The startle reflex in children with neuropsychiatric disorders
Bakker, M.J.

Citation for published version (APA):
Bakker, M. J. (2009). The startle reflex in children with neuropsychiatric disorders

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: http://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.
Chapter 8

Anxious cognitions in childhood functional abdominal pain

MJ Bakker
L Baams
MA Benninga
A Koning
S Overste
F Boer
Abstract

Background: Evidence exists suggesting that childhood functional abdominal pain has a similar etiology as childhood anxiety disorders. In order to study the etiology of childhood functional abdominal pain, two cognitive factors which have been implicated in the etiology of anxiety disorders and associated with functional abdominal pain in adults (automatic anxious thoughts and anxiety sensitivity; negative cognitions associated with bodily arousal) are investigated in childhood functional abdominal pain, anxiety disorders and controls. Methods: Anxiety Disorders Inventory Scale, Children’s Anxiety Sensitivity Index, Children’s Automatic Thoughts Scale, Spence Children’s Anxiety Scale and Children’s Somatization Inventory were administered to 32 patients with abdominal pain (17 irritable bowel syndrome and 15 functional abdominal pain syndrome; 8 boys; aged 8 – 17), 25 anxiety disorder patients and 27 healthy controls, similar in age and gender, and their parents. Results: ABDOMINAL PAIN: 41 % (13; 6 irritable bowel syndrome, 7 functional abdominal pain syndrome) of patients suffers from a comorbid anxiety disorder. Both anxiety sensitivity and automatic anxious thoughts were not significantly increased compared to controls, except in patients with a comorbid anxiety disorder. Comorbidity-free patients reported significantly less anxiety symptoms compared to controls and no somatization other than gastrointestinal symptoms. There were no differences between irritable bowel syndrome and functional abdominal pain syndrome patients, except that irritable bowel syndrome patients reported more gastrointestinal symptoms. ANXIETY DISORDER: All measures were significantly increased compared to both controls and abdominal pain patients, except the somatization symptoms which were not significantly different compared to abdominal pain patients according to the patients but significantly lower according to their parents Conclusion: These findings suggest that cognitive abnormalities like a high amount of automatic anxious thoughts or anxiety sensitivity is related to childhood anxiety disorders but not to childhood functional abdominal pain. This points to a partly non-shared etiology of childhood functional abdominal pain and anxiety disorders. A substantial part of the children with functional abdominal pain (without psychiatric comorbidity) reported low levels of anxiety, automatic anxious thoughts and anxiety sensitivity.
Chapter 8
Cognitive abnormalities in children with functional abdominal pain

Introduction

Abdominal-pain related functional gastrointestinal disorders, or functional abdominal pain, are characterized by long-lasting intermittent or constant abdominal pain without objective evidence of an underlying organic disorder. Prevalence rates of pediatric chronic functional abdominal pain range between 2-19% This range is broad due to differences in diagnostic tools, age groups, and heterogeneity of symptoms. Therefore, experts in the field of pediatric gastroenterology made an attempt to set criteria for functional gastrointestinal disorders in childhood, the so-called Rome criteria. These criteria are the gold standard for the diagnosis functional gastrointestinal disorders, but they are seldom used in studies investigating psychological characteristics of these patients. The two most common forms of functional gastrointestinal disorders are irritable bowel syndrome and functional abdominal pain syndrome. Children with functional abdominal pain syndrome experience more continuous abdominal pain compared to children with irritable bowel syndrome; in irritable bowel syndrome but not in functional abdominal pain syndrome pain is associated with a change in defecation pattern (occurrence, frequency, or form of stool).

Although clues with respect to the pathophysiology of these functional gastrointestinal entities are accumulating, the etiology is still to a large extent unknown. Recently the discussion has focused on the presence of extra-intestinal symptoms. Clinical studies show that the comorbidity rate of anxiety disorders is high, with prevalence rates as high as 80%. It has been suggested that childhood functional abdominal pain has an etiology which is similar to the etiology of anxiety disorders. If a vulnerability factor to develop anxiety disorder is also associated with childhood functional abdominal pain, this would support the hypothesis of a similar etiology.

Cognitive factors of psychopathology (such as self-statements/automatic thoughts, cognitive errors/schemas, worry) are considered to play a central role in the development and maintenance of emotional distress, and some degree of cognitive shift is assumed to be vital in treatment change. In somatoform disorders cognitive abnormalities are considered important in the etiology as well. In accordance, in young adults with irritable bowel syndrome a higher level of trait worry was demonstrated and cognitive treatment resulted in a reduction of both gastrointestinal symptoms and negative automatic thoughts in adults with irritable bowel syndrome. In addition, generalized anxiety disorder (pathological worry about several different topics) is associated with irritable bowel syndrome in adults. Although studies suggest that cognitive-behavioral treatment is successful in these patients, cognitive abnormalities, to our knowledge, have not yet been investigated in children with irritable bowel syndrome.
The Children’s Automatic Thought Scale (CATS) assesses automatic anxious thoughts (negative self-statements like ‘I will die’, ‘I am worth nothing’, ‘I will look stupid’).

Anxiety sensitivity (cognitions or believes that there are negative consequences following bodily arousal), which can be measured in children with The Children’s Anxiety Sensitivity Index, is considered a risk factors to develop anxiety disorders, especially panic disorders. Anxiety sensitivity was also found to be increased compared to controls in a large sample of adults with irritable bowel syndrome. Further, in adults panic disorder and irritable bowel syndrome seem related.

In the current study we aim to investigate the presence of anxiety sensitivity and automatic anxious thoughts in childhood functional abdominal pain diagnosed according to Rome III criteria. Our goal is to gain information on the etiology of childhood functional abdominal pain in an attempt to identify targets for treatment. Anxiety sensitivity, automatic anxious thoughts, somatization symptoms (with and without gastrointestinal symptoms) and anxiety symptoms in children with irritable bowel syndrome and functional abdominal pain syndrome will be compared to these symptoms in healthy controls and in patients with anxiety disorders. We hypothesize that all symptoms are higher in the children with functional abdominal pain disorders compared to controls, but lower compared to anxiety disorder patients, except the somatization symptoms.

**Methods**

**Subjects**

Only children aged between 8 and 17 years old were included in this study. Abdominal pain patients were recruited from the Department of Pediatric Gastroenterology of the Academic Medical Center Amsterdam (the Netherlands). Between March and September 2006, 32 patients (mean age 13, SD 2.4, 8 boys) fulfilling the Rome-III criteria for functional abdominal pain syndrome or irritable bowel syndrome were included in this study. A 2-week abdominal pain diary was kept as part of the intake procedure. No structural or biochemical abnormalities were found upon physical examination and tests of blood [Hb, leukocytes, CRB, BSE, ASAT/ALAT, amylase, phadiatop, IgE, IgG, IgA, IgM, Coeliakie AS], urine [sediment, glucose] and stool samples [Haema, TFT, H.Pylori] in these patients.

Anxiety disorder patients, described previously, were recruited from the outpatient clinic of the Academic Center for Child and Adolescent Psychiatry de Bascule in Amsterdam. In total 25 patients with an anxiety disorder (mean age 12.7, SD 2.6, 8 boys) were approached and included in the study between August and November 2006.
The 27 control children (mean age 12.0, SD 2.8, 12 boys) were recruited from friends and acquaintances of patients to ensure optimal similarity for cultural and socioeconomic status. All subjects were assessed for psychopathology by a clinical psychologist (MB) with a structured diagnostic interview to formally establish the presence or absence of an anxiety disorder. For controls this interview was to exclude children with psychopathology. Anxiety disorder patients and controls were to be free of recurrent abdominal pain, according the Abdominal Pain Index. Both patients and controls were excluded from the study if they took sedative medication, suffered from a hearing defect, or met criteria for major depression disorder, a neurological disorder, mental retardation or schizophrenia or other psychotic disorders.

**Measures**

*The Anxiety Disorder Interview Schedule*

The Anxiety Disorder Interview Schedule for children (ADIS-C) and their parents (ADIS-P) are two separate semi-structured interviews based on DSM-IV classification of psychopathology. The clinical interview addresses the following anxiety disorders: separation anxiety disorder, social phobia, generalized anxiety disorder, specific phobias, panic, agoraphobia, and obsessive–compulsive disorder. Furthermore, it allows for evaluation of depression, dysthymia, attention deficit hyperactivity disorder, oppositional disorder, and conduct disorder. Both the children and their parents give impairment scores of each disorders on a scale with a range of 0 (no interference in daily life) to 8 (extreme interference in daily life). Severity scores of 4–8 indicate the presence of a disorder. After both interviews, the clinician judged the final impairment score of each disorder. If this was between 4-8, this child was considered to suffer from this specific disorder according to DSM-IV.

*The Children Automatic Thoughts Scale (child report)*

The Children Automatic Thoughts Scale (CATS) is an instrument developed to assess negative automatic thoughts or negative self-statements in children. The self-report measure has 40 items and children are asked to rate the frequency in which they have experienced the thought; *not at all* (0) to *all the time* (4). The items load onto four separate subscales of cognitive content: physical threat, social threat, personal failure, hostility. The 0–4 ratings for each item are summed to provide a total score for all 40 items (maximum 160). The CATS possesses good internal consistency, for all subscales the CATS has a Cronbach’s alpha of .85, and a .91 test-retest correlation for the total score.
**Childhood Anxiety Sensitivity Index (child report)**

Childhood anxiety sensitivity index measures believes or cognitions concerning bodily sensations of arousal. It is an 18-items self-report questionnaire. Children rate the extent to which they believe that the experience of bodily symptoms of anxiety like increase in heart beat will have negative consequences, on a 3-point Likert scale; 1=none, 2=some, 3= a lot. Scores range between 18 and 54, with higher scores indicating greater anxiety sensitivity. Reliability is high; Cronbach’s alpha was found to be 0.84.

**The Children’s Somatization Inventory (parent and child versions)**

The Children’s Somatization Inventory (CSI) is a 35-item self- and parent-report measure. It assesses somatization symptoms in children and adolescents (e.g., “headaches,” “feeling low in energy”). The Dutch version was found to be a reliable and valid measure for these symptoms. Subjects respond to the degree they (or their child) have been bothered by the specific symptoms over the past 2 weeks. The CSI contains 35 items that have to be rated on a 5-point scale: 0=not at all, 1= a little, 2= somewhat, 3= a lot, 4= a whole lot. A total score is computed by the summing the scores across all items, higher scores indicate a higher intensity of somatic complaints. The minimum score is 0, the maximum score is 140. Reliability is high of both child and parent version, Cronbach’s alpha .90-.86, test retest reliability for children with functional abdominal pain is Pearson’s r .66. In order to assess somatization independent of the abdominal pain, we performed an additional analysis after removal of the gastrointestinal items (items 13, 14, 15, 16, 30, 31, 32).

**The Spence Children’s Anxiety Scale (parent and child versions)**

The Spence Children’s Anxiety Scale includes both parent and child reports and pretends to measure the following six subscales based on the DSM-IV: Separation Anxiety Disorder, Social Phobia, Obsessive Compulsive Disorder, Panic Disorder and Agoraphobia, Physical Injury Fears, Generalized Anxiety Disorder. The SCAS contains 38 items. Cronbach’s reliability of the SCAS is alpha = .92. Response-possibilities range from 0-3, 0=never, 1=sometimes, 2=often, 3=always. This yields a minimum score of 0 and a maximum score of 114. The SCAS has been validated, also in Dutch samples, and found to be reliable.

**Procedure**

The ADIS-C (anxiety disorder interview schedule) for children and parents was administered at the Department of Child and Adolescent Psychiatry of the Academic Medical Center. The psychological questionnaires (CBCL child and parent, SCAS child and parent, CSI child and parent, CATS child, CASI child) were completed by the children.
and their parents at home. The study protocol and consent forms were reviewed and approved by the Institutional Board of the Academic Medical Center, Amsterdam.

**Statistical analyses**

Statistical analyses were performed with SPSS (13.0). As the questionnaire scores were not normally distributed a Kruskal-Wallis test with group as the independent variable and questionnaire scores as the dependent variables was used to examine group differences. In addition, Mann Whitney U tests were used to examine differences between the functional abdominal pain patients with and without psychiatric comorbidity and controls. A p-value of ≤ .05 was considered significant.

**Results**

**The Anxiety Disorder Interview Schedule for Children parent and child versions**

A total of 13 patients with abdominal pain (41 %, 7 irritable bowel syndrome, 6 functional abdominal pain syndrome) were diagnosed as suffering from a comorbid anxiety disorder according to the DSM-IV, based on both the clinical interviews with both children and their parents. The other 19 abdominal pain patients were not considered to suffer from psychiatric comorbidity. All anxiety disorder patients were diagnosed with an anxiety disorder according to DSM-IV. All controls were considered free of DSM-IV diagnoses.

**The Children Automatic Thoughts Scale (child report)**

The abdominal pain patients did not report more automatic anxious thoughts (Z=-0.9, U=323, p=0.358) compared to controls and reported significantly less automatic anxious thoughts compared to children with anxiety disorders (Z=-3.1, U=157, p=0.002)(Table 2). The abdominal pain patients with a comorbid anxiety disorder reported significantly more automatic anxious thoughts compared to controls (Z=-2.5, U=64, p=0.010) but patients without a comorbid anxiety disorder did not (Z=-0.5, U=201, p=0.565)(Table 3). No significant difference in automatic anxious thoughts was found between irritable bowel syndrome and functional abdominal pain syndrome patients (Z= -2.9, U=26, p=0.771).

**Childhood Anxiety Sensitivity Index (child report)**

The abdominal pain patients did not report more anxiety sensitivity compared to controls (Z=-0.05, U=402, p=0.962) and reported significantly less anxiety sensitivity compared to children with anxiety disorders (Z=-2.0, U=214, p=0.037)(Table 2). The abdominal pain
patients with a comorbid anxiety disorder reported more anxiety sensitivity compared to controls (Z=-2.6, U=77, p=0.009) but the patients without a comorbid anxiety disorder did not (Z=-1.8, U=150, p=0.07)(Table 3). There were no significant differences in anxiety sensitivity between children with irritable bowel syndrome and functional abdominal pain syndrome (Z=-3.9, U=21, p=0.696).

The Children's Somatization Inventory child version

The abdominal pain patients reported a significantly increased amount of somatization symptoms compared to controls (Z=-4.3, U=141, p=0.000)(Table 2). This difference remained significant after removal of the gastrointestinal items (Z=-2.4, U=263, p=0.014). They did not report significantly more somatization symptoms compared to children with anxiety disorders, Z=-1.3, U=251, p=0.179 (Table 2)(without gastrointestinal items Z=-0.33, U=305, p=0.740).

Both the abdominal pain patients with and without a comorbid anxiety disorder reported significantly more somatization symptoms compared to controls (Z=-4.3, U=19, p=0.000)(Z=-2.9, U=111, p=0.003)(Table 3). However, after removal of the gastrointestinal
items this effect remained significant only for the abdominal pain patients with a comorbid anxiety disorder (Z=-2.8, U=70, p= 0.004) (abdominal pain patients without psychiatric comorbidity, Z=-1.6, U=171, p=0.108). Irritable bowel syndrome patients reported significantly more somatization symptoms compared to functional abdominal pain syndrome children (Z=-2.3, U=28, p=0.018). After removal of the gastrointestinal related items this difference was not significant anymore (Z=-1.5, U=40, p=0.113).

**The Children’s Somatization Inventory parent version**

The parents of the abdominal pain patients reported significantly more somatization symptoms in their child compared to parents of controls (Z=-6.0, U=15, p=0.000) and parents of children with anxiety disorders (Z=-2.4, U=206, p=0.017)(Table 2). This difference remained significant after removal of the gastrointestinal items in the comparison with parents of controls (Z=-4.9, U=79, p=0.000)(parents of anxiety disorder patients, Z=-0.66, U=300, p=0.508).

Parents of the abdominal pain patients with and without a comorbid anxiety disorder reported more somatization symptoms in their child compared to the parents of controls (Z=-4.7, U=1, p=0.000)(Z=-2.5, U=13, p=0.000)(Table 3). After removal of the gastrointestinal items these effects remained significant (comorbid anxiety disorder Z=-4.1, U=19, p= 0.000, no comorbid anxiety disorder Z=-4.0, U=53, p=0.000). The parents of irritable bowel syndrome children reported no significant difference in somatization symptoms in their child compared to the parents of functional abdominal pain syndrome children (Z=-1.0, U=49, p=0.313)(without gastrointestinal items, Z=-0.7, U=22, p=0.484).

**The Spence Children’s Anxiety Scale child version**

The abdominal pain patients did not report significantly more anxiety symptoms compared to controls (Z=-0.2, U=366, p=0.833) and significantly less anxiety symptoms compared to children with anxiety disorders (Z=-3.5, U=166, p=0.000)(Table 2). The abdominal pain patients with a comorbid anxiety disorder reported significantly more anxiety symptoms compared to controls (Z=-3.4, U=41, p=0.001) but the abdominal pain patients without psychiatric comorbidity reported significantly less anxiety symptoms compared to controls (Z=-2.2, U=128, p=0.027)(Table 3). Irritable bowel syndrome and functional abdominal pain syndrome patients did not report a significant different amount of anxiety symptoms (Z=-0.1, U=62, p=0.852).

**The Spence Children’s Anxiety Scale parent version**

The parents of the abdominal pain patients reported significantly more anxiety symptoms in their child compared to parents of controls (Z=-2.8, U=218, p=0.004) and significantly less anxiety symptoms compared to the parents of the anxiety disorder patients (Z=-4.0, U=121, p=0.000)(Table 2). The parents of patients with abdominal pain and a comorbid
anxiety disorder reported significantly more anxiety symptoms in their child compared to the parents of controls (Z=-4.5, U=10, p=0.000)(Table 3) but the parents of patients with abdominal pain patients without psychiatric comorbidity did not (Z=-0.87, U =189, p=0.384)(Table 3). Parents of irritable bowel syndrome and functional abdominal pain syndrome patients did not report a significant different amount of anxiety symptoms in their child (Z=-0.62, U=55, p=0.563).

Table 3. Questionnaire scores of the abdominal pain patients with and without a comorbid anxiety disorder. ↑ is significantly increased compared to controls, ↓ is significantly decreased compared to controls.*p ≤ .05 ** p ≤ .01 *** p ≤ .005.

<table>
<thead>
<tr>
<th></th>
<th>Abdominal pain with Comorbid Anxiety Disorder (n=13) compared to controls</th>
<th>Abdominal pain without Comorbid Anxiety Disorder (n = 19) compared to controls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Child (Median (range) p) Parent (Median (range))</td>
<td>Child (Median (range) p) Parent (Median (range))</td>
</tr>
<tr>
<td>Automatic anx. thught (CATS)</td>
<td>17.5 (2 - 93) *↑              -</td>
<td>5.5 (0 - 26) ns                  -</td>
</tr>
<tr>
<td>Anxiety sensitivity (CASI)</td>
<td>29 (21 - 42) **↑              -</td>
<td>21 (18 - 25) ns                  -</td>
</tr>
<tr>
<td>Somatization (CSI)</td>
<td>31 (17 - 50) ***↑             19 (15 - 56) ***↑</td>
<td>16.5 (3 - 48) ***↑              18 (3 - 55) ***↑</td>
</tr>
<tr>
<td>Anxiety symptoms (SCAS)</td>
<td>25 (11 - 72) *↑              21 (14 - 47) ***↑</td>
<td>5 (0 - 14) *↓                   10 (1 - 25) ns</td>
</tr>
</tbody>
</table>

Discussion

This study shows that almost half of the patients (41 %) with functional abdominal pain suffer from a comorbid anxiety disorder. In contrast to earlier findings in children and adults with functional abdominal pain, our study shows that both the automatic anxious thoughts and anxiety sensitivity are not significantly increased in abdominal pain patients, except in abdominal pain patients with a comorbid anxiety disorder. In children with anxiety disorders automatic anxious thoughts and anxiety sensitivity were significantly increased. Further, the results showed that the presence and/or report of psychiatric and other functional symptoms is heterogeneous in children with functional abdominal pain. The subgroup affected with a comorbid anxiety disorder reported an increased amount of additional (non-gastrointestinal) somatization symptoms. In
contrast, the comorbidity-free subgroup reported no additional (non-gastrointestinal) somatization symptoms and even reported a significantly lower amount of anxiety symptoms compared to controls. Both the patients with functional abdominal pain and their parents reported a significantly higher amount of somatization independent of the gastrointestinal symptoms compared to controls.

In accordance with earlier studies a high number of patients (41%) with chronic functional abdominal pain suffers from a comorbid anxiety disorder.\textsuperscript{41, 286, 326, 327} The percentage found in this study, however, is lower compared to the Campo and colleagues study which described a comorbidity of 80\%\textsuperscript{41} However, in Campo’s study, the patients were not diagnosed according to the Rome III classifications irritable bowel syndrome and functional abdominal pain syndrome which presumably resulted in a difference in patient groups. In addition, the contrasting results may reflect differences between children seen in pediatric practices in the United States and in the Netherlands. In the United States the pediatrician also offers primary care for children. In the Netherlands this type of care is always offered by a general practitioner, and the pediatrician only sees children in secondary or tertiary care.

The findings further suggest that cognitive abnormalities are present in children with anxiety disorders but not in children with functional abdominal pain. That is, only in children with anxiety disorders (with or without functional abdominal pain) automatic anxious thoughts and anxiety sensitivity were increased. Therefore automatic anxious thoughts and anxiety sensitivity cannot be specifically related to childhood functional abdominal pain. This points to a partly non-shared etiology of childhood functional abdominal pain and anxiety disorders. The results can also be explained by the heterogeneity of the group: a substantial part of the children with functional abdominal pain reported low levels of anxiety and hardly any automatic anxious thoughts or anxiety sensitivity. This study therefore confirms the variations in psychological profiles in children with functional abdominal pain.\textsuperscript{347} Similarly, in adults with irritable bowel syndrome a specific small subset of patients was responsible for the reported excess in

| Anxiety disorder patients (N=25) compared to abdominal pain patients |
|--------------------------|--------------------------|--------------------------|
|                         | Child                    | Parent                   |
|                         | Median (range)           | p            | Median (range)           | p            |
| Automatic anx. thght (CATS) | 21 (7 - 82) *** | - | 27 (18 - 50) * | - |
| Anxiety sensitivity (CASI) | 15 (3 - 50) ns | 13 (0 - 64) * | 28 (3 - 76) *** | 32 (10 - 65) *** |
The comorbidity-free subgroup of the current sample, which also reported a remarkably low amount of anxiety symptoms, may either not experience more anxiety or stress compared to controls or they do experience an abnormal amount of stress but they have a limited capacity to verbalize emotions. There is evidence suggesting that (some) children with functional abdominal pain have trouble expressing their feelings verbally. In adults the severity and amount of gastrointestinal symptoms was associated with alexithymia and patients with functional gastrointestinal disorders were more alexithymic than patients with inflammatory bowel disease and healthy controls. Alexithymic patients are unable to describe emotions in words, are unaware of what their feelings are and have difficulty in distinguishing between emotions and bodily sensations. A difference in capacity to verbalize stress instead of an actual difference in amount of stress in the subgroups is in accordance with a previous study in which was demonstrated that the auditory startle reflex (ASR) of a smaller subset of the current sample was increased compared to controls independent of comorbid anxiety symptoms (chapter 6). In short, children with functional abdominal pain and children with anxiety disorders may be similar concerning somatization and certain stress factors (reflected in over-arousal, chronic stressors, HPA activity, sensitisation etc) they can differ substantially from children with anxiety disorders in their conscious (cognitive) experience of their stress.

The Rome III subgroups (irritable bowel syndrome, functional abdominal pain syndrome) were not different on somatization other than gastrointestinal symptoms, anxiety symptoms, automatic anxious thoughts and anxiety sensitivity. However, these subgroups were small in size and therefore differences on these aspects may not have come to light in this study. In accordance with previous reports, both the abdominal pain children and their parents reported a significantly higher amount of somatization compared to controls independent of their gastrointestinal symptoms. That is, like is described in the literature, children with functional abdominal pain also suffer from other unexplained, somatic symptoms.

A limitation of this study is that we did not use an instrument which measures anxious or negative cognitions which concern specifically gastrointestinal sensations. Symptom-specific cognitions may explain the role of psychological variables in the generation of functional abdominal pain symptoms. Illness beliefs are also important in the etiology functional abdominal pain complaints.
Implications
As apparently a substantial part of the children with functional abdominal pain do not have a tendency to have anxious or negative cognitions, this may have implications for treatment. These children, who may be less able to verbalize their stress or simply do not have such symptoms, may profit less from the cognitive part of cognitive-behavioral treatment. Therefore, they may be better off with for example hypnotherapy. Further, as psychiatric comorbidity and other psychological symptoms were not related to Rome III subcategory, not only children with functional abdominal pain syndrome but also children with irritable bowel syndrome can be referred to child psychiatric treatment.

Conclusion
Taken together, this study shows that automatic anxious thoughts and anxiety sensitivity cannot be directly related to childhood functional abdominal pain but only to childhood anxiety disorders. Further studies are needed to elucidate the role of anxious or negative cognitions in childhood functional abdominal pain.