042	.298	3.181	.002
History of overprotection	.197	.064	.297	3.100	.003
Current protective parenting	.007	.075	.096	0.976	.332
Parental adjustment	.0007	.053	.012	0.128	.899

### 5.2.3.2 *Somatisation*

As discussed in the literature review, somatisation may be reflective of anxiety in children. Child anxiety was therefore also included in the analysis for the prediction of child somatisation. This enabled the association between the parental variables and child somatisation to be assessed, after controlling for the variance in somatisation explained by the anxiety subscale. For the prediction of child somatisation, the variables were entered in

hierarchical fashion, with child anxiety entered at step 1 and the parental variables entered at step 2.

As a group, the independent variables accounted for a significant proportion of the variance in child somatisation ( $F(4, 98) = 15.80, p < .001; R^2 = .50; \text{Adjusted } R^2 = .42$ ). Results are presented in Table 31. Inclusion of child anxiety at step 1 reliably improved prediction of child somatisation ( $F_{\text{inc}}(1, 101) = 36.60, p < .001$ ). The direction of the standardised coefficient indicated that an increase in child anxiety corresponded to an increase in child somatisation. This provides some support for the assumption that child somatisation measures an aspect of anxiety.

The addition of the parental factors at step 2 also reliably improved prediction of child somatisation ( $F_{\text{inc}}(3, 98) = 3.61, p < .001$ ). Examination of the standardised coefficients indicated that an increase in the degree of parental history of overprotection corresponded to an increase in child somatisation. Importantly, post hoc analyses indicated that the association between parental history of overprotection and child somatisation was actually mediated by child anxiety. This result provides further support for the assumption that child somatisation is an expression of anxiety. Associated output is presented in Appendix J.

Contrary to the bivariate analysis (and hypothesis), parental overall adjustment was not associated with child somatisation in the multivariate analysis. It is noteworthy that subsequent analyses identified child asthmatic status to be a suppressor of the relationship between parental adjustment and child somatisation (see Appendix K). The independent contribution of current protective parenting was clearly non-significant.

The finding that the parental variables significantly improved prediction of child somatisation does not discredit the position that child somatisation is a reflection of child anxiety. Rather, child somatisation may be representative of an aspect of anxiety that is not completely represented by the anxiety subscale.

Table 31 Summary of Hierarchical Multiple Regression Analysis for Variables Predicting Child Somatisation from Child Anxiety, Parental History of Overprotection, Current Protective Parenting and Parental Overall Adjustment ( $N = 103$ )

Independent variable	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$\Delta R^2$
Step 1						.266**
Child anxiety	.3340	.055	.516	6.050	.000	
Step 2						.073*
Child anxiety	.2820	.056	.436	5.031	.000	
History of overprotection	.0090	.039	.209	2.320	.022	
Current protective parenting	-.0006	.042	-.012	-0.134	.894	
Parental overall adjustment	.0060	.031	.155	1.813	.073	

\* $p < .05$

\*\* $p < .001$

### 5.3 Correlates of Current Protective Parenting

This section presents analyses testing the following hypotheses:

1. Parental overall adjustment is associated with current protective parenting.
2. Parental history of overprotection is associated with current protective parenting.
3. Parental social support is associated with current protective parenting.
4. Global stress is associated with current protective parenting.
5. Parental coping is associated with current protective parenting.
6. Parental asthmatic status is associated with current protective parenting.

#### 5.3.1 Preliminary Analyses

##### 5.3.1.1 *Covariates*

Analyses were conducted to identify whether child age, child gender, birth order, number of siblings, parental age, socioeconomic status, weekly number of hours in child care, and number of hospital admissions needed to be specified as covariates in the main set of analyses. Results are reported in detail in Appendix I. Only child age was significantly associated with current protective parenting, and was therefore treated as a covariate when current protective parenting was the dependent variable.

##### 5.3.1.2 *Assumptions*

The measure of current protective parenting was normally distributed. Results of evaluation of assumptions of normality, linearity and homoscedasticity of the residuals on the variables for the analyses predicting current protective parenting indicated minimal violations. With the use of a criterion value of  $p < .001$  for Mahalanobis' distance, no multivariate outliers among the cases were found for the prediction of current protective parenting.

### 5.3.2 Bivariate Analyses

Pearson  $r$  correlations were computed to assess the relationship between current protective parenting and parental history of being raised in an overprotective manner, parental overall adjustment, global stress, coping and social support. Results are presented in Table 32. As hypothesised, current protective parenting was significantly associated with parental history of overprotection, parental overall adjustment, social support and global stress. However, the magnitude of each correlation was small. Parental perception of how they were coping was not associated with current levels of protective parenting.

Table 32 Pearson  $r$  Correlation Coefficients Between Current Protective Parenting and Parental and Social Factors, Controlling for Child Age ( $N = 103$ )

Variable	Current protective parenting
Parental history of overprotection	.26**
Parental overall adjustment	.24*
Global stress	.21*
Perceived coping	-.02
Social support	.24*

\* $p < .05$

\*\* $p = .01$

A one-way analysis of variance, controlling for child age, was conducted to test the hypothesis that parents diagnosed with asthma at some point in their life would report higher levels of current protective parenting than parents never diagnosed with asthma. Approximately 78% ( $n = 80$ ) of parents who completed the questionnaires reported never being diagnosed with asthma, whilst 22% ( $n = 23$ ) reported being asthmatic at some point in their life. The between-subjects variable was parental asthmatic diagnosis. Group means, standard errors of means and 95% confidence intervals for levels of current protective parenting are presented in Table 33.

Contrary to the hypothesis, there was no significant main effect between parental asthma diagnosis and protective parenting ( $F(1, 100) = 0.06, p > .10$ ). The assumption of homogeneity of variance was satisfied.

Table 33 Estimated Marginal Means (M), Standard Errors (SE M) and 95% Confidence Interval (CI) for Current Protective Parenting by Lifetime Parental Asthma Diagnosis, Controlling for Child Age (N = 103)

Parental asthma	<u>M</u>	<u>SE M</u>	95% CI	
			Lower Bound	Upper Bound
No ( <u>n</u> = 80)	29.72	0.73	28.28	31.16
Yes ( <u>n</u> = 23)	30.09	1.35	27.41	32.78

### 5.3.3 Multivariate Analyses

As reported in the descriptive statistics, the independent variables are significantly inter-correlated, thus possibly influencing the relationships with current protective parenting. Multiple regression analyses were used to conduct a more stringent test of the hypotheses.

The following variables were entered as predictors of current protective parenting: child age (covariate), parental history of overprotection, parental overall adjustment, global stress and social support. Parental history of asthma was not entered as a predictor, as its association with current protective parenting was clearly insignificant. Non-inclusion of this variable also assisted in maintaining statistical power.

Results are presented in Table 34. As a set, the predictors accounted for a significant proportion of the variance in current protective parenting ( $F(6, 96) = 3.15, p < .01; R^2 = .16$ ; Adjusted  $R^2 = .11$ ). The degree to which the parent was raised in a protective manner was uniquely associated with levels of current protective parenting. However, after controlling for the other predictors, neither parental overall adjustment, social support, global stress nor coping were significantly associated with current protective parenting.

Table 34 Summary of Regression Analysis for Variables Predicting Current Protective Parenting ( $N = 103$ )

Independent Variable	$B$	$SE\ B$	$\beta$	$t$	$p$
Child age (months)	-0.107	.056	-.180	-1.897	.061
History of overprotection	0.172	.086	.196	1.994	.049
Parental adjustment	0.009	.085	.119	1.024	.308
Social support	0.010	.102	.118	0.974	.332
Global stress	0.717	.858	.090	0.835	.406
Coping	1.098	.992	.113	1.107	.271

## 5.4 Correlates of Parental Overall Adjustment

This section presents analyses testing the following hypotheses:

1. Parental history of overprotection is associated with parental overall adjustment.
2. Social support is associated with parental overall adjustment.
3. Global stress is associated with parental overall adjustment.
4. Coping is associated with parental overall adjustment.
5. Parental asthmatic status is associated with parental overall adjustment.

### 5.4.1 Preliminary Analyses

#### 5.4.1.1 *Covariates*

Analyses indicated no need to specify socioeconomic status or parental age as covariates in the main set of analyses, when parental overall adjustment was the dependent variable (see Appendix D).

#### 5.4.1.2 *Assumptions*

The measure of parental overall adjustment demonstrated a slight positive skew. Transformation was not conducted, as the skew was considered to reflect the general population. Results of evaluation of assumptions of normality, linearity and homoscedasticity of the residuals on the variables for the analyses predicting parental overall adjustment indicated minimal violations. With the use of a criterion value of  $p < .001$  for Mahalanobis' distance, no multivariate outliers among the cases were found for the parental overall adjustment.

### 5.4.2 Bivariate Analyses

Pearson  $r$  correlations were initially computed to assess the relationship between degree of parental overall adjustment and parental history of being raised in an overprotective manner, social support, global stress and coping. Results are presented in Table 35.

Preliminary support was provided for the hypotheses. Though of small magnitude, parental history of overprotection was significantly correlated with parental overall adjustment. The significant correlations between parental overall adjustment and global stress, and parental overall adjustment and coping were of moderate magnitude. (A higher coping rating was indicative of *better* coping. Thus, the *negative* correlation between coping and parental adjustment was in the expected direction.) There was a large correlation between social support and overall adjustment.

Table 35 Pearson  $r$  Correlation Coefficients Between Parental History of Overprotection, Global Stress, Coping Social Support and Parental Overall Adjustment ( $N = 103$ )

Independent Variables	Parental overall adjustment
Parental history of overprotection	.21*
Global stress	.44***
Coping	-.29**
Social support	.54***

\* $p < .05$

\*\* $p < .005$

\*\*\* $p < .001$

Independent samples  $t$ -tests were conducted to determine whether parental overall adjustment was associated with parental history of asthma. Group means, standard deviations and 95% confidence intervals for levels of parental overall adjustment and anxiety are presented in Table 36. No significant group differences emerged ( $t(101) = -0.13$ ,  $p > .05$ ). The assumption of homogeneity of variance was satisfied.

Table 36 Means (M), Standard Deviations (SD) and Standard Errors of Mean (SE M) for Parental Overall Adjustment by Lifetime Parental Asthma Diagnosis (N = 103)

Parental asthmatic status	<u>M</u>	<u>SD</u>	<u>SE M</u>
No ( <u>n</u> = 80)	19.15	9.38	1.05
Yes ( <u>n</u> = 23)	19.43	7.42	1.55

### 5.4.3 Multivariate Analyses

The intercorrelations between parental history of overprotection, global stress, coping and social support may have influenced the relationships with parental overall adjustment. Thus, multiple regression analyses were subsequently performed to provide a more stringent test of the hypotheses.

The following variables were entered as predictors: parental history of overprotection, global stress, coping and social support. As the bivariate association between parental history of asthma and parental overall adjustment was clearly non-significant, it was not entered as a predictor. Non-inclusion of this variable also assisted in maintaining statistical power.

As a set, the predictors accounted for a significant proportion of the variance in overall adjustment ( $F(4, 98) = 13.22, p < .001; R^2 = .35; \text{Adjusted } R^2 = .32$ ). As hypothesised, global stress and social support remained significantly associated with parental overall adjustment, after controlling for the other independent variables (see Table 37). The standardised beta coefficients indicate that an increased level of global stress and a reduction in perceived social support were uniquely related to poorer parental overall adjustment. Parental history of overprotection and perceived coping were not uniquely associated with parental overall adjustment.

Table 37 Summary of Regression Analysis for Variables Predicting Parental Overall Adjustment from Parental History of Overprotection, and Global Stress, Coping and Social Support ( $N = 103$ )

Independent Variable	<u>B</u>	<u>SE B</u>	$\beta$	<u>T</u>	<u>p</u>
Parental overprotection	0.004	0.102	.035	0.406	.686
Global stress	2.605	0.980	.240	2.658	.009
Perceived coping	-1.005	1.170	-.076	-0.858	.393
Social support	0.458	0.111	.401	4.140	.000

### 5.5 Indirect Relationships between Psychosocial Variables and Child Anxiety

This section extends the previously reported analyses to assess hypothesised mediators and moderators. R. M. Baron and Kenny (1986) have outlined four criteria that need to be fulfilled for a variable to fully mediate between an independent and dependent variable. The strongest demonstration for a mediator is the fulfillment of conditions 1 to 4. Fulfillment of conditions 1 to 3 indicates a partial mediation. The conditions stipulated by R. M. Baron and Kenny, and the statistical techniques used to analyse each condition, are presented in Table 38. To establish evidence for condition 1, 2 and 3, an alpha level of .05 is used. A more conservative alpha level of .01 is used to establish evidence for the fourth condition, in order to compensate for the experiment wise error rate associated with a multiple number of regression analyses (Tabachnick & Fidell, 1996).

Table 38 Conditions and Corresponding Statistical Analysis for Assessment of a Mediation Model

Condition	Statistical analysis
C1. Variations in the IV significantly accounts for variations in the MV.	Multiple regression analysis: MV is treated as the dependent variable. IV is treated as the independent variable.
C2. Variations in the MV significantly accounts for variations in the DV.	Hierarchical regression analysis, assessed in conjunction with C4 at step 1: DV is treated as the dependent variable. MV is treated as the independent variable.
C3. Variations in the IV significantly accounts for variations in the DV.	Multiple regression analysis: DV is treated as the dependent variable. IV is treated as the independent variable.
C4. Variations in the IV <i>does not</i> significantly account for variations in the DV, <i>after</i> controlling for the MV.	Hierarchical regression analysis, assessed in conjunction with C3 at step 2: DV is treated as the dependent variable. MV is treated as the independent variable, entered at step 1. IV is treated as the independent variable, entered at step 2.

Note. IV = independent variable. DV = dependent variable. MV = mediating variable.

The assessment of a moderator is achieved through use of regression analysis, which includes three predictors: the independent variable, the hypothesised moderating variable, and an interaction term between the independent and moderating variables. First centering each variable and then multiplying them together creates the interaction term. Centering of the variables reduces multicollinearity between the product terms and its constituents. A significant interaction term indicates a moderating relationship. The direction of a moderating relationship is established by using the following procedure:

- i. Convert the independent variable to a z score for each subject.
- ii. Use the standardised independent variable and standardised beta coefficients to derive the equation representing the relationship between the independent and dependent variable, with the moderator set at various levels. Specifically, the equation is computed when the moderator is:
  - a. Below average (i.e. moderator = -1)
  - b. Average (i.e. moderator = 0)
  - c. Above average (i.e. moderator = +1)
- iii. Set variables in the equation not relevant to the interaction term to zero.
- iv. Graph the relationship between the standardised independent variable and the dependent variable (derived from the equation) at the various levels of the moderator.

### 5.5.1 Indirect Correlates of Child Anxiety

The statistical output for the assessment of the hypotheses is presented in Appendix L, M and N. The output includes regression coefficients ( $B$ ), standard error of the regression coefficients ( $SE\ B$ ), standardised regression coefficients ( $\beta$ ), the test statistic for the set of predictors ( $F$ ), the test for each predictor ( $t$ ), associated significance levels ( $p$ ) and the proportion of variance explained by the predictors added into the regression equation ( $R^2$ ).

#### 5.5.1.1 *The mediating role of parental adjustment*

The following hypotheses were assessed:

1. Parental overall adjustment mediates the relationship between parental history of overprotection and child anxiety/somatisation.
2. Parental overall adjustment mediates the relationship between social support and child anxiety/somatisation.
3. Parental overall adjustment mediates the relationship between global stress and child anxiety/somatisation.
4. Parental overall adjustment mediates the relationship between parental coping and child anxiety/somatisation.

The statistical output for the assessment of the hypotheses is presented in Appendix L. Figures 2 and 3 provide a summary of the assessment of parental overall adjustment as a mediator between the set of parental and social variables (parental history of overprotection, social support, global stress and parental coping) and child anxiety and somatisation. The figures include the proportion of variance explained in the dependent variable for each condition assessed ( $R^2$ ). Fully or partially mediated models are indicated with bold arrows.

Condition 2 for the assessment of parental overall adjustment as a mediator between the parental/social factors and child anxiety was not satisfied. Discussion of the other pathways is therefore redundant.

Analyses indicated that conditions 1, 2, 3 and 4 for establishing parental overall adjustment as a mediator between the set of parental/social factors and child somatisation were satisfied. Multiple regression analysis indicated that as a group, parental history of overprotection, social support, global stress and coping explained a significant proportion of the variance in parental overall adjustment. Review of the standardised beta coefficients indicated that only social support ( $\beta = .40, p < .001$ ) and global stress ( $\beta = .24, p < .01$ ) were significant contributors to parental overall adjustment (possibly due to the inter-relationships between the predictors). Thus condition 1 was satisfied for the set of parental/social variables, and more specifically for parental social support and global stress.

Step 1 of the hierarchical regression analysis revealed that parental overall adjustment explained a significant proportion of the variance in child somatisation, even after controlling for child anxiety, thus satisfying condition 2.

Multiple regression analysis indicated that, as a group, the parental/social factors significantly predicted child somatisation (after controlling for child anxiety). However, review of the standardised coefficients indicated that none of the predictors were uniquely associated with child somatisation. Thus condition 3 was satisfied for the set of variables only.

Condition 4 was assessed at step 2 of the hierarchical regression analysis. As a group, the set of variables were no longer significantly associated with child somatisation after controlling for parental overall adjustment (and child anxiety). Furthermore, review of the standardised coefficients indicated that none of the independent variables remained uniquely associated with child somatisation after controlling for parental overall adjustment. Thus condition 4 was satisfied.

Taken together, these results imply that parental overall adjustment mediates the relationship between the set of parental/social variables and child somatisation. However, examination of the individual pathways does not provide support for parental overall adjustment as a mediator between any specific independent variable (parental history of overprotection, social support, global stress, coping) and child somatisation. This may partly be due to child anxiety mediating the relationships between some of the parental variables and child somatisation (see Appendix J).

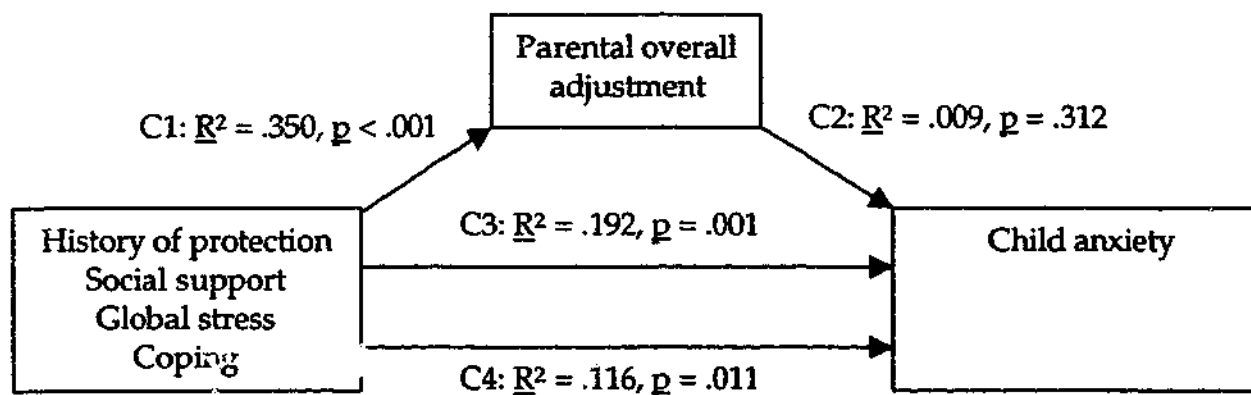


Figure 2 Assessment of conditions for parental overall adjustment as a mediator between the set of parental and social factors and child anxiety

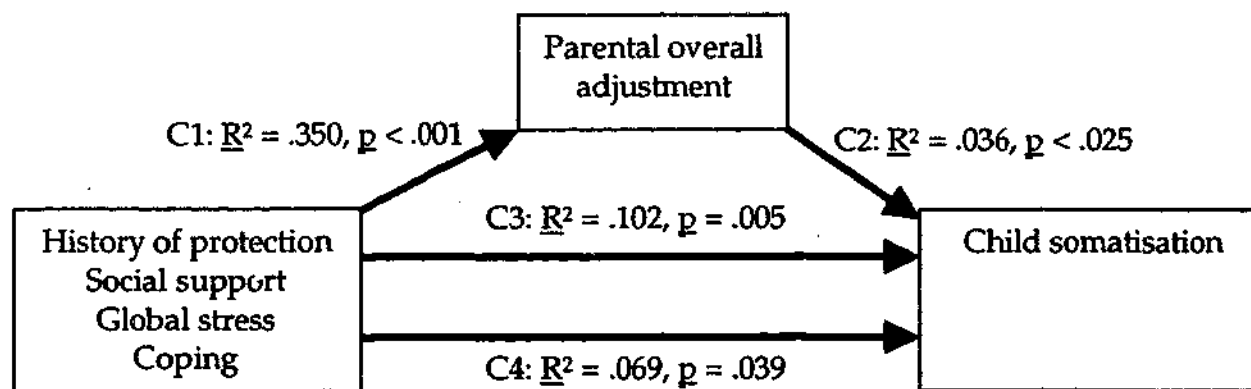


Figure 3 Assessment of conditions for parental overall adjustment as a mediator between the set of parental and social factors and child somatisation

#### 5.5.1.2 The mediating role of current protective parenting

This section presents analyses on the following hypotheses:

1. The relationship between parental history of overprotection and child anxiety/somatisation is mediated by current protective parenting.
2. The relationship between parental overall adjustment and child anxiety/somatisation is mediated by current protective parenting.
3. The relationship between social support and child anxiety/somatisation is mediated by current protective parenting.

4. The relationship between global stress and child anxiety/somatisation is mediated by current protective parenting.
5. The relationship between parental coping and child anxiety/somatisation is mediated by current protective parenting.

The statistical output for the assessment of the hypotheses is presented in Appendix M. Figures 4 and 5 provide a summary of the assessment of current protective parenting as a mediator between the set of parental and social variables (parental history of overprotection, parental overall adjustment, social support, global stress and parental coping) and child anxiety and somatisation. The figures include the proportion of variance explained in the dependent variable for each condition assessed ( $R^2$ ).

Condition 1 was satisfied for the set of the independent variables. Review of the standardised coefficients indicated parental history of overprotection explained a significant proportion of the variance in current protective parenting ( $\beta = .20$ ,  $p = .049$ ). The other independent variables did not explain a unique proportion of the variance in current protective parenting. It is noteworthy that the inclusion of the social factors precluded a significant association between parental adjustment and current protective parenting.

With respect to condition 2, the independent contribution of current protective parenting to both child anxiety and somatisation was not significant. Thus, condition 2 was violated. Discussion of the other pathways is therefore redundant. Current protective parenting did not mediate the relationship between the set of parental/social variables and child anxiety or somatisation.

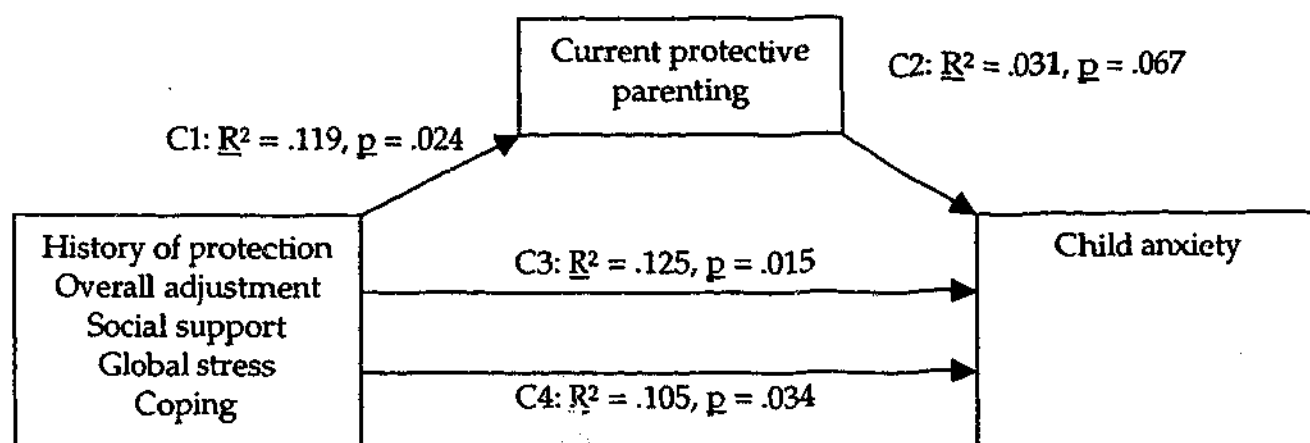


Figure 4 Assessment of conditions for current protective parenting as a mediator between the set of parental and social factors and child anxiety

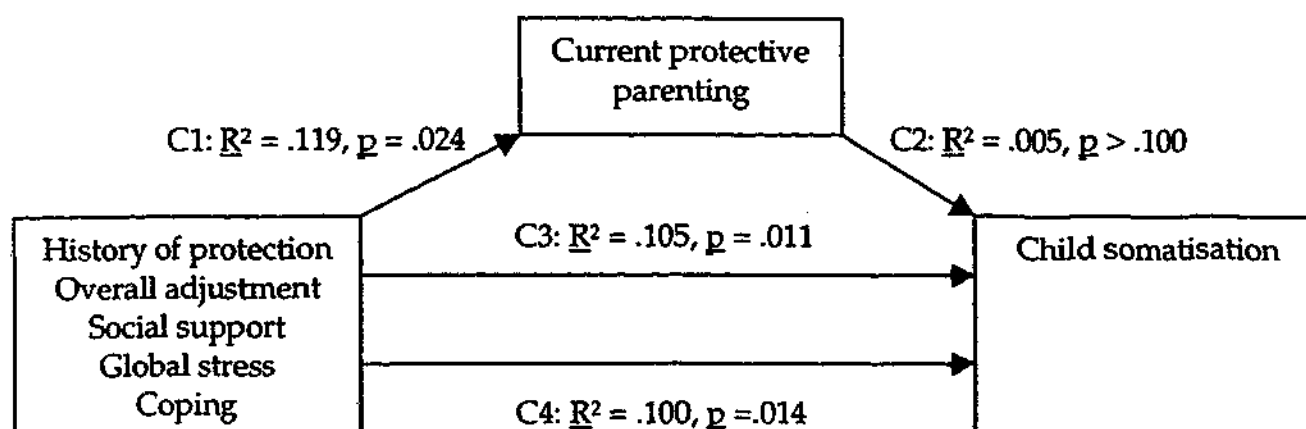


Figure 5 Assessment of conditions for current protective parenting as a mediator between the set of parental and social factors and child somatisation

#### 5.5.1.3 *The moderating role of social support*

Following the procedure outlined at the outset of this section, the following hypothesis was assessed:

1. Social support moderates the relationship between parental history of overprotection and child anxiety/somatisation.

The statistical output of the regression analysis is presented in Appendix N. Overall, the model predicting child anxiety was significant;  $F(4, 98) = 5.47, p < .001; R^2 = .18$ ; Adjusted  $R^2 = .15$ . As reported in previous analyses, parental history of overprotection explained a significant proportion of the variance in child anxiety ( $\beta = .32, p < .005$ ), whilst social support did not ( $\beta = -.03, p > .10$ ). The interaction term was not significant ( $\beta = .05, p > .10$ ), indicating that social support did not moderate the relationship between parental history of overprotection and child anxiety.

Overall, the model predicting child somatisation was significant;  $F(4, 98) = 14.92, p < .001; R^2 = .38$ ; Adjusted  $R^2 = .35$ . As hypothesised, social support moderated the relationship between parental history of overprotection and child somatisation (both before and after controlling for child anxiety);  $\beta = .21, p < .05$ . The interaction, depicted in Figure 6, demonstrates that the relationship between parental history of overprotection and child somatisation strengthens

with reducing levels of social support. The computation for deciphering the moderating effect of social support is presented in Appendix N.

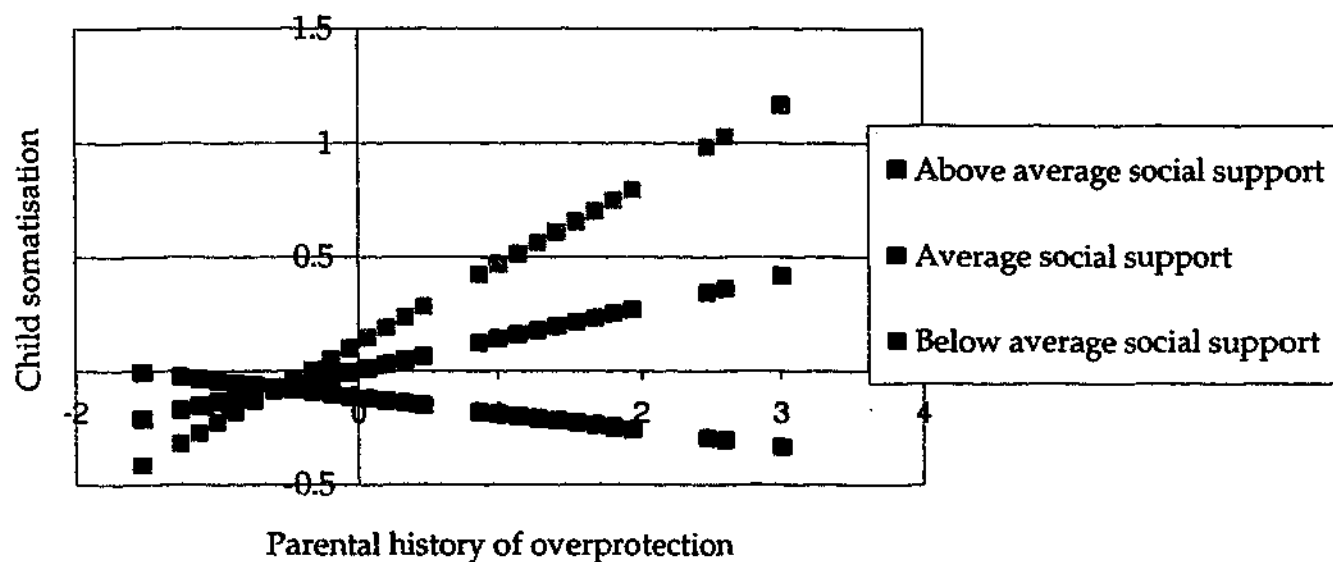


Figure 6 Scatterplot of the relationship between parental history of overprotection and child somatisation by social support

### 5.5.2 Indirect Correlates of Current Protective Parenting

The statistical output for the assessment of the hypotheses is presented in Appendix O and P. The output includes regression coefficients ( $B$ ), standard error of the regression coefficients ( $SE$   $B$ ), standardised regression coefficients ( $\beta$ ), the test statistic for the set of predictors ( $F$ ), the test for each predictor ( $t$ ), associated significance levels ( $p$ ) and the proportion of variance explained by the predictors added into the regression equation ( $R^2$ ).

#### 5.5.2.1 The mediating role of parental overall adjustment

This section presents analyses related to the following hypotheses:

1. The relationship between parental social support and current protective parenting is mediated by parental overall adjustment.
2. The relationship between global stress and current protective parenting is mediated by parental overall adjustment.

3. The relationship between parental coping and current protective parenting is mediated by parental overall adjustment.

The statistical output for the assessment of the hypotheses is presented in Appendix O. Figure 7 provides a summary of the assessment of parental overall adjustment as a mediator between the set of social variables (social support, global stress and parental coping) and current protective parenting. The figure depicts the proportion of variance explained in the dependent variables for each condition assessing a mediating relationship ( $R^2$ ).

Analyses indicated that conditions 1, 2, 3 and 4 for establishing parental overall adjustment as a mediator between the set of social factors and current protective parenting were satisfied. Multiple regression analysis indicated that as a group, social support, global stress and coping explained a significant proportion of the variance in parental overall adjustment. Specifically, social support ( $\beta = .41, p < .001$ ) and global stress ( $\beta = .24, p < .01$ ) made unique contributions to the prediction of parental overall adjustment. Thus condition 1 was satisfied for the set of parental/social variables, and more specifically for social support and global stress.

Step 1 of the hierarchical regression analysis revealed that parental overall adjustment explained a significant proportion of the variance in current protective parenting, thus satisfying condition 2.

Multiple regression analysis indicated that, as a group, the social factors significantly predicted current protective parenting. However no variable made a unique contribution. Thus condition 3 was satisfied for the set of variables only.

Condition 4 was assessed at step 2 of the hierarchical regression analysis. As a group, the set of variables were no longer significantly associated with current protective parenting after controlling for parental overall adjustment. Thus, condition 4 was fulfilled. It is noteworthy that at the final step, parental overall adjustment no longer made a significant contribution to explaining the variance in current protective parenting. This result was due to the strong inter-relationships between parental overall adjustment and the social factors.

Taken together, these results imply that parental overall adjustment mediates the relationship between the set of social variables and current protective parenting. However, examination of the individual pathways does not provide support for parental overall adjustment as a

mediator between any *specific* independent variable (social support, global stress, coping) and current protective parenting.

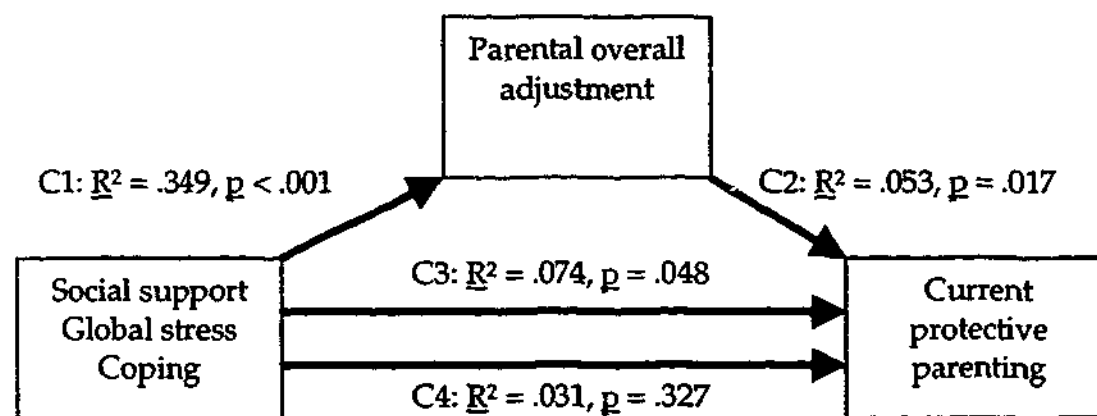


Figure 7 Assessment of conditions for parental overall adjustment as a mediator between the set of social factors and current protective parenting

### 5.5.2.2 The moderating role of social support

The following hypotheses were assessed:

1. Social support moderates the relationship between parental history of overprotection and levels of current protective parenting.
2. Social support moderates the relationship between parental overall adjustment and current protective parenting.
3. Social support moderates the relationship between global stress and current protective parenting.

Statistical output for the assessment of each hypothesis is presented in Appendix P. No support was found for the hypotheses. Using the criteria stipulated at the outset of model testing, regression analyses were conducted for each hypothesis. None of the interaction terms were significant: parental history of overprotection  $\times$  social support ( $\beta = .01$ ,  $p > .10$ ), parental overall adjustment  $\times$  social support ( $\beta = .05$ ,  $p > .10$ ), global stress  $\times$  social support ( $\beta = -.02$ ,  $p > .10$ ), and parental coping  $\times$  social support ( $\beta = .03$ ,  $p > .10$ ).

### 5.5.3 Indirect Correlates of Parental Overall Adjustment

The statistical output for the assessment of the hypotheses is presented in Appendix Q and R. The output includes regression coefficients ( $B$ ), standard error of the regression coefficients ( $SE\ B$ ), standardised regression coefficients ( $\beta$ ), the test statistic for the set of predictors ( $F$ ), the test for each predictor ( $t$ ), associated significance levels ( $p$ ) and the proportion of variance explained by the predictors added into the regression equation ( $R^2$ ).

#### 5.5.3.1 *The mediating role of social support*

This section presents analyses of the following hypotheses:

1. Social support mediates the relationship between parental history of overprotection and parental overall adjustment.
2. Social support mediates the relationship between global stress and parental overall adjustment.
3. Social support mediates the relationship between coping and parental overall adjustment.

The statistical output for the assessment of the hypotheses is presented in Appendix Q. Figure 8 provides a summary of the assessment of social support as a mediator between the set of parental and social variables (parental history of overprotection, global stress and parental coping) and parental overall adjustment. The figure includes the proportion of variance explained in the dependent variables for each condition assessed ( $R^2$ ).

Analyses indicated that conditions 1, 2 and 3 for establishing social support as a mediator between the set of parental/social factors and parental overall adjustment were satisfied. Multiple regression analysis indicated that as a group, parental history of overprotection, global stress and coping explained a significant proportion of the variance in social support. Review of the standardised beta coefficients indicated that global stress ( $\beta = .33, p < .001$ ) and coping ( $\beta = -.28, p < .005$ ) made unique contributions to the prediction of social support, whilst parental history of overprotection did not ( $\beta = .06, p > .05$ ). Thus, condition 1 was satisfied for the set of parental/social variables, and more specifically for global stress and coping.

Step 1 of the hierarchical regression analysis revealed that social support explained a significant proportion of the variance in parental overall adjustment, thus satisfying condition 2.

Multiple regression analysis indicated that, as a group, the social factors significantly predicted parental overall adjustment, with global stress ( $\beta = .37, p < .001$ ) and coping ( $\beta = -.19, p < .05$ ) making unique contributions. Thus, condition 3 was satisfied for the set of variables, and more specifically for global stress and coping.

Condition 4 was assessed at step 2 of the hierarchical regression analysis. As a group, the set of variables were no significantly associated with parental overall adjustment after controlling for social support (as previously stipulated, an alpha level of .01 is used for condition 4). Thus, condition 4 was satisfied for the set of variables. Specifically, parental coping was no longer associated with parental overall adjustment after controlling for social support ( $\beta = -.76, p > .10$ ). However, global stress remained uniquely associated with parental overall adjustment after controlling for social support ( $\beta = -.24, p < .01$ ).

Taken together, these results imply that social support partially mediates the relationship between the set of parental/social variables and parental overall adjustment. More specifically, social support is a partial mediator between global stress and parental overall adjustment and a full mediator between parental coping and parental overall adjustment.

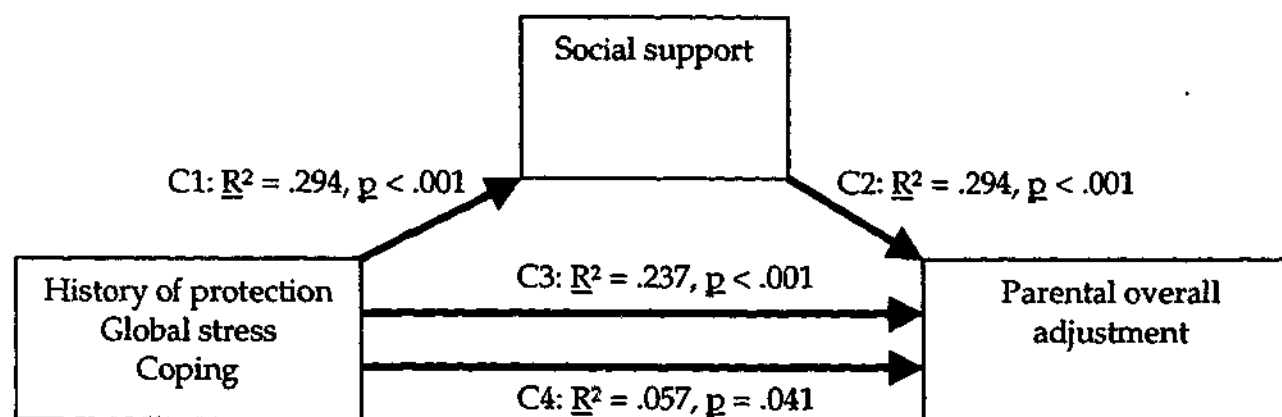


Figure 8 Assessment of conditions for social support as a mediator between the set of parental/social factors and parental overall adjustment

### 5.5.3.2 *The moderating role of social support*

Following the procedure outlined at the outset of this section, the following hypotheses were assessed:

1. Social support moderates the relationship between parental history of overprotection and parental overall adjustment.
2. Social support moderates the relationship between global stress and parental overall adjustment.
3. Social support moderates the relationship between perceived coping and parental overall adjustment.

The statistical output for the assessment of the hypotheses is presented in Appendix R. Overall, the model including parental history of overprotection, social support and the interaction between these variables as predictors, accounted for a significant proportion of the variance in parental overall adjustment;  $F(3, 99) = 18.55, p < .001; R^2 = .36; \text{Adjusted } R^2 = .34$ . The interaction term was significant ( $\beta = .27, p < .005$ ), indicating that social support moderated the relationship between parental history of overprotection and parental overall adjustment.

The interaction, depicted in Figure 9, demonstrates that the relationship between parental history of overprotection and parental overall adjustment strengthens with reducing levels of social support. In other words, above average levels of social support appears to buffer the potentially adverse impact of a history of overprotection on adult adjustment. The computation for deciphering the moderating effect of social support is presented in Appendix R.

The hypotheses that social support moderates the relationships between global stress and parental overall adjustment and coping and parental overall adjustment were not supported.

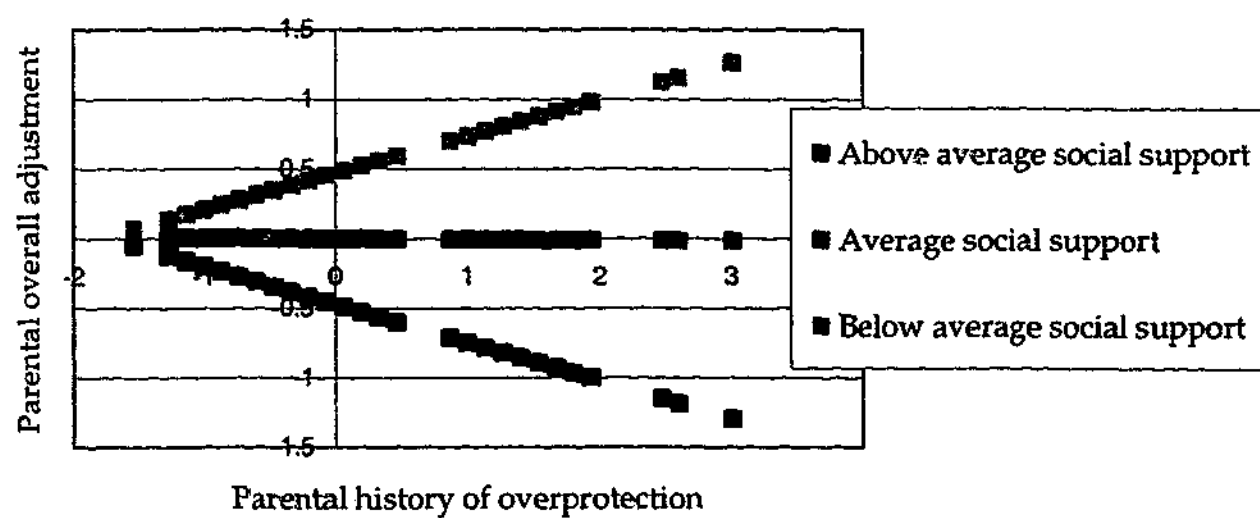


Figure 9 Scatterplot of the relationship between parental history of overprotection and parental overall adjustment by social support

## 5.6 Asthma and Child Anxiety

This section presents analyses of the relationship between childhood asthma and anxiety/somatisation using the entire sample ( $N = 103$ ) and the asthmatic sample only ( $n = 65$ ). The following hypotheses were assessed:

1. Children with asthma will have higher levels of anxiety than children without asthma ( $N = 103$ ).
2. Child asthmatic status is associated with child anxiety after controlling for the parental and social factors ( $N = 103$ ).
3. Asthma severity is associated with child anxiety and somatisation ( $n = 65$ ).

### 5.6.1 Preliminary Analyses

#### 5.6.1.1 *Covariates for the asthmatic sample ( $n = 65$ )*

Preliminary analyses were conducted to determine whether child age, child gender, hours in child care (per week) and family socioeconomic status needed to be specified as covariates in the main set of analyses where child anxiety or somatisation was the dependent variable. A significance level of .05 was used.

Details of analyses are reported in Appendix S. There was a significant moderate correlation between child age and anxiety. Child age was therefore included as a covariate in analyses where anxiety was the dependent variable. Family SES was significantly correlated with child somatisation and was also treated as a covariate. No other variables needed to be specified as covariates for analyses using only the asthma sample.

#### 5.6.1.2 *Assumptions for asthmatic sample ( $n = 65$ )*

The measures of child anxiety and somatisation were normally distributed. Results of evaluation of assumptions of normality, linearity and homoscedasticity of the residuals on the variables for the analyses predicting child anxiety and somatisation indicated minimal violations. With the use of a criterion value of  $p < .001$  for Mahalanobis' distance, no

multivariate outliers among the cases were identified. The assumption of normality of residuals was not violated.

## 5.6.2 Bivariate Analyses

### 5.6.2.1 Asthmatic status and levels of anxiety and somatisation ( $N = 103$ )

#### 5.6.2.1.1 Anxiety

Analysis of variance, controlling for child age, was used to determine whether children with asthma were perceived to have higher levels of anxiety. The between-subjects variable was child asthmatic status.

Group means, standard errors of means and 95% confidence intervals for levels of child anxiety are presented in Table 39. Statistical output is presented in Appendix T. The main effect between child asthmatic status and child anxiety was significant ( $F(1, 100) = 4.42, p < .05$ ), with the adjusted mean level of anxiety significantly higher among children with asthma. The assumption of homogeneity of variance was satisfied.

Table 39 Estimated Marginal Means ( $\bar{M}$ ), Standard Errors of Means ( $SE \bar{M}$ ) and 95% Confidence Interval (CI) for Child Anxiety by Child Asthmatic Status, Controlling for Child Age ( $N = 103$ )

Child asthmatic status	$\bar{M}$	$SE \bar{M}$	95% CI	
			Lower Bound	Upper Bound
Non-asthmatic ( $n = 38$ )	6.58	.77	5.06	8.10
Asthmatic ( $n = 65$ )	8.60	.59	7.44	9.76

#### 5.6.2.1.2 Somatisation

Analysis of variance, controlling for child anxiety, was used to determine whether children with asthma were perceived to have higher levels of somatisation. The between-subjects variable was child asthmatic status.

Group means, standard errors of means and 95% confidence intervals for levels of child anxiety and somatisation are presented in Table 40. Statistical output is presented in Appendix T. The main effect between child asthmatic status and child somatisation, after controlling for child anxiety, was highly significant ( $F(1, 100) = 18.52, p < .001$ ), with the adjusted mean level of somatisation significantly higher among children with asthma. The assumption of homogeneity of variance was satisfied.

Table 40 Estimated Marginal Means (M), Standard Errors of Means (SE M) and 95% Confidence Interval (CI) for Child Somatisation by Child Asthmatic Status, Controlling for Child Anxiety

Child asthmatic status	<u>M</u>	<u>SE M</u>	95% CI	
			Lower Bound	Upper Bound
Non-asthmatic ( $n = 38$ )	2.22	.42	1.39	3.06
Asthmatic ( $n = 65$ )	4.52	.32	3.88	5.15

#### 5.6.2.2 Severity of asthma ( $n = 65$ )

##### 5.6.2.2.1 Anxiety

A Pearson  $r$  correlation, controlling for child age, provided no support for the hypothesis that parental reports of functional severity of asthma were associated with child anxiety ( $r = -.05, p > .05, n = 65$ ). Also, independent samples  $t$ -tests revealed that the level of anxiety among children with physician-rated mild asthma did not significantly differ from the level of anxiety among children with physician rated moderate asthma ( $t(63) = -.84, p > .05$ ). Statistical output is presented in Table 41.

Table 41 Means (M), Standard Deviations (SD) and Standard Errors of Mean (SE M) for Levels of Anxiety among Children with Physician-Rated Mild or Moderate Asthma

Asthma severity	<u>M</u>	<u>SD</u>	<u>SE M</u>
Mild ( <u>n</u> = 8)	7.13	4.73	1.67
Moderate ( <u>n</u> = 57)	8.84	5.50	0.73

#### 5.6.2.2.2 Somatisation

As hypothesised, Pearson  $r$  correlation indicated a significant relationship between functional severity of asthma and somatisation ( $r = .32$ ,  $p < .05$ ,  $n = 65$ ). This relationship strengthened after controlling for the impact of anxiety on somatisation ( $r = .46$ ,  $p < .001$ ,  $n = 65$ ).

However, contrary to the hypothesis, independent samples  $t$ -test did not indicate a significant difference in the level of somatisation among children with physician-rated mild asthma compared to children with physician-rated moderate asthma ( $t(63) = -1.58$ ,  $p > .05$ ). Statistical output is presented in Table 42.

Table 42 Means (M), Standard Deviations (SD) and Standard Errors of Mean (SE M) for Levels of Somatisation among Children with Physician-Rated Mild or Moderate Asthma

Asthma severity	<u>M</u>	<u>SD</u>	<u>SE M</u>
Mild ( <u>n</u> = 8)	3.00	2.78	.98
Moderate ( <u>n</u> = 57)	4.98	3.38	.45

#### 5.6.3 Multivariate Analyses

Hierarchical regression analyses were used to provide a more stringent test of the hypothesis that asthma severity is associated with child anxiety and somatisation. Tables 43, 44, 45 and 46 display the regression coefficients (B), standard error of the regression coefficients (SE B), standardised regression coefficients ( $\beta$ ),  $t$  values, significance levels and the proportion of

variance in child anxiety/somatisation explained by the set of predictors added at each step ( $\Delta R^2$ ).

### 5.6.3.1 Asthmatic status ( $N = 103$ )

#### 5.6.3.1.1 Anxiety

The following variables were entered at step 1 for the prediction of anxiety: child age, parental history of overprotection, parental overall adjustment and current protective parenting. Child asthmatic status was entered at step 2. This analysis indicated that as a group the independent variables accounted for a significant proportion of the variance in child anxiety ( $F(5, 97) = 4.90$ ,  $p < .001$ ;  $R^2 = .20$ ; Adjusted  $R^2 = .16$ ). However, the addition of child asthmatic status at step 2 did not reliably improve prediction of child anxiety ( $F_{inc}(1, 97) = 1.66$ ,  $p > .05$ ). Results are displayed in Table 43.

Table 43 Summary of Regression Analysis for Variables Predicting Child Anxiety from Child Age, Parental History of Overprotection, Current Protective Parenting, Parental Overall Adjustment and Asthmatic Status ( $N = 103$ )

Independent variable	B	SE B	$\beta$	t	p	$\Delta R^2$
Step 1						.188*
Child age (months)	.134	.042	.298	3.197	.002	
History of overprotection	.196	.063	.296	3.106	.002	
Current protective parenting	.007	.074	.099	1.007	.317	
Parental overall adjustment	.0007	.053	.012	0.130	.896	
Step 2						.014
Child age (months)	.130	.042	.289	3.101	.003	
History of overprotection	.180	.064	.272	2.800	.006	
Current protective parenting	.006	.075	.073	0.731	.467	
Parental overall adjustment	.002	.053	.030	0.315	.754	
Child asthmatic status	1.259	.977	.123	1.288	.201	

\* $p < .001$

## 5.6.3.1.2 Somatisation

The following variables were entered at step 1 for the prediction of somatisation: child anxiety, parental history of overprotection, parental overall adjustment, and current protective parenting. Child asthmatic status was entered at step 2. The analysis indicated that as a group the independent variables accounted for a significant proportion of the variance in child somatisation ( $F(5, 97) = 15.80, p < .001; R^2 = .45; \text{Adjusted } R^2 = .42$ ). The addition of child asthmatic status at step 2 reliably improved prediction of child somatisation ( $F_{\text{inc}}(1, 97) = 19.326, p < .001$ ). Results are displayed in Table 44.

It is noteworthy that at step 1, parental overall adjustment did not explain a significant proportion of the variance in child somatisation. However, after inclusion of child asthmatic status at step 2, parental overall adjustment was a significant predictor of child somatisation. These contrasting findings indicate that child asthmatic status is suppressing the relationship between parental adjustment and child somatisation (see Appendix K). It is also noteworthy that parental history of overprotection did not explain a significant proportion of the variance in child somatisation, as child anxiety served as a mediator (see Appendix J).

Table 44 Summary of Hierarchical Regression Analysis for Variables Predicting Child Somatisation from Parental History of Overprotection, Current Protective Parenting, Parental Overall Adjustment, and Asthmatic Status ( $N = 103$ )

Independent variable	B	SE B	$\beta$	t	p	$\Delta R^2$
Step 1						.266*
Child anxiety	0.282	.056	.436	5.031	.000	
History of overprotection	0.009	.039	.209	2.320	.022	
Current protective parenting	-0.0006	.042	-.012	-0.134	.894	
Parental overall adjustment	0.006	.031	.155	1.813	.073	
Step 2						.110*
Child anxiety	0.249	.052	.385	4.779	.000	
History of overprotection	0.007	.036	.153	1.831	.070	
Current protective parenting	-0.004	.039	-.078	-0.963	.338	
Parental overall adjustment	0.007	.029	.206	2.596	.011	
Child asthmatic status	2.329	.530	.352	4.396	.000	

\* $p < .001$

5.6.3.2 *Asthma specific variables ( $n = 65$ )*

## 5.6.3.2.1 Anxiety

The following variables were entered at step 1 for the prediction of anxiety: child age, parental history of overprotection, parental overall adjustment and current protective parenting. Parent ratings of functional severity of asthma and physician severity ratings were entered at step 2. Results indicated that as a group the independent variables accounted for a significant proportion of the variance in child anxiety ( $F(6, 58) = 3.10, p < .05; R^2 = .24; \text{Adjusted } R^2 = .17$ ). However, given the bivariate results, it is not surprising that the addition of the severity ratings did not reliably improve prediction of child anxiety ( $F_{inc}(2, 58) = .93, p > .05$ ). Results are presented in Table 45.

Table 45 Summary of Hierarchical Regression Analysis for Variables Predicting Child Anxiety from Child Age, Parental History of Overprotection, Current Protective Parenting, Parental Overall Adjustment, and Asthma Severity Ratings ( $n = 65$ )

Independent variable	B	SE B	B	t	p	$\Delta R^2$
Step 1						.219*
Child age	0.159	0.055	.335	2.898	.005	
History of overprotection	0.237	0.081	.351	2.913	.005	
Current protective parenting	0.006	0.111	.070	0.555	.581	
Parental overall adjustment	-0.004	0.072	-.073	-0.567	.573	
Step 2						.024
Child age	0.149	0.056	.314	2.667	.010	
History of overprotection	0.245	0.082	.364	2.980	.004	
Current protective parenting	-0.004	0.078	-.072	-0.524	.602	
Parental overall adjustment	0.007	0.116	.077	0.589	.558	
Parent severity rating	-0.151	0.141	-.135	-1.070	.289	
Physician severity rating	2.085	2.022	.128	1.031	.307	

\* $p = .005$

## 5.6.3.2.2 Somatisation

The following variables were entered at step 1 for the prediction of somatisation: family SES, parental history of overprotection, parental overall adjustment, and current protective parenting. Parent rating of functional severity of asthma and physician severity rating were entered at step 2.

The analysis indicated that as a group the independent variables accounted for a significant proportion of the variance in child somatisation ( $F(7, 57) = 10.04, p < .001; R^2 = .55$ ; Adjusted  $R^2 = .50$ ). The addition of the asthma severity ratings significantly improved the proportion of explained variance in child somatisation ( $F_{inc}(2, 57) = 4.57, p < .05$ ). Review of the standardised coefficients indicates that only parent rating of asthma severity was associated with child somatisation (after controlling for child anxiety and the parental variables), whereby an increase in functional severity corresponded to an increase in child somatisation. Results are presented in Table 46.

Table 46 Summary of Hierarchical Regression Analysis for Variables Predicting Child Somatisation from Family SES, Parental History of Overprotection, Current Protective Parenting, Parental Overall Adjustment, and Asthma Severity Ratings ( $n = 65$ )

Independent variable	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$\Delta R^2$
Step 1						.480**
Family SES	.685	.306	.215	2.241	.029	
Child anxiety	.298	.062	.480	4.822	.000	
History of overprotection	.008	.044	.196	1.871	.066	
Current protective parenting	-.007	.056	-.137	-1.338	.186	
Parental overall adjustment	.009	.038	.253	2.371	.021	
Step 2						.072*
Family SES	.354	.309	.111	1.147	.256	
Child anxiety	.331	.060	.533	5.534	.000	
History of overprotection	.005	.042	.129	1.274	.208	
Current protective parenting	-.005	.055	-.090	-0.900	.372	
Parental overall adjustment	.007	.037	.194	1.825	.073	
Parent severity rating	.218	.073	.314	2.993	.004	
Physician severity rating	-.236	.985	-.023	-0.240	.811	

\* $p < .072$ \*\* $p < .001$

## 5.7 Child Asthma and Current Protective Parenting

This section reports analyses, using the entire sample and asthmatic sample only, pertaining to the following hypotheses:

1. Child asthmatic status is associated with current protective parenting ( $N = 103$ ).
2. Asthma severity is associated with current protective parenting ( $n = 65$ ).
3. Parental perception of asthma management is associated with current protective parenting ( $n = 65$ ).

### 5.7.1 Preliminary Analyses

#### 5.7.1.1 *Covariates for the asthmatic sample ( $n = 65$ )*

Preliminary analyses indicated that none of the following variables needed to be specified as covariates when current protective parenting was the dependent variable: child age, child gender, hours in child care (per week) and family socioeconomic. Details of analyses are reported in Appendix S.

#### 5.7.1.2 *Assumptions for Asthmatic Sample ( $n = 65$ )*

The measure of current protective parenting was normally distributed. Results of evaluation of assumptions of normality, linearity and homoscedasticity of the residuals on the variables for the analyses predicting current protective parenting indicated minimal violations. With the use of a criterion value of  $p < .001$  for Mahalanobis' distance, no multivariate outliers were found for the prediction of current protective parenting. The assumption of normality of residuals was not violated.

## 5.7.2 Bivariate Analyses

### 5.7.2.1 Asthmatic status ( $N = 103$ )

A one-way analysis of variance, controlling for child age, revealed that parents of children with asthma reported higher levels of protective parenting than parents of non-asthmatic children ( $F(1, 100) = 5.21, p < .05$ ). The assumption equality of variance was maintained. Results are presented in Table 47.

Table 47 Estimated Marginal Means ( $M$ ), Standard Errors of Means ( $SE\ M$ ) and 95% Confidence Intervals (CI) for Current Protective Parenting by Group, After Controlling for Child Age

Sample	$M$	$SE\ M$	95% CI	
			Lower Bound	Upper Bound
Non-asthmatic ( $n = 38$ )	27.95	1.03	25.91	29.98
Asthmatic ( $n = 65$ )	30.89	0.78	29.34	32.45

### 5.7.2.2 Asthma specific variables ( $n = 65$ )

#### 5.7.2.2.1 Asthma severity

Contrary to the hypothesis, a Pearson  $r$  correlation revealed no association between parent rating of functional severity of asthma and current protective parenting;  $r = -.03, p > .05, n = 65$ . Independent samples  $t$ -test indicated no significant difference in the mean level of current protective parenting among children with physician-rated mild versus moderate asthma (see Table 48);  $t(63) = 1.12, p > .05$ .

Table 48 Means ( $M$ ), Standard Deviation ( $SD$ ) and Standard Errors of Means ( $SE\ M$ ) of Degree of Protective Parenting by Physician Severity Rating

Physician severity rating	$M$	$SD$	$SE\ M$
Mild ( $n = 8$ )	33.13	3.87	1.37
Moderate ( $n = 57$ )	30.54	6.33	0.84

## 5.7.2.2.2 Management of asthma

Fourteen parents indicated that their child's asthma was completely managed, 45 parents reported that their child's asthma was managed most of the time and 6 parents reported that their child's asthma was managed only half the time. An analysis of variance indicated no significant group differences in the mean level of protective parenting (see Table 49);  $F(3, 62) = 1.47, p > .05$ . However, on face value the mean level of protective parenting appeared relatively lower among the sample of parents who perceived their child's asthma to be managed only half the time. The groups were therefore collapsed, leaving two groups, 59 with asthma managed at least most of the time (i.e. well managed) and 6 with asthma managed about half the time (i.e. poorly managed). Possibly owing to the small number in the poorly managed sample, independent samples t-tests revealed no significant group differences ( $t(63) = 1.72, p > .05, n = 65$ ). Means and standard deviations are reported in Table 50.

Table 49 Means (M), Standard Deviations (SD), Standard Error of Means (SE M) and 95% Confidence Interval (CI) of Level of Current Protective Parenting by Parent Rating of Asthma Management

Degree of asthma management	<u>M</u>	<u>SD</u>	<u>SE M</u>	95% CI	
				Lower Bound	Upper Bound
Completely managed ( <u>n</u> = 14)	31.00	5.04	1.35	28.09	33.91
Managed most time ( <u>n</u> = 45)	31.36	6.31	0.94	29.46	33.25
Managed half time ( <u>n</u> = 6)	26.83	6.37	2.60	20.15	33.52

Table 50 Means (M), Standard Deviations (SD) and Standard Errors of Means (SE M) of Level of Current Protective Parenting by Parent Rating of Asthma Management

Degree of asthma management	<u>M</u>	<u>SD</u>	<u>SE M</u>
Well managed ( <u>n</u> = 59)	31.27	5.99	0.78
Poorly managed ( <u>n</u> = 6)	26.83	6.37	2.60

### 5.7.3 Multivariate Analyses

Hierarchical regression analyses were subsequently conducted to provide a more stringent test of the hypothesis that asthmatic status and the asthma specific variables were associated with current protective parenting.

#### 5.7.3.1 *Asthmatic status* ( $N = 103$ )

Parental overall adjustment, parental history of overprotection and child age (covariate) were entered at step 1. Child asthmatic status was entered at step 2. Global stress, coping and social support were not included as previous analyses indicated that these factors were not associated with current protective parenting.

As a set, the predictors accounted for a significant proportion of the variance in current protective parenting ( $F(4, 98) = 5.21, p = .001; R^2 = .18; \text{Adjusted } R^2 = .14$ ). Importantly, the addition of child asthmatic status at step 2 reliably improved prediction of degree of current protective parenting ( $F_{\text{inc}}(1, 98) = 4.11, p < .05$ ), where parents of children with child asthma reported greater levels of protection. After inclusion of child asthmatic status at step 2, parental history of overprotection was no longer a significant predictor of current protective parenting, whilst the significance of parental overall adjustment strengthened. Taken together, this set of analyses provides further support for the hypothesis that child asthmatic status is associated with current levels of protective parenting.

Table 51 displays the regression coefficients ( $B$ ), standard error of the regression coefficients ( $SE\ B$ ), standardised regression coefficients ( $\beta$ ),  $t$  values, significance levels and the proportion of variance in protective parenting explained by the set of predictors added at each step ( $\Delta R^2$ ).

Table 51 Summary of Hierarchical Regression Analysis for Variables Predicting Degree of Parental Protection from Child Age, Parental History of Overprotection, Parental Overall Adjustment and Child Asthmatic Status ( $N = 103$ )

Independent variable	$B$	$SE\ B$	$\beta$	$t$	$p$	$\Delta R^2$
Step 1						.141**
Child age (months)	-0.123	0.056	-.206	-2.207	.030	
History of overprotection	0.185	0.084	.211	2.212	.029	
Parental overall adjustment	0.136	0.070	.186	1.949	.054	
Step 2						.035*
Child age (months)	-0.126	0.055	-.212	-2.306	.023	
History of overprotection	0.144	0.085	.164	1.694	.093	
Parental overall adjustment	0.151	0.069	.206	2.132	.032	
Child asthmatic status	2.602	1.283	.192	2.028	.045	

\* $p < .05$

\*\* $p < .005$

#### 5.7.3.2 Asthma specific variables ( $n = 65$ )

At step 1, the following variables were entered: child age, parental history of overprotection and parental overall adjustment. The set of asthma variables were entered at step 2. Overall, the model explained a significant proportion of the variance in current protective parenting ( $R^2 = .25$ ; Adjusted  $R^2 = .18$ ;  $F(5, 59) = 3.87$ ,  $p < .005$ ). Addition of the parental variables at step 1 reliably improved prediction ( $F_{inc}(2, 62) = 5.60$ ,  $p < .01$ ). Not surprisingly (given the bivariate results), there was no improvement in the prediction of current protective parenting after inclusion of the asthma variables at step 2 ( $F_{inc}(3, 59) = 1.80$ ,  $p > .05$ ).

Table 52 displays the regression coefficients ( $B$ ), standard error of the regression coefficients ( $SE\ B$ ), standardised regression coefficients ( $\beta$ ),  $t$  values, significance levels and the proportion of variance in protective parenting explained by the set of predictors added at each step ( $\Delta R^2$ ).

Table 52 Summary of Hierarchical Regression Analysis for Parental History of Overprotection, Parental Overall Adjustment, Parent Perception of Functional Severity of Asthma and Asthma Management and Physician Severity Ratings Predicting Current Protective Parenting ( $n = 65$ )

Independent variable	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$\Delta R^2$
Step 1						.153*
History of overprotection	0.007	0.094	.093	0.760	.450	
Parental overall adjustment	0.226	0.079	.353	2.874	.006	
Step 2						.094
History of overprotection	0.008	0.092	.106	0.883	.381	
Parental overall adjustment	0.263	0.079	.410	3.313	.002	
Asthma management	-3.774	2.621	-.180	-1.440	.155	
Functional severity	-0.004	0.169	-.033	-0.251	.803	
Physician severity rating	-3.962	2.202	-.214	-1.799	.077	

\* $p < .01$

## 5.8 Child Asthma and Parental Overall Adjustment

This set of analyses was conducted to assess the following hypotheses:

1. Asthmatic status is associated with parental overall adjustment ( $N = 103$ ).
2. Parent rating of functional severity of asthma is associated with parental overall adjustment ( $n = 65$ ).
3. Physician asthma severity rating is associated with parental overall adjustment ( $n = 65$ ).
4. Management of asthma is associated with parental overall adjustment ( $n = 65$ ).
5. Duration since asthma diagnosis is associated with parental overall adjustment ( $n = 65$ ).
6. Number of consultations with physician is associated with parental overall adjustment ( $n = 65$ ).

### 5.8.1 Preliminary Analyses

#### 5.8.1.1 *Covariates for the asthmatic sample ( $n = 65$ )*

Preliminary analyses indicated that none of the following variables needed to be specified as covariates in the analyses using the asthmatic sample ( $n = 65$ ) with parental overall adjustment as the dependent variable: child age, child gender, hours in child care (per week) and family socioeconomic status. A significance level of .05 was used. Details of analyses are reported in Appendix S.

#### 5.8.1.2 *Assumptions for asthmatic sample ( $n = 65$ )*

The measure of parental overall adjustment demonstrated a slight positive skew. Transformation was deemed inappropriate as the distribution reflected the general population. Results of evaluation of assumptions of normality, linearity and homoscedasticity of the residuals on the variables for the analyses predicting parental overall adjustment indicated no violations. With the use of a criterion value of  $p < .001$  for Mahalanobis' distance, no

multivariate outliers among the cases were found. The assumption of normality of residuals was satisfied.

## 5.8.2 Bivariate Analyses

### 5.8.2.1 Asthmatic status ( $N = 103$ )

Independent samples t-tests were conducted to determine whether parents of children with asthma reported poorer overall adjustment than parents of non-asthmatic children. Results are presented in Table 53. No significant group differences emerged ( $t(101) = .34, p > .05$ ). The assumptions of homogeneity of variance were satisfied.

Table 53 Means ( $M$ ), Standard Deviations ( $SD$ ) and Standard Errors of Means ( $SE M$ ) for Parental Overall Adjustment by Child Asthmatic Status ( $N = 103$ )

Group	$M$	$SD$	$SE M$
Non-asthmatic ( $n = 38$ )	19.84	7.87	1.28
Asthmatic ( $n = 65$ )	18.85	9.56	1.19

As previously indicated, child somatisation was associated with asthmatic status and parental overall adjustment. It is therefore possible that child somatisation may be suppressing the relationship between child asthmatic status and parental overall adjustment. However, even after controlling for child somatisation, the difference in parental overall adjustment between the groups remained non-significant ( $F(1, 100) = 3.35, p > .05$ ). Adjusted means and standard deviations are reported in Table 54.

Table 54 Estimated Marginal Means (M), Standard Error of Means (SE M) and 95% Confidence Intervals (CI) for Parental Overall Adjustment, After Controlling for Child Somatisation (N = 103)

Group	<u>M</u>	<u>SE M</u>	95% CI	
			Lower bound	Upper bound
Asthmatic ( <u>n</u> = 65)	21.48	1.50	18.50	24.46
Non-asthmatic ( <u>n</u> = 38)	17.89	1.12	15.67	20.11

#### 5.8.2.2 *Asthma specific variables* (n = 65)

##### 5.8.2.2.1 Duration since asthma diagnosis

Pearson *r* correlation revealed a significant relationship between duration since asthma diagnosis and parental overall adjustment, both before ( $r = -.27, p < .05, n = 65$ ) and after ( $r = -.30, p < .05, n = 65$ ) controlling for child age. As hypothesised, the direction of the coefficients indicated a decline in parental overall adjustment was associated with an increase in the time lapse since the child was diagnosed with asthma.

##### 5.8.2.2.2 Number of consultations with physician

Contrary to the hypothesis, Pearson *r* correlations (controlling for duration since diagnosis) indicated no significant association between number of consultations with the treating specialist and parental overall adjustment ( $r = -.21, p > .05$ ).

##### 5.8.2.2.3 Asthma management

The hypothesis that parental perception of asthma management is associated with parental overall adjustment ( $F(3, 62) = 1.06, p > .05$ ) was not supported. Results are presented in Table 55.

Table 55 Means (M), Standard Deviations (SD) and Standard Errors of Means (SE M) of Parental Overall Adjustment by Parent Perception of Asthma Management Status

Degree of management	<u>M</u>	<u>SD</u>	<u>SE M</u>	95% CI	
Completely ( <u>n</u> = 14)	15.57	8.42	2.25	10.71	20.43
Most of time ( <u>n</u> = 46)	19.80	9.47	1.41	16.96	22.64
Half of time ( <u>n</u> = 6)	19.33	12.52	5.12	6.16	32.50

#### 5.8.2.2.4 Asthma severity

In support of the hypothesis, Pearson *r* correlations revealed a significant relationship between parental perception of functional severity of asthma and parental overall adjustment ( $r = .27$ ,  $p < .05$ ,  $n = 65$ ).

Independent samples *t*-test indicated a tendency (though not significant) for parents of children with physician-rated moderate asthma to have poorer overall adjustment than parents of children with physician-rated mild asthma ( $t(63) = -1.88$ ,  $p = .06$ ). Results are reported in Table 56.

Table 56 Means (M), Standard Deviations (SD) and Standard Errors (SE M) of Parental Overall Adjustment by Physician Severity Rating of Child's Asthma

Physician severity rating	<u>M</u>	<u>SD</u>	<u>SE</u>
Mild ( <u>n</u> = 8)	13.00	4.60	1.63
Moderate ( <u>n</u> = 57)	19.67	9.81	1.30

#### 5.8.3 Multivariate Analyses

This set of analyses was conducted to provide a more stringent test of the hypotheses that asthmatic status and characteristics of asthma are associated with parental overall adjustment by controlling for the parenting/social factors.

5.8.3.1 Asthmatic status ( $N = 103$ )

Regression analyses were used to assess whether child asthmatic status was associated with parental overall adjustment after controlling for the other psychosocial factors. The following variables were entered as predictors at step 1: parental history of overprotection, global stress, coping and social support. Child asthmatic status was entered at step 2.

As a set, the predictors accounted for a significant proportion of the variance in overall adjustment ( $F(5, 97) = 11.23, p < .001; R^2 = .37$ ; Adjusted  $R^2 = .33$ ). The addition of child asthmatic status at step 2 did not significantly improve the prediction of parental overall adjustment ( $F_{inc}(1, 97) = 2.47, p > .10$ ). This did not support the hypothesis that parents with children with asthma will have poorer overall adjustment than parents of children without asthma.

Table 57 displays the regression coefficients ( $B$ ), standard error of the regression coefficients ( $SE B$ ), standardised regression coefficients ( $\beta$ ),  $t$  values, significance levels and the proportion of variance in parental overall adjustment explained by the set of predictors added at each step ( $\Delta R^2$ ).

Table 57 Summary of Hierarchical Regression Analysis for Variables Predicting Parental Overall Adjustment from Parental History of Overprotection, Parental Social Support, Global Stress, Coping and Child Asthmatic Status ( $N = 103$ )

Independent variable	$B$	$SE B$	$\beta$	$t$	$p$	$\Delta R^2$
Step 1						.350*
Parental overprotection	0.004	0.102	.035	0.406	.686	
Social support	0.458	0.111	.401	4.140	.000	
Stress	2.605	0.980	.240	2.658	.009	
Coping	-1.005	1.170	-.076	-0.858	.393	
Step 2						.016
Parental overprotection	0.008	0.104	.063	0.724	.471	
Social support	0.445	0.110	.390	4.041	.000	
Global stress	2.814	0.982	.259	2.866	.005	
Coping	-1.049	1.162	-.079	-0.902	.369	
Child asthmatic status	-2.427	1.544	-.132	-1.572	.119	

\* $p < .001$

5.8.3.2 *Asthma specific variables ( $n = 65$ )*

The following variables were entered as predictors at step 1: parental history of overprotection, global stress, coping and social support. Duration since asthma diagnosis and severity ratings were entered at step 2. To maintain an adequate variable to sample size ratio, management of asthma and number of consultations with the specialist, which were not significantly associated with parental overall adjustment in the bivariate analyses, were excluded from the regression analyses.

As a set, the predictors accounted for a significant proportion of the variance in overall adjustment ( $F(7, 57) = 7.95, p < .001; R^2 = .49$ ; Adjusted  $R^2 = .43$ ). Inclusion of the psychosocial variables significantly improved prediction ( $F_{inc}(4, 60) = 13.68, p < .001$ ), with social support and global stress making independent contributions. Addition of the set of asthma variables at step 2 did not add to the prediction of parental overall adjustment ( $F_{inc}(3, 57) = 0.63, p > .05$ ).

Table 58 displays the regression coefficients ( $B$ ), standard error of the regression coefficients ( $SE\ B$ ), standardised regression coefficients ( $\beta$ ),  $t$  values, significance levels and the proportion of variance in parental overall adjustment explained by the set of predictors added at each step ( $\Delta R^2$ ).

Table 58 Summary of Hierarchical Regression Analysis for Variables Predicting Parental Overall Adjustment from Parental History of Overprotection, Social Support, Global Stress, Coping and Functional Severity of Asthma ( $n = 65$ )

Independent variable	B	SE B	$\beta$	t	p	$\Delta R^2$
Step 1						.477*
History of overprotection	0.163	0.117	.137	1.391	.169	
Social support	0.475	0.140	.413	3.389	.001	
Global stress	3.420	1.168	.305	2.928	.005	
Coping	-1.093	1.434	-.081	-.0763	.449	
Step 2						.017
History of overprotection	0.136	0.121	.114	1.129	.264	
Social support	0.469	0.144	.407	3.254	.002	
Global stress	3.138	1.209	.280	2.595	.012	
Coping	-0.618	1.496	-.046	-0.413	.681	
Duration since diagnosis	-0.003	0.062	-.048	-0.471	.640	
Physician severity rating	0.665	2.912	.023	0.228	.820	
Parent severity rating	0.242	.200	.122	1.207	.232	

$p < .001$

## 5.9 Indirect Associations between Child Asthma and Child Anxiety

This section extends the previously reported analyses in order to assess hypothesised mediators or moderators between child asthmatic status/severity and psychosocial factors. Analyses using the entire sample ( $N = 103$ ) and the asthmatic sample ( $n = 65$ ) were conducted, following the procedures outlined at the beginning of section 5.5.

### 5.9.1 Indirect Correlates of Child Anxiety

The statistical output for the assessment of the hypotheses is presented in Appendix U, V and w. The output includes regression coefficients ( $B$ ), standard error of the regression coefficients ( $SE\ B$ ), standardised regression coefficients ( $\beta$ ), the test statistic for the set of predictors ( $F$ ), the test for each predictor ( $t$ ), associated significance levels ( $p$ ) and the proportion of variance explained by the predictors added into the regression equation ( $R^2$ ).

#### 5.9.1.1 *Parental overall adjustment as a mediator*

The following hypotheses were assessed:

1. Parental overall adjustment mediates the relationship between child asthmatic status and child anxiety/somatisation ( $N = 103$ ).
2. Parental overall adjustment mediates the relationship between asthma severity ratings (parental rating of functional severity and physician severity rating) and child anxiety/somatisation ( $n = 65$ ).

The statistical output for the assessment of the hypotheses is presented in Appendix U. Figures 10, 11, 12 and 13 provide a summary of the assessment of parental overall adjustment as a mediator between child asthmatic status/asthma severity and anxiety/somatisation. The figures indicate the proportion of variance explained in the dependent variables for the assessment of each condition ( $R^2$ ). Fully or partially mediated models are indicated with bold arrows.

As seen in Figures 10 and 11, condition 1 for establishing parental overall adjustment as a mediator between child asthmatic status and child anxiety/somatisation was not satisfied. Thus, discussion of the assessment of Conditions 2, 3 and 4 is pointless.

As seen in Figures 12 and 13, condition 1 for establishing parental overall adjustment as a mediator between the set of asthma severity ratings and child anxiety/somatisation was satisfied. However, review of the standardised beta coefficients indicated that neither parental rating of functional severity of asthma nor physician severity rating made an independent contribution to the variance in parental overall adjustment. Thus, condition 1 was satisfied for the set of severity ratings where parental overall adjustment was the mediator.

Condition 2 was not satisfied when child anxiety was treated as the dependent variable. Thus, results pertaining to condition 3 and 4 regarding parental overall adjustment as a mediator between asthma severity and child anxiety will not be discussed.

However, condition 2 was fulfilled when child somatisation was the dependent variable. Step 1 of the hierarchical regression analysis indicated that parental overall adjustment explained a significant proportion of the variance in child somatisation.

Regression analysis indicated that as a set the asthma severity ratings explained a significant proportion of the variance in child somatisation. Review of the standardised beta coefficients indicated that only parental rating of functional severity of asthma was a significant predictor of child somatisation ( $\beta = .38, p < .001$ ). Thus, condition 3 was therefore satisfied for the set of severity ratings, and more specifically for parental severity rating.

In relation to condition 4, step 2 of the hierarchical regression analysis indicated that as a group, the asthma severity ratings improved prediction of child somatisation after controlling for parental overall adjustment. In particular, parental rating of functional severity of asthma remained significantly associated with child somatisation ( $\beta = .35, p = .001$ ). Thus, condition 4 was not satisfied, specifically for parental rating of severity.

Taken together these results provide mixed support for the hypotheses. Firstly, parental overall adjustment does not mediate the relationship between child asthmatic status and child anxiety/somatisation. Secondly, parental overall adjustment does not mediate the relationship between the asthma severity ratings and child anxiety. Thirdly, however, parental overall

adjustment partially mediates the relationship between parental ratings of functional asthma severity (but not physician severity rating) and child somatisation.

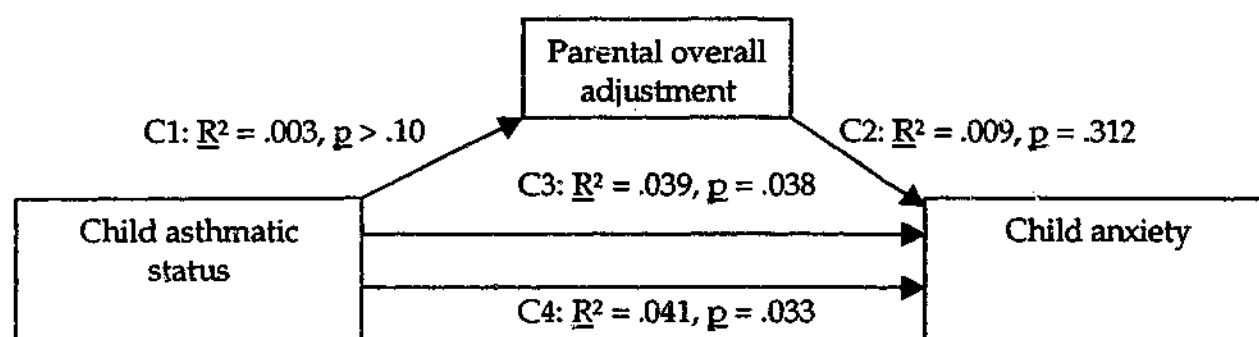


Figure 10 Assessment of conditions for parental overall adjustment as a mediator of the relationship between child asthmatic status and child somatisation ( $N = 103$ )

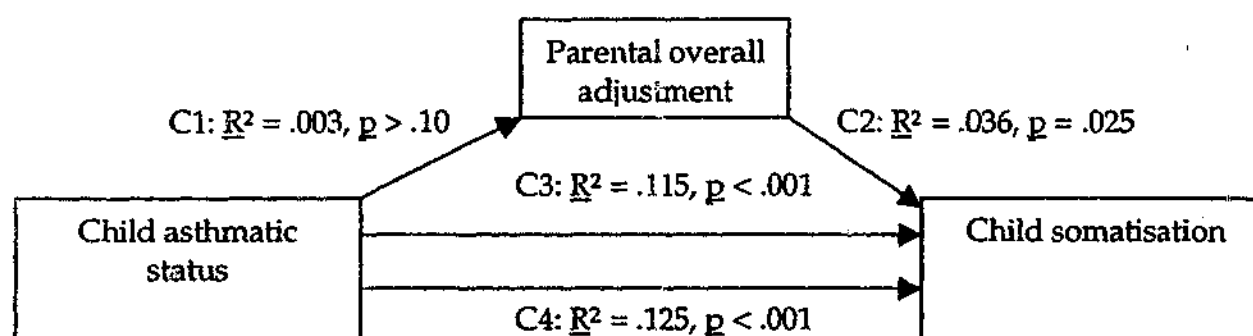


Figure 11 Assessment of conditions for parental overall adjustment as a mediator of the relationship between child asthmatic status and child somatisation ( $N = 103$ )

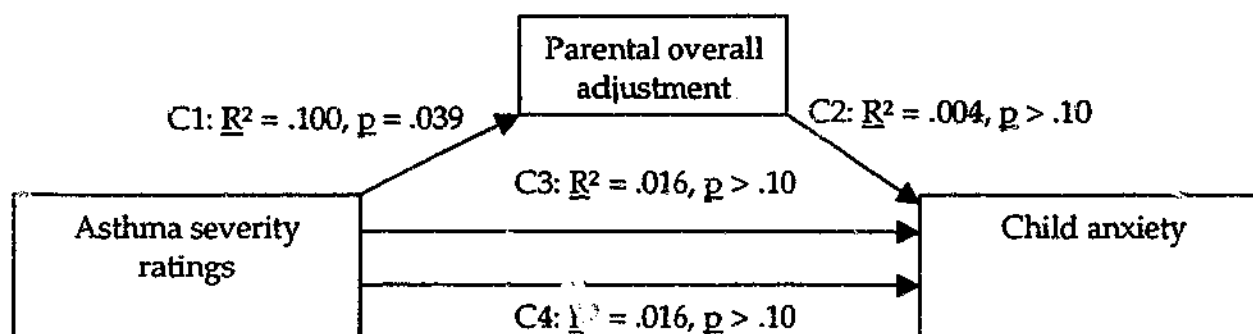


Figure 12 Assessment of conditions for parental overall adjustment as a mediator of the relationship between the set of asthma severity ratings (parental perception of functional severity and physician severity rating) and child anxiety ( $n = 65$ )

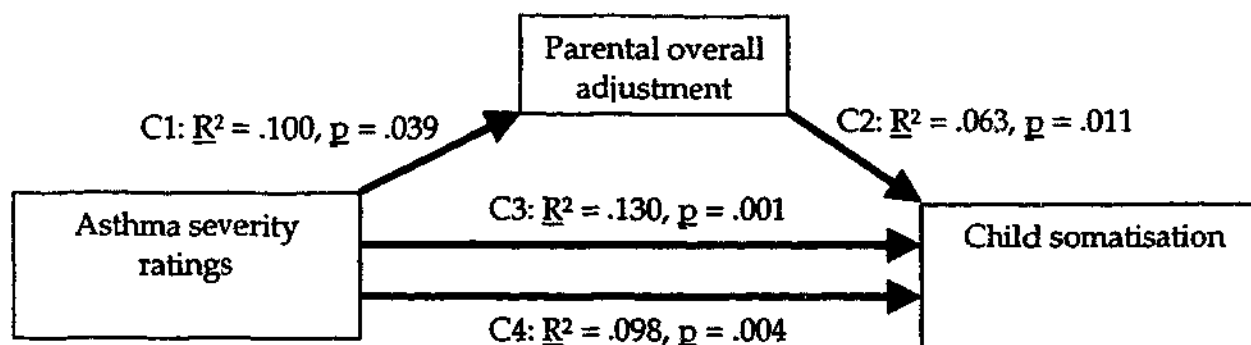


Figure 13 Assessment of conditions for parental overall adjustment as a mediator of the relationship between the set of asthma severity ratings (parental perception of functional severity and physician severity rating) and child somatisation ( $n = 65$ )

#### 5.9.1.2 Current protective parenting as a mediator

The following hypotheses were assessed:

1. Current protective parenting mediates the relationship between child asthmatic status and child anxiety/somatisation ( $N = 103$ ).
2. Current protective parenting mediates the relationship between asthma severity ratings (parental rating of functional severity and physician severity rating) and child anxiety/somatisation ( $n = 65$ ).

The statistical output for the assessment of the hypotheses is presented in Appendix V. Figures 14, 15, 16 and 17 provide a summary of the assessment of current protective parenting as a mediator between child asthmatic status/asthma severity and anxiety/somatisation. The figures include the proportion of variance explained in the dependent variables for each condition assessed ( $R^2$ ). Fully or partially mediated models are indicated with bold arrows.

As seen in Figure 14, child asthmatic status explained a significant proportion of the variance in current protective parenting, thus satisfying condition 1 for establishing current protective parenting as a mediator between child asthmatic status and child anxiety. Limited support was provided for condition 2 for current protective parenting as a mediator between child asthmatic status and child anxiety, as the contribution of protective parenting to explaining the variance in child anxiety approached statistical significance. Condition 3 was satisfied, as child

asthmatic status explained a significant proportion of the variance in child anxiety. Condition 4 was also satisfied, as child asthmatic status no longer explained a significant proportion of the variance in child anxiety after accounting for protective parenting.

As seen in Figure 15, child asthmatic status explained a significant proportion of the variance in current protective parenting, thus satisfying condition 1 for establishing current protective parenting as a mediator between child asthmatic status and child somatisation. However, current protective parenting did not explain a significant proportion of the variance in child somatisation, thus violating condition 2. Thus, conditions 3 and 4 for establishing current protective parenting as a mediator between child asthmatic status and child somatisation will not be discussed.

As seen in Figures 16 and 17, condition 1 for establishing protective parenting as a mediator between the asthma severity ratings and child anxiety/somatisation was not satisfied. Discussion of conditions 2, 3 and 4 is therefore unnecessary.

Taken together these results provide limited support for the hypotheses. Current protective parenting appeared to act as a mediator between child asthmatic status and child anxiety (though support for condition 2 was weak). However, current protective parenting did not mediate the relationships between asthmatic status and child somatisation and asthma severity and child anxiety/somatisation.

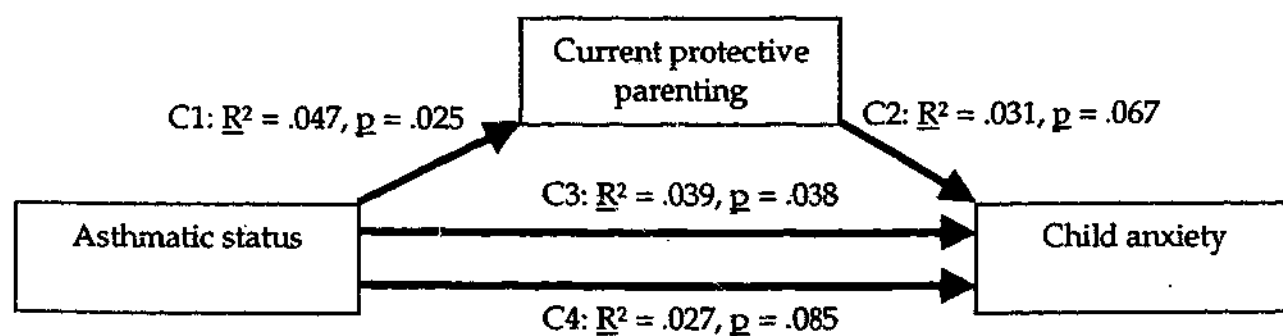


Figure 14 Assessment of conditions for current protective parenting as a mediator between child asthmatic status and child anxiety ( $N = 103$ )

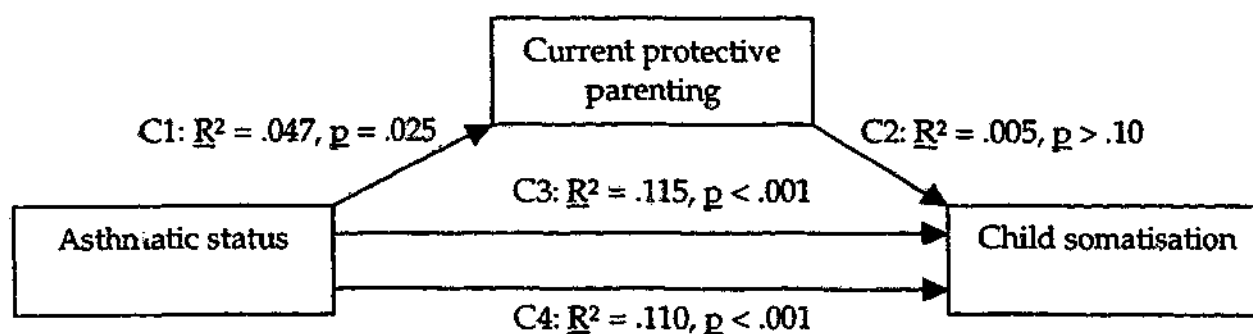


Figure 15 Assessment of conditions for current protective parenting as a mediator between child asthmatic status and child somatisation ( $N = 103$ )

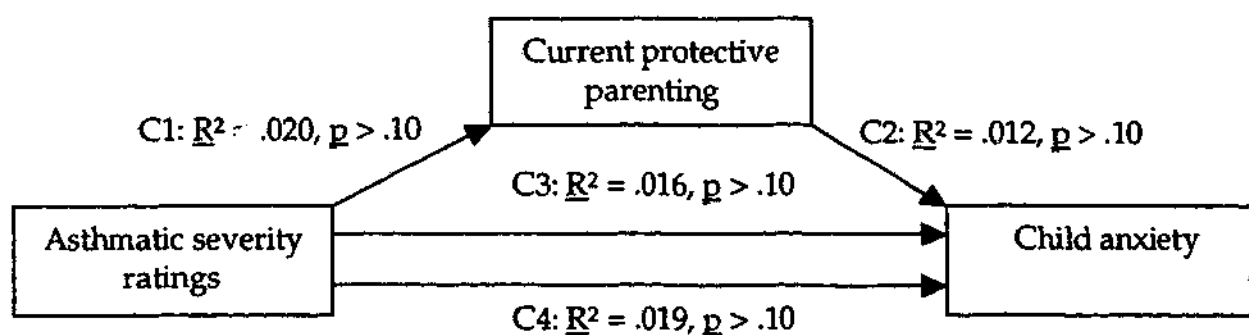


Figure 16 Assessment of conditions for current protective parenting as a mediator between parent and physician ratings of asthma severity and child anxiety ( $n = 65$ )

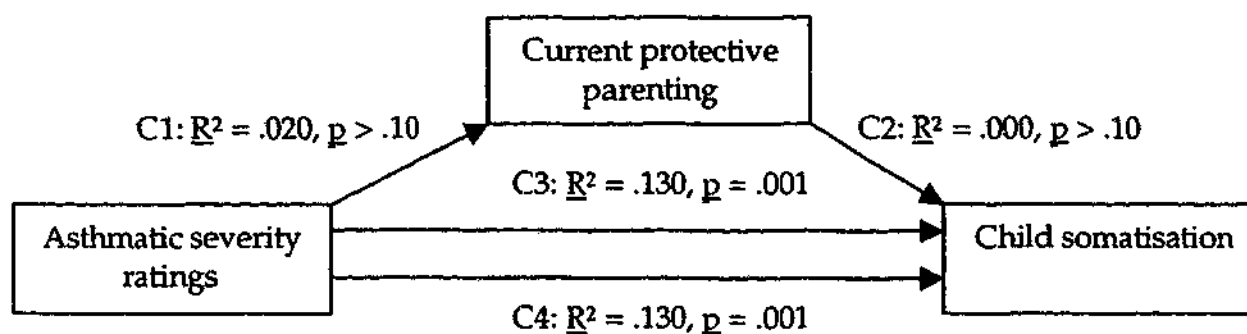


Figure 17 Assessment of conditions for current protective parenting as a mediator between parent and physician ratings of asthma severity and child somatisation ( $n = 65$ )

### 5.9.1.3 *Asthmatic status/severity as a moderator*

The following hypotheses regarding asthma status/severity as a moderator between parental variables and child anxiety/somatisation were assessed:

1. Child asthmatic status moderates the relationship between parental history of overprotection and child anxiety and somatisation ( $N = 103$ ).
2. Asthma severity moderates the relationship between parental history of overprotection and child anxiety and somatisation ( $n = 65$ ).

The statistical output of the regression analyses is presented in Appendix W. Analyses revealed that asthmatic status did not moderate the relationship between parental history of overprotection and child anxiety (interaction term:  $\beta = .09$ ,  $p > .10$ ). Similarly, analyses revealed that functional severity of asthma did not moderate the relationship between parental history of overprotection and child anxiety (interaction term:  $\beta = .16$ ,  $p > .10$ ).

However, asthmatic status moderated the relationship between parental history of overprotection and child somatisation (both before and after controlling for child anxiety). Overall, the model predicting child somatisation was significant;  $F(4, 98) = 18.84$ ,  $p < .001$ ;  $R^2 = .44$ ; Adjusted  $R^2 = .41$ . The interaction term was significant ( $\beta = .17$ ,  $p < .05$ ), indicating that asthmatic status moderated the relationship between parental history of overprotection and child anxiety. A scatter plot of child somatisation (y-axis) plotted against parental history of overprotection (x-axis) by group (asthma versus non-asthmatic) suggests that greater overprotection is more strongly linked with higher levels of child somatisation for parents of asthmatic children than non-asthmatic children (see Figure 18).

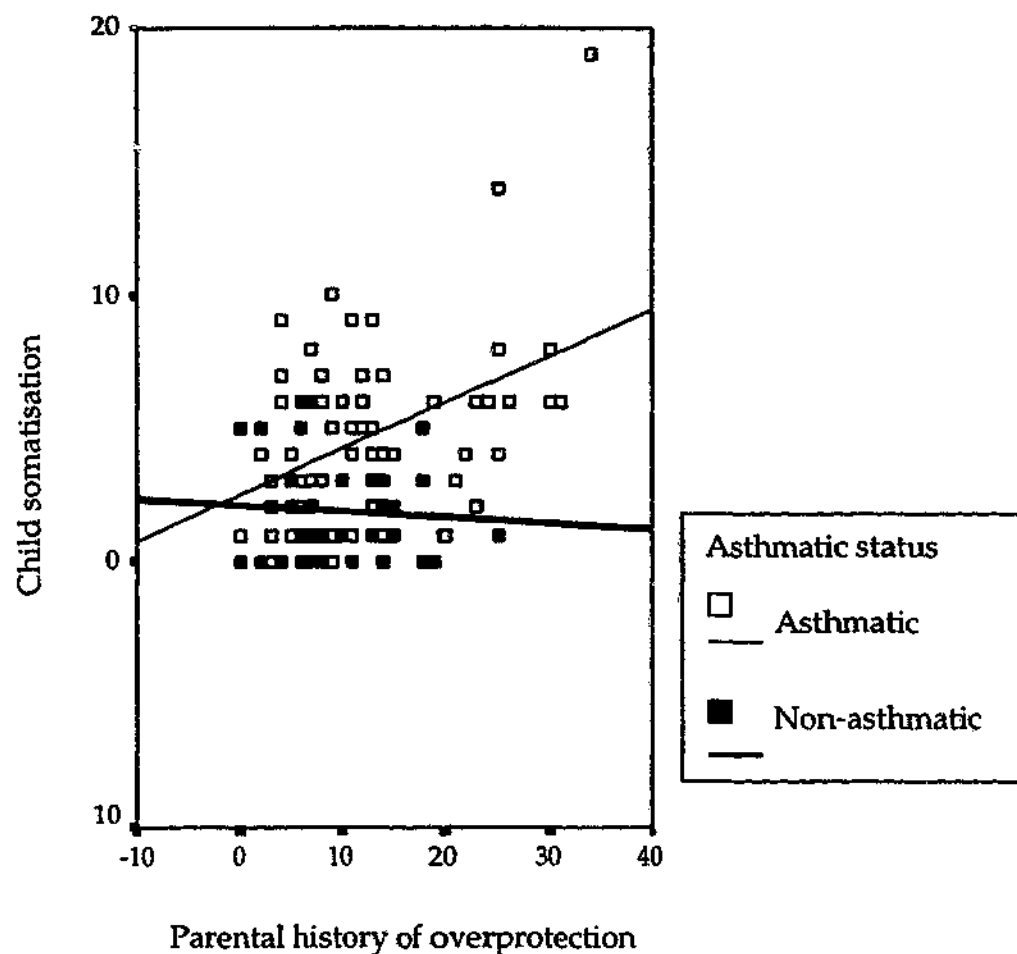


Figure 18 Scatterplot of relationship between parental history of overprotection and child somatisation by asthmatic status ( $N = 103$ )

Overall, after controlling for child anxiety, the model predicting child somatisation from functional asthma severity, parental history of overprotection and the interaction between these variables was significant;  $F(5, 60) = 14.32$ ,  $p < .001$ ;  $R^2 = .55$ ; Adjusted  $R^2 = .51$ .

The interaction term was also significant before inclusion of child anxiety ( $\beta = .25$ ,  $p < .05$ ). These findings provide some evidence that functional severity of asthma moderates the relationship between parental history of overprotection and child somatisation. A scatter plot of child somatisation (y-axis) plotted against parental history of overprotection (x-axis) by asthma severity suggests that greater overprotection is more strongly linked with higher levels of child somatisation for parents of children perceived to have more severe asthma (see Figure 19).

Importantly, the significance of functional severity as a moderator reduced after controlling for child anxiety ( $\beta = .17, p = .09$ ). The reduction in the significance of the interaction term after inclusion of child anxiety is indicative of the overlap between the child anxiety and somatisation subscales.

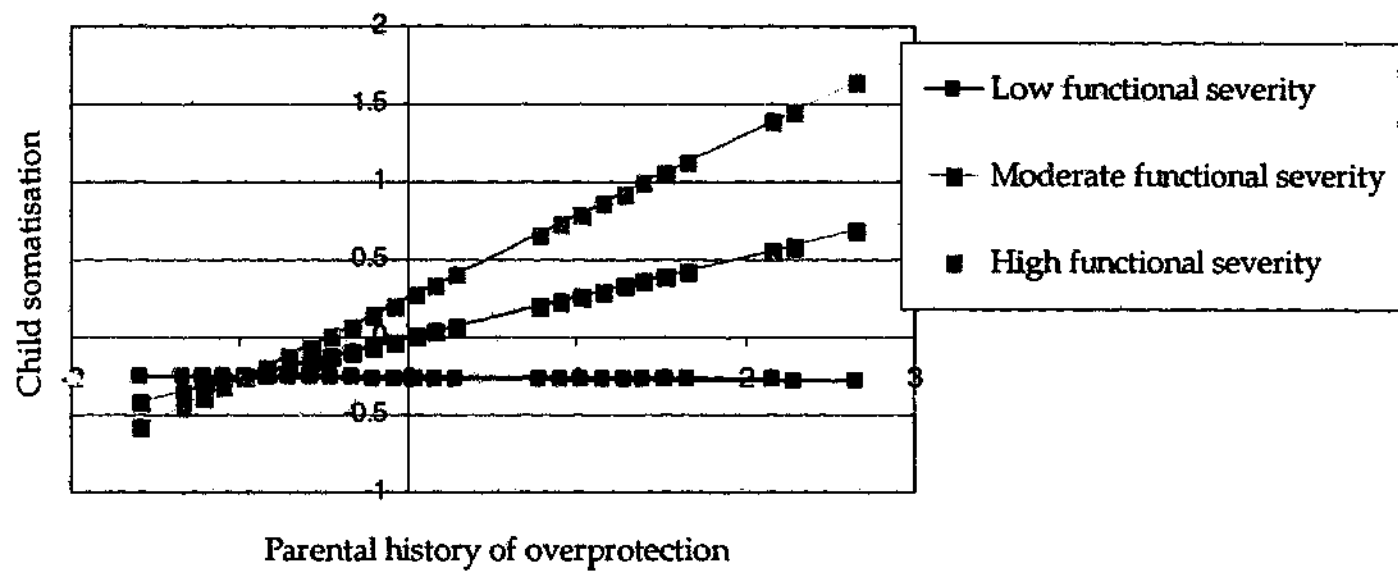


Figure 19 Scatterplot of relationship between parental history of overprotection and child somatisation by parent rating of functional asthma severity ( $n = 65$ )

### 5.9.2 Indirect Correlates of Current Protective Parenting

The statistical output for the assessment of the hypotheses is presented in Appendix X and Y. The output includes regression coefficients ( $B$ ), standard error of the regression coefficients ( $SE\ B$ ), standardised regression coefficients ( $\beta$ ), the test statistic for the set of predictors ( $F$ ), the test for each predictor ( $t$ ), associated significance levels ( $p$ ) and the proportion of variance explained by the predictors added into the regression equation ( $R^2$ ).

#### 5.9.2.1 Asthma status as a moderator ( $N = 103$ )

The following hypotheses were assessed:

1. Asthmatic status moderates the relationship between parental history of overprotection and current protective parenting ( $N = 103$ ).
2. Asthma severity moderates the relationship between parental history of overprotection and current protective parenting ( $n = 65$ ).

The statistical output of the regression analyses is presented in Appendix X. Analyses revealed that the prediction of current protective parenting from child asthmatic status, parental history of overprotection and the interaction between these variables was significant;  $F(4, 98) = 4.04, p < .005; R^2 = .14$ ; Adjusted  $R^2 = .11$ . However, asthmatic status did not moderate the relationship between parental history of overprotection and current protective parenting ( $\beta = -.08, p > .10$ ).

As a group, parental history of overprotection, asthma severity ratings and the respective interaction terms did not explain a significant proportion of the variance in current protective parenting using the asthmatic sample only;  $F(5, 59) = 1.04, p > .10; R^2 = .08$ ; Adjusted  $R^2 = .003$ . Moreover, neither parental rating of functional severity ( $\beta = .05, p > .10$ ) nor physician severity rating ( $\beta = .11, p > .10$ ) moderated the relationship between parental history of overprotection and current protective parenting.

### 5.9.2.2 Parental adjustment as a mediator ( $N = 103$ )

This section reports analysis pertaining to the following hypotheses:

1. Parental overall adjustment mediates the relationship between child asthmatic status and current protective parenting ( $N = 103$ ).
2. Parental overall adjustment mediates the relationship between asthma severity ratings and current protective parenting ( $n = 65$ ).

The statistical output for assessment of the hypotheses is presented in Appendix Y. Figures 20 and 21 provide a summary of the assessment of parental overall adjustment as a mediator between child asthmatic status/asthma severity and current protective parenting. The figures present the proportion of variance explained in the dependent variables for each condition assessing a mediating relationship ( $R^2$ ). Fully or partially mediated models are indicated with bold arrows.

Analyses indicated that condition 1 for establishing parental overall adjustment as a mediator between child asthmatic status and current protective parenting was not supported. A multiple regression analysis indicated that child asthmatic status did not explain a significant proportion of the variance in parental overall adjustment (see Figure 20), thus violating condition 1. Assessment of conditions 2, 3 and 4 will therefore not be discussed.

As seen in Figure 21, as a set, the asthma severity ratings explained a significant proportion of the variance in parental overall adjustment. However, review of the standardised beta coefficients indicated that neither physician ( $\beta = .17, p > .10$ ) nor parental ( $\beta = .22, p > .05$ ) ratings were uniquely associated with parental overall adjustment. Thus, condition 1 was satisfied for the set of asthma severity ratings only.

Step 1 of the hierarchical regression analysis indicated that parental overall adjustment explained a significant proportion of the variance in current protective parenting, thus satisfying condition 2.

However, condition 3 was violated, as the asthma severity ratings did not explain a significant proportion of the variance in current protective parenting, either as a set or individually ( $\beta_{\text{parent severity}} = .01, p > .10$ ;  $\beta_{\text{physician severity}} = -.14, p > .10$ ). Condition 4 therefore will not be discussed.

Taken together, these results provide no support for the hypotheses that parental overall adjustment mediates the relationship between child asthmatic status/severity ratings and current protective parenting.

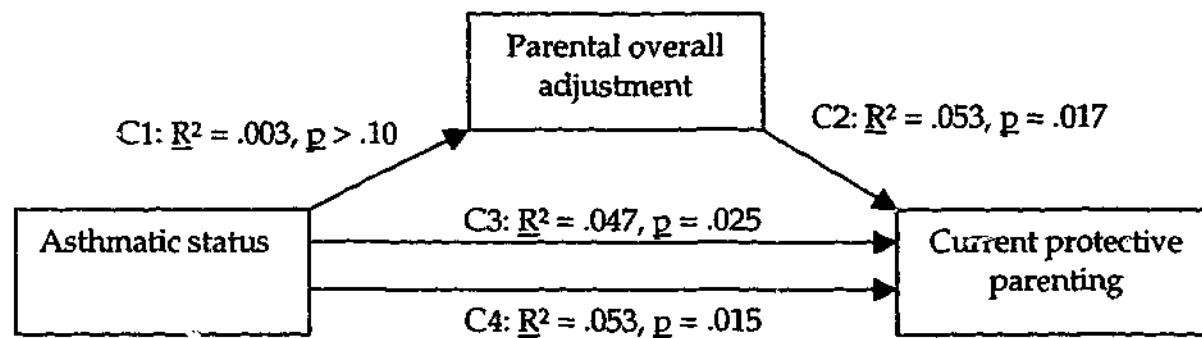


Figure 20 Assessment of conditions for parental overall adjustment as a mediator between child asthmatic status and current protective parenting ( $N = 103$ )

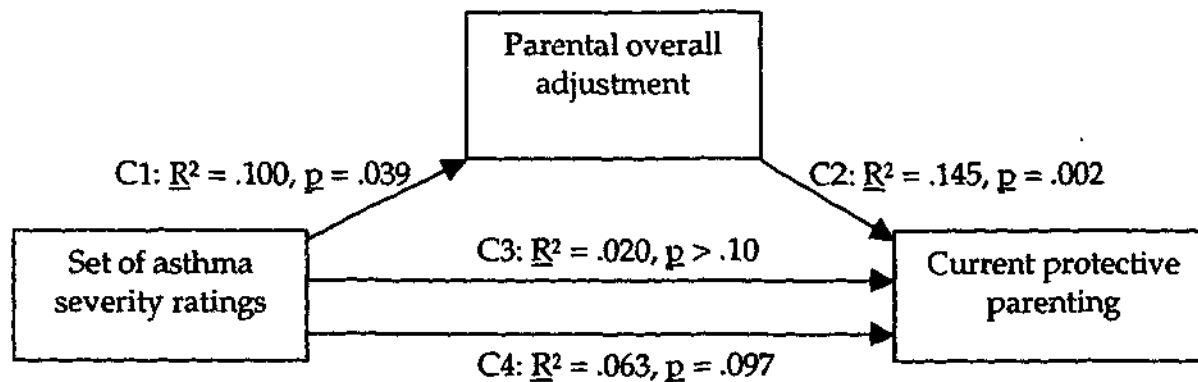


Figure 21 Assessment of conditions for parental overall adjustment as a mediator between parent rating of functional severity of asthma and physician rating of asthma severity and current protective parenting ( $N = 103$ )

### 5.9.3 Indirect Correlates of Parental Overall Adjustment

The statistical output for the assessment of the hypotheses is presented in Appendix Z and AA. The output includes regression coefficients ( $B$ ), standard error of the regression coefficients ( $SE B$ ), standardised regression coefficients ( $\beta$ ), the test statistic for the set of predictors ( $F$ ), the test for each predictor ( $t$ ), associated significance levels ( $p$ ) and the proportion of variance explained by the predictors added into the regression equation ( $R^2$ ).

### 5.9.3.1 *Parental stress, coping and social support as mediators*

This section presents analyses relating to the following hypotheses:

1. Global stress mediates the relationship between child asthmatic status and parental overall adjustment.
2. Perceived coping mediates the relationship between child asthmatic status and parental overall adjustment.
3. Perceived social support mediates the relationship between child asthmatic status and parental overall adjustment.
4. Global stress mediates the relationship between asthma severity and parental overall adjustment.
5. Perceived social support mediates the relationship between asthma severity and parental overall adjustment.
6. Global stress mediates the relationship between asthma severity and parental overall adjustment.

The statistical output for the assessment of the hypotheses is presented in Appendix Z. Figures 22 to 27 provide a summary of the assessment of parental global stress, coping and social support as mediators between child asthmatic status/asthma severity and parental overall adjustment. The figures include the proportion of variance explained in the dependent variables for each condition assessing a mediating relationship ( $R^2$ ). Fully or partially mediated models are indicated with bold arrows.

As seen in Figures 22, 23 and 24, analyses indicated that condition 1 for establishing global stress, coping and social support as a mediator between child asthmatic status and parental overall adjustment was not supported. Multiple regression analysis indicated that child asthmatic status did not explain a significant proportion of the variance in global stress, coping or social support, thus violating condition 1. Assessment of conditions 2, 3 and 4 will therefore not be discussed.

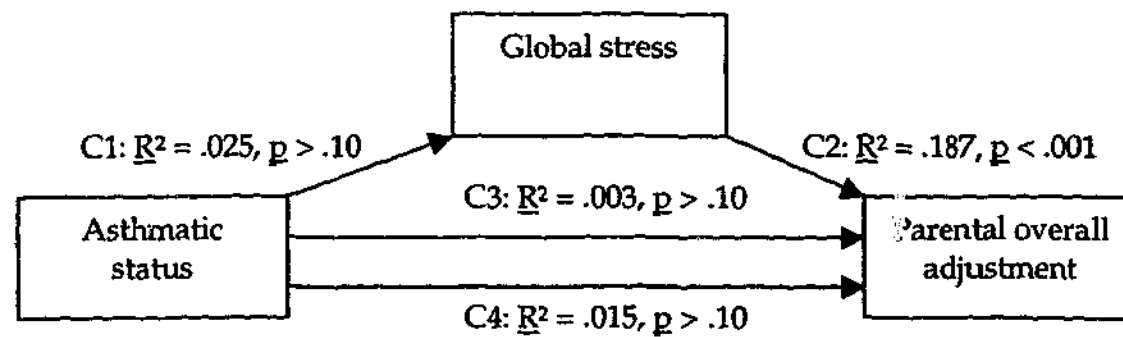


Figure 22 Assessment of conditions for global stress as a mediator between child asthmatic status and parental overall adjustment ( $N = 103$ )

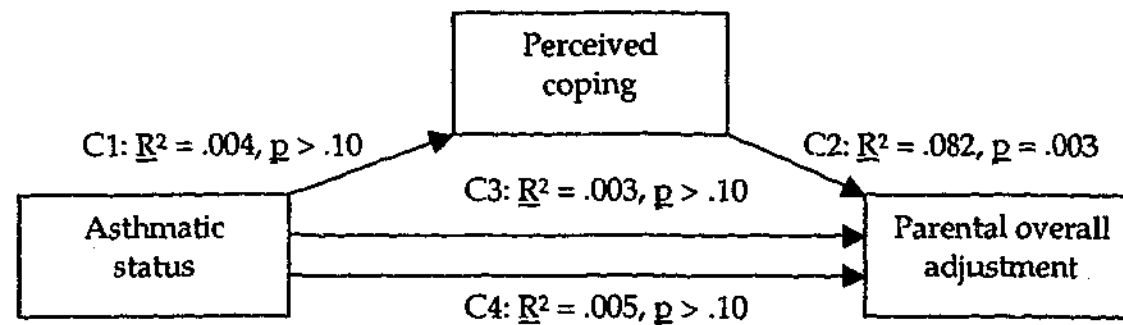


Figure 23 Assessment of conditions for perceived coping as a mediator between child asthmatic status and parental overall adjustment ( $N = 103$ )

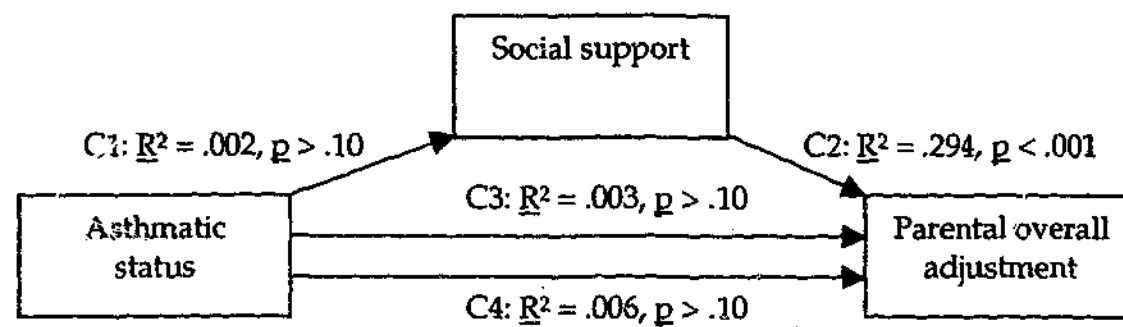


Figure 24 Assessment of conditions for perceived social support as a mediator between child asthmatic status and parental overall adjustment ( $N = 103$ )

As seen in Figures 25, 26 and 27, analyses indicated that condition 1 for establishing global stress, coping and social support as mediators between the asthma severity ratings and parental overall adjustment was not supported. Multiple regression analysis indicated that as a set, the asthma severity ratings did not explain a significant proportion of the variance in global stress, coping or social support. More specifically, neither parental rating of functional severity of asthma nor physician severity ratings made an independent contribution to the prediction of global stress ( $\beta_{\text{parent}} = .09, p > .10$ ;  $\beta_{\text{physician}} = .21, p = .10$ ), coping ( $\beta_{\text{parent}} = -.17, p > .10$ ;  $\beta_{\text{physician}} = -.12, p = .10$ ) or social support ( $\beta_{\text{parent}} = .11, p > .10$ ;  $\beta_{\text{physician}} = .18, p = .10$ ), thus violating condition 1. Assessment of conditions 2, 3 and 4 will therefore not be discussed.

Taken together, these results provide no support for the hypotheses that global stress, coping and social support mediate the relationships between child asthmatic status/asthma severity and parental overall adjustment.

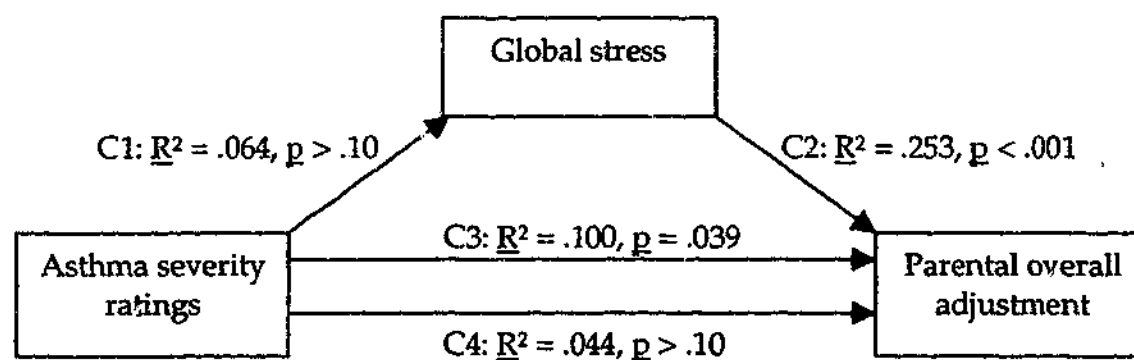


Figure 25 Assessment of conditions for global stress as a mediator between asthma severity ratings and parental overall adjustment ( $n = 65$ )

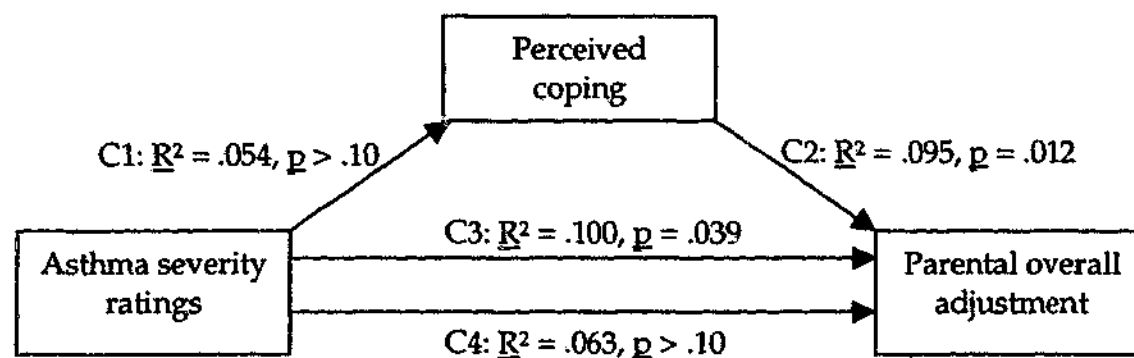


Figure 26 Assessment of conditions for perceived coping as a mediator between asthma severity ratings and parental overall adjustment ( $n = 65$ )

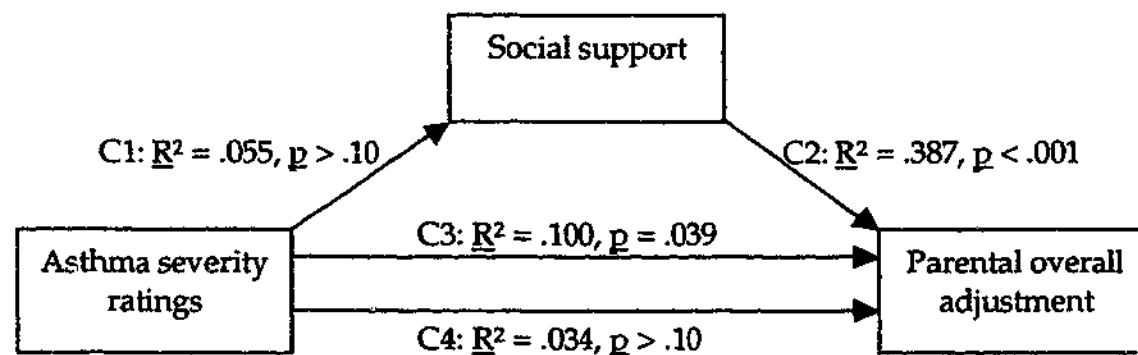


Figure 27 Assessment of conditions for perceived social support as a mediator between asthma severity ratings and parental overall adjustment ( $n = 65$ )

#### 5.9.3.2 Social support as a moderator

The following hypotheses were assessed:

1. Social support moderates the relationship between child asthmatic status and parental overall adjustment ( $N = 103$ ).
2. Social support moderates the relationship between asthma severity ratings (parental rating of functional severity and physician rating) and parental overall adjustment ( $n = 65$ ).

Statistical output for the assessment of each hypothesis is presented in Appendix AA. As a group, asthmatic status, social support and the interaction between these variables explained a significant proportion of the variance in parental overall adjustment;  $F(3, 99) = 15.25$ ,  $p < .001$ ,  $R^2 = .32$ , Adjusted  $R^2 = .30$ . Importantly, the interaction term was not significant ( $\beta = .13$ ,  $p > .10$ ), indicating that social support did not moderate the relationship between asthmatic status and parental overall adjustment.

Analyses indicated that social support did not moderate the relationship between physician severity rating and parental overall adjustment ( $\beta = .07$ ,  $p > .10$ ). However, social support did moderate the relationship between parental rating of functional severity of asthma and parental overall adjustment ( $\beta = .25$ ,  $p < .05$ ). A scatter of parental overall adjustment (y-axis) plotted against functional severity of asthma (x-axis) by social support indicated that functional severity of asthma is more strongly linked with parental overall adjustment when parents reported below-average levels of social support (see Figure 28).

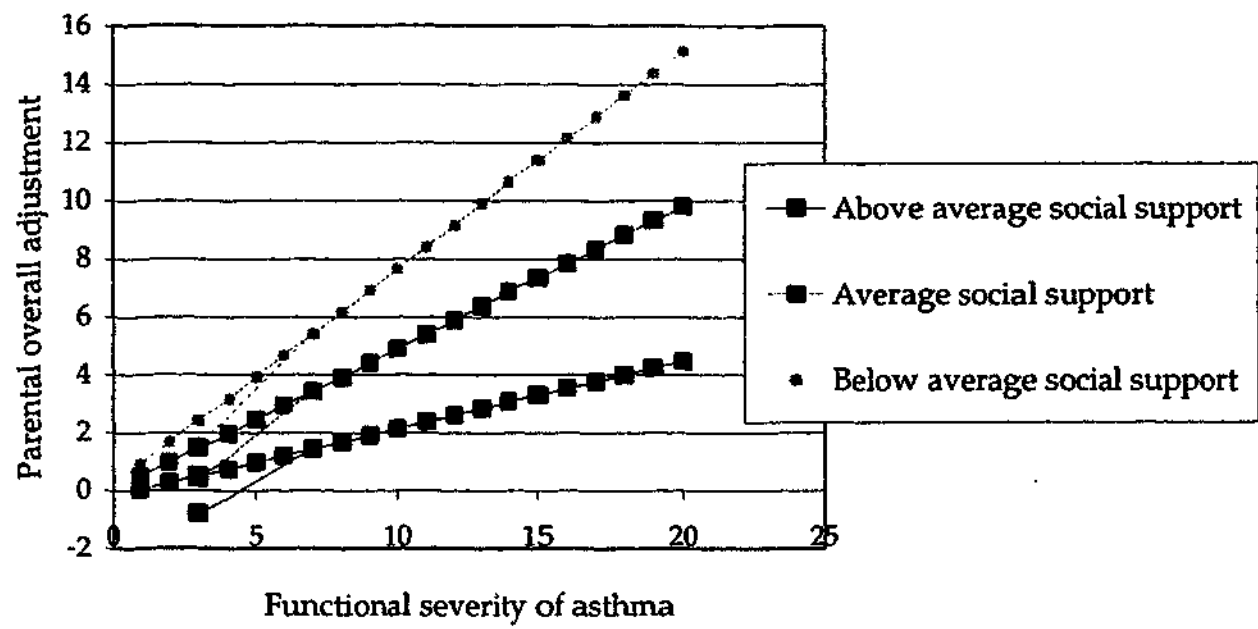


Figure 28 Scatterplot of the relationship between parent rating of functional severity of asthma and parental overall adjustment by social support ( $n = 65$ )

## 5.10 Correlates of 'At-risk' Status for Clinical Levels of Anxiety and Somatisation

This section presents analyses related to factors associated with 'at-risk' levels of anxiety/somatisation. In particular, using the entire sample ( $N = 103$ ), the following factors were assessed:

1. Parental history of overprotection.
2. Current protective parenting.
3. Parental overall adjustment.
4. Child asthmatic status.

### 5.10.1 Preliminary Analyses

#### 5.10.1.1 *Covariates*

Analyses indicated that none of the following variables needed to be specified as covariates in the main set of analyses where risk status is the dependent variable: child age, socioeconomic status, hours in child care (per week), number of hospital admissions, paternal and maternal age, number of siblings and child gender (see Appendix BB).

### 5.10.2 Bivariate Analyses

#### 5.10.2.1 *Parental and social factors*

Analysis of variance was used to determine whether risk status was associated with reliable mean differences on a combination of the following dependent variables: parental history of overprotection, current protective parenting and parental overall adjustment. Assumptions of homogeneity of variance were slightly violated for parental history of overprotection only.

Means, standard deviations, standard errors of the mean and 95% confidence intervals are presented in Table 59. Significant group differences emerged for parental history of overprotection ( $F(3, 99) = 5.93, p < .005$ ). Post hoc analyses indicated that parents of children at-risk of somatisation only and children at-risk of both anxiety and somatisation reported histories of greater overprotection than children not at-risk of either anxiety or somatisation. The level of overprotection history reported by parents of children at-risk for anxiety only did not significantly differ from the levels reported by parents of children within the following groups: no-risk, at-risk of somatisation and at-risk of comorbid anxiety-somatisation.

All other group differences were non-significant: parental overall adjustment ( $F(3, 99) = 1.69, p > .05$ ); current protective parenting ( $F(3, 99) = 0.97, p > .05$ ). However, a review of the means indicated a tendency for parents of children at-risk of comorbid anxiety-somatisation to report significantly poorer overall adjustment than parents of children in the other groups.

Table 59 Means (M), Standard Deviations (SD), Standard Errors of the Means (SE M) and 95% Confidence Intervals (CI) of the Mean of Parental Overall Adjustment, Current Protective Parenting and Parental History of Overprotection by Child Risk Status

Dependent measure	Child risk status	<u>M</u>	<u>SD</u>	<u>SE M</u>	95% CI	
					Lower Bound	Upper Bound
History of overprotection	No risk <sup>a</sup>	8.76	5.25	0.71	7.33	10.19
	Anxiety risk only <sup>b</sup>	13.58	7.09	1.63	10.16	17.00
	Somatisation risk only <sup>c</sup>	15.29	9.72	2.60	9.68	20.89
	Anxiety-somatisation risk <sup>d</sup>	14.88	9.14	2.29	10.00	19.75
Overall adjustment	No risk <sup>a</sup>	19.28	8.47	1.15	16.97	21.59
	Anxiety risk only <sup>b</sup>	16.74	5.46	1.25	14.11	19.37
	Somatisation risk only <sup>c</sup>	17.79	10.09	2.70	11.96	23.61
	Anxiety-somatisation risk <sup>d</sup>	23.19	11.83	2.96	16.88	29.49
Protective parenting	No risk <sup>a</sup>	28.83	6.42	0.87	27.08	30.59
	Anxiety risk only <sup>b</sup>	30.32	6.91	1.59	26.98	33.65
	Somatisation risk only <sup>c</sup>	30.64	7.46	1.99	26.34	34.95
	Anxiety-somatisation risk <sup>d</sup>	31.75	5.84	1.46	28.64	34.86

<sup>a</sup> $n = 54$

<sup>b</sup> $n = 19$

<sup>c</sup> $n = 14$

<sup>d</sup> $n = 16$

### 5.10.2.2 *Asthmatic status*

The proportion of children with asthma and without asthma categorised with at-risk levels of anxiety only, at-risk levels of somatisation only, at-risk levels of co-morbid anxiety-somatisation is presented in Table 60. Fisher's Exact Test indicated that a significantly greater proportion of children with asthma were categorised with at-risk levels of somatisation (one-sided  $p < .005$ ,  $n = 19$ ) and anxiety-somatisation (one-sided  $p < .005$ ,  $n = 14$ ), compared to children without asthma. No significant group difference emerged for anxiety-risk only (one-sided  $p > .05$ ,  $n = 54$ ).

Table 60 Percentage (Number) of Children with and without Asthma At-Risk for Anxiety, Somatisation or Co-morbid Anxiety-Somatisation

Risk status	% ( $n$ ) At-Risk	
	Non-asthmatic	Asthmatic
Anxiety only ( $n = 54$ )	14.8 (8)	20.1 (11)
Somatisation ( $n = 19$ )	2.6 (1)	20.0 (13)
Anxiety-somatisation ( $n = 14$ )	2.6 (1)	23.1 (15)

### 5.10.3 *Multivariate Analyses*

This set of analyses aimed to identify predictors of anxiety risk status, somatisation risk status and comorbid anxiety-somatisation risk status. Separate logistic regression analyses were conducted with the dependent variable being anxiety risk status, somatisation risk status or anxiety-somatisation risk status. In each analysis, the following independent variables were entered: parental history of overprotection, current protective parenting and parental overall adjustment. Comparisons between analyses were made to determine similarities and differences in predictors of risk status. Logistic regression analysis was selected for its capacity to assess the unique contributions of predictors, minimal restrictions on sample sizes and lack of assumptions on normality (Tabachnick & Fidell, 1996).

### 5.10.3.1 Correlates of 'at-risk' levels of anxiety

The sample for this analysis included 54 children not at-risk for either anxiety or somatisation and 19 children at-risk for anxiety only.

Table 61 displays the regression coefficients (B), standard error of the regression coefficients (SE B), the test statistic for each predictor (Wald) and associated significance level (p), the odds ratios (Exp B) and associated 95% confidence interval (95% CI).

Overall, the measures predicted anxiety risk status ( $\chi^2 (4) = 10.67, p < .05; R^2 = .14$ ), with 75% of cases correctly classified using the set of predictors. However, whilst approximately 94% of subjects not at-risk were correctly classified, only 21% of subjects at-risk were classified as being at-risk.

The Wald statistic identified parental history of overprotection as the only variable to make an independent contribution to the prediction of anxiety risk status (see table 61). The positive direction of the beta value for overprotection history indicates that parents of children at-risk of anxiety recalled being raised in a more overprotective manner than parents of children not at-risk of anxiety. Examination of the Exp B values indicates that children are 1.14 times more likely to be at-risk of somatisation with a one-point increase in parental history of overprotection.

Contrary to the hypotheses, current protective parenting, parental overall adjustment and child asthmatic status were not significantly associated with at-risk levels of child anxiety.

Table 61 Summary of Logistic Regression Analysis Predicting Anxiety Risk Status ( $n=73, df=1$ )

Independent variable	<u>B</u>	<u>SE B</u>	Wald	<u>p</u>	Exp <u>B</u>	95% CI	
						Lower	Upper
History of overprotection	.133	.050	6.941	.008	1.142	1.035	1.260
Current protective parenting	.020	.046	0.188	.664	1.020	0.932	1.117
Parental overall adjustment	-.045	.040	1.264	.261	0.956	0.884	1.034
Asthmatic status	-.166	.595	0.078	.781	0.847	0.264	2.720

### 5.10.3.2 Correlates of 'at-risk' levels of somatisation

The sample for this analysis included 54 children not at-risk for either anxiety or somatisation and 14 at-risk for somatisation only. Table 62 displays the regression coefficients (B), standard error of the regression coefficients (SE B), the test statistic for each predictor (Wald) and associated significance level (p), the odds ratios (Exp B) and associated 95% confidence interval (95% CI).

Overall, the measures predicted somatisation risk status ( $\chi^2(4) = 18.44$ ,  $p = .001$ ;  $R^2 = .24$ ), with 84% of cases correctly classified using the set of predictors. However, while approximately 94% of subjects not at-risk were correctly classified, only 50% of subjects at-risk were correctly classified as being at-risk of somatisation.

Again, the Wald statistic identified parental history of overprotection as making an independent contribution to the prediction of somatisation risk status. The positive direction of the beta value for overprotection history indicates that parents of children at-risk of somatisation recalled being raised in a more overprotective manner than parents of children not at-risk of somatisation. Child asthmatic status was also identified as a unique predictor of risk for somatisation. Examination of the Exp B values indicates a one-unit raise in parental history of overprotection corresponds to children being 1.14 times more likely to be at-risk of somatisation.

The Wald statistic also identified asthmatic status to make an independent contribution to the prediction of somatisation risk status. The odds of being at-risk for clinically significant levels of somatisation is .096 times less likely if the child does *not* have asthma.

Table 62 Summary of Logistic Regression Analysis Predicting Somatisation Risk Status ( $n = 68$ ,  $df = 1$ )

Independent variable	<u>B</u>	<u>SE B</u>	Wald	<u>p</u>	Exp <u>B</u>	95% CI	
						Lower	Upper
History of overprotection	0.128	0.052	6.057	.014	1.136	1.026	1.258
Current protective parenting	0.015	0.059	0.067	.796	1.015	0.905	1.139
Parental overall adjustment	-0.047	0.046	1.071	.301	0.954	0.872	1.043
Asthmatic status	-2.341	1.098	4.544	.033	0.096	0.011	.828

### 5.10.3.3 Correlates of 'at-risk' levels of comorbid anxiety-somatisation

Analysis was conducted using the 54 children not at-risk for anxiety or somatisation and 16 at-risk for anxiety-somatisation.

Table 63 displays the regression coefficients (B), standard error of the regression coefficients (SE B), the test statistic for each predictor (Wald) and associated significance level (p), the odds ratios (Exp B) and associated 95% confidence interval (95% CI).

As a group the independent variables were significantly predictive of anxiety-somatisation risk status ( $\chi^2 (4) = 19.90$ ,  $p = .001$ ;  $R^2 = .25$ ). Overall, approximately 81% of cases were correctly classified using the set of predictors. Whilst approximately 96% of subjects not at-risk were correctly classified, only 31% of at-risk subjects were correctly classified.

The Wald statistic identified a tendency ( $p = .053$ ) for parental history of overprotection to make an independent contribution to the prediction of anxiety-somatisation risk status. The positive direction of the beta value for overprotection history indicates that parents of children at-risk of anxiety-somatisation recalled being raised in a more overprotective manner than parents of children not at-risk of anxiety-somatisation. Examination of the Exp B values indicates a one-unit raise in parental history of overprotection corresponds to children being 1.11 times more likely to be at-risk of anxiety-somatisation.

Child asthmatic status was also identified as a unique predictor of risk for anxiety-somatisation. The odds of being at-risk for clinically significant levels of anxiety-somatisation is .07 times less likely if the child does *not* have asthma.

Table 63 Summary of Logistic Regression Analysis Predicting Anxiety-Somatisation Risk Status ( $n = 70$ ,  $df = 1$ )

Independent variable	<u>B</u>	<u>SE B</u>	Wald	<u>p</u>	Exp <u>B</u>	95% CI	
						Lower	Upper
History of overprotection	0.104	0.054	3.742	.053	1.110	.999	1.233
Current protective parenting	0.010	0.059	0.027	.870	1.010	.899	1.135
Parental overall adjustment	0.028	0.038	0.556	.456	1.029	.955	1.108
Asthmatic status	-2.601	1.096	5.629	.018	0.074	.009	0.636

### 5.11 Correlates of Asthma Severity

Thus far, the current study has focused on the role of asthma in relation to a range of parental and social factors, with child anxiety/somatisation treated as the outcome variable. As discussed in the literature review, a number of psychosocial factors may impact on a child's asthma. Following the study conducted by Klinnert et al. (2000), the current study explored the relationship between the psychosocial variables and parental rating of functional severity of the child's asthma. As functional severity provides an indication of the degree to which asthma impinges on an individual's life, it may be used as a marker for asthma management (Klinnert et al., 1997). Physician severity rating was also treated as an outcome variable. Parent and physician ratings of asthma management were not used as outcome measures, as the validity and reliability of these ratings was questionable.

#### 5.11.1 Parental Rating of Functional Severity of Asthma

A hierarchical regression analysis was first conducted to assess the contribution of parental history of overprotection, parental overall adjustment, current protective parenting, child anxiety and child somatisation to functional severity of asthma. In an effort to control for the asthma symptoms accounted for by severity, physician severity rating (based on medication) was entered at step 1. To examine the contribution of the set of parental variables to the prediction of functional severity of asthma, family socio-economic status, parental history of overprotection, parental overall adjustment and current protective parenting were entered at step 2. Child anxiety was entered at step 3 and child somatisation was entered at step 4. Child somatisation was entered subsequent to child anxiety in order to examine the theorised 'somatic' aspect of anxiety that is associated with functional severity of asthma. To maintain an adequate ratio of variables to cases, the social variables (social support, global stress and coping) were not included in the analysis.

This analysis indicated that as a group the independent variables accounted for a significant proportion of the variance in parental perception of functional severity of asthma ( $F(7, 57) = 5.02, p < .001; R^2 = .38; \text{Adjusted } R^2 = .31$ ).

The addition of physician severity rating at step 1 reliably improved prediction of functional severity of asthma ( $F_{inc}(1, 63) = 5.07, p < .05$ ). The addition of the psychosocial variables at step 2 significantly improved prediction of functional severity of asthma ( $F_{inc}(4, 59) = 3.58, p < .05$ ). Review of the regression coefficients indicated that family socio-economic status explained a significant proportion of the variance in functional severity of asthma. A higher family socio-economic status score indicated lower status. Thus, an increase in the socio-economic score (i.e. a reduction in status) corresponded to an increase in asthma severity.

Addition of child anxiety at step 3 did not significantly improve prediction of functional severity of asthma ( $F_{inc}(1, 58) = 3.32, p > .10$ ). However, inclusion of child somatisation at step 4 significantly improved prediction of functional severity of asthma ( $F_{inc}(1, 57) = 8.96, p < .005$ ). Review of the regression coefficients indicated that an increase in child somatisation corresponded to an increase in functional severity of asthma.

Interestingly, after the inclusion of child somatisation, child anxiety emerged as a significant predictor of functional severity of asthma. Unexpectedly, the direction of the standardised coefficient pertaining to anxiety indicated an inverse relationship between child anxiety and functional severity (after controlling for child somatisation), whereby an increase in anxiety corresponded to a decrease in functional severity of asthma. The significant change in the predictive value of child anxiety after inclusion of child somatisation suggests that child somatisation suppressed the relationship between child anxiety and functional severity of asthma.

Table 64 displays the regression coefficients ( $B$ ), standard error of the regression coefficients ( $SE\ B$ ), standardised regression coefficients ( $\beta$ ),  $t$  values, significance levels and the proportion of variance in functional severity of asthma explained by the set of predictors added at each step ( $\Delta R^2$ ).

Table 64 Summary of Regression Analysis for Variables Predicting Functional Severity of Asthma from Physician Severity, Parental History of Overprotection, Current Protective Parenting, Parental Overall Adjustment and Child Anxiety and Somatisation ( $n = 65$ )

Independent variable	B	SE B	$\beta$	t	p	$\Delta R^2$
Step 1						.074*
Physician severity rating	3.989	1.772	.273	2.251	.028	
Step 2						.181*
Physician severity rating	2.697	1.748	.185	1.543	.128	
Family socio-economic status	1.535	0.527	.335	2.914	.005	
History of overprotection	0.009	0.072	.149	1.257	.214	
Current protective parenting	-0.009	0.100	-.119	-0.945	.349	
Parental overall adjustment	0.008	0.068	.159	1.194	.237	
Step 3						.029
Physician severity rating	2.943	1.736	.201	1.695	.095	
Family socio-economic status	1.512	0.521	.329	2.901	.005	
History of overprotection	0.126	0.075	.209	1.689	.097	
Current protective parenting	-0.009	0.099	-.112	-0.898	.373	
Parental overall adjustment	0.007	0.067	.148	1.121	.267	
Child anxiety	-0.161	0.106	-.180	-1.524	.133	
Step 4						.097**
Physician severity rating	2.691	1.630	.184	1.651	.104	
Family socio-economic status	1.085	0.509	.237	2.132	.037	
History of overprotection	0.008	0.072	.125	1.045	.300	
Current protective parenting	-0.005	0.094	-.058	-0.488	.628	
Parental overall adjustment	0.002	0.065	.044	0.340	.735	
Child anxiety	-0.346	0.117	-.387	-2.960	.004	
Child somatisation	0.624	0.208	.433	2.993	.004	

\* $p = .011$ \*\* $p < .005$

### 5.11.2 Physician Rating of Asthma Severity

A logistic regression analysis was conducted to identify predictors of physician rating of asthma severity. The following variables were entered into the regression equation: family socio-economic status, parental history of overprotection, current protective parenting, parental overall adjustment, child anxiety and child somatisation. To maintain adequate variable to case ratio, the social variables (social support, global stress and coping) were not included in the analysis.

Table 65 displays the regression coefficients (B), standard error of the regression coefficients (SE B), the test statistic for each predictor (Wald) and associated significance level (p), the odds ratios (Exp B) and associated 95% confidence interval (95% CI).

Overall, there was a tendency for the measures to explain a significant proportion of the variance in physician rating of asthma severity ( $\chi^2 (6) = 10.57, p > .10; R^2 = .15$ ), with 89% of cases correctly classified using the set of predictors. However, while approximately 98% ( $n = 56$ ) of subjects with physician rated moderate asthma were correctly classified, only 25% ( $n = 2$ ) of subjects with physician-rated mild asthma were correctly classified.

The Wald statistic indicated that parental overall adjustment made an independent contribution to the prediction of physician severity rating (see table 65). The positive direction of the beta value indicates that parents of children with moderate asthma reported poorer overall adjustment than parents of children with mild asthma. Examination of the Exp B values indicates that children are 1.17 times more likely to have moderate asthma than mild asthma with a one-point increase in parental overall adjustment.

There was also a tendency for current protective parenting to explain a significant proportion of the variance in physician rating of asthma severity. The negative direction of the beta value indicates that parents of children with moderate asthma reported lower levels of protective parenting than parents of children with mild asthma.

Table 65 Summary of Logistic Regression Analysis Predicting Physician Rating of Asthma Severity ( $n = 65$ ,  $df = 1$ )

Independent variable	<u>B</u>	<u>SE B</u>	Wald	<u>p</u>	Exp <u>B</u>	95% CI	
						Lower	Upper
Family socio-economic status	.047	.461	0.011	.918	1.048	0.425	2.589
History of overprotection	-.004	.068	0.004	.949	0.996	0.871	1.138
Current protective parenting	-.146	.078	3.528	.060	0.865	0.743	1.006
Parental overall adjustment	.153	.075	4.166	.041	1.165	1.006	1.350
Child anxiety	.043	.110	0.156	.693	1.044	0.842	1.296
Child somatisation	.162	.192	0.714	.398	1.176	0.807	1.713

## 5.12 Brief Summary of Results

### 5.12.1 Direct Correlates of Child Anxiety

#### 5.12.1.1 *The role of psychosocial factors*

- As hypothesised, parental history of overprotection was significantly associated with child anxiety at a bivariate and multivariate level.
- In contrast to the hypotheses, current protective parenting and parental overall adjustment were not associated with child anxiety.

#### 5.12.1.2 *The role of asthma*

- As hypothesised, children with asthma were reported to have significantly higher levels of anxiety than children without asthma. Furthermore, a significantly greater proportion of children with asthma than children without asthma were identified to have clinical levels of anxiety and somatisation.
- The severity of the child's asthma was not associated with levels of anxiety.
- After controlling for the psychosocial factors, child asthmatic status was not associated with levels of child anxiety or clinical status of child anxiety.
- After controlling for the psychosocial factors, child asthmatic status was significantly associated with clinical levels of child somatisation and comorbid anxiety-somatisation.

### 5.12.2 Direct Correlates of Child Somatisation

#### 5.12.2.1 *The role of psychosocial factors*

- As hypothesised, parental history of overprotection was significantly associated with child somatisation at a bivariate and multivariate level. The relationship between parental history of overprotection and child somatisation was mediated by child anxiety.

- As hypothesised, parental adjustment was associated with child somatisation at a bivariate level and at a multivariate level (after controlling for child asthmatic status, which was identified as a suppressor).
- Contrary to the hypothesis, current protective parenting was not associated with child somatisation.

#### 5.12.2.2 *The role of asthma*

- As hypothesised, children with asthma were reported to have significantly higher levels of somatisation than children without asthma.
- The severity of the child's asthma (based on parental report) was significantly associated with levels of somatisation.
- After controlling for the psychosocial factors, child asthmatic status and parental rating of asthma severity remained significantly associated with child somatisation.

#### 5.12.3 **Direct Correlates of Current Protective Parenting**

##### 5.12.3.1 *The role of psychosocial factors*

- As hypothesised, parental history of overprotection, parental adjustment, global stress and social support were associated with current protective parenting at a bivariate level. However, parental coping was not associated with current protective parenting.
- Parental history of overprotection was associated with current protective parenting at a multivariate level. However, the other psychosocial factors were not associated with current protective parenting at a multivariate level, which is reflective of the interrelationships between the independent variables.
- Contrary to the hypothesis, there was no association between parental history of asthma and current protective parenting.

##### 5.12.3.2 *The role of asthma*

- As hypothesised, parents of children with asthma reported higher levels of protective parenting than parents of children without asthma.

- The association between child asthmatic status and protective parenting remained significant after controlling for parental history of overprotection and parental overall adjustment.
- Contrary to the hypotheses, neither the severity of asthma nor the degree to which the child's asthma was managed was associated with the level of protective parenting.

#### 5.12.4 Direct Correlates of Parental Overall Adjustment

##### 5.12.4.1 *The role of psychosocial factors*

- As hypothesised, parental history of overprotection, parental adjustment, global stress, coping and social support were associated with parental overall adjustment at a bivariate level.
- Global stress and social support remained significantly associated with parental overall adjustment at a multivariate level. However, parental history of overprotection and coping were not associated with parental overall adjustment at a multivariate level. This result reflects the interrelationships between the independent variables.
- Contrary to the hypothesis, there was no association between parental history of asthma and parental overall adjustment.

##### 5.12.4.2 *The role of asthma*

- Contrary to the hypothesis, parents of children with asthma did not have significantly poorer overall adjustment than parents of children without asthma.
- As hypothesised, asthma severity and duration since asthma was diagnosed were associated with parental overall adjustment.
- The number of consultations with the specialist and management of asthma were not associated with parental overall adjustment.
- Asthma severity ratings and duration since diagnosis were not associated with parental overall adjustment at a multivariate level.

## 5.12.5 Indirect Correlates of Child Anxiety and Somatisation

### 5.12.5.1 *The role of psychosocial factors*

- Parental overall adjustment did not mediate the relationships between the psychosocial variables and child anxiety.
- After controlling for child asthmatic status (suppressor), parental overall adjustment mediated the relationship between the set of psychosocial variables and child somatisation.
- Current protective parenting did not mediate the relationships between the psychosocial variables and child anxiety or child somatisation.
- Social support did not moderate the relationship between parental history of overprotection and child anxiety.
- Social support moderated the relationship between parental history of overprotection and child somatisation. This suggests that social support may buffer the impact of parental history of overprotection on levels of child somatisation.

### 5.12.5.2 *The role of asthma*

- Parental overall adjustment did not mediate the relationships between asthmatic status and child anxiety and somatisation.
- Parental overall adjustment did not mediate the relationship between asthma severity ratings and child anxiety.
- Parental overall adjustment partially mediated the relationship between the set of asthma severity ratings (in particular parental rating of functional severity) and child somatisation.
- Current protective parenting mediated the relationship between child asthmatic status and child anxiety (though support for condition 2 was very weak).
- Current protective parenting did not mediate the relationship between asthmatic status and child somatisation.
- Current protective parenting did not mediate the relationships between either asthma severity ratings and child anxiety or somatisation.
- Asthmatic status/severity did not moderate the relationship between parental history of overprotection and child anxiety.

- Asthmatic status moderated the relationship between parental history of overprotection and child somatisation, whereby the impact of parental history of overprotection on child somatisation was reduced if the child did not have asthma.
- Functional severity of asthma moderated the relationship between parental history of overprotection and child somatisation, whereby low asthma severity appeared to protect children from the impact of parental history of overprotection.

#### **5.12.6 Indirect Correlates of Current Protective Parenting**

##### *5.12.6.1 The role of psychosocial factors*

- Parental overall adjustment mediated the relationship between the set of social variables and current protective parenting.
- Social support did not moderate the relationship between parental history of overprotection and current protective parenting.

##### *5.12.6.2 The role of asthma*

- Neither asthmatic status nor asthma severity ratings moderated the relationship between parental history of overprotection and current protective parenting.
- Parental overall adjustment did not mediate the relationship between child asthmatic status/severity ratings and current protective parenting.

#### **5.12.7 Indirect Correlates of Parental Overall Adjustment**

##### *5.12.7.1 The role of psychosocial factors*

- Social support did not mediate the relationship between parental history of overprotection and parental overall adjustment.
- Social support partially mediated the relationship between global stress and parental overall adjustment.

- Social support fully mediated the relationship between parental coping and parental overall adjustment.
- Social support moderated the relationship between parental history of overprotection and parental overall adjustment. That is, social support appeared to protect individuals raised in an overprotective manner from having poor adjustment during adulthood.
- Social support did not moderate the relationships between global stress and parental overall adjustment, and coping and parental overall adjustment.

#### 5.12.7.2 *The role of asthma*

- Global stress, coping and social support did not mediate the relationships between child asthmatic status/asthma severity and parental overall adjustment.
- Social support did not moderate the relationship between child asthmatic status and parental overall adjustment.
- Social support moderated the relationship between parental rating of functional severity (but not physician severity rating) of asthma and parental overall adjustment, whereby greater levels of social support reduced the impact of functional severity of asthma on parental overall adjustment.

#### 5.12.8 **Correlates of Asthma Severity**

##### 5.12.8.1 *Parental perception of functional severity of asthma*

- Parental history of overprotection, current protective parenting and parental overall adjustment did not explain a significant proportion of the variance in parental rating functional severity of asthma.
- Family socioeconomic status explained a unique proportion of the variance in functional severity asthma.
- Only after controlling for child somatisation did child anxiety explain a significant proportion of the variance in parental rating of functional severity of asthma. However, unexpectedly, an increase in anxiety was associated with a decrease in asthma severity.
- After controlling for parental factors, child somatisation explained a significant proportion of the variance in parental rating of functional severity of asthma,

whereby an increase in somatisation was associated with an increase in asthma severity.

#### 5.12.8.2 *Physician severity rating*

- Parental overall adjustment was predictive of physician severity ratings after controlling for parental history of overprotection, current protective parenting and child adjustment. An increase in parental overall adjustment score (i.e. worsening adjustment) corresponded to a greater likelihood that the child will have *moderate* asthma.
- Current protective parenting was predictive of physician severity ratings after controlling for parent history of overprotection, parental overall adjustment and child adjustment. An increase in protective parenting corresponded to a greater likelihood that the child will have *mild* asthma.
- Family socioeconomic status did not explain a unique proportion of the variance in physician severity ratings.

## 6 Discussion

Anxiety in children younger than 5 years of age has been seldom studied (Spence et al., 2001). Children of all ages experience varying levels of anxiety and the experience of anxiety (e.g. fears, worries) is believed to be a normal part of development (Gullone, 1996). However, some children experience exceedingly high levels of anxiety, which may impair their quality of life. The identification of correlates of anxiety in very young children may allow for early identification of children at-risk for anxiety and guide the development of preventative and intervention programs.

This section provides a brief overview of the factors identified in the current study that may contribute to high levels of anxiety in young children. The level and prevalence of anxiety in the current sample is then discussed followed by a brief review of the levels of parental mental health problems and protective parenting. Next, there is a substantive discussion of the factors connected to child anxiety and associated issues. Finally there is a discussion on the measurement of anxiety in very young children.

### 6.1 Overview of Main Research Aims and Findings

The primary aim of this research study was to examine parental and social factors directly and indirectly associated with anxiety in a sample of young children. Additionally, the role of asthma in anxiety was considered.

Anxiety was measured using the anxiety and somatisation subscales of a parent-completed questionnaire. Based on knowledge regarding the expression of anxiety in very young children (Schniering et al., 2000; Winnicott, 1987), the current study assumed that somatisation is an expression of anxiety in young children. Thus, both the anxiety and somatisation subscales were used as a measure of anxiety. The validity of this assumption is discussed at a later stage.

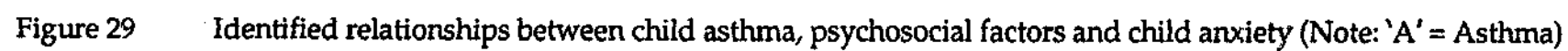
A secondary aim of this research study was to examine whether asthma-specific variables (e.g. severity of asthma, management of asthma, duration since asthma diagnosis) were directly and/or indirectly associated with childhood anxiety. A final exploratory question was

whether there were any associations between psychosocial factors and asthma severity (treated as the outcome variable).

The extensive data analyses assessed a number of relationships among the multiple psychosocial variables measured in the study, as depicted by the conceptual model in Figures 29 and 30. Figure 29 includes child anxiety, as assessed using the anxiety subscale. Figure 30 includes child somatisation, which may reflect anxiety. The bold arrows indicate relationships that received statistical support at a multivariate level. Two important reservations need to be acknowledged when interpreting the conceptual models. Firstly, each pathway was assessed using a separate series of analyses, thus overall model fits could not be estimated. Secondly, despite the inclusion of the arrows on the pathways, the current study did not assess causality. Rather, the direction of the pathways enables identification of which variables were treated as independent or dependent variables in each analysis. As seen, there were a number of inter-relationships between the variables. In particular:

1. Parental history of overprotection (i.e. the study child's parent's recollection of how they were raised) is a strong contributing factor to levels of anxiety in young children, as measured using either the anxiety or the somatisation subscale.
2. Poorer parental adjustment is associated with child somatisation (and thus possibly anxiety).
3. The social factors, including social support, global stress and coping, showed an indirect association with levels of anxiety in young children, via associations with parental adjustment.
4. Having asthma is directly and indirectly related (via associations with protective parenting) to child anxiety, as measured by the somatisation subscale. The association between child asthma and child anxiety, as measured by the anxiety subscale was not significant *after* accounting for the psychosocial variables. However, pathways leading from child asthmatic status to child anxiety, as measured by the anxiety subscale, were not supported.

Overall, the statistical analyses provided mixed support for the multiple hypotheses. The complex inter-relationships identified between the psychosocial factors indicate an ecological approach is required to learn about anxiety in very young children. Future research needs to examine the role of other, unmeasured psychosocial factors in relation to child anxiety.



**Figure 29** Identified relationships between child asthma, psychosocial factors and child anxiety (Note: 'A' = Asthma)

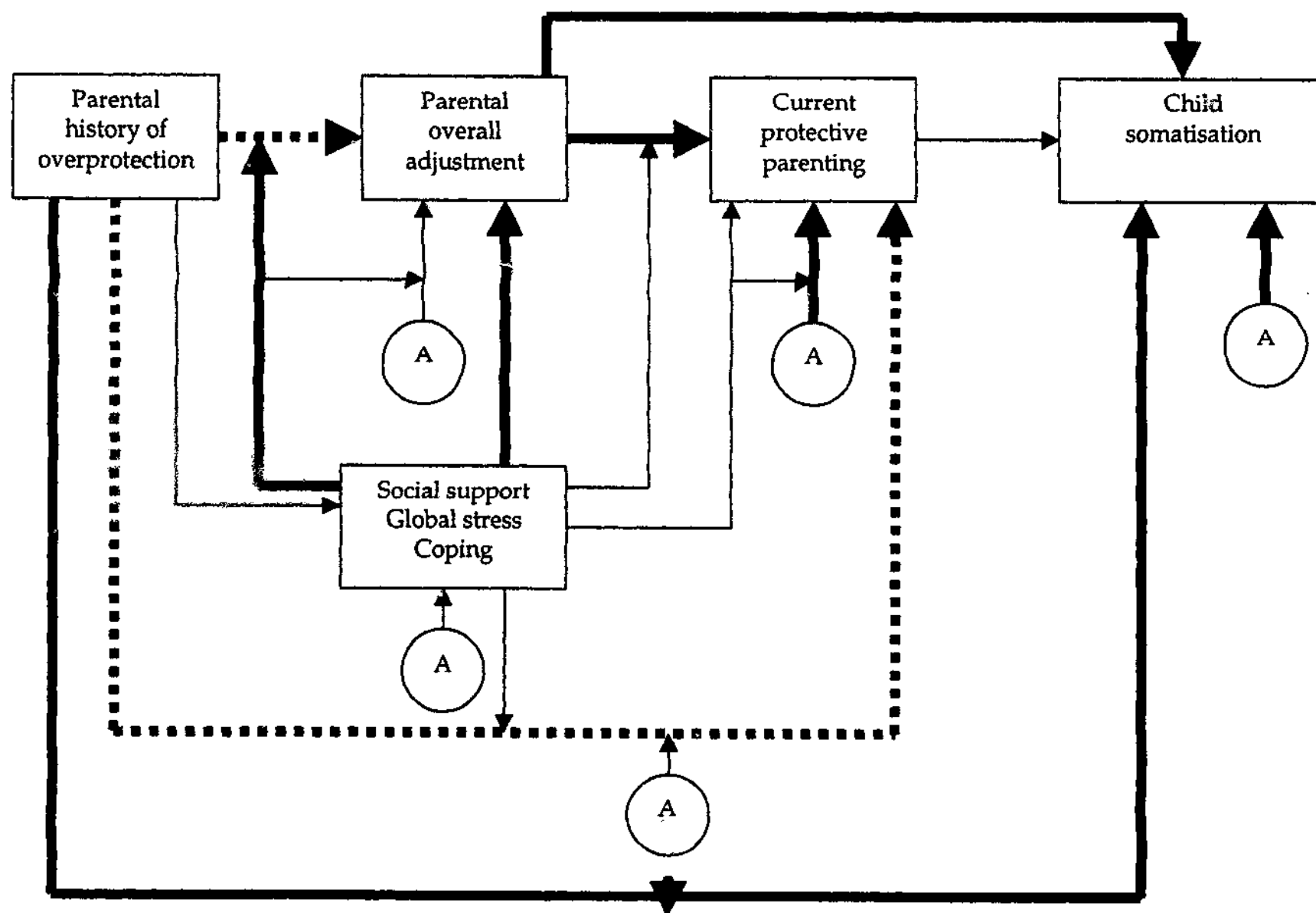


Figure 30 Identified relationships between child asthma, psychosocial factors and child somatisation (Note: 'A' = Asthma)

## 6.2 Psychosocial Problems within the Current Sample

### 6.2.1 Levels and Prevalence of Anxiety and Somatisation Symptoms

This study is among the first to report levels of anxiety in a sample of very young (between 2 years 6 months and 5 years 11 months) Australian children. Comparisons between this study and previous studies on anxiety prevalence in young children are limited due to study differences.

The majority of past research has used samples of children 4 years and older and measured anxiety/depression or 'internalising' problems, which typically include symptoms of anxiety, depression and withdrawal. While a comparison of mean scores is inappropriate, a comparison of prevalence rates can provide some benchmark regarding the severity of problems experienced by children in the current sample. Generally, compared to Australian and international studies (Briggs-Gowan et al., 2001; Sawyer, Arney et al., 2001) the prevalence of anxiety problems is higher in the current sample.

Prevalence rates of anxiety and somatisation in the current study are higher than those reported in comparable Australian studies (Sawyer, Arney et al., 2001; Zubrick et al., 1995). A recent Australian national survey of mental health (Sawyer, Arney et al., 2001) indicated a prevalence of 3.5% for anxiety/depression among a sample of 4083 children aged 4 to 17 years. Similarly, a large-scale study of West Australian children aged 4 to 11 years indicated a 3.5% prevalence rate for anxiety/depression (Zubrick et al., 1995). Results of the current study indicated a prevalence rate of 11.7% for clinically significant anxiety problems (34.0% at-risk). These higher rates are possibly related to the use of a sample of children with asthma. A specific discussion of the anxiety-asthma relationship is presented in section 6.4.

As stated previously, both the somatisation subscale and the anxiety subscale of the BASC were used to measure anxiety. Australian prevalence studies have estimated 7.3% of children aged 4 to 17 years (Sawyer, Arney et al., 2001) and 4.7% of children aged 4 to 11 years (Zubrick et al., 1995) have clinically significant levels of somatisation. The prevalence of somatisation was significantly higher in the current study (29.0% at-risk and 13.6% clinically significant).

Spence et al. (2001) reported prevalence estimates of anxiety symptoms in 510 children aged 3 to 5 years attending kindergartens and preschools in metropolitan Sydney and Brisbane. While the current study used a different questionnaire, on face value some items comprising each questionnaire appeared to measure similar symptoms of anxiety. On items pertaining to worries, Spence et al. reported prevalence rates ranging from 1.0 to 4.3 compared to prevalence rates ranging from 6.8 to 19.4 in the current study. On items assessing fears, Spence et al. reported prevalence estimates ranging from 4.0 to 17.8 compared to prevalence rates ranging from 8.7 to 14.6 in the current study. General worries were higher among the current sample compared to Spence's sample, but levels of fears were comparable. Though limited, this comparison may provide a benchmark for the prevalence of anxiety within the current study.

A further explanation for the varying prevalence estimates across studies may be due to methodological issues. Measures used in the studies varied. The samples also vary across studies. Firstly, the cited Australian studies have included a broad age range of children and adolescents. Research has demonstrated that anxiety decreases with age (Gullone, 1996). Thus, the inclusion of adolescents in the Australian studies may have reduced the prevalence rates.

#### 6.2.2 Levels of Protective Parenting

The overall level of protective parenting was slightly lower in the current study compared to the normative data reported by Thomasgard et al. (1995). Furthermore, the mean level of protective parenting in the current sample was lower than in the normative sample within age groups. Cultural and socioeconomic factors may explain the differences. The normative sample comprised American parents, primarily of middle class status. In the current study, there was a slight skew towards the middle-class status, but there appeared to be a broader representation of socioeconomic status.

As with the normative sample, the current sample demonstrated an association between increasing child age and lowering levels of protective parenting. Developmentally, a reduction in protective parenting is expected with increasing child age and healthy separation-individuation of the child from the parent. With increasing cognitive and physical development, children naturally become better equipped and motivated to explore their environment to varying degrees. The reduction in protective parenting with increasing age

reflects the parent's capacity to endorse the child's emerging autonomy (Thomasgard, Metz et al., 1995).

### 6.2.3 Levels of Parental Adjustment

According to the GHQ, the parent participants in the current study had slightly poorer overall psychological adjustment compared to other Australian (Smith & Prior, 1995; A. W. Taylor et al., 2000) and international samples (D. P. Goldberg & Hillier, 1979). Strikingly, 34% of the current sample was identified as having clinically significant mental health problems, compared to approximately 20% of a random sample representative of South Australian adults (A. W. Taylor et al., 2000). It is noteworthy that reporting of psychological problems is highly sensitive to the manner in which information is gathered (A. W. Taylor et al., 2000). Social desirability may be a particular problem when gathering information from parents of young children. Anecdotally, some parents questioned the relevance of parental adjustment to child anxiety and therefore may have felt inclined to project an image of coping well. Thus, it is important to acknowledge that parents in the current study may have actually *under-reported* their levels of psychological distress.

The reasons for poorer psychological adjustment in the current sample compared to other Australian samples (Smith & Prior, 1995; A. W. Taylor et al., 2000) and the normative sample (D. P. Goldberg & Hillier, 1979) are unclear. Contextual and situational factors may have raised parental levels of emotional distress.

The slightly higher morbidity rates in the current sample compared to the study by A. W. Taylor (2000) may be partly accounted by geographic location. Previous research has indicated that psychological problems are more prevalent among metropolitan samples. The current sample was drawn from metropolitan areas, whereas a proportion of Taylor's sample was from rural areas. Marital status has also been implicated as a factor associated with psychological adjustment (A. W. Taylor et al., 2000). Similar associations were reported in the current sample, with approximately 77% (10 out of 13) of divorced, separated or single participants reporting clinical mental health problems. Pregnancy may also contribute to poorer parental overall adjustment (sixteen of the respondents were pregnant when they participated in the current study).

In contrast to A. W. Taylor's (2000) study, all respondents in the current study were a parent of at least one child. The responsibilities of caring for a young child may have a negative effect on psychological adjustment.

Furthermore, the mean age of respondents in the current sample was also younger than that in the study conducted by A. W. Taylor (2000), which comprised adults aged from 18 to 75+ years. A. W. Taylor (2000) reported that younger age is associated with mental health problems. In Taylor's study, approximately 32% of 18 to 24 year olds, 22% of 25 to 34 year olds, and 25% of 35 to 44 year olds were identified as having a mental health condition according to the GHQ. Results from the current study are more consistent when the relative age ranges in the earlier study are used for comparison.

The time of data collection may have also influenced the results of the current study. A significant proportion of the sample participated over the Christmas period. Anecdotally, many of these parents reported higher levels of stress, which they associated with preparing for Christmas. The current sample may have therefore been exposed to a greater number of risk factors for poor psychological overall adjustment.

### 6.3 Factors Associated with Anxiety in Young Children

The current research study assessed a number of parental and social factors, which may place children at greater risk for heightened levels of anxiety. The main factors assessed were parental history of overprotection, current protective parenting, parental adjustment and parental social support, global stress and coping.

Though not a focus of the current study, it is important to note that parental history of asthma was not associated with child anxiety and somatisation. Furthermore, child birth order, hours in child care (per week), socio-economic status, gender and parental history of asthma were not associated with child anxiety/somatisation. The association between child age and anxiety was indicative of the developmental aspect of anxiety.

#### 6.3.1 The Role of Past and Current Protective Parenting and Parental Adjustment

The current study provided mixed support for the inter-generational associations implied by attachment theory.

Parental recollection of the degree of protection from their parent as a child was weakly associated with parental overall adjustment. This result suggests that the parenting they received in childhood may have influenced the development of their emotion regulation, which could then have an impact on psychological adjustment in adulthood.

Parental overall adjustment was also weakly associated with current levels of protective parenting. Parents may attempt to reduce their levels of psychological distress through parenting strategies. In turn, this may limit a child's development of emotional regulation strategies and place them at risk for emotional problems such as anxiety.

Whilst parental overall adjustment was not associated with child anxiety it was significantly associated with child somatisation. Poorer parental adjustment may impact on the parent's sensitivity to the child's needs and inadvertently place the child at risk for emotional problems.

It was expected that parents' recollection of how they were raised might provide insight into their internal working models of parent-child relations and thus protective parenting behaviours. Therefore, it was anticipated that current protective parenting would be associated with child anxiety/somatisation. Analyses indicated that parental history of overprotection was weakly associated with current protective parenting. However, current protective parenting was not associated with child anxiety and somatisation. Rather, a strong direct association existed between parental history of overprotection and child anxiety/somatisation.

The following sections discuss each aspect of the intergenerational relationships between past and current protective parenting, parental adjustment and child anxiety.

#### 6.3.1.1 *The influence of protective parenting on adult emotional adjustment*

There was a positive association between a history of overprotective parenting (as reported by parents) and psychological adjustment as an adult. This finding adds to the large body of research, which highlights the importance of early parent-child relationships for adjustment during adulthood (Alnaes & Torgersen, 1990; Parker, 1983; Parker et al., 1979; Rohner & Rohner, 1980). Empirical research has also reported associations between the degree to which an individual felt cared for by their parent as a child (caring dimension of the PBI) and psychological adjustment during adulthood (Alnaes & Torgersen, 1990; Leon & Leon, 1990; Mancini et al., 2000; Parker et al., 1979; Rapee, 1997); this factor was not examined in the current study.

It is noteworthy that the magnitude of the association between history of overprotection and adjustment during adulthood (i.e. parental overall adjustment) was relatively weak, possibly due to the influence of other factors. Indeed, the current study demonstrated that parental history of overprotection was no longer significantly associated with parental overall adjustment after controlling for other psychosocial factors (in particular social support and global stress). Further analyses identified social support as a moderator (but not a mediator) of the relationship between history of overprotection and parental overall adjustment. Hence, parents with a history of overprotection may be at risk of poorer psychological adjustment as an adult, particularly if they have limited social support. Conversely, parental perception of adequate or high levels of social support appeared to mitigate the potentially adverse effect of being raised in a protective way when it came to parental adjustment as an adult. These

findings lends support to the notion that an individual's working model of relationships may be modified by other factors (Bowlby, 1969, 1973, 1980).

#### 6.3.1.2 *The influence of parental adjustment on current protective parenting*

An association between parental adjustment and current levels of protective parenting was demonstrated. Overprotective parenting may be a consequence of the parent's core belief that the world is unsafe. Such cognitions are indicative of anxiety. Rapee (2001) suggested that parents may behave in a protective and controlling manner to reduce their own emotional distress as well as their child's anxiety.

Importantly, the association between parental overall adjustment and levels of current protective parenting was relatively weak. This may be due to measurement issues associated with the PPS and/or the GHQ. The PPS includes items that are typical daily events, and thus may not adequately capture the degrees to which parents protect very young children. A measure assessing parenting *style* rather than behaviours may be more informative. Stronger associations between parental overall adjustment and current protective parenting might be expected among parents with clinically significant levels of psychological distress, as the presence of other psychosocial adversities is likely to impede their capacity to cope well.

Following an ecological framework, other factors may moderate or mediate the relationship between parental adjustment and current protective parenting. For example, parents with heightened levels of emotional distress, but who receive good levels of social support, may be less likely to be highly protective than parents with heightened levels of emotional distress but who receive very low levels of social support. Analyses using the current sample, however, did not demonstrate that social support moderated the relationship between parental adjustment and current protective parenting. The most likely explanation for this finding relates to the issues associated with the measure of current protective parenting (discussed in section 6.3.1.8).

#### 6.3.1.3 *The influence of parental adjustment on child anxiety*

Surprisingly the hypothesis that parental overall adjustment would be associated with child anxiety, as measured by the BASC anxiety subscale, was not supported by the data in the current study. This result may partly reflect difficulties associated with the measurement of

child anxiety using items relating to 'typical' anxiety symptoms. Parents may have difficulty recognising the characteristics of anxiety represented on the BASC anxiety subscale, and/or very anxious children may express their anxiety in alternative and perhaps more recognisable forms (e.g. somatically).

Research using samples of older children and adolescents have highlighted difficulties associated with parental assessment of internalising problems, such as anxiety. In both community and clinical populations, children and adolescents (irrespective of gender) report significantly higher levels of internalising problems than mothers, fathers and teachers. The subjective nature of internalising problems and difficulties and limitations imposed on assessment has been discussed by many researchers (Northam, Prior, Sanson, & Oberklaid, 1987; Rey, Schrader, & Morris-Yates, 1992; Sawyer, Baghurst, & Clark, 1992; Sawyer, Baghurst, & Mathias, 1992; Sawyer, Clark, & Baghurst, 1993; Zubrick et al., 1997). Ideally, the measurement of anxiety should also include self-reports, though clearly this is very difficult in very young children. The issues associated with the measurement of child anxiety are discussed in section 6.5.

As expected, parental overall adjustment was associated with the child somatisation subscale (after controlling for child asthmatic status, which was identified as a suppressor). Parents with psychological problems may be less sensitive to their child's needs; the parent may not recognise his or her child's emotional distress and thus not provide the child with the assistance required to reduce distress (Crockenberg & Leerkes, 2000; A. B. Thompson et al., 1994). Modeling of maladaptive emotional regulation strategies also provides a powerful learning mechanism for young children. For example, a child might observe his/her parent managing their anxiety through avoidance of the stressful stimuli and then use this as a coping mechanism (Crockenberg & Leerkes, 2000; Spence & Dadds, 1996; A. B. Thompson et al., 1994). In consideration of these issues it seems logical to expect children of parents with heightened emotional distress to also experience higher levels of emotional distress. A number of other research studies using clinical and non-clinical samples have also demonstrated associations between parental and child adjustment (Bernstein et al., 1996; Briggs-Gowan et al., 2001; Krain & Kendall, 2000).

Whilst an interpretation of the current findings suggests that poor parental adjustment may lead to increased child emotional distress, conclusive remarks about causality cannot be made.

The association between parental adjustment and child somatisation may actually be indicative of a coercive cycle of parent-child interactions (Konchanska et al., 1997; Rubin, Stewart et al., 1995). An anxious child who complains of somatic problems may contribute to parental distress, which may then reduce the parents' capacity to assist the child in effectively managing their anxiety, in turn potentially resulting in escalating child distress. This cycle may be more pronounced when the child has asthma.

The positive (though relatively weak) association between parental overall adjustment and child somatisation may partly reflect parental bias. A large body of research has assessed factors that may compromise the objectivity of parental reports of child adjustment (Cobham et al., 1999; Najman et al., 2001). According to the depression-distortion hypothesis (Richters & Pellegrini, 1989), parents with poorer psychological adjustment have a cognitive bias, which distorts their judgments of their child's behavioural and emotional functioning. In contrast, parents with very good psychological adjustment may view their child in a particularly positive manner and therefore minimise problems.

Many studies suggest that maternal reports of child behavioural problems are influenced by the mothers' mental state (Carter, Garrity-Rokous, Chazan-Cohen, Little, & Briggs-Gowan, 2001; Mangelsdorf, Gunnar, Kestenbaum, Lang, & Andreas, 1991; Mednick, Heccevar, Schulsinger, & Baker, 1996; Richters & Pellegrini, 1989; Webster-Stratton & Hammond, 1988). A study by Frick and colleagues indicated that mothers with anxiety problems tended to over-report symptoms of anxiety in their children aged 9 to 13 years, but not children aged 6 to 8 years (Frick, Silverthorn, & Evans, 1994). A study by Krain and Kendall (2000) using a sample of 239 children aged 7 to 15 years seeking treatment at an anxiety clinic demonstrated that parents reported higher levels of child anxiety than the children. Parental anxiety was not implicated as biasing parental reports of child anxiety. However, parental depression appeared to heighten parental reports of child anxiety.

Conversely, a large study of 5277 adolescents and their mothers (Najman et al., 2001) indicated that parents with 'borderline' levels of anxiety/depression were more accurate raters of their child's internalising problems than parents with either low levels or very high levels of anxiety/depression. It may be that parents with moderate levels of psychological distress are relatively objective raters, as they may not view their child's behaviours in either an overly optimistic nor pessimistic manner. Indeed, a review of studies on to the depression-distortion

hypothesis indicated minimal evidence for parental bias (Richters, 1992). The lack of multiple informants of child emotional functioning limits the degree to which one can conclude that parental judgments are accurate. However, based on past research, it is reasonable to place relative confidence in parental reports.

It is important to acknowledge that despite the significant relationship, a large proportion of the variance in child somatisation was not explained by parental adjustment. As discussed below, issues associated with the measurement of parental adjustment may need to be addressed in future research.

Whilst the GHQ is a widely used measure, it may not adequately capture the emotional distress experienced by parents of young children, thus minimising associations with the child somatisation (and anxiety) subscale. The GHQ provides a measure of recent psychological adjustment rather than usual psychological adjustment (i.e. state rather than trait). The parents' stable psychological characteristics may have more of an impact on the child's emotional adjustment. For example, the impact of high levels of current parental distress on the child's emotional state may be less significant if the parent is typically well-adjusted than if the parent is typically distressed. It may therefore be more useful to assess the association between parents' typical psychological state and child anxiety.

It is also possible that the relationship between parental and child adjustment is influenced by the developmental stage of the child. For example, a 4 year old child who has some strategies to independently manage his/her emotions might be protected from the impact of a parent with recent heightened psychological distress. Conversely, a 2 to 3 year old child may be more dependent on the parent for assistance in managing personal emotional distress and thus may be at greater risk of developing high levels of anxiety.

Finally, the role of other psychosocial variables may impact on the relationship between parental adjustment and child somatisation. The relationship between parental and child adjustment needs to be considered using an ecological framework. Importantly, the current study examined the role of parental and social factors with respect to the relationship between parental and child adjustment. Parental adjustment was shown to mediate the set of parental/social factors (parental history of overprotection, social support, global stress and coping) and child somatisation. The importance of the social factors, discussed in section 6.3.2, appeared to outweigh the influence of parental history of overprotection.

#### 6.3.1.4 *The influence of parental history of protective parenting on current protective parenting*

In support of attachment theory, the current study demonstrated an association between parental history of overprotection and current protective parenting. Proponents of attachment theory argue that an internal working model, developed through parent-child interactions during the first few years of life, guides future interactions (Hinde, 1983; Rutter, 1995; Sroufe, 1988; R. A. Thompson, 1998). For example, adults raised in an overprotective manner during their childhood may develop a core belief that the world is a 'dangerous' place, from which one requires protection. This belief may be reflected in the internal working model, which guides them to be highly protective of their own child (Ainsworth et al., 1978; R. A. Thompson, 1998).

However, it is notable that the strength of the association between past and current protective parenting was relatively weak. Some past studies have reported insignificant associations between current protective parenting and parental history of overprotection (using the PPS and PBI, as in the current study) (Thomasgard & Metz, 1999).

As discussed, attachment theory proclaims that internal working models are not immutable. Thus, while the early parent-child relationship is said to guide the development of an internal working model, subsequent relationships may modify the internal working model. For example, it could be expected that the level and quality of perceived social support might impact on a parent's early experience and subsequent interactions. However, there was no empirical support for this proposition in the current study; social support did not moderate the relationship between past and current protective parenting. Similarly, a recent study using a sample of 73 mothers and their 5 to 7 year old children suggested that social support did not seem to mitigate the effects of early attachment relationships (Meyers, 1999). While clearly an individual who was raised in an overprotective manner is not destined to become an overprotective parent, the current study did not explore other factors (e.g. the marital relationship) that may have influenced the relationship between an experience of being raised in a protective manner and their parenting of their own child.

The relatively weak association between past and current protective parenting may be partially attributed to sample characteristics. Few parents indicated histories of extreme overprotectiveness and the levels of current protective parenting appeared lower than the

American normative data. It is noteworthy that the current study did not measure parental perception of the past paternal protectiveness. Whilst it is reasonable to assume that mothers were the principal caregivers of the parents who participated in the study during their childhood, the influence of the father's parenting history should not be ignored.

#### 6.3.1.5 *The influence of current protective parenting on child anxiety*

The finding that current protective parenting was *not* significantly related to child anxiety (using either the anxiety or somatisation subscale) conflicts with the theoretical presupposition. According to attachment theorists, parents provide a secure and protective base from which their child may operate (Bowlby, 1969, 1973, 1980). A secure attachment provides the child with the capacity to explore the environment and develop autonomy, with the knowledge that he/she may retreat to the parent for safety and comfort. Children who have the opportunity to develop age-appropriate autonomy will be more likely to demonstrate healthy emotional development. Conversely, parents with a tendency to behave in an overprotective manner may limit a child's opportunities for exploring and gaining age-appropriate independence. High levels of parental protection may foster a child's dependence on the parent, and prevent the child from learning how to manage his/her emotions in various situations (Krohne, 1990; Krohne & Hock, 1991; Spence & Dadds, 1996).

There are a couple of probable explanations for the null association between current protective parenting and child anxiety (measured by anxiety/somatisation subscales). It is possible that the impact of protective parenting on the emotional status of the child will become increasingly evident as the child gets older and attempts to individuate from the parent. Issues associated with the measurement (discussed in section 6.3.1.8) of current parenting may have also precluded a statistically significant association between current protective parenting and child anxiety.

#### 6.3.1.6 *The influence of parental history of overprotection on child anxiety*

Parental history of overprotection was expected to be *directly* associated with child anxiety. Indeed, analyses provided strong support for this hypothesis (irrespective of whether the BASC anxiety and somatisation subscale was treated as the outcome variable). This was the most

prominent finding of the current study, providing strong support for a *direct* influence of protective parenting on the emotional adjustment of the next generation.

Parental history of overprotection was also expected to be *indirectly* associated with child anxiety, via current protective parenting. Attachment theory states that early parent-child relationships influence the development of internal working models, which then guide the way an individual will relate to others (Bowlby, 1969; R. A. Thompson, 1998). For example, parents raised in a protective manner may develop an internal working model that leads to them raising their own child in a protective manner. High levels of protection limit the child's opportunities to develop effective skills for emotion regulation, thus increasing the likelihood for anxiety problems.

As discussed, the association between past and current protective parenting was relatively weak though significant. This provides some limited support for the first link. However, the second link was not supported, as the measure of current protective parenting was not associated with child anxiety. Thus, the *indirect* association between parental history of overprotection and child anxiety was *not* supported.

A possible explanation for the weak association between past and current protective parenting is that the two measures used in the current study may have captured somewhat *different* aspects of protective parenting. Furthermore, the problems associated with the measure of current protective parenting may have limited the association between past and current parenting (the first link) and precluded an association between current parenting and child anxiety (the second link). Numerous other studies (see Rapee, 1997) have demonstrated support for an association between current protective parenting and child anxiety - the unsupported link in the current study. Given the past empirical support for the tenets of attachment theory, it would be premature to conclude that past protective parenting is *not indirectly* associated with child anxiety (Ainsworth et al., 1978; Bowlby, 1969, 1973, 1980; R. A. Thompson, 1998).

In line with attachment theory (Bowlby, 1969; R. A. Thompson, 1998), the current study also identified social support as a moderator between parental history of overprotection and child somatisation. Specifically, the relationship between parental history of overprotection and child somatisation was strongest when levels of social support were below average. Assuming the measure of parental history of overprotection provides insight into current parental protection

(largely not captured by the PPS), the presence of social support may assist parents who were raised in a protective manner to modify their parenting. In turn, this may promote healthy development of their child's emotion regulation skills.

#### 6.3.1.7 *Summary: an intergenerational pattern emerges*

In summary, attachment theory suggests an intergenerational pattern between levels of psychological distress and protective parenting. Attachment theory also implies that parental history of overprotection may impact on anxiety in the children of the next-generation.

Parents raised in a protective manner are at risk for psychological problems during adulthood. The way a parent was raised has some influence on the way the parent interacts with his or her own child. If past parenting has been overprotective there is a risk of poor psychological adjustment in adulthood and a repetition of the same parenting style with their own children. In turn, the child is at risk of psychological problems, such as anxiety. The current study provided support for each of these associations except the association between current protective parenting and child anxiety. The strongest support was for the hypothesis that parental history of overprotection is directly related to child anxiety/somatisation. The direct link between current protective parenting and child anxiety may strengthen as the child gets older and attempts to individuate from the parent.

#### 6.3.1.8 *Assessment issues associated with protective parenting*

Issues with the measurement of protective parenting may shed further light on the relatively weak inter-generational associations of protective parenting, the weak association between parental adjustment and current protective parenting and the insignificant associations between child anxiety/somatisation and protective parenting.

The measure of current protective parenting (the PPS) used in the current study demonstrated adequate psychometric properties. The questionnaire was developed using an American sample and may not be appropriate for use in Australia. No Australian studies using the PPS were identified. The mean levels of protective parenting reported by parents in the current study appeared relatively lower than the normative sample and only a limited number of parents whose scores identified them as behaving in an *overprotective* manner (using the cutoff

recommended by Thomasgard and Metz, 1995). A lower cut-off may be more appropriate for an Australian sample.

The assessment of current parenting methods is fraught with difficulties (Rapee, 1997). Questionnaire items generally have negative connotations, thereby increasing the likelihood of response bias reflecting lower levels of protective parenting than is actually the case. A questionnaire such as the PPS may be particularly subject to social desirability as parents may be reluctant to openly acknowledge protective tendencies toward their child. Past research has attempted to avoid the problem of social desirability by asking the child to report on their parents' behaviours. This approach was not possible in the current study due to the very young age of the children.

The content of the questionnaire may also explain the poor associations between current protective parenting and child anxiety/somatisation, parental overall adjustment and parental history of overprotection. The PPS includes questions about typical daily events rather than parental behaviours during stressful situations. Parental protection during daily interactions may not provide an accurate portrayal of a parental behaviour during situations that are likely to elicit emotional distress. Observational measures of parenting may provide an insight to parenting styles, though even this approach is limited by contextual factors (Gartland & Day, 1999; Hermanns et al., 1989; Kavanagh, 1992; Pettit & Bates, 1989; F. S. Wamboldt et al., 1995). Furthermore, other questionnaire measures of parenting often comprise items with negative connotations (e.g. Bavolek, 1984; Block, 1965; Cohler et al., 1970; Loyd & Abidin, 1985).

The role of child gender also needs to be further examined. The current study did not demonstrate a bivariate association between protective parenting and child gender. However, previous studies have indicated the relationship between parental overprotection and child internalising problems may differ according to child gender (Bowen et al., 1995).

Given the limitations associated with the PPS, and the results of the current study, it may be reasonable to view the measure of parental history of overprotection (the PBI) as a more appropriate indicator of current parenting than the measure of current protective parenting. The PBI is a well-validated Australian measure, which demonstrated excellent psychometric properties in the current study. Parents may feel less concerned about disclosing the way they were raised than disclosing how they raise their own child. The PBI was used to provide insight into the way in which the parent was raised during his/her first 16 years of life. As

discussed above, early parent-child interactions influence the development of an individual's internal working model of relationships, which may then guide the way the parent relates to his/her child.

### 6.3.2 The Role of Social Factors

Researchers have emphasised the importance of assessing the role of many social factors in relation to a child's emotional adjustment (Belsky, 1980; Bronfenbrenner, 1977). Past research has reported equivocal associations between life events (which are strongly associated with parental perception of life stress), social support and child adjustment. Studies that have demonstrated associations between the experience of adverse life events and internalising problems among very young children have made comparisons between high-risk and low-risk samples, maximising the chance of group differences (Goodyer et al., 1988; Prior, Sanson, Smart, & Oberklaid, 1999; Shaw et al., 1997). Studies using community samples have failed to identify similar associations (Lavigne et al., 1996).

The current study sought to identify social factors associated with protective parenting and parental adjustment. Understanding the role of social factors in regard to child anxiety will assist in the development of interventions for young children with high levels of anxiety.

#### 6.3.2.1 *Social factors and protective parenting*

In line with past research (Ge et al., 1994; McLoyd, 1995; Prior, Sanson, Smart, & Oberklaid, 1999), parental perception of global life stress and social support were weakly associated with current protective parenting. Moreover, as previously suggested, parental adjustment may mediate the relationship between life stress and current protective parenting. Similar associations have been reported in past studies (Conger et al., 1984; Ge et al., 1994; R. D. Taylor et al., 1997). Parents with greater global stress may have higher levels of psychological distress, which they may attempt to reduce through parenting in a relatively protective manner. It is important to acknowledge that the associations reported in the current study were relatively weak and are therefore not conclusive.

Analysis indicated that, contrary to the hypothesis, current protective parenting did not mediate the relationship between parental perception of global stress/social support and child anxiety/somatisation. The insignificant association between protective parenting and child anxiety/somatisation violated a criterion to support the hypothesised mediating relationship. Reasons for this insignificant relationship have been discussed.

#### 6.3.2.2 *Social factors and parental adjustment*

Consistent with past research (Crnic & Greenberg, 1990; Crnic, Greenberg, Robinson, & Ragozin, 1984; Donahue Jennings, Stagg, & Connors, 1991; Mebert, 1991), there was strong support for the hypothesis that social support and life stress are associated with parental adjustment. There was also a weak association between parental coping and adjustment.

While it is possible that parental report of social support is biased by level of psychological adjustment, it is the *perception* of support that is deemed particularly important. A perception of lower levels of social support may create a sense of isolation and loneliness and increase the likelihood of cognitive distortions that may lead to heightened levels of distress, such as depression or anxiety (both of which are assumed to be partially captured by the GHQ). As the demands of caring for a young child can be a challenging experience, parents of young children may be particularly vulnerable to the impact of limited social support. Parents of young children may have many concerns and questions regarding the care of their child. As indicated, the perception of having limited social support may impact on the parents' ability to manage their own emotions. In turn, this may limit the parents' capacity to meet their child's needs and this may impact on child adjustment.

A link between global stress, stressful life events, coping and psychological problems is well established (Smith, 1992; Smith & Prior, 1995). However, the majority of people exposed to stressful life events and/or who report life difficulties do not become depressed (Kessler, 1997). Past research has implicated the role of social support as a buffer against the impact of life events/stress on psychological adjustment (Sherbourne, 1988; Sherbourne et al., 1992) and/or as a mediator between life events/stress and psychological adjustment (Quittner, Glueckauf, & Jackson, 1990).

The current study provided no evidence for social support as a *moderator* of the relationship between global stress, coping or life events and parental adjustment. However, social support *mediated* the relationship between life events and parental adjustment, and coping and parental adjustment. A large proportion of the current sample included children with asthma. Parents of children with asthma may experience additional responsibilities and stressors, which may in turn limit their ability to develop social relationships and thus receive as much social support as parents of children without a chronic illness. (This idea is not discounted by the finding that child asthmatic status was not associated with levels of parental global stress, coping or social support.) Past research has also demonstrated that social support acted as a mediator (and not a moderator) between life stress and adjustment among a sample of parents with hearing and non-hearing impaired children (Quittner et al., 1990).

### 6.3.3 Case Studies

This section includes case studies (names of the children have been changed) to highlight the previously discussed risk factors for anxiety and/or somatisation. The current study suggests intergenerational risks associated with protective parenting and the possible influence of parental adjustment and social factors. However, the strength of the associations between the psychosocial factors and child anxiety indicate that unmeasured factors must also contribute to anxiety in very young children. Further research is clearly required to gain a better understanding of anxiety in young children.

#### 6.3.3.1 Beth

Beth, aged 35 months, was classified as being at-risk for clinical levels of anxiety. Beth was not asthmatic. Beth lived with her biological parents and one sibling. Based on the questionnaire responses, multiple hypothesised risk factors for anxiety were identified. Beth's mother reported heightened levels of overall psychological distress (and anxiety) within herself. She also reported being raised in a relatively protective manner and parenting Beth in a highly protective manner. Whilst Beth's mother indicated that she had low levels of social support, she reported low levels of global stress and appeared to be coping well.

#### 6.3.3.2 *Ben*

Ben, aged 54 months, was identified as being at-risk for clinical levels of anxiety. Ben lived with his biological parents and did not have asthma. Only one hypothesised risk factor for anxiety was identified: Ben's mother reported being raised in a highly protective manner. However, Ben's mother did not indicate protective tendencies towards Ben. She reported good personal psychological adjustment, average levels of social support, low levels of global life stress and to be coping fairly well.

#### 6.3.3.3 *Oliver*

A 46 months old boy, Oliver, was classified as having clinical levels of anxiety and as being at-risk for clinical levels of somatisation. Oliver lived with his biological parents and was not asthmatic. Oliver's mother, aged 35, completed the questionnaires. Based on the questionnaire responses, only one risk factor hypothesised to be associated with high levels of anxiety was apparent. Oliver's mother reported heightened levels of overall psychological distress. Review of the GHQ subscales indicated elevated scores on the anxiety and somatisation subscales. Aside from this, Oliver's mother reported some global life stresses and average levels of social support and current protective parenting. Oliver's mother indicated that she was coping very well. It is interesting to note that Oliver's mother reported being raised in a less protective manner than average. The care dimension of the PBI was not included in the analyses of the current study. However, Oliver's mother reported being raised in a less caring manner than average.

#### 6.3.3.4 *Summary and implications of case studies*

Epidemiological research has highlighted that an accumulation of psychosocial adversities places an individual at greater risk for emotional problems (Rutter, 1976). Exposure to multiple psychosocial risk factors was more common among children with clinical levels of both anxiety and somatisation as opposed to clinical levels of anxiety (but not somatisation) or somatisation (but not anxiety).

Beth's case highlights many of the conceptual links associated with parental history of overprotection. The potential importance of early parent-child interactions on an individual's internal working model and psychological adjustment has been highlighted. The case of Ben suggests that a parental history of overprotection may have a particularly powerful impact on child anxiety. Indeed, statistical analyses in the current study identified parental history of overprotection as the primary predictor of child anxiety. As previously discussed, high levels of protective parenting potentially impedes the development of effective strategies, which may then lead to elevated levels of anxiety/somatisation. High levels of protection may foster the development of a view that the world is an unsafe place and may contribute to dependence of the child on the parent.

Importantly, the case studies also demonstrate no clear psychosocial patterns associated with clinical levels of anxiety, somatisation and anxiety-somatisation in the current sample of young children. Some children, such as Ben and Oliver, were identified as having high levels of anxiety (or somatisation), in the absence of multiple risk factors. Researchers have encouraged examination of childhood emotional and behavioural problems within an ecological framework. Despite assessment of a range of psychosocial factors in the current study, other correlates of clinical levels of anxiety/somatisation remain to be identified.

## 6.4 Childhood Asthma as a Risk Factor for Anxiety

This section discusses the role of childhood asthma in relation to anxiety. The associations between childhood asthma and psychosocial risk factors for childhood anxiety are also discussed.

### 6.4.1 Level of Anxiety and Somatisation in Children with Asthma

As hypothesised, children with asthma were reported to have significantly higher levels of anxiety, according to both anxiety and somatisation subscales, compared with children without asthma. After controlling for the set of parental variables, and in particular parental history of overprotection, child asthmatic status no longer explained a significant proportion of the variance in the anxiety subscale. However, child asthmatic status remained strongly associated with the somatisation subscale after controlling for parental factors and the child anxiety subscale.

In the current study, only 2.6% of the non-asthmatic children, compared with 16.9% of the asthmatic children, had clinically significant levels of anxiety. At an item level, the prevalence of worries appeared somewhat higher among the children with asthma (15.4 to 24.6) compared with the children without asthma (2.6 to 10.5) and another Australian sample of young children (Spence et al., 2001). It therefore appears that asthma may be a risk factor for exceedingly high levels of anxiety, for which a child may require psychological intervention (Sawyer, Arney et al., 2001; Spence et al., 2001; Zubrick et al., 1995).

The prevalence of clinically significant levels of somatisation in the non-asthmatic sample (5.3% at-risk and 0.0% clinically significant) was comparable to Australian estimates (Sawyer, Arney et al., 2001; Zubrick et al., 1995). However, the prevalence of clinically significant somatisation appeared markedly higher among the asthmatic sample (29.0% at-risk and 13.6% clinically significant) compared with the Australian studies. If somatisation is reflective of anxiety, then the level of problems according to the somatisation subscale provided even stronger support for asthma as a risk factor for anxiety. At an item level, all somatic symptoms, excluding 'complaints of dizziness', were reported to be more problematic among children with asthma compared with non-asthmatic children.

Elevated level of somatisation among children with asthma compared with healthy children has been demonstrated in previous research (Eski et al., 1995; see McQuaid et al., 2001 for a meta analysis; Meijer et al., 1995; Meijer & Oppenheimer, 1995). However, it is unclear whether asthma-specific items were removed from the measures of somatisation. The current study addressed this limitation and demonstrated elevated levels of somatisation among children with asthma even after removal of items potentially confounded with asthma.

Taken together, these findings add to a growing body of research that indicates that children with asthma may experience elevated levels of anxiety compared with healthy children (Lahey et al., 1996; McNicol et al., 1973; McQuaid et al., 2001; Meijer et al., 1995; Meijer & Oppenheimer, 1995; Newacheck & Stoddard, 1994; Rutter, 1976; Vila et al., 1999; Vila et al., 2000). However, as previously indicated, comparison with past research is limited as very few studies have examined the levels of anxiety in non-asthmatic or asthmatic children as young as 2 years 6 months.

#### 6.4.1.1 *Theoretical interpretations*

##### 6.4.1.1.1 *Asthma and a vulnerable personality*

The above findings may be interpreted in a number of ways. Despite methodological discrepancies across the studies, having asthma may be a significant risk factor for clinical levels of anxiety problems, as measured by the anxiety and somatisation subscales. The elevated levels of emotional problems among the children with asthma may be viewed as reflecting a 'vulnerable personality' (Graham et al., 1967; Meijer, 1981; Minuchin et al., 1975). However, this theory discounts the array of psychosocial factors likely to impact on the child's ability to regulate his or her emotions. As discussed later, the current findings add to the growing body of research suggesting that there are many factors associated with childhood anxiety (and other emotional and behavioural problems), and that it is more useful to adopt an ecological approach to the study of anxiety.

#### 6.4.1.1.2 Asthma and the function of somatisation

Children with asthma may learn that the expression of any somatic symptoms will gain the attention of their parent, as the parent may fear the somatic complaints are symptomatic of their asthma. Thus, children with asthma may be more inclined than healthy children to complain of somatic problems, particularly if there are problems within the family. In this sense, somatisation may therefore serve the function of maintaining harmony within the family, along a similar vein to a Psychosomatic Family Model (PFM) (Minuchin et al., 1975). It is also important to acknowledge that parents of children with asthma may be more inclined to focus on their child's physical well being during stressful times. For example, a parent may unduly emphasise the severity of somatic complaints in an attempt to be distracted from difficult situations, such as an argument with his/her spouse, in order to maintain family harmony.

Alternatively, children with asthma may be more likely to express their anxiety somatically, as their physical well-being is more likely to be an integral part of their sense of self compared with children without asthma. Stressful situations, such as family conflict, are likely to be associated with heightened anxiety within the child. The child's anxiety may be expressed somatically.

#### 6.4.1.1.3 Asthma disrupts the development of emotion regulation

The development of effective emotion regulation skills may be disrupted in young children diagnosed with a potentially life-threatening illness such as asthma (Klinnert et al., 2000). Parents might experience increased levels of emotional distress and possibly be less sensitive to their child's emotional needs and more overprotective of their child. Consequently, young children with asthma might have reduced opportunities to develop effective methods for managing their own emotional distress. As the development of emotion regulation occurs from infancy, one might expect increasing emotional problems to be associated with earlier age of onset of asthma. Earlier age of onset might be more disruptive to the development and consolidation of effective emotion regulation skills.

Some research studies have implicated earlier onset of the illness as placing the child at greater risk for emotional problems (Meijer et al., 1995; Mrazek et al., 1991; Mrazek et al., 1998).

Analysis in the current study indicated that the association between duration since the child was diagnosed with asthma (controlling for the child's age) and child anxiety/somatisation was not significant. The duration since diagnosis implies the age of onset. Other research studies also demonstrated no associations between the duration since diagnosis and child adjustment (Casper & Erickson, 1985). Mrazek (1998) has suggested that very young children may lack cognitive capacities to enable communication of emotional distress regarding their illness, and thus be less likely to receive parental support to learn methods to effectively manage their emotions. The role of the parental sensitivity to the child's emotional needs may serve as an influencing factor. The discrepant findings compared with the studies by Mrazek and colleagues may be due to different research designs and methodology (e.g. longitudinal/group comparisons versus cross-sectional/correlational, differences in age range of samples).

Parental factors may account for the failure of the current study to replicate some previous associations (Meijer et al., 1995; Mrazek et al., 1991; Mrazek et al., 1998) between age of asthma onset and child emotional adjustment. For example, children diagnosed at a very young age (e.g. 2 to 3 years) may be exposed to heightened levels of protective parenting from a very young age, particularly if the parent has heightened levels of emotional distress, which may impede the development of adaptive emotional regulation skills. Conversely, a child diagnosed at a slighter older age (e.g. 5 to 6 years) may be less likely to have been raised in an overprotective manner and thus probably had greater opportunities to develop adaptive ways of managing emotional distress. In the current study, however, there was no association between duration since diagnosis and level of protective parenting.

#### 6.4.1.1.4 Parental sensitivity to somatic problems

Elevated levels of somatisation among children with asthma compared with non-asthmatic children might indicate heightened parental awareness of the child's physical well being. Independent of the level of asthma management or asthma severity perceived by parents and physicians in the current study, parents of children with asthma reported higher levels of protective parenting. This is not surprising given the threat that asthma may impose on their child's well being. Even mild asthma or typically well-managed asthma does not preclude the occurrence of a sudden and severe attack. Increased parental protection implies a greater and more constant awareness of the child's behaviours. In particular, parents of children with

asthma may focus more intensely on somatic symptoms than 'typical' anxiety symptoms (e.g. cognitive symptoms, such as those included on the anxiety subscale).

The association between asthmatic status and somatisation might also be indicative of a parental tendency to generalise symptoms of asthma to other somatic complaints. If this is the case, the elevated levels of somatisation among the asthmatic children may actually reflect parents' perception of their child's asthma severity, rather than emotional distress.

#### 6.4.2 Severity of Asthma and Child Anxiety and Somatisation

The current study explored the association between anxiety and asthma severity. Analyses indicated no association between either physician or parental ratings of asthma severity and level of child anxiety, according to the anxiety subscale. Parental rating of functional asthma severity was associated with the somatisation subscale at the univariate level. However, the association was not statistically significant after controlling for parental factors.

This finding is neither consistent with nor in contrast to past research regarding the association between asthma severity and child emotional adjustment, which has produced mixed results (Eiser et al., 1991b; Eski et al., 1995; Graham et al., 1967; Gupta et al., 2001; Kashani et al., 1988; Klinnert et al., 2000; MacLean et al., 1992; McQuaid et al., 2001; J. M. Perrin et al., 1989; Silverglade et al., 1993; Vila et al., 1998; M. Z. Wamboldt et al., 1998).

The insignificant association between asthma severity and child anxiety may be indicative of the finding that the majority of the children with asthma were reported to have well-managed symptoms. This fact may have also contributed to the relatively small, though significant, difference in mean level of anxiety problems (according to the anxiety subscale) between the asthmatic and non-asthmatic children. The role of asthma management in regard to the relationship between asthma and anxiety was beyond the scope of the current study, as a well-validated measure of management was not included. Further research should attempt to examine this association.

Asthma threatens an individual's well-being, regardless of severity. Thus, the mere diagnosis of asthma may lead to heightened levels of anxiety. It is also possible that the association between severity of asthma and child anxiety is complicated by the influence of other psychosocial

factors, thus precluding a significant direct association. For example, severity of asthma may be associated with parental adjustment, which in turn may be associated with child anxiety.

The finding that asthma severity is associated with child somatisation may indicate that children with severe asthma are at greater risk of anxiety, which is expressed through bodily symptoms. Alternatively, as previously suggested, the somatisation subscale may reflect asthma symptoms. This is unlikely, however, as the somatisation subscale was modified for the current study to minimise the possibility of confounding with asthma.

Parental sensitivity to child physical functioning may be heightened among parents of children with severe asthma (a postulation that received some support in the current study). Accordingly, these parents may be more inclined to report somatic symptoms. To a certain degree, the association between functional severity of asthma and somatisation might therefore reflect the parent's psychological state about their child's illness. For example, a parent caring for a child who he/she considers has severe asthma may experience a range of associated distressing emotions (e.g. anxiety, helplessness). In turn, the parent's report of the child's emotional adjustment may be biased and therefore inflate the correlation between asthma severity and child somatisation. It is also noteworthy that a parent with a high distress level may be less sensitive to the child's needs, which may adversely impact on the child's emotional adjustment. Thus, the parental reports are unlikely to be entirely biased.

#### 6.4.3 Asthma and Protective Parenting

##### 6.4.3.1 *Asthma and current protective parenting*

##### 6.4.3.1.1 Asthmatic status

As hypothesised, parents of children with asthma reported higher levels of current protective parenting than parents of non-asthmatic children. This association remained significant even after controlling for other psychosocial factors (parental history of overprotection, parental overall adjustment). Also, the difference in level of parental protection was not accounted for by parental experience of asthma during their childhood. This finding is consistent with a body of epidemiological and cross-sectional studies using samples of children and adolescents with a

chronic illness (P. A. Gustafsson et al., 1994; P. A. Gustafsson et al., 1987; Pinkerton, 1967 & Rees, 1956 cited in McNicol et al., 1973; Schulz et al., 1994; M. Z. Wamboldt et al., 1996).

The measure of current protective parenting used in this study attempts to capture dimensions of parental protectiveness, including the promotion of child dependence on the parent, parental separation difficulties and parental control and supervision. Asthma attacks may occur suddenly and may be life-threatening. Parents of children with asthma may therefore be more vigilant of their child than parents of non-asthmatic children (Carson & Schauer, 1992; Eski et al., 1995; Hookham, 1985; Padur et al., 1995; Schobinger et al., 1993; Schobinger et al., 1992). Parent concern may be demonstrated by attempts to control their child's play activities in an effort to prevent their child from experiencing symptoms of asthma and possibly an asthma attack (e.g. breathing difficulties exacerbated by running during play). They may be more inclined to foster dependence of the child on the parent so the child remains in close proximity to the parent and can therefore easily receive medication as required. Parents of children with asthma may also have greater difficulties separating from their child (e.g. leaving their child with a babysitter), due to uncertainties regarding whether the alternate carer is capable of controlling the onset of asthma symptoms.

It is also noteworthy that the relationship between child asthma and parental protection may be circular, whereby heightened levels of parental protection may promote dependence of the child on the parent, thus reinforcing parental protection (Rapee, 2001).

The greater level of protection by parents of children with asthma may be associated with parental perception of child vulnerability (Green, 1964, cited in Thomasgard, Shonkoff et al., 1995). Despite physician reports that the majority of the current sample had well-managed asthma, some parents may have an unfounded belief that their child is at a much greater risk of harm than non-asthmatic children, and thus behave in a more protective manner. The strength of the association between asthmatic status and protective parenting may therefore be influenced by parental perception of vulnerability (Thomasgard & Metz, 1997; Thomasgard, Shonkoff et al., 1995). Future research may attempt to examine the construct of parental perception of child vulnerability and associations with protective parenting, in addition to child and parental adjustment.

Whilst parental protection of young children is considered a normal process, heightened levels of protection are generally considered to inhibit the development of child independence and

potentially lead to emotional problems. However, the function of protective parenting and implication of overprotection may differ among families where the young child suffers a chronic illness such as asthma. The tendency of parents of children with a chronic illness, such as asthma, to behave in a more protective manner than parents of healthy children may actually serve as an adaptive characteristic (Eiser et al., 1991b; Markson & Fiese, 2000; Meijer et al., 1995; Meijer & Oppenheimer, 1995). Young children typically have relatively structured lives, with set routines. Asthma is an illness able to cause unpredicted disruption to the child's daily routine. Greater protectiveness of the child may serve to provide greater structure and predictability to a possibly unpredictable life. In this sense protective parenting may act as a buffer against the impact of child asthma on emotional adjustment (B. L. Wood, 1994). Higher protection may provide some stability and security in the life of an asthmatic child, which may then foster healthy emotional development (C. Baron et al., 1992; Markson & Fiese, 2000). Higher parental protection may help lower parental distress about their child's illness (Meijer, 1981).

Clearly, the relationship between child asthmatic status and current protective parenting requires further attention. While a relationship was demonstrated in the current study, the strength of the association was relatively weak and past research has demonstrated equivocal findings (C. Baron et al., 1992; Eiser et al., 1991a, 1991b). Mixed research findings may be due to methodological differences and issues associated with the measurement of protective parenting. The long-term impact of protective parenting on children with a chronic illness, such as asthma, also deserves attention. As previously mentioned, the effects of early protective parenting may not be apparent until the child is older, as dependence of the child on the parent is more developmentally appropriate for very young children. Thus, it remains possible that protective parenting may serve to limit development of emotion regulative strategies in children with and without asthma. The consequences of this may become evident as the child gets older.

#### 6.4.3.1.2 Asthma severity

The association between severity of asthma (based on either parent or physician reports) and levels of current protective parenting was not significant. Sample characteristics may have blunted the association between severity of asthma and current protective parenting. The majority of the children with asthma were rated as having well-managed symptoms, despite

illness severity. Group comparisons indicated a trend for parents who perceived their child's asthma to be poorly-managed (i.e. managed only half the time or less) to report a lower mean level of protective parenting than parents who felt their child's asthma was well-managed (i.e. managed most or all of the time). Limited statistical power due to uneven sample sizes precluded the group difference from attaining statistical significance. A complex examination of the inter-relationship between asthma management, protective parenting and child anxiety was beyond the scope of the current study. This area requires further research, with the use of a standardised measure of asthma management.

#### 6.4.3.2 *Asthma and the intergenerational pattern of protective parenting*

The relationship between parental history of overprotection and child somatisation was stronger amongst the asthmatic sample than the healthy sample.

It is possible that the finding of asthmatic status as a moderator between parental history of overprotection and child somatisation is an artifact of the strong correlation between child somatisation and asthmatic status.

Alternatively, parents of children with asthma may be more likely to interact with their child in accordance with their internal working model of parent-child relationship. This process may occur because of a tendency to draw upon long-standing coping strategies during times of stress (e.g. asthma-related child illness).

A parent who was raised in an overprotective manner may gain a sense of control and manage their own distress by also being protective of their child. This type of parent-child interaction is very familiar (even though the parent may have learned the drawbacks of overprotective parenting style during his or her childhood). Likewise, a parent raised with relatively low levels of protection may gain a sense of control by parenting as they were raised. Analysis using the PBI as a measure of protective parenting conflicts with the previous interpretation that protective parenting may serve a useful function for children with asthma. Past research has also indicated that asthma in children and adolescence may influence the parent-child relationship, which may promote the development of depression (Bleil et al., 2000). However, further examination of mediating and moderating factors between asthma and anxiety in very

young children is required. Future research needs to attempt to replicate findings using samples of young children, older children and children with other chronic illnesses.

The finding that asthma status (or severity) did not moderate the relationship between parental history of overprotection and current protective parenting does not negate this interpretation, as there were limitations with the assessment of current protective parenting (previously discussed).

Moreover, the finding that *severity* of asthma did not moderate the relationship between parental history of overprotection and child anxiety or somatisation does not discredit the previous interpretation, as children with *varying* severities of asthma are vulnerable to severe attacks.

The finding that asthmatic status did not moderate the relationship between history of overprotection and child anxiety subscale may reflect issues associated with the measurement of child anxiety (discussed in section 6.5).

#### 6.4.4 Child Asthma and Parental Adjustment

The current study sought to assess the relationship between child asthmatic status and parental overall adjustment and anxiety. The relationship between asthma characteristics (in particular, severity of asthma, parental perception of asthma management and duration since asthma diagnosis) and parental adjustment were also examined.

##### 6.4.4.1 *Asthmatic status*

The hypothesis that parents of children with asthma will have poorer overall adjustment compared with parents of non-asthmatic children was not supported. Neither the level of parental psychological problems nor morbidity rates was significantly different among parents of children with or without asthma. This finding conflicts with epidemiological and empirical research studies that have indicated parents of children (generally older than the current sample) with a chronic illness report heightened levels of emotional distress, in particular anxiety and depression (Canning et al., 1993; Frankel & Wamboldt, 1998; Hamlett et al., 1992;

McNicol et al., 1973; Svavarsdottir et al., 2000; M. Z. Wamboldt et al., 1996). However, very few studies have examined the association between parental adjustment and asthma in young children (Svavarsdottir et al., 2000).

There are a few possible explanations for the statistically insignificant finding between child asthmatic status and parental overall adjustment in the current study. Methodological issues cannot be overlooked. Parents were informed that the primary purpose of the study was to examine anxiety in young children, with an interest in the role of asthma. Parents might have felt relatively defensive of their own psychological well-being, in order to project an image of being able to care for their asthmatic child.

Time of data collection may have influenced the results. A greater proportion of parents within the non-asthmatic sample participated in the weeks leading up to and following Christmas 2002. This is a busy and sometimes stressful time for most people that may be reflected in responses to certain GHQ items.

Sample characteristics may account for the current finding. A significantly greater proportion of respondents within the non-asthmatic sample (26.3%, 10 out of 38), compared with the asthmatic sample (9.2%, 6 out of 65), were pregnant when they participated in the study. Pregnancy has been associated with heightened levels of psychological distress (Austin, 2003; Marcus, Flynn, Blow, & Barry, 2003). However, even after controlling for pregnancy, no significant difference emerged in psychological adjustment between parents of non-asthmatic and asthmatic children (see Appendix CC).

The GHQ may not capture the psychological distress experienced by parents of very young children, particularly children suffering from a chronic illness such as asthma. For example, the inclusion of general anxiety symptoms may not prompt a parent to consider anxieties associated with raising a child, let alone a child with an illness such as asthma. Also, the GHQ depression items may not capture parental feelings of helplessness and despondency that may be experienced when caring for an ill child.

Parental perception of how well the child's asthma symptoms are managed may be more important to parental psychological adjustment than the presence of asthma per se. As the majority of the asthmatic sample was reported to have well-managed asthma symptoms, a link between child asthma and parental adjustment may have been masked. Parents who perceive

their child's asthma as well-managed may have a good sense of control and coping and this may promote healthy parental psychological adjustment. In turn, the parent may be more emotionally available to the child, which is particularly important during the first few years of a child's life.

Parents of children with asthma may benefit psychologically from intermittent contact with a pediatric respiratory specialist. With relatively low symptomatology, parents may be able to use their contact time with the physician to talk about other matters associated with caring for a young child. Parents of children with low functional severity may also receive positive feedback from the respiratory specialist, which may then serve to improve their confidence and reduce anxiety and psychological distress.

In the current study, parents of children with asthma consulted a respiratory specialist who provided education on the management of asthma. Numerous anecdotal reports indicated that parents attributed increased confidence in their ability to care for the child to the specialist support. Previous research has indicated that parents of children and adolescents with a chronic illness (e.g. asthma, diabetes) want greater levels of emotional support, encouragement and practical information on caring for their child. Moreover, parents feel that they benefit from such support when it is available (Casper & Erickson, 1985).

Though the current study did not assess parental perception regarding the level and type of support provided by the specialist, the number of consultations with the specialist may provide some insight into the benefits of contact with a specialist for parental psychological adjustment. Bivariate analyses indicated a tendency for the number of consultations to be associated with parental overall adjustment. A more sophisticated examination of these possible associations was beyond the scope of the current study. However, past research has implicated the importance of good physician-patient alliance in the treatment of asthma (Gavin, Wamboldt, Sorokin, Levy, & Wamboldt, 1999). Further research is required to explore these potential associations.

The finding that parents of children with asthma did not report poorer overall adjustment than parents of non-asthmatic children may have positive implications for the assessment of anxiety in young children with asthma. As previously discussed, there is great debate regarding the subjectivity of parental reports of child emotional functioning (Bates & Bayles, 1984; Engel, 2000; Krain & Kendall, 2000; Najman et al., 2001; Richters & Pellegrini, 1989). In particular, doubts

concerning the validity of parental reports arise when parents report higher levels of personal distress. The finding that parents of children with asthma did not report poorer overall adjustment suggests that their reports of child anxiety/somatisation are equally valid as reports from parents of children without asthma. This places confidence in the finding that asthma is a risk factor for anxiety/somatisation in children.

#### 6.4.4.2 *Asthma severity*

Whilst some research has examined psychological adjustment in parents of children with asthma (Carson & Schauer, 1992; Cosper & Erickson, 1985; Gupta et al., 2001; Hamlett et al., 1992; McNicol et al., 1973; M. Z. Wamboldt et al., 1996), the relationship between asthma severity and parental adjustment has received scarce attention. Thus, the current research findings provide an important contribution to this research field.

Analyses indicated associations between mean levels of parent rating of functional severity of child asthma and levels of parental overall adjustment. For example, an increase in functional severity corresponded to a decline in parental overall adjustment (i.e. poorer adjustment). There was also a tendency for parents of a child with physician-rated mild asthma to report better overall adjustment than parents of children with physician-rated moderate asthma.

These findings are open to various interpretations. The few studies that have examined the validity of parental reports of asthma symptoms and severity (Fritz, Klein, & Overholser, 1990; Yoos, Kitzman, McMullen, & Sidora, 2003) indicate only approximately one-third accuracy of reports of severity (using measures such as visual analog scales) provided by adults of themselves or their child. Reasons for relatively poor accuracy in ratings of symptom severity are unclear, as little attention has been given to psychosocial factors that might bias reports of symptom perception. Parental psychological state may be an important factor to consider.

Parent ratings of asthma severity may be a function of their psychological functioning, thus explaining the bivariate association. Parents with higher levels of psychological distress may be overly sensitive to their child's physical state and thus possibly over-report asthmatic symptoms. Conversely, parents with very good psychological adjustment may focus less on their child's asthma symptoms and possibly under-report asthma severity. Indeed, studies that have assessed the objectivity of parental reports of child behavioural and emotional problems

generally indicate that, to a certain degree, parent reports of their child's functioning is biased by their own psychological adjustment (Krain & Kendall, 2000; Najman et al., 2001).

Nevertheless, the current study provides some evidence that the association between functional asthma severity and parental adjustment is not entirely an artifact of parental bias. Parental ratings of functional severity were significantly higher among the sample of children diagnosed by the physician as having moderate asthma compared with mild asthma. This provides criterion validity for parental severity ratings. But the association was weak and not significant after controlling for social factors. If parental reports of asthma severity were predominantly biased (i.e. a reflection of their own psychological state), then asthma severity ratings should remain significantly associated with parental adjustment after controlling for the social factors. Finally, a post-hoc analysis revealed that parental anxiety (as measured by the GHQ anxiety subscale) was significantly higher among parents of children rated by the *respiratory specialist* as having moderate asthma compared with parents of child with mild asthma (see Appendix DD). This is further evidence for the validity of parental reports.

The potential bi-directionality of the findings needs to be acknowledged. Having an unwell child with asthma may be particularly distressing for parents, who may experience a range of feelings (e.g. fear, sadness). In turn, poorer parental adjustment may impact on the parents' capacity to manage the child's asthma effectively and efficiently and subsequently lead to increasing asthma severity.

#### 6.4.4.3 *Asthma specific factors*

The current study explored the relationship between parental overall adjustment and duration since their child was diagnosed with asthma (controlling for child age). Analyses indicated an improvement in parental overall adjustment with an increase in the time since diagnosis.

These findings conflict with some past research findings (Butz & Alexander, 1993; Svavarsdottir et al., 2000) that longer duration since asthma diagnosis reflects a greater level of parental responsibilities over a long period of time, possibly to the detriment of the parents' well-being. Repeated visits to hospital, presumably at times when their child's asthma attack cannot be managed may heighten parental concerns of managing future asthma attacks. Parents may then manage their own distress by becoming more protective of their child. Conversely, parents

whose child was diagnosed 12 months ago as opposed to 1 month ago (for example) may have had more opportunities to become educated about their child's illness, which may lead to a decline in parental distress. This notion received some support by findings from the current study.

In contrast to previous research studies (Fahrenfort et al., 1996; Lavigne & Faier-Routman, 1992; Minde, 2000; Mrazek, 1984), the current study did not demonstrate associations between numbers of child visits to the hospital emergency department/hospital admissions or age at hospital admissions and psychosocial adjustment of the parent (and child). While visits to hospital may be frightening for the parent and child, they may also provide parents with greater levels of support (as they can speak to a professional about their child) and be a catalyst for developing more effective asthma management strategies. In turn, the level of parental emotional distress may be reduced to baseline levels. Interpretations are limited as reports of hospital admissions were based on parental recall only.

#### 6.4.5 The Role of Social Factors

This study also sought to examine the impact of social factors on the relationship between asthmatic status and current levels of protective parenting and parental adjustment. Past research has not extensively examined links between asthma, social and parental factors (Hamlett et al., 1992). However, there is some suggestion that having a child with asthma may be associated with greater global stress and poorer social support (Hamlett et al., 1992; Pelletier et al., 1994).

Parents of young children with asthma may have more responsibilities and daily stressors than parents of non-asthmatic children (e.g. attending medical appointments, compliance with child's medical regimes). Parents may perceive life to be more difficult and stressful and have greater difficulty coping than parents of non-asthmatic children (MacLean et al., 1992). Past research (Svavarsdottir et al., 2000) has indicated that the negative impact of parental functioning is related to increased responsibilities in caring for an ill child.

The level of perceived social support may also be poorer among parents of asthmatic children compared with parents of non-asthmatic children. People in the parental support network may

not understand the stressors associated with caring for an asthmatic child. Parents may also feel less capable of accessing supports because of increased life difficulties and global stress. Social factors may influence the association between asthma status/severity and parental adjustment. Functional severity of asthma may provide an indication of the level of intractability of the child's asthma (Klennert et al., 2000; Padur et al., 1995) and the level of disruption that the child's asthma may have on the lives of the child and family.

Surprisingly, the current study did not provide empirical support for the social factors as mediators between child asthma status/severity and parental adjustment. A perception of global life stress, coping and social support were associated with parental adjustment. However, neither child asthma status nor severity were associated with global stress, coping or social support.

Characteristics of the asthma sample, such as the generally good level of asthma management and duration since asthma diagnosis, may account for the null associations. As previously suggested, physician support may have influenced parental perception of social support, global life stress and coping. Perhaps even more compelling is the hypothesis that parents of children with asthma may receive valued support from treating specialists and other professionals (Hobfoll & Lerman, 1989; Pelletier et al., 1994).

In line with the stress and coping literature, social support may buffer the impact of having a child with asthma on parental psychological adjustment and protective parenting (Casper & Erickson, 1985; Unger & Powell, 1980). In order to cope, parents may be more protective of their child than parents of non-asthmatic children. In the current study, social support was identified as a moderator between parental ratings of asthma severity and parental overall adjustment. The presence of average or above-average levels of social support appeared to protect parents from the impact of having an asthmatic child with high severity levels. However, social support did not moderate the relationship between asthma status/severity and protective parenting. The measure of social support used may not have tapped the aspect of support most valued by parents who care for a young child with an illness. This issue needs further examination.

#### 6.4.6 Case Studies

The three cases examples presented below describe children who had clinical levels of anxiety/somatisation. All children had been diagnosed with asthma and a number of psychosocial risk factors for anxiety in young children. Names of the children have been changed.

##### 6.4.6.1 *Saul*

Saul is a 42 month old boy identified as having clinical levels of anxiety and somatisation. Saul lives with his mother, father and paternal grandparents. He was diagnosed with asthma at the age of 21 months and is under the medical care of a pediatric respiratory specialist at Monash Medical Centre. According to the specialist, Saul has moderate asthma and is treated with daily preventative medication. In contrast, Saul's mother reported that his functional severity of asthma is relatively good and is very well managed.

Saul's mother, a 24 year old scientist, completed the questionnaires for the current study. A number of risk factors hypothesised to be associated with heightened levels of anxiety and somatisation were apparent. In particular, Saul's mother reported being raised in an overprotective manner; her score was more than two standard deviations above the mean level of parental history of overprotection for the sample of children with non-clinical anxiety-somatisation. She was also identified as a parent with strong overprotective tendencies towards her son.

Saul's mother also reported below average levels of social support and the occurrence of multiple adverse life events during the previous year. However, overall Saul's mother indicated few current problems and stressors and reported that she was coping very well. Whilst her level of overall psychological adjustment was in the non-clinical range, she reported an above-average number of psychological symptoms, according to the GHQ.

As Saul's functional severity of asthma was below average and reported to be well-managed, his elevated score on somatisation is likely to be a reflection of his anxiety. Saul's mother may be relatively sensitive to somatic problems, as she also reported above-average somatic problems within herself.

#### 6.4.6.2 *Callum*

Callum is a 42 month old boy identified as having clinical levels of anxiety and somatisation. He was diagnosed with moderate asthma at the age of 24 months. His mother reported very high functional severity of asthma, but indicated that his asthma is managed most of the time. Callum's parents are divorced and he lives with his mother and sibling.

All of the risk factors hypothesised to be associated with heightened levels of anxiety and somatisation were present for Callum and his mother. Callum's mother reported being raised in a highly protective manner (more than two standard deviations above the mean) and indicated strong current protective tendencies. Callum's mother also reported very poor levels of social support, some current life stressors and indicated that she was only coping 'a little'. Her personal level of overall psychological adjustment was within the clinical range (including heightened levels of anxiety). Since being diagnosed with asthma, Callum had attended only one consultation with the respiratory specialist.

#### 6.4.6.3 *Sophie*

Sophie, aged 59 months, was diagnosed with asthma at the age of 30 months. Her mother reported that Sophie had very low levels of asthma symptoms. Interestingly, aside from having asthma, no other hypothesised risk factors for clinical levels of anxiety-somatisation were identified. However, a possible factor associated with Sophie's heightened anxiety/somatisation is the finding that her mother was raised in a relatively protective manner (as indicated by being nearly one standard deviation above the mean). Sophie and her mother had attended multiple consultations with the respiratory specialist. Sophie's mother reported very good personal psychological adjustment, few global life stressors and good levels of social support. She reported that she was coping very well.

#### 6.4.6.4 *Summary and implications of case studies*

The above case studies illustrate the associations between asthma, psychosocial factors and child adjustment, as discussed in the preceding sections. Most importantly, the cases once again highlight the importance of protective parenting (past or current) in relation to child anxiety.

The presence of asthma may serve to strengthen the intergeneration effects of protective parenting on child emotional adjustment. In some families, asthma may cause disruption and potentially create a sense of greater life stress. It is also important to consider the developmental stage of the child when diagnosed with asthma. All of the above cases were diagnosed at a relatively young age and they may therefore be particularly vulnerable to the development of anxiety problems.

Contact with the respiratory specialist provides parents with a detailed asthma management plan. The opportunity to discuss concerns about their child's adjustment may serve to strengthen the parent's perception of support and possibly lower the parent's emotional distress. Some children, such as Saul and Callum, may have had clinical levels of anxiety and somatisation even if they did not have asthma, as many inter-related risk factors were identified. Further research is required to elucidate the factors associated with child anxiety and the role of asthma.

## 6.5 The Measurement of Anxiety in Young Children

This section draws on the findings of the current study to critique the use of somatisation as a measure of anxiety in young children. A number of authors have suggested that somatisation may be an expression of anxiety in very young children who may have difficulty interpreting and expressing their anxious thoughts (Last, 1991; Pavuluri & Luk, 1998; Reynolds & Kamphaus, 1998; Schniering et al., 2000; Tonge, 1994; Winnicott, 1987).

### 6.5.1 Somatisation as an Expression of Anxiety

The strong correlation between levels of anxiety and somatisation was similar to that reported by Reynolds and Kamphaus (1998) in the BASC normative sample. Reynolds and Kamphaus recommend that a combination of elevated scores on the anxiety and somatisation scales may be a more appropriate procedure for identifying children with a possible anxiety disorder. Findings from the present study show a strong correlation between the level of anxiety and somatisation subscales. Furthermore, a significant proportion of children with clinical levels of anxiety also had clinical levels of somatisation. These dimensional and categorical associations provide support for the position that somatisation reflects anxiety in young children.

The child anxiety subscale was included in all multivariate analyses with child somatisation as the dependent variable to provide an even more stringent test of somatisation as an indicator of anxiety. Child anxiety remained strongly associated with somatisation, even after controlling for other psychosocial variables. Furthermore, the proportion of unique variance explained by certain psychosocial variables reduced markedly after controlling for child anxiety. An additional analysis (see Appendix J) also provided support for anxiety as a mediator specifically between parental history of overprotection and child somatisation. This finding suggests that parental history of overprotection may lead to aspects of anxiety in children that are similarly captured by the anxiety and the somatisation subscales. This provides further validation for the assumption that young children are likely to express anxiety in a somatic manner.

Despite the considerable overlap between the anxiety and somatisation subscales, some psychosocial factors, including parental overall adjustment and child asthmatic status/severity, remained significantly associated with child somatisation after controlling for child anxiety.

This result does not discredit the position that somatisation may be an indicator for anxiety. To a certain degree, the anxiety and somatisation subscales may reflect *different* aspects of anxiety.

A recent Australian study of anxiety problems in children aged 3 to 5 years suggested that while overlap between anxiety disorders is common, there is likely to be distinct types of anxiety disorders among children in this young age group (Spence et al., 2001).

The BASC anxiety subscale used in the current study may provide a relatively global measure of anxiety. The authors of the BASC (Reynolds & Kamphaus, 1998) suggested that significantly elevated scores on the anxiety subscale may indicate diagnostic criteria for separation anxiety disorder, overanxious disorder, or avoidant disorder. The somatisation subscale may provide a measure of a more specific aspect of anxiety, such as fears pertaining to health or physical injury. This may explain the significant association between some of the psychosocial variables (e.g. parental adjustment, child asthma) and child somatisation even after controlling for child anxiety.

The possibility that the somatisation subscale partially reflects a phenomenon that is distinctly *different* from anxiety cannot be ruled out. For example, somatisation may also be an indicator for other internalising emotional problems, such as depression (Bernstein et al., 1997; Egger et al., 1998; Egger et al., 1999; Last, 1991; Livingston et al., 1988).

#### 6.5.2 Developmental Aspect of Anxiety

The cognitive and language skills that are needed to articulate emotional states are limited in young children and so the expression of anxiety is difficult (Pavuluri & Luk, 1998). Indeed, the current study demonstrated a significant association between age and levels of anxiety. For example, an increase in age corresponded with an increase in anxiety level. Therefore, with developing cognitive and language capacities, children likely develop a capacity to articulate their anxieties, making such problems more readily identifiable by parents. The appropriateness of using questionnaire measures of anxiety symptoms that reflect internal cognitions may improve with increasing child age.

In contrast, child age was not associated with the somatisation subscale. The expression of anxiety through physical complaints does not rely on a higher level of cognitive awareness.

Rather, a young child may recognise an uneasy feeling state, which they are unable to verbally articulate but may express via somatisation (Masi et al., 2000; Masi, Mucci, Favilla, Romano, & Ploi, 1999).

Despite the development of a more sophisticated level of cognitive functioning, children may continue to express anxiety somatically as this method of emotional expression may have become ingrained. Indeed, past research has demonstrated associations between anxiety and somatisation with older children and adolescents (Bernstein et al., 1997; Egger et al., 1998; Egger et al., 1999; Last, 1991; Livingston et al., 1988).

### 6.5.3 Parental Perceptions of Anxiety in Young Children

Despite anxiety being a normal human emotion, a number of parents in the current study commented that their child was 'too young' to feel anxiety. Comments made by parents included: "He's too young to get worried", "She's got nothing to feel worried about", "What does she have to feel worried about?"

As discussed, the verbal articulation of anxiety by children may be limited. Parents may therefore be highly unaware of their child's internal emotional state and thus unable to accurately complete items on the anxiety subscale (particularly those referring to the child's cognitions). Further, parents might have difficulty recognising many 'typical' symptoms of anxiety in their young child (Pavuluri & Luk, 1998).

Negative connotations associated with distressing emotions may foster a defensive parental attitude towards acknowledging anxiety in the child. Certainly, research of child temperament (which has been linked with anxiety) has referred to children with 'difficult' versus 'easy' temperament (Thomas & Chess, 1977). Furthermore, research has often focused on the causes and consequences of children with a 'difficult' temperament (Thomas et al., 1968). Though the categorisation of young children as 'easy' or 'difficult' is less commonly used in recent research (Prior et al., 1989), it is not uncommon to hear parents use these terms. Parents of young children may consider anxiety to be indicative of a 'difficult' child. Conversely, parents may be more willing to recognise and acknowledge somatic symptoms, as they may not view somatic complaints as symptomatic of emotional problems.

#### 6.5.4 The Child's Health Status

The health status of the child may influence the way in which they express their anxiety. Post-hoc analyses indicated that the correlation between the anxiety and somatisation subscales was strong for the asthmatic sample but weak for the non-asthmatic sample (see Appendix EE).

Similarly, a parent of a young child with asthma may be more aware of the physical discomforts that their child experiences than a parent of a non-asthmatic child. Parents of children with asthma may therefore provide more accurate reports regarding their child's somatisation (and possibly anxiety). Alternatively, parents of children with an illness such as asthma may be hyper-sensitive to their child's physical status and thus tend to over-report somatic symptoms. The related issue of parental bias, discussed previously, must be kept in mind when interpreting the meaning of parental reports of child emotional adjustment.

Children with asthma may also be more acutely aware of physical sensations in their body than non-asthmatic children. The expression of emotions through the body may become a part of their personality and thus a subconscious expression of anxiety (and possibly other emotions). Therefore, the finding that child asthmatic status is predictive of somatisation even after controlling for child anxiety does not invalidate the assumption that somatisation is an expression of anxiety. As previously discussed, the somatisation subscale may even reflect a specific aspect of anxiety not captured by the anxiety subscale.

It is noteworthy that the somatisation subscale may reflect the presence or severity of asthma. Researchers have argued that it is unlikely that most somatic problems included on child subscales of somatisation are reflective of asthma symptoms per se (McQuaid et al., 2001). As previously mentioned, items most likely to be confounded with asthma were removed from the somatisation subscale for the current study. Nevertheless, the possibility remained that other items still reflect the child's illness. For example, a recent Australian study (Sawyer, Spurrier et al., 2001) indicated that children with severe asthma experienced greater levels of pain and discomfort, assessed using a quality of life measure.

The role of childhood illness in relation to the expression of anxiety (and other emotional problems) requires further elucidation.

### 6.5.5 Case Studies

Eight children, each with asthma, were identified as having clinical levels of somatisation, *but not anxiety*. The two cases presented below have been selected to highlight the issues associated with the measurement of anxiety using the somatisation subscale in children with asthma.

#### 6.5.5.1 *Katie*

Katie was 47 months old and had been diagnosed with moderate asthma at the age of 12 months. She lives with both her parents, one of whom is a smoker, and her three siblings. Katie's mother reported that Katie had above-average functional asthma severity, which was managed only about half the time. Katie's mother also reported the occurrence of an above-average number of recent life events (though the number with a negative impact on the family was within the average range) and global life stress. No other risk factors were identified. Katie's mother reported good personal psychological health, average levels of past and current protective parenting, better than average levels of social support and to be coping well. Katie and her mother had attended numerous ( $n = 18$ ) consultations with the respiratory specialist.

#### 6.5.5.2 *Julian*

Julian, a 59 month old boy, living with both parents and four siblings, was diagnosed with moderate asthma at the age of 13 months. Julian's mother indicated that his asthma was relatively severe, though generally well-managed. While Julian and his mother had attended multiple consultations with the respiratory specialist ( $n = 8$ ), this was over a very long period of time.

A number of hypothesised risk factors were identified. While Julian's mother self-reported average level of overall adjustment, she was identified to have an above-average number of anxiety and somatic symptoms. Based on the questionnaire measures, Julian's mother was not raised in an overprotective manner, though she raised Julian with high levels of protection. Julian's mother also reported experiencing many recent life events and felt her life was currently relatively stressful, despite having adequate levels of social support.

#### 6.5.5.3 *Summary and implications of case studies*

Minimal psychosocial risk factors for clinical levels of somatisation, aside from asthma, were identified for Katie. High levels of somatisation may be due to the presence of asthma. The severity of Katie's asthma may cause her mother to be highly focused on her physical state and thus possibly over-report somatic problems. Additionally, being diagnosed with asthma at a very young age may lead Katie to become acutely aware of her bodily sensations, which she may use as a primary mode for communicating emotional distress. On the other hand, Julian was reportedly exposed to many psychosocial risk factors, including having asthma. It is possible that the tendency for Julian's mother to be relatively overprotective was associated with caring for a child with asthma, as well as the presence of other social problems. As previously discussed, protective parenting may impede the development of emotion regulation and lead to heightened emotional distress. Clearly, these cases demonstrate the difficulties associated with determining whether somatisation is an expression of anxiety.

## 6.6 The Potential Impact of Anxiety on Asthma in Young Children

The prevalence of asthma within Australia is increasing annually. Knowledge of the risk factors associated with asthma may lead to improved asthma management and a reduction in asthma severity.

Psychosocial factors may also impact on the management and severity of asthma (Gebert et al., 1998; Klinnert et al., 1994; Mrazek et al., 1991; Weil et al., 1999). An exploratory question within the current study was whether asthma severity was related to psychosocial factors. The study by Klinnert et al. (2000) was used as a guide for the analyses in the current study. However, the current study also included parental factors in the analysis.

### 6.6.1 Child Anxiety and Somatisation

Somatisation, which may reflect a 'somatic' aspect of anxiety, was positively associated with functional severity of asthma. However, the child anxiety subscale was not associated with functional severity of asthma before controlling for child somatisation. However, after controlling for child somatisation, child anxiety was negatively associated with functional severity of asthma.

As discussed above, the anxiety subscale may provide a global measure of anxiety in young children. Thus, before controlling for the effects of child somatisation from the anxiety subscale, the global level of anxiety in children was not associated with functional severity of asthma. However, after controlling for the effects of child somatisation, anxiety was negatively associated with functional severity of asthma. A decrease in child anxiety corresponded to an increase in asthma severity.

The study by Klinnert et al. (2000) also demonstrated a negative association between child anxiety (though based on child report) and asthma severity. Stemming from the suggestion by Weinberger (1991, cited in Klinnert et al., 2000), parents of young children with asthma may have a repressive cognitive style, whereby they may deny an association between child anxiety and asthma. A repressive cognitive style may also ensure that the severity of the child's medical illness is duly recognised and not simply attributed to emotional distress.

Importantly, the finding that child anxiety was negatively associated with functional severity of asthma (after controlling for child somatisation) may not provide an accurate indication of the relationship between 'overall' anxiety and asthma severity, as the 'somatic' aspect of anxiety has been removed. Indeed, child anxiety (and somatisation) did not explain a significant proportion of the variance in physician-rated asthmatic status.

#### 6.6.2 Parental Adjustment

In line with some past research (Bartlett et al., 2001; Wade et al., 1997; Weil et al., 1999), parental adjustment was associated with asthma severity (according to physician rating, which was based on medication level), whereby the likelihood of a child having moderate asthma increased with poorer parental adjustment. As previously discussed, emotional distress of parents may reduce parental sensitivity to the child's needs. A parent with higher levels of distress may therefore be less aware of the child's asthma symptoms, which may lead to increased asthma severity. However, the current findings do not indicate causality.

Analysis from the current study demonstrated that parental overall adjustment was not significantly associated with the parental rating of functional severity of asthma (after controlling for physician severity ratings, the parental variables, child anxiety and child somatisation). Instead, child anxiety and somatisation explained a significant proportion of the variance in parental rating of functional severity of asthma. Parental adjustment may be associated with child adjustment, which in turn is associated with functional severity of asthma. Additional research is required to explore these relationships in greater detail.

#### 6.6.3 Protective Parenting

There was a tendency for increased protective parenting to reduce the likelihood of child moderate asthma. This finding may be indicative of a potentially positive influence of parenting factors, such as parental rigidity and overprotectiveness, on a young child's physical well-being (Meijer & Oppenheimer, 1995).

The current findings on protective parenting also raise a dilemma, which may become increasingly evident as the child gets older. On the one hand, protective parenting may serve to reduce asthma severity. However on the other hand, a level of protective parenting that is inappropriate for a child's developmental level may place a child at risk for anxiety. Importantly, the relationship between parental protection and asthma severity may also change as the child matures and develops a stronger need for independence from the parent (Eiser et al., 1991a, 1991b). For example, an older child or adolescent may resist a parent's attempt to protect him/her through non-compliance to medical regimes, which may thus increase the risk for asthma attacks.

The results provide limited scope for interpretation. The proportion of variance in physician rated asthmatic status explained by current protective parenting did not achieve statistical significance at .05 ( $p = .06$ ). This non significant result may be due to the small number of children with 'mild' asthma. Moreover, neither current protective parenting nor parental history of overprotection explained a significant proportion of the variance in parent rating of functional severity of asthma.

#### 6.6.4 Socio-economic Status

In line with past research (Bartlett et al., 2001; Wade et al., 1997; Weil et al., 1999; P. R. Wood et al., 2002), the current study demonstrated an association between family socio-economic status and child asthma symptoms. The direction of the association indicated that lower socioeconomic status corresponded with an increase in functional severity. However, the association between socio-economic status and physician rating of severity was not significant. Parents of low socio-economic status may have more barriers to accessing medical services or other assistance (P. R. Wood et al., 2002). The child may therefore suffer more asthma symptoms. Children of low socio-economic status may also be exposed to more triggers of asthma symptoms, such as cigarette smoke.

## 6.7 Research Limitations and Implications

### 6.7.1 Limitations

While results of the current study indicate associations between asthmatic status, characteristics of asthma, familial psychosocial factors and child anxiety, the cross-sectional nature of the current study precludes assessment of the causal relationships between the variables. Longitudinal data is required to assess the causal relationships that are suggested from our theoretical knowledge and from cross-sectional research findings.

Though relatively large in comparison to many research studies in this area (e.g. Conger, McCarty, Yang, et al., 1984; Mrazek, et al., 1984; Padur et al., 1995; Rietveld & Colland, 1999; A. W. Taylor et al., 1997), the size of the current sample precluded use of more sophisticated data analysis techniques, such as structural equation modeling, which enable the assessment of whether the collective model provides a reasonable fit for the data, as well as comparisons among alternative models (Tabachnick & Fidell, 1996).

Generalisation of the research findings is somewhat limited by characteristics of the sample. The asthmatic sample was relatively homogenous in regard to medical care, treatment and management (because they were recruited from the same clinic). The population of children with asthma is likely to be more mixed. For example, the local pediatrician may monitor some children's asthma, whilst other children may have no one medically monitoring their asthma. Other groups include children who frequently present at emergency, children with mild or severe asthma and children with poorly managed asthma. However, the relative homogeneity of the asthmatic sample may also be positive because it provides quantitatively sound information for a specific group of children.

Perhaps the most significant limitation of the current research is the sole reliance on parental reports of the child's emotional functioning, as well as assessment of all other psychosocial factors. Parental reports may be influenced by a number of factors, including their own psychological state. Inclusion of additional forms of assessment (such as observations, structured interview), especially of the child's anxiety, would allow some assessment of the validity of parental reports. However, observations and structured interviews are not without

difficulties. An important strength of the current study was the requirement for physician confirmation that the child had asthma, rather than relying on parental report only.

The anxiety measure developed by Spence et al. (2001) has advantages over the BASC; in particular, it was developed on an Australian sample and includes multiple dimensions of anxiety. In contrast the BASC is an American instrument and includes an anxiety subscale, which only asks about general anxiety symptoms. Nevertheless, Spence's instrument does not incorporate somatic symptoms, whereas the BASC includes a somatisation subscale. Also, until recently the CBCL (which is used in the majority of other research studies relevant to the current study) did not separate the construct of anxiety from depression, and was thus deemed unsuitable.

Disappointingly, the measure of current protective parenting demonstrated poor psychometric properties for the subscales, thus preventing examination of different aspects of protective parenting in relation to child anxiety/somatisation and the other psychosocial variables. The level of internal consistency for the total scale was also less than optimal, particularly for the asthmatic sample. This may be because the PPS was not developed on a sample of children with asthma. Cultural factors may have also impacted on the suitability of using the PPS (an American instrument) with an Australian sample.

The current study did not include a standardised measure of asthma management, which prevented a detailed analysis of associations between asthma management and child anxiety and other psychosocial factors.

## 6.7.2 Research Implications

### 6.7.2.1 *The measurement of anxiety*

The foremost research implication stemming from the current study concerns the measurement of anxiety in young children. The assessment of anxiety in very young children is complex and perhaps this complexity explains why there has been limited research in this area.

The current study indicates that somatisation may be an expression of anxiety for some, but not all children. Moreover, other research studies have indicated that children with other emotional problems, such as depression, may also experience somatic problems (Masi et al., 2000).

The relationship between anxiety and somatisation may be complicated by the presence of a chronic illness. Children with a chronic illness, such as asthma, may be more likely than healthy children to express their anxiety (and perhaps other forms of emotional distress) in a physical manner. Clearly, the relationship between somatisation and anxiety warrants a detailed analysis. Research examining the construct of anxiety will then hopefully guide the development of improved measures of anxiety in very young children.

The objectivity of parental reports of childhood behavioural and emotional problems has been extensively studied (Bates & Bayles, 1984; Krain & Kendall, 2000; Najman et al., 2001). Nevertheless, future research should further examine the accuracy of parental reports of anxiety among very young children. The inclusion of additional measures, such as structured interviews and/or observations, would provide some insight into the validity of parental reports. The role of chronic illness in the validity of parental report particularly requires examination. Anecdotal reports from some parents who participated in the current study suggest the need to examine parents' understanding of a young child's experience of emotions.

In summary, future research studies may seek to address the following questions pertaining to measurement:

- What is the structure of anxiety in very young children?
- How do young children express their anxiety?
- Does somatic expression of anxiety vary according to whether or not a child is healthy or suffers a chronic illness?
- Is the relationship between anxiety and somatisation a developmental phenomenon?
- Do parents think their young child can experience anxiety?
- What do parents recognise as symptoms of anxiety within the child? Does this vary according to the presence/absence of a chronic illness?

#### 6.7.2.2 *The quest for risk and protective factors*

The quest for a complete understanding of anxiety in young children continues. As the current study demonstrates, a broad ecological perspective must be adopted when identifying risk and protective factors for childhood anxiety. Future research studies need to incorporate a variety of psychosocial measures pertinent to the lives of parents of very young children. Samples need to be large enough to enable testing of complex pathways leading to childhood anxiety. Longitudinal studies may help answer the questions:

- Why is it that some children exposed to multiple risk factors do not develop anxiety while others do?
- Similarly, why do some children seemingly exposed to minimal risk factors develop anxiety while others don't?
- What is the role of other psychosocial factors, such as child gender, paternal psychological adjustment, paternal parenting and marital satisfaction?

#### 6.7.2.3 *The development of interventions*

Whilst there is emerging evidence for effective intervention and prevention programs for anxiety in children and adolescents (Barrett et al., 2001; Elliot et al., 2002; Kendall, 1994; Kendall et al., 1997; Kendall & Southam-Gerow, 1996), research examining the effectiveness of interventions for very young children has not been conducted. The current study demonstrated that parental history of overprotection was the strongest predictor of anxiety and somatisation in young children, particular children with asthma. From a theoretical basis this association may be indicative of current protective tendencies of their child. Future research studies may attempt to devise, implement and assess the effectiveness of interventions/preventions for anxiety in very young children. The primary aim of the interventions/prevention programs may be to assist the parent in developing levels of protective parenting that enable the child to develop age-appropriate levels of independence from the parent, which in turn may foster the development of adaptive emotional regulation strategies.

#### 6.7.2.4 *Illness and child anxiety*

A limited number of studies have examined the association between asthma and anxiety (as opposed to the broader construct of internalising problems) in very young children. Replication of the current study is therefore recommended. Samples should comprise children from different subgroups, including children with varying severities of asthma, children who frequently present to the emergency department and/or are admitted to hospital, children with poorly-managed asthma and children under the care of a local physician (as opposed to respiratory specialist, as in the current study).

As previously discussed, the meaning of somatisation in relation to anxiety among children with asthma and other chronic illness, such as diabetes, requires further examination. It is likely that greater attention is paid to the physical functioning of an ill child. Thus, children with a chronic illness might be more likely than healthy children to express anxiety through physical problems. If this is the case, focus on somatisation in the assessment of anxiety (and possibly other emotional problems) among children with a chronic illness may be very insightful.

Previous studies have demonstrated associations between the management of asthma, treatment adherence and child/family socio-emotional problems (Christiaanse et al., 1989; Klinnert et al., 1997; F. S. Wamboldt et al., 1995; P. R. Wood et al., 2002). The current study adds to this body of research. However, inter-relationships between child emotional adjustment, psychosocial factors, asthma management and asthma severity require further examination. The role of treatment adherence and compliance among samples of very young children also requires examination.

### 6.7.3 Theoretical and Clinical Implications

Though further empirical studies regarding anxiety in young children are required, findings from the current thesis have certain clinical implications.

#### 6.7.3.1 *Assessment of childhood anxiety*

The assessment of anxiety in young children appears to be complicated by a number of factors. Clinicians need to be aware of these. The assessment of anxiety should include an examination of a variety of symptoms, including physical complaints (Masi et al., 2000; Reynolds & Kamphaus, 1998; Winnicott, 1987). Complete knowledge of the child's physical health status is also required, to improve clinicians' insight into the meaning of child symptomatology. Based on the concepts of attachment and emotion regulation, and current and past research findings, a developmental and biopsychosocial approach (including collection of information on the parents' family history) needs to be adopted when assessing child anxiety, particularly in very young children.

#### 6.7.3.2 *Prevention and intervention for anxiety problems*

The current study is consistent with the principles of attachment theory, which state that early parent-child interactions may guide future interactions (Bowlby, 1969; R. A. Thompson, 1998). The current and past research findings, and our theoretical understanding of anxiety, may inform the development of interventions aimed at reducing high levels of anxiety in very young children.

Being raised in an overprotective manner may prevent a child from developing independence from his/her caregiver, and in turn impede the development of effective emotion regulation strategies. High levels of protection may contribute to dependence of the child on the parent. Thus, a prime focus for intervention appears to be assisting parents to develop parental strategies that provide their child with a secure base from which the child can develop age-appropriate autonomy, including the development of effective and increasingly independent skills for managing emotional distress. The strong tendency for some parents to be highly

protective of their child may take time to modify, as their protective tendencies may be associated with personal psychological problems.

A second point of intervention would be aimed at strengthening parents' capacities to develop support networks, which should provide the parent with a greater capacity to effectively manage life stressors and improve their own psychological adjustment. In turn, parents may be more capable of attending to their child's needs, which may foster healthy emotional functioning.

#### 6.7.3.3 *Screening for anxiety in children with asthma*

The current research findings provide a strong argument for the screening of anxiety among young children with asthma, and possibly children suffering other chronic illnesses. The screening of anxiety may be undertaken within a few minutes, through use of a measure such as the BASC anxiety and somatisation subscales. Children identified to have 'at-risk' levels on both the anxiety and somatisation subscales may require further psychological assessment.

#### 6.7.3.4 *Psychological services for patients with medical conditions*

The current research highlights a potentially important role for psychologists in pediatric hospitals and general practices. The inclusion of psychological screening, follow-up assessments and interventions is likely to improve the communication between professionals of different disciplines, which will ultimately lead to improved patient care. Psychologists could advise pediatricians and specialists on the emotional functioning of young children.

Also, the parents and children would benefit from a multidisciplinary approach to the care of the child. Parents may feel more motivated to receive psychological support for their child in a medical setting, as distinct from a specific mental health service. Psychologists could also provide education (perhaps in the form of parent groups) to parents of all children with asthma.

## 6.8 Concluding Statement

The current thesis sought to examine anxiety in young children. The assessment of anxiety in very young children is complicated particularly if the child has a chronic illness. Somatisation may be an indicator of childhood anxiety, although, the meaning of somatisation requires further elucidation.

A significant proportion of young children with asthma may experience the added burden of high levels of anxiety. The impact of caring for a child with a dual diagnosis may be detrimental to the people within the child's social network. The cost to the community may also be significant.

Future research must continue to adopt an ecological perspective, with a focus on inter-relationships between factors. Limited psychosocial factors were directly associated with child anxiety in the current study. Though, parental overprotection is likely to be a strong indicator of child anxiety.

A deeper understanding regarding the factors connected with anxiety in young children will hopefully serve to promote supportive environments in which children will have rich, challenging and empowering experiences. In turn, this will foster healthy emotional development.

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**Appendix A.    Behavior Assessment System for Children**

# BASC

Behavior Assessment System for Children

## Parent Rating Scales

Cecil R. Reynolds and Randy W. Kamphaus

### Instructions

On the pages that follow are phrases that describe how children may act. Please read each phrase and mark the response that describes how this child has acted over the last **six months**. If the child's behavior has changed a great deal during this period, describe the child's recent behavior.

Circle **N** if the behavior **never** occurs.

Circle **S** if the behavior **sometimes** occurs.

Circle **O** if the behavior **often** occurs.

Circle **A** if the behavior **almost always** occurs.

**Please mark every item.** If you don't know or are unsure, give your best estimate.

Before starting, please provide the information requested in the box at the top of the next page.

### How to Mark Your Responses

Use a sharp pencil or ballpoint pen; do not use a felt-tip pen or marker. Press firmly and be certain to **circle** completely the letter you choose, like this:

N (S) O A

If you wish to change a response, mark an X through it and circle your new choice, like this:

N (~~S~~) (O) A

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A 0 9 8

Child's name \_\_\_\_\_  
 Date \_\_\_\_\_ Birth date \_\_\_\_\_ Age \_\_\_\_\_  
 School/Center \_\_\_\_\_ Grade \_\_\_\_\_  
 Sex: ☐ Female ☐ Male Other data \_\_\_\_\_

Your name \_\_\_\_\_  
 Sex: ☐ Female ☐ Male  
 Relationship to child:  
☐ Mother ☐ Father ☐ Guardian ☐ Other

1. Shares toys or possessions with other children. N S O A
2. Argues with parents. N S O A
3. Is too serious. N S O A
4. Is easily distracted. N S O A
5. Eats things that are not food. N S O A
6. Says, "Nobody likes me." N S O A
7. Acts without thinking. N S O A
8. Has good eye contact. N S O A
9. Makes frequent visits to the doctor. N S O A
10. Has trouble making new friends. N S O A
11. Stutters. N S O A
12. Has trouble shifting gears from one task to another. N S O A
13. Is cruel to animals. N S O A
14. Worries about what parents think. N S O A
15. Uses foul language. N S O A
16. Hears sounds that are not there. N S O A
17. Holds a grudge. N S O A
18. Is restless when traveling in a car. N S O A
19. Has a sense of humor. N S O A
20. Has headaches. N S O A
21. Avoids competing with other children. N S O A
22. Has eye problems. N S O A
23. Argues when denied own way. N S O A
24. Is afraid of dying. N S O A
25. Repeats one thought over and over. N S O A
26. Cries easily. N S O A
27. Climbs on things. N S O A
28. Uses appropriate table manners. N S O A
29. Has stomach problems. N S O A
30. Has seizures. N S O A
31. Breaks other children's things. N S O A
32. Makes loud noises when playing. N S O A
33. Vomits. N S O A

34. Complains when asked to do things differently. N S O A
35. Is critical of others. N S O A
36. Says, "I'm not very good at this." N S O A
37. Listens attentively. N S O A
38. Babbles to self. N S O A
39. Is sad. N S O A
40. Interrupts others when they are speaking. N S O A
41. Says, "please" and "thank you." N S O A
42. Complains about health. N S O A
43. Refuses to join group activities. N S O A
44. Sleeps with parents. N S O A
45. Adjusts well to changes in routine. N S O A
46. Blames others. N S O A
47. Says, "I'm afraid I will make a mistake." N S O A
48. Has a short attention span. N S O A
49. Rocks back and forth for long periods of time. N S O A
50. Pouts. N S O A
51. Cannot wait to take turn. N S O A
52. Responds when spoken to. N S O A
53. Complains of pain. N S O A
54. Is shy with other children. N S O A
55. Has a hearing problem. N S O A
56. Threatens to hurt others. N S O A
57. Gets very upset when things are lost. N S O A
58. Daydreams. N S O A
59. Says, "That's not fair." N S O A
60. "Shows off" when visitors are present. N S O A
61. Begins conversations appropriately. N S O A
62. Has ear infections. N S O A
63. Avoids other children. N S O A
64. Complains about being teased. N S O A
65. Is restless during movies. N S O A
66. Has allergic reactions. N S O A

N — N

## Remember:

Indicate how frequently each behavior occurs by circling

N — Never    S — Sometimes    O — Often    A — Almost always

PRS - P  
(Ages 2 1/2 - 5)

S	O	A	67. Adjusts well to new teachers and caregivers.	N	S	O	A	100. Gets upset when left in a new situation without a parent or caregiver.	N	S	O	A
S	O	A	68. Bullies others.	N	S	O	A	101. Talks back to parents.	N	S	O	A
S	O	A	69. Is nervous.	N	S	O	A	102. Worries about what teachers think.	N	S	O	A
S	O	A	70. Gives up easily when learning something new.	N	S	O	A	103. Gives up easily.	N	S	O	A
S	O	A	71. Seems out of touch with reality.	N	S	O	A	104. Says, "They're trying to get even with me."	N	S	O	A
S	O	A	72. Complains of being tired.	N	S	O	A	105. Changes moods quickly.	N	S	O	A
S	O	A	73. Needs too much supervision.	N	S	O	A	106. Touches everything when shopping.	N	S	O	A
S	O	A	74. Compliments others.	N	S	O	A	107. Smiles at others.	N	S	O	A
S	O	A	75. Has fevers.	N	S	O	A	108. Uses medication.	N	S	O	A
S	O	A	76. Shows fear of strangers.	N	S	O	A	109. Readily starts up conversations with new people.	N	S	O	A
S	O	A	77. Plays with fire.	N	S	O	A	110. Has toileting accidents.	N	S	O	A
S	O	A	78. Tries new things.	N	S	O	A	111. Laughs.	N	S	O	A
S	O	A	79. Hits other children.	N	S	O	A	112. Teases others.	N	S	O	A
S	O	A	80. Worries about things that cannot be changed.	N	S	O	A	113. Says, "It's all my fault."	N	S	O	A
S	O	A	81. Has trouble concentrating.	N	S	O	A	114. Forgets things.	N	S	O	A
S	O	A	82. Tries to hurt self.	N	S	O	A	115. Has strange ideas.	N	S	O	A
S	O	A	83. Says, "I want to be alone" or "I like being alone."	N	S	O	A	116. Says, "I want to die" or "I wish I were dead."	N	S	O	A
S	O	A	84. Is overly active.	N	S	O	A	117. Leaves seat during meals.	N	S	O	A
S	O	A	85. Volunteers to help with things.	N	S	O	A	118. Encourages others to do their best.	N	S	O	A
S	O	A	86. Complains of being cold.	N	S	O	A	119. Gets colds.	N	S	O	A
S	O	A	87. Refuses to talk.	N	S	O	A	120. Is shy with adults.	N	S	O	A
S	O	A	88. Explores new surroundings.	N	S	O	A	121. Is a "good sport."	N	S	O	A
S	O	A	89. Calls other children names.	N	S	O	A	122. Orders others around.	N	S	O	A
S	O	A	90. Worries.	N	S	O	A	123. Is fearful.	N	S	O	A
S	O	A	91. Stares blankly.	N	S	O	A	124. Sees things that are not there.	N	S	O	A
S	O	A	92. Is easily upset.	N	S	O	A	125. Whines.	N	S	O	A
S	O	A	93. Throws tantrums.	N	S	O	A	126. Screams.	N	S	O	A
S	O	A	94. Politely asks for help.	N	S	O	A	127. Congratulates others when good things happen to them.	N	S	O	A
S	O	A	95. Complains of shortness of breath.	N	S	O	A	128. Complains of dizziness.	N	S	O	A
S	O	A	96. Clings to parent in strange surroundings.	N	S	O	A	129. Stands very close to family members when in public places.	N	S	O	A
S	O	A	97. Trembles.	N	S	O	A	130. Offers help to other children.	N	S	O	A
S	O	A	98. Interrupts parents when they are talking on the phone.	N	S	O	A	131. Fiddles with things while at meals.	N	S	O	A
S	O	A	99. Wets bed.	N	S	O	A					

Please be sure you have marked all items.

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## Appendix B. Parental Bonding Instrument

This questionnaire lists various attitudes and behaviours of parents. As you remember your MOTHER in your first 16 years, would you place a tick in the most appropriate bracket next to each statement. If it is more appropriate to complete these questions with regard to another caregiver (e.g. foster mother, step-mother, aunt, etc.), please specify \_\_\_\_\_.

		Very like	Moderately like	Moderately unlike	Very Unlike
1.	Spoke to me with a warm and friendly voice.	( )	( )	( )	( )
2.	Did not help me as much as I needed.	( )	( )	( )	( )
3.	Let me do those things I liked doing.	( )	( )	( )	( )
4.	Seemed emotionally cold to me.	( )	( )	( )	( )
5.	Appeared to understand my problems and worries.	( )	( )	( )	( )
6.	Was affectionate to me.	( )	( )	( )	( )
7.	Liked me to make my own decisions.	( )	( )	( )	( )
8.	Did not want me to grow up.	( )	( )	( )	( )
9.	Tried to control everything I did.	( )	( )	( )	( )
10.	Invaded my privacy.	( )	( )	( )	( )
11.	Enjoyed talking things over with me.	( )	( )	( )	( )
12.	Frequently smiled at me.	( )	( )	( )	( )
13.	Tended to baby me.	( )	( )	( )	( )
14.	Did not seem to understand what I needed or wanted.	( )	( )	( )	( )
15.	Let me decide things for myself.	( )	( )	( )	( )
16.	Made me feel I wasn't wanted.	( )	( )	( )	( )
17.	Could make me feel better when I was upset.	( )	( )	( )	( )
18.	Did not talk with me very much.	( )	( )	( )	( )
19.	Tried to make me dependent on her.	( )	( )	( )	( )
20.	Felt I could not look after myself unless she was around.	( )	( )	( )	( )
21.	Gave me as much freedom as I wanted.	( )	( )	( )	( )
22.	Let me go out as often as I wanted.	( )	( )	( )	( )
23.	Was overprotective of me.	( )	( )	( )	( )
24.	Did not praise me.	( )	( )	( )	( )
25.	Let me dress in any way I pleased.	( )	( )	( )	( )

(Parker, Tupling, & Brown, 1979)

### Appendix C. Parent Protection Scale

	0 Never	1 Some- times	2 Most of the time	3 Always
1. I blame myself when my child gets hurt	0	1	2	3
2. I comfort my child immediately when he/she cries	0	1	2	3
3. I encourage my child to depend on me	0	1	2	3
4. I have difficulty separating from my child	0	1	2	3
5. I trust my child on his/her own	0	1	2	3
6. I let my child make his/her own decisions	0	1	2	3
7. I have difficulty leaving my child with a babysitter	0	1	2	3
8. I decide when my child eats	0	1	2	3
9. I use baby words when I talk to my child	0	1	2	3
10. I urge my child to try new things	0	1	2	3
11. I determine who my child will play with	0	1	2	3
12. I keep a close watch on my child	0	1	2	3
13. I feed my child even if he/she can do it alone	0	1	2	3
14. I feel comfortable leaving my child with other people	0	1	2	3
15. I protect my child from criticism	0	1	2	3
16. I let my child choose what he/she wears	0	1	2	3
17. I make my child go to sleep at a set time	0	1	2	3
18. I go to my child if he/she cries during the night	0	1	2	3
19. I encourage my child to play with other children	0	1	2	3
20. I give my child extra attention when he/she clings to me	0	1	2	3
21. I decide what my child eats	0	1	2	3
22. I dress my child even if he/she can do it alone	0	1	2	3
23. I decide when my child goes to the bathroom	0	1	2	3
24. I know exactly what my child is doing	0	1	2	3
25. I allow my child to do things on his/her own	0	1	2	3

(Thomasgard, Metz, Edelbrock, & Shonkoff, 1995)

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**Appendix D.    General Health Questionnaire**

# THE GENERAL HEALTH QUESTIONNAIRE

**GHQ 28**

**David Goldberg**

Please read this carefully.

We should like to know if you have had any medical complaints and how your health has been in general, *over the past few weeks*. Please answer **ALL** the questions on the following pages simply by underlining the answer which you think most nearly applies to you. Remember that we want to know about present and recent complaints, not those that you had in the past.

It is important that you try to answer **ALL** the questions.

Thank you very much for your co-operation.

Have you recently

A1 – been feeling perfectly well and in good health?	Better than usual	Same as usual	Worse than usual	Much worse than usual
A2 – been feeling in need of a good tonic?	Not at all	No more than usual	Rather more than usual	Much more than usual
A3 – been feeling run down and out of sorts?	Not at all	No more than usual	Rather more than usual	Much more than usual
A4 – felt that you are ill?	Not at all	No more than usual	Rather more than usual	Much more than usual
A5 – been getting any pains in your head?	Not at all	No more than usual	Rather more than usual	Much more than usual
A6 – been getting a feeling of tightness or pressure in your head?	Not at all	No more than usual	Rather more than usual	Much more than usual
A7 – been having hot or cold spells?	Not at all	No more than usual	Rather more than usual	Much more than usual

B1 – lost much sleep over worry?	Not at all	No more than usual	Rather more than usual	Much more than usual
B2 – had difficulty in staying asleep once you are off?	Not at all	No more than usual	Rather more than usual	Much more than usual
B3 – felt constantly under strain?	Not at all	No more than usual	Rather more than usual	Much more than usual
B4 – been getting edgy and bad-tempered?	Not at all	No more than usual	Rather more than usual	Much more than usual
B5 – been getting scared or panicky for no good reason?	Not at all	No more than usual	Rather more than usual	Much more than usual
B6 – found everything getting on top of you?	Not at all	No more than usual	Rather more than usual	Much more than usual
B7 – been feeling nervous and strung-up all the time?	Not at all	No more than usual	Rather more than usual	Much more than usual

Please turn over

## Have you recently

<b>C1 – been managing to keep yourself busy and occupied?</b>	More so than usual	Same as usual	Rather less than usual	Much less than usual
<b>C2 – been taking longer over the things you do?</b>	Quicker than usual	Same as usual	Longer than usual	Much longer than usual
<b>C3 – felt on the whole you were doing things well?</b>	Better than usual	About the same	Less well than usual	Much less well
<b>C4 – been satisfied with the way you've carried out your task?</b>	More satisfied	About same as usual	Less satisfied than usual	Much less satisfied
<b>C5 – felt that you are playing a useful part in things?</b>	More so than usual	Same as usual	Less useful than usual	Much less useful
<b>C6 – felt capable of making decisions about things?</b>	More so than usual	Same as usual	Less so than usual	Much less capable
<b>C7 – been able to enjoy your normal day-to-day activities?</b>	More so than usual	Same as usual	Less so than usual	Much less than usual

<b>D1 – been thinking of yourself as a worthless person?</b>	Not at all	No more than usual	Rather more than usual	Much more than usual
<b>D2 – felt that life is entirely hopeless?</b>	Not at all	No more than usual	Rather more than usual	Much more than usual
<b>D3 – felt that life isn't worth living?</b>	Not at all	No more than usual	Rather more than usual	Much more than usual
<b>D4 – thought of the possibility that you might make away with yourself?</b>	Definitely not	I don't think so	Has crossed my mind	Definitely have
<b>D5 – found at times you couldn't do anything because your nerves were too bad?</b>	Not at all	No more than usual	Rather more than usual	Much more than usual
<b>D6 – found yourself wishing you were dead and away from it all?</b>	Not at all	No more than usual	Rather more than usual	Much more than usual
<b>D7 – found that the idea of taking your own life kept coming into your mind?</b>	Definitely not	I don't think so	Has crossed my mind	Definitely has

<b>A</b>	<input type="text"/>	<b>B</b>	<input type="text"/>	<b>C</b>	<input type="text"/>	<b>D</b>	<input type="text"/>	<b>TOTAL</b>	<input type="text"/>
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Code 0090000394  
4 (3.03)

## Appendix E. Life Events Questionnaire

For this questionnaire please circle "Yes" for any items which have happened to members of your family, and for each of these please circle the appropriate number to show what effect this has had on the family.

(1) Have there been any of the following <u>losses</u> for family members in the last 12 months?		Effect on family		
		Good Effect	No Effect	Bad Effect
(1.1) Loss of health e.g., illness, accident	Yes	1	2	3
	No			
(1.2) Loss of job	Yes	1	2	3
	No			
(1.3) Death of a loved one	Yes	1	2	3
	No			
(1.4) Loss of money or possessions e.g., theft, debt	Yes	1	2	3
	No			
(1.5) Loss of partner through separation or divorce	Yes	1	2	3
	No			
(1.6) Absence of partner e.g., through work	Yes	1	2	3
	No			
(1.7) Others, please list _____	Yes	1	2	3
	No			
(2) Have there been any of the following <u>changes</u> for your family in the last 12 months?				
(2.1) Change of house	Yes	1	2	3
	No			
(2.2) Change of job	Yes	1	2	3
	No			
(2.3) Change of child's school	Yes	1	2	3
	No			
(2.4) Pregnancy	Yes	1	2	3
	No			
(2.5) Change of number of people at home	Yes	1	2	3
	No			
(2.6) Other, please list _____	Yes	1	2	3
	No			

(3) Are there any problems now that you or members of your family have had for <u>longer than 12 months?</u>		Effect on family		
		Good Effect	No Effect	Bad Effect
(3.1) Long illness or disability	Yes	1	2	3
	No			
(3.2) Loneliness or isolation	Yes	1	2	3
	No			
(3.3) Money worries	Yes	1	2	3
	No			
(3.4) Drug or alcohol problems	Yes	1	2	3
	No			
(3.5) Problems with children e.g., at school	Yes	1	2	3
	No			
(3.6) Relationship with partner (wife, husband)	Yes	1	2	3
	No			
(3.7) Other, please list _____	Yes	1	2	3
	No			

(4) How difficult do you think your life is at present? (Please circle the appropriate number)				
No problems or stresses	Few problems or stresses	Some problems and stresses	Many problems and stresses	Very Many problems and stresses
1	2	3	4	5

(5) How do you think you are coping? (Please circle the appropriate number)				
Not at all	A little	Fairly well	Very well	Extremely well
1	2	3	4	5

(Smith, 1992)

## Appendix F. Index of Support

The following statements have been used by many people to describe how much support they get from other people. We would like to know whether you share any of these feelings and how strongly you feel about them, by circling a number according to whether you – Strongly Agree, Agree, Undecided, Disagree or Strongly Disagree with each one.

		Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1.	People don't come to visit me as often as I would like.	1	2	3	4	5
2.	I find it easy to make friends.	1	2	3	4	5
3.	I often need help from other people but can't get it.	1	2	3	4	5
4.	I'm afraid of being left alone.	1	2	3	4	5
5.	I seem to have a lot of friends.	1	2	3	4	5
6.	I don't have anyone that I can confide in.	1	2	3	4	5
7.	The person who means the most to me takes an interest in my affairs.	1	2	3	4	5
8.	There is someone who needs me as much as I need them.	1	2	3	4	5
9.	I don't have a very close friend.	1	2	3	4	5
10.	The person who means the most to me doesn't spend time with me.	1	2	3	4	5
11.	I have no-one to lean on in times of trouble.	1	2	3	4	5
12.	I have someone to share good news with.	1	2	3	4	5
13.	There is someone who can always cheer me up when I am down.	1	2	3	4	5
14.	I often feel very lonely.	1	2	3	4	5
15.	I feel that there is something missing from my life.	1	2	3	4	5

Note. Reverse coding is required for items 1, 3, 4, 6, 9, 10, 11, 14 and 15.

(Henderson, Duncan-Jones, McAuley, & Ritchie, 1978)

**Appendix G. Physician Questionnaire**

Please complete for ASTHMATIC children aged 2-5 YEARS

Child: \_\_\_\_\_ Consultant: \_\_\_\_\_

1. Severity of child's asthma:

- ☐ Mild
- ☐ Moderate
- ☐ Severe

2. Age (months) when first diagnosed: \_\_\_\_\_

3. Prescribed medication (dosage and type): \_\_\_\_\_

4. Please indicate reported symptoms when not medicated:

- ☐ Persistent cough
- ☐ Shortness of breath
- ☐ Wheezing
- ☐ Waking at night with cough or wheeze
- ☐ Other (please specify) \_\_\_\_\_

5. Reason for current consultation: \_\_\_\_\_

6. Have you seen this child before?

- ☐ No: Skip to Question 7
- ☐ Yes: Please indicate (i) Number of consultations \_\_\_\_\_  
(ii) Frequency of consultations \_\_\_\_\_

7. Please indicate how well the child's asthma is currently managed:

- ☐ Poorly managed
- ☐ Managed less than half the time
- ☐ Managed about half the time
- ☐ Managed most of the time
- ☐ Completely managed

**Appendix H. Demographics Questionnaire****Questions about your child:**

1. Relationship to child of person completing form:

- |   |                                      |
|---|--------------------------------------|
| <input type="checkbox"/> Biological mother            | <input type="checkbox"/> Step mother |
| <input type="checkbox"/> Biological father            | <input type="checkbox"/> Stepfather  |
| <input type="checkbox"/> Other (please specify) _____ |                                      |

2. Child's sex: ☐ Boy ☐ Girl

3. Child's date of birth: \_\_\_\_ Day \_\_\_\_ Month \_\_\_\_ Year

4. What country was your child born in? \_\_\_\_\_

5. Some children may sometimes feel wheezy or tight in the chest. In the 12 months, how often did your child have episodes of wheezing, or wheezing which was more troublesome than usual?

- |                                |                                     |                                  |
|--------------------------------|-------------------------------------|----------------------------------|
| <input type="checkbox"/> Daily | <input type="checkbox"/> Weekly     | <input type="checkbox"/> Monthly |
| <input type="checkbox"/> Never | <input type="checkbox"/> Don't know |                                  |

6. In the last 12 months, how often did your child wake at night with cough or wheezing?

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> Most nights        | <input type="checkbox"/> 1-3 nights/week | <input type="checkbox"/> <1 night/week |
| <input type="checkbox"/> Only with episodes | <input type="checkbox"/> Never           | <input type="checkbox"/> Don't know    |

7. In the last 12 months, how often did your child's experience troublesome wheezing first thing in the morning?

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> Most morning       | <input type="checkbox"/> 1-3 mornings/week | <input type="checkbox"/> <1 morns/week |
| <input type="checkbox"/> Only with episodes | <input type="checkbox"/> Never             | <input type="checkbox"/> Don't know    |

8. In last 12 months, has your child had difficulty breathing which has been severe enough to limit speech to only one to two words at a time between breaths?

- |                              |                             |                                     |
|------------------------------|-----------------------------|-------------------------------------|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't know |
|------------------------------|-----------------------------|-------------------------------------|

9. In last 12 months, how often were your child's activities affected or limited by cough or wheeze or shortness of

breath whilst he/she was at home playing with other children?

- |                                |                                     |                                  |
|--------------------------------|-------------------------------------|----------------------------------|
| <input type="checkbox"/> Daily | <input type="checkbox"/> Weekly     | <input type="checkbox"/> Monthly |
| <input type="checkbox"/> Never | <input type="checkbox"/> Don't know |                                  |

(Questions 5 to 9 from Rosier, Bishop, Nolan, Robertson, Carlin & Phelan, 1994)

10. Has your child been diagnosed with asthma?

☐ No: Skip to question 14.

☐ Yes: Please specify (i) Date of diagnosis \_\_\_\_ Day \_\_\_\_ Month \_\_\_\_ Year

(ii) Doctor who made diagnosis \_\_\_\_\_

12. If you answered 'Yes' to question 10, please indicate the severity of your child's asthma

☐ Mild

☐ Moderate

☐ Severe

13. How well managed or controlled are your child's asthma symptoms (that is symptoms are prevented from arising or relieved quickly when they do occur)?

☐ Poorly managed

☐ Managed less than half the time

☐ Managed about half the time

☐ Managed most of the time

☐ Completely managed

14. Does your child suffer any allergies?

☐ No

☐ Yes: Please specify \_\_\_\_\_

15. Does your child suffer any other medical conditions?

☐ No

☐ Yes: Please specify \_\_\_\_\_

16. Does the child live with a person who smokes?

☐ No

☐ Yes

17. Has your child ever been admitted to hospital?

☐ No

☐ Yes: Please specify number of admissions: \_\_\_\_\_

	Date of admission	Duration of stay	Reason for admission
Hospital admission 1:			
Hospital admission 2:			
Hospital admission 3:			

18. Does your child spend time in care of someone other than yourself each week?

☐ No

☐ Yes: Please specify (i) Number of hours \_\_\_\_\_

(ii) Type/s (e.g. centre, friend, relative, nanny) \_\_\_\_\_

19. Your child lives with:

☐ Both biological parents

☐ Biological mother & stepfather

☐ Biological mother only

☐ Biological father & stepmother

☐ Biological father only

☐ Other (please specify) \_\_\_\_\_

20. Other children in the family:

Relationship to Child	Male or Female	Date of Birth	Tick if living at home	Tick if asthmatic & indicate severity (mild, moderate, severe)

**Questions about the child's mother / caregiver**

19. Mother's date of birth: \_\_\_\_\_ Day \_\_\_\_\_ Month \_\_\_\_\_ Year
20. Mother's country of birth: \_\_\_\_\_
21. Mother's fathers' country of birth: \_\_\_\_\_
22. Mother's mothers' country of birth: \_\_\_\_\_
23. Mother's occupation: \_\_\_\_\_
24. Mother's current marital status:
- |                                  |                                    |  |
|----------------------------------|------------------------------------|--|
| <input type="checkbox"/> Married | <input type="checkbox"/> Defacto   | <input type="checkbox"/> Separated or Divorced |
| <input type="checkbox"/> Single  | <input type="checkbox"/> Remarried | <input type="checkbox"/> Widowed               |
25. Mother's highest level of education achieved:
- ☐ Not completed high school
  - ☐ Completed high school
  - ☐ Completed trade school
  - ☐ Completed diploma or certificate
  - ☐ Started, but not completed undergraduate tertiary
  - ☐ Completed undergraduate tertiary
  - ☐ Completed higher tertiary degree (e.g. Masters degree)
26. Total household income (optional):
- |   |   |
|---|---|
| <input type="checkbox"/> Under \$15,000 per year    | <input type="checkbox"/> \$35,001-\$45,000 per year |
| <input type="checkbox"/> \$15,001-\$25,000 per year | <input type="checkbox"/> \$45,001-\$55,000 per year |
| <input type="checkbox"/> \$25,001-\$35,000 per year | <input type="checkbox"/> Over \$55,000 per year     |
27. Has the child's mother ever been diagnosed with asthma?
- ☐ No
- ☐ Yes: Please specify date of diagnosis \_\_\_\_\_ Day \_\_\_\_\_ Month \_\_\_\_\_ Year
28. If you answered "Yes" to Question 27, does the child's mother still suffer from asthma?
- ☐ No
- ☐ Yes: Please specify severity ☐ Mild ☐ Moderate ☐ Severe
29. Did the mother have contact with asthmatics in her childhood family?
- ☐ No
- ☐ Yes: Please specify relationship of person to mother \_\_\_\_\_
30. If applicable, was the child's mothers' past experience of asthma:
- |                                   |   |
|-----------------------------------|---|
| <input type="checkbox"/> Positive | <input type="checkbox"/> Neither positive or negative |
| <input type="checkbox"/> Negative | <input type="checkbox"/> Don't know                   |

**Questions about the child's father / caregiver**

31. Father's date of birth: \_\_\_\_\_ Day \_\_\_\_\_ Month \_\_\_\_\_ Year
32. Father's country of birth: \_\_\_\_\_
33. Father's fathers' country of birth: \_\_\_\_\_
34. Father's mothers' country of birth: \_\_\_\_\_
35. Father's occupation: \_\_\_\_\_
36. Father's current marital status:
- |                                  |                                    |  |
|----------------------------------|------------------------------------|--|
| <input type="checkbox"/> Married | <input type="checkbox"/> Defacto   | <input type="checkbox"/> Separated or Divorced |
| <input type="checkbox"/> Single  | <input type="checkbox"/> Remarried | <input type="checkbox"/> Widowed               |
37. Father's highest level of education achieved:
- ☐ Not completed high school
  - ☐ Completed high school
  - ☐ Completed trade school
  - ☐ Completed diploma or certificate
  - ☐ Started, but not completed undergraduate tertiary
  - ☐ Completed undergraduate tertiary
  - ☐ Completed higher tertiary degree (e.g. Masters degree)
38. Has the child's father ever been diagnosed with asthma?
- ☐ No
  - ☐ Yes: Please specify date of diagnosis \_\_\_\_\_ Day \_\_\_\_\_ Month \_\_\_\_\_ Year
39. If you answered "Yes" to Question 38, does the child's father still suffer from asthma?
- ☐ No
  - ☐ Yes: Please specify severity ☐ Mild ☐ Moderate ☐ Severe
40. Did the father have contact with asthmatics in his childhood family?
- ☐ No
  - ☐ Yes: Please specify relationship of person to father \_\_\_\_\_
41. If applicable, was the child's fathers' past experience of asthma:
- |                                   |  |
|-----------------------------------|--|
| <input type="checkbox"/> Positive | <input type="checkbox"/> Neither positive nor negative |
| <input type="checkbox"/> Negative | <input type="checkbox"/> Don't know                    |

## Appendix I. Identification of Covariates for Analyses Using the Entire Sample

### I.1 Child Anxiety and Somatisation as the Dependent Variable

Table I.1 Pearson r Correlation Coefficients between Child Anxiety, Somatisation and Demographic/Social Factors (N = 103)

Variable	Anxiety	Somatisation
Child anxiety	1	.516**
Child age (months)	.272*	-.024
Socio-economic status	-.016	.175
Hours child is in care/week	.085	.032

\*p = .005

\*\*p < .001

Table I.2 Independent Samples t-test for Gender by Anxiety/Somatisation (N = 103, 58 Males)

Dependent variable	t	df	p	Mean difference	SE of Mean Difference	95% CI	
						Lower	Upper
Anxiety	.301	101	.764	.30	.989	-1.664	2.260
Somatisation	.361	101	.719	.23	.640	-1.039	1.501

Table I.3 Independent Samples t-test for Parental Asthmatic Status by Anxiety/Somatisation (N = 103, 60 parents with asthma history, 43 parents no asthma history)

Dependent variable	t	df	p	Mean difference	SE of Mean Difference	95% CI	
						Lower	Upper
Anxiety	.251	101	.803	0.25	1.007	-1.745	2.250
Somatisation	-1.862	101	.066	-1.19	0.641	-2.466	0.078

### I.2 Current Protective Parenting as the Dependent Variable

Table I.4 Pearson  $r$  Correlation Coefficients between Child Anxiety, Somatisation and Demographic/Social Factors ( $N = 103$ )

Variable	Protective parenting
Child age (months)	-.213*
Number of siblings	.077
Birth order	.122
Maternal age	-.165
Paternal age	-.069
Socio-economic status	.034
Hours child is in care/week	-.162
Number of hospital admissions (controlling for child age)	.034

\* $p < .05$

Table I.5 Independent Samples  $t$ -test for Gender by Current Protective Parenting ( $N = 103$ , 58 Males)

Dependent variable	$t$	df	$p$	Mean difference	SE of Mean Difference	95% CI	
						Lower	Upper
Protective parenting	-.218	101	.828	-.290	1.312	-2.889	2.316

### I.3 Parental Overall Adjustment as the Dependent Variable

Table I.6 Pearson  $r$  Correlation Coefficients between Parental Overall Adjustment, Socio-economic Status and Parental Age ( $N = 103$ )

Variable	Protective parenting
Maternal age	-.060
Paternal age	-.071
Socio-economic status	.170

---

**Appendix J.     Child Anxiety as a Mediator between Psychosocial  
Variables and Child Somatisation**

Table J.1 Summary of Regression Analyses Testing the Conditions for Evidence that Anxiety Mediates the Relationship between Child Somatisation and Parental History of Overprotection, Parental Overall Adjustment and Current Protective Parenting ( $N = 103$ )

DV for each condition	IV for each Condition	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$R^2/\Delta R^2$	<u>F</u>	df1	df2	<u>p</u>
<b>Condition 1 (controlling for child age)</b>	Anxiety						.114	4.584	3	98	.005
History of protection		.1960	.063	.296	3.106	.002					
Overall adjustment		.0070	.074	.099	1.007	.317					
Current protectiveness		.0007	.053	.012	0.130	.896					
<b>Criterion 2</b>	Somatisation						.266	36.601	1	101	.000
Child anxiety		.3340	.055	.516	6.050	.000					
<b>Criterion 3</b>	Somatisation						.168	6.680	3	99	.000
History of protection		.1470	.041	.343	3.572	.001					
Overall adjustment		.0050	.034	.164	1.714	.090					
Current protectiveness		.0090	.047	.002	0.019	.985					
<b>Criterion 4</b>	Somatisation						.073	3.611	3	98	.016
Child anxiety		.2820	.056	.436	5.031	.000					
History of protection		.0080	.039	.209	2.320	.022					
Overall adjustment		.0050	.031	.155	1.813	.073					
Current protectiveness		-.0050	.042	-.012	-0.134	.894					

## Appendix K. Suppressors

A suppressed relationship exists when the pathways between three sets of variables cancel each other out. As seen in figure K-1, child somatisation is positively associated with parental overall adjustment. However, this relationship will appear non-significant as children with asthma have *higher* levels of somatisation and parents with *lower* levels of psychological problems. Thus, the indirect pathway between child somatisation and parental overall adjustment is negative, which counteracts the positive relationship between parental overall adjustment and child somatisation.

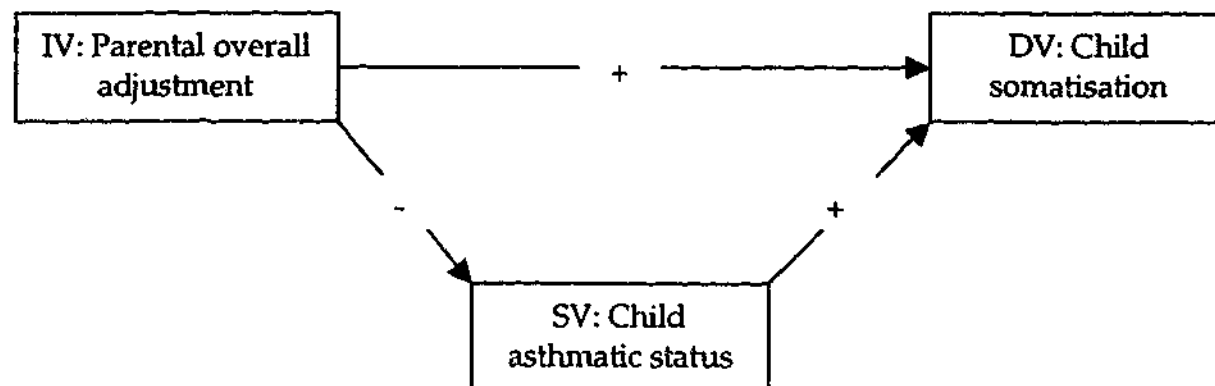


Figure K-1. Relationships between the independent variable (IV), suppressor variable (SV) and dependent variable (DV)

Appendix L.     Parental Overall Adjustment as a Mediator between  
Psychosocial Variables and Child  
Anxiety/Somatisation

Table L.1 Summary of Regression Analyses Testing the Conditions for Evidence that Parental Overall Adjustment Mediates the Relationship between Child Anxiety and Parental History of Overprotection, Social Support, Global Stress and Coping (N = 103)

DV for each condition	IV for each condition	B	SE B	$\beta$	t	p	R <sup>2</sup> / $\Delta$ R <sup>2</sup>	F	df1	df2	p
<b>Condition 1</b>	Overall adjustment						.350	13.215	4	98	.000
History of protection		0.004	0.102	.035	0.406	.686					
Social support		0.458	0.111	.401	4.140	.000					
Global stress		2.605	0.980	.240	2.658	.009					
Coping		-1.005	1.170	-.076	-0.858	.393					
<b>Criterion 2, controlling for child age</b>	Child anxiety						.009	1.031	1	100	.312
Overall adjustment		0.005	0.053	.097	1.015	.312					
<b>Criterion 3, controlling for child age</b>	Child anxiety						.192	4.624	5	97	.001
History of protection		0.226	0.064	.341	3.560	.001					
Social support		0.002	0.069	.040	0.364	.717					
Global stress		-0.754	0.610	-.125	-1.235	.220					
Coping		0.184	0.729	.025	0.252	.801					
<b>Criterion 4, controlling for child age</b>	Child anxiety						.116	3.467	4	96	.011
Overall adjustment		0.005	0.063	.101	0.890	.376					
History of protection		0.224	0.064	.338	3.518	.001					
Social support		-0.009	0.075	-.002	-0.013	.990					
Global stress		-0.903	0.634	-.150	-1.425	.157					
Coping		0.237	0.733	.032	0.323	.747					

Table L.2 Summary of Regression Analyses Testing the Conditions for Evidence that Parental Overall Adjustment Mediates the Relationship between Child Somatisation and Parental History of Overprotection, Social Support, Global Stress and Coping ( $N = 103$ )

DV for each condition	IV for each condition	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$R^2/\Delta R^2$	<u>F</u>	df1	df2	<u>p</u>
<b>Condition 1</b>	Overall adjustment						.350	13.215	4	98	.000
History of protection		0.004	0.102	.035	0.406	.686					
Social support		0.458	0.111	.401	4.140	.000					
Global stress		2.605	0.980	.240	2.658	.009					
Coping		-1.005	1.170	-.076	-0.858	.393					
<b>Criterion 2, controlling for child anxiety</b>	Child somatisation						.036	5.165	1	100	.025
Overall adjustment		0.007	0.030	.191	2.273	.025					
<b>Criterion 3, controlling for child anxiety</b>	Child somatisation						.102	3.922	4	97	.005
History of protection		0.007	0.039	.165	1.833	.070					
Social support		0.003	0.039	.073	0.757	.451					
Global stress		0.281	0.352	.072	0.799	.426					
Coping		-0.783	0.416	-.165	-1.881	.063					
<b>Criterion 4, controlling for child anxiety</b>	Child somatisation						.069	2.627	4	96	.039
Overall adjustment		0.002	0.036	.065	0.643	.522					
History of protection		0.007	0.039	.165	1.825	.071					
Social support		0.002	0.043	.047	0.447	.656					
Global stress		0.217	0.367	.056	0.592	.555					
Coping		-0.760	0.419	-.160	-1.812	.073					

**Appendix M.    Current Protective Parenting as a Mediator between**  
**Psychosocial Variables and Child**  
**Anxiety/Somatisation**

Table M.1 Summary of Regression Analyses Testing the Conditions for Evidence that Current Protective Parenting Mediates the Relationship between Child Anxiety and Parental History of Overprotection, Parental Overall Adjustment, Social Support, Global Stress and Coping ( $N = 103$ )

DV for each condition	IV for each condition	B	SE B	$\beta$	t	p	$R^2/\Delta R^2$	F	df1	df2	p
<b>Condition 1, controlling for child age</b>	<b>Current parenting</b>						.119	2.730	5	96	.024
History of protection		0.172	.086	.196	1.994	.049					
Overall adjustment		0.008	.085	.119	1.024	.308					
Social support		0.009	.102	.118	0.974	.332					
Global stress		0.717	.858	.090	0.835	.406					
Coping		1.098	.992	.113	1.107	.271					
<b>Criterion 2, controlling for child age</b>	<b>Child anxiety</b>						.031	3.428	1	100	.067
Current parenting		0.135	.073	.179	1.852	.067					
<b>Criterion 3, controlling for child age</b>	<b>Child anxiety</b>						.125	3.000	5	96	.015
History of protection		0.224	.064	.338	3.518	.001					
Overall adjustment		0.005	.063	.101	0.890	.376					
Social support		-0.009	.075	-.002	-0.013	.990					
Global stress		-0.903	.634	-.150	-1.425	.157					
Coping		0.237	.733	.032	0.323	.747					
<b>Criterion 4, controlling for child age</b>	<b>Child anxiety</b>						.105	2.531	5	95	.034
Current parenting		0.008	.075	.114	1.139	.257					
History of protection		0.209	.065	.316	3.225	.002					
Overall adjustment		0.004	.063	.088	0.768	.444					
Social support		-0.009	.075	-.015	-0.126	.900					
Global stress		-0.964	.635	-.160	-1.519	.132					
Coping		0.143	.736	.019	0.194	.847					

Table M.2 Summary of Regression Analyses Testing the Conditions for Evidence that Current Protective Parenting Mediates the Relationship between Child Somatisation and Parental History of Overprotection, Parental Overall Adjustment, Social Support, Global Stress and Coping ( $N = 103$ )

DV for each condition	IV for each condition	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$R^2/\Delta R^2$	<u>F</u>	df1	df2	<u>p</u>
<b>Condition 1, controlling for child age</b>	Current parenting						.119	2.730	5	96	.024
History of protection		0.172	.086	.196	1.994	.049					
Overall adjustment		0.008	.085	.119	1.024	.308					
Social support		0.009	.102	.118	0.974	.332					
Global stress		0.717	.858	.090	0.835	.406					
Coping		1.098	.992	.113	1.107	.271					
<b>Criterion 2, controlling for child anxiety</b>	Child somatisation						.005	0.656	1	100	.420
Current parenting		0.003	.042	.070	0.810	.420					
<b>Criterion 3, controlling for child anxiety</b>	Child somatisation						.105	3.202	5	96	.011
History of protection		0.007	.039	.165	1.825	.071					
Overall adjustment		0.002	.036	.065	0.643	.522					
Social support		0.002	.043	.047	0.447	.656					
Global stress		0.217	.367	.056	0.592	.555					
Coping		-0.760	.419	-.160	-1.812	.073					
<b>Criterion 4, controlling for child anxiety</b>	Child somatisation						.100	3.027	5	95	.014
Current parenting		-0.005	.043	-.010	-0.114	.909					
History of protection		0.007	.039	.166	1.810	.073					
Overall adjustment		0.002	.037	.066	0.647	.519					
Social support		0.002	.043	.048	0.455	.650					
Global stress		0.222	.371	.057	0.598	.551					
Coping		-0.754	.425	-.159	-1.775	.079					

**Appendix N. Social Support as a Moderator between Parental History of Overprotection and Child Anxiety and Somatisation**

Table N.1 Summary of Multiple Regression Analysis Assessing Social Support as a Moderator between Parental History of Overprotection and Child Anxiety ( $N = 103$ )

Independent variable	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>
Child age (months)	.127	.042	.282	3.051	.003
History of overprotection	.209	.065	.316	3.204	.002
Social support	-.001	.062	-.028	-0.287	.775
History of overprotection X Social support	.003	.007	.053	0.536	.593

$F(4, 98) = 5.426, p < .001; R^2 = .181; \text{Adjusted } R^2 = .148$

Table N.2 Summary of Multiple Regression Analysis Assessing Social Support as a Moderator between Parental History of Overprotection and Child Somatisation ( $N = 103$ )

Independent variable	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>
History of overprotection	.005	.039	.138	1.530	.129
Social support	.004	.035	.119	1.400	.165
History of overprotection X Social support	.009	.004	.210	2.467	.015
Child anxiety	.289	.054	.446	5.302	.000

$F(4, 98) = 14.924, p < .001; R^2 = .379; \text{Adjusted } R^2 = .353$

The following three equations were derived to graph the interaction term, which indicated that social support moderated the relationship between parental history of overprotection and child somatisation:

1. When social support = -1 (i.e. below average):  
Child somatisation =  $(-.119) + (.138 * \text{Parental Overprotection}) - (.210 * \text{Parental Overprotection})$
2. When social support = 0 (i.e. average):  
Child somatisation =  $(.138 * \text{Parental Overprotection})$
3. When social support = +1 (i.e. above average):  
Child somatisation =  $(.119) + (.138 * \text{Parental Overprotection}) + (.210 * \text{Parental Overprotection})$

**Appendix O.     Parental Overall Adjustment as a Mediator between**  
**Psychosocial Variables and Current Protective**  
**Parenting**

Table A.1 Summary of Regression Analyses Testing the Conditions for Evidence that Parental Overall Adjustment Mediates the Relationship between Current Protective Parenting and Social Support, Global Stress and Coping ( $N = 103$ )

DV for each condition	IV for each condition	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$R^2/\Delta R^2$	<u>F</u>	df1	df2	<u>p</u>
<b>Condition 1</b>	Overall adjustment						.349	17.714	3	99	.000
Social support		0.467	0.108	.409	4.311	.000					
Global stress		2.637	0.973	.243	2.711	.008					
Coping		-1.047	1.161	-.079	-0.901	.370					
<b>Criterion 2, controlling for child age</b>	Current parenting						.053	5.860	1	100	.017
Overall adjustment		0.169	0.070	.230	2.421	.017					
<b>Criterion 3, controlling for child age</b>	Current parenting						.074	2.730	3	98	.048
Social support		0.176	0.094	.210	1.880	.063					
Global stress		1.088	0.838	.136	1.298	.197					
Coping		0.843	1.001	.087	0.842	.402					
<b>Criterion 4, controlling for child age</b>	Current parenting						.031	1.166	3	97	.327
Overall adjustment		0.009	0.086	.128	1.088	.279					
Social support		0.131	0.102	.156	1.286	.202					
Global stress		0.835	0.869	.105	0.961	.339					
Coping		0.935	1.004	.096	0.932	.354					

## Appendix P. Social Support as a Moderator between Psychosocial Variables and Current Protective Parenting

Table P.1 Summary of Multiple Regression Analysis Assessing Social Support as a Moderator between Parental History of Overprotection and Current Protective Parenting ( $N = 103$ )

Independent variable	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>
Child age (months)	-.111	.057	-.187	-1.958	.053
History of overprotection	.173	.089	.198	1.953	.054
Social support	.145	.084	.173	1.728	.087
History of overprotection X Social support	.001	.010	.011	0.107	.915

$F(4, 98) = 3.849, p = .006; R^2 = .136; \text{Adjusted } R^2 = .101$

Table P.2 Summary of Multiple Regression Analysis Assessing Social Support as a Moderator between Parental Overall Adjustment and Current Protective Parenting ( $N = 103$ )

Independent variable	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>
Child age (months)	-.113	.057	-.189	-1.966	.052
Parental overall adjustment	.009	.091	.128	1.035	.303
Social support	.120	.097	.143	1.239	.218
Parental overall adjustment X Social support	.002	.005	.047	0.413	.680

$F(4, 98) = 3.209, p = .016; R^2 = .166; \text{Adjusted } R^2 = .080$

Table P.3 Summary of Multiple Regression Analysis Assessing Social Support as a Moderator between Parental Global Stress and Current Protective Parenting ( $N = 103$ )

Independent variable	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>
Child age (months)	-0.107	.058	-.180	-1.841	.069
Global stress	0.150	.089	.179	1.698	.093
Social support	1.108	.902	.139	1.228	.222
Global stress X Social support	-0.002	.105	-.021	-0.196	.845

$F(4, 98) = 3.125$ ,  $p = .018$ ;  $R^2 = .113$ ; Adjusted  $R^2 = .077$

Table P.4 Summary of Multiple Regression Analysis Assessing Social Support as a Moderator between Parental Coping and Current Protective Parenting ( $N = 103$ )

Independent variable	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>
Child age (months)	-.107	.058	-.179	-1.855	.067
Coping	.229	.093	.273	2.470	.015
Social support	.751	1.008	.077	0.745	.458
Coping X Social support	.002	.101	.029	0.278	.782

$F(4, 98) = 2.865$ ,  $p = .027$ ;  $R^2 = .105$ ; Adjusted  $R^2 = .068$

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**Appendix Q.     Social Support as a Mediator between Psychosocial  
Variables and Parental Overall Adjustment**

Table Q.1 Summary of Regression Analyses Testing the Conditions for Evidence that Social Support Mediates the Relationship between Parental Overall Adjustment and Parental History of Overprotection, Global Stress and Coping ( $N = 103$ )

DV for each condition	IV for each condition	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$R^2/\Delta R^2$	<u>F</u>	<u>df1</u>	<u>df2</u>	<u>p</u>
Condition 1	Social support						.294	13.772	3	99	.000
History of protection		0.173	0.091	.166	1.902	.060					
Global stress		3.163	0.831	.333	3.807	.000					
Coping		-3.234	1.012	-.279	-3.196	.002					
Criterion 2	Overall adjustment						.294	41.979	1	101	.000
Social support		0.619	0.096	.542	6.479	.000					
Criterion 3	Overall adjustment						.237	10.237	3	99	.000
History of protection		0.121	0.108	.101	1.117	.267					
Global stress		4.054	0.987	.374	4.108	.000					
Coping		-2.487	1.202	-.188	-2.069	.041					
Criterion 4	Overall adjustment						.057	2.855	3	98	.041
Social support		0.458	0.111	.401	4.140	.000					
History of protection		0.004	0.102	.035	0.406	.686					
Global stress		2.605	0.980	.240	2.658	.009					
Coping		-1.005	1.170	-.076	-0.858	.393					

## Appendix R. Social Support as a Moderator between Psychosocial Variables and Parental Overall Adjustment

Table R.1 Summary of Multiple Regression Analysis Assessing Social Support as a Moderator between Parental History of Overprotection and Parental Overall Adjustment ( $N = 103$ )

Independent variable	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>
History of overprotection	-.006	.103	-.006	-0.064	.949
Social support	.540	.098	.472	5.525	.000
History of overprotection X Social support	.003	.011	.268	3.117	.002

$F(3,99) = 18.551, p < .001; R^2 = .360; \text{Adjusted } R^2 = .340$

The following three equations were derived to graph the interaction term, which indicated that social support moderated the relationship between parental history of overprotection and parental overall adjustment:

1. When social support = -1 (i.e. below average):  
Parental adjustment =  $(-.472) - (.006 * \text{Parental Overprotection}) - (.268 * \text{Parental Overprotection})$
2. When social support = 0 (i.e. average):  
Parental adjustment =  $(-.006 * \text{Parental Overprotection})$
3. When social support = +1 (i.e. above average):  
Parental adjustment =  $(.472) - (.006 * \text{Parental Overprotection}) + (.268 * \text{Parental Overprotection})$

Table R.2 Summary of Multiple Regression Analysis Assessing Social Support as a Moderator between Global Stress and Parental Overall Adjustment, and Coping and Parental Overall Adjustment ( $N = 103$ )

Independent variable	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>
Global stress	2.608	1.101	.240	2.369	.020
Coping	-1.141	1.176	-.086	-0.971	.334
Social support	0.385	0.118	.337	3.266	.002
Global stress X Social support	0.111	0.125	.083	0.887	.377
Global stress X Coping	-0.170	0.122	-.129	-1.391	.167

$F(5,97) = 11.494, p < .001; R^2 = .359; \text{Adjusted } R^2 = .328$

## Appendix S. Identification Covariates for Analyses Using the Asthma Sample

### S.1 Child Anxiety and Somatisation as the Dependent Variable

Table S.1 Pearson r Correlation Coefficients between Child Anxiety, Somatisation and Demographic/Social Factors ( $n = 65$ )

Variable	Anxiety	Somatisation
Child anxiety	--	.549**
Child age (months)	.309*	-.017
Socio-economic status	-.015	.261*
Hours child is in care/week	.099	.026
Time since asthma diagnosis	.123	.043
Number of child hospitalisations	.048	.180

\* $p < .05$

\*\* $p < .001$

Table S.2 Independent Samples t-test for Gender by Anxiety/Somatisation ( $n = 65$ , 41 Males)

Dependent variable	t	df	p	Mean difference	SE of Mean Difference	95% CI	
						Lower	Upper
Anxiety	.418	63	.677	.590	1.399	-2.210	3.381
Somatisation	.784	63	.436	.680	0.866	-1.052	2.410

Table S.3 Independent Samples t-test for Parental Asthmatic Status by Anxiety/Somatisation ( $n = 65$ , 32 parents with asthma history, 33 parents no asthma history)

Dependent variable	t	df	p	Mean difference	SE of Mean Difference	95% CI	
						Lower	Upper
Anxiety	.648	63	.519	.870	1.348	-1.820	3.566
Somatisation	-.467	63	.642	-.390	0.839	-2.068	1.284

## S.2 Current Protective Parenting as the Dependent Variable

Table S.4 Pearson r Correlation Coefficients between Child Anxiety, Somatisation and Demographic/Social Factors ( $n = 65$ )

Variable	Protective Parenting
Child age (months)	-.134
Birth order	.122
Number of siblings	.001
Maternal age	-.235
Paternal age	-.040
Hours child is in care/week	-.082
Socio-economic status	.064
Number of child hospitalisations	-.117
Time since asthma diagnosis	-.024

Table S.5 Independent Samples t-test for Gender by Current Protective Parenting ( $n = 65$ , 41 Males, 24 Females)

Dependent variable	t	df	p	Mean difference	SE of Mean Difference	95% CI	
						Lower	Upper
Protective parenting	-.028	63	.978	-.040	1.584	-3.211	3.121

### S.3 Parental Overall Adjustment as the Dependent Variable

Table S.6 Pearson  $r$  Correlation Coefficients between Child Anxiety, Somatisation and Demographic/Social Factors ( $n = 65$ )

Variable	Protective Parenting
Child age (months)	-.134
Birth order	.122
Number of siblings	.001
Maternal age	-.235
Paternal age	-.040
Hours child is in care/week	-.082
Socio-economic status	.064
Number of child hospitalisations	-.117
Time since asthma diagnosis	-.024

Table S.7 Independent Samples  $t$ -test for Gender by Current Protective Parenting ( $n = 65$ , 41 Males)

Dependent variable	$t$	df	$p$	Mean difference	SE of Mean Difference	95% CI	
						Lower	Upper
Protective parenting	-.028	63	.978	-.040	1.584	-3.211	3.121

### S.4 Parental Overall Adjustment as the Dependent Variable

Table S.8 Pearson  $r$  Correlation Coefficients between Parental Overall Adjustment, Socio-economic Status and Parental Age

Variable	Protective parenting
Maternal age	-.036
Paternal age	.074 <sup>a</sup>
Socio-economic status	.152

<sup>a</sup> $n = 64$ , as one father was deceased

**Appendix T. Level of Anxiety and Somatisation Among Children With and Without Asthma**

Table T.1 Test of Between-Subjects Effects: Child Anxiety among Children with Asthma Compared to Children without Asthma, Controlling for Child Age ( $N = 103$ )

Source	Type III Sum of Squares	df	Mean Square	F	p
Corrected Model	283.564 <sup>a</sup>	2	141.782	6.377	.002
Intercept	13.105	1	13.105	0.589	.444
Child age	177.361	1	177.361	7.978	.006
Asthmatic status	98.226	1	98.226	4.418	.038
Error	2223.251	100	22.233		
Total	8861.000	103			
Corrected Total	2506.816	102			

<sup>a</sup> $R^2 = .113$  (Adjusted  $R^2 = .095$ )

Table T.2 Test of Between-Subjects Effects: Child Somatisation among Children with Asthma Compared to Children without Asthma, Controlling for Child Anxiety

Source	Type III Sum of Squares	df	Mean Square	F	p
Corrected Model	400.001 <sup>a</sup>	2	200.001	30.733	.000
Intercept	35.819	1	35.819	5.504	.021
Child anxiety	198.831	1	198.831	30.553	.000
Asthmatic status	120.503	1	120.503	18.517	.000
Error	650.775	100	6.508		
Total	2438.000	103			
Corrected Total	1050.777	102			

<sup>a</sup> $R^2 = .381$  (Adjusted  $R^2 = .368$ )

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**Appendix U.     Parental Overall Adjustment as a Mediator between**  
**Child Asthma and Child Anxiety/Somatisation**

Table U.1 Summary of Regression Analyses Testing the Conditions for Evidence that Parental Overall Adjustment Mediates the Relationship between Child Anxiety and Child Asthmatic Status ( $N = 103$ )

DV for each condition	IV for each condition	B	SE B	$\beta$	t	p	$R^2/\Delta R^2$	F	df1	df2	p
Condition 1	Overall adjustment						.003	0.295	1	101	.588
Asthmatic status		-0.996	1.833	-.054	-0.543	.588					
Criterion 2, controlling for child age	Child Anxiety						.009	1.031	1	100	.312
Overall adjustment		0.005	0.053	.097	1.015	.312					
Criterion 3, controlling for child age	Child Anxiety						.039	4.418	1	100	.038
Asthmatic status		2.025	0.963	.198	2.102	.038					
Criterion 4, controlling for child age	Child Anxiety						.041	4.681	1	99	.033
Overall adjustment		0.005	0.052	.108	1.148	.254					
Asthmatic status		2.084	0.963	.204	2.164	.033					

Table U.2 Summary of Regression Analyses Testing the Conditions for Evidence that Parental Overall Adjustment Mediates the Relationship between Child Somatisation and Child Asthmatic Status ( $N = 103$ )

DV for each condition	IV for each condition	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$R^2/\Delta R^2$	<u>F</u>	df1	df2	<u>p</u>
<b>Condition 1</b>	<b>Overall adjustment</b>						.003	0.295	1	101	.588
Asthmatic status		-0.996	1.833	-.054	-0.543	.588					
<b>Criterion 2, controlling for child anxiety</b>	<b>Child Somatisation</b>						.036	5.165	1	100	.025
Overall adjustment		0.007	0.030	.191	2.273	.025					
<b>Criterion 3, controlling for child anxiety</b>	<b>Child Somatisation</b>						.115	18.517	1	100	.000
Asthmatic status		2.291	0.532	.346	4.303	.000					
<b>Criterion 4, controlling for child anxiety</b>	<b>Child Somatisation</b>						.125	21.636	1	99	.000
Overall adjustment		0.008	0.027	.217	2.836	.006					
Asthmatic status		2.400	0.516	.363	4.651	.000					

Table U.3 Summary of Regression Analyses Testing the Conditions for Evidence that Parental Overall Adjustment Mediates the Relationship between Child Anxiety and Asthma Severity Ratings ( $n = 65$ )

DV for each condition	IV for each condition	B	SE B	$\beta$	t	p	$R^2/\Delta R^2$	F	df1	df2	p
Condition 1	Overall adjustment						.100	3.429	2	62	.039
Parent severity rating		0.442	0.247	.224	1.785	.079					
Physician severity rating		4.905	3.616	.170	1.356	.180					
Criterion 2, controlling for child age	Child Anxiety						.004	0.261	1	62	.612
Overall adjustment		0.003	0.068	.062	0.511	.612					
Criterion 3, controlling for child age	Child Anxiety						.016	0.551	2	61	.579
Parent severity rating		-0.009	0.142	-.082	-0.645	.522					
Physician severity rating		2.002	2.052	.123	0.975	.333					
Criterion 4, controlling for child age	Child Anxiety						.016	0.533	2	60	.589
Overall adjustment		0.003	0.073	.062	0.484	.630					
Parent severity rating		-0.108	0.147	-.096	-0.734	.466					
Physician severity rating		1.833	2.094	.112	0.875	.385					

Table U.4 Summary of Regression Analyses Testing the Conditions for Evidence that Parental Overall Adjustment Mediates the Relationship between Child Somatisation and Asthma Severity Ratings ( $n = 65$ )

DV for each condition	IV for each condition	B	SE B	$\beta$	t	p	$R^2/\Delta R^2$	F	df1	df2	p
Condition 1	Overall adjustment						.100	3.429	2	62	.039
Parent severity rating		0.442	0.247	.224	1.785	.079					
Physician severity rating		4.905	3.616	.170	1.356	.180					
Criterion 2, controlling for SES and child anxiety	Somatisation						.063	6.813	1	61	.011
Overall adjustment		0.009	0.035	.257	2.610	.011					
Criterion 3, controlling for SES and child anxiety	Somatisation						.130	7.873	2	60	.001
Parent severity rating		0.267	0.071	.384	3.734	.000					
Physician severity rating		0.221	0.969	.022	0.228	.821					
Criterion 4, controlling for SES and child anxiety	Somatisation						.098	6.188	2	59	.004
Overall adjustment		0.007	0.033	.186	1.963	.054					
Parent severity rating		0.243	0.071	.350	3.431	.001					
Physician severity rating		-0.009	0.960	-.009	-0.095	.924					

**Appendix V.     Current Protective Parenting as a Mediator**  
**between with Child Asthma and Child**  
**Anxiety/Somatisation**

Table V.1 Summary of Regression Analyses Testing the Conditions for Evidence that Current Protective Parenting Mediates the Relationship between Child Anxiety and Child Asthmatic Status ( $N = 103$ )

DV for each condition	IV for each condition	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$R^2/\Delta R^2$	<u>F</u>	df1	df2	<u>p</u>
Condition 1, controlling for child age	Protective parenting						.047	5.212	1	100	.025
Asthmatic status		2.949	1.292	.218	2.283	.025					
Criterion 2, controlling for child age	Child anxiety						.031	3.428	1	100	.067
Protective parenting		0.135	0.073	.179	1.852	.067					
Criterion 3, controlling for child age	Child anxiety						.039	4.418	1	100	.038
Asthmatic status		2.025	0.963	.198	2.102	.038					
Criterion 4, controlling for child age	Child anxiety						.027	3.029	1	99	.085
Protective parenting		0.107	0.074	.141	1.436	.154					
Asthmatic status		1.711	0.983	.167	1.740	.085					

Table V.2 Summary of Regression Analyses Testing the Conditions for Evidence that Current Protective Parenting Mediates the Relationship between Child Somatisation and Child Asthmatic Status ( $N = 103$ )

DV for each condition	IV for each condition	B	SE B	$\beta$	t	p	$R^2/\Delta R^2$	F	df1	df2	p
Condition 1, controlling for child age	Protective parenting						.047	5.212	1	100	.025
Asthmatic status		2.949	1.292	.218	2.283	.025					
Criterion 2, controlling for child anxiety	Child somatisation						.005	.656	1	100	.420
Protective parenting		0.042	.070	.810	0.420	.201					
Criterion 3, controlling for child anxiety	Child somatisation						.115	18.517	1	100	.000
Asthmatic status		2.291	.532	.346	4.303	.000					
Criterion 4, controlling for child anxiety	Child somatisation						.110	17.570	1	99	.000
Protective parenting		0.002	.040	.004	0.048	.962					
Asthmatic status		2.286	.545	.345	4.192	.000					

Table V.3 Summary of Regression Analyses Testing the Conditions for Evidence that Current Protective Parenting Mediates the Relationship between Child Anxiety and Asthma Severity Ratings ( $n = 65$ )

DV for each condition	IV for each condition	B	SE B	$\beta$	t	p	$R^2/\Delta R^2$	F	df1	df2	p
<b>Condition 1</b>	Protective parenting						.020	0.618	2	62	.542
Parent severity rating		0.007	0.165	.005	0.041	.968					
Physician severity rating		-2.608	2.415	-.141	-1.080	.284					
<b>Criterion 2, controlling for child age</b>	Child Anxiety						.012	.839	1	62	.363
Protective parenting		0.009	0.107	.111	0.916	.363					
<b>Criterion 3, controlling for child age</b>	Child Anxiety						.016	.551	2	61	.579
Parent severity rating		-0.009	0.142	-.082	-0.645	.522					
Physician severity rating		2.002	2.052	.123	0.975	.333					
<b>Criterion 4, controlling for child age</b>	Child Anxiety						.019	0.663	2	60	.519
Protective parenting		0.111	0.109	.126	1.025	.309					
Parent severity rating		-0.009	0.142	-.080	-0.628	.532					
Physician severity rating		2.275	2.069	.139	1.100	.276					

Table V.4 Summary of Regression Analyses Testing the Conditions for Evidence that Protective Parenting Mediates the Relationship between Child Somatisation and Asthma Severity Ratings ( $n = 65$ )

DV for each condition	IV for each condition	B	SEB	$\beta$	t	p	$R^2/\Delta R^2$	F	df1	df2	p
<b>Condition 1</b>	Protective parenting						.020	0.618	2	62	.542
Parent severity rating		0.007	0.165	.005	0.041	.968					
Physician severity rating		-2.608	2.415	-.141	-1.080	.284					
<b>Criterion 2, controlling for SES and child anxiety</b>	Somatisation						.000	0.008	1	61	.928
Protective parenting		0.002	0.067	.029	0.235	.815					
<b>Criterion 3, controlling for SES and child anxiety</b>	Somatisation						.130	7.873	4	60	.001
Parent severity rating		0.267	0.071	.384	3.734	.000					
Physician severity rating		0.221	0.969	.022	0.228	.821					
<b>Criterion 4, controlling for SES and child anxiety</b>	Somatisation						.130	7.752	2	59	.001
Protective parenting		0.008	0.051	.014	0.154	.878					
Parent severity rating		0.267	0.072	.384	3.705	.000					
Physician severity rating		0.242	0.987	.024	0.245	.807					

**Appendix W. Child Asthma as a Moderator between Parental History of Overprotection and Child Anxiety/Somatisation**

Table W.1 Summary of Multiple Regression Analysis Assessing Asthmatic Status as a Moderator between Parental History of Overprotection and Child Anxiety ( $N = 103$ )

Independent variable	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>
Child age (months)	0.124	.041	.275	3.050	.003
History of overprotection	0.177	.064	.267	2.766	.007
Child asthmatic status	1.542	.965	.151	1.597	.113
History of overprotection X Asthmatic status	0.141	.143	.094	0.988	.326

$F(4, 98) = 6.247, p < .001; R^2 = .203; \text{Adjusted } R^2 = .171$

Table W.2 Summary of Multiple Regression Analysis Assessing Asthmatic Severity as a Moderator between Parental History of Overprotection and Child Anxiety ( $n = 65$ )

Independent variable	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>
Functional severity	-.223	.137	-.199	-1.622	.110
History of overprotection	.210	.086	.311	2.428	.018
History of overprotection X Functional severity	.002	.015	.158	1.221	.227

$F(3, 61) = 3.760, p = .015; R^2 = .156; \text{Adjusted } R^2 = .115$

Table W.3 Summary of Multiple Regression Analysis Assessing Asthmatic Status as a Moderator between Parental History of Overprotection and Child Somatisation ( $N = 103$ )

Independent variable	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>
History of overprotection	0.006	.036	.138	1.639	.104
Child asthmatic status	2.326	.533	.351	4.364	.000
History of overprotection X Asthmatic status	0.163	.078	.168	2.089	.039
Child anxiety	0.245	.053	.378	4.647	.000

$F(4, 98) = 18.844, p < .001; R^2 = .44; \text{Adjusted } R^2 = .412$

Table W.4 Summary of Multiple Regression Analysis Assessing Asthmatic Severity as a Moderator between Parental History of Overprotection and Child Somatisation ( $n = 65$ )

Independent variable	B	SE B	$\beta$	t	p	$\Delta R^2$
Step 1						.332
Family SES	.360	.367	.113	0.982	.330	
Functional severity	.151	.082	.218	1.856	.068	
History of Overprotection	.112	.048	.268	2.331	.023	
History of Overprotection X Functional Severity	.002	.008	.250	2.130	.037	
Step 2						.226
Family SES	.338	.304	.106	1.113	.270	
Functional severity	.223	.069	.321	3.232	.002	
History of Overprotection	.005	.042	.111	.105	.274	
History of Overprotection X Functional Severity	.001	.007	.171	1.734	.088	
Child anxiety	.315	.059	.506	5.313	.000	

\* $p < .001$ ; At step 1:  $F(4, 60) = 7.457$ ,  $p < .001$ ; At step 2:  $F(5, 59) = 14.318$ ,  $p < .001$

The following three equations were derived to graph the interaction term, which indicated that functional severity of asthma moderated the relationship between parental history of overprotection and parental adjustment:

1. When asthma severity = -1 (i.e. below average):  
Child somatisation =  $(-.321) - (.111 * \text{Parental Overprotection}) - (.171 * \text{Parental Overprotection})$
2. When asthma severity = 0 (i.e. average):  
Child somatisation =  $(.111 * \text{Parental Overprotection})$
3. When asthma severity = +1 (i.e. above average):  
Child somatisation =  $(.321) - (.111 * \text{Parental Overprotection}) + (.171 * \text{Parental Overprotection})$

## Appendix X. Asthma as a Moderator between Parental History of Overprotection and Current Protective Parenting

Table X.1 Summary of Multiple Regression Analysis Assessing Asthmatic Status as a Moderator between Parental History of Overprotection and Current Protective Parenting ( $N = 103$ )

Independent variable	B	SE B	$\beta$	t	p
Child age	-0.129	0.056	-.217	-2.315	.023
History of overprotection	0.207	0.088	.236	2.354	.021
Child asthmatic status	2.086	1.328	.154	1.570	.120
History of overprotection X Asthmatic status	-0.166	0.197	-.083	-0.846	.399

$F(4, 98) = 4.043, p = .004; R^2 = .142; \text{Adjusted } R^2 = .107$

Table X.2 Summary of Multiple Regression Analysis Assessing Asthma Severity Ratings as Moderators between Parental History of Overprotection and Current Protective Parenting ( $n = 65$ )

Independent variable	B	SE B	$\beta$	t	p
History of overprotection	0.135	0.105	.177	1.287	.203
Parent severity rating	-0.008	0.171	-.065	-0.482	.631
Physician severity rating	-2.354	2.542	-.127	-0.926	.358
History of overprotection X Parent severity rating	0.147	0.411	.049	0.357	.723
History of overprotection X Physician severity rating	0.001	0.018	.108	0.760	.450

$F(5, 59) = 1.042, p > .10; R^2 = .081; \text{Adjusted } R^2 = .003$

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**Appendix Y.     Parental Overall Adjustment as a Mediator**  
**between Child Asthma and Current Protective**  
**Parenting**

Table Y.1 Summary of Regression Analyses Testing the Conditions for Evidence that Parental Overall Adjustment Mediates the Relationship between Current Protective Parenting and Asthmatic Status ( $N = 103$ )

DV for each condition	IV for each condition	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$R^2/\Delta R^2$	<u>F</u>	df1	df2	<u>p</u>
<b>Condition 1</b>	Overall adjustment						.003	0.295	1	101	.588
Child asthmatic status		-0.996	1.833	-.054	-0.543	.588			1		
<b>Criterion 2, controlling for child age</b>	Protective parenting						.053	5.860	1	100	.017
Overall adjustment		0.169	0.070	.230	2.421	.017					
<b>Criterion 3, controlling for child age</b>	Protective parenting						.047	5.212	1	100	.025
Child asthmatic status		2.949	1.292	.218	2.283	.025					
<b>Criterion 4, controlling for child age</b>	Protective parenting						.053	6.173	1	99	.015
Overall adjustment		0.178	0.068	.242	2.612	.010					
Child asthmatic status		3.124	1.257	.230	2.485	.015					

Table Y.2 Summary of Regression Analyses Testing the Conditions for Evidence that Parental Overall Adjustment Mediates the Relationship between Current Protective Parenting and Asthma Severity Ratings ( $n = 65$ )

DV for each condition	IV for each condition	B	SE B	$\beta$	t	p	$R^2/\Delta R^2$	F	df1	df2	p
Condition 1	Overall adjustment						.100	3.429	2	62	.039
Parent severity rating		0.442	0.247	.224	1.785	.079					
Physician severity rating		4.905	3.616	.170	1.356	.180					
Criterion 2	Protective parenting						.145	10.703	1	63	.002
Overall adjustment		0.244	0.075	.381	3.272	.002					
Criterion 3	Protective parenting						.020	0.618	2	62	.542
Parent severity rating		0.007	0.165	.005	0.041	.968					
Physician severity rating		-2.608	2.415	-.141	-1.080	.284					
Criterion 4	Protective parenting						.063	2.430	2	61	.097
Overall adjustment		0.293	0.077	.458	3.814	.000					
Parent severity rating		-0.123	0.153	-.097	-0.799	.427					
Physician severity rating		-4.045	2.220	-.219	-1.822	.073					

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**Appendix Z. Parental Perception of Global Stress, Coping  
and Social Support as Mediators between  
Child Asthma and Parental Overall  
Adjustment**

Table Z.1 Summary of Regression Analyses Testing the Conditions for Evidence that Parental Global Stress Mediates the Relationship between Parental Overall Adjustment and Asthmatic Status ( $N = 103$ )

DV for each condition	IV for each condition	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$R^2/\Delta R^2$	<u>F</u>	df1	df2	<u>p</u>
Condition 1	Global stress						.025	2.549	1	101	.113
Child asthmatic status		0.267	0.167	.157	1.597	.113					
Criterion 2	Overall adjustment						.187	23.292	1	101	.000
Global stress		4.696	0.973	.433	4.826	.000					
Criterion 3	Overall adjustment						.003	0.295	1	101	.588
Child asthmatic status		-0.996	1.833	-.054	-0.543	.588					
Criterion 4	Overall adjustment						.015	1.911	1	100	.170
Global stress		4.909	0.981	.453	5.005	.000					
Child asthmatic status		-2.306	1.668	-.125	-1.382	.170					

Table Z.2 Summary of Regression Analyses Testing the Conditions for Evidence that Parental Coping Mediates the Relationship between Parental Overall Adjustment and Asthmatic Status ( $N = 103$ )

DV for each condition	IV for each condition	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$R^2/\Delta R^2$	<u>F</u>	<u>df1</u>	<u>df2</u>	<u>p</u>
Condition 1	Coping						.004	0.410	1	101	.524
Child asthmatic status		-0.008	0.139	-.064	-0.640	.524					
Criterion 2	Overall adjustment						.082	8.968	1	101	.003
Coping		-3.776	1.261	-.286	-2.995	.003					
Criterion 3	Overall adjustment						.003	0.295	1	101	.588
Child asthmatic status		-0.996	1.833	-.054	-0.543	.588					
Criterion 4	Overall adjustment						.005	0.572	1	100	.451
Coping		-3.836	1.266	-.290	-3.030	.003					
Child asthmatic status		-1.336	1.766	-.072	-0.756	.451					

Table Z.3 Summary of Regression Analyses Testing the Conditions for Evidence that Parental Social Support Mediates the Relationship between Parental Overall Adjustment and Asthmatic Status ( $N = 103$ )

DV for each condition	IV for each condition	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$R^2/\Delta R^2$	<u>F</u>	df1	df2	<u>p</u>
Condition 1	Social Support						.002	0.212	1	101	.646
Child asthmatic status		0.740	1.606	.046	0.461	.646					
Criterion 2	Overall adjustment						.294	41.979	1	101	.000
Social Support		0.619	0.096	.542	6.479	.000					
Criterion 3	Overall adjustment						.003	0.295	1	101	.588
Child asthmatic status		-0.996	1.833	-.054	-0.543	.588					
Criterion 4	Overall adjustment						.006	0.889	1	100	.348
Social Support		0.623	0.096	.545	6.512	.000					
Child asthmatic status		-1.457	1.545	-.079	-0.943	.348					

Table Z.4 Summary of Regression Analyses Testing the Conditions for Evidence that Global Stress Mediates the Relationship between Parental Overall Adjustment and Asthma Severity Ratings ( $n = 65$ )

DV for each condition	IV for each condition	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$R^2/\Delta R^2$	<u>F</u>	df1	df2	<u>p</u>
<b>Condition 1</b>	Global stress						.064	2.106	2	62	.130
Parent severity rating		0.002	0.023	.088	0.691	.492					
Physician severity rating		0.550	0.329	.213	1.671	.100					
<b>Criterion 2</b>	Overall adjustment						.253	21.382	1	63	.000
Global stress		5.641	1.220	.503	4.624	.000					
<b>Criterion 3</b>	Overall adjustment						.100	3.429	2	62	.039
Parent severity rating		0.442	0.247	.224	1.785	.079					
Physician severity rating		4.905	3.616	.170	1.356	.180					
<b>Criterion 4</b>	Overall adjustment						.044	1.906	2	61	.157
Global stress		5.149	1.243	.459	4.143	.000					
Parent severity rating		0.361	0.221	.183	1.634	.107					
Physician severity rating		2.074	3.292	.072	0.630	.531					

Table Z.4 Summary of Regression Analyses Testing the Conditions for Evidence that Parental Coping Mediates the Relationship between Parental Overall Adjustment and Asthma Severity Ratings ( $n = 65$ )

DV for each condition	IV for each condition	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$R^2/\Delta R^2$	<u>F</u>	df1	df2	<u>p</u>
<b>Condition 1</b>	Coping						.054	1.771	2	62	.179
Parent severity rating		-0.003	0.019	-.172	-1.338	.186					
Physician severity rating		-0.249	0.274	-.117	-0.908	.368					
<b>Criterion 2</b>	Overall adjustment						.095	6.626	1	63	.012
Coping		-4.174	1.621	-.308	-2.574	.012					
<b>Criterion 3</b>	Overall adjustment						.100	3.429	2	62	.039
Parent severity rating		0.442	0.247	.224	1.785	.079					
Physician severity rating		4.905	3.616	.170	1.356	.180					
<b>Criterion 4</b>	Overall adjustment						.063	2.279	2	61	.111
Coping		-3.364	1.634	-.249	-2.058	.044					
Parent severity rating		0.357	0.245	.181	1.460	.149					
Physician severity rating		4.069	3.549	.141	1.147	.256					

Table Z.5 Summary of Regression Analyses Testing the Conditions for Evidence that Parental Social Support Mediates the Relationship between Parental Overall Adjustment and Asthma Severity Ratings ( $n = 65$ )

DV for each condition	IV for each condition	<u>B</u>	<u>SE B</u>	$\beta$	<u>t</u>	<u>p</u>	$R^2/\Delta R^2$	<u>F</u>	df1	df2	<u>p</u>
<b>Condition 1</b>	Social support						.055	1.804	2	62	.173
Parent severity rating		0.188	0.220	.109	0.853	.397					
Physician severity rating		4.499	3.215	.180	1.400	.167					
<b>Criterion 2</b>	Overall adjustment						.387	39.805	1	63	.000
Social support		0.717	0.114	.622	6.309	.000					
<b>Criterion 3</b>	Overall adjustment						.100	3.429	2	62	.039
Parent severity rating		0.442	0.247	.224	1.785	.079					
Physician severity rating		4.905	3.616	.170	1.356	.180					
<b>Criterion 4</b>	Overall adjustment						.034	1.787	2	61	.176
Social support		0.672	0.115	.583	5.821	.000					
Parent severity rating		0.315	0.201	.160	1.568	.122					
Physician severity rating		1.881	2.969	.065	0.633	.529					

## Appendix AA. Social Support as a Moderator between Child Asthma and Parental Overall Adjustment

Table AA.1 Summary of Multiple Regression Analysis Assessing Social Support as a Moderator between Asthmatic Status and Parental Overall Adjustment ( $N = 103$ )

Independent variable	$B$	$SE\ B$	$\beta$	$t$	$p$
Child asthmatic status	-1.379	1.536	-.075	-0.898	.371
Social support	0.599	0.096	.524	6.220	.000
Social support X Asthmatic status	0.319	0.208	.129	1.533	.129

$F(3, 99) = 15.250, p < .001, R^2 = .316, \text{Adjusted } R^2 = .295$

Table AA.2 Summary of Multiple Regression Analysis Assessing Social Support as a Moderator between Asthma Severity Ratings and Parental Overall Adjustment ( $n = 65$ )

Independent variable	$B$	$SE\ B$	$\beta$	$t$	$p$
Social support	0.543	0.142	.471	3.815	.000
Parent severity rating	0.278	0.195	.141	1.427	.159
Physician severity rating	4.738	4.697	.164	1.009	.317
Social support X Parent severity rating	0.005	0.019	.247	2.454	.017
Social support X Physician severity rating	0.363	0.833	.072	0.436	.665

$F(5, 59) = 10.852, p < .001, R^2 = .475, \text{Adjusted } R^2 = .439$

The following three equations were derived to graph the interaction term, which indicated that social support moderated the relationship between parent rating of functional severity of asthma and parental overall adjustment:

1. When social support = -1 (i.e. below average):  
Parental overall adjustment =  $(-.471) + (.141 * \text{Asthma severity}) - (.247 * \text{Asthma severity})$
2. When social support = 0 (i.e. average):  
Parental overall adjustment =  $(.141 * \text{Asthma severity})$
3. When social support = +1 (i.e. above average):  
Parental overall adjustment =  $(.471) + (.141 * \text{Asthma severity}) + (.247 * \text{Asthma severity})$

## Appendix BB. Identification of Covariates for Analyses Regarding Anxiety and Somatisation Clinical Risk Status

### BB.1 Anxiety Status as the Dependent Variable

Table BB.1 Independent Samples t-test for Social and Demographic Variables by Anxiety Risk Status ( $N = 103$ ,  $df = 101$ )

Independent variable	t	p	Mean Difference	SE of Mean Difference	95% CI	
					Lower	Upper
Child age	-.0354	.724	-0.85	2.402	-5.615	3.916
Socioeconomic status	-1.688	.094	-0.37	0.219	-0.803	0.065
Number hospital admissions	-1.547	.125	-0.45	0.293	-1.033	0.128
Hours in child care	0.024	.981	0.07	2.705	-5.300	5.432
Mother's age	0.983	.328	1.01	1.032	-1.032	3.061
Father's age	0.110	.912	0.14	1.250	-2.341	2.617

Table BB.2 Fisher's Exact Test for Gender by Anxiety Risk Status ( $N = 103$ )

	p (2-sided)	p (1-sided)
Fisher's Exact Test	.144	.089

BB.2 Somatisation Status as the Dependent VariableTable BB.3 Independent Samples t-test for Social and Demographic Variables by Somatisation Risk Status ( $N = 103$ ,  $df = 101$ )

Independent variable	t	p	Mean Difference	SE of Mean Difference	95% CI	
					Lower	Upper
Child age	0.377	.707	0.87	2.304	-3.702	5.440
Socioeconomic status	1.506	.135	.317	0.210	-0.101	0.734
Number hospital admissions	0.909	.365	0.26	0.283	-0.304	0.818
Hours in child care	-0.727	.469	-1.88	2.588	-7.014	3.253
Mother's age	1.462	.147	1.44	0.984	-0.513	3.391
Father's age	-0.105	.917	-0.13	1.199	-2.504	2.253

Table BB.4 Fisher's Exact Test for Gender by Somatisation Risk Status ( $N = 103$ )

	p (2-sided)	p (1-sided)
Fisher's Exact Test	.827	.430

BB.3 Anxiety-Somatisation Status as the Dependent VariableTable BB.5 Independent Samples t-test for Social and Demographic Variables by Anxiety-Somatisation Risk Status ( $N = 103$ ,  $df = 101$ )

Independent variable	t	p	Mean Difference	SE of Mean Difference	95% CI	
					Lower	Upper
Child age	0.125	.901	0.38	3.015	-5.603	6.358
Socioeconomic status	-0.520	.604	-0.14	0.278	-0.695	0.406
Number hospital admissions	-0.478	.633	-0.18	0.371	-0.913	0.558
Hours in child care	-1.146	.254	-3.86	3.371	-10.551	2.823
Mother's age	0.112	.911	0.15	1.300	-2.433	2.725
Father's age	-0.881	.380	-1.38	1.562	-4.473	1.722

Table BB.6 Fisher's Exact Test for Gender by Anxiety-Somatisation Risk Status ( $N = 103$ )

	p (2-sided)	p (1-sided)
Fisher's Exact Test	.288	.203

**Appendix CC. Post-hoc Analysis: Pregnancy and Parental Overall Adjustment**

Table CC.1 Adjusted Mean Score (M), Standard Error of Mean (SE M) and 95% Confidence Interval (95% CI) for Parental Overall Adjustment by Child Asthmatic Status, Controlling for Parental Pregnancy Status (N = 103, df = 101)

Independent variable	<u>M</u>	<u>SE M</u>	95% CI	
			Lower	Upper
Non-asthmatic ( <u>n</u> = 38)	19.434	1.471	16.515	22.353
Asthmatic ( <u>n</u> = 65)	19.085	1.117	16.868	21.301

$F(1, 100) = .035, p > .10$

**Appendix DD. Post-hoc Analysis: Parental Anxiety and Physician  
Severity Rating**

Table DD.1 Mean (M) Level, Standard Deviation (SD) and Standard Error of Mean (SE M) for Parental Anxiety by Physician Rating of Asthma Severity (n = 65, df = 63)

Severity	<u>M</u>	<u>SD</u>	<u>SE M</u>
Mild ( <u>n</u> = 8)	3.25	2.053	.726
Moderate ( <u>n</u> = 57)	6.19	3.608	.478

**Appendix EE. Post-hoc Analysis: Association between Anxiety and Somatisation by Asthmatic Status**

Table EE.1 Pearson r Correlations between Child Anxiety and Somatisation by Child Asthmatic Status

Asthmatic status	r
Non-asthmatic ( $n = 38$ )	.20
Asthmatic ( $n = 65$ )	.55*

\* $p < .001$