Psychological Correlates of Depression in Children with Recurrent Abdominal Pain

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Objective To examine the associations between coping style, social support, self-efficacy, locus of control, maternal adjustment, and depressive symptoms in children with recurrent abdominal pain (RAP) of childhood. Methods Fifty children with RAP (8–18 years) and their mothers were recruited from a gastroenterology clinic (GI) and community medical practices. Participants completed questionnaires that assessed coping style, social support, self-efficacy, locus of control, maternal adjustment, and psychological adjustment. Results Passive coping strategies such as isolating oneself from others, catastrophizing, and behavioral disengagement were associated with more child-reported depressive symptoms. Higher levels of self-efficacy and greater social support from teachers and classmates were associated with fewer child-reported depressive symptoms. Higher levels of maternal adjustment problems, higher social support from parents, and lower social support from classmates were associated with maternal reports of more child internalizing symptoms. Conclusions These findings suggest that coping style, self-efficacy, social support, and maternal adjustment are correlates of depressive symptoms in children with RAP.

Key words children; depression; psychosocial adjustment; recurrent abdominal pain.

Recurrent abdominal pain (RAP) is one of the most common somatic complaints in children and adolescents, occurring in approximately 10–15% of school-aged children (Apley, 1975; Apley & Naish, 1958; Sharrer & Ryan-Wenger, 1991; Zuckerman, Stevensen, & Bailey, 1987). The majority of these children have a functional gastrointestinal disorder, where symptoms are present in the absence of any identified structural or biochemical abnormality. Abdominal pain associated with functional gastrointestinal disorders in childhood can result in significant personal, educational, and financial costs to families and the medical health system (Apley, 1975; Wyllie & Kay, 1993). Children with RAP continue to report significantly higher levels of abdominal pain and functional disability 5–6 years after an initial evaluation (Walker, Garber, Van Slyke, & Greene, 1993; Walker, Guite, Duke, Barnard, & Greene, 1998) and are at increased risk for developing other gastrointestinal problems (i.e., irritable bowel syndrome) in adulthood (Burke, Elliott, & Fleissner, 1999; Walker et al., 1998).

Apley & Naish (1958) defined RAP as at least three episodes of pain occurring within 3 months that were severe enough to interfere with the child’s activities. Von Baeyer & Walker (1999) proposed additional criteria: (a) the child should have at least one stomach pain per month, in at least three consecutive months over the past year; and (b) the child must experience functional impairment because of pain that meets at least one of the following criteria: staying home from school, terminating or avoiding play, taking medication, or rating the pain as moderate or severe (≥3 on a 10-point scale of pain intensity).

Children with RAP have been found to display inflated levels of depressive symptoms relative to healthy children (Walker et al., 1995; Walker, Garber, & Greene, 1993; Wasserman, Whittington, & Rivara, 1988) with
reported rates from 8% to 52% (Garber, Zeman, & Walker, 1990; Wasserman et al., 1988; Woodbury, 1993). They have also been found to display anxiety disturbance with rates ranging from 48% to 79% (Garber et al., 1990; Wasserman et al., 1988; Woodbury, 1993). Parents have reported inflated rates of internalizing behavior relative to healthy children (Walker et al., 1993; Walker, Garber, & Greene, 1991; Wasserman et al., 1988) and to children with pain associated with organic disease (Garber et al., 1990).

Varni (1995) proposed a biobehavioral model specific to pediatric pain. This model suggests that pain precipitants such as disease, injury, stress, or procedures impact on the child’s biological predisposition, family environment, perceived social support, cognitive appraisal, and coping style. Pain precipitants also impact directly on pain perception, behavior, and the child’s functional status (e.g., activities of daily living, school attendance, child adjustment, interpersonal relations). Variables such as coping strategies, social support, cognitive processes (i.e., locus of control, self-efficacy), and maternal adjustment facilitate psychological and functional adjustment in children with pain problems and contribute independently to adjustment.

The studies that have investigated correlates associated with psychological adjustment in children with RAP have focused on coping. Walker et al. (1997) found that coping strategies such as self-encouragement and distraction were associated with lower levels of depressive symptoms. Thomsen et al. (2002) reported an association between parents’ reports of more use of primary (e.g., problem solving, emotional modulation) and secondary control engagement coping strategies (e.g., acceptance, distraction, positive thinking) and fewer anxiety and depressive symptoms. No research, however, has examined whether self-efficacy, locus of control, social support or maternal adjustment are associated with symptoms of depression and anxiety in children with RAP.

Research on children with physical health problems supports the view that relationships could exist between social support, self-efficacy, locus of control, maternal adjustment, and symptoms of depression and anxiety in children with RAP. Social support from peers has been found to decrease psychophysiological symptoms in adolescents who have experienced difficult life events (Walker & Greene, 1987). Higher self-efficacy has been associated with lower levels of anxiety in children with postoperative pain (Bennett-Branson & Craig, 1993). External locus of control has been found to be related to higher levels of internalizing problems in children with sickle cell disease (Thompson, Gil, Burbach, Keith, & Kinney, 1993), and maternal adjustment has been found to be associated with adjustment problems in children with various chronic illnesses (Mullins et al., 1995; Thompson et al., 1993, 1994). Varni’s (1995) model also suggests that correlates such as social support, self-efficacy, locus of control, and maternal adjustment could be associated with psychological adjustment in children with RAP. Finally, the resilience research literature supports the idea that the interaction of various correlates could result in different adjustment outcomes in children with RAP (Davis, 1990; Fonagy, Steele, Higgitt, & Target, 1994; Parker & Asher, 1987; Werner, 1995). For example, higher social support could be associated with greater feelings of self-efficacy and a more internal locus of control, which in turn could be associated with better psychological adjustment. On the basis of these findings, it was hypothesized that coping style, social support, self-efficacy, locus of control, and maternal adjustment would be significant correlates of child psychological adjustment in children with RAP. Specifically, passive coping, lower social support, lower self-efficacy, an external locus of control, and greater maternal adjustment problems would be associated with more symptoms of internalizing disorders in these children.

**Method**

**Participants**

The study was approved by the Conjoint Health Research Ethics Board, University of Calgary. Participants were 50 children and adolescents with RAP (8–17 years; M = 11 years, SD = 2.77) and their mothers. Forty-one of the participants were female and 9 were male. Only children with no identified organic disorder based on the findings of exams (i.e., ultrasounds, x-rays, blood tests, urinalysis, allergy tests) completed by the Gastroenterology Clinic (GI), Alberta Children's Hospital, or by community physicians (i.e., family physicians, community pediatricians), and no symptoms of organic disorders (i.e., fever with pain, weight loss, poor growth, blood in stools) were enrolled. Three potential participants were excluded because they displayed symptoms of organic illness.

Children from the GI clinic, Alberta Children's Hospital, and community practices were included in the study to obtain a broad sampling of children with RAP. Twenty children were recruited from the GI Clinic (M age = 11 years 5 months; SD = 3.30; males = 4, females = 16). Thirty-five percent of the families contacted
through this clinic agreed to participate. The average age of the nonparticipants was 11 years 5 months (males = 13, females = 24). Twenty-six children responded to advertisements placed in community medical practices (M age = 10 years 9 months; SD = 2.35; males = 5, females = 21). All of these children met von Baeyer & Walker's (1999) criteria for RAP.

Ninety-six percent of participants were white and 4% were of Indo-Asian background. Eighty-four percent of families had an annual family income equal to or greater than $40,000 per year. Ninety-five percent of parents completed high school. Thirty percent of families were in the high socioeconomic status (SES) group, 58% in the medium group, and 12% in the low group based on the Blishen Index of Canadian Occupations (Blishen, Carroll, & Moore, 1986). Seventy-two percent of participants were from intact two-parent families (natural or adopted parents), 16% lived in blended families, and 12% in single-parent families. Participants recruited from the GI clinic and community practices did not differ in family demographic variables; however, they were significantly older (M = 11.45) than the children from community practices (M = 10.67).

**Measures**

**Abdominal Pain Index (Walker et al., 1997)**

The Abdominal Pain Index (API), a child self-report measure, consists of five items used to assess the duration, frequency, and intensity of episodes of abdominal pain experienced in the past 2 weeks. The frequency of pain in the past 2 weeks and typical frequency is rated on a 6-point Likert scale ranging from no pain (1) to constant pain (6). The duration of pain is rated on a 9-point scale ranging from 0 minutes (1) to pain all day (9) and intensity of pain experiences is rated on a 10-point scale ranging from no pain (1) to the worst pain ever (10). Scores on each item are standardized using Z scores and are added to produce an overall score. Higher scores indicate greater pain difficulties. Alpha reliability for the API in this study was .81.

**Functional Disability Index (Walker & Greene, 1991)**

The Functional Disability Index (FDI) was used to evaluate the degree to which the children had reduced physical and psychosocial functioning because of their pain difficulties in the last 2 weeks. Each item uses a 5-point Likert scale ranging from “no trouble” (1) to “impossible” (5). Both the children and their mothers provided reports of child functional disability. In this study, the alpha reliability for the children's FDI reports was .87 and for the mothers' FDI reports was .96. An additional question was added that asked specifically about the number of school absences because of pain over the past month.

**Pain Response Inventory for Children (Walker et al., 1997)**

The Pain Response Inventory for Children (PRI) is a self-report scale that assesses children's coping responses to chronic pain. Each item uses a 5-point Likert scale ranging from never (0) to always (4), which indicates how often particular coping strategies are used. Mean PRI factor and scale scores ranged from a low of 0 to a high of 4. The PRI includes three broad coping factors: (a) Active, (b) Passive, and (c) Accommodative. The Active and Passive factors were examined in this study. Test-retest reliabilities for the PRI have been found to range from .46 to .71. In the present study, the Active factor had an internal consistency of .84 and the Passive factor the internal consistency of .89.

**The Social Support Scale for Children (Harter, 1983)**

The Social Support Scale for Children (SSSC) is a self-report scale that assesses children's perceptions of support from their parents, teachers, classmates, and a close friend. Six items are included for each of the four sources of social support. Children choose which of two opposing statements are true for them and then identify whether the statement is “sort of true” or “really true.” Mean scores on the overall scale and for each factor range from 1 to 4, with higher scores indicating greater social support. Internal consistencies in the present study for the four subscales were as follows: .78 for Parents, .82 for Classmates, .79 for Teachers, and .90 for Close Friends.

**Pain Coping Effectiveness Questionnaire (Reid, Gilbert & McGrath, 1995)**

The Pain Coping Effectiveness Questionnaire (PCE) assesses how children feel they have coped with past pain. The first section of the PCE includes three items that ask children to rate their feelings of self-efficacy regarding their management of their pain on a 5-point scale ranging from never (1) to very often (5). These items asked how often the children felt that they could change their pain, how hard or easy it was for them to deal with pain and how often they felt that they could change their moods or feelings related to pain. The second section had items that ask children how they felt about their pain after it had occurred (e.g., I handled this problem well, I felt better about myself). Children 12 years of age and older rated each item on a 5-point scale ranging from strongly disagree (1) to strongly agree (5). A visual analogue scale was used by children
younger than 12 to rate the items. Research indicated that one of the original items (i.e., I became a stronger person) was difficult for young children to understand; therefore, it was not included on questionnaires completed by children younger than 12 years of age. An overall score was computed by adding all items. In the present study, this measure had an alpha of .71.

Children’s Health Locus of Control Scale
(Parcell & Meyer, 1978)
The Children’s Health Locus of Control Scale (CHLC) measures children’s expectations and beliefs about their health. It consists of 20 statements. Children indicate whether they agree or disagree with each statement. Scores range from 1 to 2 on each item and from a low of 20 to a high of 40 for the entire scale. The overall locus of control score, which is a total score computed from all of the items, was determined. Higher scores are indicative of an internal locus of control, whereas lower scores indicate an external locus of control. In the present study, the internal consistency of the CHLC was .82.

The PCE focused on efficacy related to pain, whereas the CHLC provided a broader perspective on the child’s perception of their feelings of control and beliefs regarding their overall health. Thus, the inclusion of both measures provided us with a broader understanding of the relationship between beliefs about control over pain and general feelings of control in children with RAP.

The Brief Symptom Inventory
(Derogatis & Spencer, 1982)
The Brief Symptom Inventory (BSI) was used to assess maternal adjustment. Items are rated on a 5-point scale and T scores ranging from 30 to 80 are computed. It contains nine clinical scales (i.e., Somatization, Obsessive Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, and Psychoticism) and three global indices (i.e., Global Severity Index, Positive Symptom Total, and Positive Symptom Distress Index). For this study, the Global Severity Index was used to measure maternal adjustment. Internal consistency reliability in this study was .98.

Children’s Depression Inventory (Kovacs, 1992)
The Children’s Depression Inventory (CDI) is a self-report scale used to identify depressive symptoms in children and adolescents. For each question, children indicate which of three possible responses is appropriate to them with 0 indicating minimal symptoms and 2 indicating major symptoms. The CDI is the most commonly used self-report measure of depressive symptoms in children. In the present study, the CDI had an alpha of .89.

State-Trait Anxiety Inventory for Children
(Spielberger, 1973)
The State-Trait Anxiety Inventory for Children (STAIC) measures state (situational) and trait (personality) anxiety. Children rate each item on a 1–3 scale with 1 indicating minimal symptoms and 3 indicating major symptoms. Only the Trait scale was used in this study. Test-retest reliability over a 6-week period has been reported to be .65–.71 for trait anxiety. The alpha reliability for the Trait scale was .88 in this study.

Achenbach Child Behavior Checklist
(Achenbach, 1991)
The Child Behavior Checklist (CBCL) asks parents to rate how characteristic a list of 113 behaviors is of their child on a 3-point Likert scale that ranges from 0 (not true) to 2 (very true or often true). It consists of 7 clinical subscales: Withdrawn Behavior, Somatic Complaints, Anxiety/Depression, Social Problems, Thought Problems, Attention Problems, Delinquency, and Aggression. The scores on these scales are grouped into two broad factors, Internalizing and Externalizing scores. For this study, we investigated Total Adjustment, Internalizing and Externalizing scores, and the Anxiety/Depression subscale. In the present study, alpha reliabilities for Total Adjustment, Internalizing, and Externalizing scores were .93, .86, and .86, respectively. For the Anxiety/Depression subscale Cronbach’s alpha was .82.

Procedures
Children recruited through the GI Clinic, Alberta Children’s Hospital, were selected as potential participants by a pediatric gastroenterologist before clinic appointments on the basis of the referral letter from their family physician or pediatrician. Children referred to the clinic were not approached if the referral letter suggested that the child’s pain was because of an organic illness. Parents of potential participants were sent letters informing them of the study, a consent form, and an appointment time. Families who were interested returned a copy of the consent form.

Posters about the study were also placed in the offices of community physicians. Participants contacted the researcher by telephone or e-mail. Only children who had consulted a physician about their stomach pain were invited to participate. An appointment time was arranged with interested families.

At the appointment, a child consent form was reviewed with the child and assent for participation was
obtained. The children completed the API, FDI, PRI, SSSC, PRE, CHLC, CDI, and the STAIC with the help of the researcher, independently of their parents. Each questionnaire was explained and children under 12 years of age were asked to read the first few questions aloud, to evaluate their reading skills. Children who required additional help with reading items were provided with assistance. Mothers completed the BSI, FDI, and the CBCL. One child and mother (2%) participated in the study at a library in their community with the researcher, and two children and their mothers (4%) were mailed the questionnaires and completed them at their convenience. The two children who were mailed the questionnaires were 11 and 17 years of age and did not have any difficulties completing the questionnaires independently.

Forty-five percent of the children recruited through the GI clinic completed the questionnaires before their medical appointment and 55% completed the questionnaires following their appointment. There was no difference between these two groups in reported pain severity on the API, \( F(1, 17) = .01, p > .05 \).

**Results**

**Child Reports of Pain**

Children reported that they experienced a medium amount of pain over the last 2 weeks (\( M = 4.90 \) on a scale ranging from 1 to 10, \( SD = 2.13 \)). The average severity rating of their worst pain during the last 2 weeks was 6.0 (\( SD = 2.60 \)), with 10 being the worst pain imaginable.

**Child and Maternal Reports on the Impact of the Child’s Pain**

Reports of functional disability indicated that both children (\( M = 20.78, SD = 7.45 \)) and mothers (\( M = 19.94, SD = 10.05 \)) reported that the children were somewhat disabled by stomach pain. Only 18% of children and 14% of mothers reported that the child had trouble with sedentary activity (e.g., watching television). Many children and mothers reported a little trouble with more active activities such as walking the length of a football field (52% of children, 44% of mothers) or being at school all day (60% of children, 56% of mothers). Forty-eight percent of children missed at least 1 day of school in the month before study participation because of pain. Twelve percent of children missed 3 or 4 days of school and six percent missed a week or more of school during the past month because of their pain. Mothers’ and children’s reports of child disability were not significantly different; the mean absolute difference score on the FDI was 6.96 (\( SD = 6.65 \)). A technique employed by Garber et al. (1998) was used to identify the percentage of mother–child dyads that had similar reports of child disability. Mother–child dyads were considered similar if they had absolute difference scores on the FDI that were within .5 of an SD from each other. Mothers were considered to underreport or overreport if their reports differed by more than half an SD from their children’s reports. Thirty-six percent of mothers and children had similar scores, whereas 24% of mothers overreported and 36% underreported their children’s level of disability.

**Child Reports of Depressive Symptoms and Anxiety Symptoms**

The mean CDI T score for the sample was in the average range (\( M = 51.0, SD = 11.42 \)); 6% of the children scored above the 98th percentile. For children’s self-reports of anxiety level on the STAIC, the mean T score was in the average range (\( M = 52.00, SD = 12.10 \)); 8% of the children scored above the 98th percentile.

**Correlates of Child Reports of Depressive Symptoms and Anxiety Symptoms**

Means, SDs, and range of scores for predictive and outcome measures are presented in Table I. Before conducting the regression analyses, residuals scatter plots were examined to ensure that the assumptions for multiple regression were met and that there was an absence of outliers. Correlations among the various predictor variables were examined. Passive coping was significantly associated with social support, \( r = -.50, p < .01 \), and child-reported pain, \( r = .38, p < .01 \); self-efficacy was

<table>
<thead>
<tr>
<th>Table I. Mean Scores on Predictor and Outcome Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Predictor variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active coping factor</td>
<td>2.17</td>
<td>0.56</td>
<td>1–3</td>
</tr>
<tr>
<td>Passive coping factor</td>
<td>1.21</td>
<td>0.68</td>
<td>0.2–3.5</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>29.06</td>
<td>6.07</td>
<td>16–40</td>
</tr>
<tr>
<td>Locus of control</td>
<td>35.43</td>
<td>3.77</td>
<td>25–40</td>
</tr>
<tr>
<td>Social support</td>
<td>3.35</td>
<td>0.48</td>
<td>1.9–4.0</td>
</tr>
<tr>
<td>Mothers’ adjustment</td>
<td>52.54</td>
<td>11.69</td>
<td>32–80</td>
</tr>
<tr>
<td>Abdominal pain index</td>
<td>24.90</td>
<td>8.46</td>
<td>9–45</td>
</tr>
<tr>
<td><strong>Maternal reports—outcome variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total adjustment</td>
<td>38.72</td>
<td>9.83</td>
<td>37–82</td>
</tr>
<tr>
<td>Internalizing factor</td>
<td>61.02</td>
<td>10.84</td>
<td>33–82</td>
</tr>
<tr>
<td>Externalizing factor</td>
<td>52.40</td>
<td>9.56</td>
<td>30–75</td>
</tr>
<tr>
<td>Anxiety/depression scale</td>
<td>59.38</td>
<td>8.75</td>
<td>46–84</td>
</tr>
<tr>
<td><strong>Child reports—outcome variables</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>51.00</td>
<td>11.42</td>
<td>35–81</td>
</tr>
<tr>
<td>Anxiety symptoms</td>
<td>52.00</td>
<td>12.10</td>
<td>23–76</td>
</tr>
</tbody>
</table>
significantly associated with social support, $r = .40, p < .01$, and child-reported pain, $r = –.34, p < .05$.

Hierarchical linear regression was used to examine the associations between coping style, self-efficacy, health locus of control, social support, maternal adjustment, and child-reported depressive symptoms. Children’s scores on the API, a measure of pain severity, were included as a predictive variable and were entered at the first step. All other variables were entered simultaneously in the second step. Results indicated that lower levels of passive coping and higher levels of efficacy and social support were associated with lower levels of child-reported depressive symptoms (see Table II).

Both the Passive Coping scale of the PRI and the SSSC are composed of several subscales. To examine in more detail the relationships between these variables and children’s depressive symptom scores, two additional hierarchical regressions were performed. The first indicated that the Self-Isolation, Catastrophizing, and Behavioral Disengagement subscales of the PRI were significant predictors of depressive symptoms (Table III). Coping with pain by isolating oneself from others, catastrophizing or terminating one’s efforts to cope with pain was associated with increased levels of depressive symptoms in children with RAP. The second regression analysis showed that social support from classmates and social support from teachers were associated with lower levels of depressive symptoms (Table IV).

Hierarchical multiple regression was also used to examine the relationship between coping, self-efficacy, locus of control, social support, maternal adjustment, and child reports of anxiety. Children’s scores on the API and child age, which was significantly correlated with anxiety, were entered in the first step. The regression

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unstandardized coefficients ($B$)</th>
<th>Standard error (SE $B$)</th>
<th>Standardized coefficients ($\beta$)</th>
<th>% variance accounted for</th>
<th>t-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal pain index</td>
<td>–0.08</td>
<td>0.17</td>
<td>–0.06</td>
<td>0.28</td>
<td>$t = –0.48, p = .64$</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>–0.53</td>
<td>0.25</td>
<td>–0.28</td>
<td>5.38</td>
<td>$t = –2.10, p = .04$</td>
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<tr>
<td>Social support</td>
<td>–8.37</td>
<td>3.51</td>
<td>–3.33</td>
<td>6.92</td>
<td>$t = –3.6.8, p = .02$</td>
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<tr>
<td>Locus of control</td>
<td>0.08</td>
<td>0.37</td>
<td>0.13</td>
<td>1.7</td>
<td>$t = 0.21, p = .83$</td>
</tr>
<tr>
<td>Mother’s adjustment</td>
<td>–0.06</td>
<td>0.11</td>
<td>–0.06</td>
<td>0.31</td>
<td>$t = –0.51, p = .61$</td>
</tr>
<tr>
<td>Active coping</td>
<td>1.32</td>
<td>2.49</td>
<td>0.06</td>
<td>0.34</td>
<td>$t = 0.53, p = .60$</td>
</tr>
<tr>
<td>Passive coping</td>
<td>5.56</td>
<td>2.29</td>
<td>.34</td>
<td>7.24</td>
<td>$t = 2.43, p = .02$</td>
</tr>
</tbody>
</table>

$R^2 = .50, F(7, 41) = 5.84, p = .001$.
Adjusted $R^2 = .41$.

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Unstandardized coefficients ($B$)</th>
<th>Standard error (SE $B$)</th>
<th>Standardized coefficients ($\beta$)</th>
<th>% variance accounted for</th>
<th>t-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal pain index</td>
<td>–0.07</td>
<td>0.17</td>
<td>–0.05</td>
<td>0.19</td>
<td>$t = –0.391, p = .698$</td>
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<tr>
<td>Self-isolation</td>
<td>3.72</td>
<td>1.58</td>
<td>0.31</td>
<td>7.1</td>
<td>$t = 2.398, p = .023$</td>
</tr>
<tr>
<td>Catastrophizing</td>
<td>3.58</td>
<td>1.76</td>
<td>0.28</td>
<td>5.2</td>
<td>$t = 2.029, p = .048$</td>
</tr>
<tr>
<td>Disengagement</td>
<td>4.45</td>
<td>1.97</td>
<td>0.29</td>
<td>6.6</td>
<td>$t = 2.265, p = .028$</td>
</tr>
</tbody>
</table>

$R^2 = .43, F(4, 45) = 8.39, p = .001$.
Adjusted $R^2 = .38$.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unstandardized coefficients ($B$)</th>
<th>Standard error (SE $B$)</th>
<th>Standardized coefficients ($\beta$)</th>
<th>% variance accounted for</th>
<th>t-statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal pain index</td>
<td>0.16</td>
<td>0.16</td>
<td>0.12</td>
<td>1.28</td>
<td>$t = 1.02, p = .32$</td>
</tr>
<tr>
<td>Social support from parents</td>
<td>–0.51</td>
<td>2.99</td>
<td>–0.02</td>
<td>0.04</td>
<td>$t = –0.171, p = .87$</td>
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<tr>
<td>Social support from classmates</td>
<td>–9.19</td>
<td>2.45</td>
<td>–0.56</td>
<td>17.56</td>
<td>$t = –3.76, p = .001$</td>
</tr>
<tr>
<td>Social support from teacher</td>
<td>–4.58</td>
<td>2.01</td>
<td>–0.27</td>
<td>6.45</td>
<td>$t = –2.28, p = .03$</td>
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<tr>
<td>Social support from friends</td>
<td>2.12</td>
<td>2.23</td>
<td>0.14</td>
<td>1.12</td>
<td>$t = 0.95, p = .35$</td>
</tr>
</tbody>
</table>

$R^2 = .45, F(5, 44) = 7.25, p = .001$.
Adjusted $R^2 = .39$.
equation was significant, $F(8, 39) = 2.53, p < .05$; only age emerged as a significant predictor of anxiety.

**Maternal Reports of Child Adjustment**

The mean scores on the CBCL for Total Adjustment, Externalizing Problems, and the Anxiety/Depression subscale were in the normal range, whereas the mean score for Internalizing problems was in the borderline clinical range (see Table I).

**Correlates of Maternal Reports of Child Adjustment**

Hierarchical regression analyses were used to investigate the associations between coping style, self-efficacy, health locus of control, social support, maternal adjustment, and mothers' reports of child adjustment (i.e., CBCL Total Adjustment, CBCL Internalizing Factor, and CBCL Externalizing Factor). No outliers were detected and all of the assumptions for multiple regression were met. Children's scores on the API were included as a predictive variable and entered in the first step of the analyses. For the regression predicting the Internalizing factor, child's age was also entered in the first step because it was significantly correlated with this factor; for the regression conducted on the Externalizing Factor, family income was also entered in the first step because it was significantly correlated with this factor. All other variables were entered simultaneously in the second step. For CBCL Total Adjustment, the Internalizing Factor, and the Externalizing Factor scores, mother's adjustment was a significant predictor accounting for 44% of the variance in Total Adjustment, 19% of the variance on the Internalizing Factor, and 31% of the variance on the Externalizing Factor. On all three regressions analyses, greater maternal adjustment problems were associated with greater child adjustment difficulties.

Social support emerged as a correlate of scores on the Internalizing Factor, accounting for 7% of the variance. Lower levels of overall social support were associated with more internalizing difficulties. Follow-up analysis revealed that more social support from parents was associated with higher levels of child internalizing symptoms (accounting for 7% of the variance), whereas more social support from classmates was associated with lower levels of internalizing symptoms (accounting for 8% of the variance).

**Relationship between Maternal and Child Reports of Adjustment**

A significant difference was found between mothers' T scores on the Anxiety/Depression Scale of the CBCL and the mean T scores obtained by children when the scores on the CDI and Trait Anxiety Scale were averaged, $F(2, 47) = 22.37, p < .001$. Mothers' reports of symptoms of child anxiety and depression ($M = 59.27, SD = 10.84$) were significantly higher than their children's reports ($M = 50.98, SD = 10.22$). Absolute difference scores were calculated for each dyad on these measures to investigate agreement between mothers' and children's reports (Garber et al., 1998). A cut-off of half a standard deviation from the mean absolute difference score was used categorize dyads based on similarity of reports. The mean absolute difference score between children's and mothers' reports of symptoms of anxiety and depression was 15.2 ($SD = 9.5$). Mothers were more likely to overreport symptoms of child anxiety and depression relative to their children; 68% of mothers overreported, whereas only 14% underreported. Sixteen percent of mothers and children had similar scores.

**Discussion**

No previous research has examined the associations between self-efficacy, social support, locus of control, maternal adjustment, and psychological adjustment in children and adolescents with RAP. The relationship that was found between higher self-efficacy and lower levels of depressive symptoms makes intuitive sense. Children who are able to deal with pain are less likely to experience feelings of helplessness in regard to their pain. This could result in increased confidence in their ability to deal with other difficult situations, which in turn could protect them from mental health problems such as depression. The finding that children with greater social support from classmates and teachers reported fewer depressive symptoms is consistent with previous research. Fonagy et al. (1994) in their review of the resilience literature indicated that social support obtained from positive educational experiences facilitated adjustment in children who have been exposed to adverse life circumstances. These findings have important implications because support from individuals within the school environment could be a key factor in both the development of pain and the children's overall adjustment.

Previous research on children with pain problems has found that an active coping style and an internal locus of control are associated with better psychological adjustment compared with a passive coping style and an external locus of control (Thompson et al., 1993, 1994). Our finding of a relationship between passive coping and higher levels of child-reported depressive symptoms is
consistent with this. Follow-up analyses indicated that the specific coping styles of isolating oneself from others, catastrophizing, and behavioral disengagement were significantly correlated with children's reports of depressive symptoms (Varni et al., 1996; Walker et al., 1997). Children who isolate themselves from others when they are in pain could miss out on potentially important experiences such as reassurance and support from others. They may also feel that others cannot assist them when they are in pain and may feel alone in their experiences. Consequently, they may be more likely to experience depressive symptoms. Children with RAP who cope by using behavioral disengagement or catastrophizing could feel that they cannot effectively cope with pain and no longer attempt to deal with their symptoms (Varni et al., 1996; Walker et al., 1997). As a result, they are more likely to feel ineffective and helpless, and are more vulnerable to symptoms of depression. Children who use these coping strategies could benefit from interventions that encourage personal control and encourage them to remain active and involved with others.

Although maternal adjustment was not associated with the children's reports of symptoms of depression and anxiety, it was significantly associated with the mothers' reports of their children's symptoms of depression/anxiety. This is consistent with the findings of studies of children with physical illness (Thompson et al., 1993; Thompson, Gustafson, Hamlett, & Spock, 1992) and children with RAP (Garber et al., 1998). One explanation for this relationship is that ongoing long-term emotional problems experienced by mothers of children with RAP influence their reports of their children's adjustment. A second explanation is that mothers of children with RAP may be very aware that their children are having emotional difficulties. This may result in increased distress and psychological symptoms in themselves. It is also possible that this relationship could also be because of factors such as maternal response set across the measures used in this study; however, the relatively high internal consistency of the measures used in this study should mitigate against this.

Social support emerged as a significant predictor of mothers' reports of children's internalizing symptoms, with higher levels of social support from parents associated with higher levels of internalizing symptoms. Previous research with children with RAP has also reported that coping by seeking social support was related to greater symptoms of anxiety and depression (Varni et al., 1996). It is unclear, however, what the basis is for this association. One possibility is that mothers that observe internalizing problems in their children may strive to be very supportive and caring toward their children. A second possibility is that mothers who respond to their children's pain by giving them special privileges or relieving the children of responsibilities may be viewed as very supportive by their children. Children who are allowed to miss school or activities because of pain, however, could experience higher levels of internalizing symptoms because of greater isolation and inactivity.

Greater social support from classmates was associated with mothers' reports of fewer internalizing symptoms. This finding is consistent with the relationship between greater levels of support from classmates and lower levels of depressive symptoms. It is notable that social support from classmates was associated with both child and maternal reports of internalizing symptoms in children with RAP, and underscores the importance of the relationship between the school environment and internalizing symptoms in children with RAP.

Previous research has reported low levels of agreement between maternal and child reports of internalizing symptoms (Hodges, Gordon, & Lennon, 1990). Garber et al. (1990), found, however, that children with RAP and their mothers reported similar levels of internalizing difficulties based on a diagnostic interview. The discrepancy between maternal and child reports in the present study, with mothers reporting more internalizing symptoms than their children, could be because of the fact that questionnaires were used by both mothers and children to report symptoms of anxiety and depression. Compared with diagnostic interviews, it is possible that questionnaire measures result in underreporting of symptoms by children with RAP. Further research that compares mothers' and children's reports of internalizing symptoms using these various methods is needed to determine if the low level of agreement found in this study is an artifact of the measures used.

Our sample appeared to be typical of children with RAP in terms of reported pain and the impact of pain on daily functioning. The children's reports indicated that they experienced medium amounts of pain. Maternal reports indicated that the pain interfered with children's ability to take part in daily activities. Similar to Garber et al. (1998), children with RAP and their mothers provided similar reports of child disability. All of the participants met both Apley & Naish's (1958) and von Baeyer & Walker's (1999) criteria for RAP. One possible explanation for the low rate of depressive symptoms in this sample (6% of the participants had scores on the CDI that were at or above the 98th percentile) relative to previous studies (Garber et al., 1990; Walker et al., 1993, 1995; Wasserman et al., 1988) may be related to
socioeconomic factors. The majority of the children who participated in this study came from middle-class and upper-middle-class families. Perhaps, such families are able to provide their children with resources and supports that act to buffer psychological adjustment.

Although this study found relationships between many variables (i.e., self-efficacy, social support, coping strategies) and depressive symptoms in children with RAP, no conclusive statements can be made regarding causality. It has been noted that some children with RAP have had mental health problems that pre-dated their diagnosis (Wasserman et al., 1988). Longitudinal studies are needed, however, to clarify the causal relationships between social support, coping style, and child adjustment in this population.

A limitation of this study relates to the gender distribution of the sample, 82% of which was female. As a result, our findings may be more generalizable to girls with RAP. Studies of children with RAP have generally not investigated the influence of gender on psychological adjustment (Faull & Nicol, 1986; Garber et al., 1990; Hodges, Kline, Barbero, & Woodruff, 1985; Robinson, Alvarez, & Dodge, 1990). Woodbury (1993) reported, however, that girls with RAP were more likely to suffer from symptoms of depression, whereas boys had higher rates of anxiety. Future research should take into account the effect of gender when examining psychological adjustment in children with RAP. A second limitation relates to the measures of child adjustment. The questionnaires that were used provided an indication of whether the children had elevated symptoms of depression and anxiety; they did not assess whether these children met diagnostic criteria for a psychological disorder. Future research should investigate the influence of predictive factors on the adjustment of children with RAP utilizing diagnostic measures.

Recently, the Pediatric Rome Criteria were developed to standardize the classification of pediatric functional gastrointestinal disorders (FGIDs). These symptom-based diagnostic criteria identify five FGIDs associated with chronic or recurrent abdominal pain in childhood (i.e., functional abdominal pain, irritable bowel syndrome, functional dyspepsia, aerophagia, and abdominal migraine). RAP was not included in this classification system, however, because the criteria developed by Apley and Naish for RAP were too vague (Hyman et al., 2000). A recent study by Walker et al. (2004) found that 73% of children with RAP could be classified into one or more of the symptom subtypes defined by the Pediatric Rome Criteria. Thus, although many children identified with RAP meet the criteria for FGIDs, a significant minority do not. Future research may find the Pediatric Rome Criteria for FGIDs useful for describing the symptoms of children with RAP and selecting children with similar symptom profiles for more in-depth study (Walker et al., 2004). The usefulness of these criteria in clinical practice, however, is still open to question. Research is needed that shows that the Pediatric Rome Criteria have high sensitivity and specificity for FGIDs in children.

Longitudinal, epidemiological research that investigates the long-term psychological outcomes of children with functional abdominal pain is needed. Future research should evaluate whether young children with these pain problems and adjustment difficulties continue to suffer from psychosocial adjustment difficulties as they grow older. Although a portion of children with functional abdominal pain may recover from their pain problem, it is unknown whether symptoms of depression remain as long-term issues for this population (Apley & Hale, 1973; Boyle, 1996; Christensen & Mortensen, 1975).

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References


