

# Latent Variable Analysis of Coping, Anxiety/Depression, and Somatic Symptoms in Adolescents With Chronic Pain

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Reports of adolescents' coping with recurrent pain, symptoms of anxiety/depression, and somatic complaints were obtained from a sample of 164 adolescents with recurrent abdominal pain and their parents. Confirmatory factor analysis revealed that coping consisted of 3 nonorthogonal factors: Primary Control Engagement Coping (problem solving, emotional expression, and emotional regulation), Secondary Control Engagement Coping (positive thinking, cognitive restructuring, acceptance, and distraction), and Disengagement Coping (denial, avoidance, and wishful thinking). Structural equation modeling using latent variables revealed that secondary control engagement coping predicted lower levels of anxiety/depression symptoms and somatic complaints, and disengagement coping was related to higher levels of anxiety/depression and somatic complaints. Implications for understanding child and adolescent coping with pain are highlighted.

*Keywords:* coping, pain, anxiety/depression, adolescence, stress responses

The ways that children and adolescents cope with stress and pain (i.e., efforts to regulate emotions, thoughts, behaviors, and physiological arousal) play a central role in current approaches to pediatric pain (Compas & Boyer, 2001). How children and adolescents cope with pain may affect the association of pain and related stressors with physical and psychological health and well-being (Walker, 1999). Moreover, cognitive-behavioral interventions to enhance pain-management skills and reduce pain episodes often focus on teaching children and adolescents coping skills as a means of improving pain outcomes (e.g., Holden, Deichmann, & Levy, 1999; Janicke & Finney, 1999). In spite of the importance of coping in pediatric pain, however, research in this area has been limited in several ways.

First and foremost, previous studies have relied on a single informant (either the child or adolescent or a parent) to provide almost all of the information on stress, coping, and pain. Typically, either the child or adolescent or the parent provides reports about both coping and symptoms. Such monomethodism is not unique to the pediatric pain literature but has hindered child and adolescent coping research in general (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). When measures of symptoms and coping are obtained from a single source, they may correlate with each other for methodological rather than substantive reasons (e.g., shared method variance). Reliance on a single method or source of information inflates estimates of the relations between the targeted constructs (Cole, 1987). Without controlling for shared method variance, there is a serious risk of overestimating relations between coping and symptoms.

Second, instruments used to measure coping have had a number of limitations (Compas et al., 2001). For instance, some questionnaires used to assess child and adolescent reports are downward extensions of adult measures (e.g., Gil, Williams, Thompson, & Kinney, 1991) and, thus, may overlook potentially important developmental considerations (Rudolph, Dennig, & Weisz, 1995). Furthermore, many studies have used coping measures that do not focus on coping with pain in particular but, rather, ask about coping with life stress in general (e.g., Holden, Rawlins, & Gladstein, 1998; Lewis & Kliever, 1996). As Weisz and colleagues have demonstrated in studies of children and adolescents in medical settings, strategies that are effective for coping with other types of stress may prove ineffective for managing pain (Band & Weisz, 1990; Weisz, McCabe, & Dennig, 1994). Therefore, studying coping within the context of specific stressors and situations is critical. Finally, some coping measures include strategies that

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This research was supported by funds from the Children's Miracle Network and from the Patient Oriented Research Fund of Fletcher Allen Health Care, Burlington, Vermont. We gratefully acknowledge the families who participated in this study.

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overlap with symptom distress (e.g., Causey & Dubow, 1992), which may lead to inflated estimates of the relation between symptoms and coping.

Two studies have addressed some of these concerns in the assessment of children's coping with recurrent pediatric pain (Thomsen et al., 2002; Walker, Smith, Garber, & Van Slyke, 1997). In a study of former and current pediatric patients with recurrent abdominal pain (RAP), Walker et al. (1997) examined three broad dimensions of coping (active, passive, and accommodative coping). In cross-sectional analyses of child and adolescent self-reports of coping with pain, Walker et al. found that passive coping (self-isolation, behavioral disengagement, catastrophizing) was positively associated with greater pain, somatic symptoms, disability, and depressive symptoms. Active coping (problem solving, seeking social support, rest, massage or guard, condition-specific strategies) correlated with higher levels of psychological and somatic symptoms, whereas accommodative coping (acceptance, minimizing pain, self-encouragement, distract or ignore, stoicism) showed mixed results in correlations with outcome variables. In short-term prospective analyses with this sample, passive coping and accommodative coping predicted changes in pain 2 weeks after the clinic visit. Although Walker et al.'s findings impressively demonstrate that passive coping with abdominal pain through disengagement and catastrophization may aggravate symptoms, the study does not clarify which coping strategies may help to reduce or relieve symptoms. Furthermore, Walker et al. used a monomethod assessment strategy, collecting only child and adolescent self-reports of coping and symptoms, which may have been limited by children's and adolescents' ability and inclination to recall past episodes of pain. Use of only a single method in this study leaves the results subject to monomethod bias.

Thomsen et al. (2002) also examined coping with pain in a sample of children and adolescents who met criteria for pediatric RAP (Apley, 1975). These researchers measured parents' reports of children's and adolescents' use of three coping dimensions (primary control engagement coping, secondary control engagement coping, and disengagement coping) that are conceptually similar to the active, accommodative, and passive coping factors studied by Walker et al. (1997; see Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000). Path analysis demonstrated that both primary control engagement coping (problem solving, emotional regulation, emotional expression) and secondary control engagement coping (acceptance, distraction, positive thinking, cognitive restructuring) were cross-sectionally related to fewer somatic symptoms and symptoms of anxiety and depression; only secondary control engagement coping was related to lower pain. These findings demonstrate that children and adolescents with RAP who purposefully use certain coping strategies when they have stomach pain (e.g., distracting themselves or talking with someone about the pain) show lower levels of psychological and somatic symptoms. Findings for disengagement coping (denial, avoidance, and wishful thinking) were mixed. Findings from previous studies of children's coping with other pediatric disorders, such as headache, sickle cell disease, and juvenile arthritis, suggest that disengagement coping is associated with poorer adjustment to pain (e.g., Bandell-Hoekstra et al., 2002; Gil et al., 2001; Kashikar-Zuck, Goldschneider, Powers, Vaught, & Hershey, 2001; Thastum, Herlin, & Zachariae, 2005). That is, children who use more disengagement (passive) coping strategies to deal with their con-

dition have increased rates of depressive symptoms, functional disability, and emergency room or doctor's office visits.

Building on the findings from Walker et al. (1997), Thomsen et al. (2002) demonstrated that coping with pain through primary control engagement coping or secondary control engagement coping predicted better overall adjustment. Nevertheless, an important limitation of this study—reliance on parents as the sole source of information about both children's coping and outcomes—requires additional investigation before firm conclusions about coping with recurrent pediatric pain can be drawn. Because pain and associated psychological symptoms such as anxiety (Walker, Garber, & Greene, 1993) are internalizing in nature, these symptoms may be less apparent to observers (compared with externalizing symptoms, such as aggressive behavior). Parents, therefore, may provide better information on observable aspects of coping and symptoms, whereas children and adolescents may be better able to report on the covert aspects of these processes.

In response to these issues in understanding the role of coping in pediatric pain, the current study was designed to address two related questions. First, is there convergence between parent and child reports of the ways that adolescents cope with episodes of recurrent pain? Parents and adolescents both provide important perspectives on coping with pain; for instance, parents may be especially aware of overt coping responses, and children may be especially able to report on covert coping responses. Nevertheless, it is critical to establish the degree to which their reports of coping correspond. Second, what is the association between coping and symptoms of somatization and emotional distress in children with recurrent pain, after controlling for method variance associated with parent and child reports? To continue to develop pain management interventions that teach effective coping skills, it is important to establish which coping strategies, apart from informant effects or shared method variance, are helpful in relieving pain-related symptoms. We addressed both of these questions simultaneously using a multitrait-multimethod structural equation modeling (SEM) approach.

We obtained parent and adolescent reports of adolescents' coping with a recent episode of stomach pain in a sample of children and adolescents with RAP. We hypothesized that parent and adolescent reports of three coping dimensions (primary control engagement, secondary control engagement, disengagement) would manifest both discriminant and convergent validity. We further hypothesized that secondary control engagement coping would be associated with lower levels of somatic symptoms and anxiety/depression, and that disengagement coping would be related to higher levels of somatic symptoms and anxiety/depression. Confirmatory factor analysis (CFA) and SEM were the main statistical methodologies in this study as they allowed for a priori testing of measurement and theoretical models of coping developed in previous research (see Compas et al., 2001, and Connor-Smith et al., 2000, for discussion of the coping model; see Kline, 1998, for discussion of theory testing and SEM). No previous study has examined the convergence of parent and adolescent measures of coping or used latent variable modeling to control for shared method variance while testing theory-based relations between multiple dimensions of coping and various symptoms in children or adolescents (Compas et al., 2001). CFA and SEM, coupled with a multimethod assessment strategy, enabled us not only to test various measurement-related assumptions but also to control for

the potentially problematic effects of monomethod bias in the study of adolescents' coping with abdominal pain.

## Method

### Participants

Participants were 164 adolescents with RAP, ages 11 to 18 years, and one of their parents (90% mothers). The mean age of the sample was 13.7 years ( $SD = 2.0$ ), and 54.9% of the sample was girls. The mean occupational status of the parents, based on the Hollingshead Occupational Index (Hollingshead, 1975; range = 1–9), was 6.0 ( $SD = 2.2$ ), or equivalent to that of technicians, semiprofessionals, and small business owners. The sample was primarily Caucasian (94%), representative of the demographic characteristics of northern New England and northern New York State from which the sample was drawn.

Medical chart reviews were conducted by three research assistants trained in a procedure developed by one of the authors (details about this procedure can be obtained from the authors). Briefly, research assistants extracted data regarding the date of the child's first appointment with the physician, symptoms that were reported as occurring prior to the first appointment (e.g., nausea, vomiting, diarrhea), duration of abdominal pain episodes, medical procedures completed during the physician visit, and diagnosis. Charts were randomly selected from the sample for training purposes, and training was continued until all raters achieved 90% agreement with the author. Information drawn from the participants' charts revealed that 53.4% had a functional RAP diagnosis, 33.5% had an organic RAP diagnosis, and 13.0% had an unknown RAP diagnosis. The category of "unknown RAP diagnosis" described patients who did not complete follow-up tests or procedures that would have provided complete diagnostic information. To receive a functional pain diagnosis, there had to be no evidence of an organic basis for the pain. The group identified as having functional pain included those with functional recurrent abdominal pain (23.8%), irritable bowel syndrome (19.5%), functional dyspepsia (5.5%), or more than one of these functional diagnoses (2.4%). The category of functional constipation was included as a category in chart reviews, but no patients fell in this category. The group with organic pain included participants with gastrointestinal reflux, including hernias and esophagitis (9.8%); lactose malabsorption (4.3%); Crohn's disease (5.5%); dyspepsia or gastritis (0.6%); an infectious or postinfectious process (2.4%); unspecified inflammatory bowel disease (1.2%); more than one of these organic diagnoses (3.7%); or an organic diagnosis not specified under our original gastrointestinal diagnostic categories, such as rib pain or cysts (6.1%). At their initial appointments with the pediatric gastroenterologist, participants reported a mean of 4.0 abdominal pain symptoms ( $SD = 2.0$ ) and indicated that they had experienced abdominal pain for a mean of 24.9 months ( $SD = 31.4$ ).

### Procedures

Participants were referred from a pediatric gastroenterology clinic, a tertiary care facility that serves the majority of referrals from northern New England and upstate New York. A pediatric gastroenterologist recruited participants in person at the time of the initial medical evaluation ( $n = 140$ ) or through a follow-up letter within a year of their first appointment for RAP ( $n = 24$ ).<sup>1</sup> Participants were considered eligible for the study if they met Apley (1975) criteria for RAP, that is, if they had experienced functionally impairing abdominal pain at least three times over 3 consecutive months. In the group of adolescents recruited in person, 92% of eligible patients agreed to participate, and 80% of those who agreed completed questionnaires. In the group of adolescents contacted by letter, 32% of those eligible agreed to participate and returned questionnaires. The mean time from diagnosis to questionnaire completion for the group recruited by letter was 261 days ( $SD = 128$ ). The mean time since

diagnosis for the group recruited in person was 11 days ( $SD = 13$ ). Informed consent was obtained from the parents and assent obtained from the children; parents and adolescents completed all questionnaires at home and returned them by mail. There were no significant differences between participants recruited by letter and those recruited in person on any of the measures of coping, anxiety/depression, or somatic symptoms.

### Measures

**Child Behavior Checklist.** The Child Behavior Checklist (CBCL; Achenbach, 1991) measured parents' perceptions of their children's psychological and somatic symptoms over the previous 6 months. The CBCL is a 118-item checklist of problem behaviors rated on a 3-point scale ranging from *not true* to *often or always true*. Because of their relevance to symptoms associated with RAP (e.g., Walker et al., 1993), the Anxiety/Depression subscale (12 items) and the Somatic Complaints subscale (9 items) were used in this study. Data are reported as  $T$  scores based on separate norms for age and gender to allow comparison of this sample to norms; however, raw scores were used in the analyses to allow for maximum variance. Reliability and validity of the CBCL are well established.

**Youth Self-Report.** Adolescents completed the Youth Self-Report (YSR; Achenbach, 1991), a 118-item self-report version of the CBCL. Reliability and validity of the YSR are also well established. As with the CBCL data, the Anxiety/Depression subscale (12 items) and Somatic Complaints subscale (9 items) were used in this study. The internal consistency reliability for these scales on the CBCL and YSR were greater than .80.

**Responses to Stress Questionnaire.** Both parents and adolescents completed the 57-item abdominal pain version of the Responses to Stress Questionnaire (RSQ; Connor-Smith et al., 2000), which measures coping and involuntary responses to stress in regard to specific stressors or domains of stress. In this study, only the three coping dimensions (primary control engagement, secondary control engagement, disengagement) were examined. In this version of the RSQ, participants completed the items in reference to recent episodes of abdominal pain, and the stressor was identified specifically in each item as a "stomachache." Participants respond to items on a 4-point scale ranging from 1 (*not at all*) to 4 (*a lot*) in regard to their responses to abdominal pain over the past 6 months.

The RSQ includes 10 subtypes of coping that reflect engagement or disengagement in voluntary responses to stress, each of which is measured by parcels of three items. CFA has supported a three-factor coping model (Connor-Smith et al., 2000; Wadsworth, Reickmann, Benson, & Compas, 2004). The voluntary coping factors are Primary Control Engagement Coping (9 items; problem solving, emotional expression, emotional regulation), Secondary Control Engagement Coping (12 items; distraction, acceptance, positive thinking, cognitive restructuring), and Disengagement Coping (9 items; avoidance, denial, wishful thinking). Raw scores on these scales were used in the current analysis (sums for each factor were used in the SEM analyses). Sample items from each scale appear in the Appendix.

In prior studies using the RSQ to measure adolescents' self-reports of their responses to economic stress and parental conflict, coefficient alphas for the three coping factors ranged from .67 to .88 for child self-reports (Thomsen et al., 2002; Wadsworth & Compas, 2002) and from .53 to .83 for parent reports (Connor-Smith et al., 2000; Langrock, Compas, Keller, Merchant, & Copeland, 2002). Test-retest reliability in a sample of adolescents ranged from .69 to .81 (mean of .75) for the three factors (Connor-Smith et al., 2000). Convergent validity correlations between parent and adolescent reports on the RSQ have been shown to be significant and

<sup>1</sup> These two groups were included to achieve maximum sample size for SEM. Analyses comparing the two groups revealed no significant differences between the two groups in terms of key demographic, medical, or psychological variables ( $p < .05$ ).

moderate in magnitude (mean  $r$ s ranged from .23 to .33) and significantly higher than discriminant validity correlations (Connor-Smith et al., 2000; Jaser et al., 2005). In the current study, coefficient alphas on the coping factors for parents' reports were as follows: Primary Control Engagement Coping,  $\alpha = .65$ ; Secondary Control Engagement Coping,  $\alpha = .68$ ; and Disengagement Coping,  $\alpha = .58$ . Coefficient alphas on the coping factors for adolescents' self-reports were as follows: Primary Control Engagement Coping,  $\alpha = .76$ ; Secondary Control Engagement Coping,  $\alpha = .77$ ; and Disengagement Coping,  $\alpha = .62$ .

## Results

### Preliminary Analyses

We compared participants with organic versus functional pain on key demographic and psychological variables to determine whether the basis of the pain meaningfully distinguished participants from one another. (Children with unknown pain diagnoses, 13% of the sample, were not included in these analyses.) Chi-square and  $t$  tests revealed no significant group differences on gender, age, ethnicity, socioeconomic status, number of months with pain, and number of symptoms,  $p$ s  $> .05$ , indicating that the two groups were demographically similar. For the psychological variables, multivariate analyses of variance were conducted on the parent and adolescent reports. The analyses consisted of the single independent variable of RAP diagnosis (organic vs. functional) and five dependent variables: the three factors from the RSQ and the two subscales from either the YSR or the CBCL (Anxiety/Depression and Somatic Complaints). Neither the parent-report data nor the child-report data revealed significant main effects for diagnostic group,  $p > .05$ . On the basis of these analyses, we combined the organic and functional groups for subsequent analyses.

Because of concerns in the coping literature that issues of development and gender are not adequately addressed (Compas et al., 2001), we also examined adolescents' age and gender in relation to coping and symptoms. Age was modestly correlated with parent reports of somatic complaints ( $r = .23$ ,  $p < .01$ ) but not with anxiety/depression symptoms. There were no significant correlations between age and any of the parent-reported RSQ scales. Of the adolescent self-reports, only the Primary Control Engagement Coping scale correlated with age ( $r = -.19$ ,  $p < .05$ ). Gender differences on CBCL subscales were nonsignificant. We found significant gender differences in Primary and Secondary Control Engagement Coping, similar to previous studies, with girls reporting higher levels of coping than boys (Connor-Smith et al., 2000).

Means and standard deviations for the coping and symptom variables are displayed in Table 1. Examination of normalized  $T$  scores on the CBCL indicated that parents reported that their children experienced above average symptoms of anxiety/depression ( $M = 57.3$ ,  $SD = 8.3$ ) and high levels of somatic complaints ( $M = 66.0$ ,  $SD = 8.9$ ). According to parent reports, 44.7% of adolescents scored in the borderline clinical range in terms of somatic complaints or above the 95th percentile for the normative sample, and 33.6% scored in the clinical range or above the 98th percentile for the normative sample. Adolescent self-reports of symptoms were similar to the parent reports, in that adolescents reported above average levels of anxiety/depression symptoms ( $M = 56.0$ ,  $SD = 7.9$ ) and high levels of somatic complaints ( $M =$

Table 1  
*Means and Standard Deviations of Coping and Symptoms Variables*

Variable	<i>M</i>	<i>SD</i>
Primary control engagement coping (parent)	2.76	0.54
Secondary control engagement coping (parent)	2.07	0.49
Disengagement coping (parent)	2.14	0.44
Primary control engagement coping (child)	2.59	0.60
Secondary control engagement coping (child)	2.35	0.54
Disengagement coping (child)	2.30	0.50
Anxiety/depression <i>T</i> score (parent)	57.31	8.29
Somatic complaints <i>T</i> score (parent)	65.96	8.88
Anxiety/depression <i>T</i> score (child)	55.99	7.88
Somatic complaints <i>T</i> score (child)	61.13	7.70

*Note.* Anxiety/depression and somatic complaints scores are reported as  $T$  scores for purposes of comparison to normative data, but analyses were conducted with raw scores. Coping scores are presented as raw scores (range = 1–4).

61.1,  $SD = 7.7$ ) on the YSR. According to adolescent reports, 27.0% scored in the borderline clinical range in terms of somatic complaints, and 15.8% scored in the clinical range.

Parents and adolescents reported that the adolescents used all three types of coping when dealing with abdominal pain. Dependent  $t$  tests were conducted comparing the raw scores of coping strategies that participants used, within informant, and a Bonferroni adjustment was made for inflated Type I error. Parents reported that adolescents used significantly more primary control engagement coping strategies ( $M = 2.76$ ) than secondary control engagement coping strategies ( $M = 2.07$ ),  $t(156) = 14.5$ ,  $p < .01$ , and significantly more primary control engagement coping strategies ( $M = 2.76$ ,  $SD = .54$ ),  $t(156) = 12.54$ ,  $p < .01$ , than disengagement coping strategies ( $M = 2.14$ ). Parents' reports of their adolescents' use of secondary control engagement coping and disengagement coping strategies were not significantly different ( $p = .079$ ). Adolescents reported that they used more primary control engagement coping strategies ( $M = 2.59$ ,  $SD = .60$ ) than either secondary control engagement coping strategies ( $M = 2.35$ ,  $SD = .59$ ),  $t(158) = -8.48$ ,  $p < .01$ , or disengagement coping strategies ( $M = 2.30$ ,  $SD = .50$ ),  $t(158) = 6.07$ ,  $p < .01$ , and significantly more secondary control engagement coping strategies than disengagement coping strategies,  $t(156) = 12.26$ ,  $p < .01$ .

Comparison of parent and adolescent reports of the three coping dimensions revealed significant differences for all factors. Parents reported that adolescents used more primary control engagement coping strategies ( $M = 2.76$ ) than adolescents reported that they used ( $M = 2.59$ ),  $t(151) = 3.05$ ,  $p = .003$ . Conversely, adolescents reported using more secondary control engagement coping strategies ( $M = 2.34$ ) than parents reported for their adolescents ( $M = 2.07$ ),  $t(151) = 5.25$ ,  $p < .001$ . And adolescents reported using more disengagement coping strategies ( $M = 2.30$ ) than their parents reported for their adolescents ( $M = 2.14$ ),  $t(151) = 3.47$ ,  $p = .001$ . These differences were all small in magnitude.

Zero-order correlations among the parent- and child-report measures of children's symptoms and coping are reported in Table 2. Generally, measures of symptoms (somatic complaints and anxiety/depression) were positively correlated and tended to be negatively correlated with the coping measures (when such correlations were significant).



Table 2  
Correlations Between Coping and Symptoms Variables

Variable	1	2	3	4	5	6	7	8	9	10
1. Primary control engagement coping (parent)	—									
2. Secondary control engagement coping (parent)	.18*	—								
3. Disengagement coping (parent)	-.29**	.05	—							
4. Primary control engagement coping (child)	.24**	.05	-.13	—						
5. Secondary control engagement coping (child)	.14†	.32**	.06	-.06	—					
6. Disengagement coping (child)	-.04	.07	.26**	-.21**	-.02	—				
7. Anxiety/depression (parent)	-.33**	-.39**	.04	-.11	-.23**	-.02	—			
8. Somatic complaints (parent)	-.19*	-.28**	-.02	.05	-.21*	-.05	.44**	—		
9. Anxiety/depression (child)	-.13	-.31**	-.02	-.19*	-.33**	-.06	.58**	.28**	—	
10. Somatic complaints (child)	-.08	-.05	.12	.00	-.21**	-.09	.18*	.35**	.50**	—

†  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$ .

### Latent Variable Analyses

We conducted a two-step modeling procedure, as recommended by Anderson and Gerbing (1988). First, we used CFA to address measurement-related hypotheses in keeping with the three-factor model of coping of Connor-Smith et al. (2000). Second, we used SEM to address theoretical questions about the relations between coping and symptoms of pain and anxiety/depression. In both sets of analyses, we obtained maximum likelihood parameter estimates using AMOS 4 (Arbuckle, 1999). These procedures enabled us to test whether or not a particular priori measurement and theoretical model provided an adequate fit to the observed data (Bollen, 1989).

Following convention, we evaluated models in terms of the chi-square goodness-of-fit index; however, this index is sensitive to sample size. When the  $N$  is large, relatively small discrepancies between the model and the data can be statistically significant (e.g., Bentler & Bonnett, 1980; Bollen, 1989). Consequently, we also examined additional goodness-of-fit indices that are less sensitive to sample size. These indices included the normed fit index (NFI), the relative fit index (RFI), the incremental fit index (IFI), the Tucker–Lewis Index (TLI), the comparative fit index (CFI), as well as Steiger's (1990) root-mean-square error of approximation (RMSEA). For the NFI, RFI, IFI, TLI, and CFI, models with a good fit have values of .95 or greater. For the RMSEA, confidence intervals containing .06 indicate a close fit (see Hu & Bentler, 1999).

**Measurement model.** Following Widaman's (1985) recommendations, we constructed a measurement model in which each measure loaded onto exactly one of five trait factors and exactly one of two method factors. The trait factors consisted of the three dimensions of coping and the two outcome dimensions (anxiety/depression and somatic complaints). The method factors represented the child self-reports and the parent reports. The variance of each measure was, therefore, partitioned into three parts: trait variance, method variance, and random error variance.

We started with a model in which the trait factors were oblique, the method factors were oblique, but the trait and method factors were orthogonal to each other. Variances of the latent variables were standardized to identify the model. Although this model provided a good fit to the data, large standard errors and out-of-range values suggested that the model was overparameterized. Following Widaman's (1985) suggestions, we tested more parsimonious models in which either the trait factors or the method

factors were constrained to be orthogonal. The orthogonal method model (depicted in Figure 1) also provided a good fit,  $\chi^2(15, N = 164) = 14.7, p > .40$ , but still generated out-of-range parameter estimates. Next, the orthogonal trait model proved to be too parsimonious; the solutions suggested serious problems of misspecification. Consequently, we returned to the orthogonal-method, oblique-trait model and added several conceptually defensible (not empirically driven) equality constraints on selected factor loadings. In particular, the three trait factor loadings for the child RSQ measures were constrained to be equal, as were the three method factor loadings (although trait and method loadings were not constrained to equal one another). We placed similar equality constraints on the parent RSQ factor loadings. Similar sets of constraints were imposed on the measures of anxiety/depression and somatic complaints. Although this model generated a significant chi square,  $\chi^2(27, N = 164) = 47.7, p > .05$ , all other goodness-of-fit criteria suggested that the model fit the data well: The IFI and CFI were all greater than .94. The RMSEA was a little large (.069), but its 90% confidence interval included .06 (.035, .100). By the standards recommended by Hu and Bentler (1999), this model provided a good fit to the data.

The good fit of this model coupled with the pattern of parameter estimates shown in Table 3 provide evidence of convergent and discriminant validity. Evidence of convergent validity derives from the fact that the trait factor loadings were all statistically significant ( $ps < .001$ ) even after extracting shared method variance with the parent and child method factors. By virtue of the multitrait–multimethod design and our extraction of both trait and method factors, we are reasonably assured that the trait factors represent the constructs of interest and not parent- or child-report method variance. Evidence of discriminant validity derives from several factors. First, the model fit the data well without the addition of extra factors, cross-loadings, or post hoc correlated disturbances. Second, the correlations between the trait factors, although often significantly different from zero, were also significantly less than unity. (None of their 90% confidence intervals contained 1.0.) Thus, the underlying trait factors (after extracting systematic method variance) were not conceptually or empirically redundant of one another.

**Structural model.** Next, we constructed a structural model in which the two outcome factors (Somatic Complaints and Anxiety/Depression) were regressed onto the three coping factors. In this

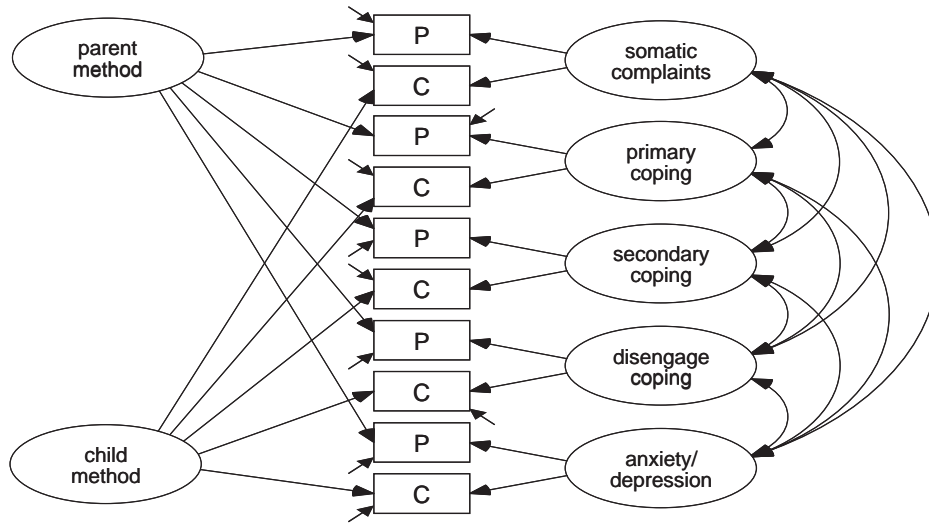


Figure 1. Measurement model of coping and symptoms. P = parent; C = child.

model, we retained the previously described measurement model. This model is depicted in Figure 2. As shown in the path diagram, all six paths connecting the three coping factors to the two outcome factors were freely estimated, the three coping factors were oblique, and the disturbance terms for the two outcome factors were allowed to correlate. These specifications render the struc-

tural portion of the overall model just-identified, just like the previous measurement model. Consequently, the model provides a fit that is equivalent to the described measurement model (Kline, 1998). We used this model to estimate the latent variable path coefficients of interest. The other parameter estimates are presented in Table 3.

Table 3  
Measurement Model Factor Loadings, Factor Correlations, and Error Variances

Factor	Trait loading	Method loading
Primary Control Engagement Coping		
RSQ1—parent	.72	.05
RSQ1—child	.38	.53
Secondary Control Engagement Coping		
RSQ2—parent	.79	.06
RSQ2—child	.37	.51
Disengagement Coping		
RSQ3—parent	.87	.06
RSQ3—child	.44	.61
Somatic Complaints		
CBCL—parent	.64	.35
YSR—child	.63	.35
Anxiety/Depression		
CBCL—parent	.81	.46
YSR—child	.71	.40

	Trait factor correlations				
	1	2	3	4	5
1. Primary Coping	—				
2. Secondary Coping	.52***	—			
3. Disengagement	.35**	.53***	—		
4. Somatic Complaints	.25*	.02	.42***	—	
5. Anxiety/Depression	.08	-.16	.42***	.58***	—

Note. RSQ = Responses to Stress Questionnaire; CBCL = Child Behavior Checklist; YSR = Youth Self-Report. All trait factor loadings are significant ( $p < .001$ ). All method factor loadings greater than .20 are significant ( $p < .001$ ).  
\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . (All one-tailed.)

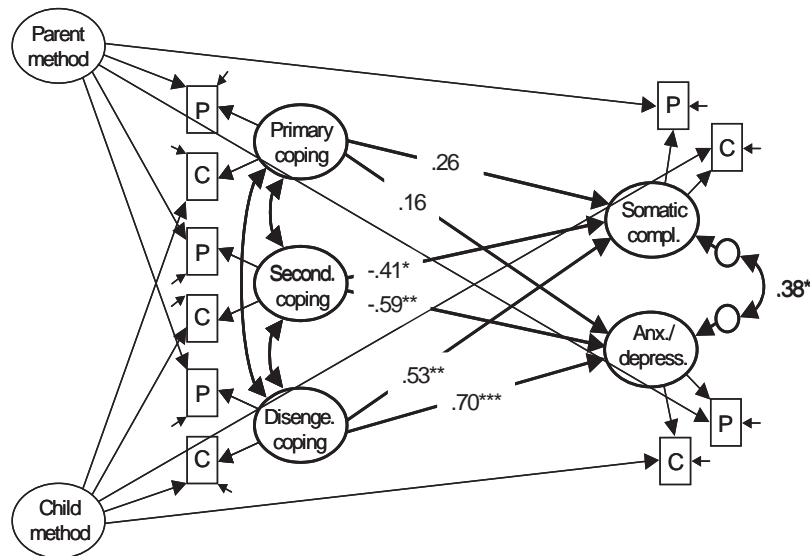


Figure 2. Structural model predicting anxiety/depression and somatic complaints from coping. Numbers in or on paths are standardized regression coefficients. Numbers above variables are percentage of variance accounted for by the model (squared multiple correlations). P = parent; C = child; Disenge. coping = disengagement coping; Somatic compl. = somatic complaints; Anx./depress. = anxiety/depression. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

Examination of the coefficients for the paths connecting the coping factors to the child outcome factors revealed four sizable and statistically significant associations. On the one hand, Secondary Control Engagement Coping was negatively related to the Anxiety/Depression factor ( $z = -2.56, p < .006$ , one-tailed) and to the Somatic Complaints factor ( $z = -1.73, p < .042$ , one-tailed). More use of secondary control engagement coping strategies was associated with fewer somatic complaints and anxiety/depression symptoms. On the other hand, Disengagement Coping was positively related to Somatic Complaints ( $z = 2.94, p < .002$ , one-tailed) and Anxiety/Depression ( $z = 3.58, p < .001$ , one-tailed). More use of disengagement coping was associated with more somatic complaints and symptoms of anxiety/depression. Primary Control Engagement Coping was not significantly related to Anxiety/Depression and was only marginally related to Somatic Complaints ( $p < .088$ , one-tailed), after controlling for the other two coping factors. Correlations among the coping factors were significant, ranging from .35 to .53.

## Discussion

This study had two primary aims—to test a control-based model of children's coping on the basis of child and parent reports and to examine the association between coping and symptoms of somatization and emotional distress in children with RAP. The findings indicate that children's coping can be successfully modeled by deriving latent indicators of coping that are based on parent and adolescent reports. Furthermore, the findings add to the literature on the association between secondary control engagement coping and disengagement coping responses with somatic and emotional symptoms in children coping with pain.

With regard to the first goal, this study demonstrated that adolescent and parent reports of coping can be meaningfully

merged into cohesive latent constructs, reflecting the existence of underlying coping factors separate from informant effects. CFA demonstrated that the theoretical model of coping (Compas et al., 2001; Connor-Smith et al., 2000) fits data from both parents and children quite well. The measurement model showed that categorizing coping responses as Primary Control Engagement Coping, Secondary Control Engagement Coping, and Disengagement Coping is empirically sound. Each of the indicators loaded significantly on the expected factors, and indices of fit and parsimony were adequate to excellent. Thus, the control-based model of coping on which the RSQ is based appears to be a robust representation of the structure of coping in adolescents. To our knowledge, this is the first use of CFA to confirm a latent variable model of child and adolescent coping. The factor loadings for the "parent-report factor" were all relatively small, suggesting that the "parent method" factor did not contribute strongly to the parents' reports of their children's coping. This supports the view that the coping factors are cohesive constructs independent of method or informant variance.

Despite our success in confirming a latent variable model of coping, it is noteworthy that the simple correlations between parent and adolescent reports of adolescents' coping were significant but small in magnitude, ranging from  $r = .24$  to  $r = .32$ . These correlations are similar to other parent-adolescent reports of coping reported in previous studies (e.g., Connor-Smith et al., 2000; Jaser et al., 2005), and they suggest that there is still unique information in the reports of parents and adolescents that may not be reflected in the latent variables derived from these two source of information.

When we examined the structural model, which predicted symptoms of anxiety/depression and somatic complaints from the three coping factors, we found that the model was also a good fit to the

data. Fit indices were adequate to excellent, demonstrating that how children cope with episodes of recurrent stomach pain is related to their emotional distress and somatic symptoms. Additional testing will be necessary to further develop this model with RAP and other samples. Nevertheless, this model demonstrates that the theoretical, multidimensional construct of coping, when cleared of error and bolstered by multiple informants, is in fact related to the psychological and somatic symptoms associated with a stressor. In other words, coping matters: Coping strategies such as thinking positively about a stressor, avoiding a stressor, or problem solving about the stressor, for example, are significantly related to symptoms associated with the stressor.

In this study, the use of SEM with latent variables provided several advantages. First, SEM permitted the simultaneous testing of several associations among independent and dependent variables, which allowed for greater parsimony than is possible with repeated multiple linear regression analyses. Second, SEM allowed us to control for random error, as well as systematic error attributable to common method variance. It was important in this multitrait-multimethod study to parse out the "true" nature of relations among variables, separate from relations that simply were due to shared method variance in measures of coping and symptoms (Campbell & Fiske, 1959). In addition, SEM allowed us to examine an a priori theoretical model of coping, developed in previous work (Compas et al., 2001; Connor-Smith et al., 2000). This three-factor model of coping had been previously supported in tests using single informants; however, this study represents the first time that a multi-informant test of the model has been conducted. Finally, SEM with latent variables allowed us to test hypothetical constructs measured by several indicators (that is, coping and symptoms as reported by both parents and children) without measurement error. This provided a cleaner analysis of the cross-sectional associations between these three types of coping and psychological and somatic symptoms.

With regard to the second goal of this study, we replicated many of the findings of Walker et al. (1997) and Walker, Smith, Garber, and Claar (2005) and extended some of the findings of Thomsen et al. (2002) in terms of the relations between coping and symptoms in children with RAP. For example, Walker et al. (1997, 2005) demonstrated that, on the basis of children's reports of how they coped with pain, disengagement (or passive coping) strategies (e.g., self-isolation) were related to increases in both psychological symptoms (depression) and somatic symptoms. It is notable that this relation between disengagement strategies and symptoms was not found in path modeling analyses conducted by Thomsen et al. (2002) in their analyses of parents' reports of their children's coping with pain. Similar to Walker et al. (1997, 2005), the current study shows a strong link between the latent variable representing disengagement coping strategies (e.g., wishful thinking, denial) and concurrent reports of anxiety/depression and somatic complaints. In addition, Thomsen et al. (2002) and Walker et al. (2005), and to some degree Walker et al. (1997) in prospective analyses of coping and pain, found links between secondary control engagement coping (or accommodative coping) strategies and symptoms, and these links were also found in the current study. On the basis of these three studies, it appears that coping with pain by adapting to the problem (e.g., cognitive restructuring, acceptance) is associated with fewer psychological and somatic symptoms.

The current study did not find significant relations between primary control engagement (or active) coping strategies and symptoms, which contrasts with the findings of both Thomsen et al. (2002) and Walker et al. (1997), who have shown these strategies to be associated with fewer pain-related symptoms. The current findings demonstrate that these coping strategies are not related to symptoms, and in fact, there appears to be a trend for primary control engagement coping strategies to be related to increased somatic symptoms. The difference between these findings and those of Walker et al. (1997) can be partly attributed to differences in the coping strategies that make up this dimension of coping. For example, the active coping construct of Walker et al. (1997) consists of strategies that include seeking social support, rest, and massage/guard (e.g., "Bend over or curl up to try to feel better"), some of which may be more conceptually similar to secondary control engagement coping strategies on the RSQ (e.g., distraction).

The difference between the current findings concerning primary control engagement coping and those of Thomsen et al. (2002) are more puzzling because both used the same measures to assess coping and symptoms and, particularly, because bivariate correlations in the current study show primary control engagement coping strategies to be negatively related to symptoms. It is possible that suppression occurred in the present study, as it also may have in Thomsen et al. (2002).<sup>2</sup> When examined alone in relation to symptoms (i.e., in simple correlations), primary control engagement coping is related to fewer symptoms. When it is analyzed taking into account the effects of other coping strategies and informant effects (i.e., in SEM), however, primary control engagement coping does not appear to be related to internalizing or somatic symptoms. This finding is consistent with prior research on control and coping, showing that when children face relatively uncontrollable stressors, such as illness, pain, medical procedures, and separations from parents, the most effective coping strategies are those that help the child adapt to the stressor (secondary control engagement coping) rather than control it (primary control engagement coping; e.g., Band & Weisz, 1990; Weisz et al., 1994).

In the current study, when taking into consideration past research and the fact that children who used primary control engagement coping also used other coping strategies (thus making suppression effects important to consider), it is possible that primary control engagement coping strategies may have little benefit in managing pain; however, future research will need to address this question. Moreover, the internal consistency reliabilities of the parent reports of child coping were relatively low (ranging from .58 to .68), and this may have constrained the degree to which associations between coping and somatic and anxiety/depression symptoms could be detected. Finally, the internal consistency reliability for the Disengagement Coping scale was somewhat lower than for either of the engagement coping scales for adolescent and parent reports, warranting further attention to the reliability of the Disengagement Coping scale in use of the RSQ in studies of coping with pain.

<sup>2</sup> *Suppression* is a statistical effect in which "the relation of a predictor to a criterion once corrected for its intercorrelations with other predictors is quite different from that suggested by its simple correlation with the criterion" (Kline, 1998, p. 39).



The findings of this study suggest that coping strategies may make a difference in adaptation to recurrent pain conditions, secondary control engagement coping strategies may alleviate the symptoms associated with recurrent pain, and disengagement coping strategies increase these symptoms. More specifically, teaching adolescents to think positively, cognitively restructure their thoughts and beliefs about pain, distract, and use acceptance may lead to more adaptive outcomes. Also, encouraging them to cope in ways other than denying or avoiding the pain, or wishing it were gone, may lead to better outcomes. These potential directions for interventions are supported by prior research using samples of children with RAP (Thomsen et al., 2002; Walker et al., 1997) and in samples of children coping with other chronic health conditions such as sickle cell disease, juvenile arthritis, and pediatric headache (Bandell-Hoekstra et al., 2002; Gil et al., 2001; Kashikar-Zuck et al., 2001; Thastum et al., 2005).

An important issue in this field is the need to develop empirically supported interventions that draw on research distinguishing adaptive and maladaptive coping strategies. Prior to developing these interventions, however, it is necessary to examine coping and understand the contexts, stressors, and individual differences that affect the nature of coping among children. In addition, research is needed to examine whether coping is a cohesive construct across informants that is measurable above and beyond method effects, or whether the structure and correlates of coping are unique to different informants. To this end, in this study, we have examined parent and child reports of coping with the stress of recurrent pain. We do not assume that the results from these analyses will necessarily generalize to children's coping with other types of stressors. Certainly, coping with recurrent pain may differ greatly from coping with other stressors—managing recurrent pain episodes, which may vary in predictability and controllability from other stressors, may require different resources compared with coping with medical procedures or academic pressures. Nevertheless, to our knowledge, this study represents the first time that parents' and children's reports on a measure of children's coping have been examined together as latent variables, allowing for tests of convergence.

This study involved a sample of adolescents with RAP, which is the most prevalent recurrent pain condition among individuals younger than 18 years old. On average, these individuals had experienced significant pain for more than 2 years, and many of them had experienced pain for more years of their lives than not. Many adolescents in this sample had undergone lengthy and costly diagnostic and therapeutic procedures, and most had missed many days of school and other activities. Although these adolescents most likely experienced more severe RAP compared with individuals drawn from settings other than a tertiary care clinic, perhaps sacrificing some generalizability, using this sample allowed us to focus on children who may be in most need of pain-management interventions.

Despite these findings, an important limitation of the current study is its cross-sectional design—prospective research is needed to assess whether or not these coping strategies affect symptoms over time. Additional research is needed to assess whether or not coping strategies aimed at managing pain also alleviate the pain itself, in addition to general somatic symptoms and anxiety/depression associated with it. The generalizability of the current findings is limited by the fact that the participants were mostly

Caucasian and that they were referred by a tertiary care specialist, which may indicate that their pain was particularly severe or that their parents were sufficiently concerned about the pain and had the means to visit a specialist. The fact that mothers represented 90% of the nonadolescent informants also limits the findings—future research should consider fathers' reports, as well as non-parent informants, including teachers, siblings, friends, and physicians. It also will be important to consider individual coping strategies (e.g., positive thinking) in addition to the larger coping factors. Examining interactions among coping factors, as well as among coping factors and involuntary responses to stress, is an important future avenue for investigation, as is the investigation of how children and adolescents cope with stressors produced in an experimental setting. Notwithstanding these additional concerns, the current study confirms that coping is multidimensional and that the coping factors on the RSQ are cohesive constructs, even when the reports of multiple informants are used, and indicates that the ways in which adolescents cope with pain are related to somatic and emotional symptoms. Moreover, the relations between coping and symptoms are robust and hold up beyond simple method and informant effects.

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(Appendix follows)

## Appendix

## Items From the Responses to Stress Questionnaire, Parent Version

## Primary Control Engagement Coping

*Problem Solving*

My daughter does something to try to fix her stomachache or take action to change things. Write one thing she did.

*Emotional Expression*

My son lets someone or something know about his emotions or feelings (check all that apply).

- Parent Friend Sibling Teacher Doctor/nurse  
God Pet Stuffed animal None of these

*Emotional Regulation*

My daughter does something to calm herself down when she has a stomachache (check all that she does).

- Take deep breaths Pray Walk Listen to music  
Take a break Meditate None of these

## Secondary Control Engagement Coping

*Distraction*

My son thinks about happy things to take his mind off his stomachache or his emotions.

*Acceptance*

My son realizes that he just has to live with things the way they are.

*Positive Thinking*

My daughter tells herself that everything will be all right.

*Cognitive Restructuring*

When my son has a stomachache, he thinks about the things he is learning from the situation or something good that will come from it.

## Disengagement Coping

*Avoidance*

My daughter tries not to think about her stomachache, to forget all about it.

*Denial*

When my son gets a stomachache, he says to himself, "This isn't real."

*Wishful Thinking*

My daughter deals with her stomachaches by wishing they would just go away, that everything would work itself out.

Received December 21, 2005

Revision received May 22, 2006

Accepted July 10, 2006 ■