

# Empirically Supported Treatments in Pediatric Psychology: Recurrent Abdominal Pain

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**Objective:** To review the status of empirically supported treatments for recurrent abdominal pain (RAP).

**Methods:** We identified studies based on literature search and contact with experts in the field and evaluated studies based on guidelines modified from the criteria established by the Task Force on Promotion and Dissemination of Psychological Procedures.

**Results:** Nine published intervention studies were identified that fell into three distinctive approaches: operant procedures, fiber treatments, and cognitive-behavioral treatments.

**Conclusions:** Operant procedures did not meet even the most lenient category (promising intervention) of the guidelines. Fiber treatment for RAP associated with constipation met the criteria for a promising intervention. Cognitive-behavioral treatment met the criteria for a probably efficacious intervention. We discuss implications and offer recommendations for future intervention research.

**Key words:** recurrent abdominal pain; empirically supported treatment; psychological intervention.

The health and development of children are often compromised by chronic medical problems for which there are limited physiological indications and medical treatments. Recurrent abdominal pain (RAP) is the most common gastrointestinal disorder in children, with prevalence estimates ranging between 10%–15% of school-age children (Apley, 1975; Faull & Nocol, 1986; Zuckerman, Stevenson, & Bailey, 1987). The disorder has been considered a psychosomatic disorder best treated by psychologists and psychiatrists often working collaboratively with pediatricians (Barr & Feuerstein, 1983; McGrath & Feldman, 1986).

The RAP disorder is characterized by pain that (a) is paroxysmal, (b) occurs for three or more episodes over a 3-month period or longer, and (c) re-

sults in a change in normal activities (i.e., functional status). Children with RAP are frequent users of medical services (Finney, Riley, & Cataldo, 1991) and often present with multiple somatic complaints such as nausea, vomiting, headache, and limb pains (Barr & Feuerstein, 1983; Walker, Garber, & Greene, 1991). In addition, pediatric patients with RAP are significantly more likely than well patients and patients with organically based abdominal pain to maintain symptoms 3 months after the initial clinic visit (Walker et al., 1991).

The long-term prognosis of RAP is unclear, but data suggest that RAP is associated with a number of future health-related and other difficulties. Although many children will become symptom-free without treatment, a significant number of these children continue to experience recurrent pain for years. Some have hypothesized that children with RAP are at increased risk of experiencing similar symptoms as adults that are usually diagnosed as

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irritable bowel syndrome (IBS) (Christensen & Mortensen, 1975). Walker, Guite, Duke, Barnard, and Greene (1998) found an increased risk of IBS in female adolescents/young adults with a history of RAP, though no such relationship was found with adolescent boys. They also found that IBS patients with a history of RAP reported greater levels of disability and health service use than IBS patients without a history of RAP, suggesting that RAP influences symptom presentation and future coping. Stickler and Murphy (1979) found that 24% of their sample of children with RAP continued to report abdominal pain at follow-up of between 5 and 17 years, while Walker, Garber, Van Slyke, and Greene (1995) found that at 5-year follow-up former RAP patients reported significantly higher levels of abdominal pain, somatic symptoms, and functional disability, including school and work absence, than did former well patients. Evidence of reduced school attendance has also been reported in other studies (Bury, 1987; Kaufman et al., 1997; Robinson, Alvarez, & Dodge, 1990). As a result of such data, some researchers have suggested that RAP may be a precursor to somatization disorder (Ernst, Routh, & Harper, 1984).

The etiology of RAP has not been established. Symptoms are not usually associated with an identifiable pathophysiology; less than 10% of children hospitalized for RAP, and an even smaller percentage of outpatients, have an identifiable disease process (Apley, 1975; Liebman, 1978). Moreover, research has suggested that relatively few patients who are diagnosed with RAP (i.e., less than 5%) are later found to have an organic basis for their pain (Apley & Hale, 1973; Strickler & Murphy, 1979; Walker et al., 1995). The issue is complicated further by the great heterogeneity of RAP. Apley's criteria for RAP (1975) are broad and by definition include a diverse group of children.

With such a diverse group, it is likely that a number of different developmental pathways are associated with the onset of RAP. The medical literature has identified various potential subgroups that may be used to help classify patients based on differing clinical presentations (Barr, 1983; Boyle 1991). Not surprisingly, a number of possible physiological mechanisms have been proposed for RAP. Constipation and colonic motility (Dimson, 1971; Kopel, Kim, & Barbero, 1967; Whitehead, Engel, & Schuster, 1980), lactose intolerance (Barr, Levine, & Watkins, 1979; Wald, Chandra, Fisher, Gartner, & Zitelli, 1982), and musculoskeletal abnormalities

(Alfven, 1993a, 1993b) have all been implicated. However, none of these mechanisms has been found in a significant portion of children with RAP symptoms, supporting the position that the presentation of RAP symptoms may develop from a variety of mechanisms.

Psychological and environmental factors have frequently been implicated as vital components in the development and maintenance of RAP, including personality characteristics (Astrada, Licamele, Walsh, & Kessler, 1981; Robinson et al., 1990), reinforcement and encouragement of pain complaints (Walker, Garber, & Greene, 1993), stress and negative life events (Robinson et al., 1990; Stone & Barbero, 1970), ineffective coping skills (Walker, Garber, & Greene, 1994), and modeling (Bennett-Osborne, Hatcher, & Richtsmeier, 1989; Robinson et al., 1990). However, evidence of the role of psychological factors in the etiology of RAP has been limited by the correlational, descriptive nature of psychological research in this area, as well as inconsistent findings.

Some investigators have studied the personality characteristics of RAP children and have noted anxious, shy, and perfectionistic tendencies (Apley & Naish, 1958; Astrada et al., 1981; Ernst et al., 1984; Robinson et al., 1990), as well as traits of submissiveness and dependence on parents (Kaufman et al., 1997). In a recent series of studies, Walker and colleagues have shown that in comparison with healthy controls, RAP patients have higher levels of anxiety and somatization symptoms (Garber, Zeman, & Walker, 1990; Walker et al., 1993; Walker & Greene, 1989). Whether these personality characteristics are causally related to RAP symptoms or stem from having the symptoms is uncertain, but it appears that a large percentage of patients with both RAP and organic abdominal pains (e.g., ulcer-related conditions) may have a clinically significant emotional disorder (Garber et al., 1990).

Other researchers have noted a loose temporal relationship between abdominal pain and psychosocial stressors in the family and school, which suggests that RAP may be at least partially a response to stress (Rubin, Barbero, & Sabinga, 1967; Stone & Barbero, 1970). Specific investigations of the relationship between RAP and negative life events have produced equivocal results. In a cross-sectional study comparing the frequency of negative life events in hospitalized and school RAP patients to that of a matched patient group, Robinson et al. (1990) found that the pain groups reported

significantly more negative life events during the year preceding the onset of pain. However, other cross-sectional studies conducted by Walker and Greene (1991) and Walker et al. (1993) found the RAP patients did not report higher levels of negative life events than organic patients or well patients at the time of their clinic evaluations. Two prospective studies have reported that negative life events predicted symptom maintenance following clinic visits for RAP patients (Walker et al., 1994; Walker & Green, 1991). Interestingly, Walker et al. (1994) reported that negative life events were moderated by social competence, as measured by social skills and peer acceptance, with children low in social competence and high in negative life events reporting more RAP symptoms. Thus, although higher levels of negative life events may not distinguish RAP from other patient groups, they may help to account for individual differences in the course of RAP following medical evaluation. This suggests that children's ability to cope with stress may be a key variable in whether they manifest RAP symptoms. Similar coping deficit hypotheses have been proposed by Garralda (1996) and Scharff (1997).

Operant principles have been cited as one possible factor contributing to RAP by encouraging maladaptive coping strategies. It has been proposed that in many instances children experience positive consequences as a result of pain complaints. Adults unwittingly encourage "illness behavior" by excusing children from school or household chores, allowing them to avoid difficult situations, or providing increased attention upon expression of pain symptoms. Walker, Garber, and Van Slyke (1995) examined parents' reactions to somatic complaints associated with unexplained illness and demonstrated that parents tend to provide secondary gains in the presence of illness behavior. They found that parents responded with less anger, disappointment, and punishment to children who exhibited undesirable behavior associated with unexplained illness complaints than did parents who responded to their children who exhibited undesirable behavior not associated with illness complaints. Although this study deals with general child illness, research has shown that parents encourage children to adopt the sick role for gastrointestinal symptoms more often than for other symptoms (Walker & Zeman, 1992). Research has also demonstrated that children with abdominal pain have families characterized by greater parental encouragement of abdominal pain relative to well controls and psychi-

atric patients (Walker et al., 1993). Moreover, although Bennett-Osborne et al. (1989) did not look specifically at abdominal pain, they found that children with explained pain and their parents identified more negative consequences for pain than did children with unexplained pain, while children with unexplained pain and their parents identified more positive consequences for pain than did children with explained pain and their parents.

Modeling theories have also been cited to explain the development of RAP. In this process, a child observes the pain complaints and corresponding contingencies experienced by another individual (usually a close family member) and then adopts this strategy to deal with his or her own personal stressors. In support of these theories, many researchers have reported a relationship between childhood RAP and a family history of chronic pain (Oster, 1972; Robinson et al., 1990; Stone & Barbero, 1970). In addition, Walker and colleagues (1991) investigated somatization symptoms in pediatric abdominal pain patients. They reported that higher levels of somatization symptoms in both mothers and fathers were associated with higher levels of somatization symptoms in RAP patients, but not in patients with explained abdominal pain. Although noting the possibility of a genetic explanation, Walker and colleagues suggest that such findings may be the result of a greater emphasis on body awareness throughout the family, or reinforcement and modeling of illness behavior by family members. Robinson et al. found that parents of children with RAP report a variety of somatic symptoms to a greater extent than parents of children without RAP, which suggests that modeling may play a role in the development of such problems. Bennett-Osborne et al. found that children with recurrent unexplained pain and their parents are more likely to identify models of pain or illness from their environment than children with explained pain. Jamison and Walker (1992) found that children of patients with chronic pain reported more frequent abdominal pain and used more medication than children of parents without pain. They also reported that perceived somatic complaints in children were associated with higher levels of parent disability, pain behavior, and emotional distress. Finally, Walker et al. (1994) examined a sample of pediatric patients with RAP and found that children whose fathers were characterized by high levels of somatic complaints showed high levels of somatic complaints at a 1-year follow-up. A similar pattern

**Table I.** Categories for Empirically Supported Treatments

Treatments	Criteria
Well-established	<p>I. At least two good between-group design experiments demonstrating efficacy in one or more of the following ways:</p> <p>A. Superior to pill or psychological placebo or alternative treatment.</p> <p>B. Equivalent to an already established treatment in experiments with adequate statistical power (about 30 unless chronic illness group).</p> <p>II. A large series of single case design experiments (<math>n \geq 9</math>) demonstrating efficacy. These experiments must have:</p> <p>A. Used good experimental design and</p> <p>B. Compared the intervention to another treatment as in I. A.</p> <p>III. Experiments must be conducted with treatment manuals or treatment protocol must be specified in article.</p> <p>IV. Characteristics of the client samples must be clearly specified.</p> <p>V. Effects must have been demonstrated by at least two different investigators or investigatory teams.</p>
Probably efficacious	<p>I. Two experiments showing the treatment is more effective than a waiting-list control group</p> <p>OR</p> <p>II. One or more experiments meeting the Well-Established Treatment Criteria I, III, and IV, but not V.</p>
Promising interventions	<p>I. At least one well-controlled study and another less rigorously controlled study by a separate investigator.</p> <p>II. Two or more well-controlled studies with small numbers.</p> <p>III. Two or more well-controlled studies by the same investigator.</p>

for maternal influence was found for sons but not for daughters.

Given the potential negative consequences of RAP and the absence of organic disease that can be treated medically, it is important to identify treatments that may benefit children with RAP and improve their long-term outcomes (Walker et al., 1995). It seems apparent that an effective intervention for RAP needs to address the potential pathogenic variables outlined above, including elevated stress and anxiety, deficient coping skills, and parental influences that encourage or maintain RAP symptoms, as well as to consider the great heterogeneity seen within RAP (Walker, in press). However, traditional treatment for RAP has consisted of reassurance about the absence of disease processes (Edwards, Mullins, Johnson & Bernard, 1994). More recently, however, there has been increased interest in developing and evaluating specific treatment approaches (Edwards, Finney, & Bonner, 1991; Finney, Lemanek, Cataldo, Katz, & Fuqua, 1989).

The purpose of this article is to review the current state of literature and assess the status of empirically supported treatments for pediatric RAP. Building on guidelines formulated by the Task Force on Promotion and Dissemination of Psychological Procedures (1995), this article and the others in this special series in the *Journal of Pediatric Psychology* review existing published literature on topics of interest to pediatric psychologists. Our review identified published intervention studies and evaluated the studies based on the criteria shown in Table I. Thus, interventions are categorized as well-established

treatments, probably efficacious treatments, and promising interventions (see Table I).

## Review of Intervention Studies

Nine intervention studies were identified that investigated the efficacy of treatments for RAP. Only four of these studies were controlled group interventions. Three distinctive intervention approaches were investigated in these studies: operant approaches, fiber treatments, and cognitive behavior therapy.

### Operant Approaches

The earliest investigations of treatments for RAP examined the efficacy of fundamental operant procedures through two controlled case studies (see Table II). Miller and Kratochwill (1979) reported a controlled case study in which they used a time-out procedure to treat a 10-year-old girl presenting with severe stomach pains. A behavioral analysis was conducted to ascertain the variables maintaining the pain complaints. The authors hypothesized that parental attention was maintaining the girl's pain behaviors; thus a time-out procedure was implemented that consisted of removing adult attention and social activities following pain complaints. Pain complaints in the home decreased from two per day during baseline to approximately one per month following treatment and at 1-year follow-up. Similar improvements were noted in the school environ-

**Table II.** Operant Procedures

Treatment types	Case Studies	
	Miller et al. (1979)	Sank et al. (1974)
Subject		
Sample size	1	1
Age range	10 yrs. old	10 yrs. old
Gender	Female	Male
Ethnicity	Not stated	Not stated
Representative	NA	NA
Diagnostic criteria	Description of symptoms	Description of symptoms
Baseline	15-day home baseline 60-day school baseline	7 days
Experimental design	Multiple baseline across environments	Case study
Assessment measures	Recorded number of pain complaints at home and in school	Self-monitoring of frequency and intensity of pain attacks, temperature monitoring, recording school attendance
Treatment protocol	Protocol explained in sufficient detail to allow replication	Protocol explained in sufficient detail to allow replication
Outcome	Virtual elimination of reported abdominal pain episodes	Virtual elimination of reported abdominal pain episodes, reduction in pain intensity, significant increase in school attendance
Follow-up	4, 6 & 8 wks.	None

ment following implementation of treatment procedures.

Sank and Biglan (1974) similarly reported the use of operant procedures within a controlled case study to treat a 10-year-old boy with severe stomach pains. Specifically, a token system was used to reinforce nonpain behaviors while attention was removed for pain complaints. Treatment resulted in a decrease in the frequency of abdominal pain attacks and subsequent pain ratings and an increase in school attendance.

Presently, it is rare to find researchers advocating the treatment of RAP symptoms by operant procedures in isolation. These two investigations into operant procedures do not meet criteria for even the most lenient category (promising intervention) in the present rating system (see Table I). However, these preliminary investigations were of great significance as they served as a foundation for the establishment of alternative interventions, which include operant procedures as one fundamental element of a treatment program (e.g., cognitive-behavioral intervention strategies).

**Fiber Treatments**

The use of a dietary fiber supplement has also been investigated as a possible treatment for children with RAP (see Table III). Unfortunately, the number

of studies in this area is few and the results are mixed. Christensen (1986) conducted a double-blind, randomized, controlled investigation into the efficacy of fiber (ispaghula husk) on 31 children (ages 3 to 15 years) with RAP. He found no difference in the number of RAP episodes between treatment and control groups. Unfortunately, his presentation is very limited, with insufficient information provided to allow one to assess the methodological soundness of this study. For example, neither the method of fiber administration nor placebo control group was outlined. Moreover, the sample consisted solely of hospitalized children and thus may have been biased toward children with more severe symptoms. Children with RAP so severe as to require hospitalization may have already tried a number of interventions including fiber, and thus it would not be surprising that it was ineffective with this population.

Two studies investigating fiber treatments have provided some evidence of improvement. Feldman, McGrath, Hodgson, Ritter, and Shipman (1985) conducted a randomized, double-blind, placebo-controlled study of 52 children with RAP. Subjects ranged in age from 5 to 15 years and were recruited through physicians and pediatricians in the community. Specific inclusion and exclusion criteria were outlined in the article, with the main inclusion criterion being at least one attack of unex-

**Table III.** Fiber Treatments

	Group Designs		Single Case Design
	Christensen (1986)	Feldmen et al. (1985)	Edwards et al. (1991)
Subjects			
Sample size	31	52	11
Age range	3 to 15 yrs.	5 to 15 yrs.	6 to 13 yrs.
Gender ratio	Not stated	17 M, 35 F	4 M, 7 F
Ethnicity	Not stated	Not stated	Not stated
Representative	Some children admitted to hospital; excluded children with emotional or behavioral problems	Recruited from family physicians & pediatricians in local community	Recruited via physicians' media announcements
Diagnostic criteria	2 attacks of RAP over last 6 wks. of sufficient severity to affect activity. R/O organic causes	At least 1 episode per week, over 2 mos., of sufficient severity to affect activity. R/O various organic causes	Apley's criteria: 3 episodes of significant severity to interfere with activities, over last 3 mos.
Baseline	None	2 wks.	Between 2 and 6 wks.
Experimental design	Double blind randomized treatment vs. placebo	Double blind randomized treatment vs. placebo	Multiple baseline
Assessment measures	Not stated	Stomachache diary Side effects diary	CDI, STAI-C, CBCL, BDI, record of bowel movements, self-monitoring of pain, parent's record of child's pain, record of problems at school
Treatment protocol	No standardized or manualized protocol	Protocol explained in sufficient detail to allow replication	Protocol explained in sufficient detail to allow replication
Outcome	No difference in number of RAP episodes between groups	Significantly more children in treatment group reported 50% reduction in pain occurrence	Use of fiber associated with improvement in patients with symptoms of constipation. Minimal success for relaxation treatment in children without constipation
Follow-up	None	None	1, 3, 6, 9, and 12 wks.

plained abdominal pain per week over at least two months. All participants were asked to eat two cookies each day for 6 weeks in addition to their usual diet. Children in the treatment group received cookies that included 5 grams of corn fiber. Frequency and intensity of pain reports were recorded through the use of a "Stomach Ache Diary." Resulting data indicated that a significantly greater number of children in the treatment group reported a 50% reduction in frequency of attacks, which suggested that fiber was effective in reducing the frequency of attack. Unfortunately, the authors did not report the number of children who were pain-free following the intervention, which is another standard of treatment efficacy in this area.

A second study by Edwards et al. (1991) investigated the efficacy of fiber versus relaxation treatment on a series of 11 children using multiple baseline designs. Children were between the ages of 6 and 12 years and were recruited through physicians and media announcements. Children were as-

signed to first receive either fiber or relaxation treatment based on the presence of symptoms of constipation, which was ascertained via parental and child reports of the frequency of bowel movements and stool consistency. In an attempt to control for various confounds, most subjects received the alternative treatment first, followed by the treatment suggested from their presenting symptoms. Pain frequency, intensity, and duration were obtained via parent and child report. The fiber treatment consisted of the addition of 10 grams of dietary fiber through the consumption of two high-fiber wafer bars. The relaxation treatment consisted of a progressive muscle relaxation procedure taught weekly in session and practiced daily at home using an audiocassette. Results showed that children with symptoms of constipation responded positively to fiber treatments, while only minimal support was provided for the use of relaxation training for children without presenting symptoms of constipation.

Both Feldman et al. (1985) and Edwards et al. (1991) provided evidence to suggest that fiber is successful in treating RAP in children with corresponding symptoms of constipation. Feldman et al. included a placebo control group for a true experiment. However, the treatment and control groups each included only 26 subjects (which fell slightly short of the 30 required for a study to be classified in the well-established category). In addition, the criteria for success (50% reduction in RAP incidents) could have been more precisely measured. Thus, this study does not meet the guidelines required for a study to meet one of the criteria for the well-established category but appears to meet criteria for a promising intervention (i.e., one well-controlled study). The Edwards et al. study used a series of single case designs ( $n = 11$ ) to compare fiber and relaxation treatments. Although the fiber appeared to be successful in reducing RAP symptoms for children who had constipation, improvement was not uniform across subjects, and trends toward improvement before administration of fiber in some cases led to questions about mechanisms of improvement. Furthermore, the constipation group consisted of only four subjects. Thus, this study meets one of the criteria for a promising intervention (i.e., another less rigorously controlled study by a separate investigator).

The fact that Christensen (1986) found that fiber was not successful in treating RAP is a concern. However, both the Feldman and Edwards studies recruited subjects through physician and media announcements, while Christensen's sample consisted solely of hospitalized children. Thus, the level of severity of RAP may have been higher in the Christensen sample. Children with RAP who require hospitalization likely have tried a number of interventions that have failed to cause change, including fiber, and we would not expect that a hospital-based sample would include children with RAP associated with constipation. As a result, it would not be surprising that fiber, while effective with less severe manifestations of RAP as seen in the Feldman and Edwards studies, was ineffective with the population of subjects in the Christensen study. Given the apparent data supporting fiber as a treatment for RAP in these studies, we propose that the use of fiber should be classified as a "promising intervention" for treatment of RAP associated with constipation; the data do not support such a designation for RAP without constipation. Addi-

tional research is warranted to further document the outcomes associated with fiber treatment.

### ***Cognitive-Behavior Therapy***

The largest number of studies investigating treatment approaches for RAP focused on cognitive-behavioral treatment packages (see Table IV). The most significant progress in the area of treatment for RAP has been provided by Sanders and colleagues (Sanders et al. 1989; Sanders, Shepherd, Cleghorn, & Woolford, 1994). Sanders et al. (1989) utilized a controlled group design to assess the efficacy of a cognitive-behavioral treatment program with 16 children ranging in age from 6 to 12 years. Apley's criteria for RAP were utilized as selection criteria, with subjects recruited from physician referrals and media announcements. Children who met selection criteria were randomly assigned to treatment or wait-list control conditions. The children used a visual analog scale (VAS) to record estimates of pain intensity, with parents and teachers also providing systematic observations of the child's pain behavior. Following a 2-week baseline period, children and their mothers in the treatment group participated in an 8-week treatment consisting of behavioral and cognitive components. Specific components of the intervention were described in the article and consisted primarily of self-monitoring, differential reinforcement of competing activities, relaxation and imagery, and cognitive self-control strategies. Parents were also trained to prompt and reinforce appropriate coping behaviors. Mothers in the wait-list control group were instructed to "continue to manage child pain complaints in their usual manner" (p. 297), while continuing to complete child pain diaries and parent observations. Although both treatment and control groups showed improvements over time, the treatment group improved more quickly and to a greater extent than the wait-list control group. In addition, 87.5% of the treatment group (seven of eight children) were pain-free at 3-month follow-up versus only 37.5% (three of eight) of the control group, thus providing partial support for the efficacy of this treatment. However, as noted by the authors, the failure to control for therapist contact and parents' pretreatment expectancies bring into question the exact mechanism of change.

Sanders et al. (1994) attempted to address some of the shortcomings noted in the previous investi-

**Table IV.** Cognitive Behavioral Treatments

	Group Designs		Case Studies	
	Sanders et al. (1989)	Sanders et al. (1994)	Finney et al. (1989)	Linton (1986)
Subjects				
Sample size	16	44	16	1
Age range	6 to 12 yrs.	7 to 14 yrs.	4 to 18 yrs.	17
Gender ratio	Not stated	16 M, 28 F	6 M, 10 F	Female
Ethnicity	Not stated	Not stated	Not stated	Not stated
Representative	Australian youth Referrals from physicians; media announcements	Australian youth; Referrals from physicians; media announcements	All subjects referred to pediatric psychology consultation service	Upper middle class
Diagnostic criteria	Apley's criteria; R/O medical concerns (virus & constipation)	Apley's criteria; medical exam R/O	2 episodes of pain over a 3-mo. period of sufficient severity to affect activity	Description of subject symptoms
Baseline	Yes; length not specified	Yes; length not specified	Util. records 6 to 15 mos. before treatment	2 wks.
Experimental design	Pre-post treatment vs. control group	Pre-post treatment vs. pediatric care (CBFI vs. SPC)	8 cases receiving treatment matched with 8 nontreated cases	Case study
Assessment measures	Self-report pain intensity, parent & teacher obsrv. of pain behavior, Conner's Teacher Scale, Behavior Checklist, obsrv. of parent/child interactions	Self-report pain intensity, parent obsrv. of pain, assessmt maternal caregiving, child's self-coping, CBCL, treatment, expectancy satisfctn., follow-up interview	Parent pain ratings, therapist ratings of improv. of school absences, total health care utilization, daily activities	BDI, Illness Behavior Questionnaire, self-monitoring of pain intensity, anxiety, mood & daily activities checklist
Treatment protocol	Protocol explained in sufficient detail to allow replication	Protocol explained in sufficient detail to allow replication	Treatment varied from child to child; specific components outlined	Outlined basic relaxation & coping skills taught
Outcome	Treatment group improved more quickly & more pain free at 3 mos.	CBFI significantly more likely to be pain free at follow-up & lower rate of relapse	81% of parents rated pain as improved; fewer med. visits & school absences for treated group	Gradual improvement in pain, mood & general health. Pain free at 9 mos.
Follow-up	3 mos.	6 and 12 mos.	5 and 14 mos.	9 mos.

gation and built upon the results by using a controlled clinical trial to compare the relative efficacy of cognitive-behavioral family intervention to standard pediatric care. Forty-four children ages 7 to 14 years were selected for inclusion based on Apley's criteria for RAP and a host of medical exclusionary criteria; these criteria were outlined clearly in the article. Children who met criteria were randomly assigned to one of the two treatment conditions. The children used a VAS to record estimates of pain intensity, and parents provided observations of the children's pain behavior. Video vignettes were also used to assess maternal caregiving behavior and children's self-coping. The cognitive-behavioral family intervention consisted of three components delivered in six 50-minute sessions: an explanation for RAP and rationale for pain management procedures, contingency management training for parents, and self-management training for children.

The standard pediatric care treatment controlled for professional contact and treatment expectancy by providing reassurance, support, and insistence that the child must learn to cope with the pain but did not provide training in specific coping skills. Similar to data obtained by Sanders et al. (1989), the trial found that, although both treatment conditions were associated with a reduction in pain intensity and frequency of pain attacks, children in the cognitive-behavioral family treatment were more likely to be pain-free at posttreatment and follow-up.

Two less well-controlled studies also reported the benefits of cognitive-behavioral strategies in reducing symptoms of RAP. Finney et al. (1989) used a multicomponent targeted therapy to treat 16 children with RAP in a clinical replication series. Children ranged from 4 to 18 years of age and had sought medical attention for abdominal pain. Children who met selection criteria received treatment

based on their individual behavioral concerns and symptoms identified during assessment. Individual treatment components included self-monitoring, reinforcement of nonillness behavior, relaxation training, dietary fiber, and required school attendance. Medical care use data were gathered for each of the 16 subjects before, during, and after treatment. Results showed that 81% of the parents rated their children's pain symptoms as improved or resolved and that both medical use and school absenteeism declined after treatment. It is important to note that not all children received all five treatment components. Moreover, although a group of 16 matched controls was used as a comparison group to assess changes in health care use, a wait-list control or placebo group was not included in the study design to compare ongoing treatment effects and reductions in pain symptoms.

In a case study, Linton (1986) reported the use of relaxation, coping skills, and social skills training to treat a 17-year-old young woman presenting with a two-year history of RAP. Gradual improvements were noted on measures of pain intensity, mood, nausea, activity level, and general health, with the patient presenting as nearly pain-free at 9-month follow-up.

Both studies by Sanders and colleagues are well-controlled investigations that meet the individual criteria for a well-established intervention study. However, neither Finney et al. (1989) nor Linton (1986) meets one of the criteria for a well-established intervention study. As a result, the only adequate evidence is from one investigatory team, which does not meet the requirement of "at least two different investigators," as defined by the task force criteria (see Table I). Cognitive-behavioral interventions for RAP therefore fit within the classification of probably efficacious.

## Recommendations

Nine published intervention studies were identified that fell into three distinctive approaches: operant procedures, fiber treatments, and cognitive-behavioral treatments. Operant procedures, with two early case studies that provided a foundation for later research, did not meet even the most lenient category (promising intervention) of the guidelines. Three studies investigated fiber treatment for RAP. Fiber treatment for RAP associated with constipation met the criteria for a promising

intervention. Four studies investigated the effectiveness of cognitive-behavioral treatment. Cognitive-behavioral treatment met the criteria for a probably efficacious intervention.

We suggest the following recommendations to help guide future intervention research in this area. First, a critical issue that needs to be addressed concerns the heterogeneity of RAP (Walker, in press). Research suggests a variety of subtypes of RAP with various etiologies. Due to the diverse nature of children with RAP, effective treatment should not begin until reliable and accurate information is gathered on the presenting symptoms. Such information will allow treatment components to be matched to each individual's problem presentation. One tool that may help in this process will be the development of a more reliable classification system for differentiating subtypes of RAP that may respond differently to various treatments. Until such a system is developed, we are likely to be plagued by inconsistent findings due to within- and across-study sample differences in the presentation of RAP. Alternatively, incorporating functional analysis into clinical treatment also allows researchers and clinicians to develop a closer match between treatment and presenting problems. Empirical validation of treatment approaches is important for providing guidelines for therapists; however, manualized treatment should not replace a functional analysis of each child's problem behaviors. Functional analysis will require self-report and objective measures of children's pain behaviors and other behaviors indicative of optimal functioning. Examples of these other behaviors include school attendance, extracurricular activities, and participation in social activities. Assessment to determine the processes contributing to RAP and to problems with other school and social activities should inform the treatment process. This functional analysis may identify additional components that would be appropriately matched to an individual's needs (e.g., Edwards et al., 1991; Finney et al. 1989).

Related to this issue, further research needs to differentiate RAP presenting with and without constipation. Research results (Edwards et al., 1991; Feldman et al., 1985) have hinted at the differential effectiveness of various RAP treatments (e.g., fiber vs. relaxation) based on the presence of constipation. Further research is needed to replicate and delineate the conditions under which fiber or coping skills treatment is more efficacious. Moreover, colonic motility has been linked to abdominal pain in

adults (Whitehead et al., 1980). How this is linked to constipation and RAP in children, and the subsequent treatment efficacy of various strategies for these children, warrants further investigation. If colonic motility is found to be related to children's RAP, other forms of treatment including biofeedback (Whitehead et al., 1980) should be investigated.

The cognitive-behavioral program developed by Sanders and his colleagues is very encouraging, but efforts by independent researchers to replicate these findings are necessary before these techniques can be classified as well-established. In conjunction with efforts to replicate these findings, it may be useful to develop and evaluate the effectiveness of abbreviated intervention programs (three to four sessions) to improve the cost-effectiveness of intervention (Sanders et al., 1994). Sanders et al. compared their cognitive-behavioral treatment with standard pediatric treatment. Additional comparisons of cognitive-behavioral treatments with other common intervention approaches are also needed.

Many of the intervention research protocols require substantial time and effort by participants not only to implement the treatment techniques but also to record data. Requiring this strict procedural adherence likely leads to a selection bias in that the families who volunteer and are selected to participate in the study are highly motivated to change and have the time or organization skills necessary to complete the protocol. This may not accurately reflect the majority of families with RAP children. Researchers need to be cognizant of this fact and develop research protocols that are less demanding on participants. Alternatively, researchers must include components that will motivate all families to participate. Either strategy will better allow researchers to evaluate the effectiveness of such interventions with all families with children with RAP.

In addition, it may be beneficial to investigate the relative effectiveness of child-focused versus family-focused strategies in treating RAP. In some children myriad family variables likely contribute to RAP symptoms and thus preclude the use of a solely child-focused intervention. On the other hand, in many cases a relatively straightforward focus on enhancing the child's coping skills may be all that is required. Determining which pathogenic variables respond best to different treatments will lead to more efficient and effective treatment.

A number of methodological issues should be considered for future research. First, researchers

should develop a standard criteria for success in treatment outcome studies. Some studies have used a "pain-free" criteria for success following intervention, while others focus on a percentage reduction (i.e., 50%) in pain reports. The differing criteria make it difficult to compare the relative effectiveness of various interventions. Given evidence of the high base rate of abdominal pain in school children (Aro, Paronen, & Aro, 1987), a standard for success of "pain-free" may not be appropriate. Measures of peripheral effects of RAP including utilization of medical services, school absence, and participation in social activities may also provide a useful measure of the functional disability caused by RAP. Second, long-term follow-up of treatment outcome is important for research on empirically supported treatment. The available treatment research studies include follow-up periods of up to 14 months. In addition to establishing maintenance of treatment effects, longer follow-up of children with RAP will also enable researchers to determine if additional gastrointestinal disorders or stress-related problems are prevalent in these children. Third, the ages of children included in the current treatment studies ranged from 4 years to 18 years. In all studies with groups of children, the age range was quite large, but age effects were not included in the data analyses. The developmental variations of children between 4 and 18 years of age demand that researchers determine whether treatment approaches are effective at all ages or whether children of particular ages require specific or additional treatment approaches. For example, family therapy may be more critical for younger children, and older children may have a greater ability to develop and use a variety of coping strategies.

Sampling issues also require attention. Large sample sizes will be necessary for randomized clinical trials comparing different treatment procedures. Selection and descriptions of subjects also require more detail. For example, sampling from different ethnic and racial groups, families of different socioeconomic status, and children with varying severity of RAP is needed to determine the generality of treatment effectiveness. It is particularly important to compare children who are recruited from the community, from outpatient medical clinics, and from inpatient services to determine whether treatment effectiveness varies within these different populations of children with RAP. Most of the subjects from the treatment intervention studies reviewed herein were gathered from primary care

settings that may be representative of the community at large but may have a different level of severity than for children selected from tertiary care centers. An interesting point to note is that while much of our treatment outcome data come from primary care samples, much of the recent empirical literature of RAP characteristics draws on samples from tertiary care settings where patients may have differing levels of symptoms severity, dysfunction, and etiology from the primary care samples (i.e., pediatric gastroenterology clinics, hospitals; Walker et al., 1991, 1993, 1994; Walker & Greene, 1998, 1991). If intervention efforts based on the data gathered from these tertiary care settings are applied to children from community or outpatient settings, we may underestimate (or overestimate) the effectiveness of these intervention efforts due to a mismatch between the focus of treatment and the

variables maintaining RAP in these children. Careful attention and awareness of these differences, plus a growing emphasis on classification based on subtypes of RAP and functional analysis, should help researchers avoid misapplication of treatments.

Effective therapies for children with RAP have been identified. Although additional research is needed to empirically validate these therapies, current research provides an excellent starting point for practicing clinicians and for researchers who wish to extend this field of inquiry. Research on treatment approaches for RAP can provide an exemplar for similar chronic medical problems that compromise the health and development of children.

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