Anxiety, Coping, and Disability: A Test of Mediation in a Pediatric Chronic Pain Sample*

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*Methods of this study are based on a study that was originally described in Claar RL, Scharff L. Parent and child perceptions of chronic pain treatments. Children’s Health Care, 2007:36:285–301.

Received October 1, 2010; revisions received and accepted March 14, 2011

Objective  To evaluate pain coping as a mediator of associations between anxiety and functional disability and anxiety and somatic symptoms in adolescents with chronic pain. Method  Participants (mean age = 14.76 years, range: 12–17 years) included 280 patients (212 girls) with chronic pain who underwent multidisciplinary evaluation at a tertiary pain clinic in a northeast pediatric hospital. Patients completed measures of current pain, anxiety, active, passive, and accommodative pain coping, functional disability, and somatic symptoms. Results  Structural equation modeling was employed. The association between anxiety and disability was fully mediated by passive coping. The association between anxiety and somatic symptoms was not mediated by coping. Conclusions  Links between anxiety symptoms and pain-related outcomes in adolescents with chronic pain are complex. Assessing how an adolescent copes with his/her pain provides further understanding of this relationship.

Key words  adolescents; anxiety; chronic pain; mediation; pain coping; structural equation modeling.

Introduction

Pediatric patients with chronic pain exhibit elevated symptoms of anxiety (Knook et al., 2011). In addition, anxiety disorders are the most prevalent comorbid psychiatric condition in pediatric patients with chronic pain, including patients with juvenile primary fibromyalgia syndrome (Kashikar-Zuck et al., 2008) and functional abdominal pain (Campo et al., 2004). Children with recurrent abdominal pain were found to be indistinguishable from children with diagnosed anxiety disorders in terms of both anxiety symptoms and somatic complaints (Dorn et al., 2003; Dufon, Dunn, & Compas, 2009), suggesting that chronic abdominal pain and anxiety are at a minimum highly comorbid and may in fact represent a single, unified disorder (Dufon et al., 2009). Anxiety symptoms also are elevated in children and adolescents with chronic daily headache (Pakalnis, Butz, Slaingard, Kring, & Fong, 2007). In fact, somatic complaints, such as headache and abdominal pain, are part of the diagnostic criteria for certain anxiety disorders, such as separation anxiety disorder and generalized anxiety disorder (DSM-IV, American Psychiatric Association, 1994). Furthermore, comorbid anxiety is linked with negative outcomes in patients with chronic pain, including increased pain severity and frequency, increased pain interference in daily life (Hermann, Hohmeister, Zohsel, Tuttas, & Flor, 2008), and poorer physician-rated functioning (Kashikar-Zuck et al., 2008).

The processes linking anxiety to negative outcomes in pediatric patients with chronic pain are unclear. Pain coping has been identified as an important factor in understanding functional deficits in this population (Compas et al., 2006; Eccleston, Crombez, Scotford, Clinch, & Connell, 2004), and it may be that coping partially...
explains the relation between anxiety and disability. Different pain coping strategies have been linked to different outcomes in youth with chronic pain (Walker, Smith, Garber, & Van Slyke, 1997). For example, the use of passive coping strategies, such as self-isolation, catastrophizing, and activity avoidance, has been associated with increased pain, somatic symptoms, depression and anxiety (Kaminsky, Robertson, & Dewey, 2006; Reid, Gilbert, & McGrath, 1998; Walker et al., 1997), and functional disability (Kaminsky et al., 2006). In contrast, the use of accommodative coping strategies, such as acceptance, self-encouragement, and distraction, has been linked with decreased pain (Walker et al., 1997), reduced somatic complaints, and decreased symptoms of anxiety and depression (Vowles, McCracken, & Eccleston, 2008).

Research on active coping strategies, however, such as problem solving and social support seeking, has produced inconsistent results. Some studies have shown that active coping is associated with increased somatic symptoms, pain, and disability (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Simons, Claar & Logan, 2008; Walker et al., 1997), while other studies indicate that active coping is associated with decreased disability (Gil et al., 2001; Reid et al., 1998). These conflicting findings may be due to the way active coping is operationalized on frequently used pain coping measures, including both adaptive strategies such as behavioral distraction and less effective strategies such as resting (Simons et al., 2008; Walker et al., 1997) providing further support for the premise that specific pain coping strategies differentially predict outcomes.

Youth with chronic pain and comorbid anxiety may be more likely to engage in pain coping strategies that involve negative thinking and activity avoidance (i.e., passive coping strategies), which are common cognitive and behavioral responses to the emotional experience of anxiety. Indeed, anxiety in patients with chronic pain has been found to be positively associated with the use of passive coping strategies (e.g., activity avoidance) and negatively associated with the use of active coping strategies (e.g., problem solving; Eccleston et al., 2004). An increased tendency to employ passive coping strategies may partially explain increased pain and disability in pediatric patients with chronic pain and comorbid anxiety.

Prior research clearly supports the bivariate relations between anxiety and pain coping, anxiety and negative outcomes (i.e., disability and somatic symptoms), and pain coping and negative outcomes in youth with chronic pain. However, minimal prior research has directly evaluated pain coping as the mechanism linking anxiety with negative outcomes. In one recent study of adolescents with sickle cell disease, negative thinking partially mediated the link between anxiety and interference in daily functioning (Barakat, Schwartz, Simon, & Radcliffe, 2007). The authors interpreted these results to indicate that adolescents who experience greater disruption in daily functioning due to pain exhibit more negative thinking, resulting in greater anxiety. Although it is not possible to determine the direction of effect in this cross-sectional study, a possible alternative interpretation is that negative thinking, a passive coping strategy, develops as a result of anxiety (Garber, Weiss, & Shanley, 1993), and negative thinking in the context of chronic pain results in disruption in daily functioning. While results of this study provide initial support for the premise that coping may mediate the link between anxiety and functional outcomes, the authors relied upon a limited assessment of one coping response (i.e., negative thinking) and focused only on youth with sickle cell disease; therefore, findings may not be relevant to different pain coping strategies or to youth with other chronic pain conditions.

The current study was designed to build upon limited prior research in this area by directly examining pain coping as a mediator of the relation between anxiety and disability and between anxiety and somatic complaints in children and adolescents with diverse chronic pain conditions. In addition, we expanded on prior studies (Barakat et al., 2007) by including a more comprehensive assessment of pain coping, including subscales measuring active, passive, and accommodative coping, to determine whether different types of pain coping differentially mediate associations between anxiety and disability and somatic complaints. Although our research group has previously examined pain coping profiles as related to child outcomes such as anxiety (Claar, Barber, Simons, Logan, & Walker, 2008), pain coping as a moderator of the relation between parental behavior and child outcomes (Simons, Claar, & Logan, 2008), and gender differences in relations between coping and child outcomes (Kaczynski, Claar, & Logan, 2009), we have never specifically examined coping responses as the mediator of the relationship between anxiety symptoms and child outcomes. Furthermore, this study involves evaluation of a complex mediation model that is unlike models that have been previously examined in our research program (Claar et al., 2008; Claar, Guite, Kaczynski, & Logan 2010; Claar & Scharff, 2007; Claar, Simons, & Logan, 2008; Kaczynski et al., 2009; Logan, Claar, & Scharff, 2008; Simons et al., 2008).

In light of previous research, we predicted that (a) anxiety, pain coping, somatic complaints, and disability would be correlated and (b) passive coping would mediate the relations between anxiety and disability and between
Methods
Participants
Potential study participants included all consecutive new patients ages 12–17 years, with at least 3 months duration of chronic pain, who underwent a multidisciplinary pain evaluation at a tertiary care chronic pain clinic in a large, urban northeast pediatric hospital between April 2004 and October 2006. The evaluation consisted of a physician’s medical history and physical exam, assessment by a physical therapist, and structured clinical interview conducted by a clinical psychologist. Of the 538 patients seen by the Pain Treatment Service during this time, 93 did not meet the age range criterion. Sixteen patients did not meet the 3-month pain duration criterion. Only one patient refused to complete the questionnaires. Of the 429 eligible patients, 149 patients were excluded because they did not complete the pain coping measure (i.e., Pain Response Inventory; PRI) as part of their standard clinic battery.

The 280 patients in the current study ranged in age from 12 to 17 years ($M = 14.76$ years; $SD = 1.51$). Participants were primarily Caucasian (91.1%) and female (75.7%), reflective of the population of children seen in this tertiary care clinic setting. The participants’ primary medical diagnoses included headaches (35.5%; including migraine, tension-type headache, combined and daily chronic headache), neuropathic pain (23.3%; including complex regional pain syndrome and neuralgia), back pain (9.3%; including scoliosis and idiopathic pain), joint pain (9.0%; including juvenile rheumatoid arthritis and hypermobility syndromes), abdominal pain (11.1%; including functional abdominal pain and inflammatory bowel disease), diffuse pain (5.0%; including fibromyalgia or description of pain in three or more areas without a clear etiology), limb pain (3.2%; arm or leg pain that was not neuropathic and did not involve the joints), and other pain (3.6%; e.g., chest, ear, bladder). At the time of the evaluation, patients’ mean duration of pain was over two years, $M = 28.43$ months ($SD = 29.83$). Family socioeconomic status (SES) based on the four-factor index of social status (Hollingshead, 1975) ranged from 15 (semi-skilled workers) to 66 (business owner; professional), with a mean of 48.95 (minor professional; technical), $SD = 11.27$. The majority of mothers (56.7%) and fathers (61.5%) were college graduates. A majority of parents were married (73.5%), although some parents were divorced or separated (20.4%), widowed (2.9%), or never married (3.2%).

Procedure
The data analyzed in this study represent a subset of data from a larger database. All measures were collected for clinical purposes as part of initial evaluation in our multidisciplinary chronic pain clinic. Data collection has been discontinued at present. IRB approval was obtained prior to this study to conduct a retrospective chart review in order to compile a database of these clinical measures, and to apply these data to research questions relevant to pediatric chronic pain, including research on psychosocial correlates, pain characteristics, functioning, and family factors. Several previously published research studies have employed different subsets of data from this larger database (Claar et al., 2008; Claar et al., 2010; Claar & Scharff, 2007; Claar et al., 2008; Kaczynski et al., 2009; Logan et al., 2008; Simons et al., 2008).

Questionnaires were mailed to families prior to the child’s multidisciplinary pain clinic evaluation. Parents and children were asked to complete the questionnaires individually and return them on the date of the evaluation. If parents and children had not completed the questionnaires prior to the appointment, they were asked to do so when they arrived for their evaluation. Children then underwent evaluation by a physician, physical therapist, and clinical psychologist. All questionnaires were reviewed by the psychologist prior to the clinical interview. Patients’ pain diagnoses, assigned by a physician during the multidisciplinary evaluation, were obtained from a review of their medical records.

Measures
Basic Demographic Information
Parents provided basic demographic information (e.g., child’s age and gender, parents’ occupations, education, and marital status) on the Pain Treatment Service Demographic Information form.

Pain Rating
As part of the semi-structured interview with the clinical psychologist, children rated their current pain, as well as their lowest and highest pain on a standard 11-point numeric rating scale (von Baeyer, 2009) ranging from 0 (no pain) to 10 (most pain possible).

Pain Response Inventory
The PRI (Walker et al., 1997) is a child-report measure of pain coping strategies that is comprised of three higher order composite scales: passive coping (15 items), active coping (16 items), and accommodative coping (16 items). Passive coping strategies include self-isolation, activity...
restriction, and catastrophizing. Active coping strategies include problem-solving and social support seeking. In the current study, the two active coping subscales that are specific to children with abdominal pain [Condition-Specific Strategies (5 items) and Massage/Guard (3 items)] were eliminated from analyses, as is consistent with past research (e.g., Claar et al., 2008; Claar & Simons, in press). In addition, the rest subscale (5 items) was removed from the active coping composite scale due to concerns that its inclusion may contribute to inconsistent findings in the literature regarding the role of active coping (Simons et al., 2008). Notably, preliminary correlations in our sample indicated that rest was significantly associated with anxiety \( r = .16, p < .05 \) and somatic symptoms \( r = .18, p < .05 \), whereas the other active coping subscales were not associated with these outcomes, suggesting that the rest subscale may behave differently from the other active coping subscales, potentially leading to biased results if rest were included. Thus, we decided to remove rest and include only the problem solving and social support seeking subscales for a more consistent assessment of active coping. Accommodative strategies include acceptance, self-encouragement, and distraction. Children report the frequency with which they employ different coping strategies on a 5-point scale ranging from 0 (“never”) to 4 (“always”). A total score is computed by taking the average of the item scores, and higher scores indicate higher levels of passive, active, or accommodative coping. The PRI has demonstrated adequate validity and reliability (Walker et al., 1997). Item-level data were available for a subset of the current sample \( n = 150 \); alpha reliabilities for this subset of the sample for the three subscales were acceptable: .88 for Passive, .87 for Active, .88 for Accommodative.

**Revised Children’s Manifest Anxiety Scale**

The Revised Children’s Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1978, 1997) is a 37-item yes/no self-report questionnaire that assesses symptoms of anxiety. There are three subscales, including Physiological Anxiety, Social Concerns, and Worry. Total anxiety scores are calculated by summing all items to which the child responded “yes” with the exception of the seven lie scale items. Total raw scores range from 0 to 28, and raw scores are converted into t-scores, with higher scores indicated higher levels of anxiety. The RCMAS is a well-validated and reliable measure of anxiety for children ages 7–17 years (Reynolds et al., 1978, 1997). Alpha reliability for a subset of this sample \( n = 150 \) was adequate \( \alpha = .83 \). Raw scores were used for analyses unless otherwise indicated.

**Functional Disability Inventory**

The Functional Disability Inventory (FDI; Claar & Walker, 2006; Walker & Greene, 1991) assesses children’s self-reported difficulty in physical and psychosocial functioning due to their physical health. The instrument consists of 15 items concerning perceptions of activity limitations during the past 2 weeks which children rate on a 5-point scale ranging from 0 (“No trouble”) to 4 (“Impossible”). Total scores are computed by summing the items. Scores on the FDI range from 0 to 60; higher scores indicate greater disability. The FDI has demonstrated reliability and validity in children and adolescents (Claar & Walker, 2006; Walker & Green, 1991). Alpha reliability for a subset of this sample \( n = 150 \) was adequate \( \alpha = .89 \).

**Children’s Somatization Inventory**

The Children’s Somatization Inventory (CSI; Garber, Walker, & Zeman, 1991; Walker & Green, 1991) assesses the severity of nonspecific somatic symptoms (e.g., “weakness,” “dizziness”) that need not have organic disease etiology. Respondents rate the extent to which they have experienced each of 35 symptoms during the last 2 weeks using a 5-point scale ranging from “not at all” (0) to “a whole lot” (4). Higher scores indicate higher levels of somatic symptoms. The CSI has demonstrated good reliability and validity (Walker & Green, 1991). Alpha reliability for a subset of this sample \( n = 150 \) was adequate \( \alpha = .87 \).

**Analytic Plan**

Preliminary analyses were first conducted in SPSS (Green, Salkind, & Akey, 2000). Data were screened to ensure that all SEM requirements for normality were met. Correlations were conducted to determine whether there were associations among demographic variables (age, SES), pain variables (current pain rating, pain duration), and the study variables (anxiety, active coping, passive coping, accommodative coping, functional disability, somatic symptoms); demographic and/or pain variables that were significantly correlated with study variables were controlled for in all subsequent analyses. A MANOVA was conducted to determine whether there were differences in the study variables based on participant gender and pain condition.

Structural equation modeling (SEM), as implemented by Mplus software (Muthén & Muthén, 2004), was employed to evaluate the study hypotheses. SEM was considered superior to other analytic techniques, such as multiple regression, because it is possible to simultaneously evaluate the overall fit of complex models as well as the significance of individual model pathways, to reduce measurement...
error, to compare alternative models, and to include cases with missing data in the model (Muthén & Muthén, 2004; Nelson, Aylward, & Steele, 2008). Full information maximum likelihood estimation (FIML) was employed to account for missing data. Bentler and Bonett (1980), the following statistics were used to evaluate model fit: chi square, Comparative Fit Index (CFI; >.90 acceptable, >.95 excellent), and Root Mean Square Error of Approximation (RMSEA; <.08 acceptable, <.05 excellent). A sample size of 100–200 subjects is generally considered adequate for testing mediation models in SEM (Kline, 2005).

Based on recommendations for testing mediation in SEM (Holmbeck, 1997), a direct effects model was first evaluated in which only direct pathways from anxiety to functional disability and somatic symptoms were specified. Based on significant direct pathways, a partial mediation model was specified in which anxiety was allowed to be associated with functional disability and somatic symptoms directly and indirectly, via relations with active, passive, and accommodative coping (Figure 1). We then tested several alternative models to determine which model most accurately portrayed the data (Martens et al., 2005).

As recommended by Bollen (1989), nested models were compared whenever possible, and model comparisons are indicated by a change in chi-square (Δχ²), with a significant change in chi-square indicating a significant difference between models.

Results

Sample Characteristics

Means, standard deviations, and correlations are presented in Table I. In our clinical sample, 15.1% of patients endorsed clinically elevated anxiety symptoms (i.e., RCMAS t-scores of 60 or above). In terms of functional disability, 24.6% endorsed minimal or no disability (FDI score = 0–12), 53.2% endorsed moderate disability (FDI score = 13–29), and 22.1% endorsed severe disability (FDI score = 30 or above) (Kashikar-Zuck et al., in press), suggesting the majority of participants reported moderate levels of disability. Our sample endorsed somatic symptoms (M = 27.9, SD = 16.3) at a level comparable to a clinical sample of pediatric patients with abdominal pain (CSI mean = 24.16, no SD reported; Walker et al., 1993) and considerably greater somatic symptoms than a healthy community sample of girls and boys in middle school and high school [CSI means ranging from 12.91 (SD = 10.08) to 18.13 (SD = 12.60); Garber et al., 1991].

Preliminary Analyses

All variables met the SEM requirements for normality (i.e., skewness <3.0; kurtosis<10.0; Kline, 2005). Correlation analyses indicated that age, SES, current pain, and pain duration were significantly associated with several study variables (Table I); therefore, these variables were controlled for in all subsequent analyses. Correlations

Table I. Means, Standard Deviations, and Pearson Correlations for Demographic, Pain, and Study Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>M (SD)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td>14.8 (1.5)</td>
<td>1.00</td>
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<td></td>
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<tr>
<td>2. SES</td>
<td>48.9 (11.3)</td>
<td>0.01</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>3. Current pain</td>
<td>4.3 (2.9)</td>
<td>0.01</td>
<td>0.10</td>
<td>1.00</td>
<td></td>
<td></td>
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<tr>
<td>4. Pain duration</td>
<td>28.4 (29.8)</td>
<td>0.05</td>
<td>0.07</td>
<td>0.15*</td>
<td>0.01</td>
<td>1.00</td>
<td></td>
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</tr>
<tr>
<td>5. FDI</td>
<td>21.6 (11.9)</td>
<td>0.08</td>
<td>0.13*</td>
<td>0.28*</td>
<td>0.10</td>
<td>1.00</td>
<td></td>
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<tr>
<td>6. CSI</td>
<td>27.0 (15.5)</td>
<td>0.01</td>
<td>0.03</td>
<td>0.21*</td>
<td>0.07</td>
<td>0.41*</td>
<td>1.00</td>
<td></td>
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<tr>
<td>7. RCMAS</td>
<td>9.7 (6.2)</td>
<td>0.05</td>
<td>0.07</td>
<td>0.02</td>
<td>0.12</td>
<td>0.14*</td>
<td>0.33*</td>
<td>1.00</td>
<td></td>
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<tr>
<td>8. PRI passive</td>
<td>1.2 (0.7)</td>
<td>0.05</td>
<td>0.02</td>
<td>0.02</td>
<td>0.14*</td>
<td>0.18*</td>
<td>0.32*</td>
<td>0.53*</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. PRI active</td>
<td>2.1 (0.8)</td>
<td>0.01</td>
<td>0.01</td>
<td>0.05</td>
<td>0.05</td>
<td>0.22*</td>
<td>0.00</td>
<td>0.04</td>
<td>0.06</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>10. PRI accommodative</td>
<td>1.8 (0.7)</td>
<td>0.01</td>
<td>0.01</td>
<td>0.21*</td>
<td>0.01</td>
<td>0.21*</td>
<td>0.00</td>
<td>0.08</td>
<td>0.05</td>
<td>1.00</td>
<td></td>
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Note. FDI = Functional Disability Inventory; CSI = Clinical Symptom Inventory; RCMAS = Revised Children’s Manifest Anxiety Scale, Total Anxiety; PRI = Pain Response Inventory.

*p < .05.
indicated that the study variables were interrelated as predicted, with exception of accommodative coping, which was only correlated with somatic symptoms, and active coping, which was only correlated with functional disability. Results of a MANOVA indicated that there were no differences in the study variables based on gender \([F(6, 195) = 0.16, \text{ns}]\), primary pain diagnosis \([F(66, 1200) = 1.15, \text{ns}]\), or a gender by primary pain diagnosis interaction \([F(60, 1200) = 1.06, \text{ns}]\).

**SEM Tests of Mediation**

Model parameters reported represent standardized values. The direct effects model, including direct pathways from the control variables and anxiety to functional disability and somatic symptoms, with disability and somatic symptoms allowed to covary, was saturated, indicating that there were no degrees of freedom to test for model fit. Thus, it was necessary to constrain a model parameter (e.g., an error variance or covariance) to free up a degree of freedom and allow for tests of model fit. The covariance between functional disability and somatic symptoms was significant (covariance = 0.37, \(p < 0.05\)), as were the error variances of the endogenous variables in the model (range = 0.83–0.99). Therefore, based on a non-significant correlation between age and SES (Table I), the covariance between these variables was constrained to 0. This modified direct effects model provided excellent fit to the data \([\chi^2(1) = 0.11, \text{ns}, \text{CFI} = 1.00, \text{RMSEA} = 0.00\ (90\% \text{CI} = 0.00–0.11)]\), and pathways from anxiety to functional disability \((\beta = .15, p < .05)\) and from anxiety to somatic symptoms \((\beta = .34, p < .05)\) were significant, indicating it was appropriate to test for mediation.

Next, a partial mediation model was specified in which direct pathways from anxiety to functional disability and somatic symptoms, as well as indirect pathways from anxiety to active, passive, and accommodative coping, and from the coping variables to functional disability and somatic symptoms, were included. Based on the modification indices and the likelihood that the three different types of coping may covary, covariances were included among the three coping variables. The partial mediation model provided excellent fit to the data \([\chi^2(1) = .14, p = .71; \text{CFI} = 1.00; \text{RMSEA} = 0.00\ (90\% \text{CI} = 0.00–0.12)]\) and the association between anxiety and functional disability was no longer significant \((\beta = .07, \text{ns})\). The association between anxiety and somatic symptoms was essentially unchanged \((\beta = .29, p < .05)\). Anxiety was significantly associated with passive coping \((\beta = .19, p < .05)\) and accommodative coping \((\beta = .28, p < .05)\), and passive coping was significantly associated with disability \((\beta = .35, p < .05)\). No coping variables were associated with somatic symptoms.

Given that the relation between anxiety and disability was no longer significant, we decided to formally test for mediation by testing a model in which the pathway from anxiety to functional disability was constrained to 0. When compared with the partial mediation model, this constrained model did not result in deterioration in model fit \([\Delta \chi^2(1) = 1.25, \text{ns}]\), indicating that the direct pathway from anxiety to disability was not contributing to model fit and could be removed, further supporting mediation of this pathway. As the pathway from anxiety to somatic symptoms remained significant when the coping variables were included in the model and somatic symptoms were not associated with any coping variable, we did not think it would be appropriate to test for mediation of this pathway.

Lastly, we tested a regression model in which pathways from anxiety to the coping variables were constrained to 0 and thus only direct effects from the control variables, active coping, passive coping, accommodative coping, and anxiety to the outcomes, functional disability and somatic symptoms, were included in the model. The regression model resulted in significant deterioration in model fit when compared with the partial mediation model \([\Delta \chi^2(19) = 91.67, p < .01]\), indicating that the partial mediation model, including both direct and indirect pathways, via coping, was more accurate.

The final mixed mediation model is presented in Figure 2. Evaluation of model parameters indicates that passive coping fully mediated the association between anxiety and functional disability, as predicted. The association between anxiety and somatic symptoms was not found to be mediated by coping. As recommended by Preacher and Hayes (2008), the bootstrapping method with 5,000 iterations was used in this multiple mediator model only to estimate the indirect effects. The indirect pathway from...
anxiety to disability via passive coping was significant (indirect path: 0.13, p < .01, 95% CI: 0.06–0.22). All other indirect pathways from anxiety to the outcomes via the coping variables were nonsignificant. The model accounted for 27% of the variance in functional disability and 19% of the variance in somatic symptoms.

Discussion

Results of this cross-sectional study indicate that the association between anxiety and disability was mediated by passive coping, as hypothesized, in pediatric patients with diverse chronic pain complaints. These results demonstrate that the detrimental impact of anxiety on functional disability can be explained through patients’ pain coping strategies, as is consistent with previous research on adolescents’ pain coping (e.g., Walker et al., 1997). Our results build upon these findings by specifically highlighting the role of passive coping strategies in the pathways from anxiety to functional impairment in adolescents with chronic pain.

Results suggest that when adolescents with chronic pain and comorbid anxiety engage in passive coping strategies in response to their pain they may exhibit greater disability. Although arrows in SEM models are frequently misinterpreted as indicating a direction of effect (Hoyle, 1995), the arrows merely indicate associations between variables, and it also is possible that the direction of effect may be reversed. That is, it may be that difficulty engaging in regular activities due to pain results in increased anxiety when adolescents employ passive coping strategies to manage their pain. It also may be that anxiety mediates links between coping and negative outcomes, as passive coping strategies such as negative thinking and activity avoidance may result in increased anxiety, which may interfere with adaptive functioning. It is most likely that the relations among anxiety, pain coping, and disability are bidirectional and potentially fuel a vicious cycle of increasing pain-related disability, as outlined in the Fear Avoidance Model of Pain (Leeuw, Goossens, van Breukelen, Boersma, & Vlaeyen, 2007; Vlaeyen & Linton, 2000). According to the model, which has garnered significant empirical support, when pain is interpreted as threatening, pain-related fear, and anxiety develops, leading to avoidance behaviors and hypervigilance, and ultimately disability, disuse, and depression. These adverse outcomes fuel the vicious cycle of increased fear, anxiety, and avoidance. Despite evidence that anxiety associated with fear of pain leads to avoidance of activities and worsening of disability over time among adults with chronic pain (Newcomer, Shelerud, Vickers Douglas, Larson, & Crawford, 2010), longitudinal research is still needed to elucidate the causal relations among these variables in adolescents.

Comorbid anxiety is associated with increased somatic complaints in adolescents with chronic pain; however, results of this study indicate that this relation does not appear to be mediated by coping skills, and additional factors may explain this relation. For example, recent neuroscience research suggests that an abnormal physiological response to stress may predict increases in both anxiety and somatic symptoms (Stein & Muller, 2008), suggesting that an underlying biological vulnerability to stress may explain the association between anxiety and somatic symptoms. Thus, patients’ coping responses may be less influential in this more biologically driven relation.

Our findings must be interpreted in the context of several limitations. First, the high rates of female and Caucasian patients limit the generalizability of findings to males and diverse ethnic groups; however, our sample is commensurate with other pediatric pain clinics (Eccleston et al., 2004). In addition, as with all cross-sectional research, we cannot establish causality among anxiety, pain coping, and child functioning. Furthermore, there are limitations in testing mediation with cross-sectional data, such as the lack of a time lapse between variables (Cole & Maxwell, 2003). Longitudinal studies are needed to further understand the interplay of anxiety and child coping with chronic pain. Finally, measuring an inherently dynamic construct such as coping poses a challenge in relation to an ever-changing experience such as pain. Coping often changes in response to the demands of the stressor (Lazarus & Folkman, 1984), suggesting that coping responses reported at this pain clinic evaluation may differ as the child’s pain symptoms change over time.

This study provides preliminary implications for clinical practice. Although many factors contribute to a child’s functioning in the face of persistent pain, results of this study suggest that learning adaptive coping strategies has the potential to limit and possibly eliminate the negative impact of anxiety on patients’ functional disability, particularly for patients who rely on passive pain coping strategies. However, recent research indicates that patients who rely on more passive coping techniques may in fact be less receptive to pursuing those psychological interventions that teach more adaptive coping techniques (Claar & Simons, in press), and therefore, practitioners may need to provide additional explanation and persuasion to pursue these treatments, perhaps focusing on the potential to improve overall physical functioning.
Additionally, treating anxiety in the context of pain, specifically when it takes the form of pain-related fear, promotes participation in daily activities (Leeuw et al., 2008; Linton et al., 2008; Woods & Asmundson, 2008). When patients experience that engagement in previously enjoyed activities does not lead to catastrophic consequences, their misinterpretations are challenged and disconfirmed and they correct their fear expectancies (Goubert, Crombez, & Danneels, 2005; Leeuw, Goossens et al., 2007). Graded in vivo exposure to tasks previously avoided due to fear of pain (Vlaeyen, De Jong, Onghena, Kerckhoffs-Hanssen, & Kole-Snijders, 2002) has been found to be effective in improving disability and reducing pain-related fear in adults (Bailey, Carleton, Vlaeyen, & Asmundson, 2009) and two treatment studies with adolescents echo these promising findings (Wicksell, Melin, Lekander, & Olsson, 2009; Wicksell, Melin, & Olsson, 2007).

In summary, the current study provides evidence for the potentially explanatory role of passive coping strategies in understanding the relationship between anxiety and functional disability among adolescent with chronic pain. These results, consistent with findings in the pain-related fear literature, suggest that targeting the behavioral response of passive coping can result in amelioration of anxiety symptoms that impact pain-related disability. Future research is needed to further evaluate these relations over time.

Acknowledgments
The authors thank the Pain Treatment Service at Children’s Hospital Boston and its patients and families for their roles in this research, as well as the Sara Page Mayo Endowment for Pediatric Pain Research and Treatment.

Conflicts of interest: None declared.

References


