Testing Gender as a Moderator of Associations Between Psychosocial Variables and Functional Disability in Children and Adolescents with Chronic Pain

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Objective To evaluate gender as a moderator of associations between psychosocial variables and functional disability in children and adolescents with chronic pain. Method Participants included 266 patients (177 girls; mean age = 13.3 years) with chronic or recurrent headache or abdominal pain who were evaluated at a pediatric chronic pain clinic. Patients completed measures of pain intensity, anxiety, depression, pain coping, and functional disability. Parents completed a measure of protective behavior. Results Girls and boys reported similar levels of pain intensity. Girls were more likely to endorse depressive symptoms, and internalizing symptoms were associated with disability in girls, not in boys. No gender differences were found in links between coping and protective parenting and disability. Conclusions In general, psychosocial factors influenced functional disability similarly in girls and boys, although some gender differences were found. Findings highlight the importance of considering child gender when evaluating factors that contribute to functional disability.

Key words children and adolescents; chronic pain; gender; psychosocial risk factors; structural equation modeling.

Introduction

Chronic pain is a significant problem affecting a substantial proportion of children and adolescents, and epidemiological studies indicate up to 30% of children and adolescents experience chronic or recurrent pain severe enough to interfere with functioning (e.g., Roth-Isigkeit, Thyen, Stoven, Schwarzenberger, & Schmucker, 2003). According to the biopsychosocial model (Engel, 1977), chronic pain is a centrally mediated phenomenon, shaped jointly by physiologic, psychological, social, and environmental forces (Mulvaney, Lambert, Garber, & Walker, 2006; Turk, 1996; Varni, 1989; Walker & Johnson, 2004). This theoretical framework is an important advance over the former mind–body dichotomy, in which pain was viewed as either “real” (i.e., biological) or purely psychosomatic. Developing effective pain treatment hinges on targeting appropriate variables that determine functional outcomes in the face of chronic pain. Researchers have begun to elucidate some of the many physical, social, and psychological factors that influence the pain experience. Although factors such as anxiety and depression (Claar & Walker, 2006; Gatchel, Peng, Peters, Fuchs, & Turk, 2007), coping (Walker, Smith, Garber, & Claar, 2007), and protective parenting (Logan & Scharff, 2005; Peterson & Palermo, 2004) have been identified, their interactions and specific effects on functional outcomes are not fully understood. Gender also is thought to influence the pain experience (Fillingim, 2000; Unruh, 1996); therefore, it is important to determine whether associations between psychosocial factors and functional disability are moderated by child gender in order to appropriately target interventions.

In adult patients with chronic pain, women exhibit greater pain-related disability than men (Unruh, 1996). Similarly, research examining gender differences in pediatric pain patients indicates that girls are more likely than boys to experience chronic pain (Hakala, Rimpela, Salminen, Virtanen, & Rimpela, 2002; Perquin et al., 2000), report greater pain intensity (Merlijn et al., 2003;
chronic pain, as active (e.g., distraction, maintaining in functional disability in children and adolescents with coping strategies may partially explain gender differences (et al., 2007). These gender-based differences in pediatric pain has focused on acute laboratory-induced or procedural pain (e.g., Chambers, Craig, & Bennett, 2002; Fanurik, Zeltzer, Roberts, & Blount, 1993; Fowler-Kerry & Lander, 1991; Hodgins & Lander, 1997; Logan & Rose, 2004; Myers et al., 2006).

Researchers have only recently begun to examine gender differences in associations among psychosocial variables and functional disability in children and adolescents with chronic pain (e.g., Lynch et al., 2007; Martin et al., 2007). Specifically, an association between comorbid internalizing symptoms and functional disability is well supported in the literature (Clara & Walker, 2006; Gatchel et al., 2007), and preliminary evidence suggests that this relation may be stronger in girls than in boys. Results of a population-based study indicate that chronic pain is more strongly related to anxiety and depression in girls than in boys, whereas disruptive behavior disorders are more frequently associated with reports of chronic pain in boys (Egger, Costello, Erkanli, & Angold, 1999). In general, anxiety and depression are more prevalent in females (Hankin & Abramson, 1999; Nolen-Hoeksema & Girgus, 1994), suggesting that girls with chronic pain may be more likely to struggle with internalizing problems than boys. Furthermore, girls are more likely to attribute their pain to emotional distress, whereas boys are more likely to attribute their pain to physical problems (Roth-Isigkeit et al., 2005). Thus, the association between emotional problems and functional disability may be moderated by gender, although direct tests of gender as a moderator of this association in clinic-based samples are lacking.

Gender also may influence the type of coping strategies patients use to manage their pain (Keogh & Eccleston, 2006; Lynch et al., 2007), which in turn may influence resulting disability (Walker et al., 2007). Pediatric research with both community and clinical samples suggests that girls are more likely to engage in emotion-focused coping and social support seeking (Merlijn et al., 2003; Thomsen et al., 2002), while boys are more likely to use active coping strategies, such as behavioral distraction (Lynch et al., 2007). These gender-based differences in pain coping strategies may partially explain gender differences in functional disability in children and adolescents with chronic pain, as active (e.g., distraction, maintaining regular activity) and accommodative coping strategies (e.g., acceptance, self-encouragement) are associated with more adaptive outcomes (Walker, Smith, Garber, & Van Slyke, 1997), whereas passive pain coping strategies (e.g., self-isolation, activity restriction, negative cognitions) have been associated with increased functional disability (Walker et al., 1997). However, limited research has examined gender as a moderator of an association between coping and functional disability in pediatric chronic pain patients. One exception is a recent clinic-based study by Keogh and Eccleston (2006), which indicated that patient gender did not moderate associations between coping strategies and functional disability in a sample of patients with diverse pain conditions. However, analyses were based on a relatively small sample of boys (N = 46), and it will be important to replicate these findings in a larger sample of children and adolescents with chronic pain (Keogh & Eccleston, 2006).

Child gender also may influence parenting behavior, and previous research has demonstrated an association between parenting behavior and functional disability in pediatric pain (Logan & Scharff, 2005; Peterson & Palermo, 2004). Specifically, protective parental responses to children’s pain behaviors may inadvertently reinforce disability (Chambers et al., 2002; Clara, Simons, & Logan, 2008; Logan & Scharff, 2005), as solicitous, overprotective parenting has been associated with increased disability in pediatric chronic pain patients (Clara et al., in press; Peterson & Palermo, 2004). Research suggests that parents respond differently to sons and daughters, particularly during times of stress (Bronstein, Clauson, Stoll, & Abrams, 1993). Thus, parents may react differently to chronic pain behaviors in sons and daughters. For example, in the context of postsurgical pain, parents appear to encourage more adaptive coping strategies (e.g., visual imagery, relaxation, distraction) in girls than in boys (Pollki, Vehvilainen-Julkunen, & Pietila, 2002). In addition, recent research indicates that mothers of sons report more protective behavior in response to their children’s pain than mothers of girls, particularly when mothers perceive the pain to be severe (Langer et al., 2007). However, no research could be identified that examined gender as a moderator of an association between parent responses to pain behavior and functional disability in pediatric patients with chronic pain.

The current study was designed to address gaps in the literature by evaluating gender as a moderator of associations between functional disability and psychosocial factors in pediatric chronic pain patients. The psychosocial variables we tested were selected because they are well
established in the literature as important influences on pain-related functioning. These factors were examined simultaneously within a single model, in which pain severity, passive coping, protective parenting, and internalizing symptoms are posited as being associated with functional disability (Figure 1). Because risk factors for functional disability also have been associated with internalizing symptoms (e.g., Lewinsohn, 1974; McCleary & Sanford, 2002), and internalizing symptoms have been more closely linked with functional deficits than pain intensity (Claar & Walker, 2006; Kashikar-Zuck, Goldschneider, Powers, Vaught, & Hershey, 2001), we also included links between pain severity, passive coping, protective parenting, and internalizing symptoms in the model. This model was examined in both genders to evaluate whether gender moderates associations between psychosocial factors and functional disability.

We hypothesized that (a) girls would report higher levels of pain intensity, internalizing symptoms, and passive coping than boys; (b) associations among pain intensity, internalizing symptoms, passive coping, and functional disability would be significantly stronger in girls than in boys; (c) parents of boys would report greater protective parenting than parents of girls; and (d) the association between protective parenting and functional disability would be stronger in boys than in girls.

**Method**

**Participants**

Potential study participants included all new patients aged 8–17, with at least 3 months of chronic pain, who underwent a multidisciplinary pain evaluation at a tertiary care chronic pain clinic in a large, urban northeast pediatric hospital between October 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 778 patients seen by the Pain Treatment Service during this time, 33 did not meet the age range criterion. Thirty-eight patients did not meet the 3-month pain duration criterion. Only one patient refused to complete the questionnaires. Of this total sample of 706 patients, a subset of 266 patients with a diagnosis of chronic headache and/or abdominal pain, the most prevalent chronic pain conditions of childhood (Campo, Jansen-McWilliams, Comer, & Kelleher, 1999), was selected for the current study. Individuals with these conditions appear to be highly similar; they exhibit high levels of comorbid psychopathology and family distress (Liakopoulou-Kairis et al., 2002), suggesting that psychosocial factors may play a role in the pain and disability these patients experience. Because associations between psychosocial variables and disability may differ in patients with other pain conditions, and because the sample size did not allow for tests of pain diagnosis as a moderator of associations, we decided to include only patients with chronic headache and/or abdominal pain in this study.

The 266 patients in the current study ranged in age from 8 to 17 years (M = 13.3 years; SD = 2.55). Participants were primarily Caucasian (89%) and female (66.5%), reflective of the population of children seen in this tertiary care clinic setting. The primary presenting problem was chronic abdominal pain (including functional abdominal pain and inflammatory bowel disease) in 78.6% of patients; 21.4% of patients were referred for headaches (including migraine, tension-type headache, and chronic daily headache). At the time of the evaluation, patients’ mean duration of pain was almost 3 years, M = 32.68 months (SD = 32.53). Family socioeconomic status (SES) based on the four-factor index of social status (Hollingshead, 1975) ranged from 21 (semiskilled workers) to 66 (business owner; professional), with a mean of 49.25 (minor professional; technical), SD = 11.58. The majority of mothers (57.1%) and fathers (60.9%) were college graduates. A majority of parents were married (75.4%), although some parents were divorced or separated (16.3%), widowed (2.7%), or never married (5.7%). There were no differences between participants with headache and abdominal pain in terms of age, gender, parent marital status, or family SES. However, when participants with headache and abdominal pain were combined, girls (M = 13.68, SD = 2.48) were found to be significantly older than boys, M = 12.55, SD = 2.53; t(264) = −3.49, p < .01.

**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 semistructured interview with the clinical psychologist, children provided their rating of current pain, as well as their rating of the lowest and highest pain on a standard 11-point numeric rating scale (Thompson & Varni, 1986) ranging from 0 (no pain) to 10 (most pain possible).

**Pain Response Inventory**

The Pain Response Inventory (PRI; Walker et al., 1997) is a child-report measure of pain coping strategies that comprises three subscales: passive coping (15 items), active coping (24 items), and accommodative coping (16 items). Passive coping strategies include self-isolation, activity restriction, and catastrophizing. Active coping strategies include problem solving, social support seeking, and distraction. Accommodative strategies include acceptance and self-encouragement. Children report the frequency with which they use different coping strategies on 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). Alpha reliabilities for the three subscales in the current sample were acceptable: .88 for passive, .87 for active, and .89 for accommodative.

In order to determine the extent to which participants used passive coping strategies relative to other types of coping strategies, a passive coping index was computed. As described by Lipani and Walker (2006), the mean score on the passive coping scale was divided by the sum of the mean scores of the passive, active, and accommodative scales. The passive coping index was included in the model (M = 0.26, SD = 0.12, range = 0–0.60).

**Adult Responses to Children’s Symptoms**

The Adult Responses to Children’s Symptoms (ARCS; Van Slyke & Walker, 2006) is a parent-report measure that includes three subscales assessing parents’ responses to their children’s pain: parental protectiveness, minimization of pain, and encouraging and monitoring responses. Responses are rated on a 5-point scale ranging from never (0) to always (4). A total score is computed by taking the average of the item scores, and higher scores indicated greater levels of protective parenting. For the current study, only the Protect scale was used (16 items, alpha = .84). Items on the Protect scale refer to protective parental behavior such as giving the child special attention and limiting the child’s normal activities and responsibilities. The ARCS has been developed and validated in parents of children aged 8–18 (Van Slyke & Walker, 2006).

The ARCS was completed by one parent, typically mothers, although data on parent gender were not collected as part of this clinic-based evaluation.

**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. Total anxiety scores are calculated by summing all items to which the child responded “yes” with the exception of the 7 lie scale items. Total raw scores range from 0 to 28, and raw scores are converted into T-scores, with higher scores indicating higher levels of anxiety. The RCMAS is a well-validated and reliable measure of anxiety for children aged 7–17 (Reynolds & Richmond, 1978, 1997). Alpha reliability for this sample was adequate (α = .88). Raw scores were used for analyses unless otherwise indicated.

**The Children’s Depression Inventory**

The Children’s Depression Inventory (CDI) contains 27 self-report items that assess depressive symptoms (Kovacs, 1981, 1992). Items are rated on a 3-point scale and summed to obtain a total score. Total raw scores range from 0 to 81, and raw scores are converted into T-scores, with higher scores indicating higher levels of depressive symptoms. The CDI has been found to have adequate reliability and validity for children aged 7–17 (Saylor, Finch, Spirito, & Bennett, 1984). Alpha reliability for this sample was adequate (α = .87). Raw scores were used for analyses unless otherwise indicated.

**Functional Disability Inventory**

The Functional Disability Inventory (FDI; Claar & Walker, 2006; Walker & Greene, 1991) is a child-report measure that assesses children’s 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 & Greene, 1991). Alpha reliability for this sample was adequate (α = .89).
Procedure

Approval from the hospital’s institutional review board was obtained prior to conducting the retrospective chart review. 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.

Statistical Analysis

Data were first screened in SPSS (Green, Salkind, & Akey, 2000) to ensure that all requirements for normality were met. A multivariate analysis of variance (MANOVA) was conducted to determine whether there were differences in the study variables (i.e., pain intensity, passive coping, protective parenting, anxiety, depression, and functional disability) based on participant gender, pain condition (i.e., headache vs. abdominal pain), and the interaction between gender and pain condition. Because girls were significantly older than boys, age was controlled for in the MANOVA. Correlations among the study variables were computed separately for girls and boys.

Structural equation modeling (SEM), as implemented by Mplus software (Muthén & Muthén, 2004), was used to evaluate the study hypotheses. SEM was considered superior to other analytic techniques, such as multiple regression, because it is possible to evaluate more complex models with both latent and single-indicator variables, to reduce measurement error, to test for group differences in complex multigroup analyses, and to include cases with missing data in the model (Muthén & Muthén, 2004; Nelson, Aylward, & Steele, 2008). Full information maximum likelihood estimation was used in order to account for missing data.

A hybrid model was specified including both latent and single-indicator variables. In order to represent the average pain rating, accounting for daily variation in pain intensity, three indicators of pain were included: current pain, lowest pain, and highest pain. In addition, anxiety (RCMAS total raw score) and depression (CDI total raw score) were specified as indicators for a single latent variable representing internalizing symptoms. Passive coping (PRI passive coping index), parental protective behavior (ARCS Protect subscale score), and functional disability (FDI total score) were represented by single indicator variables.

A model was tested in which direct effects were specified between the biopsychosocial predictor variables (i.e., pain intensity, internalizing symptoms, passive coping, and protective parenting) and functional disability (Figure 1). Additionally, direct effects were specified between internalizing symptoms and the other biopsychosocial predictor variables and between internalizing symptoms and functional disability. To account for gender differences in participant age, age was controlled for in all analyses by regressing the exogenous variables in the model (i.e., variables that are not predicted by any other variable) on child age. Multigroup modeling was used in order to evaluate gender differences. That is, separate models for girls and boys were specified simultaneously within the same overall model. In order to simplify the model, latent variable factor loadings were constrained to be equal in girls and boys. Gender differences were tested by constraining specific model parameters to be equal in girls and boys, and comparing the constrained model with a model in which parameters for girls and boys are free to vary (Holmbeck, 1997). Equality constraints that resulted in a significant deterioration in model fit, as indicated by a significant change in $\chi^2$, indicate that gender modifies the constrained model parameter.

Results

Descriptive Statistics by Gender and Type of Pain

Demographic and study variable means and standard deviations by gender and type of pain are presented in Table I. Results of a MANOVA controlling for age indicated that there were no differences in pain intensity, passive coping, protective parenting, anxiety, depression, or disability based on gender, $F(1, 58) = 0.75, NS$, type of pain, $F(1, 58) = 1.13, NS$, or the interaction between gender and type of pain, $F(1, 58) = 0.19, NS$, contrary to prediction. To follow-up on the results of the MANOVA, a chi-square test was conducted to determine whether there were gender differences in the proportion of participants who endorsed symptoms of anxiety and/or depression in the at-risk ($T$-score $= 65–69$) or clinically significant range ($T$-score $\geq 70$). Results of the chi-square test suggest that girls were significantly more likely to report at-risk ($N = 13, 7\%$) or clinically significant levels of depression ($N = 25, 14\%$) than boys [at risk: $N = 3, 3\%$; clinically significant: $N = 4; 4\%; \chi^2(2) = 7.91, p < .05$], as hypothesized.
There were no gender differences in reported symptoms of anxiety, $\chi^2(2) = 2.07$, NS.

**Correlations**

Table II presents bivariate correlations for girls and boys. In both girls and boys, current pain rating was associated with depression (girls: $r = .19$, $p < .05$; boys: $r = .26$, $p < .05$) and disability (girls: $r = .23$, $p < .01$; boys: $r = .37$, $p < .01$), as predicted. In girls, but not in boys, both depression and anxiety were associated with disability (depression: $r = .37$, $p < .001$, anxiety: $r = .24$, $p < .01$), consistent with expectations. Passive coping was associated with both depression (girls: $r = .44$, $p < .001$; boys: $r = .58$, $p < .001$) and anxiety (girls: $r = .33$, $p < .05$; boys: $r = .60$, $p < .001$) in participants of both genders. Protective parenting was associated with disability in boys ($r = .49$, $p < .01$), but not in girls, as hypothesized.

**SEM Tests of Gender Differences**

Model parameters reported represent standardized values. The baseline multigroup model provided adequate fit to the data, $N = 266$; $\chi^2(48) = 82.07$, $p < .05$; $\text{CFI} = .92$; $\text{RMSEA} = .07$ $^*$ $p < .05$. Values for girls are reported first.
to test for gender differences in associations between the psychosocial variables and functional disability. An equality constraint on the path from internalizing symptoms to functional disability resulted in a significant deterioration in model fit, $\Delta \chi^2(1) = 5.19$, $p < .05$, indicating the path was moderated by gender. Specifically, the relation was significantly stronger in girls than in boys, as hypothesized. Equality constraints on paths between pain intensity, $\Delta \chi^2(1) = 3.41$, NS, passive coping, $\Delta \chi^2(1) = 0.19$, NS, and protective parenting, $\Delta \chi^2(1) = 2.57$, NS, and functional disability did not result in significant deterioration in model fit, indicating that gender did not moderate these pathways, contrary to prediction. In addition, there was no evidence that gender moderated pathways between pain intensity, $\Delta \chi^2(1) = 2.25$, NS, passive coping, $\Delta \chi^2(1) = 0.86$, NS, and protective parenting, $\Delta \chi^2(1) = 0.002$, NS, and internalizing symptoms. In girls, the model accounted for 27% of the variance in internalizing symptoms and 19% of the variance in functional disability. In boys, the model accounted for 46% of the variance in internalizing symptoms and 30% of the variance in functional disability.

**Discussion**

This cross-sectional study found support for a model in which pain, passive coping, and protective parenting contribute to internalizing symptoms and functional disability in children and adolescents with chronic headache or abdominal pain. Although the model was generally similar in boys and girls, some support was found for gender as a moderator of these relations, such that the association between internalizing symptoms and functional disability was significantly stronger in girls than in boys. In addition, girls were more likely to report elevated symptoms of depression than boys.

Contrary to expectations, girls and boys in this clinic-based study reported similar levels of pain intensity. Results are consistent with some prior research with clinical samples (Martin et al., 2007; Lynch et al., 2007). In order to be referred to a tertiary care chronic pain clinic, all patients likely report high levels of pain, independent of gender, resulting in comparable levels of reported pain in girls and boys. Furthermore, a clinical follow-up study indicates that although girls are more likely to report persistent pain several years following treatment at a pediatric pain clinic than boys, there are no gender differences in reported pain intensity among former patients who continue to report pain (Martin et al., 2007). Although one clinic-based study has reported gender differences in reported pain intensity (e.g., Keogh & Eccleston, 2006), this study included primarily patients with complex regional pain syndrome and idiopathic pain, and it may be that there are no gender differences in reported pain intensity among patients with other pain conditions. Specifically, results of this study indicate that girls and boys with headache or abdominal pain who receive treatment at pediatric pain clinics report similar levels of pain intensity.

Girls were more likely to report at-risk or clinically significant symptoms of depression than boys, consistent with prior research indicating that girls generally demonstrate higher rates of depression than boys, particularly during adolescence (Hankin & Abramson, 1999; Nolen-Hoeksema & Girgus, 1994). Furthermore, internalizing symptoms were positively associated with disability in girls, but not in boys, as hypothesized. Because the majority of boys reported symptoms of anxiety and depression in the normal range, it is possible that internalizing symptoms were not associated with disability in boys due to a floor effect. It is also possible that boys underreport internalizing symptoms, although research suggests that boys who seek medical treatment for their pain are more vocal in expressing both physical and emotional distress than boys in community settings (Robinson et al., 2003). Nonetheless, findings are consistent with prior research indicating that internalizing symptoms are more closely linked to functional disability in girls with chronic pain compared with boys (Egger et al., 1999). Similarly, in the adult chronic pain literature, research consistently demonstrates that women exhibit greater emotional distress and disability than men (Unruh, 1996). A relation between internalizing symptoms and chronic pain is well supported (Gauntlett-Gilbert & Eccleston, 2007; Scharff et al., 2005; Walker et al., 2007), and it may be that higher rates of depression in adolescent girls, relative to boys, contribute to the increased prevalence of chronic pain in adolescent girls (Perquin et al., 2000). Future research should address potential mediators of the association between depression and functional disability in pediatric patients with chronic pain.

Although the relation between perceived pain intensity and internalizing symptoms was relatively stronger in boys than in girls, contrary to prediction, the gender difference was not statistically significant. Thus, the association between pain intensity and internalizing symptoms was similar in girls and boys in this clinic-based study. Findings are consistent with recent research that suggests girls and boys are equally likely to internalize distress related to chronic pain (Lynch et al., 2007). Similarly, our clinical experience suggests that children and
adolescents with chronic pain tend to be sensitive, conscientious youth who are apt to internalize distress. It may be that girls and boys with chronic or recurrent pain that interferes with functioning and requires treatment in a multidisciplinary pain clinic exhibit similar clinical presentations due to their shared experience. Findings highlight the importance of addressing symptoms of anxiety and depression in assessment and intervention with pediatric chronic pain patients (Degotardi et al., 2006; Hicks, von Baeyer, & McGrath, 2006).

The association between protective parenting and functional disability was relatively stronger in boys than in girls, consistent with expectations. However, this gender difference was not statistically significant. Thus, protective parenting appears to be related to functional disability in both girls and boys. Research suggests that parents engage in greater protective behavior when they perceive their children’s pain problem to be serious (Langer et al., 2007), and it is likely that parents would consider a chronic pain condition that necessitated treatment in a tertiary care chronic pain clinic to be serious. Although results of one recent study by Langer and colleagues (2007) suggest that mothers may be more protective of their sons than of their daughters in the context of severe pain, this study did not include a clinical pediatric sample. Thus, although mothers may be more protective of their sons in response to pain in community samples, parents appear to be equally protective of children of both genders in clinic-based samples. Such protective parenting behaviors may inadvertently reinforce a child’s pain behaviors, thereby maintaining functional difficulties (Peterson & Palermo, 2004). More research is needed with larger samples of both boys and girls with chronic pain to further explicate the role of gender in the association between protective parenting and disability.

In participants of both genders, passive coping was associated with increased internalizing symptoms but was not directly associated with functional disability. Children who cope with their pain passively may have little self-efficacy regarding their ability to cope with their pain and may feel overwhelmed and emotionally distressed by pain symptoms (Walker, Smith, Garber, & Claar, 2005). Passive coping behaviors such as restricting activities, isolating oneself, and engaging in negative cognitions in response to chronic pain may lead to decreased social support and/or access to positive activities, which may further exacerbate symptoms of depression (Levinsohn, 1974). Indeed, results of one clinic-based study indicate that the association between pain severity and depression may be mediated by activity restriction, a passive coping strategy (Walters & Williamson, 1999). In turn, depressive symptoms may result in greater disability, particularly in girls.

Alternatively, symptoms of anxiety and depression may result in more frequent use of passive strategies to cope with pain. Specifically, symptoms of anxiety and depression such as social withdrawal, avoidance, decreased motivation, and negative cognitions are largely overlapping with passive coping techniques, and it may be that passive pain coping in pediatric chronic pain patients is indicative of comorbid depression and anxiety. That is, children and adolescents with chronic pain who are depressed may react to their pain in a passive manner as a result of depression. It appears that relations among pain intensity, passive coping, and internalizing symptoms are complex and bidirectional. Longitudinal research with clinical samples is needed to more fully explicate the pattern of associations among pain intensity, passive coping, internalizing symptoms, and functional disability.

This study is not without limitations. Specifically, the study is cross-sectional; thus, it is not possible to determine causal relationships. In addition, a majority of the variables of interest in this study were assessed with child self-report measures, and shared method variance may contribute to the strength of associations. There may also be bias due to the fact that participants completed measures at home rather than in a more controlled laboratory setting. Furthermore, findings are relevant to children and adolescents with headaches or chronic abdominal pain who present to tertiary care pain clinics; results may not generalize to children and adolescents with other chronic pain conditions who do not receive treatment or who are referred to more generalized medical clinics. In addition, the model may differ in participants with headache and abdominal pain; however, the limited sample of participants with abdominal pain did not allow for evaluation of pain condition as a moderator in multigroup analyses in SEM. Last, the model evaluated is likely incomplete, as other contextual variables such as the child’s perceived athletic and social competence (Claar, Walker, & Smith, 1999) have also been found to contribute to pain-associated functional disability.

Consistent with a biopsychosocial model (Engel, 1977), this study suggests that multiple individual and family factors contribute to disability in pediatric chronic pain. These factors do not operate in isolation; rather, they jointly influence child functioning in complex ways (Engel, 1977; Zeltzer, Bursch, & Walco, 1997). Thus, although research has supported associations among internalizing symptoms (Claar & Walker, 2006; Lynch et al., 2007), coping (Keogh & Eccleston, 2006), and parenting...
(Logan & Scharff, 2005; Peterson & Palermo, 2004) and functional disability when these psychosocial variables are examined separately, this study provides a more complete model for the way in which these psychosocial variables influence disability concurrently. Future model development will include tests of cumulative and interactive effects of psychosocial factors such as coping and internalizing symptoms in order to better explicate the influence of these factors on child functioning. Furthermore, although the model is generally similar in boys and girls, some gender differences emerged that suggest psychosocial factors may influence functioning differentially in girls and boys with chronic pain. Future research is needed to examine gender differences in psychosocial correlates of pediatric pain with more diverse samples, and to identify factors that may mediate associations between psychosocial correlates and functional disability in pediatric chronic pain.

Conflicts of interest: None declared.

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