

The Treatment of Recurrent Abdominal Pain in Children: A Controlled Comparison of Cognitive-Behavioral Family Intervention and Standard Pediatric Care

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Abstract

This study describes the results of a controlled clinical trial involving 44 7- to 14-year-old children with recurrent abdominal pain who were randomly allocated to either cognitive-behavioral family intervention (CBFI) or standard pediatric care (SPC). Both treatment conditions resulted in significant improvements on measures of pain intensity and pain behavior. However, the children receiving CBFI had a higher rate of complete elimination of pain, lower levels of relapse at 6- and 12-month follow-up, and lower levels of interference with their activities as a result of pain and parents reported a higher level of satisfaction with the treatment than children receiving SPC. After controlling for pretreatment levels of pain, children's active self-coping and mothers' caregiving strategies were significant independent predictors of pain behavior at posttreatment.

Recurrent abdominal pain (RAP) is defined as recurring episodes of abdominal pain severe enough to interfere with a child's usual activities, but not having an identifiable organic pathology. RAP is a common pediatric complaint affecting an estimated 10%–15% of school-age children (Apley, 1975; Apley & Naish, 1958). The disorder often generates considerable parental anxiety and uncertainty about how to respond to the child's pain (Walker & Greene, 1989). These children are frequent users of health care services (Finney, Lemanek, Cataldo, Katz, & Fuqua, 1989), and children hospitalized for the condition have been known to undergo expensive multiple investigation and occasionally unnecessary surgical intervention (Barr & Feuerstein, 1983).

The causes of RAP have not been clearly established, although abnormal physiological processes (e.g., decreased gastrointestinal motility, chronic stool retention, lactose intolerance, and irritable colon), child psychological factors (e.g., excessive anxiety, depression, stressful life events, and somatization), and family characteristics (e.g., excessive parental anxiety, depression, preoccupation with health concerns, stressful family life events, and patterns of family interaction) have been proposed to explain the etiology and maintenance of RAP symptoms (Apley, 1975; Barr, 1987; Feuerstein & Dobkin, 1990; Mavromichalis, Zaramboukas, Richman, & Slavin, 1992; Rappaport, 1989; Sharrer & Ryan-Wenger, 1991; Walker & Greene, 1989; Walker & Greene, 1991).

Explanations of chronic pain in both adults and children increasingly highlight the role of social learning processes in understanding pain, including an individual's coping strategies in dealing with pain and the response of the person's social environment to pain expression (Feuerstein & Dobkin, 1990; Flor, Birbaumer, & Rudy, 1990; Turk, Flor, & Rudy, 1987). The type of coping response used by the child has been shown to mediate the impact of pain (Siegel & Smith, 1989). Active coping responses (efforts to function despite pain or to distract oneself from pain) are thought to increase the child's sense of control, whereas more passive reactions (depending on others for help and restricting activities) lead to withdrawal, decreased activity, and greater pain (Flor et al., 1990; Siegel & Smith, 1989).

Although no studies have examined the pain-coping styles of children with RAP, clinical experience and research with other pediatric pain syndromes (Branson & Craig, 1988; Dunne-Geier, McGrath, Rourke, Latter, & D'Astous, 1986) suggest that children with severe and persistent RAP often have inadequate coping responses and perceive themselves as having little control over their symptoms. The potential usefulness of coping skills training for children with RAP has been suggested by uncontrolled clinical case reports (Linton, 1986). Relaxation training as a specific coping skill has been used in conjunction with other behavioral and dietary interventions (e.g., Edwards, Finney, & Bonner, 1991; Finney et al., 1989). However, controlled studies are lacking and no studies have examined whether a change in a child's coping strategies is the mechanism responsible for improvement in the child's pain. Despite the paucity of controlled research into the treatment of RAP, other literature points to the effectiveness of cognitive-behavioral techniques with anxious children (Kendall et al., 1991; Kendall, 1992).

A child's capacity to implement adaptive coping skills is influenced by broader family environment (Dolgin & Phipps, 1989; Dunne-Geier et al., 1986). According to operant and cognitive-behavioral models of chronic pain (e.g., Fordyce, 1976; Kerns et al., 1991; Turk et al., 1987), caregivers (including parents) provide discriminative cues and selective reinforcement for behavioral expressions of pain (e.g., complaints of pain, guarded movement). Parental attention contingent on pain, the avoidance of nonpreferred activities (Philips, 1987), and parental modeling influences (Whitehead, Busch, Heller, & Costa, 1986) may affect the child's pain. Specifically, some caregiving practices (e.g., sympathy and attention, expression of concerns, physical nurturance, external help seeking, or emotional reactions of anger or criticism) may reinforce pain behaviors (Fordyce, 1976; Payne & Norfleet, 1986). Consequently, training parents to alter attending behaviors that reinforce pain behaviors and to support their children's well behavior or active coping (e.g., positive self-talk, persistence with tasks, relaxation, or distraction) may be useful. Parents can be trained to prompt self-management skills and to withhold reinforcement for pain behavior (extinction). Such parent-child collaboration may improve children's implementation of self-management skills, decrease relapse, and at the same time decrease parents' anxiety and uncertainty about how to help their child.

Although case studies have shown that modifying the social consequences of pain behavior can be effective in treating RAP symptoms (e.g., Miller & Kratochwill, 1979; Sank & Biglan, 1974), only one group comparison study has evaluated cognitive-behavioral therapy for RAP (Sanders et al., 1989). This study evaluated an eight-session program that involved training children to use self-management skills (namely, relaxation, distraction, positive imagery, and coping self-statements) and training their parents to prompt and reinforce children's use of these skills.

Compared with a waitlist control condition, more children in the cognitive-behavioral condition were completely pain free after a 3-month follow-up. They responded more quickly, and cognitive-behavioral treatment was associated with greater improvement in the school setting. However, this study had only a short (3-month) follow-up and did not control for therapist contact or parents' pretreatment expectancies for change. Beames, Sanders, and Bor (1992) used a similar intervention in successfully treating 2 children with recurrent headaches. These latter two studies suggest that interventions that address the broader family context of pain in addition to training children to use self-management skills are useful in the management of some types of pediatric pain.

In the present research the consultation model of behavioral family intervention described by Sanders and Dadds (1993) was adapted for use with pain patients. The model involves conducting a comprehensive functional analysis of the child's behavior and family interactions; discussing with parents assessment findings that challenge, where necessary, maladaptive attributions or explanations; presenting a social learning explanation for the pain; and providing active skills training by way of instructions, modeling, rehearsal, feedback, and homework assignments that train parents to implement behavior change strategies with children in the home. Individual skills training intervention is provided to children on an as-required basis.

There are several unresolved issues concerning the role of cognitive-behavioral family intervention methods in the treatment of RAP. First, as RAP is an episodic condition, the extent of relapse and interference with the child's activities following treatment are important measures of the clinical significance of changes produced by different interventions. No studies have examined this issue. Cognitive-behavioral family intervention, with its dual emphasis on teaching children coping skills and on creating a supportive family environment, should produce better outcomes than care that does not emphasize these components.

Second, although cognitive-behavioral treatment is more effective than a waitlist control (Sanders et al., 1989), no studies have compared a psychological treatment to ongoing pediatric care. Pediatric care often consists of providing reassurance to the parent and child that there is no serious organic disease—that many children “grow out” of the pain—and general advice to the parent and child about learning to cope with the pain. It is an important comparison condition as few children with RAP are referred to mental health specialists unless they have additional psychiatric symptoms, with most children being treated by pediatricians or family physicians (McGrath & Feldman, 1986). Apart from assessing whether such care may be effective for some children, it can serve as a useful attention control condition in clinical trials.

Third, few studies in any area of child psychotherapy or pain management research have assessed or controlled for the comparability of expectancies for improvement invoked by different randomized conditions before receiving treatment (Bandura, 1986; McGlynn & McDonnell, 1974; Solomon & Annis, 1990). This is a particular problem when one condition is perceived to be innovative and hence potentially more advantageous to be randomized into. Subsequent differences on outcome measures may be due to initial pretreatment differences in the perceived effectiveness of treatment. Although the groups may be equivalent before randomization, they may be non-equivalent after randomization. In this study, we assessed and controlled for possible differences in parents' pretreatment expectations of treatment outcome.

Finally, no studies have examined the mechanisms of change responsible for improvement in RAP. cognitive-behavioral family intervention is based on the assumption that changes in active coping and maternal caregiving strategies are responsible for improvement in RAP; however, this assumption has not been tested.

This study sought to extend the literature on RAP by addressing each of the aforementioned limitations. Specifically, we evaluated the effects of a cognitive-behavioral family intervention program on children's pain, the extent of relapse, and the degree of interference of the pain with the child's activities. We predicted that family-based treatment would be superior to standard pediatric care in reducing children's pain up to a 12-month follow-up and would be associated with less relapse following treatment and lower levels of interference in the child's daily activities. We also controlled for parents' pretreatment therapeutic expectancies and examined parents' satisfaction with treatment outcome. Finally, we predicted that child coping and maternal caregiving variables would each independently predict levels of pain at posttreatment after controlling for the pretreatment level of pain.

Method

Participants

Forty-four children (7 to 14 years of age) with RAP were medically examined to exclude those who had an organic condition that might account for the pain. Each child met Apley's (1975) criteria for nonspecific RAP. The pain had to be paroxysmal in nature, severe enough to interfere with the child's daily activities (daily living, school attendance, or relationships), and had to occur at least three times over a 3-month period. Children were excluded if they had undergone major surgery; experienced a previous major medical illness, lactose intolerance, constipation, a recent virus, or persistent loose bowel syndrome; were on any medication; or were receiving treatment elsewhere. Following a structured intake interview, any child who met diagnostic criteria for affective disorder, conduct disorder, oppositional defiant disorder, psychosis, or developmental disorder or who was suspected of being sexually abused was also excluded. None of the children referred to the project had to be excluded on these grounds.

Following medical assessment children were randomly assigned to either cognitive-behavioral family intervention (CBFI) or standard pediatric care (SPC). The mean duration of the children's pain before intake was 44 months ($SD = 37.76$), and there was no significant difference between groups in the duration of pain. There were 13 girls (59.1%) in the CBFI and 15 girls (68.2%) in the SPC condition. Nineteen of the children (86.4%) in CBFI and all of the other children (100%) came from intact two-parent families. Of the mothers in CBFI 36.4% were employed outside the home. The corresponding figure for mothers in SPC was 45.5%. Other demographic characteristics of the sample appear in Table 1. A series of univariate analyses of variance (ANOVAs) and chi-squares (for categorical variables) showed that there were no significant differences between the groups on any measures, suggesting that the groups were equivalent on these sociodemographic measures before treatment.

Table 1
Summary of Sociodemographic Variables

Variable	CBFI (<i>n</i> = 22)		SPC (<i>n</i> = 22)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Child's age (months)	107.4	19.1	113.9	28.8
Mother's age (years)	37.7	5.0	37.6	4.4
Father's age (years)	40.4	5.1	41.5	5.0
Father's SES ^a	4.1	0.9	4.2	1.2
Family's SES ^b	1,113.0	90.0	1,086.0	82.0
Number of siblings	1.4	0.8	1.4	1.0
Birth order of child	1.6	0.7	1.8	0.9

Note. CBFI = cognitive-behavioral family intervention; SPC = standard pediatric care; SES = socioeconomic status.

^a Based on a 7-point occupational prestige scale. ^bBased on residential status, Australian Bureau of Statistics.

Measures

Pain intensity: A pain diary that measured the intensity of pain with a visual analogue scale (VAS) was used (see Sanders et al., 1989). The 10-cm visual analogue, in the shape of a thermometer, represented a continuum from no pain at all to very bad pain. The child was instructed to record the presence or absence of pain (by drawing a line on the thermometer) three times per day (before school, after school, and before bed). A pain intensity score was calculated by measuring the distance from the left of the child's line in millimeters. Pain ratings were calculated by summing the average daily pain intensity scores and dividing by the number of recording days. The VAS has been widely used as a valid and reliable measure of pain intensity with children (McGrath, 1990; Varni, Walco, & Katz, 1989). The measure has been shown to correlate highly with parental and physician estimates of pain on a similar VAS (Varni, Thompson, & Hanson, 1987). The measure correlates highly with parents' independent observation of children's pain behavior and is sensitive to the effects of psychological interventions designed to reduce pain (Sanders et al., 1990). Children monitored their pain on a daily basis for 14 consecutive days at each assessment period (pretreatment, posttreatment, and 6- and 12-month follow-up).

Parent observation of pain behaviour: The Parent Observation Record (POR) was used to measure children's pain behavior. The POR is a time-sampling instrument in which parents record the presence or absence of five categories of pain behavior (complaining verbally about pain, displaying nonverbal pain behavior, requesting medication, resting because of pain, and crying) in observation blocks of 60 min throughout the child's waking day. The data are expressed as a percentage of time intervals of pain behavior per week. This measure has correlated highly with children's pain intensity ratings in prior research (Sanders et al., 1990). Parents monitored the child's pain on the same basis as did children.

Assessment of maternal caregiving: Videotaped vignettes of caregiver-child interactions associated with the expression of pain were used as stimuli to elicit mothers' reports of their caregiving behavior. Mothers were used because of the high level of involvement of women in the care of children during times of illness (Turk, Litt, Salovey, & Walker, 1985). We wished to

use contextually relevant stimuli that would capture commonly encountered interactional events associated with caregiving. Hence, mothers watched a specially designed videotaped vignette that depicted a 10-year-old girl approaching her mother and complaining of abdominal pain ("Mommy, my tummy hurts"). The parent was then shown six alternative ways a parent might respond to the child's pain behavior. Three of the strategies were hypothesized to serve as reinforcers of pain behavior (giving sympathy, seeking medical advice, and getting angry and annoyed with the child), and three were thought to encourage more adaptive coping (acknowledging the pain and then distracting the child, prompting the child to engage in active coping behavior, and ignoring the pain complaint). These strategies were derived from pilot work with parents of children with RAP and pediatricians and psychologists experienced in treating RAP. After each vignette the mother rated the likelihood that she would use each strategy on a 7-point Liker-type scale (1 = not likely at all to 7 = very likely). Subjects were shown one of six randomly determined sequences of the stimuli to control for sequencing and order effects. This assessment measured the average likelihood of using each individual caregiving strategy. We used this methodology because previous research using independent observation in the home had been unsuccessful in sampling the caregiver interactions hypothesized to be central in the maintenance of pain. Such research had been unsuccessful because the pain behaviors in question are of relatively low frequency and are reactive to the presence of observers (Sanders et al., 1989).

Assessment of children's self-coping: Children's coping strategies for dealing with pain were assessed in a similar manner to that used with mothers. Children were shown a videotaped vignette that depicted a child in bed complaining of pain to herself. Four alternative coping strategies, one depicting active coping (namely, positive self-talk) and three depicting attention-gaining strategies that would produce consequences that reinforce pain behavior (requesting medication, resting, and complaining to mother) were shown to the child in a randomized order. The child rated his or her likely use of each strategy on a 7-point rating scale.

Measures of child adjustment: The Child Behavior Checklist (CBCL; Achenbach & Edelbrock, 1983) was used to assess the psychological adjustment before and after treatment. The CBCL is a 118-item parent-completed checklist designed to obtain parents' reports in a standardized format. The T scores for internalizing and externalizing dimensions were examined.

Measures of treatment expectancies: To assess parents' expectations of favorable outcome, each child's mother rated on a 7-point scale (1 = not at all confident to 7 = extremely confident) her degree of confidence that the program would alleviate her child's pain. This measure was administered twice, once after inclusion in the study but before randomization, and then again after randomization to a condition but before treatment. All mothers received an explanation of each condition before they made their ratings.

Measures of relapse: Each mother-child pair was independently interviewed at 6- and 12-month follow-up to determine whether the child had experienced any pain in the 3 months before follow-up assessment. Mother and child were asked separately to estimate the frequency of pain episodes and to rate on a 7-point Likert scale (0 = no effect at all to 6 = major effect) the extent to which RAP pain had interfered with the child's daily activities. To increase the accuracy of parents' and children's reports of pain episodes, the procedures described by Sobell, Toneatto,

Sobell, Schuller, and Maxwell (1990) to reduce errors in reporting life events were used. This procedure involved using a temporal anchor to mediate subject recall through the establishment of marker events during the previous 3 months. These events served as contextual cues to facilitate recall before specific questioning about pain episodes. To minimize the possibility that follow-up data collection might inadvertently cue subjects to underreport pain episodes, subjects were not informed that we were specifically interested in their pain during the period in question.

Measures of parent satisfaction with treatment: Immediately following treatment, parents completed a 14-item satisfaction questionnaire. The items covered satisfaction with therapeutic process during the course of treatment (nine questions) and satisfaction with the outcome of therapy (five questions; rated on a 5-point scale from 1 = strongly disagree to 5 = strongly agree). Two scores were derived: parents' satisfaction with the quality of service received (rated on a 5-point scale) and a composite score that was the summation of all individual items on the questionnaire (a maximum score of 70 and a minimum score of 14 were possible).

Design

The study used a randomized group comparison design with two treatment conditions and four time periods (pretreatment, posttreatment, and 6- and 12-month follow-up).

Procedure

Following a medical examination and pretreatment pain assessment, children were randomly allocated to treatment conditions. Two clinical psychologists provided all therapy in the CBF group and three pediatric gastroenterologists delivered SPC. All treatment was provided on an individual basis. Referred children and their mothers attended all treatment sessions in both conditions. Treatment for both groups was generally completed over an 8-week period.

CBFI. This six-session (50 min per session) program consisted of three components: provision of an explanation of RAP pain and a rationale for pain management procedures; contingency management training for parents; and self-management training for children. Session 1 involved a discussion of the assessment results and the provision of a rationale for pain management procedures. Session 2 involved training parents to reinforce well behavior through contingent social attention (e.g., praise) and token reinforcement in the form of a happy faces or points chart; to respond to verbal pain complaints by prompting the child to engage in competing behavior or distracting activities; to ignore nonverbal pain behaviors; to avoid modeling sick role behaviors; and to discriminate between RAP symptoms and other physical complaints requiring medical attention (i.e., to respond with care and attention and if necessary seek medical advice if the child is physically injured, develops a new symptomatic pattern of illness, or suffers from pain or discomfort arising from injury or viral infection). Sessions 3, 4, and 5 taught children coping skills including progressive muscular relaxation and deep-breathing exercises, positive self-talk, distraction and engagement in competing activities, and positive imagery skills. The final session was devoted to relapse prevention training, in which children were taught problem-solving strategies for dealing with pain that might arise in future high-risk situations (e.g., when studying for examinations or participating in competitive sports). The training process was

accomplished through a combination of verbal and written instructions for both parent and child, within-session demonstrations and practice of techniques, and specific weekly homework tasks.

SPC. Children received four to six sessions. Each family received reassurance from their gastroenterologist that the child's pain was real, that no serious organic disease was present, that most children eventually grow out of the pain, and that the children must learn to cope with the pain themselves. Attempts were made to develop a caring, supportive, noncritical therapeutic relationship. The family was encouraged, in general terms, not to overreact or fuss over the pain and to allow the child to participate fully in normal activities (e.g., school attendance). Neither child nor parent received specific training in self-coping or behavior change techniques; however, the child's progress was monitored closely over the treatment period, and parents and children were encouraged to express their concerns and to report any continuance of pain problems.

Posttreatment and follow-up assessment. Subjects were reassessed following treatment and again at 6 and 12 months posttreatment. At 6- and 12-month follow-up the mother and child underwent a brief structured relapse interview.

Results

Preliminary Analysis

A preliminary analysis sought to determine the comparability of the two groups before treatment in terms of expectancies for change. Mothers in both groups were moderately confident of a favorable outcome at both time 1 (CBFI = 4.62, SD = 1.19; SPC = 4.64, SD = 0.84) and after randomization at time 2 (CBFI = 5.15, SD = 1.21; SPC = 4.85, SD = 1.07). A 2 (Groups: CBFI vs. SPC) \times 2 (Times: prerandomization vs. postrandomization) ANOVA showed no significant differences in mothers' expectations. These findings suggest that any subsequent differences between groups were not simply a function of differential pretreatment expectancies.

Effects of Treatment on Pain and Relapse

Table 2 presents the data from the children's pain diary (pain intensity) and the POR (pain behavior). A 2 (Group: CBFI vs. SPC) \times 4 (Phase: pre- and posttreatment and 6- and 12-month follow-up) repeated measures multivariate ANOVA (MANOVA) revealed a highly significant phase effect, $F(6, 26) = 6.50$, $p = .0005$, and interaction, $F(6, 27) = 2.79$, $p = .03$; the group effect was nonsignificant. Subsequent univariate analyses showed that the phase effects were significant for both the pain diary measure, $F(3, 93) = 17.70$, $p = .0005$, and for the POR, $F(3, 93) = 6.59$, $p = .0005$. Inspection of Table 2 shows that reduced levels of pain on both measures at posttreatment were maintained throughout the 6- and 12-month follow-up period.

Table 2
Effects of Treatment on Children's Pain Over Time

Variable	Pretreatment		Post-treatment		6-month follow-up		12-month follow-up	
	CBFI	SPC	CBFI	SPC	CBFI	SPC	CBFI	SPC
Pain diary								
<i>M</i>	16.51	11.13	3.27	6.67	0.36	3.97	0.64	2.11
<i>SD</i>	17.15	11.47	8.33	7.04	0.77	5.08	1.38	3.56
Parent observation of pain behaviors								
<i>M</i>	10.04	8.55	2.39	7.56	2.28	5.57	0.33	1.88
<i>SD</i>	11.37	17.34	7.15	13.74	5.96	10.86	0.86	2.67

Note. CBFI = cognitive-behavioral family intervention; SPC = standard pediatric care.

Analyses were also conducted on the most stringent criteria for improvement: the number of children who were completely pain free at each phase on the pain diary and the POR. On the pain diary measure there were no significant differences between groups before treatment; however, there was a significantly higher proportion of children in the CBFI group who were pain free at posttest, $\chi^2(1, N = 39) = 4.02, p = .04$, and at 6-month follow-up, $\chi^2(1, N = 39) = 5.31, p = .02$ (see Table 3). However, there were no significant differences between the groups at 12-month follow-up. On the POR measure there were no differences between groups at pretreatment, but there were significantly fewer children displaying pain behavior in the CBFI group at posttreatment, $\chi^2(1, N = 38) = 3.87, p = .05$, and at 12-month follow-up, $\chi^2(1, N = 36) = 5.96, p = .01$, but not at 6-month follow-up ($p > .05$).

Table 3
Proportion of Painfree Children at Each Phase of Treatment

Measure	<i>n</i>	Proportion of painfree children (%)	
		CBFI	SPC
Pain diary			
Pretreatment	44	0.00	0.00
Posttherapy	39	55.60	23.80
6-month follow-up	39	66.70	27.80
12-month follow-up	36	58.80	36.80
Parent observation of pain behaviors			
Pretreatment	44	0.00	0.00
Posttherapy	38	70.60	38.10
6-month follow-up	38	66.70	38.90
12-month follow-up	36	82.40	42.10

Note. CBFI = cognitive-behavioral family intervention; SPC = standard pediatric care.

To determine the level of relapse associated with each condition, a 2 (Groups) \times 2 (Phase: 6- vs. 12-month follow-up) repeated measures MANOVA was used to examine differences between groups in the number of pain episodes reported by the mother and the degree of interference pain had on the child's activities in the 3 months before the 6- and 12-month follow-up assessments. The results of this analysis are presented in Table 4. There was a significant main effect for group, $F(2, 26) = 5.95, p = .007$, but not for phase or for the interaction of group and phase ($p > .05$). Subsequent univariate analyses showed that parents of children in the CBFI group reported

their children experienced fewer episodes at both 6-month, $F(1, 33) = 11.37, p = .002$, and 12-month follow-up, $F(1, 31) = 4.28, p = .05$. They also rated the child's pain as interfering with the child's activities significantly less at both 6-month, $F(1, 42) = 4.10, p = .05$, and 12-month follow-up, $F(1, 40) = 4.39, p = .04$. The apparent difference in the number of pain episodes was not significant at either 6- or 12-month follow-up.

Table 4
Parent and Child Report of Pain and Impact on Functioning at 6- and 12-Month Follow-Up

Variable	CBFI		SPC	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Parent report				
No. of pain episodes				
6-month follow-up	0.9	1.1	6.2	6.2
12-month follow-up	1.6	3.2	4.9	5.9
Interference with child's activities				
6-month follow-up	1.1	1.5	2.1	1.8
12-month follow-up	1.1	1.7	2.7	2.3
Child report				
No. of pain episodes				
6-month follow-up	2.6	6.6	7.6	11.1
12-month follow-up	0.4	1.0	5.5	9.3
Interference with child's activities				
6-month follow-up	0.5	1.2	2.5	1.6
12-month follow-up	0.3	0.8	1.9	2.1
CBCL internalizing				
Pretreatment	66.1	7.7	64.8	6.4
Posttreatment	57.5	11.5	58.1	5.8
6-month follow-up	58.1	12.2	58.6	7.5
12-month follow-up	54.3	12.2	55.6	10.2
CBCL externalizing				
Pretreatment	55.1	12.0	57.4	7.9
Posttreatment	50.5	11.2	50.1	10.4
6-month follow-up	51.9	12.7	51.2	9.7
12-month follow-up	50.7	11.8	49.1	10.5
Mother's satisfaction				
With quality of service	4.33	0.78	3.58	0.79
With treatment	59.42	9.94	50.17	9.28

Note. CBFI = cognitive-behavioral family intervention; SPC = standard pediatric care; CBCL = Child Behavior Checklist.

An identical analysis using children's reports revealed a similar pattern of results. There was a significant main effect for group, $F(2, 32) = 9.39, p = .001$, but not phase or the interaction of phase and group. Children reported fewer pain episodes at 12-month, $F(1, 29) = 5.20, p = .03$, but not at 6-month follow-up. They also rated their pain as interfering less with their activities at both 6-month, $F(1, 33) = 10.51, p = .003$, and at 12-month follow-up, $F(1, 29) = 10.59, p = .003$. There were no differences between groups in the number of pain episodes reported by children.

Effects of Treatment on Global Adjustment

A 2 (Group) \times 4 (Phase) repeated measures MANOVA was conducted on the internalizing and externalizing CBCL T scores (see Table 4). This analysis showed a significant main effect for phase, $F(6, 25) = 10.10, p = .0005$, but nonsignificant group and interaction effects. Subsequent

univariate analyses showed that the phase effect was significant for both internalizing and externalizing scores. On the externalizing subscale there were significant differences between pretreatment and posttreatment scores, $F(1, 32) = 9.55, p = .004$; pretest and 6-month follow-up, $F(1, 32) = 5.05, p = .03$; and pretest and 12-month follow-up, $F(1, 32) = 19.72, p = .0005$. Similarly, on the internalizing subscale there were significant differences between pre- and posttreatment scores, $F(1, 32) = 5.38, p = .09$; pretest and 6-month follow-up, $F(1, 32) = 4.66, p = .04$; and pretest and 12-month follow-up, $F(1, 32) = 46.07, p = .005$. To examine the effects of treatment on the internalizing subscale further, we deleted the 9 somatic items for boys and 13 somatic items for girls. An identical pattern of results was obtained.

Satisfaction With Treatment

Table 4 also presents data on mothers' ratings of the quality of service received and their overall satisfaction with treatment. Mothers in the CBF group had a significantly higher rating of both the quality of service received, $t(22) = -2.34, p = .02$, and their overall satisfaction, $t(22) = -2.36, p = .03$, than mothers in the SPC group.

Predictors of Response to Treatment

A fundamental assumption of cognitive-behavioral approaches to pain management is that changes in children's coping and maternal caregiving mediate reductions in pain. As both groups showed improvements in their pain, we examined this assumption using hierarchical regression equations to predict posttreatment scores on the pain diary measure and the POR from measures of child coping and maternal caregiving using all 44 subjects. We predicted that after controlling for the initial level of pain at pretreatment, a child's posttreatment pain would be a function of the child's coping strategies and the parents' caregiving at posttreatment.

The results of these analyses appear in Table 5. The variables were entered as predictors in the following order: pretreatment level of pain, the child's use of self-talk (active coping), the child's use of passive reactions likely to reinforce pain behavior (requesting medication, complaining, and resting), caregiving strategies likely to promote more adaptive coping by the child (acknowledging the pain and then distracting the child, prompting independence, and ignoring the pain complaint), and caregiving strategies like to reinforce pain behavior (providing sympathy, seeking external help, and getting angry). Overall, the model accounted for 48% of the variance in pain diary scores, with pain diary pretest scores (16%) and parents' use of ignoring the pain complaint, acknowledging the pain and then distracting the child, and prompting independence (26%) each being significant predictors. The same regression equation predicting change in pain behavior (POR) accounted for 72% of the variance with pain behavior at pretest (39%); child self-talk (8%); parents' use of ignoring the pain complaint, acknowledging the pain and then distracting the child, and prompting independence (13%); and parents' use of sympathy, external help seeking, and anger (11%) each explaining unique variance.

Table 5

Hierarchical Regression of Pain, Child Coping, and Maternal Caregiving Variables, on Pain Diary and Parent Observation Record (FOR) Scores at Posttreatment

Criterion and step predictor variables	Multiple R	R ²	R ² change	F change	Significance of F change
Pain diary scores					
Pretreatment level of pain	.40	.16	.16	7.00	.01
Child's use of self-talk at posttreatment	.40	.16	.00	.14	.71
Child requests medicine, rests, complains at posttreatment	.45	.21	.04	.61	.61
Parent ignores the pain complaint, acknowledges the pain and then distracts the child, prompts independence at posttreatment	.68	.47	.26	4.92	.01
Parent provides sympathy, seeks external help, gets angry at posttreatment	.69	.48	.01	.18	.91
POR scores					
Pretreatment level of pain	.62	.39	.39	22.86	.00
Child's use of self-talk at posttreatment	.68	.46	.08	4.98	.03
Child requests medicine, rests, complains at posttreatment	.70	.48	.02	.39	.76
Parent ignores the pain complaint, acknowledges the pain and then distracts the child, prompts independence at posttreatment	.78	.61	.13	3.17	.04
Parent provides sympathy, seeks external help, gets angry at posttreatment	.85	.72	.11	3.26	.04

Discussion

This study found that both CBFi and SPC were associated with clinically significant improvements in the functioning of children with RAP. Several aspects of the data support the predicted superiority of the combined child- and parent-focused cognitive-behavioral intervention. First, on the most stringent measure of clinical improvement, children receiving CBFi were significantly more likely to be pain free on the pain diary measure than SPC recipients at posttreatment and at 6-month follow-up. They were also more likely to be pain free on the parent observation measure of pain behavior at posttreatment and at 12-month follow-up. These findings are consistent with those of prior research on cognitive-behavior therapy for RAP (Sanders et al., 1989), and extend this research by showing that the effects are maintained over at least a 12-month follow-up period.

Children and their parents in CBFi reported a lower level of relapse and rated pain as interfering significantly less with the child's daily activity at 12-month follow-up than did children and their parents in SPC. The clinical significance of the reductions in children's pain is also indicated by the fact that children's pain in the CBFi condition at 12-month follow-up on the pain diary measure ($M = 0.64$, $SD = 1.38$) and on the POR ($M = 0.33$, $SD = 0.86$) were virtually identical to the scores of a sociodemographically matched sample of pain-free children reported elsewhere (Sanders, Woolford, Shepherd, & Cleghorn, 1992). In this latter study the means and standard deviations of the pain-free sample on the pain diary measure were 0.26 ($SD = 0.72$) and on the POR, 0.56 ($SD = 2.20$). Furthermore, the findings show that the treatment effects were not attributable to mothers' differential pretreatment expectancies. It is interesting to note that both conditions invoked relatively positive maternal expectations of outcome.

The present study also revealed that pain reduction was not associated with any symptomatic deterioration in the child's psychological functioning for either treatment. On the contrary, as pain reduced, there were reductions in both their internalizing and externalizing symptoms on the CBCL. This finding replicates earlier research by Sanders et al. (1989), which showed that treatment did not result in unwanted negative side-effects or symptom substitution.

The present results add to an increasing body of research showing the value of cognitive-behavioral treatments for a variety of pain problems in children including headaches (Beames et al., 1992; Richter et al., 1986), painful medical procedures and elective surgery (McGrath & DeVeber, 1986; Melamed & Siegel, 1980), arthritic pain associated with hemophilia (Varni, Gilbert, & Dietrich, 1981), and burns (Varni, Bessman, Russo, & Cataldo, 1980). This research also highlights the usefulness of preparing parents to support their children's self-management behavior. It is consistent with a growing body of research showing that behavioral family interventions that provide skill training for both parents and children can be adapted to a variety of childhood conditions (Dadds, Heard, & Rapee, 1992; Sanders, 1992; Sanders & Dadds, 1993). However, it would be useful to evaluate the effects of an abbreviated 3- or 4-session or a 1-day intensive program to improve the cost-effectiveness of treatment. (We have successfully used briefer interventions with children from remote areas, who do not have access to psychological services.)

An important issue addressed by the current research concerned the mechanisms of change responsible for improvement in children's pain. As hypothesized, the hierarchical regression analyses showed that children's use of positive self-talk (a self-management skill taught to children) and maternal caregiving strategies were significant independent predictors of clinical improvement in pain behavior following treatment, after controlling for the pretreatment level of pain. Although these are only preliminary analyses of the mechanisms of change, the findings are consistent with the cognitive-behavioral family model of pain management, which focuses on changing both children's coping strategies to manage their pain and parents' caregiving strategies. Further research is needed to examine the role of other potential predictors of clinical improvement, including the characteristics of the child's initial level of pain (intensity, duration, and pain behavior), the mode of onset of the pain (e.g., stress-related or after a period of illness), type of treatment received, global adjustment, and other family characteristics. A more detailed analysis of the predictors of clinical improvement is reported elsewhere (Sanders, Cleghorn, Shepherd, & Patrick, 1993).

A limitation of the present study was that only one active child coping skill was assessed. We have recently completed a study using a more elaborate observational system for coding a variety of child coping behaviors. Future research needs to examine clinical outcomes in which children with RAP have documented additional stress or psychopathology in the family.

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