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Somatic complaints in childhood: How they are related to children's emotional and social functioning

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Citation

Jellesma, F. C. (2008, October 21). *Somatic complaints in childhood: How they are related to children's emotional and social functioning*. Retrieved from <https://hdl.handle.net/1887/13154>

Version: Not Applicable (or Unknown)

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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

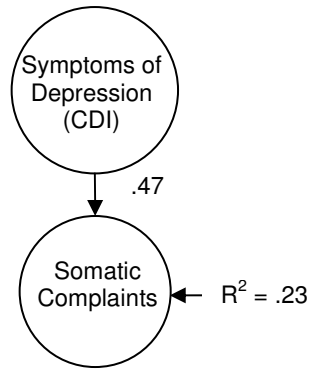
Latent Factor	Measured Variable	Factor Loading	Error	R ²
Somatic Complaint				
	Somatic Complaint List	.91	.41	.83
Depression				
	Children's Depression Inventory	.89	.45	.80
Negative Affect ($\chi^2(2) = 14.27, p < .01, GFI = .99$)				
	Depression (CDI)	.32	.95	.10
	Sadness (Mood List)	.64	.77	.41
	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.

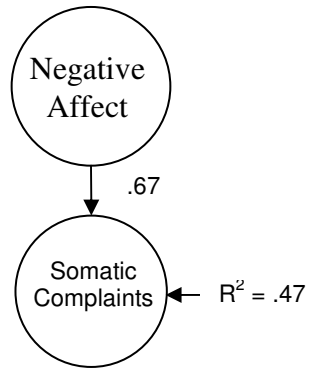
Figure 1.
The relationship between symptoms of depression and children's somatic complaints.



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.

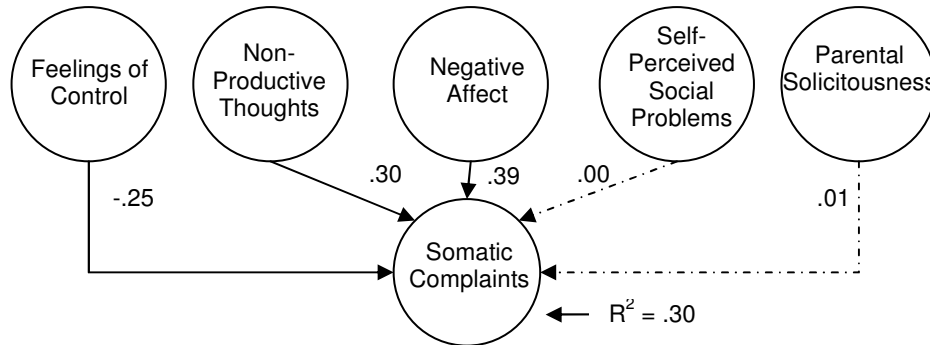
Figure 2.
The relationship between negative affect and children's somatic complaints

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



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

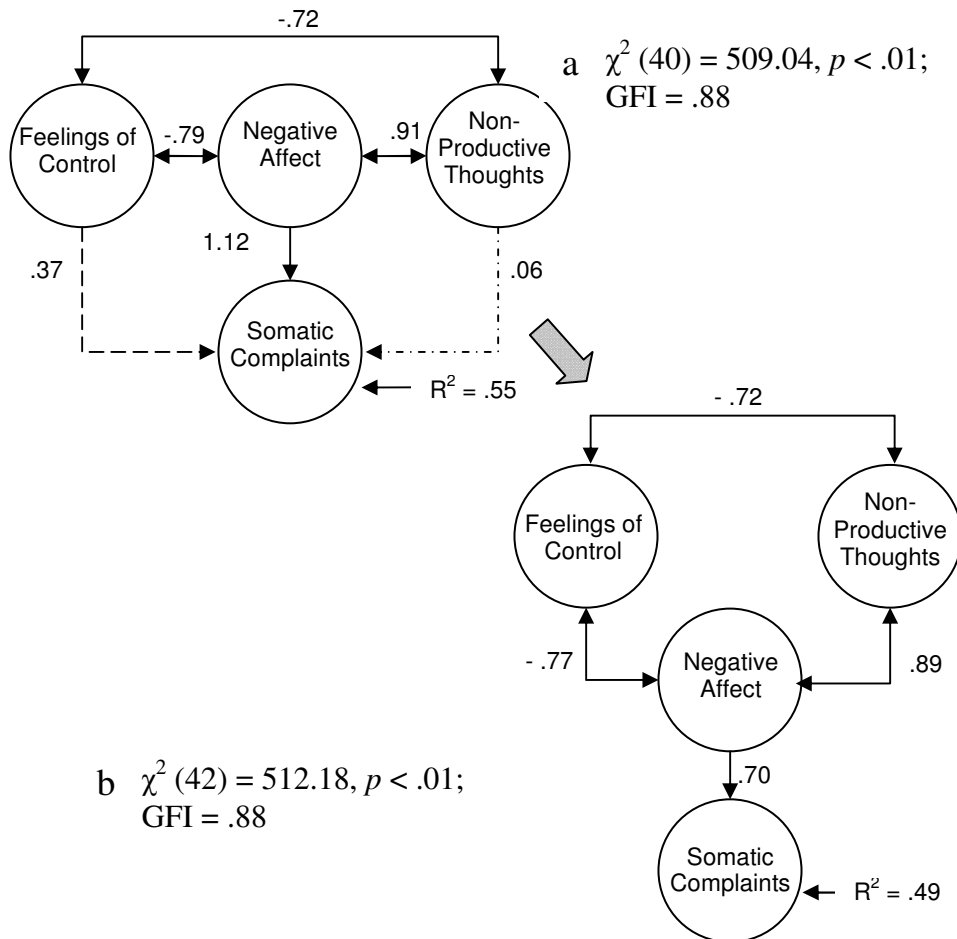


$\chi^2 (102) = 1913.45, p < .01; GFI = .73$

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



Note. Dotted paths are insignificant at a significance level of .05.

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)

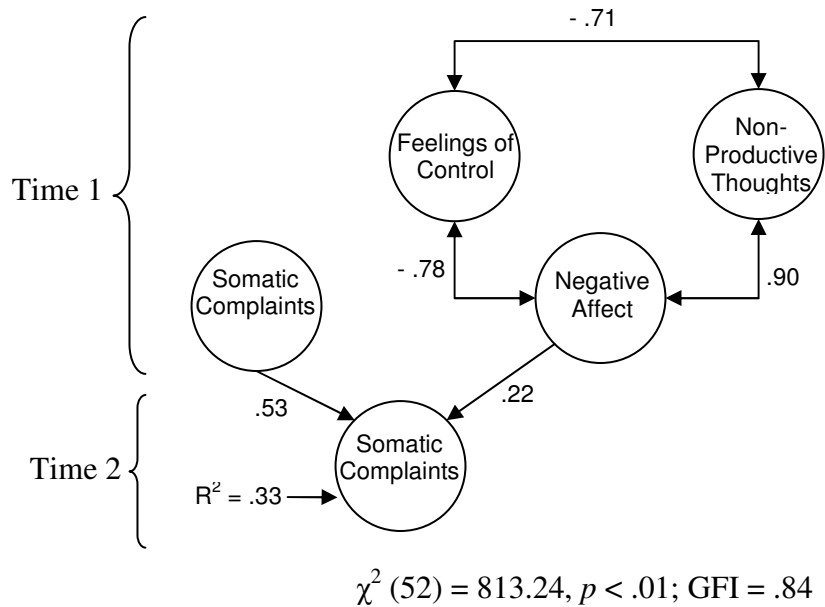
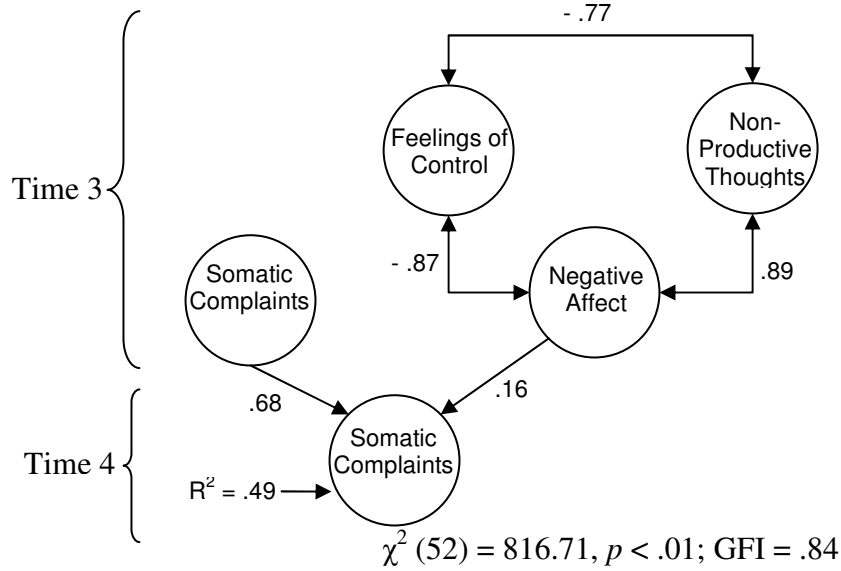


Figure 6.
Feelings of control, non-productive thoughts, and negative affect at Time 3 predicting children's somatic complaints at Time 4 (six months later)



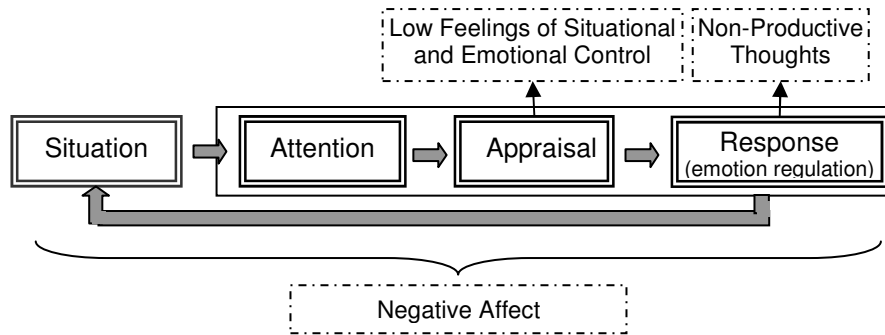
DISCUSSION OF THE PSYCHOLOGICAL INFLUENCES ON CHILDREN'S SOMATIC COMPLAINTS

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.