

Somatic Complaints in Childhood:
How they are related to children's emotional and social functioning

PROEFSCHRIFT

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Promotor: Prof. Dr. P.M. Westenberg (Universiteit Leiden)
Co-promotoren: Dr. C. Rieffe (Universiteit Leiden)
Prof. Dr. M. Meerum Terwogt (Vrije Universiteit)
Referent: Prof. Dr. A. Vingerhoets (Universiteit Tilburg)
Overige leden: Dr. J. F. Brosschot (Universiteit Leiden)
Dr. A. Kindermann (Academisch Medisch Centrum)
Prof. Dr. A. van der Leij (Universiteit van Amsterdam)
Prof. Dr. A.M. Oudesluys-Murphy (Leids Universitair Medisch Centrum)

Your heart is a great river after a long spell of rain, spilling over its banks. All signposts that once stood on the ground are gone, inundated and carried away by that rush of water. And still the rain beats down on the surface of the river. Every time you see a flood like that on the news you tell yourself: That's it. That's my heart.

Haruki Murakami

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Chapter 1

General introduction

INTRODUCTION

Somatic complaints in children are a puzzling phenomenon as their etiology is poorly understood. Children's somatic complaints are by no means solely explained by medical causes such as infections or injuries (Croffie, Fitzgerald, & Chong, 2000; Goodman & McGrath, 1991). The current literature suggests that, because emotional processes incorporate activation of physiological systems, they can play a role in the development of somatic complaints (Cohen & Herbert, 1996; Hyams, & Hyman, 1998; Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002; Jones, Dilley, Drossman, & Crowell, 2006; Mayer, 1996; Mayne, 1999; Nash & Theberge, 2006; Segerstrom & Miller, 2004; Tsygos & Chrousos, 2002). Indeed, negative affect is strongly and positively associated with somatic complaints in children (Campo, et al., 2004; Diepenmaat, van der Wal, de Vet, & Hirasing, 2006; Mikkelsen, Sourander, Piha, Salminen, 1997; Muris & Meesters, 2004). Negative affect, however, is a very broad concept. Frequent or long term negative affect reflects a maladaptive emotional process (Garber, Braafladt, & Weiss, 1995; Papadakis, Prince, Jones, & Strauman, 2006; Silk, Steinberg, & Morris, 2003), but says little about the exact underlying psychological problems. Children's emotional functioning is strongly affected by cognitive-emotional processes and indirectly by certain social influences. The aim of this thesis is to identify a number of emotional and social influences important for understanding the development of somatic complaints in children. This first chapter is meant as an introduction to the studies described in this thesis explaining their relevance as well as their theoretical basis. First, the relevance of studying the etiology of children's somatic complaints will be made clear. Second, the emotional variables that were considered in this thesis will be described. Third, possible social influences will be considered. Fourth and finally, the further structure of this thesis will be clarified.

RELEVANCE OF STUDYING THE ETIOLOGY OF CHILDREN'S SOMATIC COMPLAINTS

The prevalence of somatic complaints in children is high, especially in middle childhood and adolescence (Perquin, et al., 2000; Petersen, Bergstrom, & Brulin, 2003; Roth-Isigkeit, Thyen, Raspe, Stoven, & Schmucker, 2004). About 25% of the children are bothered by recurrent or continuous complaints, such as headaches, abdominal pain, and fatigue for more than three months (Perquin et al.; Petersen et al.). This is disturbing because somatic complaints can affect many domains of the child's life: somatic complaints are for instance associated with decreased activity in hobbies and missing out on social activities with peers (Campo, Jansen-McWilliams, Comer, & Kelleher, 1999). Also, when psychological problems (partly) cause these somatic complaints, the psychological functioning of children with many somatic complaints is a problem on its own (Campo, et al., 2004; Diepenmaat, et al., 2006; Mikkelsen, et al., 1997; Muris & Meesters, 2004). In addition, somatic complaints developed in childhood can be quite persistent,

sometimes continuing to return into adulthood (Campo et al., 2001). When there is no adequate help available, somatic complaints will thus give rise to long term troubles for many children.

When children have frequent somatic complaints, parents sometimes seek *medical* health care for them (Janicke, Finney, & Riley, 2001; Claar & Walker, 1999). Especially when physicians cannot find any medical condition that can explain the presence of somatic complaints in a child, it is the general opinion that *psychological* therapy is warranted (Campo, et al., 1999; Claar & Walker, 1999; Eminson, 2007). Information about successful ways of helping children with many somatic complaints through psychological treatment is, however, very limited (Eminson). Even though some children thus might eventually receive psychological help, more knowledge about the psychological processes underlying somatic complaints is warranted in order to make the interventions more efficient. Moreover, not all parents seek help when their child experiences somatic complaints. Parents may not always be aware of somatic (or emotional) problems in their children, depending on the child's skill to talk about internal feelings (Meade, Lumley, & Casey, 2001): when children do not talk about their complaints, we cannot expect parents to know about these complaints. In addition, seeking medical health care depends on many factors other than symptom severity. For instance, the causes a parent sees for the somatic complaints, and the general attitude of parents towards seeking medical health care are associated with health care seeking (Janicke et al.; Claar & Walker). Because children are dependent of their parents in seeking health care, it is highly questionable whether children who visit outpatient hospital clinics and have a chance of eventually receiving psychological therapy differ from children who do not visit a pediatrician in the degree in which they experience problems. There are no interventions, let alone preventive measures for somatic complaints in general populations based on reducing somatic complaints by improving children's psychological well-being. The psychological help available may therefore also fail to reach many children with somatic complaints who are in need of this. We can thus conclude that, first of all, many children undergo medical examinations before receiving the psychological help they really need. Second, the help these children receive is not yet well geared to psychological problems of these children (as we do not fully understand the psychological functioning of children with many somatic complaints). Third, many children with frequent somatic complaints or at risk for developing these complaints do not receive any help at all. Finding out which psychological factors are important in understanding the development of somatic complaints in children is a precondition for solving these issues.

EMOTIONAL FACTORS IN RELATION TO SOMATIC COMPLAINTS IN CHILDHOOD

With respect to psychological influences on the experience of somatic complaints, the lion's share of attention has been given to emotional factors. This is

understandable considering the physiological component of emotions. Emotions steer our behavior (Oatley & Jenkins, 1996). When something for example makes you angry, you wish to change the situation to meet your own goals, whereas when you are scared, you may want to escape from the situation. These types of reactions are facilitated by physiological changes that are part of emotions (Mayne, 1999). During experiences of negative emotions arousal is increased (eg., heart rate, breathing rate, and muscle tension increase), making it possible to focus attention and perform a behavioral response. As such, emotions help us in our daily functioning (Frijda, 1994; Mayne). When emotions are not adequately processed, however, resulting in long-term or recurrent negative emotional states, the physiological changes can contribute to the experience of somatic complaints (Cohen & Herbert, 1996; Hyams, & Hyman, 1998; Kiecolt-Glaser et al., 2002; Jones et al., 2006; Mayer, 1996; Mayne; Nash & Theborge, 2006; Segerstrom & Miller, 2004; Tsygos & Chrousos, 2002).

Research from a medical perspective has focused on general somatic problems that can arise under chronic stress (e.g., Segerstrom & Miller, 2004), and (more recently) on effects of stress on specific organs, such as the abdomen (eg., Bathia & Tandon, 2005; Hyams, & Hyman, 1998). Theories concerning emotional processing that may account for the development of somatic complaints stem mainly from the fields of psychiatry and psychology. The dominant theory in the field of psychiatry states that somatic complaints arise in people who insufficiently understand and verbally label their emotions. This theory is based on observations of Sifneos in psychosomatic patients:

The ability ... not only to recognize and express emotions but also to verbalize them is significant. Some patients experience a difficulty in this area. When they are asked to talk about how they feel they mention repetitively and endlessly only somatic sensations, without being able to relate them to any accompanying thoughts, fantasies, or conflicts. Others seem to be unable to specify what it feels like to be angry or sad, and a few individuals fail to differentiate between pleasant and unpleasant emotions.... I would like to introduce the word alexithymic (Greek *a*, lack, *lexis*, word, *thymos*, mood) to describe patients who present these difficulties. (Sifneos, 1972; pp. 81-82).

The alexithymia hypothesis thus states that problems of emotion awareness lead to the experience of frequent somatic complaints.

Other researchers, however, take a different view. In the field of health psychology, most attention is given to the theory of 'sense of coherence' (a feeling of situational control) developed by Antonovsky (1979, 1987). This theory states that individuals who perceive low feelings of control over situations interpret negative situations as highly stressful. These individuals will therefore often experience negative affect with high intensities that in turn will lead to somatic complaints. People who, in contrast, experience situations as predictable,

meaningful, and as something they can change for their benefit are said to have a strong ‘sense of coherence’ and it is assumed that they will show resilience when faced with negative situations. These people will develop few somatic complaints (Antonovsky, 1979, 1993; Pallant & Lae, 2002)¹.

These two dominant theories, and additional minor theories (see below) concern different aspects of emotional processing: whereas the alexithymia hypothesis has led to a debate between researchers about possible issues with emotion identification skills (e.g., De Gucht, Fischler, & Heiser, 2004; Rieffe, Meerum Terwogt, & Bosch, 2004), others have focused on intensity of emotion appraisal based on the concept of sense of coherence (e.g., Torsheim, Aaroe, & Wold, 2001), and there has been some attention for emotion regulation problems as well (e.g., Compas & Boyer, 2001). The different theories exist quite independent of each other: almost no theoretical links have been made between the theories and most research is conducted based on a single theory. The different theoretical frameworks do, however, not exclude each other. This fragmentation of theories and associated research causes complexity in taking stock of the literature.

One solution to nevertheless give a clear outline of the different theoretical frameworks is by making explicit which step and aspect of emotional processing they refer to. Many models of emotional processing exist (Scherer, 2000), but fortunately there is consensus about three basic steps: attention, appraisal, and response (see Scherer or Gross & Thompson, 2007 for reviews). Figure 1, depicts these three steps of emotion processing. We will first explain these three steps more extensively –with respect to children- and then give an outline of the existing theoretical frameworks.

The first step of attention is self-evident: emotions arise when children attend to a situation that is significant for them with respect to their goals and desires. However, some children might more consciously pay attention to these situations and this can influence the next step of emotion processing: appraisal. Appraisal is an individual’s evaluation of the emotion-eliciting situation (Gross & Thomson; Scherer, 2000). Depending on how the situation relates to a child’s motivation and goals, but also on the extent to which a child feels able to control or deal with this situation, he or she will experience a certain *type* of emotion with a certain *intensity* (Scherer; Sander, Grandjean, & Scherer, 2005). For example, imagine two children. One of them has a membership card for the Zoo and therefore quite regularly goes there. He enjoys this, but it is not a special experience for him. The other child does not like the Zoo at all, because he is compassionate about the animals’ needs and believes it is wrong that the animals in the Zoo live imprisoned for the entertainment of people. When a school trip to the Zoo will be announced, the first child most likely will feel fairly happy: going to the Zoo is nice, but not something to get excited about. The second child on the other hand, will feel extremely sad that the school has planned a trip to the Zoo. The feeling of sadness

¹ Note that although alexithymia and sense of coherence are concepts that are more dominant in the field of psychiatry and health psychology respectively, they are studied by researchers from multiple disciplines.

will be more intense for a child who experiences little situational control (e.g., did not anticipate the announcement of this school trip).

This brings us to the final step of emotion processing: the response. The response is thought to include changes in neurobiological, experiential, and behavioral response systems (Gross & Thompson). Of most interest for this thesis is children's emotion regulation as unsuccessful emotion regulation will prolong physiological changes. In middle childhood, most children have learned several ways of dealing with their emotions (Fields & Prinz, 1997). This includes problems solving (where the situation is altered, see Figure 1), as well as cognitive emotion regulation strategies such as positive reappraisal that change a child's perception of the situation. In the example above, the second child can for instance decide to ask his or her parents permission to stay at home. Again, perception of control can influence the process of emotion processing at this step. Children who feel able to manage the situation and/or their emotions will make more effort and show more confidence in their emotion regulation (Zeman, Cassano, Perry-Parrish, & Stegall, 2006).

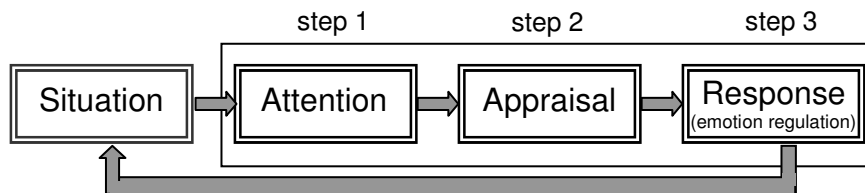


Figure 1

The "Modal Model" of emotional processing, adapted from Gross and Thompson (2007: Copyright permission provided by Guilford Press)

EMOTION IDENTIFICATION

According to the alexithymia hypothesis, emotional difficulties related to somatic complaints can be expected in the second step of emotional processing: emotion appraisal, possibly preceded by problems in the first step (i.e., insufficient attention for elements the situation that evoked the emotion). As explained before, the central problem expected in adults and children with somatic complaints is that they have difficulty with labeling of emotions and an inability to talk about feelings due to a lack of emotion awareness (De Gucht et al., 2004; Meade, Lumley, Casey, 2001; Rieffe, Meerum Terwogt, & Bosch, 2004; Taylor, Bagby, & Parker, 1997). In other words: the alexithymia hypothesis assumes a deficiency in the emotion identification aspect of emotion appraisal

We can find a shift in the theoretical framework that was formed in order to explain why people who experience difficulty with emotion identification would develop more somatic complaints than people who adequately identify their emotions. Sifneos identified alexithymia based on his own observations. Thus, the theoretical explanations for a possible link between somatic complaints and alexithymia came after the concept had been defined. Originally, it was thought

that alexithymia would result in a misattribution of normal psychophysiological reactions as somatic complaints (Frawley & Smith, 2001). This idea however, was invalidated by research showing that not many people seem to feel totally unaware of their emotions (Taylor & Bagby, 2000); people who experience many somatic complaints often strongly acknowledge the possibility that somatic complaints are caused by psychological factors (Lundh and Wangby 2002); and that children with frequent somatic complaints are even more aware than children with few somatic that emotional experiences involve somatic sensations (Rieffe, Meerum Terwogt & Tolland; 2004). The theoretical explanation for a possible link between alexithymia and somatic complaints is nowadays placed within the emotion process: poor emotion appraisal leading to less efficient emotion regulation (see Figure 1; Taylor, 2000). In other words, it is assumed that people who do not understand the reason why they experience negative emotions, are less likely to apply adequate solutions and thus are at risk for developing somatic complaints.

The introduction of the alexithymia concept has led to an enormous amount of research focused on the link between emotion identification skills and the experience of somatic complaints in adults (e.g. De Gucht, Fischler, & Heiser, 2004; Taylor, 2000; Taylor, Bagby, & Parker, 1997). Only recently has this link been addressed in children (Rieffe, Meerum Terwogt, & Bosch, 2004; Rieffe, Meerum Terwogt & Tolland, 2004). Despite the many publications on the topic of alexithymia, the evidence concerning the role of alexithymia in the experience of somatic complaints by adults or children is inconclusive. Almost all studies have used self-reports of somatic complaints and these studies seem to support the alexithymia hypothesis. When studying emotions and moods, self-reports are most often used, as moods and emotions are a subjective experience (Cole, Dolezal, Murray, & Canzoniero, 1999). The validity of self-reports to measure emotional *abilities*, however, has been criticized (Linden, Wen, & Paulhus, 1995; Rief Heuser, Fichter, 1996; Tull Medaglia, Roemer, 2005). There are only a few initial studies conducted with measures of alexithymia other than self-reports. These studies failed to support the alexithymia hypothesis (Rief et al., 1996; Rieffe, Meerum Terwogt, & Bosch, 2004; Tull, et al.). Yet, only one of them (Rieffe, Meerum Terwogt, & Bosch) was conducted in children. This signals that we need to further investigate the alexithymia hypothesis for explaining somatic complaints in childhood with a multi-method design.

FEELINGS OF CONTROL

Besides a *deficiency* in conscious appraisal as is assumed under the alexithymia hypothesis, there is also literature about *differences* in appraisal (still step 2 of emotional processing) that can account for maladaptive emotional processing. As shown in the previously described example of the announced school trip to the Zoo, there are diversities in the experienced emotions under the same or similar circumstances (Brown & Cowan, 1988). In part, these differences can be explained by the meaning of a situation with regard to a child's own purposes and goals.

Yet, although children's emotion appraisal is depended on quite random child-situation interactions, appraisal is also determined by a child's personal evaluation style. Confirming Antonovsky's sense of coherence theory (1979, 1993), it has been found that some children are inclined to view potentially negative situations as predictable, meaningful and as something they can change for their benefit, whereas other children perceive little control over situations. For these children who experience low situational control, potentially negative situations cause evaluations of hopelessness or even helplessness. The emotional process of these children is maladaptive, often resulting in symptoms of internalizing negative affect disorders.

It has not yet been firmly assessed whether experiencing little situational control also contributes to the development of somatic complaints in children. There are, however, some preliminary results supporting this idea. First, studies in adults have shown that the experience of more situational control indeed not only is a protective factor for emotional, but also for somatic problems (Eriksson & Lindström, 2006; Pallant & Lae, 2002). Second, a cross-sectional relationship between low experienced situational control and more self-reported somatic complaints has been found in children (Torsheim, Aaroe, & Wold, 2001).

Besides experienced situational control, children's experienced control over emotions might also influence their appraisals. More specifically, children with low emotional self-efficacy possibly will perceive more stress when confronted with negative situations because they feel they will be unable to cope with the situation: not because they feel they have no influence, but because they feel unable to exert any influence. Like a higher general self-efficacy is associated with a better psychological functioning by influencing the thoughts and actions of people (Luszczynska, Gutierrez-Dona, Schwarzer, 2005), it is likely that self-efficacy with regard to ones own emotional abilities will influence the way children deal with emotions. However, emotional control in relation to children's experience of somatic complaints has not yet been studied.

Note that both perceived emotional control and the before mentioned perceived situational control are formed in middle childhood, when children monitor their own thoughts, feelings and behavior from an outsider's perspective (Selman & Byrne, 1974) and evaluate their initial appraisals and consequences of their actions (Eccles, 1999). In adulthood, these feelings of control have become quite stable and are assumed difficult to challenge (Antonovsky, 1997; Petrides & Furnham, 2001). This further stresses the importance of understanding influences of perceived situational and emotional control in childhood, where the development of these variables can still be manipulated.

EMOTION REGULATION STRATEGIES

The last step of emotional processing has rarely been addressed as a possible factor in the etiology of somatic complaints. Given the general notion that somatic complaints can be caused by emotional problems, surprisingly little research has been conducted in order to asses aspects of emotion regulation with respect to the

development of somatic complaints in children (Compas & Boyer, 2001). Studies that have focused on coping in children with somatic complaints, were mostly conducted to assess which coping strategies these children use in order to deal with pain or health problems instead of more general situations. Thus, although we know that children have certain resources to cope with negative situations, we need more information about which of these resources contribute to fewer somatic complaints in children.

When considering emotion regulation, two processes of specific interest are worry and rumination. Borkovec, Robinson, Pruzinsky and DePree (1983) described worry as: “a chain of thoughts and images, negatively affect-laden and relatively uncontrollable” (p.10). Rumination on the other hand is referred to as: “behaviors and thoughts that passively focus one’s attention on one’s depressive symptoms and on the implications of these symptoms” (Nolen-Hoeksema, 1998, p. 239). Thus, worry and rumination both cover repetitive, non-productive thoughts. However, whereas worry takes place in the anticipation of events, rumination reflects negative cognitions that are based on passed experiences. Nevertheless, although it has been shown that worry and rumination are distinct processes in adults, they are highly correlated (Fresco, Frankel, Mennin, Turk, & Heimberg, 2002). In children there seems to be an even greater overlap between worry and rumination, since it has been found that it is not possible to measure the two constructs separately (Jellesma, Meerum Terwogt, Reijntjes, Stegge, & Rieffe, 2005). When focusing on children, therefore it makes more sense to speak of non-productive thoughts instead of artificially separating thoughts that are supposed to reflect either worry or rumination.

It is thought that negative thoughts initially have a function, that is: to make a person aware or maintain a person’s awareness that there is a negative situation that has to be solved and to prepare the person for a “fight or flight” reaction (Brosschot, Gerin, & Thayer, 2006). Non-productive thoughts, that are repetitive without positive outcomes, are a clear signal that people have difficulty in regulating their emotions by using adaptive emotion regulation strategies. Unfortunately, little attention has been given to the effect of non-productive thoughts on somatic complaints. In their review study, Broschott et al. showed that in adults, non-productive thoughts seem to increase the duration of negative emotional feelings and the associated physiological arousal. Although this is likely to be true in children as well, the finding that children’s available coping strategies differ from those of adults and that non-productive thoughts cannot be further discriminated in children, emphasize the importance of studies at younger ages. It is clear that our knowledge of the relationship between emotion regulation and children’s somatic complaints is very limited.

SOCIAL FACTORS IN RELATION TO SOMATIC COMPLAINTS IN CHILDHOOD

Besides the previously described cognitive-emotional processes, there is also some debate about social factors that might contribute to children's somatic complaints. There are several quite different processes through which social factors may have an influence on children's somatic complaints. For example, some might cause negative emotions, help with emotion regulation or have a more direct influence on somatic complaints by linking them with positive emotions. These will now be explained.

PARENTAL INFLUENCES

One of the social influences on somatic complaints in children is expected from parents. Following the behaviorists approach, it is thought that somatic complaints will be reinforced when they are followed by positive consequences (Fordyce, Fowler, Lehmann, & DeLateur, 1968), in other words: are followed by positive emotions. In children, parents are the ones who influence the consequences of somatic complaints the most. They are able to keep their children home from school, give them extra treats or relieve them of chores; behaviors referred to as 'parental solicitousness' (Walker and Zeman, 1992).

A careful analysis of the available results does not yet result in a conclusive answer as to the role of parental reinforcement. The results of several studies that included the relationship between parental solicitousness and the frequency of somatic complaints seem to contradict the hypothesis of reinforcement (Levy et al., 2004, Peterson & Palermo, 2004, Merlijn et al., 2003, Walker, Claar, & Garber, 2002). Non-linear relationships, however, have not yet been studied. Possibly, there is a threshold for parental solicitousness to have an effect on the frequency of complaints. Moreover, parental solicitousness might have a stronger effect in groups of children who are at risk for somatic complaints.

In addition, the samples of previously conducted studies all included adolescents. Adolescents are less dependent on their parents: as children get older, their autonomy increases (Von Salisch, 2001). Perhaps then, in pre-adolescent children parents can influence the frequency of somatic complaints when they attach positive consequences to reported health complaints, whereas in adolescence the influence of parents in this respect disappears. In conclusion, we need more empirical studies to substantiate whether operant conditioning can be of influence in children's somatic complaints.

PEER INFLUENCES

The influence of peers on the experience of somatic complaints can go two ways. First, peers interactions can cause negative affect when they are viewed as problematic and negative (Barrett & Heubeck, 2000; Oldehinkel, Rosmalen, Veenstra, Dijkstra, & Irmel, 2007). As could be expected based on the earlier explained connection between negative affect and somatic complaints, it has been

found that children's experience of problems with peers also (indirectly) contributes to children's reports of somatic complaints (Gadin & Hammerstrom, 2003; Murberg & Bru, 2004; Odegaard, Lindbladh, & Hovellius, 2003). However, these findings are based on self-reports. Similar to the studies that addressed the alexithymia hypothesis with solely self-reports, we are again faced with an interpretation problem. It might be that children who are disliked by others develop somatic complaints, but it is also possible that the role of internal child-variables on children's perception is (more) important. This would be in line with the finding of Boyer et al. (2006) who showed that children with pain complaints have an attention bias towards social threat-related words. Possibly, child-variables such as social insecurity or social anxiety contribute to the development of somatic complaints rather than a child's actual status of being liked or disliked by other children. This possibility needs further attention.

Second, peers can also provide support. Especially friends are important for children's emotional well-being, in particularly best friends (Sullivan, 1953). In middle childhood, they provide children with the opportunity to share experiences and to learn ways of dealing with negative emotions (Newcomb & Bagwell, 1995). This talking about emotions with a best friend can increase felt support. Moreover, a friend can further stimulate successful emotion regulation by giving examples of strategies and provide feedback on children's emotional functioning (LaFreniere, 2000). Since it helps children with emotion regulation, it is likely that disclosure to a friend also has a reducing effect on the frequency with which children experience somatic complaints.

STRUCTURE OF THE THESIS

In this chapter, different psychological variables that might be of relevance for the etiology of children's somatic complaints were described. In the next chapters, research will be presented that was conducted to further verify the theoretical assumptions. In chapter 2, the emotional and somatic complaints of children from medical outpatient clinics with abdominal complaints (as a very common childhood complaint) will be compared to that of children from the general population. This can give further justification for the relevance of studying psychological influences on children's somatic complaints in a general population rather than selecting only those children who receive medical health care. In chapter 3, the alexithymia hypothesis is studied with different measures besides self-reports. Moreover, the self-reported answers are studied on an item-level to further understand the meaning of previously found differences between children with few and many somatic complaints on scales used to assess emotion identification and communication problems. In chapter 4, situational and emotional control are studied with respect to children's somatic complaints. It is analyzed whether feelings of control can indeed account for differences between children in the frequency with which they experience somatic complaints and whether changes in feelings of control indeed are accompanied by changes in the levels of somatic complaints in individual children. In chapter 5, the last step of the emotion process is addressed. It is examined which emotion regulation strategies contribute to the development of somatic complaints in children, and in particular, what the influence is of non-productive thoughts. Besides emotion regulation, symptoms of depression will be taken into account to further support the direction of causality between negative affect and children's somatic complaints, but more importantly to verify whether emotion regulation strategies are independently associated with somatic complaints or not give rise to somatic complaints before they have lead to symptoms of a mood disorder. In chapters 6 and 7 social influences are concentrated on. In chapter 6 the possibility of parental reinforcement is further analyzed, addressing each of the alternative explanations for previous research that seemed to contradict the possibility that parents can reinforce somatic complaints in their children. In chapter 7, peer influences are analyzed with two studies: one assessing whether perceived or actual peer problems contribute to the experience of somatic complaints and one studying the possibility that disclosure to best friends has a beneficial effect. In the last chapter (chapter 8) the results will be integrated and further discussed.

This thesis is composed of several independent papers. Some overlap between the chapters is therefore inevitable.

Chapter 2

Somatic complaints and health care use in children: Mood, emotion awareness and sense of coherence

In this study we compared several aspects of the emotional functioning of schoolchildren reporting very few somatic complaints ($n=59$), schoolchildren reporting many somatic complaints ($n=61$), and a clinical group of children with functional abdominal complaints who visited the outpatient clinical of a hospital ($n=33$). The children had an average age of 10.6 years. We studied whether general moods (happiness, anger, fear, and sadness), symptoms of depressiveness, emotion awareness, and sense of coherence contributed to group classification. Eighty-three percent of the schoolchildren reporting very few somatic complaints were identified correctly on the basis of better emotional functioning. However, there was little difference in the emotional functioning of schoolchildren with many somatic complaints and that of the clinical group. We concluded that the variables studied are valuable for differentiating children who are troubled by somatic complaints from children experiencing few somatic complaints. The results stress the existence of emotional problems in children reporting many somatic complaints.

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INTRODUCTION

Somatic complaints, such as abdominal pain and headache, are common in children (Perquin, Hazebroek-Kampschreur, Hunfeld, Bohnen, van Suijlekom-Smit, Passchier et al., 2000; Petersen, Bergstrom, & Brulin, 2003; Roth-Isigkeit, Thyen, Raspe, Stoven, & Schmucker, 2004). Moreover, there seems to be an increase in prevalence of somatic complaints during early childhood, (Perquin et al.; Ramchandani, Hotopf, Sandhu, Stein & ALSPAC study team, 2006) with a peak in middle childhood and early adolescence (Perquin et al), which is accompanied by an increase in health care utilization (Roth-Isigkeit et al.). However, a medical cause for these complaints is rarely found (Croffie, Fitzgerald, & Chong, 2000; Roth-Isigkeit, et al.). Furthermore it has consistently been shown that negative moods are related to more somatic complaints (Campo, Bridge, Ehmann, Altman, Lucas, Birmaher et al., 2004; Dorn, Campo, Thato, Dahl, Lewin, Chandra et al., 2003; Egger, Costello, Erkanli, & Angold, 1999; Rieffe, Oosterveld, & Meerum Terwogt, 2006). These findings indicate that children's emotional functioning is related to somatic complaints. Nevertheless, the current knowledge about the emotional functioning of children with somatic complaints is rather limited, especially concerning differences between children who receive medical health care and peers with many somatic complaints from a non-clinical population. The aim of the current study was twofold. The first objective was to provide more knowledge about differences in the emotional functioning of children who report many somatic complaints compared to children who report few somatic complaints. The second objective of this study was to find out whether children in a clinical (medical) population can be discriminated from peers in non-clinical populations by certain aspects of their emotional functioning. This information can be helpful in adjusting existing treatment programs, but also in the prevention of somatic complaints and perhaps even in the prevention of fruitless medical examinations.

The finding that psychological factors are related to somatic complaints can be understood from a biopsychosocial perspective. Somatic changes are thought of as a key component of emotional or affective experiences. Damasio even argues that emotional states are defined by: "changes within the body proper, e.g., viscera, internal milieu, and within certain sectors of the brain, e.g. somatosensory cortices; neurotransmitter nuclei in the brain stem" (p.84, 1998). The biological changes (or their representation in the central system) are considered as essential for adaptive behavior, decision making and learning. More elaborate information on the neurological and bodily responses to aversive events can be found elsewhere (e.g. Carrasco & Van de Kar, 2003; Damasio, 1998; Tsigos & Chrousos, 2002). What is relevant to the current context is that the emotional neuro-physiological reactions can also give rise to somatic complaints: In the long run, these changes can cause organic dysfunction, for instance in the gastrointestinal system, (Bhatia & Tandon, 2005) and suppression of the immune system (Segerstrom & Miller, 2004).

Which coping strategies are adaptive will obviously depend on characteristics of the emotion evoking situation for instance whether the outcome can be controlled or not (Fields & Prinz, 1997). In the current study we did not focus on the type of coping strategies children use, but instead focused on two aspects of children's emotional functioning that might promote inefficient coping.

First, we looked at the *appraisal* component of negative situations. The extent to which negative situations are appraised as stressful and uncontrollable is reflected in a low 'sense of coherence' (Antonovsky, 1993), which refers to difficulty with understanding the meaning of situations, making sense of them and controlling them. Previous study results show that people perceiving a strong sense of coherence report better mental health (such as less depression and anxiety) and better physical health (Geyer, 1997; Pallant & Lae, 2002). Although the strength of the relation between sense of coherence and measures of mental health has raised questions about overlap of constructs in the past (e.g. Geyer), more recent results have proven that sense of coherence is an independent concept (Cohen & Savaya, 2003). Nevertheless, no study has yet been conducted to determine whether children with many somatic complaints appraise negative situations as stressful and uncontrollable. It is sometimes assumed that sense of coherence does not reach stability until the age of approximately 30 (Torsheim et al., 2001). Therefore, sense of coherence measured in children may be less trait-like. However, this does not mean that sense of coherence has less influence on children's health.

Second, a precondition for efficient coping is an adequate *understanding* of the emotional experience. After all, incomplete or incorrect understanding limits the possibilities of finding a suitable solution, even when appropriate strategies to accomplish that solution, are in principle available to the child. For instance, when own emotional states are not acknowledged, the possible emotion-focused solutions - strategies that enable you to improve your mood state even when the problem itself cannot really be altered - will be ignored as well. In 1973, Sifneos noticed that his patients with somatic complaints had difficulty putting their emotions into words, which he called 'alexithymia'. Today it has consistently been demonstrated that poor emotion awareness (difficulty recognizing and analyzing emotions) is related to more somatic complaints in adults as well as in children in a normal population (De Gucht, Fischler, & Heiser, 2004; Grabe, Spitzer, & Freyberger, 2004; Rieffe, et al., 2006). However the emotion awareness of children in a clinical, medical population has not yet been studied.

In this study we compared the moods, symptoms of affective disorder (depression), sense of coherence and emotion awareness of three groups of children: children visiting a hospital outpatient clinic because of abdominal complaints, regular school children who report many somatic complaints, and a contrasting group of school children with few complaints. We decided to use a clinical group with functional abdominal complaints, because these complaints are highly prevalent in school-aged children (Catto-Smith, 2005; Perquin, et al., 2000). Furthermore, we analyzed which variables contributed to the differentiation of the three groups and how well group membership could be predicted by aspects of

children's emotional functioning. We expected that the children with few complaints would be differentiated from the other groups quite distinctly (by fewer negative moods, fewer symptoms of affective disorder, better emotion awareness and greater sense of coherence), whereas this difference would be less distinct for the children with many complaints from the school population and the clinical population. Though the use of self-report questionnaires in childhood is very common, the questionnaires that were used in this study relied on the participants' ability to self-reflect, which increases with age and might not yet be fully developed in young children. In order to control for this, we also examined the possible effect of age on children's responses.

METHOD

PARTICIPANTS AND PROCEDURE

The clinical group consisted of 33 children (17 boys, 16 girls, $M = 10$ years and 5 months, $SD = 16$ months, age range 8 years and 5 months - 13 years and 5 months), who were attending the outpatient clinic of the VU University Medical Centre and were diagnosed with functional abdominal pain and/or constipation. The children were seen individually after a visit to the outpatient clinic of the hospital.

The groups from the non-clinical population were derived from two regular primary schools. They were selected on basis of their scores on the Somatic Complaint List (SCL; see Measurements): the children who scored high on the SCL (highest 30 %; 30 boys, 31 girls, $M = 10$ years and 7 months, $SD = 14$ months, age range 8 years and 6 months - 12 years and 5 months) and the children that scored low on the SCL (lowest 30%; 33 boys, 26 girls, $M = 10$ years and 7 months, $SD = 16$ months, age range 8 years and 7 months - 12 years and 9 months). The questionnaires were handed out in the classroom during normal school hours. It took the children 45 to 60 minutes to complete the questionnaires. It was carefully observed whether the children remained motivated and focused during the complete session. This appeared to be the case. Moreover, we had less than 1% missing data and there were no aberrant patterns in the answers given to questions near the end of the session. Afterwards, two groups of children were selected on basis of the SCL, and these data were further analyzed. Participation was on a voluntary basis and parental consent was obtained.

MEASUREMENTS

Somatic Complaints (SCL)

Somatic complaints were assessed by the Somatic Complaint List (Riefte, et al., 2006). This questionnaire consists of 10 somatic complaints that are common in children (e.g. abdominal pain, dizziness and headache). Children were asked to fill out each item on a Likert-type scale (0 = never, 1 = sometimes, 2 = often, e.g. 'I never/sometimes/often have a headache'). Previous research (Riefte, et al., 2006) has indicated that the internal consistency of the SCL is good ($\alpha = .77$), which was confirmed in this study ($\alpha = .86$). The schoolchildren were also asked to report for

each item whether they had visited a General Practitioner because of that specific somatic complaint.

Mood (MQ)

The Mood Questionnaire was used to assess children's self-reported mood (MQ; Rieffe, et al., 2006). The MQ, developed for children, consists of four scales: Happiness, Anger, Fear and Sadness, each represented by four items. We asked the children to indicate how they had been feeling recently. Four neutral items were added to compensate for the over-representation of negative items. Including these items, the questionnaire consists of 20 items on a Likert-type scale (0 = never, 1 = sometimes, 3 = often, e.g. 'I never/sometimes/often feel angry'). Previous research has shown an internal consistency of each subscale between .75 and .90 (Rieffe, Meerum Terwogt, & Bosch, 2004; Rieffe, et al., 2006), which was confirmed in this study ($\alpha = .78-.82$).

Depression (CDI)

A Dutch translation of the Children's Depression Inventory (Kovacs, 1985) was used to identify self-reported symptoms of depression. The scale contains 32 items. Each item consists of three statements graded in order of increasing severity from 0 to 2. An example of an item is: "I never feel alone/I often feel alone/I feel alone all the time". Children select the item that characterized them best during the past two weeks. Timbremont and Braet (2001) found good test-retest reliability over a period of 1 month ($r = .79$) and internal consistency ($\alpha = .79$) for children aged 10 to 12, which was confirmed in this study ($\alpha = .83$).

Sense of Coherence (SOC-13)

A translation of the Sense of Coherence Scale (SOC-13) by Torsheim, et al. (2001) was made for the benefit of this study. In the formulation of the items, the age of the respondents was taken into account as much as possible. The questionnaire consists of 13 items that are filled out on a Likert-type scale (1= very often, 2 = often, 3 = sometimes, 4= seldom, 5 = never). Example items are: 'How often do you have the feeling that you are being treated unfairly?' "How often do you have the feeling that the things you do everyday are not really important?" and "How often does it happen to you that you have the feeling that you don't know exactly what's about to happen?" Two of the thirteen items were positively formulated, for which a different five-point scale was used (1= like it a lot to 5 = don't like it at all; scores were recoded). The internal consistency of the overall factor is good ($\alpha = .83$). Another study among 700 Dutch school children confirmed the psychometric properties of the questionnaire, and also showed a good test-retest reliability over a 6 month period ($r = .46$). The validity of the scale was supported by negative relationships with symptoms of depression (-.54); fear of negative evaluation (-.55); social avoidance and distress specific to new situations (-.39); and generalized social avoidance and distress (-.38; Jellesma, Meerum Terwogt, & Rieffe, 2006).

Emotion Awareness (EAQ)

The Emotion Awareness Questionnaire (Rieffe, Meerum Terwogt, Petrides, Cowan, & Tolland, 2007) was used to assess children's emotion awareness. This questionnaire is developed for children and we used four scales: Differentiation of

emotions (7 items), Communication of emotions (5 items), Bodily Symptoms (attention for the physiological effect of emotions or moods; 6 items) and Others (attention to the emotions of others; 7 items). Good emotion awareness (a high score) is reflected by better emotion differentiation, better communication, less awareness of the bodily sensations of emotions and more attention to emotions of others. The list consists of 25 items on a Likert-type scale (0 = not true, 1 = sometimes true, 2 = often true. An example of an item is: 'When I feel upset, I often talk to someone about it'. Nineteen items are negatively formulated and were rescored. Study results of Rieffe et al. have indicated that the EAQ correlates with related constructs, such as moods and worrying. The internal consistency of the subscales varied between $\alpha = .62$ (Communication) and $\alpha = .76$ (Bodily Symptoms). The internal consistency in the current study was roughly similar: internal consistency between $\alpha = .67$ (Others) and $\alpha = .81$ (Differentiation).

STATISTICAL ANALYSES

In the statistical analyses, we used a significance level of .05. We first analyzed the pattern of somatic complaints of the children with many complaints and the clinical group. Somatic complaints overall were compared with a Mann-Whitney U test, proportions of children reporting a specific complaint were compared using Pearson's Chi-Square. We then compared the three groups on all variables with a multivariate analysis. In order to verify whether age had any effect on the variables, we calculated correlations between age and all of the variables and used age as a covariate in the multivariate analysis of variance. The Tukey-Kramer test was used for post hoc paired comparisons between the groups, as recommended by Rafter, Abell and Braselton (2002) for unbalanced designs. We subsequently conducted a discriminant analysis to find out how well the groups could be discriminated by their emotional functioning and which variables are most valuable in this discrimination. The default values for entry were set at .05, the default for removal at .10. Z-approximation tests were used to assess whether the proportions of correctly identified children were above chance.

RESULTS

ANALYSIS OF THE PATTERNS OF SOMATIC COMPLAINTS

In line with the group selection, the clinical group and the schoolchildren with many complaints both reported more (serious) complaints compared to the children with few complaints (see Table 1). However, the clinical group still seemed to score a little lower compared to the schoolchildren with many complaints on the SCL, which was confirmed by a Mann Whitney U test, $z = -2.22$, $p = .03$. All children in the clinical group reported abdominal pain. As could be expected, for most children in the clinical group abdominal pain was not the only complaint they had; in particular tiredness and headache were quite common (94% and 85 % respectively). However the schoolchildren with many complaints (top 30% on the SCL) showed an even more diverse pattern of complaints. For instance, 82%

reported 'feeling weak' sometimes or often compared to only 61% of the clinical group, $\chi^2(1) = 5.14, p = .02$. Abdominal pain was also a frequently reported complaint among the schoolchildren with many complaints: 98% sometimes have abdominal pain and 54% often. Only a relatively small percentage of the schoolchildren with few or many complaints had visited a General Practitioner: 20.3% and 37.7% respectively, $\chi^2(1, N = 120) = 4.38, p = .04$.

Table 1

Means and standard deviations of the clinical group, the children with many somatic complaints and the children with few complaints on all dependent variables

Variable	Clinical group	Many Somatic Complaints	Few Somatic Complaints
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Somatic Complaints	9.27 (1.30) _a	10.75 (1.76) _b	2.53 (1.30) _c
Mood States			
Happiness	1.81 (0.30) _{ab}	1.68 (0.36) _a	1.91 (0.21) _b
Fear	0.87 (0.45) _a	0.86 (0.46) _a	0.55 (0.40) _b
Anger	0.93 (0.47) _a	0.94 (0.32) _a	0.64 (0.41) _b
Sadness	0.86 (0.35) _a	0.86 (0.40) _a	0.45 (0.39) _b
Depressiveness	1.37 (0.23) _a	1.36 (0.21) _a	1.18 (0.15) _b
Emotion Awareness			
Differentiation of Emotions	1.10 (0.47) _a	1.28 (0.45) _a	1.62 (0.36) _b
Communication of Emotions	0.88 (0.50) _a	0.92 (0.55) _a	1.20 (0.44) _b
Awareness of Bodily Symptoms	0.87 (0.39) _b	0.60 (0.37) _a	1.04 (0.45) _b
Others	1.39 (0.34) _a	1.48 (0.39) _a	1.51 (0.36) _a
Sense of Coherence	3.48 (0.63) _a	3.35 (0.58) _a	4.13 (0.54) _b

Note. Means in the same row that do not share subscripts differ at $p < .05$

MULTIVARIATE ANALYSIS OF VARIANCE

The means and standard deviations of the three groups on all 10 dependent variables are shown in Table 1. There were no significant correlations between age and the other variables (somatic complaints, moods, depression, aspects of children's emotion awareness or sense of coherence). A multivariate analysis of variance across all 10 dependent variables (happiness, anger, sadness, fear,

depression, Differentiation of emotions, Communication of emotions, Bodily Symptoms, Others and SOC-13) with age as a covariate, revealed a significant difference between the groups, Wilks' $\Lambda = .53$, $F(20, 280) = 5.18$, $p < .01$, partial $\eta^2 = .27$. There was no significant age effect, Wilks' $\Lambda = .91$, $F(10, 140) = 1.34$, $p = .22$.

As expected, the clinical group and the schoolchildren with many somatic complaints reported more negative moods on the anger, sadness and fear scale of the MQ and on the CDI; more difficulty differentiating their emotions and communicating about them (subscales EAQ); and a lower sense of coherence compared to children with few complaints, (all differences $p < .01$). Although the schoolchildren with many complaints reported being less happy compared to the children with few complaints ($p < .01$), the clinical group did not significantly differ in reported happiness from the schoolchildren with many or few complaints. Unexpectedly, the schoolchildren with many complaints reported giving more attention to a link between emotion and bodily symptoms (subscale EAQ) compared to the children with few complaints *and* the clinical group, $p \leq .01$. However, the score on the Somatic Complaint List was a significant covariate in this difference in attention between the schoolchildren with many complaints and the clinical group, $F(1, 94) = 10.90$, $p < .01$, partial $\eta^2 = .11$. After controlling for somatic complaints, the schoolchildren with many complaints and the clinical group hardly differed in the reported attention to the link between emotions and bodily symptoms, $F(1, 94) = 5.89$, $p = .02$, partial $\eta^2 = .06$.

DISCRIMINANT FUNCTION ANALYSIS

A stepwise discriminant analysis was performed to define the variables that provide the best discrimination between the groups. The four variables that significantly contributed to discrimination of the groups were SOC-13, Bodily Symptoms, Differentiation of emotions and Sadness. The results from the discriminant analysis are presented in Table 2. The overall Wilks' Λ was significant, $\Lambda = .57$, $\chi^2(8, N = 153) = 84.35$, $p < .01$ as well as the residual Wilks' Λ , $\Lambda = .90$, $\chi^2(3, N = 153) = 16.18$, $p < .01$. This indicates that a second discriminant function significantly contributed to the differentiation among the three groups after partialling out the effects of the first discriminant function. Sense of coherence was positively associated with the first function, whereas sadness showed a negative association. The second function was mainly determined by less awareness of the bodily sensations of emotion and less differentiation of emotions.

As can be seen by the group centroids, the clinical group and the group of schoolchildren with many complaints were best discriminated from the children with few complaints by their negative scores on the first function. This reflects the previously described finding that both groups of children with many somatic complaints report less sense of coherence and more sadness compared to the children with few complaints. The three groups all had different profiles on the variables that contribute to the second function, as can be concluded by the mean scores earlier described. Children in the clinical group found it relatively difficult

to differentiate between emotions and reported relatively little attention to the bodily sensation of emotions. Therefore, they had a high score on the second function. The children with many somatic complaints on the other hand, also reported difficulty with emotion differentiation, but they appeared to be strongly aware of the bodily sensations of emotions. This is reflected in a lower score on the second function. The children with few somatic complaints scored reasonably low on the second function as well. However this was caused by their better ability to differentiate emotions, whereas they reported relatively little awareness of the bodily sensations of emotion.

Table 2
Results from the stepwise discriminant function analysis

	DISCRIMINANT FUNCTION ^a	
	Function 1 (eigenvalue = .58)	Function 2 (eigenvalue = .12)
STANDARDIZED DISCRIMINANT COEFFICIENT (CORRELATION WITH FUNCTION) ^b		
<i>Variable</i>		
Sense of Coherence	.57 (.83)	.27 (-.02)
Sadness	-.36 (-.67)	.18 (.23)
Differentiation of Emotion	.14 (.59)	-.87 (-.68)
Bodily Symptoms	.35 (.59)	.68 (.55)
Sense of Coherence	.57 (.83)	.27 (-.02)
GROUP CENTROIDS		
<i>Group</i>		
Clinical group	-.39	.62
Children with many somatic complaints	-.70	-.27
Children with few somatic complaints	.94	-.06

^a Function 1 is the first function that contributes to group discrimination. Function 2 is the second function contributing to group discrimination after partialling out the effects of the first discriminant function.

^b Variables that have a large association with the function are indicated by bold font.

We were able to correctly classify 67% of the individuals in our sample using the two discriminant functions, with a kappa coefficient of .49. The leave-one –out technique showed that we would correctly classify 62% of the cases with the classification procedure in a new sample. In our sample, 83% of the children were correctly categorized as belonging to the group of children with few complaints, which is well above chance, $p < .01$. However the percentage of correctly identified individuals in our sample was not above chance for the clinical group (55%) and the schoolchildren with many complaints (57%), $p = .73$ and $p = .31$ respectively.

DISCUSSION

In this study, we compared the emotional functioning of schoolchildren with few somatic complaints, schoolchildren with many somatic complaints and a clinical group of children with functional abdominal pain or constipation. We found that the clinical group closely resembled the schoolchildren with many somatic complaints: both groups reported more negative moods, more symptoms of depression, more difficulty in emotion differentiation and communication and less sense of coherence compared to children with few somatic complaints. These results were confirmed in our attempt to classify the three groups on the basis of their emotional functioning. Although this worked quite well for the children with few somatic complaints, it was not possible to determine which children belonged to the clinical group and which children to the group of schoolchildren with many somatic complaints just on the basis of the studied variables. Other, as yet unknown, discriminating factors are influential. The way a child's symptoms are attributed by children and their parents, as mentioned in the discussion below, might for instance be a possible candidate.

The discriminant function that distinguishes the group with few complaints from both other groups is mainly determined by a combination of sadness and poor sense of coherence. As argued in the introduction, negative mood states with a chronic character can affect health because of the neuropsychological changes they involve. Indeed children with many somatic complaints reported higher scores not only on sadness, but also on anger and fear. The low sense of coherence scores indicate that appraisal of negative situations as unpredictable and uncontrollable is also connected to somatic complaints. Such appraisal may lead to maladaptive or ineffective coping. Future research might pursue the nature of the relation between appraisal of negative situations, ineffective coping, emotion and somatic complaints.

The only significant difference we found between the clinical group and the schoolchildren with many somatic complaints was in their awareness of the bodily sensations of emotions. We found that children with many somatic complaints are strongly aware of the bodily sensations of emotions, which is in line with previous research (Rieffe, Meerum Terwogt, & Tolland, 2004). Nonetheless, both the group of school children with few complaints and the clinical group reported being less aware of the physiological correlates of emotions. However, as we will argue, this is caused by different processes.

Compared to children with many somatic complaints, children with few complaints reported a lower frequency of negative emotions. Earlier (Rieffe Meerum Terwogt, & Tolland, 2004) it was found that they also indicated that their emotional experiences were less intense. Whereas physiological sensations predominate especially in strong emotions, for children with mainly moderate emotional reactions, the temporal relation between physiological sensations and emotions is probably less marked. For the clinical group it can be assumed that the intensity of their emotions is as strong as those of the schoolchildren with many

complaints. Therefore, we presume that the physiological sensations of emotions will be equally noticeable for both. However, the relatively low score of the clinical group on the somatic complaints list indicates that their complaints are more focused than those of the non-clinical group with many complaints. Pennebaker (2000) already argued that some people have a tendency to attribute the physiological phenomena that accompany emotions to an organic problem. A pattern of complaints that is restricted to, for instance, a combination of abdominal pain and tiredness (the most common combination within the clinical group) is much easier to interpret as symptoms of a specific organic dysfunction than the variety of complaints reported by the schoolchildren. Moreover, such an organic interpretation might be at least partly correct for the children in the clinical population. As mentioned in the introduction, frequent stress actually causes physiological changes and eventually can even cause permanent damage to the weakest part of the body. It seems plausible that all subsequent emotional stress will mainly surface in that same part of the body. The clinical group may be different from the non-clinical group in the sense that a relatively large number of children in this group already have developed such a marked weakness. Indeed, when taking the score on somatic complaints into account, the difference between the clinical group and the schoolchildren with many somatic complaints in their awareness of physiological sensations becomes negligible. In any case, a general organic attribution of physiological sensations and symptoms removes attention from the direct link between emotions and bodily symptoms. Moreover the difference between an emotion and an organic interpretation could also explain why the clinical group seems to be slightly happier than the schoolchildren with many somatic complaints. An organic interpretation has the advantage that it can protect the level of self-worth; it is a way to avoid admitting that one is not able to handle stressful events. Consequently, there is still ample room for positive experiences. Of course, the idea that you are ill does not really help, but the group of school children with many complaints suffers from the same problems and have not (as yet) sought help. The clinical group at least has the hope that their doctors might relieve their problems in time. Of course, further research is necessary to substantiate all these speculations.

In conclusion, the results indicate that emotional functioning can be of great importance in understanding why some children have many somatic complaints, but which children end up in the medical circuit mostly depends on other factors. In future research parents could be used as an extra informant to find out whether their ideas about the somatic complaints are perhaps better predictors of which children end up in the medical circuit.

One limitation of this study was the use of only one source of information for the children's somatic complaints and emotional functioning. Although children's own experience seems most important when considering their well-being, they rely on their parents when seeking medical help. In particular, the causal attributions of parents and children for complaints in the child should be addressed. However, other factors could also influence the search for medical help, such as the attitude

of the GP towards common somatic complaints, or the burden the complaints put on the child's functioning. Longitudinal research will be needed to understand causal relations between these kinds of factors and the search for medical health care. Longitudinal research is also needed to understand to what extent children's emotional functioning can be considered as an etiological factor for somatic complaints in children. Nonetheless, whatever the causal direction, the findings of this study indicate that children complaining of many somatic complaints are often in need of help as regards to their emotional functioning.

Chapter 3

Do I feel sadness, fear or both? Comparing self-reported alexithymia and emotional task-performance in children with many or few somatic complaints.

Children with many somatic complaints have been found to report more problems with emotion identification and communication ('alexithymia') than children with few complaints. In this study, it was verified whether children with many somatic complaints indeed show signs of alexithymia. We compared 35 children with many somatic complaints with 34 children reporting no or few complaints in their performance on several tasks that require the skill to identify and communicate emotions ($M_{age}=10;12$, $SD =14$ months). Children with many somatic complaints seemed to have higher self-reports of alexithymia than children with few complaints, but these results were due to difficulty in communicating negative internal states and experiencing indefinable internal states, not to difficulty in identifying emotions. In emotion tasks, they reported higher intensities of fear and sadness. The children did not differ in their attention for emotions and causes of emotions. Children with many somatic complaints more often were able to describe previous emotional experiences and showed better abilities in identifying multiple simultaneous emotions. Children with many somatic complaints thus show a more negative emotion process, but the alexithymia-hypothesis was unsupported.

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INTRODUCTION

The idea that recognizing and expressing feelings is healthy is widespread. There are even many self-help and support groups for adults and children based on the idea that sharing your emotions with others helps in reducing negative feelings. Moreover, being able to recognize own emotions is thought of as a precondition for adequate emotion analysis and subsequent emotion regulation (Rieffe, Meerum Terwogt, Jellesma, 2008). Not being able to verbalize emotions would have negative outcomes, including psychosomatic problems. Sifneos (1972, 1973) first described 'alexithymia' in this respect: problems with identifying and describing emotions. He observed these characteristics in patients with somatization problems. To date, a literature search shows that alexithymia is of interest for many researchers who study the field of somatic complaints. In this study, we aim to further investigate the association between somatic complaints and alexithymic features in children.

The assumption is that adults and children with alexithymia develop health complaints through (unrecognized) emotional arousal and the accompanying physiological reactions (Taylor, 1997). Not being able to recognize and express emotions would intensify and prolong these physiological reactions, causing an increased likelihood of experiencing somatic complaints. Most studies on alexithymia have been conducted in adult populations. A review of these studies indicates that self-reports of alexithymia are indeed positively related to reports of somatic symptoms (De Gucht & Heiser, 2003). More recent studies also confirm this relationship in childhood (Burba, Oswald, Grigaliunien, Neverauskiene, Jankuviene, & Chue, 2006, Jellesma, Rieffe, Meerum Terwogt, & Kneepkens, 2006; Meade, Lumley, & Casey, 2001; Rieffe, Oosterveld & Meerum Terwogt, 2006). These outcomes seem to imply that children with alexithymic characteristics might be more susceptible for developing somatic complaints.

Sifneos (1972, 1973) based his initial ideas about alexithymia on clinical observations, but most empirical studies in this area use self-report questionnaires to measure the construct. A potential problem is that self-reports give information about an individual's subjective perception, but fail to provide information about one's actual abilities. The associations between self-perceived emotional abilities, including alexithymia, and emotional abilities observed through other kinds of tasks are weak in adulthood (Brackett, Rivers, Shifman, Lerner, & Salvoy, 2006; Lumley, Gustavson, Partridge, & Labouvie-Vief, 2005). There is no reason to expect more accurate self-perceptions in childhood. The link between somatic complaints and alexithymia should therefore also be studied by means that differ from self-reported indices of alexithymia.

In a previous study, Rieffe, Meerum Terwogt, and Bosch (2004) presented eight to twelve year old children with sixteen emotion evoking vignettes and asked children how they would feel and how strongly. Rieffe and colleagues not only showed that children with many somatic complaints were as able to identify emotions as children with few or no somatic complaints, but also that children with

many somatic complaints reported more negative emotions. Children with many somatic complaints reported stronger intensities and frequencies for anxiety and a similar trend was present for fear, whereas the children with few complaints reported higher frequencies and intensities for anger. This seems to undermine the alexithymia hypothesis that problems with identifying and describing emotions cause somatic complaints to arise, and suggests indeed that self-reports on alexithymia differ from children's capacities in this respect. However, two alternative explanations might challenge this conclusion.

First, an obvious objection to the use of the vignettes could be that children were prompted to name emotions in the task by Rieffe et al, because they were asked "How would you feel?". Possibly, the question that Rieffe et al asked is a question that children with alexithymic characteristics would not ask spontaneously. It has been suggested that alexithymia causes decreased attention for emotions, but research using an experimental stroop task in adults revealed unclear results (Lundh & Simonsson-Sarnecki, 2002). Concrete attention tasks representing situations similar to those in children's everyday life have not yet been used. The spontaneous attention for emotion experiences could therefore be the crucial problem for children reporting more alexithymic characteristics and somatic complaints.

Second, the empirical evidence that children and adults who score high on self-reported alexithymia, are able to identify their affective state is overwhelming. There are numerous studies that show positive relationships between alexithymia and symptoms of internalizing problems, such as anxiety and depression in adults and children (Berthoz, Consoli, Perez-Diaz, & Jouvent, 1999; Grabe, Spitzer, Freyberger, 2004; Honkalampi, Hintikka, Tanskanen, Lehtonen, & Viinamaki, 2000; Rieffe et al., 2006). However, feeling "bad" about an argument with a classmate is less reflective than feeling angry because he took your pencil away, scared because you think he might break it, and perhaps feeling sad because the pencil was a birthday present you very much liked and now cannot use. Possibly, not the ability to globally identify how one feels, but the ability to differentiate between different emotion states might be a problem in people reporting alexithymic characteristics, due to a problem in locating the various emotion antecedents. The fact that it has repeatedly been found (Rieffe et al, 2004; 2006; 2008) that children with more somatic complaints score higher than their peers with few somatic complaints on all negative mood states (anger, sadness and fear) could indeed suggest that children with many somatic complaints fail to identify multiple emotions, but do acknowledge a general negative affective state.

The aim of this study was two-fold. First, we aimed to examine both alternative explanations for the findings reported in the previously described study by Rieffe et al (2004). In order to achieve this, a group of children who reported many somatic complaints were compared with children who reported no or few somatic complaints on several emotion indices. We assessed children's ability to spontaneously attend to emotions in possible emotion-evoking situations; their ability to identify their own emotions and related emotion antecedents; and their

ability to identify multiple emotions simultaneously. If problems with i) spontaneous emotion identification, or ii) emotion differentiation and identification of emotion antecedents are related to somatic complaints, children with many somatic complaints are expected to show deficits in at least one of these three tasks. More specifically: they would have less spontaneous attention for emotional situations, identify fewer emotion antecedents and differentiate fewer emotions simultaneously.

Second, we wanted to compare children's ability to identify, differentiate and communicate their emotions with their self-reports about these abilities and therefore also administered the scale "Differentiating Emotions", which consists of items that reflect the ability to differentiate emotions but also to identify emotion antecedents, and the scale "Verbal Sharing", which contains items that reflect the ability to communicate emotions of the Emotion Awareness Questionnaire, a questionnaire based on the well-known TAS-20, adjusted for children (Rieffe et al, 2006). Gender was taken into account, but no hypotheses were formulated in this respect.

METHOD

PARTICIPANTS AND PROCEDURE

In this study, 4 primary schools participated. Parents were given information letters that included an informed consent, to be returned to the child's teacher. The participation rate was 96%. In the classroom, 381 filled out the Somatic Complaint List, on basis of which two groups of children were selected for an individual session of approximately 45 minutes. The 10% children with the lowest scores and the 10% highest scoring children were selected, excluding children who scored exactly on the 10th or 90th percentile. Children with few somatic complaints were 21 boys and 13 girls aged 8;84 to 13;11, $M = 11;03$, $SD = 1.03$. Children with many somatic complaints were 12 boys and 23 girls aged 9;15 to 12;83, $M = 10;99$, $SD = 1.04$.

MEASUREMENTS

On all tasks that included a question about intensity of emotions, we used a visual rating scale from 1 to 5.

Self-reported Somatic Complaints: For the self-reports of Somatic Complaints, the Somatic Complaint List was used (Jellesma, Rieffe, Meerum Terwogt, 2007). This list consists of 11 somatic symptoms that are rated by children on a 5 point scale from 1 = (*almost*) *never* to 5 = *quite often* (each verbally anchored). The previously reported internal consistency is good, as is the internal consistency we found in the current study, $\alpha = .85$.

Spontaneous Attention for Emotions: We used three picture cards: one depicting an angry man looking at a boy with a ball in his hand, standing before a shattered window; one depicting a boy with a sad face watching a group of children walking away from him towards a soccer field with a ball; and one depicting a girl on a

diving board looking scared. The children were given the instruction: “Tell me something about this picture.” It was rated whether they referred to an emotion and if so whether they also included the cause of this emotion in their story. The cards were presented in randomized order.

Identification of Own Emotions: In order to see the extent to which children acknowledge their own emotional experiences, children were asked the following questions regarding the four basic emotions (Rieffe, Meerum Terwogt, & Kotronopoulou, 2007):

“ [name child], do you feel [emotion] sometimes?” (question 1)

“Can you tell me about the last time you felt [emotion]?” (question 2)

“I would also like to know how [emotion] you felt.

Can you show me on this scale how [emotion] you felt?” (question 3)

A 5-point scale was introduced to children in order for them to respond to question 3:

“Look, if you felt *very very* happy, you take the highest bar in this scale. And if you felt just *a tiny little bit* happy, you point at the lowest bar. You could also feel *quite* happy, and that might be somewhere in the middle. So, just try to think which one fits best how you felt.”

The first emotion asked about was happy, the negative emotions (sad, anger, fear) were asked about in a randomized order

Emotion Identification in Mixed Emotion Situations: For the assessment of children’s abilities in emotion differentiation (Meerum Terwogt, Koops, Oosterhof, & Olthof, 1986), we used 6 stories about situations with the potential of evoking multiple emotions. The stories were accompanied by a simple picture. They were presented in a randomized order. We added two positive stories, one in the middle and one in the end, in order to make the task more pleasant for the children. After each task, the children were asked whether they would feel happy, angry, sad, and/or afraid (randomized order), and if so, why they would feel this way and with what intensity. An example of a vignette:

Imagine you have a cat and you love her very much. You play a lot with her and she always sleeps in your room. However, the last few days she has been ill, it looks like there is something wrong with her belly. You bring her to the vet. “Yes”, says the vet, “I have to operate on the cat, but soon, after the operation, she will no longer have pain”.



Self-reported Alexithymia: Two subscales of the Emotion Awareness Questionnaire (Rieffe, Meerum Terwogt, Petrides, Cowan, Miers, & Tolland, 2007) were used to assess children’s self-reports of alexithymia. The subscale Differentiating emotions measures experienced emotion identification ability, especially differentiation and consists of 7 items. An example item is: “I am often confused or puzzled about what I am feeling” (reverse coded). The second subscale we used: Verbal sharing of emotions measures experienced ability in the communication of emotions and consists of 6 items. An example item is: “I can

easily explain to a friend how I feel inside”. Lower scores on both scales are indicators of self-reported alexithymia. The previously reported internal consistencies of the scales were satisfactory, similar to the results in the current study ($\alpha = .68$ and $.72$ respectively).

STATISTICAL ANALYSES

For the simultaneous comparison of the two groups on multiple dependent variables, Hotelling’s Trace test was used, followed up by independent t-tests. However, some dependent variables were not normally distributed. In that case we used the more appropriate, non-parametric Mann-Whitney U test. For the comparison of frequencies, we calculated a Chi-square test. We controlled for gender effects, but we did not find any gender interactions. Therefore, it was more efficient to report the results for the total groups of children with few or many somatic complaints.

RESULTS

SPONTANEOUS ATTENTION FOR EMOTIONS

We first compared how often children with many somatic complaints and children with few somatic complaints spontaneously mentioned the emotions depicted in the picture cards and how often they spontaneously referred to a cause for the emotion (0-3 times). A multivariate analyses of variance revealed that the groups did not differ in their spontaneous emotion analysis on this task, Hotelling’s Trace = .03, $F(2,66) = 1.04$, partial $\eta^2 = .03$, $p = .36$ (Table 1).

IDENTIFICATION OF OWN EMOTIONS

All children answered confirmatively when asked whether they ever were happy. Only 1 child with few somatic complaints and 2 children with many somatic complaints denied that they were ever angry. However, 9 out of the 34 children with few somatic complaints compared to only 3 out of the 35 children with many somatic complaints said they were never afraid, $\chi^2(1, N=69) = 3.85$, $p = .05$. There were also more children with few somatic complaints ($n = 8$) than children with many somatic complaints ($n = 2$) who denied ever being sad, $\chi^2(1, N=69) = 4.42$, $p = .04$.

We then compared how often children with few or many somatic complaints could report on their last experience of the emotions. Children with many somatic complaints more often described their last emotion evoking situations, $t(67) = -3.09$, $p < .01$, this difference remained significant when correcting for the times when children had denied experiencing a certain emotion, $t(67) = -2.46$, $p = .02$.

Table 1

Means on the emotional abilities and emotion intensities for children with few and children with many somatic complaints

	Few Somatic Complaints	$p < .05$	Many Somatic Complaints
	$M (SD)$		$M (SD)$
Self-reported Alexithymia			
Differentiating Emotions	1.51 (0.32)	>	1.00 (0.34)
Verbal Sharing of Emotions	0.99 (0.51)	=	0.77 (0.47)
Spontaneous Emotion References			
Spontaneous referring to Emotion	1.97 (0.76)	=	2.11 (0.80)
Spontaneous referring to Emotion Cause	1.76 (0.85)	=	2.03 (0.92)
Own Emotions			
Descriptions of Emotion Evoking Situations	2.82 (1.03)	<	3.51 (0.82)
Multiple Emotion References			
Positive and Negative Emotions	0.85 (0.82)	=	1.03 (0.82)
Multiple Negative Emotions	3.56 (1.48)	<	4.31 (1.71)
Emotion Intensity: in own experiences			
Happiness Intensity	4.09 (1.19)	=	4.03 (0.95)
Anger Intensity	1.91 (1.50)	=	2.22 (1.63)
Fear Intensity	1.56 (1.69)	<	3.23 (1.72)
Sadness Intensity	1.82 (1.71)	<	3.11 (1.55)
Emotion Intensity: in imagined scenario's (Mixed Emotion Situations)			
Mean Intensity Happiness	0.53 (0.40)	=	0.59 (0.53)
Mean Intensity Anger	1.75 (0.80)	=	1.66 (0.69)
Mean Intensity Fear	0.55 (0.55)	<	1.40 (0.82)
Mean Intensity Sadness	2.03 (0.85)	<	2.48 (1.03)

Some children referred to specific situations (e.g. "I was angry yesterday because my sister had ruined our board game"), whereas others mentioned more general situations (e.g. "I feel scared after watching a scary movie"). We have to take into account that general answers can be quite prototypical, not necessarily referring to actual remembered experiences. Therefore, we controlled whether perhaps children with few somatic complaints more often referred to specific, concrete situations than children with many somatic complaints. This was not the case, $t(67) = -1.10$, $p = .28$. Children with many somatic complaints ($M = 0.87$, $SD = 0.17$) and children with few somatic complaints ($M = 0.82$, $SD = 0.22$) equally often recalled specific situations.

A multivariate analyses of variance comparing the groups (few versus many somatic complaints) on the rated intensity of happiness, anger, fear, and sadness revealed a significant group difference, Hotelling's Trace = .35, $F(4,64) = 5.64$, partial $\eta^2 = .26$, $p < .01$. Compared to children with few somatic complaints, children with many somatic complaints reported higher intensities for fear and sadness, $t(67) = -4.07$ and $t(67) = -3.28$ respectively, $p < .01$ (Table 1).

EMOTION IDENTIFICATION IN MIXED EMOTION SITUATIONS

We calculated the number of times children identified happiness and at least one negative emotion and the number of times children identified more than one negative emotion. The means and standard deviations are presented in Table 1. Since the two variables violated the assumption of a normal distribution, Mann-Whitney U tests were used for a comparison of the groups. The children only differed in the number of times multiple negative emotions were reported, $U = 405.50$, $p = .02$, $r = -.28$. Children with many somatic complaints more often reported multiple negative emotions ($Mdn = 5$) than children with few somatic complaints ($Mdn = 4$). Some children reported multiple emotions, but gave the same reasons for the different emotions. For instance, children responded that they would be sad and angry when punished for something they did not do. On the hand, it is possible that children indeed feel both emotions for the 'same' reason (whereas sadness is linked to the punishment as such, anger is linked to the fact that it was not justified); on the other hand, giving the same reason for different emotions can also reflect poor emotion differentiation. Therefore, we conducted an additional analysis, comparing the number of times children reported multiple emotions that each had a different explanation. This revealed similar results, $U = 413.50$, $p = .03$, $r = -.27$, $Mdn = 4$ for children with many somatic complaints, $Mdn = 2$ for children with few somatic complaints.

Finally, we compared the groups on their mean emotion intensity over stories, for happiness, anger, sadness and fear separately. The mean scores and standard deviations are presented in Table 1. Because the assumption of normality was violated, we used Mann-Whitney U tests for the group comparisons. Children with many somatic complaints reported higher intensities of fear ($Mdn = 1.33$) and sadness ($Mdn = 2.67$) compared to children with few somatic complaints ($Mdn = 0.50$ and $Mdn = 2.17$), $U = 210.50$, $p < .01$, $r = -.20$, and $U = 418$, $p = .03$, $r = -.26$ respectively. No other significant differences were found.

SELF-REPORTS OF ALEXITHYMIA

We finally analyzed whether the previous findings with regard to the self-reports of children's alexithymia could be confirmed in the current study. A multivariate analysis of variance was used, with group (few versus many somatic complaints) as independent variable and emotion differentiation and verbal sharing of emotions as dependent variables. Indeed, we found differences between the groups, Hotelling's Trace = 0.62, $F(2,66) = 20.39$, partial $\eta^2 = .38$, $p < .01$. As could be expected, children with many somatic complaints experienced more difficulty with differentiating emotions than their healthy peers, $t(67) = 6.42$, $p < .01$ (Table 1). Children with many somatic complaints also seemed to have more difficulty with the verbal sharing of emotions. However, probably due to a smaller sample size in comparison to our previous study, this difference was only significant at a significance level of .10, $t(67) = 1.84$, $p = .07$.

As children's self-reports of alexithymia and the emotional capacities they showed on each of the tasks seemed to contradict each other, we decided to analyze children's self-reports more thoroughly. Discriminant function analyses were used in order to determine which of the scale items contributed to the discrimination of children with many somatic complaints and children with few somatic complaints. A stepwise procedure was applied. When more than one item is found to discriminate between the groups, a latent variable is created as a linear combination of the discriminating items. This latent variable is more accurate in predicting group membership than each of the items alone. An item was entered in the linear combination at a significance level of .05 and deleted at a level of .10.

For the items of the differentiating emotions scale, a significant function was found, Wilks' $\lambda = .40$, $\chi^2(2, N = 69) = 60.44$, $p < .01$. A combination of two items was used for creating the latent variable. The association between the latent variable and all items of the scale are presented in Table 2. These results indicate that children with many somatic complaints experienced difficulty in understanding or placing their feelings, but this concerned *general internal states*. Items that assessed confusion about *specific emotions* did not contribute to discrimination of children with many or few somatic complaints. We labeled this latent variable 'experience of undefined internal states'. With the created latent variable, classification of both groups was quite accurate: 88.2% for the children with few somatic complaints and 88.6% for the children with many somatic complaints.

Table 2
Correlations Between Items and the Latent Variables Created with Discriminant Function Analyses

Item	Pooled Within Group Correlation
Experience of undefined internal states	
I am often confused or puzzled about what I am feeling (R)	.93*
Sometimes I feel upset and have no idea why (R)	.53*
I never know exactly what kind of feeling I am having (R)	.26
When I am upset, I don't know if I am sad, scared or angry (R)	.18
It is difficult to know whether I feel sad, angry or something else (R)	.15
Difficulty in talking about internal states	
I find it hard to talk to anyone about how I feel (R)	1.00*
I find it difficult to explain to a friend how I feel (R)	.60
When I am upset about something, I often keep it to myself (R)	.25
I can easily explain to a friend how I feel inside	.17
I always like to tell my friends how I am feeling	.13
When I feel upset, I like to talk about it with a friend	.08

(R) = reverse coded *Variable used as latent trait predictor

For the items of the verbal sharing or emotions scale, we found a significant function as well, Wilks' $\lambda = .84$, $\chi^2(1, N = 69) = 11.30$, $p < .01$, consisting of only 1 item. Table 2 shows how this latent variable (which in this case was identical to the item) is related to the other items. Based on these results, we can conclude that group difference found on this scale can be attributed to experienced difficulty in talking about internal states by children with many somatic complaints; there is no clear motivational problem. Specific feelings or emotions were not referred to in this item. Therefore, 'difficulty in talking about internal states' seems a suitable way of describing the variable.

Of the children with few somatic complaints 82.4% could be correctly classified based on this item. Almost all children with few somatic complaints found it easy to talk about internal feelings. Yet, only 54.3% of the children with many somatic complaints was correctly classified. This indicates that those children who experienced difficulty with talking about internal states, reported many somatic complaints. Yet, there were also many children who reported many somatic complaints, but did not experience difficulty in talking about their internal states with others.

DISCUSSION

Subject of this study was the assumption that alexithymia -an inability to recognize or verbalize one's emotions- is related to more somatic complaints, which was tested by comparing a group of children with many versus a group with few somatic complaints on different emotion indices. The frequently noted alexithymic characteristics based on self-reports (Burba et al., 2006; Jellesma et al., 2006; Meade et al., 2001; Rieffe et al., 2006) seemed to be replicated in this study. However, children's answers on the different emotion tasks and a more in depth analysis of children's self-reports gave more subtle insights into the exact problems and difficulties of children with many somatic complaints with respect to their emotional functioning.

When we examined children's capacities to refer to emotions spontaneously, differentiate between various emotions and identify their own emotions in relation to emotion-eliciting events, it appeared that, compared to children with few somatic complaints, children who had reported many somatic complaints identified more simultaneous emotions within the negative domain and more often acknowledged feeling sad and scared. Children with many somatic complaints also noted higher intensities for sadness and fear with respect to their own experiences, as well as those of protagonists. No other differences between the two groups appeared with respect to their capacities. These results indicate that children with many somatic complaints have no *deficiencies* in their ability to identify emotions and verbally share them, but their emotional responses are *different* compared to those of children with few somatic complaints. Moreover, further analyses of children's self-reports showed that children with many somatic complaints more often experience undefined internal states than children with few complaints. Thus,

identifying specific emotions or differentiating between them does not seem to be a problem. Rather, children with many somatic complaints report they experience general negative internal feelings they are unable to further define or place into context. Finally, within the group of children with many somatic complaints, there were more children who experienced difficulty in talking about internal states compared to the group of children with complaints. Perhaps, the experience of ill-defined internal states contributes to perceived difficulties in talking about these feelings.

Two questions arise from these findings. First, in the introduction we stated that children's emotional processing is related to somatic complaints via psychophysiological arousal. If not the originally described alexithymic characteristics lead to difficulties with reducing emotional states and belonging physiological changes, what can be alternative explanations? In order to answer this question, we have to consider the process through which emotions are experienced and regulated. The first two steps involve having attention for emotional aspects and emotion appraisal (Gross & Thompson, 2007). Attention and appraisal in the sense of emotion identification ability were not associated with somatic complaints. Yet, the appraisal of children with many somatic complaints was different from their peers. They more frequently reported sadness and fear and also had higher intensity ratings for these two emotions. This was in line with the previous study of Rieffe et al (2004). Higher emotion intensities indicate stronger physiological reactions. Moreover, sadness and fear are emotions typically associated with feelings of lower control. Sadness and fear are evoked by situations that are perceived as difficult to change (Kalat & Shiota, 2007). Children with many somatic complaints indeed more often confirm that they perceive situations in life as less controllable (Jellesma et al, 2006). The third step of emotion processing, applying emotion regulation strategies, could therefore expected to be less effective in children with many somatic complaints. After all, if you feel you are in a situation you cannot control, you are less likely to successfully cope. Indeed, children who experience chronic somatic complaints, are less confident of their ability to change or adapt to stress (Rieffe, Meerum Terwogt, Jellesma, 2008; Walker, Smith, Garber, & Claar, 2007). Future studies can clarify whether the actual use of coping strategies in children with many somatic complaints is indeed different of that of other children. And even if that proves to be the case it has to be found out whether these differences remain when the children are prompted to use certain strategies. After all, if this is not the case, it might be concluded that children with many somatic complaints, guided by their own negative perceptions, are inclined to avoid using coping mechanisms.

The second question is what causes children with many somatic complaints to experience undefined negative internal states. Since the results of this study show that this experience is very unlikely to be the result of confusion about emotions, these self-reports are most likely associated with negative moods. Whereas emotions are temporary experiences that arise in response to specific events (Kalat & Shiota, 2007; Beedie, Terry, & Lane, 2005), moods are more general. Moods are

affective states without a specific cause. Moods can be thought of as residual affective states that are influenced by a conglomerate of experiences and emotions over time. The source of negative moods is therefore hard to define and it is not always possible for people to understand why they are in a negative mood (Beedie et al). As can be expected based on the just suggested poor emotion regulation of children with many somatic complaints, there is a strong association between negative moods and somatic complaints in childhood (Campo, et al., 2004; Diepenmaat, van der Wal, de Vet, & Hirasing, 2006; Jellesma, Rieffe, Meerum Terwogt, Bosch, Kneepkens, & Kindermann, 2006; Muris & Meesters, 2004). The reports of children with many somatic complaints that they often experience indefinable negative internal states thus probably are a reflection of more frequent negative mood experiences in these children compared to their peers. In future research, this explanation should be further investigated. As group classification (many versus few somatic complaints) based on the experience of undefined negative internal states was exceptionally accurate, understanding the exact meaning of these self-reports is highly relevant.

In conclusion, the results of this study fail to support the alexithymia hypothesis in children. Whereas children with many somatic complaints have sufficient emotion identification capacities, they show signs of an emotion processing and emotion regulation tendency that increases the likelihood of intense and long-term negative affect. Therefore, not alexithymia, but (felt) competence in dealing with negative situations and regulating own emotions are likely to increase children's vulnerability to somatic complaints.

Chapter 4

Feeling in control: A longitudinal study of sense of coherence and emotional self-efficacy in relation to somatic complaints in childhood

The aim of this study was to analyze the relationships between perceived situational control and perceived emotional control and children's experience of somatic complaints. The study included four waves of data collection with 6 months in between each wave. The sample consisted of 324 girls and 393 boys, $M_{age}=10;3$, $SD=8.5$ months at the first time of data collection. The participants filled out self-report questionnaires assessing perceived situational control (sense of coherence), perceived emotional control (emotional self-efficacy), and experienced somatic complaints. A series of multilevel model analyses showed that higher levels of situational and emotional control independently contributed to the predictions of fewer somatic complaints in children. These results suggest that children's subjective experience of situations and own emotional capabilities play a role in the development of common somatic complaints in childhood.

INTRODUCTION

Fear of being late for school, being sent to the principal, feeling threatened by peers: these are all examples of situations that can be stressful for children (Muldoon, 2003). Stress is a normal reaction to negative situations in life: it is a preparation to face challenging or threatening circumstances (Ursin & Eriksen, 2004). For instance, when in fear of being late for school, running would be an adequate response. Physiologically, these kinds of behavioral responses are facilitated by activation of the autonomic nervous system and hypothalamo-pituitary-adrenal axis (McEwen, 2007). However, despite this functionality of stress, for some children stress can become *dysfunctional*, causing somatic complaints to arise (Walker, Garber, Craig, Smith, Van Slyke, & Claar, 2001). Recent studies have shown that the prevalence rates of common stress related somatic complaints such as headaches and fatigue are disturbingly high in childhood (Perquin et al., 2000; Petersen, Bergström, & Brulin, 2003; Petersen, Brulin., Bergstrom, 2006; Roth-Isigkeit, Thyen, Stöven, & Schmucker, 2004). In this study we strive for an advanced understanding of individual differences in the frequency of these somatic complaints. We will not focus on stressful events. Instead, we will examine the extent to which children's perceived control contributes to the frequency with which children experience somatic complaints.

Although daily stressors and somatic complaints are positively related (Walker, Garber, Craig, Smith, Van Slyke, & Claar, 2001), the frequency of stressors does not seem to be the best predictor of which children will report more somatic complaints than others. This can be explained by similar stressors evoking quite different levels of stress in individual children. Brown and Cowan (1988) for example showed that whereas there is little variation in children's ratings of the degree that major life events can be upsetting, such as death of a parent ($M = 4.90$, $SD = 0.44$ on a five point scale), a daily stressor such as a bad mark on a test, is upsetting for some children but less so for others ($M = 3.17$, $SD = 1.12$). Walker et al. found that the relationship between daily stress and somatic complaints is qualified by children's subjective experiences. This suggests that subjective experiences contribute to our understanding of why some children develop many somatic complaints whereas other children are seldom bothered by somatic complaints.

The idea that perceived control influences children's experience of somatic complaints is supported by the literature about stress and somatic complaints in adults. It has been shown that people's cognitions influence the perception of stress (Ursin & Eriksen, 2004). These cognitions can concern the appraisal of *external situations*, but also an individual's own perceived potential of *emotionally* dealing with the situation (Ursin & Eriksen). When adults think they have little control over situations and/or the emotions that arise, they are at risk for sustained high levels of arousal and subsequent somatic complaints (Sapolsky, 2004; Ursin & Eriksen). These two aspects of control are probably also relevant when considering

the frequency with which children experience somatic complaints. They will now be discussed in further detail.

FEELING IN CONTROL OF SITUATIONS: SENSE OF COHERENCE

Similar situations can be appraised quite differently by individual children. Consider the example of a school trip to the Zoo. One child might feel scared and unable to oversee what is going to happen, such as where to wait for the other children, and how to keep track of the group once in the Zoo. Yet, another child might feel confident that everything will work out fine and expect no problems in staying close to the group. This is a difference in experienced situational control. Some children easily feel that situations in life just happen to them. Other children generally feel that situations in life are comprehensible, meaningful and manageable, and these children will most likely experience low levels of negative affect and find adequate solutions when coping with negative situations`. This last way of perceiving the world is what Antonovsky (1979, 1993) refers to as a strong 'sense of coherence'.

In middle childhood and early adolescence, children's development is characterized by increasing autonomy. They become more independent from adults, for instance in going to school, and maintaining peer relationships (Santrock, 1992). At this age, children also start to process experiences more consciously: they make plans and coordinate their behavior. Moreover, children evaluate their own appraisals, behavior and consequences of their own actions (Eccles, 1999). Erikson referred to a period of industry versus inferiority (Eccles), indicating that children learn to be competent and productive, but feel a sense of inferiority if they do not succeed. Variance in experienced sense of coherence can be expected at this age, with children having high levels of sense of coherence presenting few somatic stress symptoms. After all, because children are monitoring themselves in interaction with their environment, they develop a sense of how much they understand situations and are able to influence these situations.

Most studies assessing the relationship between sense of coherence and somatic complaints have been conducted in adults. It has only recently been shown that sense of coherence and the presence of common somatic symptoms in children are negatively associated (Jellesma, Rieffe, Meerum Terwogt, Kneepkens, 2006; Torsheim, Aaroe, & Wold, 2001). The extent to which sense of coherence can account for differences between children in the development of reported somatic complaints has not yet been studied.

FEELING IN CONTROL OF EMOTIONS: EMOTIONAL SELF-EFFICACY

The increasing autonomy of children in middle childhood refers not only to their behavior. As children get older, they also start to depend less on others in their regulation of internal feelings, but rely more and more on their own skills in dealing with emotional experiences (Saarni, 2000). Similar to sense of coherence, children at this age also show introspection concerning their emotional skills. In other words: children develop what we will refer to as 'emotional self-efficacy' (in

other contexts also referred to as ‘trait emotional intelligence’; Petrides & Furnham, 2000, 2001).

Emotional self-efficacy refers to something quite different from an individual’s performance measured emotional skills. After all, emotional self-efficacy is part of a person’s self-image and can be based on diverging variables besides emotional skills, such as the nature of one’s group of reference to meta-cognitive abilities and the tendency to be self-critical. Indeed, the correlation between emotional self-efficacy and emotional abilities is low (Matthews, Emo, Funke, Zeidner, Roberts, Costa, & Schulze, 2006). In this article, we focus on children’s feelings of control in relation to somatic complaints and therefore used children’s self-reported emotional self-efficacy.

Little research has been conducted assessing emotional self-efficacy in childhood. Nevertheless, in one recent study a negative association was found with stress related variables. Children who experience more emotional self-efficacy, report less negative affect and choose more appropriate ways of dealing with negative circumstances. Moreover, emotional self-efficacy was indeed negatively related to somatic complaints (Mavroveli, Petrides, Rieffe, & Bakker, 2007), the outcome we focus on in the current study. Thus this initial finding supports the idea that emotional self-efficacy is associated with fewer somatic complaints arising in childhood. Yet, the development over time has never been addressed.

THE PRESENT STUDY

Sense of coherence and emotional self-efficacy have both proven to be associated with concurrent levels of somatic complaints in children. Yet, it has not yet been studied to what extent these two variables can predict future variations in somatic complaints. In other words: it has not been examined whether differences in experienced control contributes to explaining differences in the frequency with which children report somatic complaints. Moreover, the two forms of experienced control have never been studied simultaneously with respect to somatic complaints. It can nevertheless be expected that sense of coherence and emotional self-efficacy are related. Both variables reflect a form of self-perceived control. Both children’s sense of coherence and emotional self-efficacy are assumed to arise and further develop in middle childhood. We therefore analyzed the longitudinal relationship between sense of coherence, emotional self-efficacy and somatic complaints, taking into consideration the unique effects of both independent variables. We expected that both a strong sense of coherence and a high emotional self-efficacy protect children from developing many somatic complaints and can therefore explain differences between children in the frequency of self-reported somatic complaints over time.

For this study, four waves of data collection with 6 months in between each assessment were used. We focused on middle childhood/ preadolescence ($8\frac{1}{2}$ – $12\frac{2}{3}$ year olds at first assessment). From this age on, it has been shown that girls report more somatic complaints than boys (Perquin et al., 2000). For this reason, we controlled for gender. We focused on middle childhood because the socio-

emotional and cognitive level of children makes it possible to reflect upon one's own feelings. Self-reports may in general be valid and reliable at younger ages (Olson, Radecki, Frintner, Weiss, Korfmacher, Siegel, 2007; Varni, Limbers, & Burwinkle, 2007), but as we described above, awareness of emotional-self efficacy and sense of coherence most likely arises in middle childhood. Self insight into these feelings is unlikely at younger ages. There is an increase in children's levels of somatic complaints with age. We analyzed change over time. The cross-sectional amount of variance in the age of the children in our sample was not as large as usually expected change to occur. We nevertheless also controlled for the variation in age at the beginning of the study.

METHOD

PARTICIPANTS

The data were collected as part of a larger project in which various psychological influences on children self-reported somatic complaints were examined. Participants were 717 children (90% participation rate). In our sample, 55% of the children were boys. The mean age of the children at the initial survey was 10 years and 3 months, $SD = 8.5$ months. Of the 717 children considered in the analysis, 93% completed all four surveys. The complete sample was used for the estimation of the models described in the Results section (which is possible in multilevel analyzes). We asked parents socio-demographic information to be returned in a pre-paid university envelope. Most parents cooperated (78%), indicating that almost all children (90%) came from a two-parent family and were of Dutch origin (93%). All ranges of income were represented in our sample, with a median net monthly income of € 2000-2600. Written parental consent was obtained prior to the conduct of the study.

PROCEDURE

This study was conducted at 11 regular primary schools that were part of a school network in the Netherlands. Parents were informed about the study with information letters that were handed out to the children in the classroom for taking home. Informed consent forms that included a brief abstract of the information letter were subsequently distributed to the parents, including a pre-paid University envelope. Data were collected four times, each with a half year period in between. The children completed self-report questionnaires, only part of which was used for analyses in the current article. The questionnaires were completed within 1,5 to 2 hours, on two days in successive weeks, in order to maximize the children's levels of attention and comfort in participating in the study. At any time during the assessments, the children were able to ask questions. Part of the parents also participated in the project. All parents received subsequent information about psychology and research focused at somatic complaints through a school paper and a website. However, study outcomes were not shared at first in order to prevent any effects on the results of subsequent data collections.

MEASUREMENTS

Emotional self-efficacy was measured with the Trait Emotional Intelligence Questionnaire-Adolescent Short Form (Mavroveli et al., 2007; Petrides, et al., 2006). The scale consists of 30 items. An example of an item is: “It’s easy for me to talk about my feelings to other people”. Children indicate on a seven point Likert scale to what extent they disagree or agree. A total score is computed that reflects the mean of all items. The perceived emotional competence scores can therefore vary between 1 and 7. The questionnaire had a good internal consistency on all measurement occasions (mean Cronbach’s alpha = .84).

Sense of Coherence was measured with the children’s version of the Sense of Coherence Questionnaire (Jellesma, Rieffe, Meerum Terwogt, & Kneepkens, 2006). An example of an item is: “How often do you have the feeling that you are in an unfamiliar situation and don’t know what to do?” The items are scored on a five point scale. For 11 items the response format is: *very often, often, sometimes, seldom, never*. Two items that are recoded have a different response format: *like it a lot, like it, it is OK, don’t like it, don’t like it at all*. The questionnaire had a good internal consistency on all measurement occasions (mean Cronbach’s alpha = .82).

Somatic complaints were measured using the Somatic Complaint List (Jellesma, Rieffe, Meerum Terwogt, 2007). This questionnaire consists of 11 items on a five point scale from *(almost) never to quite often*. All somatic complaints referred to in this questionnaire are common in childhood and rarely fully explained by a medical problem. An example of an item is: “I (almost) never/seldom/sometimes/often/quite often have a headache”). This questionnaire also had a good internal consistency on all measurement occasions (mean Cronbach’s alpha = .83).

STATISTICAL ANALYSES

We analyzed our data with multilevel modeling (software MLWin). The children had self-reported on somatic complaints, trait emotional intelligence and sense of coherence four times. Thus, we had repeated measures, the scores on the three variables being nested within individuals. The answers of an individual on the different times of assessment are expected to be dependent. With multilevel modeling this hierarchy in the data is taken into account. Somatic complaints are described as a function of parameters on two levels. On Level 1, within person variance in somatic complaints is described, on Level 2, differences between individual children are described.

We fitted several models in order to analyze the effects of emotional self-efficacy and sense of coherence on the development of somatic complaints. With these models we examined the same time, but also the longitudinal effects. Same time effects are referred to as contemporaneous effects. They resemble correlations between variables measured at the same point of time. Longitudinal effects are the effects found over time and are referred to as lagged effects. In our models, we predicted the developmental trajectories of somatic complaints, using the self-

reports of somatic complaints at the different times of assessment as the dependent variable. Because sense of coherence and emotional self-efficacy could also change within children, we shifted the data in order to examine the lagged effects taking this into account. Emotional self-efficacy and sense of coherence measured at Time 1, Time 2, and Time 3 were used for the prediction of somatic complaints at Time 2, Time 3, and Time 4.

RESULTS

DESCRIPTIVES

The means and standard deviations for each of the variables are presented in Table 1. There was hardly any change in the overall level of somatic complaints even though there were slight variations, Wilks' $\lambda = .98$, $F(3, 660) = 3.70$, $p = .01$. The overall group effect for emotional self-efficacy showed an increase with time Wilks' $\lambda = .90$, $F(3, 660) = 25.81$, $p < .01$. The same was true for sense of coherence, Wilks' $\lambda = .91$, $F(3, 660) = 22.18$, $p < .01$.

Table 1

Mean scores and standard deviations for somatic complaints, emotional self-efficacy, and sense of coherence at the four times of assessment.

Variable	Time 1 <i>M (SD)</i>	Time 2 <i>M (SD)</i>	Time 3 <i>M (SD)</i>	Time 4 <i>M (SD)</i>
Somatic Complaints	1.91 _{ab} (0.63)	1.95 _a (0.59)	1.94 _{ab} (0.58)	1.89 _b (0.55)
Emotional Self-Efficacy	4.72 _a (0.70)	4.90 _b (0.73)	4.95 _{bc} (0.76)	4.94 _c (0.76)
Sense of Coherence	2.80 _a (0.53)	2.90 _b (0.53)	2.95 _b (0.58)	2.98 _b (0.55)

Note. Means on the same row that do not share subscripts are significantly different at $\alpha = .05$.

VARIANCE DISTRIBUTION: VARIANCE BETWEEN AND WITHIN INDIVIDUALS

The first model (Model A) was an “unconditional means model”. This model was fitted in order to examine how much of the variance in somatic complaints reflects differences between individuals and how much of the variance is caused by variations in somatic complaints within individual children. In the unconditional means model, somatic complaints of individuals were explained by a constant (intercept), not taking into account instability over time, as this could explain part of the variance. The within person variance (Level 1) reflects the variance of somatic complaints around this constant. The between person variance reflects the variance between individuals, thus the amount of variance found in the individual levels of somatic complaints. Based on these variances, the intraclass correlation coefficient could be computed. The intraclass correlation coefficient describes the proportion of the total outcome variance in somatic complaints that is interindividual (between children). We found an intraclass correlation of .57, meaning that 57% of the total variation in somatic complaints was attributable to differences between children and 43% of the total variation was attributable to intra-individual variations.

CONTROLLING FOR TIME EFFECTS

In model B, we added time as a predictor. This way, we could control for variance in somatic complaints that could be explained by time. The model now consisted of a begin score (intercept) and a rate of change (slope). Model B shows a significant, but negligible decrease in somatic complaints over time. Change was negatively associated with the begin score ($r = -.43$). This means that children who experienced relatively more health complaints at the first assessment overall showed stronger decreases and smaller increases in somatic complaints compared to children who had lower begin scores, which probably reflects regression to the mean (Streiner, 2001).

EFFECTS OF GENDER AND AGE ON SOMATIC COMPLAINTS

By adding gender and age to the model (Model C), we controlled for the effect of these variables. As expected, age was unrelated to somatic complaints within the age range used in this study. We predicted boys would have fewer complaints than girls, which was indeed the case. Therefore, gender could explain part of the variance between children in somatic complaints.

SENSE OF COHERENCE AND EMOTIONAL SELF-EFFICACY AS PREDICTORS OF SOMATIC COMPLAINTS

Next, we added the lagged and contemporaneous effects of emotional self-efficacy (Model D) and sense of coherence (Model E). The contribution of these variables in understanding somatic complaints was thus determined for emotional self-efficacy and sense of coherence separately. It is clear that taking into account individual differences in control contributes to the explanation of within person variation, especially when sense of coherence is included in the model (21% of the within person variance explained). This indicates that although there is little systematic overall change in the levels of somatic complaints when considering the group, individual's levels of somatic complaints fluctuate over time. These effects all were significant, suggesting that both emotional self-efficacy and sense of coherence are likely to be causally related to somatic complaints. Children with higher scores on emotional self-efficacy and a stronger sense of coherence developed fewer somatic complaints. Moreover, Model E indicates that decreases in somatic complaints over time are attributable to an increase in sense of coherence. As expected, feelings of control were useful variables in the prediction of somatic complaints.

Table 2

Parameter estimates and fit indices (standard errors are in brackets).

Parameter	Model A	Model B	Model C	Model D	Model E	Model F
FIXED EFFECTS						
Intercept (initial status)	1.928*** (0.018)	1.959*** (0.022)	2.028*** (0.029)	1.999*** (0.026)	3.227*** (0.064)	3.077*** (0.070)
Gender			-0.125*** (0.036)	-0.092*** (0.032)	-0.087*** (0.030)	-0.081*** (0.029)
Age			0.001 (0.002)	0.001 (0.002)	0.000 (0.002)	-0.000 (0.002)
Time (rate of change)		-0.032*** (0.011)	-0.031*** (0.011)	-0.021*** (0.011)	-0.009 (0.010)	-0.012 (0.011)
Lagged EmoSelf-Efficacy				-0.047** (0.017)		0.002 (0.018)
Contemporaneous EmoSelf-Efficacy				-0.216*** (0.017)		-0.100*** (0.018)
Lagged SOC					-0.061*** (0.020)	-0.037* (0.022)
Contemporaneous SOC					-0.032*** (0.002)	-0.026** (0.022)
VARIANCE COMPONENTS						
Level-1:						
Within person	0.142*** (0.005)	0.121*** (0.007)	0.121*** (0.007)	0.121*** (0.007)	0.111*** (0.006)	0.111*** (0.006)
Level-2:						
In initial status	0.185*** (0.013)	0.230*** (0.018)	0.226*** (0.018)	0.168*** (0.015)	0.167*** (0.015)	0.156*** (0.014)
In rate of change		0.020*** (0.005)	0.020*** (0.005)	0.021*** (0.006)	0.017*** (0.005)	0.017*** (0.005)
Covariance		-0.029*** (0.008)	-0.029*** (0.008)	-0.029*** (0.007)	-0.033*** (0.007)	-0.031*** (0.007)
GOODNESS OF FIT						
Deviance	2922.834	2896.650	2884.777	2694.983	2470.288	2438.683
AIC	2928.834	2908.650	2900.777	2714.983	2490.288	2462.683
BIC	2931.401	2913.783	2907.621	2723.538	2498.843	2472.949

* $p < .10$, ** $p < .05$, *** $p < .001$

Note: age, emotional self-efficacy, and sense of coherence were grand-mean centered;
EmoSelf-Efficacy = Emotional Self-Efficacy; SOC = Sense of Coherence

THE UNIQUE EFFECTS OF SENSE OF COHERENCE AND EMOTIONAL SELF-EFFICACY ON SOMATIC COMPLAINTS

Emotional self-efficacy and sense of coherence are strongly associated ($r = .55, p < .01$). We wished to understand the unique effects of these two aspects of control on somatic complaints. Therefore we fitted Model F, that included the effects of emotional self-efficacy *and* sense of coherence. It shows that whereas the lagged effect of emotional self-efficacy is no longer significant when the effects of sense of coherence are taken into account, the contemporaneous effect of emotional self-

efficacy still makes a contribution in explaining children's somatic complaints. We found interaction effects between emotional self-efficacy and sense of coherence to be insignificant (not reported here).

COMPARING THE PREDICTIVE VALUE OF THE MODELS

We compared the six previously described models in order to determine which model is most useful in predicting the development of somatic complaints. For model comparison, we computed three goodness of fit indices. The deviance compares the log-likelihood for a model with that of the saturated model, similar to the residual sum of squares in regression analysis. Smaller deviances indicate a better fit. Since the models we fitted were not nested (models D and E contain different sets of parameters), it was not possible to compare them by testing the difference in deviance. Two additional statistics were computed: the Akaike Information Criterion (AIC) that corrects for the number of parameters and the Bayesian Information Criterion (BIC) that corrects for the number and parameters and sample size (Singer & Willett, 2003). The goodness of fit statistics indicate a better fit for Model E that includes sense of coherence than Model D with emotional self-efficacy. Yet, model F, has the best fit. This indicates that the effect of emotional self-efficacy, especially the contemporaneous effect is useful in predicting somatic complaints, even when information about situational control is already taken into account. The final model explained 29% of the total variance in somatic complaints.

DISCUSSION

The results of this study support our idea that children's feelings of control are of influence on the frequency with which children experience somatic complaints. Situational and emotional control were for the first time studied simultaneously with respect to somatic complaints that are common in childhood. Whereas situational and emotional control were positively associated (children who experienced situations as controllable tended to also be optimistic about their emotional control and vice versa), they independently contributed to the prediction of children's somatic complaints. Children who perceived lower control, more often experienced somatic complaints than children who perceived higher control and this negative association between control and somatic complaints was also found longitudinally. Whereas perceived situational and emotional control showed an increase with age, the overall level of somatic complaints remained stable. In other words: the prevalence of somatic complaints did not change as children became older. When looking at individual children, however, we found that there were many children of whom the reported frequency of somatic complaints changed over time. As the stability on the overall, group level suggests, some children reported more and other children reported fewer somatic complaints at subsequent times of assessment. These fluctuations were preceded by decreases in situational and emotional control and increases in situational and emotional control

respectively. These findings are in line with the assumption that lower levels of perceived control causes children to experience more stress and subsequent somatic complaints when confronted with negative situations than for children who perceive higher levels of control

Our results that weaker feelings of control are associated with more somatic complaints are in line with previous research findings. It has been shown that children with many somatic complaints rate their emotions in reaction to negative situations as more intense (Rieffe, Meerum Terwogt, & Jellesma, 2007). Feeling a lack of control is one possible explanation for these intense emotional experiences. Moreover, children with many somatic complaints do not seem to lack adaptive ways of dealing with negative emotional experiences, but nevertheless are often bothered by many maladaptive thoughts and experience less effect from their strategies of dealing with emotional experiences (Rieffe et al.). Again, this finding might be explained by the experience of little control. After all, children can try changing situations and thoughts about situations, but if they simultaneously feel insufficient understanding and control in difficult situations, it is unlikely that their efforts will have the same positive results compared to those of children with high emotional self-efficacy and sense of coherence.

A similar result was found by Meerum Terwogt, Rieffe, Miers, Jellesma, & Tolland (2006) who presented children with descriptions of situations in which children clearly experienced stress, including emotional and somatic stress symptoms. When offered a psychological strategy to diminish the emotion, children with many somatic complaints often answered confirmatively as to whether they would use this strategy. Yet, compared to peers, they more often opted for medical solutions for the somatic stress symptoms as well. This might suggest that these children are less confident that their own psychological attempt will be sufficient to resolve the stress, which is in line with the finding that children with many somatic complaints are less optimistic about their coping potential (Rieffe et al.). More research is necessary to confirm these speculations. For instance, questions about experienced control in these types of concrete situations could be presented to children.

In our study, we did not find a general increase in the frequency of children's experiences of somatic complaints. Previous studies indicate that an increase in somatic complaints can be expected in somewhat older children (Perquin et al., 2000). This increase may be due to increased levels of stress in adolescence and to biological changes, such as the onset of menstruation in girls (Perquin). In contrast to this average stability in somatic complaints, for many children their sense of coherence became stronger over time and their emotional self-efficacy increased. Obviously, this increase in feelings of control might be explained by the development of cognitive skills that increase children's control (Santrock, 2007). In addition, our sample consisted of primary school children who became the oldest grades of the school. Future studies could reveal what happens with children's feelings of control when they go to middle school.

Based on the results of the current study, we would like to make two additional suggestions for further research. First, we found that the contemporaneous effects of feelings of control were much stronger than the long-term effects. This may signify that control can have a quite direct, short term relationship with somatic complaints (Blossfeld & Rohwer, 1997). Studies with shorter time intervals, such as diary studies could further clarify the time frame in which control affects somatic complaints. Second, the finding that feelings of control and children's levels of somatic complaints show variation within individual children suggests that these variables are not (yet) stable traits (De Fruyt, Bartels, Van Leeuwen, De Clerck, Decuyper, & Mervielde, 2006). This is in line with previous studies showing that aspects of personality generally show plasticity in childhood (Roberts & DelVecchio, 2000; Terracciano, Costa, & McCrae, 2006). This gives room for interventions aimed at decreasing children's somatic complaints by increasing their feelings of control. The influence of such an intervention (e.g. cognitive behavioral therapy; Compton, March, Brent, Albano, Weersing, & Curry, 2004; Prins & Ollendick, 2003) on children's feelings of control and associated somatic complaints could be addressed in future studies.

Our finding that feelings of control are likely to influence children's somatic complaints, becomes especially relevant when considering recent arguments of how children in modern western societies are 'hurried' by adults (Elkind, 2007). Children are thought to often be exposed to expectations that are too grown up for their developmental level. Compared to past prevalence rates, somatic complaints have become more common in childhood (Laurell, Larsson, Eeg-Olofsson, 2004; Santalahti, Aromaa, Sourander, Helenius, & Piha, 2005) and one can wonder whether this perhaps is caused by decreased feelings of control caused by situations referred to by Elkind, such as: children being exposed to many school tests and comparisons with peers. Indeed, many children report that having insufficient time and lagging behind classmates are major sources of stress for them (Brobeck, Marklund, Haraldsson, Berntsson, 2007) and these types of stressors often are associated with somatic complaints (Brobeck et al.; White & Farrell, 2005). In conclusion, the results of this study combined with previous findings, suggest the importance of increasing children's feelings of control in order to reduce the prevalence of somatic complaints at this early life stage.

Chapter 5

When I have a problem, I cannot stop thinking about it. How negative thoughts predict children's self-reported somatic complaints.

In this study, the long-term relationship between emotion regulation and children's self-reported somatic complaints was analyzed. The study included four waves with 6 months in between each wave of data collection. The sample consisted of 324 girls and 393 boys, $M_{age}=10;3$, $SD=8.5$ months at the first time of data collection. Non-'productive thoughts' (negative, repetitive thoughts about past or anticipated negative situations that reflect inadequate emotion regulation) were predictive of more self-reported somatic complaints, a relationship that was partially mediated by symptoms of depression. Of the emotion regulation strategies, particularly maladaptive cognitive strategies were associated with somatic complaints. This association, however, was fully accounted for by non-productive thoughts. The results strongly suggest that, over a period of six months, emotional problems cause an increase in self-reported somatic complaints, as reversed long-term associations were not found. In conclusion, non-productive thoughts indicate an increased risk for somatic complaints in children.

INTRODUCTION

Somatic complaints in childhood are common, with about 25% of the children experiencing recurrent somatic complaints (Perquin, Hazebroek-Kampschreur, Hunfeld, Bohnen, van Suijlekom-Smit, Passchier et al., 2000; Petersen, Bergstrom, & Brulin, 2003; Roth-Isigkeit, Thyen, Raspe, Stoven, & Schmucker, 2004). Common complaints in childhood, such as headaches and abdominal pain, often are not (fully) explained by medical problems (Croffie, Fitzgerald, & Chong, 2000; Goodman & McGrath, 1991) and it is thought that emotional problems in addition can contribute to children's experience of somatic complaints (Eminson, 2007). Indeed, research has consistently found a positive relationship between negative emotional states and the frequency of somatic complaints. Several studies have shown a positive association between depression and somatic complaints (e.g., Campo, et al., 2004; Campo, Jansen-McWilliams, Comer, & Kelleher, 1999; Diepenmaat, van der Wal, de Vet, & Hirasig, 2006). A positive association between negative moods and somatic complaints has also been found (Jellesma, Rieffe, Meerum Terwogt, & Kneepkens 2006). This last finding suggests that emotional problems outside the ranges of psychopathology or severe negative emotional states are related to children's somatic complaints. Furthermore, it has been shown that the prevalence rates of emotional problems in children with a medical disease are similar to those found in appropriate comparison groups (Noll & Kupst, 2007; Noll, Reiter-Purtill, Vannatta, Gerhardt, & Short, 2007), whereas emotional problems do increase the symptoms of children with a disease (Rosenkranz et al., 2005; Wood et al., 2007). These findings support the assumption that emotional problems contribute to children's experience of somatic complaints. The aim of the current study was to further analyze this above described relationship between emotional problems and somatic complaints by focusing on children's emotion regulation.

One explanation for the association between emotional problems and somatic complaints comes from the perseverative cognition hypothesis (Brosschot, Gerin, & Thayer, 2006). According to this hypothesis, somatic complaints arise when physiological activation is prolonged beyond the presence of actual stressful situations. Whereas acute physiological changes in response to an actual stressor are useful in enabling a person's behavioral responses to stress (i.e. fight or flight), the prolongation of this physiological activation caused by non-productive thoughts adds to the total load that stressful events have on somatic well being (McEwen & Sapolsky, 1995). This prolonged physiological activation eventually leads to somatic complaints (Brosschot Gerin, & Thayer, 2006). Prolonged physiological activation is assumed to be caused by 'non-productive thoughts': negative, repetitive thoughts about past or anticipated negative situations that reflect inadequate emotion regulation (e.g., worry or rumination: in the adult literature referred to as 'perseverative thoughts'; Brosschot, Gerin, & Thayer, 2006; Jellesma, Meerum Terwogt, Reijntjes, Rieffe, Stegge, 2005; Verkuil, Brosschot, & Thayer, 2007). In sixteen to seventeen year old adolescents, strong support has

been found for the perseverative cognition hypothesis (Brosschot & Van der Doef, 2006). In middle childhood, however, the relationship between non-productive thoughts and somatic complaints has not yet been addressed.

Two previous studies from our research group do provide some initial support for the preservative cognition hypothesis in children. In the first study, children were presented with negative situations and asked whether they would use certain strategies aimed at reducing the associated negative emotions (e.g. learn more when nervous for a school test) and certain strategies focused on the somatic symptoms (e.g. take painkillers for a headache (Meerum Terwogt, Rieffe, Miers, Jellesma, & Tolland, 2006). It was found that compared to children with few complaints, children with many somatic complaints equally often answered confirmatively with regard to the emotion focused strategies, but more often confirmed using strategies focused on the somatic symptoms (Meerum Terwogt et al.). This indicates that even though children with many somatic complaints may be aware of possible emotion regulation strategies, they nevertheless do not expect these strategies to have a large enough reducing effect on the stress experienced to solve the somatic symptoms.

In the second study this idea was confirmed (Rieffe, Meerum Terwogt, & Jellesma, 2008). Children again were presented with negative situations, but this time we asked them how they would respond with an open question and also addressed children's expected subsequent emotion intensities. Children with many somatic complaints reported emotion regulation strategies similar to those reported by children with few somatic complaints, confirming their awareness of possible ways to reduce negative emotions. Compared to children with few somatic complaints, children with many somatic complaints in contrast expected more intense negative emotions afterwards and even later at night (Rieffe et al.). The result of this study probably reflects a less successful use of adaptive emotion regulation by children with many somatic complaints compared to peers.

These two studies suggest that non-productive thoughts are present in children with many somatic complaints (especially given the finding that they reported still having relatively intense negative emotions at night), but these thoughts were not directly assessed. Another restriction of these studies was that they mainly provided information about active emotion regulation strategies and not about the content of children's helpful or unhelpful cognitions. Comparing self-reported emotion regulation strategies of children with chronic abdominal pain and well children, Walker, Smith, and Garber (2007) found that children with abdominal pain had similar reports on active coping, but used fewer helpful thoughts. These helpful thoughts were not further specified as is usually done (e.g., putting something into perspective or positive refocussing; Garnefski, Rieffe, Jellesma, Meerum Terwogt, & Kraaij, 2007) and maladaptive cognitive emotion regulation strategies, such as self-blame, were not addressed. Thus, the studies conducted in the past have not provided very specific information about emotion regulation strategies associated with children's somatic complaints, but suggest that problems

in emotion regulation are associated with cognitions and/or ineffective use of active emotion regulation strategies.

Whereas there is a lack of information about specific emotion regulation strategies, based on the perseverative cognition hypothesis the mere presence of non-productive thoughts is expected to be of direct relevance with respect to somatic complaints. The specific content of thoughts about negative situations, although obviously associated with the presence of non-productive thoughts (Garnefski et al., 2007), is not assumed to be associated with the frequency of somatic complaints once the presence of non-productive thoughts is controlled for. After all, it is the reoccurrence of negative thoughts that is assumed to cause prolongation of physiological activation (Brosschot, Gerin, & Thayer, 2006).

The main aim of the current study was to verify whether non-productive thoughts precede somatic complaints in children. We controlled whether this relationship was not fully mediated by symptoms of depression (based on the previous finding that somatic complaints are related to emotional problems within normal ranges; Jellesma et al., 2006). Further, we also controlled for the use of specific emotion regulation strategies and expected that these strategies would not be associated with somatic complaints once non-productive thoughts were taken into account.

METHOD

PARTICIPANTS AND PROCEDURE

The study design of this study consisted of four waves (Time 1, Time2, Time3, Time4), with 6 months in between each wave of data collection. In the first wave of the study (Time 1), 717 children from 11 primary schools participated (90% response rate): 324 girls and 393 boys with a mean age of 10 years and 3 months, $SD = 8.5$ months. There was 4% participant loss during the 1.5 years, due to children changing to schools not participating in the study. Written parental consent was obtained from all children before the conduct of the study. The children filled out questionnaires during regular school hours in their own classroom.

MEASUREMENTS

Somatic Complaints

For the measurement of Somatic Complaints, the Somatic Complaint List was used (Jellesma, Rieffe, Meerum Terwogt, 2007). This questionnaire contains 11 items. Children indicated how often they experienced the somatic complaints in the four weeks before assessment on a five-point scale from (*almost*) *never* (0) to (*almost*) *always* (4). The scale internal reliability previously reported was good ($\alpha = .77$) as was the internal consistency we found in the current study ($\alpha = .83$).

Measurement of Emotion Regulation Strategies

We assessed cognitive emotion regulation strategies using the child version of the Cognitive Emotion Regulation Questionnaire (Garnefski et al., 2007). This

questionnaire consists of 9 subscales, each of which is represented by 4 items on a five point scale from (*almost*) *never* (0) to (*almost*) *always* (4). The subscales were: Selfblame, referring to thoughts of putting the blame of what you have experienced on yourself; Other-blame, referring to thoughts of putting the blame of what you have experienced on others; Acceptance (thoughts of accepting what you have experienced and resigning yourself to what has happened); Planning (thinking about what steps to take and how to handle the negative event); Positive Refocusing, (thinking about joyful and pleasant issues instead of thinking about the actual event); Focus on thought (thinking about the feelings and thoughts associated with the negative event); Positive reappraisal (thoughts of attaching a positive meaning to the event in terms of personal growth); Putting into perspective (thoughts of playing down the seriousness of the event or emphasizing the relativity when comparing it to other events); and Catastrophizing (thoughts of explicitly emphasizing the terror of an experience). Originally, Focus on thought was referred to as Rumination. However, the scale is not about the content of the thoughts and to avoid confusion with non-productive thoughts, that clearly have a negative content, we choose to use Focus on thought.

We added the Active coping subscale of the COPE in order to assess the taking of active steps to try to remove or circumvent the stressor or to ameliorate its effects (Carver, Scheier, & Weintraub, 1989) The scales are known to have sufficient internal consistencies, which was confirmed in this study (internal consistencies between .67 and .80).

Measurement of Non-Productive Thoughts

Non-productive thoughts were assessed with the Non-Productive Thoughts Questionnaire for Children (Jellesma, Meerum Terwogt, Reijntjes, Rieffe, Stegge, 2005). This scale consist of 10 statements. The child indicates whether the statements are *not true* (0), *sometimes true* (1) or *often true* (2). The statements reflect thoughts typical for rumination or worry, such as “If I have a problem, I cannot stop thinking about it” and “If I don’t exactly know what is going on, I often think something bad is going to happen”. The internal consistency of the scale is known to be good, which was confirmed in this study ($\alpha = .84$).

Measurement of Depression

The Children’s Depression Inventory was used for assessing symptoms of depression (Kovacs, 1992) The scale consists of 27 items, however one item regarding suicidal ideation was dropped in this study. In each item, the children choose on of three statements, that are given a score from 0 (not reflecting a symptom of depression) to 2 (fitting a symptom of depression). The questionnaire is known to have a good internal consistency, which was confirmed in this study ($\alpha = .81$).

STATISTICAL ANALYSIS

We analyzed the relationships between non-productive thoughts, symptoms of depression, emotion regulation strategies, and somatic complaints with Pearson product-moment correlations. Linear regression was used to confirm that emotion

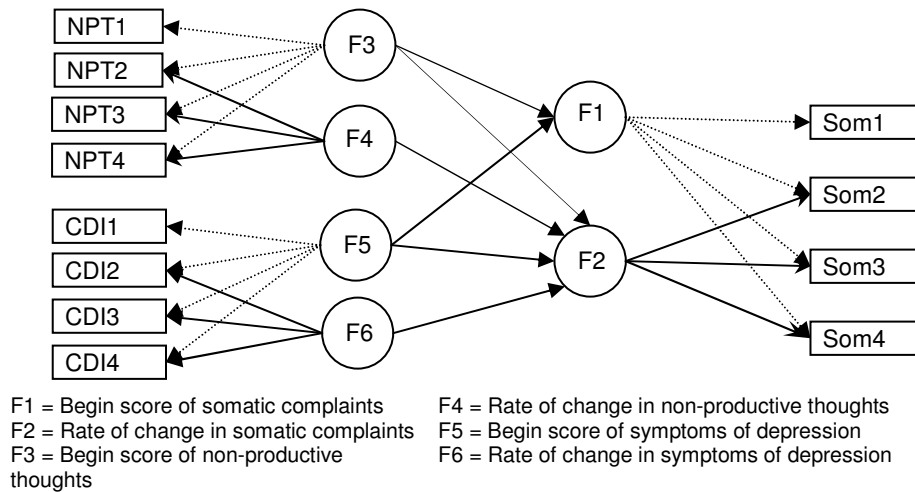
regulation strategies were no longer associated with somatic complaints once non-productive thoughts were controlled for. With the method of Baron and Kenney (1986) we tested mediation of the association between non-productive thoughts and somatic complaints by depression. The amount of mediation was estimated with Shrout and Bolger's method (2002).

Linear regression analysis does not provide information about the direction of found associations. To determine whether non-productive thoughts precede children's somatic complaints, we used two statistical methods. First, we analyzed on a group level whether non-productive thoughts precede somatic complaints. This was done with structural equation modeling. We first focused on fitting adequate measurement models, with which we meant to represent the variables as latent variables, thereby using single indicator models. The random errors were fixed at a value of one minus the scales reliability and the factor loading were fixed at the square root of the reliability. Thus without making a model with too many predictors for the latent variables, we made use of the information about our constructs provided by the questionnaire items, while taking into account the internal consistency (Bollen, 1989). Subsequently, a series of structural models were tested on the first two waves of data collection. We applied maximum likelihood estimation, using EQS 6.1 software. For evaluation of model fit, we looked at several comparative fit indices: the General Fit Index (GFI), the Normed Fit Index (NFI) and the Comparative Fit Index (CFI), with scores $> .90$ reflecting good model fit (Stevens, 2002). For comparison of models, Chi-square difference tests were calculated, using a critical value of 5%. A common method for analyzing longitudinal relationships is the comparison of models that include cross-lagged paths (i.e. paths that reflect a causal relationship between two different variables over time) with a model that includes only stabilities. However, variables can influence each other within the time interval used, in our case 6 months (Zapf, Dormann, Frese, 1996). We did not have a hypothesis about the time interval within which a certain variable should significantly affect somatic complaints. Therefore, we also fitted models with the synchronous (concurrent) paths. These are paths that reflect an association between one variable and the other at the second time of measurement, while including the time 1 covariation and paths of stability. These models were also used to confirm our assumption that symptoms of depression precede somatic complaints

Second, on an individual level, children can show different developmental trajectories (over different periods of time children can show fluctuations reflecting increase, decreases, or stability). With multilevel structural equation techniques, we analyzed how the initial scores on somatic complaints and the rate of change over time are predicted by the begin scores and rate of change in non-productive thoughts, controlling for depression. We achieved this by predicting the scores on non-productive thoughts, symptoms of depression, and somatic complaints out of two latent variables per construct: one for the begin score and one for the rate of change (see Figure1). For this analysis, all four waves of data collection were used. We made no assumptions for the rate of change. Therefore the loadings for each

occasion were allowed to vary. This means that the rate of change can be different for each occasion. The measurement error of each variable was assumed to be constant over time. Before testing the effect of the time varying predictors, it was first verified whether, indeed, there were significant interindividual differences in the rate of change on somatic complaints to be accounted for. This was achieved by testing the latent growth model for somatic complaints independently.

Figure 1. *Multilevel structural equation model for begin score and rate of change in somatic complaints*



Note. Dotted paths have a factor loading 1. Structural means modeling was used: the variables indicating the means belonging to the latent variables are not depicted for simplicity.

The model including all predictors of the intercept and rate of change in somatic complaints depicted in Figure 1 (i.e. associations between the latent growth models of both independent variables and the latent growth model of somatic complaints) was subsequently compared to three models. One model included no associations between the latent growth models for the independent variables and the latent growth model for somatic complaints. The other two other models included associations between the latent growth model of a single independent variable and the latent growth model of somatic complaints. In all four models, the latent growth models of the two independent variables were allowed to covary, the latent variables for begin score and rate of change of each construct were allowed to covary, and the measurement errors of each construct were assumed to be stable.

RESULTS

RELATIONSHIPS BETWEEN EMOTION REGULATION STRATEGIES, DEPRESSION AND SOMATIC COMPLAINTS

The correlations between the variables are presented in Table 1. Non-productive thinking and depression were strongly associated with somatic complaints measured at the same time and at Time2, 6 months later. There was a small association between the use of positive refocusing and the experience of fewer somatic complaints, that remained over time. Stronger associations existed between the experience of more somatic complaints and the use of self-blame, acceptance, focus on thought, catastrophizing, and other-blame. Many of the independent variables were intercorrelated. We did not find any gender differences in the relationships.

Table 1
Correlations between the variables

	2	3	4	5	6	7	8	9	10	11	12	13	14
1.Som1	.52	.28	.23	.28	-.10	.05	.08	.08	.35	.16	.02	.50	.39
2.Som2		.16	.15	.17	-.09	.01	.06	.00	.23	.12	-.04	.35	.34
3.Self-blame			.42	.52	.07	.39	.37	.35	.50	.14	.36	.48	.25
4.Acceptance				.49	.21	.35	.42	.37	.49	.29	.31	.35	.14
5.Focus on thought					.16	.56	.51	.37	.55	.27	.51	.47	.17
6.Positive refocusing						.43	.43	.50	.03	.04	.43	-.15	-.25
7.Refocus on planning							.61	.48	.31	.17	.75	.17	-.07
8.Positive reappraisal								.56	.37	.25	.56	.13	.01
9.Putting into perspective									.27	.17	.48	.12	-.04
10.Catastrophizing										.38	.28	.49	.34
11.Other-blame											.16	.18	.26
12.Active coping												.10	-.12
13.NPT													.44
14.Depression													

Correlations in bold are significant at $\alpha = .05$; Som1=Somatic complaints at time 1, Som2 = Somatic complaints at time 2, NPT = Non-productive thoughts

The results of the regression analyses are presented in Table 2. The variables could explain 30% of the variance in somatic complaints at Time 1, $F(12, 716) = 25.06$, $p < .01$. Of the variance in somatic complaints at Time2, 17% was explained, $F(12,701) = 12.08$, $p < .01$. Clearly, only non-productive thoughts and depression were of predictive value in both analyses. As the cognitive emotion regulation strategies were specific, but related variables, we examined whether their combined effect could contribute to the prediction of somatic complaints. In order to achieve this, two additional analyses were conducted. First, it was examined whether the emotion regulation strategies together could explain part of the variance in somatic

complaints, by entering depression and non-productive thoughts in the first step, and the other cognitive emotion regulation strategies in the second. As expected, this analysis revealed that the cognitive emotion regulation strategies as a group did not increase the amount of variance in somatic complaints explained, $F(9, 705) = 1.26, p = .26$ at Time 1 and $F(9, 690) = 0.57, p = .82$ at Time 2.

Table 2

Somatic complaints at time 1 (Som1) and time 2 (Som2) regressed on coping strategies, non-productive thinking and depression

Variable	B		Standardized Error		β	
	Som1	Som2	Som1	Som2	Som1	Som2
Self-blame	0.00	-0.02	0.03	0.03	0.00	-0.03
Acceptance	0.03	0.02	0.03	0.03	0.03	0.03
Focus on thought	0.03	0.02	0.03	0.04	0.05	0.03
Positive refocussing	0.00	0.01	0.02	0.02	0.00	0.03
Refocus on planning	-0.04	-0.01	0.03	0.04	-0.06	-0.01
Positive reappraisal	0.00	0.04	0.03	0.03	0.00	0.06
Putting into perspective	0.02	-0.03	0.03	0.03	0.02	-0.04
Catastrophizing	0.06	0.02	0.03	0.03	0.08	0.03
Other-blame	0.01	0.01	0.03	0.03	0.01	0.01
Active coping	-0.01	-0.04	0.03	0.03	-0.02	-0.07
Non-productive thinking	0.50	0.31	0.06	0.06	0.36**	0.24**
Depression	0.52	0.58	0.11	0.11	0.19**	0.22**

** $p < .01$

Second, we used the weighted mean scores of the cognitive strategies usually considered maladaptive (selfblame, focus on thought, and catastrophizing) and of the strategies considered adaptive (planning, positive refocusing, positive appraisal, and putting into perspective). The variables made a significant, $F(2, 712) = 2.96, p = .05$, but very small contribution to the explained variance in somatic complaints ($R^2 < 0.01$).

This effect was attributable to a positive association between maladaptive emotion regulation and somatic complaints. The weighted mean scores of the cognitive emotion regulation strategies did not contribute to the long term prediction of somatic complaints, $F(2, 697) = 0.10, p = .90$.

When considering the effects of non-productive thinking and symptoms of depression on somatic complaints, we found that, as expected, only part of the effect of non-productive thoughts was mediated by symptoms of depression, $z = 8.54, p < .01$. Comparing the cross-sectional product of the effects of non-productive thoughts on symptoms of depression (.22) and symptoms of depression on somatic complaints (1.10) with the total effect of non-productive thinking on somatic complaints (.71), we found that approximately 34% of the total effect of non-productive thinking on somatic complaints was mediated by symptoms of depression.

LONG TERM, GROUP LEVEL ASSOCIATIONS BETWEEN NON-PRODUCTIVE THOUGHTS AND SOMATIC COMPLAINTS

First, we focused on the measurement model for non-productive thoughts and somatic complaints. In this model we fitted the two factor structure, allowing the same latent variable to correlate over time and the two different variables to correlate at the same time of measurement. This resulted in a good model fit, (NFI = .985, CFI = .985, GFI = .989).

The results of the structural equation models fitted are presented in Table 3.

Table 3

Model fit and standardized solution for structural models reflecting longitudinal relationships between non-productive thoughts (NPT), and somatic complaints (Som)

NON-PRODUCTIVE THOUGHTS AND SOMATIC COMPLAINTS	
Model	<i>r</i>
A: Null Model [χ^2 (<i>df</i> = 3) = 94.78;NFI = .991;CFI = .991;GFI =.941]	
NPT2 = .70NPT1 + D2	.62
Som2 = .64Som1 + D1	
B: NPT→Som2 [χ^2 (<i>df</i> = 2) = 87.80*;NFI = .991;CFI = .991 ;GFI = .944]	
NPT2 = .71NPT1 + D2	.61
Som2 = .14NPT1 + .54Som1 + D1	
C: Som→NPT2 [χ^2 (<i>df</i> =2) = 92.40;NFI = .991;CFI = .991;GFI =.941]	
NPT2 = .65NPT1 + .08Som1 + D2	.61
Som2 = .64NPT1 + D1	
D: NPT2→Som2 [χ^2 (<i>df</i> = 2) = 21.69**;NFI = .998;CFI = .998;GFI = .985]	
NPT2 = .69NPT1 + D2	.59
Som2 = .36NPT2 + .46Som1 + D1	
E: Som2→NPT2 [χ^2 (<i>df</i> =2) = 22.77**;NFI = .998;CFI = .998;GFI = .984]	
NPT2 = .62NPT1 + .34Som1 + D2	.60
Som2 = .62Som1 + D ₁	

p* < .05, *p* < .01 in comparison with Model A, *r* = time 1 correlation between non-productive thoughts and somatic complaint

We followed the order and scheme of analyses of models as presented by Zapf, Dormann and Freese (1996). The Null Model (Model A) included stabilities of non-productive thoughts and somatic complaints and a correlation at Time 1, but no lagged or synchronous paths between non-productive thoughts and somatic complaints. In each of the subsequent models, one additional path was included and these models were compared against the Null Model: in Model B, the lagged effect of non-productive thoughts on somatic complaints; in Model C, the lagged effect of somatic complaints on non-productive thoughts; in Model D, the synchronous effect of non-productive thoughts on somatic complaints; and in Model E, the synchronous effect of somatic complaints on non-productive thoughts. From the comparison of the models, it became clear that the synchronous

paths were the strongest, indicating a bidirectional association between non-productive thoughts and somatic complaints in the short run (< 6 months). In the long run however, only the effect of non-productive thoughts on somatic complaints remained present.

LONG TERM, GROUP LEVEL ASSOCIATIONS BETWEEN SYMPTOMS OF DEPRESSION AND SOMATIC COMPLAINTS

The procedure for analyzing the longitudinal relationships between depression and somatic complaints was similar to that of analyzing the longitudinal relationships between non-productive thoughts and somatic complaints. The measurement model included single indicator latent variables for depression and somatic complaints, allowing correlations between the same constructs over time and correlations between somatic complaints and depression at the same point of time.

Table 4

Model fit and standardized solution for structural models reflecting longitudinal relationships between symptoms of depression (Dep) and somatic complaints (Som)

SYMPTOMS OF DEPRESSION AND SOMATIC COMPLAINTS		
Model		<i>r</i>
A: Null Model [χ^2 (<i>df</i> = 3) = 56.31;NFI = .994;CFI = .994;GFI = .963]		
Dep2 =	.77*Dep1 + D2	.50
Som2 =	.64*Som1 + D1	
B: Dep1 → Som2 [χ^2 (<i>df</i> =2) = 35.43**; NFI = .996;CFI = .996;GFI = .976]		
Dep2 =	.78*Dep1 + D2	
Som2 =	.21* Dep1 + .53* Som1 + D1	.48
C: Som1 → Dep2 [χ^2 (<i>df</i> =2) = 54.75;NFI = .994;CFI = .944;GFI = .963]		
Dep2 =	.74*Dep1 + .05*Som1 + D2	.49
Som2 =	.64*Som1 + D1	
D: Dep2 → Som2 [χ^2 (<i>df</i> =2) = 5.06**;NFI = .999 ;CFI = 1.000;GFI = .996]		
Dep2 =	.76*Dep1 + D2	.47
Som2 =	.30*Dep2 + .51*Som1 + D1	
E: Som2 → Dep2 [χ^2 (<i>df</i> = 2) = 21.92**;NFI = .998;CFI = .998;GFI = .985]		
Dep2 =	.68*Dep1 + .23*Som2 + D2	.47
Som2 =	.63*Som1 + D1	

p* < .05, *p* < .01 in comparison with Model A, *r* = time 1 correlation between symptoms of depression and somatic complaint

This measurement model had good fit properties, NFI = .986, CFI = .986, GFI = .916. Comparison of the models (Table 4) indicated that the relationship between depression and somatic complaints was also bidirectional in the short run. Over a 6 month period, only the effect of depression on somatic complaints remained significant.

INDIVIDUAL DIFFERENCES IN THE DEVELOPMENT OF SOMATIC COMPLAINTS

First of all, a model was fitted that included only an intercept (F1) and rate of change (F2) latent variable for the prediction of somatic complaints (the right side of Figure 1). This model had a good model fit (NFI = .977, GFI = .985, CFI = .981). Even though all factor loadings of F1 and F2 were significant, the mean of F2 ($M = 0.003$) did not significantly deviate from 0. The average score of somatic complaints does not seem to change over time. The mean of F1 was significant ($M = 1.919$), reflecting the average begin score on somatic complaints. Both deviations were significant ($D1 = .268$ and $D2 = 0.067$), meaning that there are interindividual differences in the begin scores and in the change of somatic complaints over time. This finding justified us for analyzing the effect of non-productive thoughts.

The results of the fitted models are presented in Table 4. It can be concluded that latent growth in somatic complaints was associated with both latent growth in non-productive thoughts and symptoms of depression. The model including all effects gave the best model fit. Compared to model 1, the drop in the chi square was huge. The drop in the deviation of F1 indicates that non-productive thoughts and symptoms of depression accounted for a large part of the differences between children in their begin scores of somatic complaints. All inter-individual differences in the rate of change were accounted for. The negative covariance in the begin scores on somatic complaints and rates of change indicated that higher initial scores were associated with a subsequent decrease in somatic complaints. Higher initial scores in non-productive thoughts were also associated with a subsequent decrease in somatic complaints, whereas the effect of begin scores in depression did not have an additional effect. Children who initially had more symptoms of depression and more non-productive thoughts also reported more somatic complaints. Increases in depression and non-productive thoughts co-occurred with the experience of more somatic complaints. The relationships found were independent of gender.

DISCUSSION

The results of this study show that, in line with the perseverative cognition hypothesis, non-productive thoughts precede somatic complaints in children. As expected, this long-term association between non-productive thoughts and somatic complaints was only partly mediated by symptoms of depression. Moreover, we found that somatic complaints in contrast, were not related to long-term subsequent non-productive thoughts or symptoms of depression. This finding confirms previous results indicating that associations between emotional problems and children's somatic complaints are mainly unidirectional with emotional problems preceding somatic complaints (Noll & Kupst, 2007; Noll, Reiter-Purtill, Vannatta, Gerhardt, & Short, 2007; Rosenkranz et al., 2005; Wood et al., 2007). Finally, whereas cognitive emotion regulation strategies (especially maladaptive strategies) were associated with children's somatic complaints, non-productive thoughts fully accounted for this association and in line with previous research, no association

between active coping and somatic complaints was found (Meerum Terwogt et al., 2006; Rieffe et al., 2008; Walker et al., 2007).

The finding that adaptive cognitive emotion regulation strategies and active coping were practically unrelated to children's somatic complaints is important, as it shows that children who develop frequent somatic complaints might not have a problem with understanding possible ways of efficient coping. Instead, these children are more likely to have a low self-efficacy with regard to their emotion regulation potential and therefore are less likely to (adequately) use adaptive emotion regulation (Meerum Terwogt et al., 2006). Alternatively, or in addition, negative thoughts can also easily interfere with the success of more adequate strategies. For instance, a child who failed a school test might try to think that this experience is not just bad, but also teaches him a lesson to learn better in the future. Yet, it is very unlikely that this positive thought will be helpful in reducing his negative emotions when he also keeps thinking about his failure of the test and starts to worry about future school tests. Our finding is in line with that of previous studies, showing that whereas children with many somatic complaints have knowledge of possible positive ways of emotion regulation, they still do not expect that they will be able to diminish their negative emotions and report to still think about day-time negative events when lying in bed at night (Meerum Terwogt et al., 2006; Rieffe et al., 2008).

The effect of non-productive thoughts on somatic complaints was partially mediated by symptoms of depression. It thus seems that non-productive thoughts contribute to depression and that, in turn, depression increases the risk of experiencing somatic complaints. At the same time, non-productive thoughts also had a positive relationship with children's experiences of somatic complaints, independent of depression. This is in line with the previous finding that negative moods are also associated with more frequent somatic complaints in children (Jellesma et al., 2006). Apparently, children do not have to experience (symptoms of) an affect disorder in order to experience frequent somatic complaints. According to the perseverative cognition hypothesis it can indeed be expected that non-productive thoughts cause prolonged physiological activation leading to somatic complaints and this prolongation can be reached in the presence of negative moods without depression (Brosschot et al., 2006).

One limitation of the current study was the use of six month intervals between the assessments. This is a powerful design for measuring stronger associations and analyzing individual differences in the development of somatic complaints, yet it does not give insights into possible short term bidirectional relationships between variables. Given the finding that the contemporaneous effects were much stronger compared to the longitudinal effects, future studies could address the relationships between emotion regulation and somatic complaints in shorter time intervals, for instance using diaries. Nevertheless, the results of the current study indicate that, in line with the results of Noll and colleagues (2007), if any short term effects of somatic complaints on emotional problems are present, these effects usually dissipate over time. In other words: whereas it is possible that children do have

some emotional problems at the moment they are bothered by certain somatic complaints, these emotional problems are not long-lasting.

It may seem contra-intuitive that children with frequent somatic complaints, and even children with severe medical conditions (Noll & Kupst, 2007) do not seem to develop more emotional problems than their healthy feeling peers. After all, not feeling well physically, whether caused by emotional or medical problems, can be thought of as a stressor on its own (Robinson & Riley, 1999). The Human Evolutionary Response to Trauma/Stress (HEART) theory recently proposed by Noll and Kupst (2007) provides a possible explanation why children seemed to show hardiness when faced with somatic problems. According to this theory, children's somatic problems are indeed a stressor. But, from an evolutionary perspective, the typical reactions of children to this stressor are likely to be adaptive. Therefore, rather than emotional problems, such as feelings of hopelessness or depression, children who have been faced with somatic complaints and/or disease will show reactions such as alertness and increased attachment behavior.

These and other explanations, but also possible third variables should be given further attention. The current study was innovative in illuminating long-time associations between emotional problems and children's somatic complaints and can be used as a first step for additional studies looking into possible causal mechanisms by which common somatic complaints in childhood develop. Furthermore, the key role of non-productive thinking calls for future studies addressing further aspects of emotion regulation, such as the effectiveness of adaptive coping strategies when children simultaneously use maladaptive emotion regulation.

Chapter 6

Do parents reinforce somatic complaints in their children?

The objective of this study was to examine the influence of parental solicitousness on self-reported somatic complaints in school-age children. Participants were 564 children (mean age 10 years) and their parents. Children completed self-report measures of somatic complaints, parental solicitousness, depressiveness, fear and sense of coherence. Somatic complaints were assessed again six months later. Parents also completed a questionnaire about solicitousness. The results showed that parental solicitousness as reported by children or parents was unrelated to the frequency of self-reported somatic complaints. Symptoms of depression, fear and lower sense of coherence were associated with more somatic complaints, but did not interact with parental solicitousness. It is concluded that parental solicitousness seems unrelated to more frequent somatic complaints in school children.

Jellesma, F.C., Rieffe, C., Meerum Terwogt, M., & Westenberg, P.M. (2008). Do parents reinforce somatic complaints in their children? *Health Psychology, 27*, 280-285.

INTRODUCTION

Somatic complaints are a subjective experience (Edwards, Ness, Weigent, & Fillingim, 2003) and influences on reports of somatic complaints are thought to include psychological variables (Cohen & Herbert, 1996). From a behavioral perspective, Fordyce (1976) suggested that earlier positive environmental reactions to somatic complaints can increase the future frequency of the display of those complaints. His work has been influential in the literature about somatic complaints in adults (Patterson, 2005). Even though somatic complaints are common in children (Perquin, et al., 2000) few studies have been focused on the reinforcement of children's somatic complaints. In this study we examined the possibility that children would report somatic complaints more frequently if they were followed by positive consequences provided by parents.

For children, parents are the ones who have most influence on the consequences of somatic complaints. For example, they can give their children extra treats or relieve them of chores: responses referred to as 'parental solicitousness' (Peterson & Palermo, 2004). If parental solicitousness reinforces the self-report of somatic complaints in children, children who receive these positive consequences will be expected to report somatic complaints more frequently. This may not necessarily cause an increase in the frequency of a single complaint: parents may respond in similar ways to different somatic complaints and therefore, may reinforce somatic complaints in their children. To date, the few studies evaluating the relationship between parental solicitousness and the frequency of a single (Levy et al., 2004; Peterson & Palermo, 2004) or various somatic complaints (Levy et al., 2004; Merlijn et al., 2003; Walker, Claar, & Garber, 2002) have not supported the hypothesis that somatic complaints can be reinforced by parental solicitousness. Levy et al. and Walker, et al. (2002) focused on quite specific samples (8 to 15 year olds having a mother diagnosed with irritable bowel syndrome or 8 to 18 year olds reporting recurrent abdominal pain) and did not find an association between parental solicitousness and the frequency of somatic complaints. Peterson and Palermo found a negative relationship between solicitousness and somatic complaints in their more general sample of 8 to 16 year olds with headaches, juvenile idiopathic arthritis or sickle cell disease. Merlijn, et al. showed that 12 to 18 year olds with chronic pain experience *less* parental solicitousness compared to adolescents without chronic pain. Nevertheless, we argue there are several reasons for conducting further research to evaluate the theory and hypothesis.

First, the studies described above all included adolescents. This is problematic because parental solicitousness may only have a reinforcing effect on younger children's somatic complaints, whereas this effect diminishes as children's autonomy increases (Von Salisch, 2001). Second, when somatic complaints become chronic, parents may feel they should respond less solicitously. For example, keeping a child home from school for a couple of days may be considered harmless, but longer periods of absence are likely to cause academic and social

problems. Thus, as long as the complaints remain within the normal range, a positive association with parental solicitousness may be more likely than when the frequency of the somatic complaints is extreme. This non-linear relationship between solicitous responses and somatic complaints has not been studied. Third, it has been suggested that negative affect moderates the relationship between parental solicitousness and the self-reporting of somatic complaints (Walker et al., 2002; Peterson & Palermo, 2004). When experiencing negative affect, physiological changes take place that facilitate our reactions. Yet, when people experience intensive or long-term negative affect, they report more somatic complaints (Leventhal, Hansell, Diefenbach, Leventhal, & Glass, 1996). In children, symptoms of depression, anxiety and a low 'sense of coherence' (the feeling that life is manageable, comprehensible, and meaningful) are related to more somatic complaints (Campo et al., 2004; Jellesma, Rieffe, Meerum Terwogt, Kneepkens, 2006; Muris & Meesters, 2004; Torsheim, Aaroe, & Wold, 2001). Perhaps, only children who are more susceptible to somatic complaints because of negative affect are influenced by parental solicitousness.

This study had four objectives. First, we examined the relationship between parental solicitousness and somatic complaints in a population of school children, aged 9 to 12. The somatic complaints score was a compound of the frequency of a variety of somatic complaints that are common in children. Second, to assess the possible nonlinearities of the data, we compared parental solicitousness for children with scores in the low, medium or high range in terms of frequency of somatic complaints. Third, we evaluated moderation of depression, fear and low sense of coherence. Fourth, in order to examine the causal effect of parental solicitousness on the frequency of children's reported somatic complaints, we conducted a longitudinal study using a time interval of six months.

METHOD

PARTICIPANTS AND PROCEDURE

Participants were 564 children and their parents, who were taking part in a larger longitudinal study of somatic complaints in children among 11 randomly-selected primary schools in the Netherlands. Of the potential sample, 79% of the parents chose to participate. Two waves of data, separated by 6 months were used (1% participant loss due to change of school). Participants were 255 girls and 309 boys, *M* age 10 years and 3 months at Time 1 (range 9 to 12), 88% living in a two-parent family and 92% having the Dutch ethnicity. The questionnaires were handed out to children in classrooms. Children took the parents' questionnaires home and they were returned by self-addressed return envelopes. Written (parental) informed consent was obtained before beginning this study.

MEASURES

Solicitous parental responses

The Illness Behaviour Encouragement Scale (IBES; Walker, & Zeman, 1992; Bijttebier and Vertommen, 1999) measures children's and parents' perceptions of parents' responses to children when children have somatic complaints. There are two parallel forms for parents and their children. The questionnaire consists of 12 responses to somatic complaints, for example: *spend more time with the child than usual*, and *let the child do things he or she isn't usually allowed to do*. Children and their parents rate how often the parent responded this way on a 5-point scale (0 = *never* to 4 = *always*). To prevent biases related to specific complaints, we asked about parents' responses when the child was not feeling well. Walker and Zeman reported a good internal consistency for the child and mother report scales for gastro-intestinal complaints ($\alpha = .88$ and $\alpha = .85$ respectively). Internal consistencies of the more general scales were satisfactory ($\alpha = .74$ and $\alpha = .71$ respectively).

Somatic complaints

We assessed children's somatic complaints with the Somatic Complaint List (SCL; Rieffe, Oosterveld, Meerum Terwogt, 2006). This questionnaire contains 14 items that reflect common somatic complaints in children, such as abdominal pain and fatigue. Children indicate how often they have experienced the somatic complaints in the four weeks prior to the assessment on a 5-point scale from (*almost*) *never* (1) to (*almost*) *always* (5). Internal consistency reported by Rieffe et al is strong ($\alpha = .77$) as was reliability we found in the current study ($\alpha = .85$).

Depressive symptoms

Children completed the Children's Depression Index (Kovacs, 1992; Timbremont & Braet, 2001). The CDI consists of 27 items; the item concerning suicidal thoughts was excluded. For each item, children selected one of three statements that characterised them best during the past three weeks. The statements were graded in order of increasing severity from 1 to 3. The internal consistency of the scale is known to be good ($\alpha = .80$) just as the test-retest reliability ($r = .81$; Timbremont & Braet). Internal consistency in this sample was .81.

Fear

The Revised Fear Survey Schedule for Children (FSS-R; Ollendick, 1983; Oosterlaan, Prins & Sergeant, 1995) was used to determine the level of children's fearfulness. The FSSC-R contains 80 items on a 3-point scale (0 = *not at all* to 2 = *very much*) how much they fear specific stimuli or situations. Sub-scales can be distinguished. However, in this study, only the total score was used. Research shows the scale has a good internal consistency (alpha is approximately .90 for all sub-scales) and high test-retest reliability (Pearson's r around .70; Oosterlaan et al.). Oosterlaan et al. also reported support for convergent as well as divergent validity. We found an internal consistency of .97 for the total score.

Sense of Coherence

Children's experience of sense of coherence was measured using the Sense of Coherence scale (Jellesma, Meerum Terwogt, & Rieffe, 2006; Torsheim, et al.,

2001). The scale consists of 13 items. Children are asked to respond to statements on a 5-point scale from 0 = (almost) never to 4 = (almost) always). Torsheim et al. reported a good internal consistency ($\alpha = .85$) and test-retest reliability ($r = .78$); similar results were found for the Dutch translation (Jellesma, et al.). In the current study we found an internal consistency of .76.

STATISTICAL ANALYSIS

For comparison of somatic complaints at Time 1 (T1) and Time 2 (T2) and solicitousness reported by parents or children (both T1), t-tests were used. For gender differences in somatic complaints and parental solicitousness multivariate analysis of variance with post hoc t-tests were used. Pearson product moment correlations (Bonferroni corrected) were computed for parental solicitous responses, depression, fear, sense of coherence and somatic complaints. We also compared 3 groups of 56 children: those who scored within the 0-10th (with a score below 1.21); 45-55th (with a score between 1.64 and 1.79); and 90-100th percentile on the SCL (with a score above 2.64). A nonlinear relationship would be indicated by a difference between two groups.

Next, a stepwise linear regression analysis was conducted to test the possibility that the effect of solicitous parental responses on children's somatic complaints was moderated by depressive symptoms, fear symptoms, or sense of coherence. To reduce problems associated with multicollinearity and to facilitate interpretation of the effects of predictors and moderators, we standardized the variables (Frazier, Tix, & Baron, 2004). Parental solicitous responses as perceived by the child and parent, the possible moderator variables, and the interactions between parental solicitousness and the moderator variables were entered in three steps. Entering all of the interaction effects in a single step, after the predictor and moderator variables, has the advantage of controlling for an inflated Type 1 error (Frazier et al.).

A second stepwise linear regression analysis was conducted to examine whether changes in self-reported somatic complaints (i.e. somatic complaints at T2 minus somatic complaints at T1) are influenced by the initial level of somatic complaints, parental solicitousness, depressive symptoms, fear symptoms, or sense of coherence. The variables were standardized. Somatic complaints at T1; parental solicitousness as perceived by children and parents; depression, fear, and sense of coherence; and interactions with somatic complaints at T1 were entered in four steps. When one variable contains part of another variable, and the two variables are then analyzed using regression testing the null hypothesis that the slope of regression is zero becomes inappropriate. We corrected for this problem, known as 'mathematical coupling', when analyzing the relationship between change and initial value (Tu, Baelum, and Gilthorpe; 2005). For the interpretation of both stepwise linear regression analyses, the non-standardized regression coefficients were used, as the β coefficients for the interactions are not properly standardized.

RESULTS

SCORES ON SOMATIC COMPLAINTS AND PARENTAL REINFORCEMENT

Children had a mean score of 1.83 ($SD = 0.58$, range 1.00-3.86) on the somatic complaint list at T1 and a slightly higher score of 1.90 ($SD = 0.57$, range 1.00-4.89) at T2, $t(557) = -3.27$, $p < .01$. The mean score of children on the IBES was 1.79 ($SD = 0.59$, range 0.42-3.83). Parents reported somewhat less solicitousness, with a mean score of 1.64 ($SD = 0.48$, range 0.25-3.33), $t(563) = 5.23$, $p < .01$. There were small gender differences, Hotelling's Trace = .03, $F(4,553) = 4.00$, $p < .01$, partial $\eta^2 = .03$. Girls reported more parental solicitousness ($M = 1.86$, $SD = 0.55$) than boys ($M = 1.73$, $SD = 0.61$), $t(562) = 2.70$, $p < .01$. Girls also reported more somatic complaints than boys at both times, $M = 1.90$, $SD = 0.61$ versus $M = 1.76$, $SD = 0.53$, $t(562) = 2.87$, $p < .01$ at T1 and $M = 1.95$, $SD = 0.56$ versus $M = 1.86$, $SD = 0.56$, $t(556) = 2.05$, $p = .04$ at T2. There was no gender effect for parental reinforcement reported by parents.

RELATIONSHIPS BETWEEN THE VARIABLES

As expected, somatic complaints were positively related to symptoms of depression, fear and control over life. Parental solicitousness, however, was unrelated to somatic complaints or any of the other variables. There was a small correlation between parental solicitous responses as perceived by children and their parents (Table 1).

Table 1

Correlations between somatic complaints, parental solicitousness, negative affect and experienced control over life

Variable	2	3	4	5	6	7
1. Somatic complaints (T1)	.03 ^a	-.06 ^b	.39*	.34*	-.39*	.55*
2. Children's perception of parental solicitousness (T1)		.17*	-.07	.12*	.09	.01
3. Parents' perception of parental solicitousness (T1)			.05	-.00	.02	-.05
4. Depressive symptoms (T1)				.22*	-.58*	.35*
5. Fear (T1)					-.26*	.27*
6. Control over life (T1)						.27*
7. Somatic complaints at T2 (6 months later)						

^a Identical correlations for pain (e.g., abdominal pain) and non-pain symptoms (e.g., fatigue); ^b $r = -.06$ for pain and $r = -.04$ for non-pain symptoms

* correlation significant at $\alpha = .05 / 21$

PARENTAL REINFORCEMENT FOR CHILDREN WITH FEW, MODERATE OR MANY SOMATIC COMPLAINTS

The mean scores and standard deviations of the three selected groups on somatic complaints and parental solicitousness by children and their parents are presented

in Table 2. There was no difference between the groups in parental solicitousness, Wilk's $\lambda = .99$, $F(4, 328) = 0.59$, $p = .67$, partial $\eta^2 = .01$.

Table 2

Mean scores and standard deviations on somatic complaints and parental solicitousness of children that score within the percentiles of 0-5, 45-55, and 90-100 on somatic complaints.

Group (based on somatic complaints)	Somatic Complaints <i>M(SD)</i>	Parental Solicitousness reported by child <i>M(SD)</i>	Parental Solicitousness reported by parent <i>M(SD)</i>
0-5 th percentile	1.08 (0.06)	1.80 (0.70)	1.66 (0.44)
45-55 th percentile	1.71 (0.05)	1.91 (0.55)	1.72 (0.55)
90-100 th percentile	3.01 (0.34)	1.84 (0.65)	1.59 (0.49)

Note. No significant differences in parental solicitousness were found for the three groups.

PREDICTION OF SOMATIC COMPLAINTS REPORTED AT T1

Parental solicitous behavior in response to children's somatic complaints was unrelated to the somatic complaints score. More depression, fear and less sense of coherence all predicted more somatic complaints, as would be expected, but failed to make the children more prone to reinforcing effects of parental solicitousness. Higher order interactions, including three and four-way interactions were evaluated, revealing no significant interaction effects. Separate analyses for boys and girls gave similar results. Results are presented in Table 3 (interaction and gender effects not shown).

Table 3

Stepwise linear regression of somatic complaints on parental solicitousness, depression, fear, and sense of coherence

	<i>B</i>	<i>SE</i> <i>B</i>	β	ΔR^2
STEP 1				.01
Children's perception of parental solicitousness	.03	.03	.05	
Parents' perception of parental solicitousness	-.04	.03	-.07	
STEP 2				.25***
Children's perception of parental solicitousness	.03	.02	.05	
Parents' perception of parental solicitousness	-.04	.02	-.08*	
Fear	.13	.02	.23***	
Depressive symptoms	.13	.03	.23***	
Sense of coherence	-.11	.03	-.20***	

* $p < .05$, ** $p < .01$, *** $p < .001$

PREDICTION OF THE DIFFERENCE IN SOMATIC COMPLAINTS REPORTED AT T1 AND T2 (6 MONTHS LATER)

There was a strong, but not completely stable association between somatic complaints at T1 and T2 (Table 1). After correction for mathematical coupling, it is clear that the initial value of somatic complaints were not significantly related to changes in somatic complaints, $z = 0.50$, $p = .62$. There was positive association between fear and depression at T1 and increases in somatic complaints at T2. There was no association between parental solicitousness and change in somatic complaints, nor were there any interactions with the level of somatic complaints at T1. Higher-order interactions were all insignificant. Separate analyses for boys and girls gave similar results. Results are presented in Table 4 (interaction and gender effects not shown).

Table 4

Stepwise linear regression analysis of changes in somatic complaints on the initial level of somatic complaints, parental solicitousness, depression, fear, and sense of coherence

	<i>B</i>	<i>SE B</i>	β	ΔR^2
STEP 1				.24***
Initial level of somatic complaints ^a	-.27	.02	-.49***	
STEP 2				.00
Initial level of somatic complaints	-.27	.02	-.49***	
Children's perception of parental solicitousness	-.00	.02	-.00	
Parents' perception of parental solicitousness	-.01	.02	-.01	
STEP 3				.03***
Initial level of somatic complaints	-.31	.02	-.58***	
Children's perception of parental solicitousness	.00	.02	.00	
Parents' perception of parental solicitousness	-.02	.02	-.03	
Fear	.05	.02	.09*	
Depressive symptoms	.09	.03	.17***	
Sense of coherence	.02	.03	.04	

^a $\Delta t = 6$ months

* $p < .05$, ** $p < .01$, *** $p < .001$

DISCUSSION

In recent years, the possibility that parents reinforce somatic complaints in their children by behaving solicitously has received increasing attention. Previous studies that included adolescents did not confirm this hypothesis. Surprisingly, we also found no evidence for these effects. There was no positive relationship between children's reports of somatic complaints and parental solicitousness reported by parents or children. There also was no difference in parental

solicitousness for children with a low, medium or high score on the frequency of somatic complaints. In contrast, negative affect was related to somatic complaints, but did not moderate the relation between parental solicitousness and children's reports of somatic complaints. Thus, even for children who are vulnerable to developing somatic complaints, positive consequences provided by parents do not encourage children to reporting somatic complaints more often. This was confirmed by results showing that changes in reports of somatic complaints 6 months later were unrelated to initial parental solicitousness. Fear and symptoms of depressiveness were associated with an increase in somatic complaints.

From previous studies, it seems that in older children, there is a negative relationship between somatic complaints and parental reinforcement (Merlijn, et al., 2003; Peterson & Palermo, 2004). As Merlijn, et al. suggest, the family may have grown accustomed to the adolescent's somatic complaints. In addition, parents of adolescents may have a different interpretation of frequent somatic complaints compared to parents of schoolchildren. For example, knowing that truancy and school dropout are more prevalent during this developmental period (Eccles, 1999), parents of adolescents may worry about frequent somatic complaints. More research is needed to shed light on developmental factors that may explain the fact that somatic complaints are unrelated to parental solicitousness in school children, whereas more chronic pain complaints are associated with less parental solicitousness in adolescents.

In summary, parental solicitousness does not appear to cause an increase in children's and adolescents' somatic complaints. Nevertheless, solicitousness and somatic complaints may be related in different ways. Peterson and Palermo (2004) found that parental solicitousness is associated with parents' perceptions of children's somatic complaints. Perhaps parents adjust their responses and become more solicitous when they think that their child requires more care. This idea is supported by the finding that mothers who appraise somatic complaints in their children as more bothersome are more likely to respond solicitously to these complaints (Levy et al., 2004). Combined with the finding that parental solicitousness does not have a reinforcing effect, such an adjustment of parental behaviour may be appropriate, as long as parents make a good evaluation of their children's somatic complaints and discomfort.

There are other processes within the family that might influence children's reports of somatic complaints. Modeling and overprotection are possible examples (Garralda, 1996). Children's cognitions and behaviour with respect to somatic complaints may be influenced by what children observe in their immediate surroundings, rather than by the consequences of reporting somatic complaints. Future studies could focus more on these influences.

Chapter 7

My peers, my friend, and I: Peer interactions and somatic complaints in boys and girls

In this article we present two studies about the relations between peer relationships and somatic complaints in children (conducted on the same sample: M age at time 1 = 10; $n_1 = 711$, $n_2 = 688$; 1.5 years between both assessments). In the first study, we focused on social status as rated by classmates (popular, neglected, controversial, rejected, and average), self-reported social anxiety and somatic complaints. The second study focused on possible positive influences of best friends on somatic complaints. We analyzed how reciprocity of the friendship, self-reported disclosure with the nominated best friend and self-reported emotion communication skill were related to children's somatic complaints. The results indicate an influence of peer interactions on somatic complaints. Social anxiety was associated with more somatic complaints, but peer status was unrelated to somatic complaints. Further, for girls with a reciprocated best friend, emotion communication skill was related to fewer somatic complaints. For boys emotion communication skill was negatively associated with somatic complaints when their friendship was unreciprocated, whereas disclosure with the nominated peer was related to the experience of more complaints in this case. The results indicate different associations of the sharing of emotions among boys and girls with regard to somatic complaints. Self-reports on relationships and health may overlap more than classmates' reports of peer status because of shared method variance.

Jellesma, F.C., Rieffe, C., & Meerum Terwogt, M. (2008). My Peers, My Friend, and I: Peer Interactions and Somatic Complaints in Boys and Girls. *Social Science & Medicine*, 66, 2195-2205.

INTRODUCTION

Many children experience somatic complaints, such as abdominal pain and headaches, especially in middle childhood and adolescence (Perquin, et al., 2000; Petersen, Bergstrom, & Brulin, 2003). These common complaints can be best understood using a biopsychosocial model (Kaptein, Appels, & Orth-Gomer, 2000). In this model, biomedical, psychological and social factors are considered as possible influences on the perception of somatic complaints. Although it may be obvious that biomedical factors do have an influence, the literature shows that psychological or social influences can also have an impact on the experience of complaints. Better insight into psychosocial influences in addition to medical studies can help understanding the frequency of somatic complaints in childhood.

In response to stress or negative affect, humans experience physiological reactions such as an increased heart rate, perspiration, and muscle tension. These reactions are normal and facilitate responding (Kraaimaat & Van den Bergh, 2000). Yet, physiological reactions have the potential to change biological parameters and can contribute to the development of somatic complaints over longer and/or more intense periods of negative affect (Bhatia, & Tandon, 2005; Charmandari, Tsigos, & Chrousos, 2005; Vingerhoets & Perski, 2000). Several studies have demonstrated that even in childhood, negative affect is associated with more somatic complaints (Campo, Bridge, Ehmann, Altman, Lucas, Birmaher et al., 2004; Diepenmaat, van der Wal, de Vet, & Hirasing, 2006; Jellesma, Rieffe, Meerum Terwogt, Kneepkens, & Kindermann, 2006; Muris & Meesters, 2004). In addition, several psychological variables that contribute to increased negative affect are related to the experience of more somatic complaints. For example, maladaptive coping (Compas, Boyer, Stanger, Coletti, Thomsen, Dufton & Cole, 2006; Walker, Smith, Garber, & Claar, 2007) and low perceived emotional intelligence (Mavroveli, Petrides, Rieffe, & Bakker, 2007) are associated with more negative affect and somatic complaints.

Besides psychological variables, social factors also have the potential of increasing negative affect. This is especially true for children in middle childhood and adolescence, when peers become more important and adult supervision of peer interactions decreases (Gifford-Smith & Brownell, 2003). For example, it has been shown that children who are disliked by many children in their classroom have more symptoms of depression (Oldehinkel, Rosmalen, Veenstra, Dijkstra, & Ormel, 2007). Moreover, children who experience problems with classmates report more symptoms of anxiety (Barrett & Heubeck, 2000). Yet to date, the influence of peer acceptance in relationship to somatic complaints has received little attention. Still, especially when it concerns interactions in the classroom, it might be expected that there is a negative association between acceptance and somatic complaints. After all, children spend a substantial part of the week in the classroom. If relationships with classmates are problematic, children can experience negative affect quite frequently or even chronically, increasing the likelihood of somatic complaints. Indeed, self-reported problems with peers in the

classroom seem to be associated with more somatic complaints (Gadin & Hammarstrom, 2003; Murberg & Bru, 2004; Odegaard, Lindbladh & Hovellius, 2003). However, this relationship has not yet been studied with measures of peer acceptance from peers themselves. In addition, boys and girls feel differently about interpersonal behavior. For instance, girls experience relational aggression as more hurtful than physical aggression and girls who show relational aggression are more likely to be rejected by their peers than boys (Crick, 1996). Gender differences should therefore be taken into account. In our first study, we focused on peer status in the classroom in relationship to somatic complaints in girls and boys.

Based on the outcomes of the first study, a second mechanism was identified through which relationships in the classroom could influence the experience of somatic complaints. In the second study we focused on children's friendships. Friendships serve the purpose of emotional security and support (Gifford-Smith & Brownell, 2003). As children get older, friendships are increasingly determined by intimacy and disclosure (the sharing of personal experiences and feelings). In middle childhood and adolescence, best friendships are formed, friendships with a single, favored peer (Sullivan, 1953). As these friendships are more intimate, they could be helpful in decreasing negative affect. Moreover, talking about emotions with a best friend can increase a feeling of support and provide new strategies for coping with negative situations. Close friends can thus influence children's well-being (LaFreniere, 2000). There are gender differences in the perception of friendships. Girls appreciate their friendships more than boys and report more intimacy (Parker & Asher, 1993). Therefore, in the second study, we investigated possible positive effects of a best friend on the experience of somatic complaints in boys and girls in the same sample 1.5 years later.

STUDY 1

INTRODUCTION

In the first study we examined the relationship between peer acceptance in the classroom and the experience of somatic complaints. To date, studies on peer problems and somatic complaints have usually concentrated on self-perceived peer problems (Gadin & Hammarstrom, 2003; Murberg & Bru, 2004; Odegaard et al., 2003). However, self-perceived social status in the group does not necessarily have to coincide with one's actual acceptance by peers. Socially anxious children may be inclined to view relationships as more problematic than their non-anxious peers. Social anxiety has been previously linked to children's somatic complaints. Children with recurrent abdominal pain report more symptoms of social phobia than pain-free peers (Campo et al., 2004). In addition, children with pain complaints have an attention bias towards social threat-related words (Boyer, et al., 2006). Self-reported social anxiety and social status could also interact: socially anxious children with a negative status in the classroom (rejected, neglected or controversial) may be more concerned about their social status.

In this study, we focused on the aforementioned relationships between children's peer contacts and somatic complaints. The objective of this study was to examine the extent to which peer-rated social status and self-rated social anxiety are related to children's somatic complaints. We used classroom peer nominations and took into account children's perceptions of peer interactions through self-report of social anxiety in such interactions.

Children's acceptance by peers is usually categorized into five status types -- popular, rejected, average, neglected and controversial -- based on like-dislike nominations by the other children in the classroom. The reason for this categorization is that the combination of the relative number of like and dislike nominations gives more information than using these nominations as two separate variables. Acceptance and rejection are related, but can not be placed on the opposite ends of a single continuum (Coie, Dodge, & Coppotelli, 1982; Coie & Dodge, 1983). Children liked by many peers and disliked by few are *popular*, children liked and disliked by many peers are *controversial*, children disliked by many peers, but liked by few are *rejected*, children liked and disliked by few peers are *neglected* and children with average numbers of nominations on both dimensions are *average*. Rejected and - to a lesser extent -controversial children are at risk for negative developmental outcomes (Gifford-Smith & Brownell, 2003).

Previous studies have indicated gender differences in the experience of peer relationships. It has been shown that social anxiety is more strongly related to victimization in boys than in girls (Erath, Flanagan, & Bierman, 2007; Saarni, 1999). On the other hand, the stress experienced as a consequence of negative peer relationships seems to be higher for girls. Negative peer relationships imply having less social support, which is particularly appreciated by girls and less by boys (Erath et al., 2007). This idea is further confirmed by the finding that the increased risk of depression associated with a negative peer status is higher for girls than for boys (Prinstein & Aikins, 2004). We therefore analyzed whether there were gender-specific differences in these relationships. Because peer influence might be age-dependent, we controlled for possible age effects.

METHOD

PARTICIPANTS AND PROCEDURE

This study was conducted with 717 children from 11 regular primary schools in November 2004. The schools were all part of a school network in towns around Den Bosch, a city in the Netherlands. Because of missing data, 6 children had to be excluded, leaving 711 children in the sample: 324 girls and 387 boys, 8 years and 6 months to 12 years and 8 months, with a mean age of 10 years and 3 months, $SD = 8$ months. The questionnaires were administered in the classroom during regular school hours. Children who were absent on the day of data collection answered the questions in the following week. Written parental consent was obtained from all participating children (90% participation rate). Parents provided additional socio-

demographic information by returning it in a self-addressed university envelope. Most parents were willing to cooperate (78%). Almost all children (90%) came from a two-parent family, and were of Dutch origin (93%). All ranges of income were represented in our sample, with a median net monthly income of € 2000-2600.

MEASUREMENTS

Classroom social status was determined by positive and negative classmate nominations (Coie et al., 1982). The nomination procedure itself has not in the past created any risk for children who participate (Bell-Dolan & Wessler, 1994). However, we informed the schools and parents about the nominations before they gave consent. Children were informed with age appropriate explanations about the nomination procedure and about confidentiality. The children were asked to write down three names of classmates they liked and three names of classmates they did not like. The standard score model (Coie et al., 1982; Coie & Dodge, 1983) was used. First, four variables were calculated: like (the number of times the child is nominated as liked), dislike (the number of times the child is nominated as disliked), impact (the sum of the like and dislike scores), and preference (the difference between the like and dislike scores). These variables were then standardized and used to categorize the children into five groups. The *popular* group consisted of children with a negative standard dislike, a positive standard like score and a standard preference score > 1.0 . The *rejected* group consisted of children with a negative standard like, a positive standard dislike score, and a standard preference score < -1.0 . The *neglected* group consisted of children with standard impact scores < -1.0 and negative standard like and dislike scores. The *controversial* group consisted of children with a standard impact score > 10 and positive standard like and dislike scores. The *average* group consisted of children not belonging to any of the foregoing groups. The nominations were analyzed with KUNST SOCSTAT (Thissen-Pennings & Brink, 1995).

Somatic complaints were measured using the Somatic Complaint List (Jellesma, Rieffe, Meerum Terwogt, 2007). This questionnaire consists of 11 items on a 5-point scale from *(almost) never* to *quite often*. An example of an item is: "I (almost) never/seldom/sometimes/often/quite often have a headache". The internal consistency of the scale was good, $\alpha = .83$ (.85 for girls and .87 for boys, $.82 \leq \alpha \leq .84$ if analyzed by group). Parental reports would have been an alternative measure. However, previous research has shown that parents underestimate somatic complaints in their children (Chambers, Reid, Kenneth, McGrath, & Finley, 1998; Waters, Stewart-Brown, & Fitzpatrick, 2003). The range of somatic complaints ratings was 1 to 5 with a mean score of 1.91 ($SD = 0.63$).

Social Anxiety was measured with the Social Anxiety Scale for Children (La Greca & Stone, 1993; Mesman & Koot, 1998). This questionnaire consists of 22 items rated on a 5-point scale from *not at all* to *always*. An example of an item is: "I worry that other kids don't like me". The questionnaire's internal consistency was good, $\alpha = .89$ (.89 for girls and .87 for boys, $.83 \leq \alpha \leq .90$ if analyzed by

group). The range of the Social Anxiety Scale for Children was 0-4. Children had a mean score of 1.16 ($SD = 0.67$).

RESULTS

ASSOCIATIONS AMONG THE VARIABLES

Table 1 presents the mean scores on somatic complaints and social anxiety for each of the classroom status groups and Table 2 for boys and girls. Gender and classroom status effects (popular, rejected, neglected, controversial, average) were determined for the dependent variables (somatic complaints and social anxiety), using analysis of covariance. An analysis of covariance using classroom status as predictor, gender and age as covariates, and somatic complaints as the dependent variable did not reveal a significant effect for classroom status, $F(4, 705) = 1.19, p = .31$. There was a significant gender effect with girls reporting more somatic complaints than boys, $F(1, 705) = 8.84, p < .01$. An analysis of covariance using classroom status as predictor, gender as covariate, and social anxiety as dependent variable revealed a significant classroom status effect for social anxiety, $F(4, 705) = 4.79, p < .01$. The Tukey-Kramer *post hoc* procedure was used to follow up on this significant effect ($\alpha = .05$). Compared to the neglected and rejected children, controversial ones reported less social anxiety. The analysis of covariance also revealed a main effect for gender, with girls reporting more social anxiety than boys, $F(1, 705) = 49.82, p < .01$. We also compared the proportion of boys and girls in each of the classroom status categories and found a significant difference, $\chi^2 (df = 4) = 10.34, p = .04$. Rejected children more often were boys (69.7%) than girls (30.3%), $\chi^2 (df = 1) = 9.52, p < .01$. There were no significant gender differences on the other categories. Finally, we analyzed the association between social anxiety and somatic complaints and found a moderate correlation, $r = .38, p < .01$.

Table 1
Means (SD) of Somatic Complaints and Social Anxiety by Classroom Status and Gender

Variable	Classroom Status				
	Average	Popular	Neglected	Controversial	Rejected
Somatic Complaints	1.92 (0.62)	1.90 (0.62)	2.01 (0.68)	1.89 (0.64)	1.74 (0.59)
Social Anxiety	1.14 _{ab} (0.66)	1.07 _{ab} (0.52)	1.31 _a (0.74)	0.91 _b (0.64)	1.29 _a (0.74)

Note. Subgroups that do not share subscripts are significantly different

Table 2
Means (SD) of Somatic Complaints and Social Anxiety by Gender

Variable	Gender	
	Girls	Boys
Somatic Complaints	1.99 (0.66)	1.84 (0.59)
Social Anxiety	1.34 (0.68)	1.01 (0.63)

RELATIONSHIP BETWEEN THE SOCIAL ANXIETY AND CLASSROOM STATUS INTERACTION, AND SOMATIC COMPLAINTS

In order to assess the influence of the interaction effects of social anxiety and classroom status and gender, classroom status was dummy coded using the average group as the reference category for the other groups, and gender was dummy coded using girls as the reference category. In addition, social anxiety was standardized and product terms created in order to avoid multicollinearity problems (Frazier, Tix, Baron, 2004). A stepwise regression was subsequently conducted. As recommended, the main effects were included in the first step, all possible two-way interactions were entered in the second step, and all three way interaction effects were included in third and last step.

The outcomes of this analysis are presented in Table 3. Only social anxiety and rejection contributed to the prediction of somatic complaints, but in opposite directions. Social anxiety was related to more somatic complaints, whereas rejection showed an association with fewer somatic complaints. None of the gender effects or interactions were significant. The long-term relationship between social anxiety and somatic complaints could also be determined, combining the data from the first study with those of the second (see Study 2). Social anxiety had a significant, positive association with somatic complaints 1.5 years later ($r = .27, p < .01$). This relationship remained significant after controlling for somatic complaints at the first measurement ($r = .13, p < .01$).

Table 3
Summary of Stepwise Regression Analysis for Peer Relationships Predicting Somatic Complaints

Step	Variable	<i>B</i>	<i>SE B</i>	β	ΔR^2
1					.16**
	Gender	-.02	.05	-.01	
	Popular	.01	.07	.01	
	Neglected	.04	.07	.02	
	Controversial	.06	.10	.02	
	Rejected	-.19	.07	-.10**	
	Social Anxiety	.24	.02	.38**	
2					.00
	Gender	-.02	.05	-.01	
	Popular	.01	.07	.00	
	Neglected	.02	.07	.01	
	Controversial	.09	.11	.03	
	Rejected	-.20	.07	-.10**	
	Social Anxiety	.22	.03	.35**	
	Social Anxiety x Popular	-.02	.09	-.01	
	Social Anxiety x Neglected	.09	.06	.06	
	Social Anxiety x Controversial	.10	.11	.04	
	Social Anxiety x Rejected	.05	.06	.03	

Note. Because standardized variables and product terms of these variables were used, *B*'s are used for interpretation

** $p < .01$

DISCUSSION

The outcomes of this study show that self-reported social anxiety is associated with more somatic complaints in children. Yet, popularity in the classroom does not seem to be related to fewer somatic complaints; neither is a rejected, a controversial or neglected status related to more somatic complaints. Surprisingly, rejected children even tend to report fewer somatic complaints. Rejected aggressive children are known to have externalizing problems (Newcomb, Bukowski, & Pattee, 1993). Somatic complaints, on the other hand, are strongly associated with internalizing problems (Campo et al., 2004). Neglected children may be expected to have somatic complaints but they are known to not suffer from low self-esteem or loneliness. Having one close friend might be more important than being liked by many classmates (Deater-Deckard, 2001). While being in a group of peers is likely to influence children's feeling of belonging and provide children with opportunities for joint-activity engagement, sharing intimate experiences depends more strongly on the presence of a best friend. For instance, regardless of how well-accepted children are by their peers, children without a best friend feel lonelier than children with a best friend (Parker & Asher, 1993). Therefore, a

reasonable next step was to conduct a second study in which we focused on qualities of children's friendships and their effect on self-reported somatic complaints.

STUDY 2

INTRODUCTION

As previously described, anxiety about perceived problems in the relationship with peers can become stressful and associated with somatic complaints. Obviously, peer relationships might also positively affect children's lives. Friends in particular may help children cope with emotional experiences, in that friends talk about problems with each other and thereby learn how to display and regulate emotions (Newcomb & Bagwell, 1995). In stressful situations such as hospitalization, natural disaster, and divorce, support from friends can contribute to children's emotion regulation (Nicholas, Darch, McNeill, Brister, O'Leary, Berlin, & Koller, 2007; Prinstein, LaGreca, Vernberg, & Silverman, 1996; Wasserstein & LaGreca, 1996). Studies in adults also have strongly supported the idea that disclosure decreases stress and has beneficial effects on health (Frattaroli, 2006). In these close interactions, adults and children provide each other with emotional security and a context for expressing emotions. In this second study, we focused on the potential positive role of a best friend on children's somatic complaints.

Research showed that the self-reported quality of friendships is negatively associated with somatic complaints (Rhee, Holditch-Davis, & Miles, 2005). However, because friendship is a relationship with mutual feelings, it will be important to include a measure of mutuality. It has been shown that only the support of a mutual best friend can be a buffer for the negative effects of peer victimization (Hodges, Boivin, Vitaro, & Bukowski, 1999). Furthermore, within mutual friendships, disclosure of emotions may be important for reducing stress. Children who feel secure about disclosing troubling emotions to a friend when they need to would be expected to have fewer somatic complaints. We therefore took into account children's self-reports of emotion communication skills.

In brief, we studied whether having a mutual best friend with whom one could share personal experiences and reports of actually talking about one's emotions are associated with fewer somatic complaints. Possible differences between boys and girls in these relationships and interactions were considered. In western countries, emotion communication seems to be stimulated more in girls than in boys during the preschool years (Adams, Kuebli, Boyle, & Fivush, 1995) and gender specific cultural display-rules of emotion expression continue to exist into adolescence (O'Kearney & Dadds, 2004). These gender differences in acceptance of disclosure might affect the relationship between emotion communication skill, disclosure and somatic complaints in boys and girls.

METHOD

PARTICIPANTS AND PROCEDURE

The data for this second study were collected from the same children that participated in Study 1, 5 years later. Of the original 717 children, the 688 participants in the second wave were still attending the same school (308 girls and 380 boys).

MATERIAL

Somatic complaints were again assessed using the Somatic Complaint List (see Study 1).

The children's self-reported **Emotion Communication Skill** assessed their ability to talk about and explain emotions. We used six items from the Emotion Awareness Questionnaire (Rieffe, Meerum Terwogt, Petrides, Cowan, Miers, & Tolland, 2007). An example item is "I can easily explain to a friend how I feel inside" and was rated on a 0 to 2 scale. The internal consistency was $\alpha = .72$ (.75 for girls and .70 for boys, $.63 \leq \alpha \leq .74$ if analyzed by group). Children had a mean score of 1.07 ($SD = 0.45$).

Mutuality of Best Friendship was assessed by asking children to write down the name (only one name allowed) of their best friend in the classroom. This nomination could be reciprocated by the friend or not reciprocated if the friend nominated someone else.

Disclosure of personal feelings and experiences was assessed using the Intimate Exchange items of Parker and Asher's Friendship Quality Questionnaire (Parker & Asher, 1993). The 6 items were rated on a 5-point scale from *not at all true* to *really true*. Examples are: "We always tell each other our problems" and "We talk about the things that make us sad". Children filled out these items about the child they nominated as their best friend. The internal consistency of this scale was good, $\alpha = .86$ (.85 for girls and .82 for boys, $.83 \leq \alpha \leq .86$ if analyzed by group). The range of the Disclosure scale was 0 to 2. Children had a mean score of 2.34 ($SD = 0.97$).

RESULTS

MUTUAL BEST FRIENDS

Four children, two boys and two girls, nominated themselves as being their best friend and an additional 34 children did not nominate a best friend at all. Of these children, there were significantly more boys ($n = 23$) than girls ($n = 11$). Of the other children, 80 nominated a friend that did not participate in the study. Since the reciprocity of their own nomination could not be determined, they were deleted from the main analyses. There were 278 children with a reciprocal nomination and 292 children with a one-sided, non-reciprocal, nomination. Whereas 148 out of the 263 girls (56%) had a mutual best friend, only 130 of the 307 boys (42 %) had a mutual best friend, $\chi^2(10) = 11.00, p < .01$.

ASSOCIATIONS BETWEEN THE VARIABLES

Analysis of variance was used to determine the effect of friendship reciprocity (children who failed to nominate a best friend, children with a mutual best friend and children with an unreciprocated best friend) on the two dependent variables (somatic complaints and emotion communication skill). The groups did not differ on somatic complaints, $F(2, 605) = 0.86$, *ns*, but there was a small friendship reciprocity effect on emotion communication skill, $F(2, 605) = 3.07$, $p = .05$, partial $\eta^2 = .01$. Children who failed to nominate a best friend reported more problems with emotion communication skill compared to children with a mutual best friend (Table 3). The children with an unreciprocated best friend did not significantly differ from the other two groups on emotion communication skill, but an independent t-test revealed that children with an unreciprocated nomination did report less disclosure in the interaction with their nominated friend, $t(568) = 5.03$, $p < .01$.

Subsequent independent sample t-tests revealed that girls had higher scores on disclosure, $t(568) = 10.66$, $p < .01$, and somatic complaints, $t(568) = 3.45$, $p < .01$. Although there also seemed to be a trend for girls scoring higher on emotion communication skill, boys and girls did not significantly differ on this variable, $t(568) = 1.79$, $p = .07$ (see Table 3).

Pearson correlations revealed that emotion communication skill and disclosure were correlated, $r = .34$, $p < .01$, and that emotion communication skill had a negative association with somatic complaints, $r = -.16$, $p < .01$. Disclosure and somatic complaints however, were unrelated, $r = .05$, $p = .22$.

Table 4

Mean (SD) Somatic Complaints, Disclosure and Emotion Communication Skill for Students related to Mutuality of Nominated Best Friend and Gender.

	Best Friend (BF)			Gender	
	Mutual BF <i>M (SD)</i>	Unreci- procated BF <i>M (SD)</i>	No BF Nominated <i>M (SD)</i>	Girls <i>M (SD)</i>	Boys <i>M (SD)</i>
Somatic Complaints	1.96 _a (0.55)	1.90 _a (0.58)	1.99 _a (0.53)	2.02 _a (0.59)	1.85 _b (0.53)
Disclosure	2.60 _a (0.89)	2.20 _b (1.00)	-	2.82 _a (0.83)	2.03 _b (0.93)
Emotion Comm. Skill	1.11 _a (0.44)	1.06 _{ab} (0.48)	0.31 _b (0.38)	1.12 _a (0.47)	1.05 _a (0.45)

Note. Subgroups that do not share subscripts are significantly different

AGE EFFECTS

Correlations revealed that age was unrelated to somatic complaints, emotion communication skill and disclosure. There was also no age difference in the children with an unreciprocated or reciprocal best friend.

INTERACTIONS

A stepwise regression analysis was conducted in order to analyze interaction effects on somatic complaints. Gender was dummy coded, using girls as the reference category and best friend was dummy coded, using unreciprocated best friend as the reference category. The independent interval variables were standardized and product terms were subsequently computed. Each order of interaction effects was entered in a new step. All first and higher order effects were interpreted in the step they were entered.

The results of this analysis are presented in Table 5. The four-way interaction was not significant and so is not presented in the table. Most informative was the third step of the analysis, which indicated that the interaction effects of best friend and emotion communication skill and best friend and disclosure were gender dependent.

Estimations of the simple slopes of the groups were computed following the procedure described by Cohen, Cohen, West, and Aiken (2003). Four new variables were created for emotion communication skill and disclosure, each reflecting the standardized scores on emotion communication skill/disclosure of one group, and coded 0 for of the other groups. These variables were entered simultaneously, keeping the group main effects in the regression model, but leaving out the main effects of emotion communication skill and disclosure. The *B* coefficients in this analysis reflect the slopes on somatic complaints for each of the groups, along with the appropriate tests of significance. This made it possible to determine whether emotion communication skill and disclosure were significant predictors of somatic complaints in the specific groups (boys and girls with a reciprocal or unreciprocated best friend).

The results are depicted in *Figure 1, 2 and 3* to facilitate interpretation of the interactions. Please note that the graphs reflecting somatic complaints regressed on emotion communication skill depict estimated values of somatic complaints under the assumption that children score average on disclosure. Similarly, the graph reflecting somatic complaints regressed on disclosure shows estimated values of somatic complaints under the assumption that children score average on emotion communication skill. As emotion communication skill and disclosure were positively associated, this assumption cannot be maintained. The graphs are thus only to be used for understanding the found interactions, not for inferring absolute values.

There was a negative association between emotion communication skill and somatic complaints for girls with a reciprocal best friend, $B = -0.18$, $SE = .05$, $t(559) = 3.74$, $p < .01$, but not for girls without a reciprocal best friend (*Figure 1*). Emotion communication skill was negatively associated with somatic complaints in boys, but only for boys with an unreciprocated best friend, $B = -0.16$, $SE = .05$, $t(559) = 3.54$, $p < .01$ (*Figure 2*). For boys with an unreciprocated best friend, there was also a positive association between disclosure and somatic complaints, $B = 0.11$, $SE = .05$, $t(559) = 2.39$, $p = .02$ (*Figure 3*). No other significant effects were found.

Table 5
*Summary of Stepwise Regression Analysis for Best Friendship Characteristics
 Predicting Somatic Complaints*

Step		<i>B</i>	<i>SE B</i>	β	ΔR^2
1					.05**
	Emotion Communication (Com) Skill	-.11	.02	-.19**	
	Disclosure	.03	.03	.06	
	Gender	-.15	.05	-.13**	
	Best Friend	.03	.05	.03	
2					.01**
	Emotion Com Skill	-.06	.05	-.11	
	Disclosure	.01	.05	.01	
	Gender	-.09	.07	-.08	
	Best Friend	.09	.07	.08	
	Best Friend * Emotion Com Skill	-.02	.05	-.03	
	Disclosure * Emotion Com Skill	-.05	.03	-.08	
	Best Friend * Disclosure	-.02	.06	-.02	
	Gender * Emotion Com Skill	-.06	.05	-.08	
	Gender * Disclosure	.06	.06	.08	
	Gender* Best Friend	-.13	.10	-.10	
3					.02*
	Emotion Com Skill	.03	.05	.05	
	Disclosure	-.09	.06	-.17	
	Gender	-.11	.08	-.10	
	Best Friend	.02	.08	.02	
	Best Friend * Emotion Com Skill	-.18	.08	-.22*	
	Disclosure * Emotion Com Skill	-.07	.05	-.12	
	Best Friend * Disclosure	.16	.09	.19	
	Gender * Emotion Com Skill	-.20	.07	-.26**	
	Gender * Disclosure	.22	.08	.28**	
	Gender* Best Friend	-.09	.10	-.07	
	Gender * Best Friend * Disclosure	-.31	.11	-.23**	
	Gender * Best Friend * Emotion Com Skill	.30	.11	.24**	
	Best Friend * Disclosure * Emotion Com Skill	.03	.06	.03	
	Gender * Disclosure * Emotion Com Skill	.02	.06	.03	

Note. Because standardized variables and product terms of these variables were used, *B*'s are used for interpretation * $p < .05$, ** $p < .01$

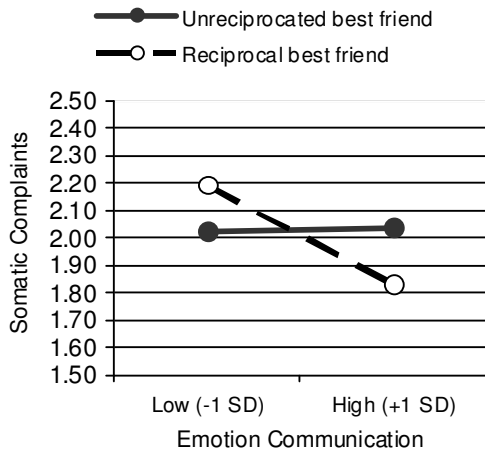


Figure 1. *Interaction between best friendship reciprocity and emotion communication skill predicting somatic complaints in girls at the mean level of disclosure.*

Figure 2. *Interaction between best friendship reciprocity and emotion communication skill predicting somatic complaints in boys at the mean level of disclosure.*

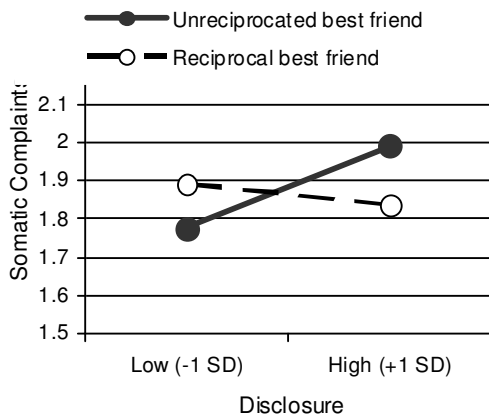
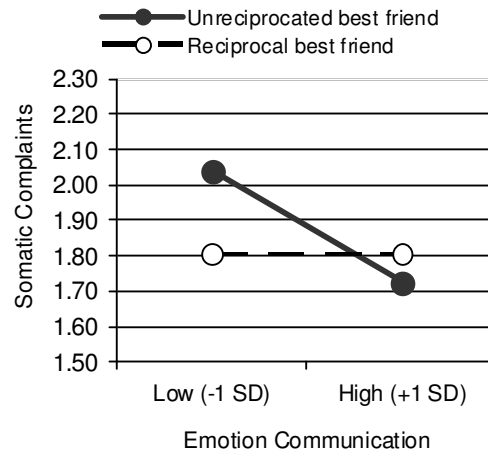


Figure 3. *Interaction between best friendship reciprocity and disclosure predicting somatic complaints in boys at the mean level of emotion communication skill.*

DISCUSSION

The outcomes of this study showed that being able to communicate about emotions is associated with fewer somatic complaints in girls with a reciprocal best friend. Expressing negative feelings to a friend may mean that the feelings do not get translated into somatic complaints. Longitudinal research is necessary to confirm the causal relationship that is assumed here. For example, there might be a third variable explaining the higher frequency of somatic complaints in some children as well as their poorer skills in emotion communication. Moreover, shared method variance could have positively biased associations we found between different measures of children's self-reports. Therefore, future studies could include a multiple-method design. There was no interaction between disclosure and these findings, nor did we find any effects for girls without a reciprocated best friend. The outcomes for boys differed from those for girls. Emotion communication skill and disclosure were unrelated to self-reported somatic complaints in boys with a reciprocated best friend. However, emotion communication skill was associated with fewer somatic complaints in boys with an unreciprocated best friend, while the opposite appeared for disclosure.

As Windle (1992) argued, even though boys may feel they have friends who provide support, this does not imply that these interactions indeed facilitate more intimate exchanges. It appears that the satisfaction in a friendship depends less on satisfaction with interpersonal closeness in boys than in girls (Zarbatany, Conley, & Pepper, 2004). Boys with more somatic complaints or other internalizing problems especially might feel the need to discuss their feelings with someone. As the negative relationship between emotion communication skill and somatic complaints indicates, this is probably helpful for boys who experience their emotion communication skills to be sufficient. For instance, they may satisfactorily discuss their feelings with a parent or sibling. However, actual emotion disclosure with peers is less accepted among boys (Durkin, 1995; Von Salisch, 2001). Even though a mutual best friend will probably not reject disclosure, the reaction might be less sensitive or helpful than within girls' friendships, and may have a reverse effect for boys. We need more in-depth studies on self-disclosure in friendships to gain insight in these kinds of processes.

OVERALL DISCUSSION

This research indicated several social mechanisms that might be responsible for heightening and reducing somatic complaints in children. Two relationships were examined, namely peer acceptance and mutual friendship, along with social anxiety and disclosure of emotions to peers. Children who reported more social anxiety experienced more somatic complaints, whereas actual rejected social status in the classroom failed to predict somatic complaints. Social anxiety contributed even to the prediction of somatic complaints 1.5 year later (controlling for the baseline score of somatic complaints). More research is needed to confirm this assumed direction of causality, yet past research is supportive. People with social phobia

were found to react with more somatic complaints to a social stressor (Grossman, Wilhelm, Kawachi, & Sparrow, 2001).

Mutual friendships may be a positive context in which to diffuse social anxiety and other negative emotions. Friendship effects appear to be gender specific. Girls with a mutual best friend who were able to communicate their emotions were somewhat less likely to experience somatic complaints. For boys, on the other hand, emotion communication skills were associated with fewer somatic complaints in the case of a *non*-reciprocated best friend and disclosure with the nominated friend was related to more somatic complaints. Boys' friends may be useful for other types of social support (Durkin, 1995; O'Kearney & Dadds, 2004; Von Salisch, 2001). Nevertheless, the association between better emotion communication skills and fewer somatic complaints for boys with a non-reciprocated best friend indicates that emotion communication may have a positive impact within other relationships.

A limitation of this study was that we did not study the underlying causal mechanisms through which social relationships influence somatic complaints. As discussed in the introduction, the experience of peer problems might increase stress levels (Barrett & Heubeck, 2000; Oldehinkel et al., 2007), whereas friends can help by giving support and providing a context in which to learn other ways of coping (LaFreniere, 2000). These and other possible processes need to be addressed in future studies.

In conclusion, our studies indicate that besides the more frequently studied medical and psychological factors, social factors are also related to children's experience of somatic complaints. Social anxiety in particular, and to a lesser extent children's emotion communication are variables of influence. The results of this study underline the importance of acknowledging potential social influences on somatic complaints in childhood.

Chapter 8

Integration of the results and general discussion

INTRODUCTION

In this thesis emotional and social factors were studied with respect to the development of somatic complaints in children. The results found will now be further integrated by simultaneously examining the effects of all variables involved that were found to be important with respect to children's somatic complaints. The resulting tentative model will then be used for a further discussion of the psychological influences on children's somatic complaints. Furthermore, the strengths and limitations of the studies presented in this thesis will be considered, and clinical implications and directions for further research will be further discussed.

INTEGRATION OF THE RESULTS

In this thesis, our aim was to enlarge the knowledge about psychological influences on children's experience of somatic complaints. At the beginning of this undertaking, the literature on somatic complaints in childhood indicated that somatic complaints are related to negative affect, mainly studied with a measure of depression (Campo, et al., 2004; Diepenmaat, van der Wal, de Vet, & Hirasings, 2006; Mikkelsen, Sourander, Piha, Salminen, 1997; Muris & Meesters, 2004). This relationship was explained by physiological reactions belonging to emotional states –although normally adaptive- giving rise to somatic complaints if their frequency or duration causes a depletion of bodily resources (Cohen & Herbert, 1996; Hyams, & Hyman, 1998; Kiecolt-Glaser et al., 2002; Jones et al., 2006; Mayer, 1996; Mayne, 1999; Nash & Theborge, 2006; Segerstrom & Miller, 2004; Tsygos & Chrousos, 2002). Indeed, it was repeatedly confirmed in this thesis that symptoms of depression are positively related to the frequency of somatic complaints in children (chapter 3; chapter 5). In addition, symptoms of depression predict subsequent somatic complaints, whereas somatic complaints do not cause depression to arise (chapter 5; Noll & Kupst, 2007; Noll, Reiter-Purtill, Vannatta, Gerhardt, & Short, 2007; Rosenkranz et al., 2005; Wood et al., 2007). Depression thus seems to contribute to the development of somatic complaints in childhood.

We also found that general negative emotional states are related to children's somatic complaints and not just symptoms of depression (chapter 2; chapter 3). This mainly concerned the internalizing emotions and moods: sadness and fear/anxiety. In chapter two, we found that children with many somatic complaints also reported more angry moods than their peers. The relationship between anger and somatic complaints, however, is explained by angry moods being related to internalizing negative affect ($r_{(\text{anger, somatic complaints} \mid \text{internalizing negative affect})} = .07, p = .08$). Sadness and fear on the other hand, have an independent relationship with somatic complaints. In chapter three, where we used descriptions of concrete negative situations, children with many somatic complaints indeed had comparable scores on anger, whereas they reported higher frequencies and intensities on the emotions of fear and sadness than children with few somatic complaints. In the line of these

findings, it is also understandable that a negative peer status in the classroom, which is particularly linked to externalizing problems (Newcomb, Bukowski, & Pattee, 1993), is not associated with more frequent somatic complaints (chapter 7).

As explained before in this thesis, internalizing emotional states have in common that they reflect the experience of little control (chapter 3; Kalat & Shiota, 2007). Children's feelings of control were a major theme in this thesis. Based on Antonovsky's sense of coherence theory (1979), we expected beforehand that children who perceive low situational control would be at risk for developing somatic complaints because they are more likely to suffer from frequent, long term experiences of negative affect. In addition, we speculated about a similar effect of low emotional control (chapter 1). The influences of these situational and emotional feelings of control were confirmed in chapter four. Referring back to the model of emotion processing described in the introduction (chapter 1), children's appraisal is thus characterized by low control.

When considering the later step of children's emotion regulation, control was again of relevance. Previous findings and our own study results indicate that children who develop somatic complaints can think of adaptive emotion regulation strategies equally well compared to their peers, yet nevertheless feel an inability in regulating their emotions, as is reflected in the presence of non-productive thoughts (chapter 5; Meerum Terwogt et al., 2006; Rieffe et al., 2008). In other words: children who experience frequent somatic complaints come up with similar solutions to negative situations and/or the belonging emotions, but the finding that they frequently worry and ruminate reflects that they experience little control over negative situations and/or their own emotions.

The above described findings refer to differences between children's *subjective* experiences that help explaining the presence of somatic complaints. Based on the alexithymia hypothesis (Sifneos, 1972; 1973), we also expected that a lack of emotional *skills*, more precisely an inability to label emotions and/or communicate them, was assumed to contribute to the development of somatic complaints in childhood. What we found in contrast, was that children with many somatic complaints more frequently referred to multiple negative emotions (with adequate explanations) than children with few somatic complaints. This was an unexpected finding considering the self-reports on alexithymia scales of children and adults with frequent somatic complaints (chapter 2; chapter 3; Burba et al., 2006; De Gucht & Heiser, 2003). The finding was, however, in line with a recent study in adults, showing that people who score high on self-reported alexithymia, use more diverse negative emotion words than people low on self-reported alexithymia when describing a distressing event (Tull, Medaglia, & Roemer, 2005). Children's self-reports further indicated that the high scores on alexithymia are mainly caused by the experience of undefined emotional states. Whereas a lack of emotion identifications skills is unrelated to somatic complaints, subjective insecurity about internal states thus is associated with the experience of more complaints. This finding supports the previously described positive relationship between feelings of low emotional control and the experience of somatic complaints.

Emotion communication was addressed with respect to alexithymia, but also with respect to children's peer relationships and social functioning. After all, emotion communication cannot only be thought of as a reflection of emotion labeling skills, talking about emotions is also part of children's interactions, especially within a best friendship (Sullivan, 1953). With respect to children's social functioning, again, children's subjective experiences were of importance, rather than their social skills. Poor social skills would be reflected in a negative status in the classroom, or the lack of a reciprocal best friend (Coie & Dodge, 1983; Gifford-Smith & Brownell, 2003), but neither of these peer relations were related to the experience of more somatic complaints. Yet, self-reported emotion communication problems and social anxiety were associated with more somatic complaints (chapter 7). This finding was in line with previous studies showing a positive relationship between self-perceived social problems and children's experience of somatic complaints (Gadin & Hammarstrom, 2003; Murberg & Bru, 2004; Odegaard et al., 2003).

To summarize, children who are easily overwhelmed by negative situations in life and take a negative view on things, seem to be most likely to develop somatic complaints. One final issue we have not yet addressed is the idea that parents would reinforce somatic complaints in children if they respond solicitously to somatic complaints. Neither previous findings, nor our own confirm this idea (chapter 6; Levy et al., 2004; Merlijn et al., 2003; Peterson & Palermo, 2004; Walker, Claar, & Garber, 2002). Often, insignificant findings are not published (Rosenthal, 1979, Sterling, 1959). It has now nevertheless repeatedly been shown that parental solicitousness with respect to complaints is unrelated to the frequency of children's somatic complaints. We feel that it is important that this "non-result" is made public, as unawareness of the lack of a relationship between parental solicitousness and somatic complaints can cause maintenance of wrong advice. In the media, parents are often told that positive attention when their child experiences common somatic complaints, will cause these complaints to remain present for longer periods of time or to return (e.g., http://patients.uptodate.com/topic.asp?file=c_health/2445, retrieved March 19, 2008). Given the emotional problems found to be associated with somatic complaints, this advice does not seem adequate.

In the introduction (chapter 1), we argued that literature on somatic complaints is segmented and can be integrated, as the different theoretical frameworks did not exclude each other. Now that we have gained knowledge about several psychological variables that of relevance with respect to children's somatic complaints, we will study the effects of these variables on somatic complaints simultaneously. The studies described in chapter four to seven were based on a single, longitudinal data set. We will now use this dataset in order to integrate the emotional variables that we have analyzed throughout this thesis with respect to children's somatic complaints.

PSYCHOLOGICAL CONSTRUCTS

To get closer to the constructs of relevance with the measures available, we use several closely related measured variables or take into account the scales reliability where we have a single measure to come to the underlying constructs – also called ‘latent factors’. The fit of the measurement models of the constructs with multiple indicators is evaluated based on two fit indices at the first time of data collection (Time 1). The Chi square gives information about how well the model fits the data found in the population. Smaller values are indicative of a good fit. With a large population ($N > 200$), significance can be found even at trivial differences between the model predictions and observations, thus the Chi square is used as a descriptive of model fit rather than interpreted as a statistical test (Stevens, 2002). In addition, the General Fit Index (GFI) is another indicator of model fit, representing the total amount of variance and covariance accounted for by the model. Models that provide a better approximation of the data thus have a higher GFI, ideally the GFI is above .90 (Stevens). For latent factors with a single indicator, the error variance was set to $(1 - \text{reliability}) * \text{variance of the scale}$.

The measurement models of the latent factors are presented in Table 1. The models for somatic complaints, depression, non-productive thoughts, and parental solicitousness are straightforward. The measures of these constructs are the same as used before. As it was revealed that negative emotional states are related to children’s somatic complaints, symptoms of depression, a general measure of fear, and negative moods of sadness and anxiety are combined to come to the underlying construct of negative affect.

For control, we have also combined the measures available. The emotion differentiation scales seemed to reflect insecurity about internal states and together with emotional self-efficacy reflects emotional control. Situational control is added by the three aspects of sense of coherence, being: meaningfulness, manageability, and comprehensibility. These three aspects are not separate constructs, but can be used as separate indicators when considering an underlying latent variable (see for example Torsheim et al., 2001). Finally, for self-perceived social problems, we use the emotion communication scale, representing perceived difficulty with talking about emotions to other people. In addition, the social anxiety scale used in chapter seven, consists of three: fear of negative evaluation by peers, social anxiety in new situations, and generalized social anxiety subscales we now use as separate indicators to come closer to the underlying factor of self-perceived social problems.

Table 1
Measurement Models for the Latent Constructs: Standardized Solution Presented

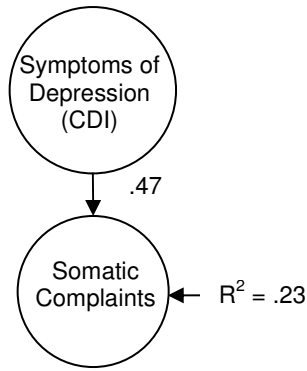
Latent Factor	Measured Variable	Factor Loading	Error	R ²
Somatic Complaint				
	Somatic Complaint List	.91	.41	.83
Depression				
	Children's Depression Inventory	.89	.45	.80
Negative Affect ($\chi^2(2) = 14.27, p < .01, GFI = .99$)				
	Depression (CDI)	.32	.95	.10
	Sadness (Mood List)	.64	.77	.41
	Anxiety (Mood List)	.56	.83	.31
	Fear (Fear Survey Schedule Children)	.82	.57	.67
Feelings of Control ($\chi^2(5) = 27.28, p < .01, GFI = .99$)				
	Emotion Differentiation Scale (EAQ)	.48	.88	.23
	Emotional Self-Efficacy (TEIQ)	.63	.78	.39
	Meaningfulness (SOC-13)	.50	.87	.25
	Manageability (SOC-13)	.78	.62	.62
	Comprehensibility (SOC-13)	.74	.67	.55
Non-Productive Thoughts				
	Non-Productive Thoughts Questionnaire	.92	.40	.84
Self-Perceived Social Problems ($\chi^2(2) = 7.18, p = .03, GFI = 1.00$)				
	Emotion Communication Scale (EAQ)	-.27	.96	.07
	Fear of Negative Peer Evaluation (SAS)	.67	.75	.44
	Social Anxiety in New Situations (SAS)	.69	.72	.48
	Generalized Social Anxiety (SAS)	.80	.60	.64
Parental Solicitousness				
	Illness Behavior Encouragement Scale	.86	.52	.73

CDI = Children's Depression Inventory, TEIQ = Trait Emotional Intelligence Questionnaire, SOC-13 = Sense of Coherence Questionnaire for Children, EAQ = Emotion Awareness Questionnaire, SAS = Social Anxiety Scale

A TENTATIVE MODEL OF PSYCHOLOGICAL INFLUENCES ON CHILDREN'S SOMATIC COMPLAINTS

In this section, we will slowly build our tentative model, in which we shall try to integrate the results found in the different chapters. First of all, at the start of my PhD-project, it was clear that symptoms of depression and somatic complaints in children are related. In chapter two and chapter five, this finding was confirmed. As shown in Figure 1, symptoms of depression account for about 23% of the variance in children's somatic complaints.

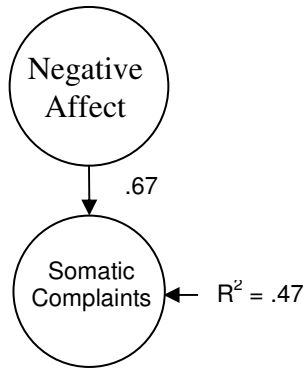
Figure 1.
The relationship between symptoms of depression and children's somatic complaints.



In order to verify whether our broader construct of negative affect (including symptoms of depression, fear, and negative moods of sadness and anxiety) indeed shows a stronger relationship with children's somatic complaints, symptoms of depression are replaced by the latent variable negative affect (see Figure 2). The relationship with children's somatic complaints is indeed larger.

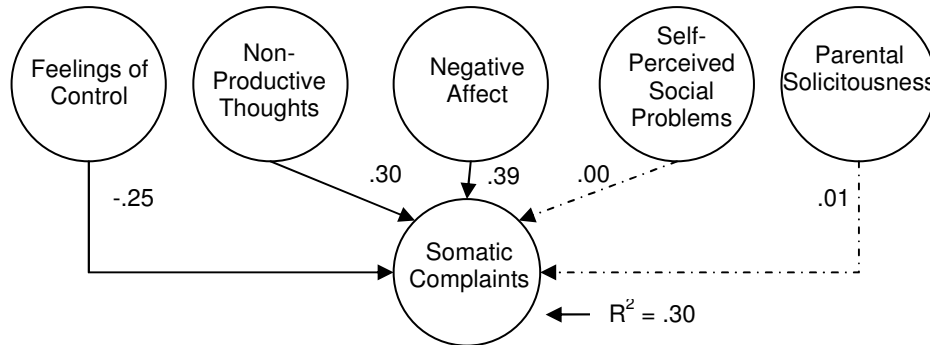
Figure 2.
The relationship between negative affect and children's somatic complaints

$\chi^2 (5) = 62.39, p < .01; GFI = .97$



Subsequently, children's feelings of control, maladaptive emotion regulation, self-perceived social problems and parental reinforcement are added to explain somatic complaints. Based on the previously discussed findings, we expect that parental solicitousness would not be related to somatic complaints. As shown in Figure 3, feelings of control and non-productive thoughts are relevant with respect to somatic complaints, but –as expected– parental solicitousness is not and self-perceived social problems are also not independently related to somatic complaints once the other variables are taken into account. Parental solicitousness and self-perceived social problems are therefore deleted from subsequent models.

Figure 3.
The independent relationships between feelings of control, non-productive thoughts, self-perceived social problems, negative affect and children's somatic complaints

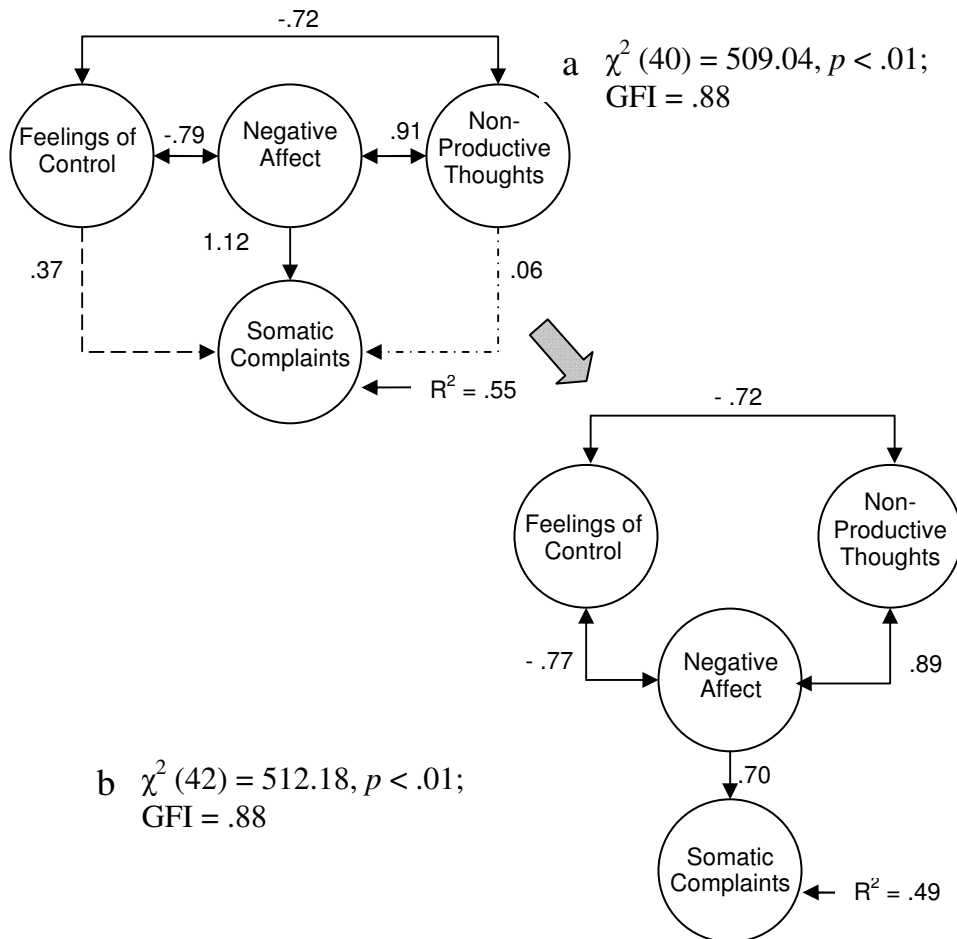


$\chi^2 (102) = 1913.45, p < .01; GFI = .73$

Whereas Figure 3 is informative with respect to the relationships between the emotional variables and somatic complaints in children, it is unlikely that the emotional factors are independent. After all, they all reflect problems or strengths in emotional functioning and derive from different steps of emotional processing. They thus probably are closely intertwined. For example, whereas a depressed mood may induce more negative, non-productive thoughts, it is possible to reduce symptoms of depression by altering children's cognitions (Jaycox, Reivich, Gillham, & Seligman, 1994). This indicates that the different aspects of children's emotional functioning influence each other. The model fit indices and the drop in explained variance where an increase would be expected, indicate that, indeed, improvement of the model is necessary.

We now let the emotional variables covariate, which results in Figure 4a. Negative emotional states are directly and positively related to the frequency of somatic complaints. This is in line with the assumption that emotional problems lead to somatic complaints because the experience of emotional feelings incorporates physical changes (Cohen & Herbert, 1996; Hyams, & Hyman, 1998; Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002; Jones, Dilley, Drossman, & Crowell, 2006; Mayer, 1996; Mayne, 1999; Nash & Theberge, 2006; Segerstrom & Miller, 2004; Tsygos & Chrousos, 2002). Maladaptive emotion regulation and (to a lesser extent) feelings of control are related to the experience of negative emotional states, and to each other. Now the insignificance of the paths between feelings of control, maladaptive emotion regulation, and somatic complaints is clear, these paths are removed from the model. The resulting model is depicted in Figure 4b. Note that the fit indices of this model indicate that the deleted paths were indeed redundant and the model further is identical to that of Figure 4a. We only changed the spatial presentation for convenience. This model shows an acceptable fit and 49% of the variance in children's somatic complaints is explained by the emotional variables. Separate analyses for boys and girls give practically identical models.

Figure 4.
The integrated relationships between feelings of control, non-productive thoughts, negative affect, and children's somatic complaints



Next, we wished to verify whether this model can be found over time and whether knowledge of children's emotional functioning is of interest in *predicting* subsequent levels of somatic complaints. After all, chapters four and five supported the assumption that emotional problems often precede the experience of frequent somatic complaints. The variables used in the measurement models of the constructs were all assessed at Time 1, Time 3, and Time 4 (first, third, and last assessment of the research). Whereas we do not have information about all variables at Time 2, somatic complaints were reported by the children. We can thus

make a prediction of somatic complaints at Time 2 based on children’s emotional functioning at Time 1 and controlling for somatic complaints at Time 1. The same process can be followed for the last two times of measurement: somatic complaints at Time 4 can be predicted based on children’s emotional functioning at Time 3, controlling for somatic complaints at Time 3 (for a full comprehension, these prediction models are also presented in Figures 5 and 6).

Figures 5 and 6 show the results of these two additional, longitudinal analyses. Clearly, earlier levels of somatic complaints are most predictive of subsequent levels of somatic complaints. Children’s emotional functioning nevertheless provides significant additional information. Over time, the model is consistent. The stability in somatic complaints measured between Time 3 and Time 4 is higher and the relationship between feelings of control and maladaptive emotion regulation seems stronger at Time 3 than at Time 1. The relationship between negative affect and children’s reported somatic complaints nevertheless remains constant.

Figure 5.
Feelings of control, non-productive thoughts, and negative affect at Time 1 predicting children’s somatic complaints at Time 2 (six months later)

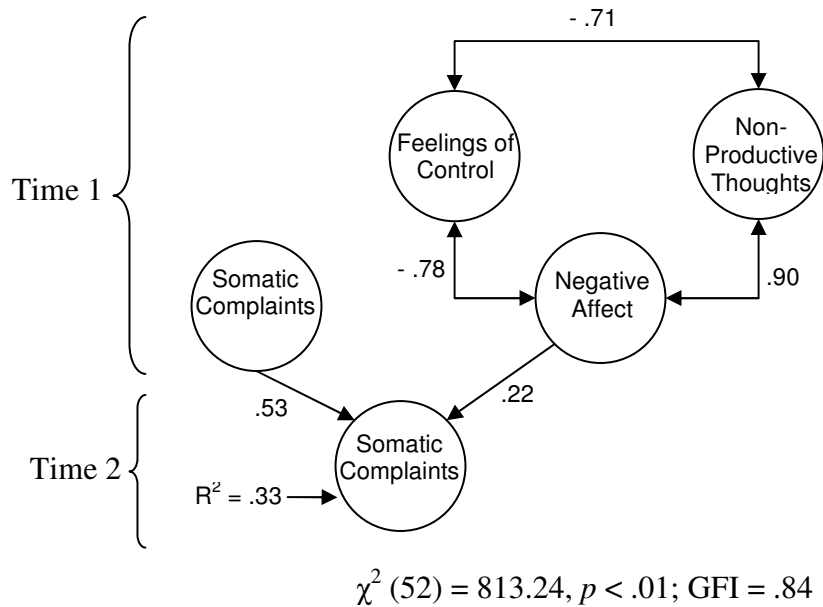
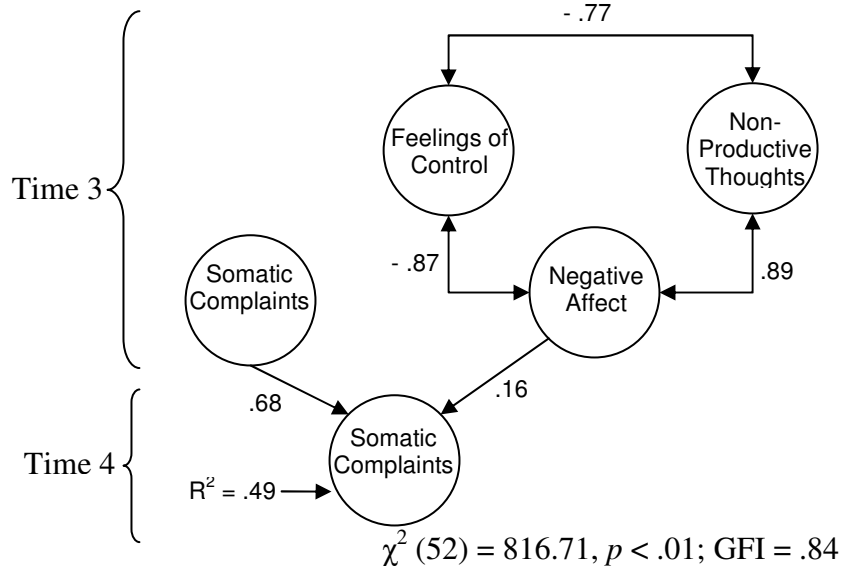


Figure 6.
Feelings of control, non-productive thoughts, and negative affect at Time 3 predicting children's somatic complaints at Time 4 (six months later)



DISCUSSION OF THE PSYCHOLOGICAL INFLUENCES ON CHILDREN'S SOMATIC COMPLAINTS

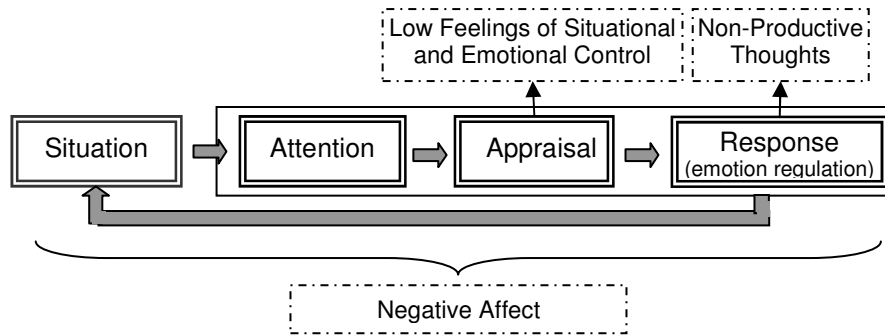
The final model found in this thesis shows that negative emotional affect contributes to children's experience of somatic complaints. The model further reveals that negative affect in turn is negatively associated with children's emotional processing. Children who often experience feelings of negative affect are likely to also have low feelings of control and maladaptive emotion regulation styles. Returning to the steps of emotional processing described in the general introduction of this thesis, we can place the found influences in the model as depicted in Figure 7.

At the first step, attention, children with many somatic complaints seem equally skilled compared to their peers. There might be differences however: as suggested in the discussion of chapter five, children with many somatic complaints might be biased towards awareness of internal states. Future research, however, is necessary to confirm this idea and possible causality. This thesis, in contrast, has shown that appraisal clearly is of relevance with respect to somatic complaints. Children who feel little control (over situations and emotions), are at risk for developing somatic complaints. This was not only reflected in the self-reports of control, but also in children's expected emotions. After all, children with many somatic complaints more often reported fear and sadness compared to children with few somatic complaints and these emotions are typically associated with low control (Kalat & Shiota, 2007). In the final step of emotions, maladaptive emotion

regulation forms a risk for the experience of somatic complaints. Even though they might think of adaptive strategies, the presence of recurrent negative thoughts is associated with more negative emotional feelings and the experience of somatic complaints.

Figure 7.

The processing of emotions with respect to somatic complaints in children.



Of all psychological variables assessed in this thesis, only negative affect had a direct influence on somatic complaints. This was expected as the other variables were taken into consideration because of their effect on the processing of emotions. Negative affect can be thought of as a potential outcome of emotional processing, indirectly signifying the presence of physiological changes (Cohen & Herbert, 1996; Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002; Jones, Dilley, Drossman, & Crowell, 2006; Mayer, 1996; Mayne, 1999; Nash & Thebarge, 2006; Segerstrom & Miller, 2004; Tsygos & Chrousos, 2002). This thesis has provided strong support for the idea that negative affect contributes to the development of somatic complaints in childhood. In addition, the studies give more information about the type and levels of negative affect associated with somatic complaints in childhood. First of all, the internalizing negative emotional experiences are more relevant than experiences of anger. Second, it was found that negative moods and symptoms of mood disorder may lead to children's experience of somatic complaints. In other words: sadness and anxiety or fear seem to increase the risk of somatic complaints in children, even at sub clinical levels.

In contrast to the role of emotional problems, the social influences addressed in this thesis did not seem to have a very strong effect on somatic complaints. Only self-perceived social problems show a correlation with somatic complaints, and this association is fully mediated by the other aspects of children's emotional functioning. It must be noted however that there might be other social aspects that are of direct influence on the development of somatic complaints in childhood but were not taken into account in the current thesis. For example, a recent study showed that parental catastrophizing of children's pain negatively influences children's perception of pain (Goubert, Eccleston, Vervoort, Jordan & Crombez, 2006). As discussed in chapter six, this indicates that parents might serve as a

model for children's experience of somatic complaints, not just as a model for their emotional processing (Morris, Silk, Steinberg, Myers, & Robinson, 2007). Similarly, it has been shown that children with many somatic complaints more often have potential models of somatic complaints in their direct surroundings, such as a sibling with a chronic illness condition (Guite, Lobato, Shalon, Plante, & Kao, 2007; Sharpe & Rossiter, 2002). Future research might provide information about the role of social learning in explaining this finding.

Throughout this thesis, similar effects of children's emotional functioning on the experience of somatic complaints were found for boys and girls. Most likely, the mechanisms through which psychological factors can affect the experience of somatic complaints are thus independent of gender. Previous studies show, however, that in adolescence, the prevalence of somatic complaints becomes higher in girls (Perquin et al., 2000). In adolescence, there is also an increase in internalizing emotional problems for females (De Matos, Barret, Dadds, & Shortt, 2003). This might explain why somatic complaints become more prevalent among girls than boys. After all, when the emotional problems found to be predictive of somatic complaints increase, an increase is expected in the experience of somatic complaints.

The model as described above indicates that the frequency of somatic complaints becomes more stable as children get older. The studies conducted in this thesis were focused on middle childhood/early adolescence. At this age, there is increase in somatic complaints compared to younger children. In later adolescence, there is a subsequent increase (Perquin et al., 2000). It thus seems that it is highly relevant to study somatic complaints in the current age group that was used, as interventions may have less effect in older samples.

The results of this thesis provide information about psychological factors that are highly likely to play a role in the etiology of children's somatic complaints. At the same time, they evoke new research questions. We will provide a more extensive description of clinical and research implications after a discussion of the strengths and limitations of the studies presented in this thesis.

STRENGTHS AND LIMITATIONS OF THE STUDIES PRESENTED IN THIS THESIS

The studies presented in this thesis were based on large sample sizes with high response rates. Moreover, multiple methods were used in order to verify the hypothesis. These methodological points have contributed to the generalizability and validity of the found results. The longitudinal collection of data, incorporating aspects of all topics included in this thesis has greatly contributed to the understanding of directions of causality and has made it possible to come to a model that most likely explains the results that were found. Yet, one limitation of the studies in this thesis is that they were either cross-sectional or longitudinal with six months periods in between times of data collection. Therefore, only long-term causal relationships could be studied. It is very likely that some of the found relationships actually exist in much shorter time intervals. For instance, it is more likely that a child who experiences a week full of negative moods will have

abdominal pain during this same week or immediately afterwards rather than one half year later. Associations found over longer periods of time thus reflect relationships between *general* vulnerabilities or risk factors and outcomes. One can say that the current thesis dealt more with trait-like variables than psychological states, although the results did show that the psychological variables found to be important in the development of somatic complaints can change in children.

In addition, it seems a pitfall of the studies presented in this thesis that children's self-reports were used or children's performance was observed and rated by experimenters. It can be argued that parents could have given additional information. However, this is not what we found. In fact, in one study not presented in this thesis, we tried to determine whether the emotional functioning reported by children or their parents could predict which children would have very few or many somatic complaints six months later. Whereas categorization based on children's self-reported emotional functioning was correct in more than 80% of the cases, parental information about children's emotional functioning was not predictive of somatic complaints six months later (Jellesma, Rieffe, Meerum Terwogt, 2006). This strengthens our belief that internal problems such as negative emotions, moods and somatic complaints can be best reported by the individual her-/himself (Jellesma et al., 2006; 2007).

Feelings of control, maladaptive emotion regulation, and negative emotional states were useful in describing which children are most likely to experience many somatic complaints. There are, however, additional influences that determine whether children will experience somatic complaints. After all, the final model did account for all variance in children's somatic complaints. Further studies, are thus necessary if we wish to more fully understand the etiology of children's somatic complaints.

Finally, a limitation of this study was that children's medical status was largely unknown. Parental reports of visits to the general practitioner or hospital were collected, but seemed to be unrelated to children's somatic complaints. However, children's medical status could have provided information about the influence of psychological factors on existing somatic problems with a medical cause, such as a virus. Previous research has indicated that symptom severity is increased by emotional problems. Thus, similar relationships can be expected in children with medical problems (Rosenkranz et al., 2005; Wood et al., 2007), but for many medical conditions it has not yet been determined to what degree. Despite this limitation in information about the precise role of psychological influences on existing medical problems, the current literature clearly demonstrates that medical conditions generally do not cause long-term emotional problems (Noll & Kupst, 2007; Noll, Reiter-Purtill, Vannatta, Gerhardt, & Short, 2007). This indicates that our results are not positively biased by the missing information about children's medical status. At most, the results are biased towards smaller associations when children have reported somatic complaints that were fully accounted for by a medical condition. As previously reported however, medical problems are seldom found in children with common somatic complaints (Croffie, Fitzgerald, & Chong,

2000; Goodman & McGrath, 1991) and we therefore do not believe this bias to be substantial.

CLINICAL AND RESEARCH IMPLICATIONS

Throughout the discussion of this thesis, we have already made several suggestions for further research:

- More types of (direct) social influences on children's somatic complaints could be addressed in future studies
- The increased strength in the negative association between feelings of control and maladaptive emotion regulation over time should be further explained
- The relationships between the psychological variables should be measured on short-term time intervals. For instance a daily or weekly diary study or the use of an ambulant digital device could be used in order to find more clues about the (bi)directionality of found associations, the strength, as well as the levels and durations of for example negative affect needed for somatic complaints to arise.
- For generalizability of the results, similar studies could be conducted comparing the effects of children's emotional functioning on somatic complaints in children with and without identified medical problems.

Furthermore, the results have clinical implications, particularly for the prevention and reduction of somatic complaints in children using psychological interventions. Based on the perseverative cognition hypothesis explained in chapter five, Brosschot and Van der Doef (2006) tried to reduce adolescents levels of worrying. It was found that when 16 to 17 year old adolescents are instructed to postpone their worry-some thoughts to a special worry period, this causes a decrease in the number of somatic complaints. Similar results were obtained in younger children (Jellesma, Brosschot, & Verkuil, 2008). Thus, changing one aspect of emotional functioning found to be of influence on children's experience of somatic complaints, already has a beneficial effect.

Based on the model found, it can be expected that interventions aimed at increasing children's feelings of control and decreasing their use of maladaptive emotion regulation strategies will also be helpful in reducing somatic complaints in children are preventing them from developing. There is evidence that teaching children an adaptive, optimistic style of emotional processing is achieved by changing their attributions in such a way that children perceive more control over their emotions. This intervention particularly decreases maladaptive emotion regulation strategies (Cunningham, Brandon, & Frydenberg, 2002). With a comparable prevention program, Quayle and colleagues attained a decrease in children's symptoms of depression (Quayle, Dziurawiec, Roberts, Kane, & Ebsworthy, 2001). The effect of these types of interventions on children's experience of somatic complaints could be addressed in future studies. Moreover, perhaps combining the worry postponement instruction with a cognitive behavioral therapy would increase the found benefit of this worry reduction with regard to children's somatic complaints. In short, the results provide several clues about

possible interventions that would be helpful for reducing the frequency with which children experience somatic complaints.

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Summary

The aim of this thesis is to enlarge the knowledge about psychological influences on somatic complaints in children. Emotional and social factors are considered in children aged eight to thirteen. In **chapter 1**, a theoretical framework is provided for the studies described in this thesis. The assumption for emotional influences is that long-term or returning negative affect can lead to somatic complaints because of the accompanying physiological changes. In principle, these physiological changes help a person to respond. When they are prolonged for too long, however, this can cause somatic symptoms. It is therefore thought that somewhere in the processing of emotions (attention, appraisal, or reactions) there is a difference in children who develop somatic complaints. Following the alexithymia hypothesis, it is assumed that children who have difficulty labeling their emotions (part of appraisal), have an increased risk of developing somatic complaints. Based on the sense of coherence theory, it is assumed that the intensity aspect of appraisal matters. Children who perceived little control over negative situations would develop more somatic complaints than peers who perceive more situational control. This theory is extended to emotional control: a weak sense of control over emotions could also lead to more negative affect, and subsequent somatic complaints. Finally, it is explained that, although a neglected topic in the literature on somatic complaints, emotion regulation is an important aspect of the processing of emotions. It can therefore be expected that children who have a maladaptive emotion regulation, will have more somatic complaints.

The social influences are approached from different angles. Negative interactions with peers could lead to somatic complaints through negative affect. Sharing emotions, on the other hand, could perhaps have a positive effect, in the sense that children who easily share emotions would develop fewer somatic complaints. It is further thought, based on behavioral theory, that parents with solicitous behavior in response to somatic complaints could reinforce these somatic complaints in children.

In **chapter two**, children from the general population with few or many somatic complaints are compared with children visiting an outpatient medical clinic because of medically unexplained abdominal complaints in their self-reports of: depression, negative moods, situational control, and labeling emotions. Children with few somatic complaints, experience more negative affect, less control, and less difficulty with the labeling of their emotions. These emotional variables are, however, not helpful in distinguishing which children with somatic complaints visit an outpatient clinic. This finding indicates the significance of studying psychological influences on somatic complaints in the general population, where somatic complaints occur frequently.

In **chapter three**, the alexithymia hypothesis is further studied. Children with many somatic complaints indicate more problems with the labeling of emotions on self-report questionnaires than children with few somatic complaints. Different from the alexithymia hypothesis, however, it is not so much about the

differentiation of specific emotions, but rather the experience of not fully understood internal feelings. On various tasks that make observable children's emotional labeling, children with many somatic complaints are even more differentiated about emotions than children with few somatic complaints. Children with many somatic complaints further more often indicate that situations would make them sad or scared, with higher intensities. Here, the link with control is made: sadness and fear are typically emotions that arise when somebody experiences little control.

In **chapter four**, control is further studied. The relationship between perceived emotional control, situational control, and the experience of somatic complaints is investigated over time. Children who experience little control over emotions or situations indeed are more often bothered by somatic complaints. These two types of perceived control are associated, but each have an independent relationship with somatic complaints. Control also is a predictor of somatic complaints over time, with children who gain felt control, showing a decrease in somatic complaints.

In **chapter five**, children's emotion regulation is studied with respect to somatic complaints. Especially those emotion regulation strategies generally assumed to be ineffective, such as self-blame, are related to somatic complaints. It appears that a lack of knowledge about effective ways of decreasing negative emotions is not predictive of somatic complaints. Children who nevertheless do not succeed in emotion regulation and have non-productive (worrying or ruminative) thoughts, develop somatic complaints. All effects on somatic complaints of maladaptive strategies reported by children to deal with emotions, are explained by the presence of non-productive thoughts. Symptoms of depression only partly mediate the relationship between non-productive thoughts and somatic complaints. This indicates that non-productive thoughts already contribute to somatic complaints when they are associated with milder forms of negative affect, such as negative moods.

In **chapter six**, relationships with peers are considered. A negative status with classmates does not lead to more somatic complaints, nor is the presence of a mutual best friend associated with somatic complaints. Children's subjective experience is again of relevance: children who experience difficulty in communicating about emotions and children who experience social anxiety, more frequently experience somatic complaints compared to their peers.

In **chapter seven**, the possibility of complaint reinforcement by parental solicitousness is studied. In contrast to the expectations, children will not report somatic complaints more frequently when parents provide associated positive consequences. Even when possible vulnerabilities (negative affect or a low sense of control) are taken into account, reinforcement is not of importance.

In **chapter eight**, all above mentioned emotional and social variables are investigated together. Negative affect is the strongest predictor of somatic complaints and feelings of control and non-productive thoughts have an indirect influence on children's somatic complaints. The results and implications are further discussed.

Samenvatting

Het doel van dit proefschrift is de kennis over psychologische invloeden op lichamelijke klachten bij kinderen te vergroten. Er wordt gekeken naar emotionele en sociale factoren bij kinderen tussen de acht en dertien jaar oud. In **hoofdstuk 1** wordt een theoretisch kader gegeven voor de onderzoeken die in dit proefschrift worden beschreven. Voor de emotionele invloeden geldt als uitgangspunt dat langdurig of terugkerend negatief affect tot lichamelijke klachten kunnen leiden vanwege de bijbehorende lichamelijke veranderingen. In principe helpen deze lichamelijke veranderingen een persoon om te reageren. Wanneer ze echter te lang aanhouden, kan dit tot lichamelijke symptomen leiden. De gedachte is daarom dat er ergens in de verwerking van emoties (aandacht, appraisal, of reacties) iets anders verloopt bij kinderen die lichamelijke klachten ontwikkelen. Vanuit de alexithymia hypothese wordt verondersteld dat kinderen die moeite hebben met het labelen van hun emoties (een onderdeel van appraisal), meer risico hebben op het ervaren van lichamelijke klachten. Vanuit de sense of coherence theorie wordt verondersteld dat het gaat om het intensiteit aspect van appraisal. Kinderen die weinig gevoel van controle ervaren over negatieve situaties zouden eerder lichamelijke klachten ontwikkelen dan leeftijdsgenootjes die meer situationele controle ervaren. Deze theorie wordt uitgebreid naar emotionele controle: weinig gevoel van controle over emoties zou eveneens tot meer negatief affect kunnen leiden, en als gevolg daarvan tot lichamelijke klachten. Ten slotte wordt uitgelegd dat, hoewel er weinig aandacht voor is in de literatuur over lichamelijke klachten, emotie regulatie een belangrijk aspect is van de verwerking van emoties. Verwacht mag dus worden dat kinderen die een maladaptieve emotieregulatie hebben, meer lichamelijke klachten krijgen.

De sociale invloeden worden vanuit verschillende hoeken benaderd. Negatieve interacties met leeftijdsgenootjes zouden via negatief affect tot lichamelijke klachten kunnen leiden. Het delen van emoties met anderen zou daarentegen juist een positief effect kunnen hebben, in die zin dat kinderen die dit makkelijker doen mogelijk minder lichamelijke klachten ontwikkelen. Verder wordt vanuit de gedragstheorie gedacht dat ouders hun kinderen met zogenaamd “solicitous” (zorgzaam, toegankelijk), gedrag in reactie op lichamelijke klachten deze klachten zouden kunnen bekrachtigen.

In **hoofdstuk twee** worden kinderen uit de algemene populatie met weinig lichamelijke klachten en met veel lichamelijke klachten vergeleken met kinderen die vanwege medisch onverklaarde buikklachten een polikliniek bezoeken met elkaar vergeleken op zelfrapportages van: depressie, negatieve stemmingen, situationele controle, en het labelen van emoties. Het blijkt dat kinderen met weinig lichamelijke klachten minder negatief affect ervaren, meer controle en minder moeite met het labelen van emoties dan de andere kinderen. Deze emotionele variabelen zijn echter niet van nut in het onderscheiden van kinderen met lichamelijke klachten die al dan niet bij de polikliniek komen. Dit geeft aan dat het

bestuderen van psychologische invloeden op lichamelijke klachten zinvol is in de algemene populatie kinderen, waar lichamelijke klachten frequent voorkomen.

In **hoofdstuk drie** wordt de alexithymia hypothese nader onderzocht. Kinderen met veel lichamelijke klachten geven op een zelf-rapportage vragenlijst naar het labelen van emoties meer problemen aan dan kinderen met weinig lichamelijke klachten. Anders dan de alexithymia hypothese verondersteld, gaat het echter niet zozeer om het onderscheiden van specifieke emoties, maar meer om het ervaren van niet gehele begrepen negatieve gevoelens. Op verschillende taken waarbij de vaardigheid van kinderen tot het labelen van emoties kan worden geobserveerd, zien we dat kinderen met veel lichamelijke klachten zelfs gedifferentieerder zijn over emoties dan kinderen met weinig klachten. Kinderen met veel lichamelijke klachten geven verder vaker aan dat situaties hen verdrietig of angstig zouden maken, met een hogere intensiteit. Hier wordt de link met controle gelegd: verdriet en angst zijn typisch emoties die ontstaan wanneer iemand weinig controle ervaart.

In **hoofdstuk vier** wordt dan controle verder onderzocht. Er wordt over de tijd heen gekeken wat de relatie is tussen ervaren emotionele controle, situationele controle, en ervaren lichamelijke klachten bij kinderen. Het blijkt dat kinderen die op het gebied van emoties of situaties weinig controle ervaren inderdaad meer last hebben van lichamelijke klachten. Deze twee typen gevoelens van controle hangen met elkaar samen, maar hebben beide een eigen relatie met lichamelijke klachten. Controle blijkt ook een voorspeller van lichamelijke klachten over de tijd, waarbij bovendien wordt gevonden dat kinderen die in toenemende mate controle ervaren, een vermindering in lichamelijke klachten laten zien.

In **hoofdstuk vijf** wordt de emotieregulatie van kinderen onderzocht in relatie tot lichamelijke klachten. Met name die emotie regulatie strategieën die doorgaans niet effectief zijn, zoals jezelf de schuld geven, hebben een relatie met lichamelijke klachten. Het lijkt erop dat niet zozeer het ontbreken van kennis over manieren om negatieve emoties te verminderen, voorspellend is voor lichamelijke klachten. Eerder blijken kinderen die desondanks er niet in slagen hun emoties te reguleren en met non-productieve gedachten (pieker en rumineer gedachten) zitten, lichamelijke klachten te ontwikkelen. Alle effecten op lichamelijke klachten van de maladaptieve strategieën die kinderen noemen om met emoties om te gaan, worden verklaard door de aanwezigheid van non-productieve gedachten. Symptomen van depressiviteit medieren de relatie tussen non-productieve gedachten en lichamelijke klachten slechts ten dele. Dit geeft aan dat non-productieve gedachten al bij dragen aan lichamelijke klachten wanneer ze geassocieerd zijn met mildere vormen van negatief affect, zoals negatieve stemmingen.

In **hoofdstuk zes** wordt dan gekeken naar relaties met leeftijdsgenootjes. Een negatieve status bij leeftijdsgenootjes in de klas leidt niet tot meer lichamelijke klachten, en ook de aanwezigheid van een wederzijdse beste vriendschap is hier niet mee geassocieerd. Opnieuw geldt wel dat de subjectieve beleving van kinderen van belang is: kinderen die het gevoel hebben moeilijk over emoties te praten en kinderen met sociale angst ervaren vaker lichamelijke klachten dan hun leeftijdsgenootjes.

In **hoofdstuk zeven** wordt de mogelijkheid van bekrachtiging door bezorgd gedrag van ouders onderzocht. In strijd met de verwachting blijkt dat kinderen niet vaker lichamelijke klachten gaan rapporteren wanneer hier meer positieve consequenties aan worden verbonden door ouders. Ook wanneer rekening wordt gehouden met eventuele kwetsbaarheden bij kinderen (negatief affect of weinig gevoel van controle), speelt ziektebekrachtiging geen rol.

In **hoofdstuk acht** worden al deze bovengenoemde emotionele en sociale variabelen samen onder de loep genomen. Het blijkt dat negatief affect de sterkste voorspeller is van lichamelijke klachten en gevoelens van controle en non-productieve gedachten een indirecte invloed hebben op lichamelijke klachten bij kinderen. De bevindingen en implicaties worden verder besproken.

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Curriculum Vitae

Francisca (Francine) Catharina Jellesma was born on December 11th, 1981 in Amsterdam, The Netherlands. She completed high school (Gymnasium) at the “Christelijke Scholengemeenschap Buitenveldert” in 2000. From 2000 to 2004, she studied Psychology at the VU University in Amsterdam, during which she did a clinical work experience in Medical Child Psychology and wrote master thesis on the topic of the emotional functioning of children with many somatic complaints at the VU Medical Centre. She graduated cum laude in Developmental Psychology. From 2004 to 2008 she worked as a PhD student at Leiden University, Developmental Psychology. The main themes of her research during this period were emotional and social influences on children’s experience of somatic complaints. Francine currently works at the department of Educational Sciences at the University of Amsterdam, where she conducts research on socio-emotional problems in children.

