

Predictors of Clinical Improvement in Children with Recurrent Abdominal Pain

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Forty-three children with recurrent abdominal pain who had received treatment from a paediatric gastroenterology clinic were reassessed 6 and 12 months after initial presentation. Measures of children's pain included a pain diary (PD) which measured pain intensity, a parent observation record (POR) which assessed pain behaviour and a structured interview to assess the degree to which pain interferes with the child's activities. Pretreatment measures of the child's history of pain, coping strategies in dealing with pain, and their mother's caregiving strategies were examined as predictors of two indices of clinical improvement: the extent of change in pain on the child's pain diary from pre-test to 6 months follow-up, and the degree of interference to the child's activities. All children had shown significant improvement in the level of pain at follow up, with 74.4% being pain free at 12 month follow-up on the PD and 83.7% being pain free on the POR. The amount of change they showed varied, with some showing residual impairment even though they were significantly improved. Regression analyses showed that children with greatest reductions on the child's pain diary at the 6 month follow-up were those with a stress-related mode of onset, whose mothers used more adaptive caregiving strategies, and who received cognitive behavioural family intervention. There was also a non significant trend for younger children to fare better. These data suggest the importance of early diagnosis and routinely assessing parental caregiving behaviour and beliefs about the origins of pain in planning treatment for children with RAP.

Introduction

Recurrent abdominal pain is a common paediatric complaint affecting an estimated 10-15% of primary school aged children (Apley, 1975; Apley and

Naish, 1958). The pain varies in onset and duration, often occurring with no clearly identifiable precipitating events or recognizable organic etiology. Children with RAP typically report aches and pain diffusely localized in the epigastric or periumbilical region (McGrath, 1990). RAP symptoms are episodic and although they spontaneously remit in some children, the reasons for this are unknown and some children suffer from recurring severe attacks for many years. The long term outcome of children with RAP has not been firmly established. Apley (1975) conducted a long term follow-up of 30 children with RAP 9–20 years later and found that one third continued to have RAP, one third developed other somatic complaints, and one third were symptom free. Stichler and Murphy (1979) found that 20% of children 5–9 years later still experienced symptoms.

However, all reported follow-up studies have methodological limitations. None have employed adequate pain assessment methods where children's pain experience and pain behaviour is measured directly. Most studies have relied on verbal reports of parents and children in interviews to determine the presence of pain in the child. Perhaps more importantly, few studies have examined whether the processes assumed to trigger, maintain, or exacerbate RAP symptoms are related to recovery (Sanders *et al.*, 1990). Consequently, little is known about the variables (psychological or otherwise) that prospectively predict clinical improvement. In one of the few studies examining the persistence of pain, Walker and Greene (1990) found that the number of stressful life events experienced by the child following initial assessment predicted persistence of pain over the next three months.

Previously, we reported data from a clinical trial comparing cognitive behavioural family intervention (CBFI) and standard paediatric care (SPC) (Sanders, Shephard, Cleghorn and Woolford, 1994). CBFI, which involved training of the mother and the child in pain coping strategies and behaviour management procedures, was more effective than standard care (consisting primarily of reassurance) in eliminating pain and reducing relapse. CBFI was also associated with lower levels of interference (due to pain) with the child's daily activities and higher levels of parental satisfaction with treatment than SPC. However, both groups of children showed significant improvements in their RAP symptoms over the 12 month follow-up period, raising questions about the mechanisms of change responsible for children's recovery. The present study extends our prior work by examining whether the pretreatment characteristics of the child and their parents predict clinical improvement in children with RAP.

The identification of child and family variables which predict responsiveness to intervention is important in identifying children likely to benefit

from psychological treatments for RAP. The child variables selected here for investigation were the child's age, pain history, and the child's strategies for coping with pain. Parent variables were the mother's caregiving strategies, and treatment variables were whether children had received CBFI or SPC.

The child's age was selected as there is evidence that children of different ages respond differently to the same psychological interventions (Siegel and Smith, 1989). Also older children may have a longer history of pain and therefore a more chronic course. We predicted that older children would have a less favourable outcome than younger children. The circumstances surrounding the child's first episode of pain (mode of onset) may relate to the family's receptiveness to psychological interventions. The mode of onset here refers to the circumstances (according to maternal report at intake) at the time of the first episode of RAP pain. Parents who believe their child's pain is related to physical illness in the past (even though no current organic findings explain the pain) may be less receptive to psychological interventions that emphasize changing their current methods of dealing with their child's pain, than parents who consider the pain to be related to stressful life events.

Another set of variables concerns how children cope with pain. Research has indicated that children's coping strategies not only affect the degree of pain they experience but also the degree of distress and functional impairment to their everyday lives (Branson and Craig, 1988; Sanders, Woolford, Shepherd and Cleghorn, 1992). Children's pain coping behaviour is complex, being affected by the child's age and developmental level, their prior experience with pain, and the type, duration, frequency and controllability of pain (Sanders *et al.*, 1992). We know of only one study that has examined the coping strategies of children with RAP, although several have employed coping skills such as distraction, relaxation, positive self-talk and imagery as intervention techniques. Sanders *et al.* (1992) found that children's self reported use of positive self-talk, rest, requesting medication and complaining as strategies for dealing with RAP did not differentiate between children with RAP, children with organic pain and pain free children. Children with RAP reported using similar coping styles to other children, with complaining to their mother being the most commonly endorsed strategy. Most children have a fairly restricted repertoire in dealing with recurrent pain and are socialized to report distress to the mothers.

In another study (Sanders *et al.*, 1994) we found that after children with RAP had been taught effective coping skills, their reported use of positive self-talk was a concurrent significant predictor of pain behaviour at post treatment. This finding suggests that treatment could alter the nature of the

relationship between children's coping and pain. However, it is not known how children's reported use of different coping strategies is related to the persistence or remission of pain over time. Children with RAP who have low levels of active coping, or who engage in higher levels of avoidant behaviours such as bed rest, attention gaining behaviours such as complaining to their mother or requesting medication, may be less likely to recover from RAP than other children. Consequently, we predicted that children with more active coping would have a more favourable outcome.

The caregiving behaviours of the parent also may affect children's pain. There is some evidence that social learning influences in the family, such as caregiver attention following pain expression, avoidance of activities and parental modelling of illness behaviour, may affect pain behaviour (Fordyce, 1976; Sanders *et al.*, 1989; Turk, Flor and Rudy, 1987). For example, Sanders *et al.* (1992) showed that mothers of children with RAP reported using more reassuring sympathy than mothers of pain free controls, but did not differ from parents of children with organic pain or pain free controls in their tendency to encourage rest, seek external medical help or to get angry and upset. However, it is not known whether maternal caregiving behaviours prior to treatment are related to the longer term outcome in children with RAP. We predicted that mothers who use more adaptive caregiving, which we defined as encouraging children to deal with the pain themselves and minimizing attention following pain complaints, would have children with lower levels of pain at follow-up.

The final set of variables concerns the type of treatment children receive. Clearly pretreatment variables may interact with subsequent treatment to determine outcome. However, it is unknown to what extent different treatment predicts outcome after controlling for child and parent pretreatment variables. We predicted that children receiving CBT would fare better than children receiving SPC.

In summary, this study examined the role of the child's pain history, their coping style and their mother's caregiving, and type of treatment as predictors of recovery from RAP.

Method

Participants

Forty-three children (7 to 14 years of age) with RAP were medically examined and investigated as indicated 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 and 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 three month period. Children were excluded if they had undergone major surgery, experienced a major past medical illness, lactose intolerance, constipation, a recent viral diarrhoeal disease or persistent loose bowel syndrome, were on any medication or receiving treatment elsewhere. Following a structured intake interview, any child meeting diagnostic criteria for affective disorder, conduct disorder, oppositional defiant disorder, psychosis, developmental disorder or where there was suspected sexual abuse, was also excluded. None of the children referred to the project were excluded on these grounds.

A structured interview was used to determine the history of the child's pain. Verbal descriptions from the mothers regarding the circumstances surrounding the onset of the pain allowed children to be classified as either RAP-illness onset ($n=21$) or RAP-stress onset ($n=22$). Children were classified as having a stress-related onset if there was an identifiable psychosocial stressor that preceded or occurred concurrently with the first episode of pain. Illness related onset required an identifiable episode of physical illness to have preceded the first episode of RAP. The demographic characteristics of the sample appear in Table 1. The family composition was as follows: 88.7% came from intact two parent families; 5.7% had parents who were separated or divorced; 3.8% came from step families; and 1.9% from families where the parent was widowed.

TABLE 1. Characteristics of sample

Variable	Mean	SD
Child's age (years)	9.42	2.04
Mother's age (years)	37.79	4.60
Father's age (years)	41.31	5.38
Number in household	4.34	1.07
Number of siblings	1.36	0.86
Father's occupational status	4.08	1.07
Mother's occupational status	4.20	1.03
Age in years at onset	5.13	2.79
Duration of pain (months)	44.98	37.82

Measures

Pain intensity. A pain diary (PD) which measured the intensity of pain via a visual analogue scale (VAS) was employed (Varnie, Walco and Katz, 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 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 millimetres. Mean 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 (Varnie, Thompson and Hanson, 1987). The measure has been shown to correlate highly with parental and physician estimates of pain on a similar VAS. The measure correlates highly with parents' independent observation of children's pain behaviour and is sensitive to the effects of psychological interventions designed to reduce pain (Varnie *et al.*, 1989). Children monitored their pain on a daily basis for 14 consecutive days at each assessment time (pre-treatment, post-treatment, 6- and 12-month follow-up).

Parent observation of pain behaviour. The Parent Observation Record (POR) was used to measure children's pain behaviour. The POR is a time sampling instrument in which parents record the presence or absence of five categories of pain behaviour (verbal pain complaint, non-verbal pain behaviour, request for medication, resting due to pain, and crying) in observation blocks of 60 minutes throughout the child's waking day. The data are expressed as a percentage of time intervals of pain behaviour per week. This measure has correlated highly with children's pain intensity ratings in prior research (Sanders *et al.*, 1990). Parents monitored their child's pain for 14 consecutive days as for children at each assessment phase.

Assessment of maternal caregiving. Mothers were shown videotaped vignettes of caregiver-child interactions associated with the expression of pain which were used as stimuli to elicit mothers' reports of their caregiving behaviour. Mothers were employed because of the high level of involvement of women in the care of children during times of illness (Farrell, 1993). We wished to employ 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 complaining of abdominal pain ("Mummy, my tummy hurts"). The parent was then shown six alternative ways a parent might respond to the child's pain behaviour. Four of the strategies were hypothesized to serve as reinforcers of pain behaviour (giving sympathy, encouraging rest, seeking medical advice, getting angry and annoyed with the child), and three were thought to encourage more adaptive coping (prompting the child, prompting the child to engage in active coping behaviour, and ignoring the pain complaint). After each vignette, the mother rated the likelihood that she would employ each strategy on a 7 point Likert-type scale (7 = not likely at all; 1 = very likely). Mothers were shown one of six randomly determined sequences of the stimuli to control for

sequencing and order effects. The measures derived from this assessment were the average likelihood of employing each individual caregiving strategy. This methodology was employed as prior research using independent observation in the home had been unsuccessful in sampling the caregiver interactions hypothesized to be central in the maintenance of pain since the pain behaviours in question are of relatively low frequency and reactive to the presence of observers (Varnie *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 her self. Four alternative coping strategies, one depicting active coping (viz. positive self-talk) and three depicting attention gaining strategies that would produce consequences that reinforce pain behaviour (requesting medication, resting, complaining to mother) were shown to the child in a randomized order. The child rated their likely use of each strategy on a 7 point rating scale.

Relapse Interview assessment. Each mother-child pair was interviewed at six-month and 12-month follow-up to determine whether the child had experienced any pain in the three months prior to 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, 6 = major effect) the extent to which RAP pain had interfered with the child's daily activities. The scores of the mother and child were averaged. To reduce errors in reporting life events, the procedures described by Sobell, Toneatto, Sobell, Schuller and Maxwell (1990) were employed to increase the accuracy of parents' and children's reports of pain episodes. This involved using a temporal anchor to mediate subject recall through the establishment of "marker" events during the previous three months. These events served as contextual cues to facilitate recall prior to specific questioning about pain episodes. To minimize the possibility that follow-up data collection might inadvertently cue subjects to under-report pain episodes, subjects were not informed that we were specifically interested in their pain over the time period in question.

Procedure

Following initial medical evaluation, children and their mothers met with a clinical psychologist who explained the pain diary and the parent observation record. The diaries were kept for a period of two weeks at each assessment phase. Participants then separately completed the videomediated assessment of child coping and maternal caregiving. Following assessment, children were randomly assigned to either a cognitive behavioural

family intervention procedure or standard paediatric care (a comparison group). Details of interventions are reported elsewhere (Sanders *et al.*, 1994).

Results

Preliminary analyses

Preliminary analyses were conducted to confirm that the treated children had indeed showed improvements on measures of pain. Repeated measures ANOVAs were employed to examine changes on the PD and the POR over time (see Table 2). On the PD there was a highly significant effect for time, $F(3, 117)=21.38, p<.0005$. Similarly, on the POR there was a highly significant main effect for time $F(3, 117)=11.68, p<.0005$. Subsequent paired comparisons showed that there were significantly lower levels of pain on the PD at post treatment and at both 6 months and 12 months follow-up compared to pretreatment. There was also a significant difference between levels of pain at 6 month follow-up and 12 month follow-up. The change from pretreatment to 12 months follow-up represented a 92.9% reduction in pain. A similar pattern of results was evident on the POR. Changes in pain behaviour on this measure represent a 93.5% reduction.

Recovery status

Table 2 also presents information about the number of children who were completely pain free on these measures at each assessment point. On the pain diary 55.2% of children were pain free at post treatment, 65.1% by 6 months follow-up and 74.4% by 12 months follow-up. On the parent observation record the percentage of children who were pain free at post treatment, 6 month follow-up and 12 month follow-up were 67.4%, 65.1%, and 83.7% respectively. On the most stringent measure of recovery, namely

TABLE 2. Changes in children's pain over time

Measure	Pre treatment		Post treatment		Follow-up 6 months		Follow-up 12 months	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Pain Diary ¹	20.95	(23.71) _{abc}	5.10	(8.26) _a	3.08	(5.94) _{bc}	1.34	(2.64) _{nc}
Parent Observation Record	14.39	(20.71) _{abc}	4.37	(10.30) _a	3.67	(8.14) _{bc}	0.95	(1.98) _{bc}

Note: Means with the same subscript differ significantly using planned comparison and tests at $p<.05$

no pain being recorded on either the PD or the POR, 75% of children receiving CBF1 and 47.4% of children receiving SPC were completely pain free at 12 months follow-up.

Predictors of change in pain

As the main focus of this study was to identify predictors of clinical improvement in children presenting with RAP, hierarchical block regression analyses were conducted separately to predict (from pretreatment variables) each of two measures of medium term clinical status. Criterion variables were the amount of change in pain evident from pre-test to six month follow-up (calculated by subtracting the child's six month follow-up score on the pain diary from their pre treatment score) and the degree of functional impairment experienced by the child at the six month follow-up assessment (calculated by averaging the child and the parent ratings of the degree of interference to the child's activities). The child's six month rather than 12 month follow-up data were used as there was greater variability in clinical outcome at that point, and missing data on some measures at 12 month follow-up reduced the sample size available for analysis to an unacceptable level.

Predictor variables were selected because of their hypothesized importance in the etiology, maintenance or treatment of pain. They were entered in blocks in the following sequence. 1) The child's age; 2) Mode of onset (illness versus stress-related); 3) Children's adaptive coping (use of positive self-talk); 4) Children's maladaptive coping (this was a composite variable comprised of requesting medicine, rest and complaining to mother); 5) Mother's adaptive caregiving (a composite variable assumed to promote active self coping consisting of prompting independent coping, and ignoring pain complaints); 6) Mother's maladaptive caregiving (a composite variable assumed to reinforce or maintain pain behaviours consisting of encouraging rest, providing sympathy, seeking external help, and getting angry with the child); 7) The type of treatment received (CBF1 vs SPC) was entered last to determine whether treatment explained additional variance after first accounting for pre treatment variables.

Table 3 shows that the overall regression predicting change in pain was significant, $R^2 = .42, p=.005$. The child's age and mode of onset accounted for 8% and 10% of variance respectively. Greater change in pain occurred for younger children and those with a stress-related mode of onset. Mother's level of adaptive caregiving explained an additional 9% of variance, with greater reported use of adaptive caregiving predicting better outcome. Finally, the type of treatment the child received also explained an additional 10% variance, with CBF1 being associated with a more favourable outcome.

In the second analysis, predicting the extent to which pain interfered with the child's activities showed that while the overall regression equation was significant with 31% of variance explained, $F(7,35) = 2.2$, $p = .05$, type of treatment was the only individual variable that was significant, explaining 13% of variance. Once again, children receiving CBFi had a more favourable outcome.

TABLE 3. Results of regression analysis predicting change in children's pain diary scores

Variable	Step	R ²	Change in R ²	Significance of change
Age		.08	.08	.06
Mode of onset	2	.18	.10	.04a
Adaptive coping	3	.18	.00	.76
Maladaptive coping	4	.23	.05	.12
Adaptive caregiving	5	.32	.09	.03a
Maladaptive caregiving	6	.32	.00	.96
Treatment condition	7	.42	.10	.02a

$F(7, 34) = 3.59$, $p = .005$

a = $p < .05$

Discussion

The purpose of this study was to examine the relative contribution of child characteristics (age and mode of onset), their pain coping style, their mother's caregiving practices and the type of treatment children subsequently received in predicting the medium term outcome of children presenting with RAP. Consistent with our hypothesis, the magnitude of reduction on the measure of children's pain was predicted by the combination of child entry variables, mother's caregiving and type of treatment. A stress-related mode of onset, more adaptive maternal caregiving as defined by the greater use of prompting active self coping, and ignoring pain complaints, collectively explained 19% of variance. Significantly, the type of treatment was important in predicting outcome, with CBFi accounting for a further 10% of variance, thus confirming the increasing evidence that cognitive behavioural family intervention is useful for children with RAP. The children's age variable also approached significance, with a trend towards more favourable outcome for younger children ($R^2 = .08$, $p = .06$).

These results provide support for the importance of social learning factors frequently addressed in cognitive behavioural treatments of pain (Fordyce, 1976; Walker and Greene, 1990). The results for maternal caregiving confirm the importance of investigating the mother's usual caregiving practices in dealing with the child's pain and their beliefs about the origins of the child's

pain. Mothers who reported encouraging children to take control of their pain and to be less reliant on parental attention at pre-test had better outcomes. Importantly, the provision of CBFi that systematically teaches parents how to prompt and reinforce active self coping by the child was associated with improved outcome. Parents' beliefs about the nature and origins of the child's pain may influence whether parents accurately implement recommended advice, and whether children actually use pain coping strategies. Parents who, on entry to the study, believed their child's pain was stress-related and who already were encouraging active coping are likely to be good candidates for cognitive behavioural treatments for RAP. These findings highlight the importance of providing a plausible explanation for the child's symptoms.

None of our hypotheses concerning the relationship between children's coping and outcome were supported. This may be due to the relatively limited range of coping strategies assessed in the present study, the limited variability in children's pretreatment coping styles, or it might reflect that if treatment is effective in teaching coping skills, pretreatment use of these skills is irrelevant.

This study helps to clarify the relative contribution of different predictor variables for different aspects of treatment outcome. The amount of variance explained by any individual variable was modest, ranging from 8–13%. Clearly RAP is a multidetermined phenomenon. The possibility of persisting subclinical organic factors relating to the precipitating illness could not be excluded as a reason for persisting RAP episodes. Possibilities include altered gastrointestinal motility, or persisting GI infection, as recently suggested by prevalence studies of *Helicobacter gastritis* (Farrell, 1993).

Overall, our data suggest that the prognosis for children treated in our clinic sample was extremely good, with the degree of improvement being related to both child and parent pretreatment variables and the type of treatment received. In this sample, three quarters of the children were pain free on the PD measure and 83.7% were pain free on the POR measure by 12 months follow-up.

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Cognitive-Behaviour Therapy Under Conditions of Routine Treatment in the General Health Care System

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The range of areas where cognitive-behavioural treatment (CBT) is applied has been considerably extended over the previous decade. This paper describes the application of CBT in the German health care system as typified by a random sample of 1,344 cases. Content analysis was used, and indicates a generally appropriate pattern of treatment strategy. Cognitive components were more prominent than behavioural ones in the description of treatments used.

Behaviour therapy started at the beginning of this century with studies on conditioned reflexes and conditioned avoidance behaviour (Bechterew, 1912; Pavlov, 1927), and with the introduction of experimental paradigms in clinical psychology and psychiatry (Watson, 1913). The experimental and observational perspective of these forefathers has been an important definition of behaviour therapy. Behaviour therapy was introduced into clinical practice with methods to change conditioned responses, such as through systematic desensitization (Wolpe, 1958). In further developments, not only overt but also covert behaviour was taken into consideration as, for example, the construct of self-control (Goldiamond, 1965). More and more, it has become generally accepted that observable behaviour and internal psychological processes, such as emotional states and cognitions, are all necessary in order to come to meaningful clinical descriptions of psychological disorders, and that all these different aspects of behaviour lend themselves to modification. They are also the basis for the development of therapeutic strategies of various kinds. This development of ever broadening the theoretical and therapeutic basis of behaviour therapy has, especially under the influence of Beck (1963, 1976), led to the point where today behaviour therapy has become "cognitive-behaviour therapy".

This development was a very fruitful one. Whereas behaviour therapy started with the treatment of phobias and anxiety, it has now become a broad

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