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The Interplay of Parent and Adolescent Catastrophizing and Its Impact on Adolescents' Pain, Functioning, and Pain Behavior

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Abstract

Objectives—Catastrophizing is a coping style linked to poorer patient outcomes. Little attention has focused on the parent-adolescent dyad and catastrophizing as a shared coping style. The purpose of this study was to: (1) examine the effects of adolescent and parent pain catastrophizing on adolescent functioning and (2) explore concordance in catastrophizing in parent-adolescent dyads, with equal interest in outcomes of dyads with discordant coping styles.

Methods—Pain intensity, catastrophizing, depressive symptoms, quality of life, and pain behaviors were assessed in adolescents (ages 11 to 17) presenting to a pediatric chronic pain clinic (N = 240).

Results—Significant correlations between (1) parent and adolescent catastrophizing; (2) catastrophizing and pain behaviors; and (3) catastrophizing and adolescent outcomes were found. Parents and adolescents were classified into concordant or discordant dyads based on catastrophizing with a majority of dyads (> 70%) showing concordant coping styles. Among discordant dyads, functional disability and depressive symptoms were significantly higher in a dyad with a high catastrophizing adolescent and low catastrophizing parent.

Discussion—Results provide further support for catastrophizing being a maladaptive coping strategy for adolescents with pain and their parents. Greater adolescent catastrophizing was related to increased pain behaviors and poorer adolescent functioning. Parent catastrophizing also seems related to poorer adolescent outcomes, and most parent-adolescent dyads showed concordance in use of catastrophizing, which may suggest a shared tendency for adaptive or maladaptive styles of coping with pain. Future research should investigate pain coping at a dyadic or family level to explore how family coping styles magnify distress and disability or buffer adolescents from such problems.

Keywords

catastrophizing; pain behaviors; discordance; pediatric chronic pain

The pain experience is a complex mixture of sensory, affective, and behavioral aspects in the context of a social environment, in which family members play an integral role.¹ For

adolescents with chronic pain, parents are the primary caregivers who must interpret pain expressions and respond to their children, making decisions about the need for medical care, school attendance, or activity restrictions because of pain. Undoubtedly, caring for an adolescent with chronic pain is distressing for parents because of the complex parenting demands involved in dealing with typical adolescent developmental challenges coupled with persistent pain-related suffering and behavioral changes.² Investigating parental factors (such as parental coping strategies) and effects on adolescents' adjustment to chronic pain has been heralded as an important but under studied area of pediatric chronic pain.²

Adolescents with chronic pain use a host of verbal and nonverbal behaviors to communicate with their parents about their pain symptoms and ability to function. On the basis of our knowledge of the importance of social factors in determining the functional consequences of adolescents' pain, one might expect that interactions within the parent-adolescent dyad would heavily influence various adolescent outcomes. In the adult pain literature, pain behaviors—defined as overt expressions of pain—have been linked to greater functional disability,^{3–5} depressive symptoms,^{5–7} pain intensity,^{3,5,7} and pain-related catastrophizing.^{8–10} These findings have begun to be replicated in clinical samples of pediatric chronic pain,¹¹ but much work is needed to understand how pain behaviors and coping interact in parent-adolescent dyads.

Catastrophizing is a coping style characterized by rumination and magnification of negative cognitions.⁸ Pain catastrophizing has a well-established connection to higher pain levels and poorer patient functioning in both adults^{8,12,13} and children¹⁴ with chronic pain. Emerging evidence suggests that parental catastrophizing has important ramifications for the pediatric chronic pain experience. Two studies found that higher parent catastrophizing was correlated with greater child-reported pain intensity, functional disability, and school absences.^{11,15} In clinical and laboratory studies, catastrophizing has been linked to parental engagement in pain-promoting behaviors,¹⁶ higher ratings of their children's pain levels,¹⁷ and an increased parental tendency to want to stop experimental pain tasks.¹⁸

In the absence of intervention, catastrophizing seems to be a relatively stable manner of responding to pain.⁸ Sullivan et al⁸ suggest that catastrophizers may be “communal” copers, engaging in a variety of pain behaviors and outward expressions of distress to solicit social support, unintentionally maintaining a focus on the pain experience and heightening rather than reducing symptoms. Reinforcement of these pain expressions by others' reactions likely sustains this emotion-focused coping style. Using this conceptualization, pain behaviors are central components of the communal coping model of catastrophizing.⁸ Given the findings from the adult literature that indicate a shared tendency toward catastrophizing among individuals with chronic pain and their spouses,¹⁹ one might speculate about whether there could also be a shared parent-adolescent inclination toward catastrophizing. It is predicted that parents and adolescents are likely to share similar coping styles related to catastrophizing whereby parent catastrophizers are expected to have children who catastrophize more frequently and show more pain behaviors to communicate distress. However, research so far has not investigated the intradyadic agreement or concordance between levels of parent and adolescent catastrophizing. Moreover, no attention has been paid to the match or mismatch (ie, congruence) between parent-adolescent levels of catastrophizing and its effects. For example, are outcomes better or worse in the case of a high catastrophizing parent with a low catastrophizing adolescent versus a high catastrophizing teen with a low catastrophizing parent?

Research in adult chronic pain has found that greater discordance between patients and spouses on pain factors results in poorer emotional outcomes for patients.^{19,20} In studies more specifically focused on pediatric pain, greater impairment in adolescents with

fibromyalgia was associated with higher Incongruence scores on the Family Environment Scale indicating a discrepancy in how adolescent-parent dyads described their family environment.²¹ Parallel findings have been reported in the mental health literature, where parent and child discrepancy on the report of child internalizing symptoms was predictive of worse child functioning over time.²² It was posited that this discrepancy was symptomatic of larger family system problems (eg, poor communication or conflict). However, there are no studies in clinical pediatric pain populations about how congruence/discrepancy between parent and adolescent coping styles (especially one of the most critical aspects of coping—catastrophizing) is differentially associated with adolescent outcomes.

The aims of this study are to: (1) replicate prior findings of the relationship between adolescent/parent catastrophizing and poorer adolescent outcomes using a larger sample size of adolescents with chronic pain. Specifically, greater adolescent and parent catastrophizing is expected to positively correlate with increased pain intensity, functional disability, and depressive symptoms and negatively correlate with quality of life; (2) investigate the relationship between parent and adolescent catastrophizing and adolescent pain behaviors. It is predicted that greater parent and adolescent catastrophizing will both be significantly related to more adolescent pain behaviors (parent-reported); and (3) determine the concordance within parent-adolescent dyads related to level of catastrophizing. It is hypothesized that parent-adolescent dyads are more likely to show congruence than discordance regarding level of catastrophizing; and (4) explore the effects of dyadic discordance on adolescent-reported outcomes of pain intensity, functional disability, depressive symptoms, quality of life, and parent report of adolescent pain behaviors. No specific hypotheses are made related to this aim given its exploratory nature.

MATERIALS AND METHODS

Participants

Participants were adolescents and their parent/s presenting to a tertiary care interdisciplinary pediatric pain management clinic between February 2007 and January 2010. A total of 240 adolescents and their parent/s, typically mothers, completed a set of questionnaires as part of their initial clinic evaluation as well as research questionnaires for which they provided written informed consent/assent. Inclusion criteria were: (1) patient age between the years of 11 and 17; (2) primary presenting symptom of chronic pain (recurrent or continuous pain ≥ 3 mo); and (3) patient and parent ability to read and comprehend written English. Patients were ineligible for participation if they had significant developmental delays or impairments. Patients were primarily referred by other pediatric subspecialty clinics such as orthopedics, gastroenterology, rheumatology. Institutional Review Board approval was obtained for this study.

Measures

Numeric Rating Scale—The numeric rating scale is a self-report measure that was used to assess pain intensity.²³ It is an 11-point scale on a 10-cm line, anchored with the terms “no pain” and “worst imaginable pain” at the end points and numbered from 0 to 10. Patients reported their highest, lowest, and average pain intensity for the last 2 weeks. Numeric scales correspond closely to visual analog scales, which have been well researched and validated for children 8 years of age and older.^{24,25}

Functional Disability Inventory (FDI)—The FDI²⁶ is a 15-item self-report inventory assessing difficulty with the performance of daily activities in home, school, recreational, and social domains. Items are rated on a 5-point Likert scale, ranging from 0 to 4 (no trouble to impossible) and summed to create a total score with higher scores indicating greater pain-

related physical disability. The FDI is recommended for children above the age of 8. Cronbach α within the current sample was good ($\alpha = 0.88$).

Pain Catastrophizing Scale for Children and Parents (PCS-C/P)—This 13-item questionnaire is adapted from the PCS, which has been previously used to study coping styles among adult chronic pain patients.^{27,28} The child version (PCS-C) was created by rewording 1 item, simplifying the rating scale, and repeating the item stem at the beginning of each item. There is evidence of construct and predictive validity.¹⁴ The parent version is adapted for caregivers and assesses the degree to which parents worry and catastrophize about their child's pain. Parents rate 13 items by choosing their responses on a 5-point Likert scale ranging from not at all (0) to extremely (4). Items are summed to create a total score, with higher scores indicating increased worry. There is good evidence for construct and criterion validity.¹⁵ Internal consistency for the child and parent versions of the PCS in this current sample was excellent (both α 's = 0.93).

Pediatric Quality of Life (PedsQL)—The PedsQL²⁹ is a 23-item child-report questionnaires assessing children's (ages 8 to 12) and adolescents' (ages 13 to 18) perceptions of health-related quality of life. Initial responses are made on a 5-point Likert scale, from 0 (never a problem) to 4 (almost always a problem), and are reverse scored and converted into scores ranging from 0 to 100. For this study, the total scale score of the PedsQL was utilized. Internal consistency of the total scale score has been shown to be quite good ($\alpha = 0.88$). Higher scores reflect better quality of life. Evidence suggests that the PedsQL can differentiate healthy from chronically ill children and adolescents and is correlated with number of school absences and need for health care.³⁰ Cronbach α within the current sample was good ($\alpha = 0.81$).

Children's Depression Inventory (CDI)—The CDI is comprised of 27 items assessing self-reported symptoms of depression in children and adolescents.³¹ For each item patients choose 1 of 3 responses, representing varying symptom levels, that best describes their symptoms for the past 2 weeks. The CDI is a well validated measure³² and is frequently used to measure depressive symptoms in pediatric pain populations.^{33–35} The CDI raw score was used in analyses to capture the variability of responses without the truncation associated with *t* scores. Cronbach α within the current sample was excellent ($\alpha = 0.91$).

Adolescent Pain Behavior Questionnaire (APBQ)—The APBQ is a 23-item parent-reported instrument designed to assess a parent's perceptions of the various types of adolescent verbal and nonverbal expressions of pain (eg, facial expressions, gestures, vocalizations).¹¹ Parents rate their adolescents' behaviors for the last 4 weeks, using a 6-point Likert scale ranging from 0 (never) to 5 (almost always). Items sum to create a total pain behavior score, ranging from 0 to 115, with higher scores reflecting a greater frequency of pain behaviors as viewed by the parent. This measure has been developed for use with the parents of adolescents 11 years or older. Cronbach α within the current sample was excellent ($\alpha = 0.94$).

Parent Information—A parent (usually the mother) provided basic demographic information and an estimate in weeks of the adolescents' duration of pain problems.

Procedures

The study was presented at the initial Pain Management Center clinic visit to the families by either an advanced practice nurse or the psychologist as a current research project that the family had the option of completing. Select measures (ie, FDI and pain intensity ratings) were completed separately for all families as part of the routine assessment; the remaining

instruments were part of the research protocol. If the family had any questions, these were addressed and then written consent/verbal assent was obtained from the adolescent patient and parent to use already-completed clinical assessment information and additional research-based measures. Adolescents completed the following measures: FDI, PedsQL, PCS-C, numeric rating scale, and CDI. Their parents completed the PCS-P, APBQ, and parent information form.

Planned Analyses

All data were entered and analyzed using PASW 17.0³⁶ software. First, descriptive data on patient demographics were run, including pain characteristics (intensity, duration, and location), depressive symptoms, functional disability, quality of life, pain behaviors, and pain catastrophizing. To address item level missing data, a total score was estimated by multiplying the total number of items on the scale by the mean item score across available items for that case. In the event of missing data on patient pain history, information was obtained from secondary sources (ie, medical chart review, evaluation reports).

To examine the relationship between parent and adolescent catastrophizing and adolescent outcomes, a series of correlations were computed. Given the relationship found in our study between parent catastrophizing and adolescent outcomes, partial correlations were run to determine the relationship between adolescent catastrophizing, pain behaviors, and other identified outcomes while controlling for parent pain catastrophizing. Significant correlations were identified as $P < 0.007$ (0.05/7) to correct for multiple analyses.

Adolescents and their parents were categorized into high and low catastrophizers based on PCS scores being ± 1 SD from each respective mean ($M_{PCS-C} = 27.17$, $SD = 11.40$, low < 16.17 and high > 37.17 ; $M_{PCS-P} = 26.06$, $SD = 11.00$, low < 15.06 and high > 37.06). Two multivariate analyses of variance (MANOVAs) were run to investigate differences on the level of parent and adolescent catastrophizing (high vs. low) on parent report of pain behaviors and adolescent-reported outcomes (functional disability, depressive symptoms, average pain intensity, and quality of life). To correct for multiple analyses, P values of < 0.01 (0.05/5) were set.

To investigate the concordance between parent and adolescent levels of catastrophizing, a dummy variable was created with 3 levels. A difference score was created by subtracting the adolescent PCS score from the parent PCS score. Scores with a positive valence reflected higher parent catastrophizing, whereas scores with a negative valence reflected greater adolescent catastrophizing. Categories were determined in the following manner: (1) parent-adolescent concordance (difference score within ± 1 SD of the mean); (2) discordance: high parent–low adolescent catastrophizing ($> +1$ SD); and (3) discordance: low parent–high adolescent catastrophizing (< -1 SD). A MANOVA test was conducted to determine whether poorer adolescent outcomes (functional disability, average pain intensity, quality of life, depressive symptoms, and pain behaviors) were found in the discordant categories when the parent was the high catastrophizer compared with when the adolescent was the high catastrophizer. Post hoc comparisons were conducted using Bonferroni corrected t tests.

RESULTS

Participant Characteristics

Participants were 240 adolescents who were predominantly white ($N = 213$, 88.8%) and female ($N = 184$, 76.7%). The mean age of the adolescents was 14.76 years ($SD = 1.7$). This patient profile parallels those reported by other comparable pediatric pain studies.^{16,37} Primary presenting pain locations included: abdomen ($N = 63$, 26.3%), back ($N = 62$,

25.8%), and joint ($N = 37$, 15.4%) pain. Mean pain duration was 118.56 weeks ($SD = 159.0$), and most adolescents had pain between 1 and 3 years (Table 1). Pain duration did not show significant relationships with adolescent outcome variables. A majority of patients experienced daily pain ($N = 228$, 85.1%). Age was positively correlated with depressive symptoms ($r = 0.20$, $P < 0.003$) and catastrophizing ($r = 0.14$, $P < 0.03$), and negatively correlated with quality of life ($r = -0.19$, $P < 0.004$). Thus, older adolescents were more likely to report increased mood issues and pain-related worry and poorer quality of life, although the strength of these relationships was small.

Family Characteristics

Parent participants were primarily mothers ($N = 195$, 81.3%) with a small portion of fathers ($N = 28$, 11.7%) or other caregivers ($N = 17$, 7.0%). Demographic results revealed that parents of adolescents were well educated, with a large proportion of mothers ($N = 181$, 75.4%) and fathers ($N = 157$, 65.4%) attending some college or technical school beyond a high school degree.

Correlational Analyses: Adolescent-reported Outcomes and Parent-reported Pain Behaviors

Significant positive correlations were found between parent and adolescent catastrophizing, $r = 0.36$ ($P < 0.001$), as well as pain behaviors and catastrophizing [$r = 0.43$ (parent) and $r = 0.31$ (adolescent), $P < 0.001$, respectively]. Parents who self-reported more catastrophizing about their adolescent's pain were more likely to have adolescents who catastrophized about their own pain and showed greater expressions of pain. Results showed a significant positive correlation between adolescent catastrophizing and self-reported average pain intensity ($r = 0.38$), depressive symptoms ($r = 0.58$), and functional disability ($r = 0.51$, all P s < 0.001) and a significant negative correlation with quality of life ($r = -0.24$, $P < 0.001$). Partial correlations were used to explore the relationship between adolescent catastrophizing, adolescent outcomes, and parent-reported pain behaviors while controlling for parent catastrophizing. Most relationships remained significant (Table 2) except for relationships with average pain intensity, and the magnitude of the significant relationships reduced slightly after controlling for parent catastrophizing.

High Versus Low Catastrophizing and Adolescent Outcomes

The sample was grouped into low catastrophizers (adolescents, $N = 49$ and parents $N = 39$) and high catastrophizers (adolescents, $N = 55$ and parents $N = 41$) based on their PCS scores being ± 1 SD from each respective PCS mean. A 1-way between-groups MANOVA was performed to investigate adolescent catastrophizing and adolescent outcomes (functional disability, average pain intensity, depressive symptoms, quality of life, and parent report of pain behaviors). Significant differences between high and low adolescent catastrophizers were found on the combined outcome variables ($F_{5,98} = 36.07$; $P < 0.001$). Considering the dependent variables individually using a corrected α -level, all outcomes variables showed significant results: functional disability ($F_{1,102} = 83.19$; $P < 0.001$), average pain intensity ($F_{1,102} = 30.08$; $P < 0.001$), depressive symptoms ($F_{1,102} = 85.68$; $P < 0.001$), quality of life ($F_{1,102} = 19.26$; $P < 0.001$), and pain behaviors ($F_{1,102} = 15.32$; $P < 0.001$). In all cases, adolescents who were classified as high catastrophizers showed worse outcomes (Table 3). Of note, high catastrophizing adolescents reported scores for depressive symptoms that were 4 times higher ($M = 20.02$, $SD = 9.83$) than low catastrophizing adolescents ($M = 5.35$, $SD = 5.11$).

A second MANOVA was conducted for parent catastrophizing and the adolescent outcomes described above. Significant differences were found for high and low catastrophizing parents related to the combined adolescent outcome variables ($F_{5,74} = 7.16$; $P < 0.001$).

When variables were investigated separately, 4 variables were statistically significant with corrected α s: depression ($F_{1,78} = 6.43$; $P < 0.01$), functional disability ($F_{1,78} = 17.27$; $P < 0.001$), average pain intensity ($F_{1,78} = 7.22$; $P < 0.009$), and pain behaviors ($F_{1,78} = 31.01$; $P < 0.001$). Thus, high catastrophizing parents had adolescents with significantly more depressive symptoms, greater functional disability, higher pain intensity, and greater pain behaviors compared with low catastrophizing parents (Table 3).

Dyadic Concordance Versus Discordance on Level of Catastrophizing

Parent and adolescent dyads ($N = 206$ with complete data) were classified based on their catastrophizing congruence. Dyads were categorized as concordant if their difference score fell within ± 1 SD of the mean difference score ($M_{\text{difference}} = -0.99$, $SD_{\text{difference}} = 12.7$). In general, the majority ($N = 148$, 71.8%) of dyads showed congruence between parents and adolescents on level of catastrophizing, regardless of the valence of catastrophizing. The remaining dyads were discordant with about an even split between high parent–low adolescent catastrophizing ($N = 27$, 13.1%) and low parent–high adolescent catastrophizing ($N = 31$, 15.0%).

To determine the impact of dyad catastrophizing classification on adolescent outcomes (functional disability, average pain intensity, depressive symptoms, pain behaviors, and quality of life), a one-way between-groups MANOVA was run, with significance set at $P < 0.01$ to correct for multiple tests. Specifically, we were interested in exploring whether or not poorer adolescent-reported outcomes were a result of having a higher catastrophizing parent or adolescent in a discordant catastrophizing dyad. Significant differences between dyadic groups were found on the combined outcome variables ($F_{10,390} = 3.01$; $P < 0.001$). Considering the dependent variables individually using a corrected α level, significant results were found for functional disability ($F_{2,198} = 6.34$; $P < 0.002$) and depressive symptoms ($F_{2,198} = 10.27$; $P < 0.001$). Post hoc comparisons using Bonferroni adjustments indicated significant differences between the 2 discordant catastrophizing groups for both functional disability and depressive symptoms. Dyads where the adolescent was classified as high catastrophizing showed greater levels of functional disability ($M = 24.19$, $SD = 8.52$) compared with dyads where the parent reported high levels of catastrophizing ($M = 14.67$, $SD = 7.80$). Similarly, dyads with high catastrophizing adolescents revealed higher depressive symptoms ($M = 17.11$, $SD = 9.32$) compared with dyads with high catastrophizing parents ($M = 6.70$, $SD = 6.15$). In general, means for the concordant categories fell between those of the 2 discordant categories.

DISCUSSION

The adolescent pain experience is influenced by a complex interplay between biological, sociocultural, and psychological factors in which parents are highlighted as an important aspect of the environmental context.^{1,2} Although much of the research thus far has focused on the pain experience from the adolescent or the parent's perspective, little attention has been focused on the parent-adolescent dyad as a unit until recently.³⁸ This study begins to explore these dyads, particularly with respect to the effects of parent and adolescent catastrophizing in response to adolescents' pain, pain behaviors that are an important communication mechanism between adolescents and parents, and the effects of concordance versus discordance in parent-adolescent dyads with regard to catastrophizing as a coping response to pain.

As predicted and consistent with past research findings,^{11,39,40} increased adolescent catastrophizing was significantly correlated with all indicators of negative adolescent outcomes. These findings are notable given the large sample size of clinically referred adolescents experiencing chronic pain. Specifically, increased adolescent catastrophizing

was associated with higher pain intensity, greater functional disability, poorer quality of life, and increased depressive symptoms. These significant relationships remained after partialing out the effects of parent catastrophizing, although the magnitude of the correlations was reduced to a small degree. When the adolescent sample was separated into subgroups of high and low catastrophizers, high catastrophizers showed significant worse outcomes in all domains. The fact that depressive symptoms among the high catastrophizing adolescents were 4 times as high as the low catastrophizing adolescents reflects a strong relationship between this maladaptive coping style and mood symptoms. It has been proposed that this association may represent general negative affectivity, and historically the constructs of catastrophizing and depression were described as ambiguous and redundant. However, further research has shown that catastrophizing plays a unique role over and above broader depressive symptoms in predicting future mood problems as well as explaining pain-related outcomes.⁸

As predicted, parent catastrophizing about their adolescent's pain was found to be associated with increased adolescent pain behaviors. Although the reason for this association needs further exploration, it is potentially a bidirectional relationship and may even be a self-reinforcing cycle. Research has shown that children showing greater distress tend to obtain stronger responses (both reinforcing and critical) from others in their environment.⁴¹ Parents engaging in pain catastrophizing may elicit more pain behaviors from their adolescents, and their constant vigilance to the adolescent's pain may inadvertently reinforce more pain expression and result in misinterpretation of even innocuous behaviors as pain and suffering. This is supported by recent community-based research that found mothers of children with chronic abdominal pain have a tendency to interpret ambiguous facial expressions of emotion as pain.⁴² Conversely, parents who are high catastrophizers may be more likely to perceive pain behaviors resulting in a reporting bias, which in turn may inflate the relationship between parental catastrophizing and pain behaviors.

There are a number of proposed explanations for the role of catastrophizing as a coping response to pain and why this type of coping strategy might cluster in individuals with close/caregiving relationships. The communal model of coping^{8,9} describes the purpose of catastrophizing as a coping technique used by pain with pain to seek social support and resources from people in their environment. Overt displays of pain are one way for people with pain to communicate distress and solicit support from family and/or caregivers. Pain behaviors may be particularly pronounced if the person with pain desires or expects social support when in pain, but worries about potential negative reactions of directly verbalizing his/her needs.⁴³ Empirical evidence in the adult pain literature has routinely supported the communal coping model of catastrophizing particularly in patient-spouse dyads.^{8,19,43} In turn, the frequent display of pain behaviors might be reinforced by overly solicitous responses from those in the environment.⁸ This type of mutually supportive maladaptive communication may be equally as strong in a parent-adolescent relationship characterized by chronic health issues, where adolescents are more heavily dependent on their parents than would be typical for their age for meeting physical, medical, and emotional needs.

Recent research in the pediatric literature continues to refine the communal coping and reinforcement model of catastrophizing and pain behaviors. In a study of experimentally induced pain in school-aged children, high catastrophizers were found to show facial pain expressions indiscriminately, whether or not a parent was present to observe these pain expressions and/or theoretically reinforce them with attention.⁴⁴ Moreover, for high catastrophizers, youth increased their facial expressions of pain in response to nonreinforcing, nonpain talk from parents. These frequent, indiscriminant pain displays could be the result of repetitive attempts to communicate pain regardless of observer response, signs of generalized emotional and motor dysregulation, or even active attempts to

cope with pain rather than inhibit negative emotions. Because pain behaviors can be both automatic and deliberate, it remains unclear whether the pain behavior displayed by high catastrophizers is intentional communication and to what extent behaviors that are shown depend on the “nature of the observer” (eg, parent vs. stranger).⁴⁵ Clearly, more work in clinical populations of children and adolescents with pain is needed to see whether these relationships work in the same way.

Our exploration of dyadic concordance and discordance in level of catastrophizing revealed that most adolescents and parents tend to share the same (high or low) level of catastrophizing. Given the tendency of other forms of anxiety to run in families,⁴⁶ this finding might be expected. Of equal interest were the discordant dyads where one member (parent or adolescent) reported high catastrophizing and the other reported low catastrophizing and whether or not this discrepancy in coping style resulted in differential outcomes. Results showed that adolescent-reported functional disability and depressive symptoms were significantly worse when the adolescent, and not the parent, was the high catastrophizer. This finding is particularly interesting given the collective research that suggests observers (parents) who engage in increased catastrophizing tend to be more attentive to pain signals, overestimate pain intensity, and report increased distress themselves,⁴⁵ suggesting that a high catastrophizing parent might indirectly contribute to their adolescent’s disability based on their parenting decisions. However, if parental decisions about adolescent’s participation in daily activities is based on the adolescent’s level of distress, then even a highly anxious parent may have little reason to make restrictive decisions for adolescents showing minimal moodiness or worry about pain. It is possible that developmental influences also contribute to this finding such that parents may have a greater influence on the daily activities of younger adolescents, and less impact on older adolescents who show increased autonomy and independent decision making. Descriptive data tentatively support this idea, with young adolescents (ages 11 to 13) comprising 37% of the high parent catastrophizing discordant dyads and only 13% of the high adolescent catastrophizing discordant dyads. In the future, empirical work should focus on the nuances of age and development in parent-adolescent dyads.

It is important to consider that the impact of discordant dyads may not be fully captured in the outcome measures collected. For example, there was no measurement of parenting response to pain, such as punitive or solicitous behavior. Recent research found that adolescent catastrophizing is one mechanism of explaining the relationship between overly protective parental behaviors and subsequent adolescent pain-related disability.⁴⁷ What remains unknown is how this type of outcome variable may differ more observably in a dyad with a high catastrophizing parent compared with a low catastrophizing parent. In addition, inclusion of parent-reported data may provide a richer understanding of these dyads. Cohen et al³⁸ found concordance on parent and adolescent ratings for pain-related outcomes related to more overt behaviors such as physical functioning and shared environmental factors such as family functioning, and significant discordance for internal processes such as depressive symptoms, pain-related anxiety, as well as functional disability on the FDI. Although beyond the scope of this study, future research should determine whether similar results are found in this sample, and if so, whether our conclusions hold true for parent-reported functional disability.

Several limitations should be considered when reviewing these results. Parent catastrophizing almost exclusively referred to maternal catastrophizing in our study, although many adolescents reside with 2 parents. The level of paternal catastrophizing was unknown and consequently we were unable to assess whether or not entire families (both parents and patient) shared a similar style of catastrophizing. It would be interesting to know whether parental catastrophizing may only be relevant for the parent who engages in

medical and caregiving decisions, such as when to seek treatment, call health care providers, or keep the adolescent home from school, and if catastrophizing levels of a less involved parent are less meaningful. Also, if parental discrepancies in catastrophizing exist, it is unknown whether this might serve as a protective factor, that is, one parent buffering the anxiety of the other for the adolescent.

It should be noted that pain behavior was measured based on parent report of adolescent's pain behaviors, which may result in skewed data for high catastrophizers. An objective assessment would confirm parental impressions, and sophisticated facial or behavioral coding systems could better quantify pain behaviors. Nonetheless, parental observation and impressions of their adolescents' pain behaviors remain important as they form the basis for making judgments and decisions about their adolescent's pain.

Future studies should look at the impact of catastrophizing and pain behaviors on parent responses to pain, and whether differential parent responses are a function of parent level of catastrophizing. Further, recruitment for research protocols should focus on fathers, given the paucity of data on paternal responses to adolescent chronic pain. Because outcome measures were primarily reported by adolescents, it would be beneficial to determine whether the findings for discordant dyads are replicated using parent-proxy report. From the perspective of adaptive coping, it would be interesting to study how parents who are "low catastrophizers" function. For example, do parents who are "low catastrophizers" show bias whereby they underestimate adolescent pain-related disability or do they accurately perceive disability but register low levels of distress? Finally, replication of the current research with larger samples of discordant dyads may yield more fruitful outcomes.

The present study further explores how the family milieu affects the complex connections between pain catastrophizing, pain behaviors, mood, and functional outcomes for adolescents experiencing chronic pain. Analyzing a large clinical sample, it describes parent-adolescent pain coping characteristics from a dyadic perspective. This view offers an initial exploration into the realm of family implications of chronic pain in adolescents and invites further research on resiliency and vulnerability factors for these families.

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TABLE 1

Sample Characteristics (N = 240)

Variables	%	N
Sex (% female)	76.7	184
Ethnicity (% white)	88.8	213
Pain locations		
Back pain	25.8	62
Abdominal/flank pain	26.3	63
Joint pain	15.4	37
Other	32.5	78
Pain duration		
3-6mo	25.4	61
7-11mo	15.4	37
1-3 y	42.1	101
> 3 y	16.3	39
	Mean	SD
Pain intensity (NRS)		
Highest	7.9	1.8
Lowest	3.3	2.4
Average	5.7	1.9

NRS indicates numeric rating scale 0 to 10.

TABLE 2

Partial Correlations Between Parent-reported Pain Behavior and Adolescent-reported Depressive Symptoms, Pain Catastrophizing, Pain Intensity, Functional Disability, and Quality of Life Controlling for Parent Catastrophizing

	APBQ	CDI	FDI	PCS-C	PedsQL	NRS
APBQ	—	—	—	—	—	—
CDI	0.24 ^{**}	—	—	—	—	—
FDI	0.28 ^{**}	0.38 ^{**}	—	—	—	—
PCS-C	0.21 [*]	0.52 ^{**}	0.46 ^{**}	—	—	—
PedsQL	−0.22 [*]	−0.19 [*]	−0.22 [*]	−0.21 [*]	—	—
NRS	0.14	0.14	0.46 ^{**}	0.35 ^{**}	0.05	—

^{**}
 $P > 0.001$

^{*}
 $P < 0.01$.

APBQ indicates Adolescent Pain Behavior Questionnaire; CDI, Children's Depression Inventory; FDI, Functional Disability Inventory—Child version; NRS, numeric rating scale, average pain intensity; PCS-C, Pain Catastrophizing Scale for Children—Child version; PedsQL, Pediatric Quality of Life Scale—Child or Adolescent version.

TABLE 3

Adolescent-reported Outcomes and Parent-reported Pain Behaviors for Parents and Adolescents by Level of Catastrophizing

Variables	<i>M (SD)</i>			
	Adolescent High Catastrophizing	Adolescent Low Catastrophizing	Parent High Catastrophizing	Parent Low Catastrophizing
FDI (0-60)	28.12 (9.60) [*]	12.99 (7.12)	25.04 (12.23) [†]	15.40 (7.79)
CDI (0-54)	20.02 (9.83) [*]	5.35 (5.11)	14.98 (10.14) [†]	9.76 (7.25)
PedsQL (0-100)	67.73 (15.17) [*]	78.36 (9.57)	70.22 (15.67)	72.20 (10.36)
NRS (0-10)	6.71 (1.72) [*]	4.75 (1.85)	6.27 (2.00) [†]	5.06 (1.93)
APBQ (0-115)	25.48 (16.60) [*]	13.18 (15.21)	29.67 (17.94) [†]	10.74 (10.92)

^{*} Significant group differences between high/low adolescent catastrophizing.

[†] Significant groups differences between high/low parent catastrophizing.

APBQ indicates Adolescent Pain Behavior Questionnaire; CDI, Children's Depression Inventory; FDI, Functional Disability Inventory—Child version; *M*, mean; NRS, numeric rating scale, average pain intensity; PedsQL, Pediatric Quality of Life Scale—Child or Adolescent version.