

Family Pain History Predicts Child Health Status in Children With Chronic Rheumatic Disease

Laura E. Schanberg, MD*; Kelly K. Anthony, MA‡; Karen M. Gil, PhD‡; John C. Lefebvre, PhD§; Deborah W. Kredich, MD*; and Lisa M. Macharoni, BA‡

ABSTRACT. *Objectives.* To examine the relationships of parental and family pain history on the pain experience of children with chronic rheumatic disease. The aims of the study were as follows: 1) to describe the pain history of parents and families of children with rheumatic disease, 2) to examine relationships between parental and family pain history and the pain report and physician-rated health status of children with chronic rheumatic disease, and 3) to determine whether child coping mediates the relationship between family pain history and the child's pain and physician-rated health status.

Method. Parents of 100 children were recruited from a pediatric rheumatology clinic during routine visits. Parents completed questionnaires assessing parental pain history and family characteristics. Children in the study completed a series of questionnaires to assess pain and pain coping strategies, including the Coping Strategies Questionnaire and parts of the Pediatric Pain Questionnaire. A pediatric rheumatologist provided a global assessment of disease severity on a 100-mm visual analog scale as an index of child health status.

Results. A high number of parents of children seen in a pediatric rheumatology clinic described a personal pain history. More than 90% of parents reported having at least 1 chronic pain condition, with an equal proportion reporting an episode of pain in the past month. The most commonly reported pain conditions were lower back pain, shoulder/neck pain, and migraine headache pain. On average, this group of parents reported a history of 3.5 chronic pain conditions (standard deviation: 2.3) and reported having sought treatment for 1.7 (standard deviation: 2.3) of these conditions. Additionally, 93% of all parents reported extended family members experiencing at least 1 chronic pain condition. Correlational analyses indicated that parents reporting higher levels of current pain and higher mean levels of pain during the past month were more likely to have children reporting higher levels of current pain ($r = 0.23$ and $r = 0.27$). In addition, parents who sought more treatment for their own pain were more likely to have children reporting higher levels of pain ($r = 0.22$) and presenting with poorer health status ($r = 0.22$). Similarly, parents reporting higher levels of pain-related interference with activ-

ity were more likely to have children reporting higher levels of current pain ($r = 0.23$). Correlational analyses also indicated that children whose extended families reported a history of multiple pain conditions were more likely to report higher levels of current pain ($r = 0.24$) and more pain locations ($r = 0.23$). Finally, a series of mediational statistical models confirmed that child use of the pain coping strategy, catastrophizing, partially accounted for the relationship between several parent and family pain history variables and the child's own current pain ratings and physician global assessment. Specifically, child catastrophizing mediated the relationships between the total number of treated pain conditions and children's current pain ratings and physician global assessment. In addition, child catastrophizing was shown to mediate the relationship between parental mean level of pain in the past month and children's current pain rating and the relationship between total number of family pain conditions and children's current pain rating. Taken together, our results suggest that parental and familial pain experiences predict children's use of catastrophizing to cope with pain, which in turn predicts physician global assessment and children's current pain.

Conclusions. The results from the present study indicate that many of the parents of children seen in a pediatric rheumatology clinic have a personal pain history and highlight the potential impact of parental pain history on children's pain experiences. Specifically, parents who were more likely to seek treatment for their own pain or more likely to report interference with recreational activities because of pain had children with higher pain ratings and poorer health status as measured by the physician global assessment. Additionally, a series of mediational models showed that child catastrophizing serves as a specific mechanism through which parental and familial pain history variables influence child ratings of current pain and physician ratings of health status. Future studies are needed to determine exactly how children living in families with painful conditions become more reliant on catastrophizing to cope with their pain. In addition, more research is needed to identify other potential mediators, such as positive ways parents may influence children's pain coping. There are several important clinical implications of our findings. First, our results suggest that by gathering information from parents about their own pain histories, health care providers may be able to identify children at risk for developing maladaptive pain coping strategies and higher levels of disease-related pain and disability. Second, our results indicate that intervention programs should focus specifically on reducing children's use of catastrophizing to cope with their pain. Perhaps most importantly, our results highlight the need to include parents in interventions aimed at reducing children's pain and improving children's abilities to cope with

From the *Department of Pediatrics, Division of Rheumatology, Duke University Medical Center Durham, North Carolina; ‡Department of Psychology, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina; and §Department of Psychology, Wofford College, Spartanburg, South Carolina.

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Address correspondence to Laura E. Schanberg, MD, Department of Pediatrics, Division of Rheumatology, DUMC 3212, Duke University Medical Center, Durham, NC 27710. E-mail: schan001@mc.duke.edu.

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pain. *Pediatrics* 2001;108(3). URL: <http://www.pediatrics.org/cgi/content/full/108/3/e47>; pain coping, catastrophizing, juvenile rheumatoid arthritis, family pain history, pain.

ABBREVIATIONS. SD, standard deviation; CSQ-C, Coping Strategies Questionnaire for Children.

The pain experience of children with chronic disease is influenced by many factors. Some of these factors are related directly to medical characteristics of the disease, such as diagnosis and disease severity, whereas others are more psychosocial in nature. In fact, in recent empirical models, psychosocial factors were better predictors of outcome than medical variables.¹⁻³ Significant psychosocial factors include the child's baseline psychological adjustment, the specific strategies that children use to cope with pain (pain coping), and the social context.

Pain is a significant symptom for many children with rheumatic disease. Sherry and colleagues⁴ found that 86% of 293 children with juvenile rheumatoid arthritis, the most common of the rheumatic diseases in childhood, reported pain during a routine pediatric rheumatology clinic visit. Other investigators have shown that pain is an important symptom throughout the duration of the illness, present both at presentation and 5-year follow-up.⁵ Our research has shown that most children with juvenile rheumatoid arthritis report mild to moderate pain.⁶ Although correlational studies have shown a relationship between measures of disease severity and reported pain intensity,⁷⁻¹⁰ several studies using regression models have shown that medical status and disease severity variables alone predict only a modest proportion of overall pain variance.^{6-7,11}

The influence of parental pain history is an obvious, but surprisingly understudied, factor that may impact the pain experience of children with chronic disease. The potential relationship between child pain and parental pain history is particularly important to study in children with chronic arthritis because they may experience pain for many years and how children cope with pain is a significant factor in overall health status. Two earlier studies in healthy children and young adults suggested that children whose parents have recurrent pain problems may be at greater risk for problems with pain.¹²⁻¹³ Additional studies showed that levels of somatization in the families of children with chronic abdominal pain correlate with children's symptom complaints.¹⁴⁻¹⁵ Children with migraine or abdominal pain had a greater proportion of mothers with a history of migraine or depression compared with healthy controls.¹⁶ In addition, a study of 2165 Aberdeen schoolchildren revealed that 44% of children with recurrent limb pain and 47% of children with migraine pain had at least 1 first degree relative with migraine pain compared with 17% of control children.¹⁷ Finally, our own research has shown that parents' pain experience is related to the pain experience and health status of children with juvenile primary fibromyalgia

syndrome. In particular, children with fibromyalgia whose parents reported a history of multiple chronic pain conditions and treatment for those conditions had poorer health status as assessed by a physician.¹⁸

In the present study, we sought to examine the impact of parental pain history on the pain experience of children with chronic rheumatic disease. The aims of this study were as follows: 1) to describe the pain history of parents and families of children with rheumatic disease, 2) to examine the relationships between parental and family pain history and child current pain report and health status as measured by a physician global assessment, and 3) to test whether child coping mediated the relationship between parent and family pain history and child pain and physician global assessment. In other words, we examined if parental and familial pain history influenced how children cope with pain and, thereby, influenced the child's pain report and overall health status.

METHODS

Study Participants

One hundred children were recruited sequentially for a study about pain from the Duke University Medical Center pediatric rheumatology clinic during routine visits.⁶ Of the 100 children recruited, 89 parents participated. This included 73 mothers and 14 fathers. Two parents did not report their gender. The mean age of the parents was 40.4 years (standard deviation [SD]: 6.7) with a range of 26 to 57 years of age. Based on self-identification, the racial characteristics of the participants were 82.4% white, 11.8% black, 1.2% Asian American, and 4.7% other (4 parents did not provide this information). The parents were mainly married (84.3%).

Children in the study presented with a variety of diagnoses. Of the 89 children whose parents participated in the study, 54 were diagnosed with a form of juvenile chronic arthritis, 17 were diagnosed with systemic lupus erythematosus, 8 had pain syndromes such as fibromyalgia, and 10 had miscellaneous other rheumatologic diseases including vasculitis, juvenile dermatomyositis, and linear scleroderma. Mean duration of illness was 4.77 years (SD: 4.61 years). Of the 89 children participating, 63 were female and 26 were male. The age range was 6 to 19 years, with a mean of 12.8 years (SD: 3.3 years).

Procedure

Parents and children were recruited during a routine clinic visit. Informed consent was obtained according to the procedures of the institutional review board. Parents completed questionnaires designed to assess parental pain history and family characteristics. Data were collected from 1 parent accompanying the child to the evaluation session. If 2 parents accompanied the child to the session, preference for participation was given to the child's primary caregiver. A research technician monitored the parents as they completed the questionnaires. Each child in the study completed a series of questionnaires to assess pain and pain coping strategies. Each child was examined by a pediatric rheumatologist who provided a physician global assessment as an index of child health status. The examining physician was blinded to the participant's self-reported pain ratings.

Measures

Parental Pain History and Family Pain History

Each parent's history of pain and pain treatment was assessed by a pain history questionnaire used previously in our research laboratory and others.^{13,18} This instrument consisted of 2 sections. In the first section, parents were asked to indicate a personal history of any of the following chronic pain conditions: migraine headaches, arthritis, and localized pain syndromes including jaw/facial pain, shoulder/neck pain, arm/hand pain, chest pain, spine/upper back pain, pelvic/groin pain, lower back pain, and

leg/foot pain. In the second section, parents were asked to indicate whether they have sought treatment for any of the pain conditions endorsed. Two summary scores were computed based on responses to the pain history questionnaire: 1) a measure of the number of pain conditions reported, and 2) a measure of the number of pain conditions for which the respondent sought treatment.

In addition, parents completed a questionnaire assessing the family's pain history. Parents indicated whether any blood relatives within the child's family, excluding the reporting parent and target child, had a history of any chronic pain conditions included in the list above.

Parental Pain: Intensity, Disability, and Grading

Questionnaire items drawn from an instrument developed by Von Korff, Ormel, and Keefe¹⁹ were used to assess pain intensity and disability to grade the severity of pain reported by parents. To assess pain intensity each parent was asked to rate their own pain on an 11-point scale anchored by the words "no pain" and "pain as bad as it can be." Parents were asked to rate the intensity of their current, worst, least, and average pain over the last month. To assess pain impairment, parents were also asked to indicate how many days in the last month pain kept them from completing their usual activities. In addition, participants were asked to rate on three 11-point scales (0 = "no interference" and 10 = "extreme change") the degree to which pain had interfered with ability to take part in recreational, social, and family activities, and ability to work over the last month.

The pain intensity and activity interference items were combined into 1 score grading the pain impairment of each parent based on the Von Korff Chronic Pain Grading system,¹⁹ which classifies pain severity into 4 hierarchical grades. Von Korff and colleagues¹⁹ found this grading system has high test-retest reliability and classification of the chronic pain grade at baseline evaluation is highly predictive of pain-related functional limitations at long-term follow-up.

Children's Pain, Physician Global Assessment, and Number of Pain Locations

Children's health status was determined using physician global assessment and self-report questionnaires addressing pain and physical function as previously reported.⁶ After physical examination, the pediatric rheumatologist provided a physician global assessment using a 100-mm visual analog scale anchored at the endpoints by the words "doing very well" and "doing very poorly". Multiple researchers have used the physician global assessment as a measure of disease activity for children and adults with rheumatic disease. Recently, it has been designated as part of the core set of outcomes variables for clinical studies of juvenile arthritis.²⁰ Finally, children rated their current pain using a 100-mm visual analog scale in the form of a pain thermometer anchored by the end points "no pain" and "pain as bad as it can be" and were asked to color in a body map showing their pain locations. The pain location body map was taken from the Varni/Thompson Pediatric Pain Questionnaire.⁸ Both the thermometer format of the visual analog scale²¹⁻²⁴ and the body map^{8,25} have been shown to have adequate reliability and validity in the assessment of pain in children with rheumatic disease. Portions of the child data were previously analyzed and reported.⁶

Children's Pain Coping

Children's tendency to use catastrophizing to cope with pain was assessed using the Catastrophizing Scale from the Coping Strategies Questionnaire for Children (CSQ-C). This scale is composed of 6 items assessing the use of negative, or catastrophizing, thoughts to cope with pain (eg, "It's terrible and I feel it's never going to get any better"; "It's awful and I feel that it overwhelms me"; "I feel I can't stand it anymore"). Children rate how often they use the strategy in each item to cope with pain on a 7-point scale ranging from 0 (never) to 6 (always).

The CSQ-C is a version of the Coping Strategies Questionnaire developed by Rosentiel and Keefe²⁶ that has been modified for children.²⁷⁻²⁹ The reliability and validity of the CSQ-C and the Catastrophizing Scale has been documented by our previous research on pediatric patients with pain and sickle cell disease,²⁷⁻²⁸ juvenile primary fibromyalgia syndrome,²⁹ and juvenile chronic

TABLE 1. Descriptive Analyses of Children's Pain and Health Status Variables (N = 89)

	Mean	SD	Range
Physician global assessment (0-100)	28.89	22.87	0-95
Pain thermometer (0-100)	31.04	26.11	0-93.5
Pain locations (0-9 sites)	2.47	1.60	0-8
Duration of disease (mo)	47.72	46.07	1-208

arthritis.⁶ This research has also demonstrated the significance of the Catastrophizing Scale in predicting child adjustment, pain, and physical function.^{6,27-29}

RESULTS

Descriptive Analyses of Children's Pain and Health Status

Table 1 presents descriptive information on the mean, SDs, and range of children's scores for the physician global assessment and the pain thermometer, as well as the mean number of pain locations reported by children and the duration of children's disease. Univariate analyses of variance revealed no significant differences in physician global assessment ratings, child pain report, or disease duration across children in different diagnostic categories.

On average, children presented with mild to moderate disease activity and reported pain in the low to middle range on the pain thermometer. Physician global assessment significantly correlated with both children's pain thermometer ratings ($r = 0.43$; $P < .01$) and the total number of pain locations ($r = 0.35$; $P < .01$).

Parental Pain and Pain History

Descriptive Analyses

Eighty-nine parents provided information about their current level of pain and the level of pain they had experienced in the past month. Of these parents, 47% reported pain at the time of the evaluation and 90% reported an episode of pain during the past month. As seen in Table 2, parents as a group experienced low levels of average pain in the past month.

A total of 85 parents reported on their experience with various chronic pain conditions and the extent to which pain interfered with their daily activities. Four parents did not provide this information. Of these 85 parents, 78 parents (92%) reported at least 1 chronic pain condition and 70 (82%) reported 2 or more chronic pain conditions. Table 3 displays data on the types of chronic pain conditions reported by the 78 parents with a history of at least 1 pain con-

TABLE 2. Descriptive Analyses of Parental Pain and Disability Measures

	Mean	SD	Range
Pain Measure			
Current pain level (0-10)	1.57	2.44	0-10
Worst pain in past month (0-10)	5.35	3.08	0-10
Least pain in past month (0-10)	1.40	2.26	0-10
Average pain in past month (0-10)	2.59	2.19	0-10
Activity Interference Measure			
Days kept from usual activities (0-30)	1.49	4.90	0-30
Interference with daily activities (0-10)	1.73	2.50	0-10
Change in recreational activities (0-10)	1.83	3.14	0-10
Change in ability to work (0-10)	1.40	2.93	0-10

TABLE 3. Parental and Family Pain History

	Number of Parents Reporting History of Pain Condition	Number of Parents Treated for Pain Condition	Number of Families Reporting History of Pain Condition
Migraine headaches	37 (44%)	22 (26%)	33 (40%)
Arthritis	25 (29%)	13 (15%)	64 (77%)
Jaw/facial pain	11 (13%)	6 (.07%)	8 (10%)
Shoulder/neck pain	42 (49%)	15 (18%)	26 (31%)
Arm/hand pain	26 (31%)	13 (15%)	32 (39%)
Chest pain	17 (20%)	14 (16%)	22 (27%)
Spine/upper back pain	21 (25%)	11 (13%)	13 (16%)
Pelvic/groin pain	22 (26%)	11 (13%)	7 (8%)
Low back pain	50 (59%)	23 (27%)	35 (42%)
Leg/foot pain	41 (48%)	18 (21%)	36 (43%)
Reporting at least 1 condition	78 (92%)	49 (58%)	77 (93%)
Reporting >1 condition	70 (82%)	36 (42%)	66 (80%)

dition. On average, this group of parents reported a history of 3.5 chronic pain conditions (SD: 2.3). There was considerable variability in the type of pain conditions parents reported with the most commonly reported pain conditions being lower back pain, shoulder/neck pain, and migraine headache pain. Table 3 also shows information on parents' history of treatment for chronic pain conditions. On average, parents sought treatment for 1.7 (SD: 2.3) of their chronic pain conditions with lower back pain and migraine headache pain being the most frequently treated conditions.

Table 2 displays information on parents' pain-related activity interference in the past month. Parents reported little interference across a range of activities. Pain intensity (eg, current level of pain and worst pain in the past month) and pain impairment (eg, number of days pain interfered with daily activities, and levels of pain-related interference) data from 82 parents were combined into a pain impairment score for each parent according to the Von Korff Chronic Pain Grading system.¹⁹ As shown in Table 4, the majority of parents (82%) met the criteria for grade I or below, reflecting low levels of pain and related disability in the sample.

Relationship of Parental Pain and Pain History With Child Health Status

A series of correlational analyses were conducted examining the relation of measures of parental pain history and pain to children's pain and physician-rated health status. These results showed parents' ratings of current pain and mean level of pain in the

past month significantly correlated with children's ratings of current pain ($r = 0.23$; $P < .05$ and $r = 0.27$; $P < .02$, respectively). Thus, parents reporting higher levels of current pain and higher mean levels of pain during the past month were more likely to have children reporting higher levels of current pain. Correlational analyses also indicated that parents who sought more treatment for their own pain were more likely to have children reporting higher levels of current pain ($r = 0.22$; $P < .05$) and children with poorer health status as assessed by physician global assessment ($r = 0.22$; $P < .05$). Finally, the results revealed that parents who reported higher levels of interference with recreational activities because of pain in the past month were more likely to have children reporting higher levels of current pain ($r = 0.23$; $P < .05$).

Family Pain History

Descriptive Analyses

Family pain history data were available for 83 of the 89 children in the present sample. Seventy-seven (93%) of the children with family pain history data were reported to have families experiencing at least 1 chronic pain condition, with 66 (80%) reporting 2 or more chronic pain conditions. Table 3 displays data on the types of chronic pain conditions reported in children's extended families, not including those reported by parents. On average, families were reported to have a history 3.3 chronic pain conditions (SD: 2.2), with variability in the type of pain conditions reported. The most commonly reported pain conditions in families were arthritis, leg/foot pain, and lower back pain.

Relationship of Family Pain History With Child Health Status

A series of correlational analyses were performed to determine whether family history of pain conditions was related to children's current pain and physician global assessment. Results indicated that the number of chronic pain conditions reported in families significantly correlated with children's ratings of current pain ($r = 0.24$; $P < .05$) and the total number of children's reported pain locations ($r = 0.23$; $P < .05$). Thus, children whose families reported a history of multiple pain conditions were more likely to re-

TABLE 4. Parental Von Korff Chronic Pain Classifications (N = 82)

Grade	Frequency of Parents Reporting Pain at Different Intensity Levels
Grade 0 (no disability)	5 (6%)
Grade I (low disability–low intensity)	62 (76%)
Grade II (low disability–high intensity)	8 (10%)
Grade III (high disability–moderately limiting)	6 (7%)
Grade IV (high disability–severely limiting)	1 (1%)

TABLE 5. Regression Tests of Mediation Hypotheses

Step	Unstandardized Beta	Standard Error of Unstandardized Beta	Standardized Beta	R ²
Mediation model #1				
Step 1: predicting child catastrophizing with number of treated parental pain conditions	0.90	0.42	0.23*	0.05
Step 2: predicting children's current pain rating with number of treated parental pain conditions	2.60	1.25	0.22*	0.05
Step 3: predicting children's current pain rating with number of treated parental pain conditions and child catastrophizing				
Number of treated parental pain conditions	0.93	1.02	0.08†	0.42
Child catastrophizing	1.86	0.26	0.62**	
Mediation model #2				
Step 1: predicting child catastrophizing with number of treated parental pain conditions	0.90	0.42	0.23*	0.05
Step 2: predicting the physician global assessment with number of treated parental pain conditions	2.21	1.10	0.22*	0.05
Step 3: predicting the physician global assessment with number of treated parental pain conditions and child catastrophizing				
Number of treated parental pain conditions	1.63	1.13	1.45†	0.10
Child catastrophizing	0.62	0.31	0.23*	
Mediation model #3				
Step 1: predicting child catastrophizing with parental mean level of pain	1.93	0.40	0.48**	0.23
Step 2: predicting children's current pain rating with parental mean level of pain	3.15	1.24	0.27*	0.08
Step 3: predicting children's current pain rating with parental mean level of pain and child catastrophizing				
Parental mean level of pain	-0.28	1.2	-0.02†	0.36
Child catastrophizing	1.77	0.30	0.61**	
Mediation model #4				
Step 1: predicting child catastrophizing with number of family pain conditions	1.17	0.43	0.29**	0.09
Step 2: predicting children's current pain rating with number of family pain conditions	2.81	1.27	0.24*	0.06
Step 3: predicting children's current pain rating with number of family pain conditions and child catastrophizing				
Total number of family pain conditions	0.67	1.10	0.06†	0.40
Child catastrophizing	1.82	0.27	0.61**	

Step 1 was the same in the series for both mediation models #1 and #2. All R² values are for the total model.

* *P* < .05.

** *P* < .01.

† Mediation is demonstrated when the addition of the mediator variable into the third regression equation substantially decreases or eliminates the previously significant relationship between the independent variable and the dependent variable.

port higher levels of current pain intensity and more pain locations.

Mechanisms of Effect: Child Coping

To examine whether child catastrophizing served as a mechanism, or mediator, of the reported effects between parental and family pain history variables and child pain and health status variables, a series of regression analyses were performed following the procedures outlined by Baron and Kenny.³⁰ These procedures can be summarized as a 3-step series of regression analyses. In the first regression, the independent variable must be associated with the hypothesized mediator. In the second regression, the independent variable must be associated with the dependent variable. Finally, in the third regression, the effects of both independent variable and mediator on the dependent variable are tested. Mediation is demonstrated when the addition of the mediator

variable into the third regression equation substantially decreases or eliminates the previously significant relationship between the independent variable and the dependent variable.

A series of 3-step regression analyses was performed. In each series, a parental or family pain history variable selected based on either our conceptual model or the result of the correlational analyses (total number of parental pain conditions, total number of parental treated pain conditions, parental mean level of pain in the past month, parental change in ability to work due to pain, or total number of family pain conditions) served as the independent variable. Children's use of catastrophizing to cope with pain served as the mediator and a child pain or health status variable (physician global assessment or child's current pain rating) served as the dependent variable. Of these analyses, 4 mediational models were confirmed. Table 5 presents the coeffi-

cients and R^2 values associated with each of the three steps of the 4 mediational models.

As can be seen in Table 5, child catastrophizing mediated the relationships between several of the parent and family pain history variables and child outcome variables. In particular, child catastrophizing mediated the relationship between the total number of treated parental pain conditions and children's current pain rating and the relationship between the total number of treated parental pain conditions and physician global assessment. Child catastrophizing was also shown to mediate the relationship between parental mean level of pain in the past month and children's current pain rating. Finally, child catastrophizing was mediated the relationship between total number of family pain conditions and children's current pain rating.

Taken together, our results suggest that parental and familial experiences with pain impact children's health status and pain experience indirectly through children's pain coping. More specifically, our mediator models suggest that parental and familial pain experiences influence children's use of catastrophizing to cope with pain, which in turn influences physician global assessment and children's current pain (Fig 1).

DISCUSSION

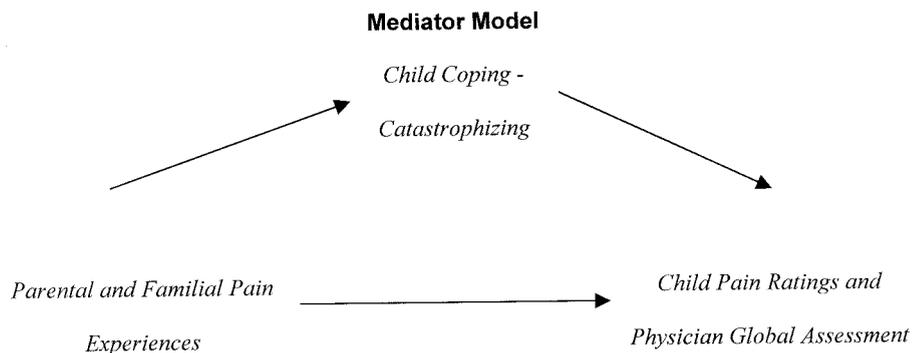
The results indicate that many of the parents of children seen in a pediatric rheumatology clinic have a personal pain history. More than 90% of parents reported having at least 1 chronic pain condition and 90% of parents reported an episode of pain in the past month. The mean level of pain in the parents was low; however, seeking treatment for pain was common. It should be noted that some of the sample disease subgroups were small and that no firm conclusions can be made as to whether the study's conclusions are applicable to children with any of these miscellaneous illnesses. Future studies are needed to determine whether these patterns of parental pain history are a general phenomenon (eg, occurring in samples of parents of healthy children) or whether this extensive pain history is unique to parents of children with chronic illness or, more specifically, to parents of children with musculoskeletal pain. When looking beyond parents to other family members, we found similarly high numbers of children who had other family members with chronic pain problems (93%). These results question the role of environmen-

tal versus hereditary factors in the pain experience of chronically ill children.

There were significant positive correlations between parent pain ratings (of current pain and pain in the past month) and child pain ratings. Additionally, parents who were more likely to seek treatment for their own pain problems or more likely to report interference with recreational activities had children with higher pain ratings and poorer health status as measured by the physician global assessment. Children from families with more frequent chronic pain conditions also reported higher current pain and more pain locations. Although these analyses suggest that parental and family pain variables predict child pain, the findings are based on correlational and cross-sectional data, thus limiting inferences about causality. Additionally, given the amount of variance accounted for in our results, there are likely other important predictors of child pain and health status. Nevertheless, the consistent pattern of significant results seems to confirm our study hypotheses that parent and family pain history are meaningful predictors of child pain and health status. The results are also consistent with previous studies of children with abdominal pain,¹⁴⁻¹⁵ children with recurrent limb pain and migraine,¹⁷ and children with fibromyalgia.¹⁸

In this study, we extended previous research by examining specific mechanisms that might be responsible for the observed relationships. We specifically focused on childhood coping because multiple previous studies have demonstrated that the coping strategy of catastrophizing is a powerful predictor of adjustment problems in pediatric chronic pain populations.²⁷⁻²⁹ We hypothesized that children living with parents and families that have a significant pain history might be prone to rely on catastrophizing as a strategy to cope with their own pain. The series of mediational statistical models showed that child catastrophizing mediated the relationship between several parent and family pain history variables and child ratings of current pain and physician ratings of health status. Although the mediational models imply a linear direction of effect from parent pain history through child catastrophizing to health status variables in children with rheumatic disease, the model does not exclude the possibility that some of the variables mutually influence each other in a more complicated fashion. Moreover, future studies are needed to determine exactly how children living in

Fig 1. Proposed mediator model showing the relationships between variables.



families with painful conditions become more reliant on catastrophizing. It might be that children learn their own coping strategies directly or indirectly from their parents and other family members.

There are several important clinical implications of these findings. First, our results suggest that by gathering information from parents about their own pain histories, health care providers may be able to identify children who are at risk for developing maladaptive pain coping strategies and higher levels of disease-related pain and disability. Identification of at risk children will enable physicians and other health care professionals to provide children and their families with additional services aimed at promoting effective pain-coping skills. Second, our results support that intervention programs should focus specifically on reducing children's use of catastrophizing to cope with their pain.³¹⁻³² Furthermore, and perhaps most importantly, our results support the inclusion of parents in interventions aimed at reducing children's pain and increasing their ability to control pain.

Future studies are needed to explore other potential mediators in these relationships, particularly positive ways that parents may influence their chronically ill children's ability to cope with pain. Furthermore, it will be important for researchers to understand and differentiate the roles of environmental versus hereditary factors in children's acquisition of pain coping strategies and pain responses. For example, it may be worthwhile to examine pain thresholds and physiologic responses to pain stressors in chronically ill children and their families. Finally, future studies are needed to examine the relationships between parent and child pain in families of younger children. Such studies will be necessary to determine when in a child's development the relationships between parent and child pain emerge.

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