

The Role of Parent Training in the Cognitive Behavioral Treatment of Children's Headaches

Lee Beames, Matthew R. Sanders and
William Bor

University of Queensland, Australia

This study reports on the effects of a cognitive-behavioral treatment program for two pre-adolescent children with chronic headaches. The program involved a combination of training the child in self-management skills (e.g. relaxation training, attention training, cognitive self-statements), and training for parents in how to prompt and reinforce children's self-help behaviors. Self-report assessment utilized a headache diary, a general activity measure, and a depression measure, whilst parental report measures were taken of the child's headache behavior and contingent parental care-giving behavior. Child headache behavior at school was also recorded by the child's teacher. The results indicated that by six months follow-up the subjects had improved in headache intensity 100% and 61% respectively, and in headache frequency 100% and 84% respectively. Both subjects also showed decreases in headache behaviors and reductions in contingent care-giving behavior by parents. Overall, the results suggest the potential usefulness of systematic involvement of parents in cognitive-behavioral treatment of children's chronic headaches.

Increasingly the pain literature has recognized that psychological (e.g. affect and cognition), and social variables (e.g. modelling and social context) are important components of the experience of pain, both at the level of pain perception and expression (Craig, 1983; Weisenberg, 1977). For example, Melzack and Wall's gate control hypothesis added conceptual support to a multidimensional model of pain by highlighting the potential significance of psychological factors in pain mechanisms (Melzack and Wall, 1965; Melzak and Wall, 1982). Similarly, Fordyce (1975) argued for the importance of both operant and respondent learning influences in understanding pain and added a whole new dimension to the assessment and treatment of chronic pain.

Several studies have shown that non-pharmacological treatments can be effective in reducing pain symptoms in children with current headaches. Successful treatments have included biofeedback (EMG, blood pulse volume, temperature), providing information, cognitive and autogenic approaches, relaxation training, self hypnosis, and operant conditioning strategies (Fentress, Masek, Mehegan and Benson, 1986; Feuerstein and Adams, 1977; Houts, 1982; Larsson and Melin, 1986; Marrazo and Hickling, 1983; Pepper and Grossman, 1974; Richter *et al.*, 1986; Waranch and

Reprint requests to Associate Professor Matt Sanders, Department of Psychiatry, Clinical Sciences Building, University of Queensland, Herston, Q. 4029, Australia.

© 1992 British Association for Behavioural Psychotherapy

Keenan, 1985; Werder, 1978; Werder and Sargent, 1984). Most studies have focused on biofeedback or relaxation training and a recent review by Duckro and Cantwell-Simmons (1989) concluded that both of these procedures were effective in treating recurrent headaches in children. Relatively few studies have used contingency management procedures as a major component of treatment. One such study by Ramsden, Friedman and Williamson (1983) used a differential reinforcement procedure (DRO schedule) which involved reinforcing the absence of pain behavior within a multiple baseline across settings design (home and school) to treat a six-year-old girl with migraine headaches. While the child reported having no headaches at the end of treatment, the results were confounded by the cessation of headache reports at school prior to the initiation of the contingency contract.

While several studies show that cognitive behavioral interventions can be successful in treating headaches in children, few studies have systematically involved parents in their child's treatment. Parental involvement in a child's treatment is justified for several reasons. First, training of parents to encourage and support self-management behaviors in children through prompting and reinforcement strategies may improve children's implementation of self-coping skills and thereby therapeutic outcome. Secondly, parents may need to alter their current patterns of care-giving (e.g. sympathy, attention) which can inadvertently maintain pain behaviors. A child's family can play an important role in the aetiology and maintenance of chronic pain, as recently highlighted in a review by Payne and Norfleet (1986). Family influences via direct reinforcement of pain behavior or social modeling are particularly important factors to consider with children, as the family histories of many children with pain complaints indicate a higher incidence of chronic pain or illness in other family members than for pain-free controls. Dunn-Geier, McGrath, Rourke, Latter and D'Astous (1986), in their study of adolescents with chronic benign pain, found that mothers of those adolescents characterized as non-coping tended to discourage coping behaviors significantly more often than mothers of coping adolescents. Their findings suggested the possibility that mothers of non-coping adolescents tend to be more responsive or perhaps over-protective when their child experiences pain.

These findings point to the importance of adequate preparation of parents in the process of helping children develop pain management skills. While several authors (Fentress *et al.*, 1986; Sanders *et al.*, 1989), have incorporated parent training into pain management approaches, few have done so systematically, and no studies have documented whether such training produced actual changes in the way parents respond to the child's pain behavior. Consequently, it is unknown whether parents actually alter their pain management strategies during treatment.

Hence, the present study aimed to evaluate the effects of a pain management programme which included training the child to employ various self-management strategies (relaxation training, attention training and coping self-statements) and the parents to prompt and reinforce self-management behavior and the absence of pain complaints. The study included specific measures of contingent parent behavior following episodes of pain behavior in children, and assessed the effects of treatment on pain intensity and frequency ratings. We also examined whether there were any

negative side effects of treatment on children's general adjustment and whether treatment effects generalized to the school setting.

Method

Subjects

Two females, aged 9 and 10 years, served as subjects. Both subjects were referred to the project by their general practitioners and met the following selection criteria: they were between the ages of 9 and 16 years; they suffered from chronic headaches for at least 4 months and the pain was of a non-organic origin, i.e. muscle contraction or simple migraine; they had no other major medical, surgical or psychiatric problems; both parents and the child gave their written consent to participate after receiving a verbal and written explanation of the study. The headaches had to occur at least twice per week and significantly affect the child's personal, social or school life. Both subjects reported some disruption to their normal activities. These included increased family conflict stemming from irritability associated with headaches, concentration problems, or through missing lessons which affected school work and participation in household chores.

Subject 1 was a nine-year-old female with muscle contraction headaches of 18 months duration. There was a positive family history of migraine headaches in an uncle, an aunt and a grandfather. Subject 2 was a ten-year-old male with migraine headaches of three years duration. His mother also suffered from migraine headaches. Subject 2 had been on medication for headaches for three months prior to the study and continued the same medication with the same dosage during the study. Subject 2 had been taking Periactin (2mg) on a three times daily basis and Panadol and Maxolin on a PRN basis.

Child measures

Headache diary. Both subjects kept a daily headache diary which recorded headache activity during three periods per day: 7-8 a.m., 12-1 p.m., and 4-5 p.m. These times were selected to provide a representative sample of headaches and at the same time to increase compliance with recording. Richardson, McGrath, Cunningham and Humphreys (1983) assessed the validity of two variations of headache diary with children with migraine, one using subjective descriptors similar to those used in the present study. On comparing both types of diary data collected four times per day with a measure of objective headache (parent observation), they found some support for the validity of the subjective self-report diaries. The adult literature suggests that diaries are more objective and reliable than global self-report measures, reflect variations and patterns in headache activity and are sensitive to treatment effects (Lichstein, Hoelscher, Nickel and Hoon, 1983).

Headache intensity was recorded on a six point scale: 0 indicated no headache; 1 indicated a small headache that could only just be felt; 2 indicated a small headache and it took only a little effort to ignore it; 3 indicated a big headache and the child had to try quite hard to ignore it; 4 indicated a very big headache and the child had

to try very hard to ignore it; and 5 indicated a huge headache and the child could not do anything to ignore it. The frequency of headaches was measured by either their presence or absence in the three recording periods per day. The frequency was then summed to provide a maximum of 21 time periods per week in which headaches were potentially present. The headache intensity data were derived by summing the intensities over the 21 time periods per week and then dividing this by the frequency of headaches in that week. This provided a measure of average headache intensity per week.

Activity measure. A measure of general activity level was employed as it was hypothesized that chronic headache would lead to lowered activity with occurrence of bed rest or "down time". Both subjects used a daily diary format in which they kept a record of what they did hourly in global terms (e.g. playing, homework, meals, etc.) and specifically noted rest periods due to headaches. The subjects kept this record over a 12 hourly period and from this a measure of the percentage of 12 hourly time periods in which rest occurred was obtained.

Children's depression measure. The Children's Depression Inventory CDI (Kovaks, 1981), is a 27 item self-report instrument that was used for assessing the child's level of depression. The CDI has good internal consistency, is a valid measure of emotional distress and a reasonable measure of depression, although its test-retest reliability may be variable across populations and intervals (Kazdin, 1981; Saylor, Finch, Spirito and Bennett, 1984).

Parental observation measures

Headache behavior. The child's parents observed and recorded six headache behaviors during baseline and at follow-up for a three week period. The parents also recorded six parental responses to the subjects' headache behavior. Behavior definitions of the observation system appear in Table 1. The observations and recording also included that for setting events for the headaches. These were defined as situations in which headache behavior occurred and included time (time, date); place (home, school, visiting etc.); people present (e.g. mother, brother) and context or activity at the time (e.g. child playing, having breakfast).

Teacher observation measures

School headache behavior. Each child's teacher kept a simple, brief daily record of headache behavior that the subject engaged in at school. This behavior was divided into four categories: 1. Pain complaint—any verbal, specific complaint to the teacher that the child had a headache. 2. Request to go to the sick room—a request by the child to go to the sick room because of a headache. 3. Sick room attendance—the child actually goes to the school sick room because of a headache. 4. Absent from school—the child does not attend school because of a headache.

The teachers kept a three week record during baseline and at post-treatment but not at follow-up. Teachers were asked to keep this record at all times they were in contact with the child which included class times, lunch break and sports activity. This enabled a simple frequency of each behavior to be calculated.

TABLE 1. Headache behavior observed by parents

Category	Definition	Example
Pain behaviors:		
Headache complaint (HC)	Child uses words to say he/she has a headache.	"Mum, it hurts."
Moan or groan (MG)	Child utters a sound to indicate a headache.	Ooooh, Mum.
Medication request (MR)	Child requests medication for headache.	"Can I have some Panadol?"
Non-verbal expression (NV)	Child appears to have headache from non-verbal behavior.	Grimacing, head-holding, pallor, tense face, quiet.
Interrupted activity (IA)	Child stops or slows down an activity due to headache.	Playing, eating slowly.
Rest (R)	Child sits or lies down due to headache.	Sitting down, resting on bed.
Parental response to headaches:		
Ignore (I)	Parent does not respond to child's headache.	Mother keeps on asking child his/her homework.
Compliance with medication request (CMR)	Parent gets or allows child to take medication.	"Yes you can have some Panadol."
Makes suggestions (MS)	Parent tells child to do something to cope.	"Why don't you try and relax dear."
Statement of acknowledgement (SA)	Parent only says they are aware of headache.	"Yes dear, I know you have a headache."
Direct helping behavior (DHB)	Parent helps child directly with headache.	Parent completes washing up for child.
Indirect helping behavior (IHB)	Parent makes the environment more pleasant for the child.	Parent pulls the blind, keeps others quiet.

Design

Treatment was evaluated using a multiple baseline across subjects design in which subjects commenced their baselines within three days of each other.

Procedure

Baseline phase. Following initial screening and intake interviews, observations of subjects' pain behaviors were conducted for varying numbers of days within the multiple baseline format.

Treatment phase. The therapy involved nine sessions, with the first six-sessions devoted primarily to teaching the child self-management skills and the final three sessions to contingency management strategies. Both components involved active parental participation. The self-management component, derived from Turk, Meichenbaum and Genest (1983), included giving children information about the nature

of chronic headaches and a model of headache and its relation to stress. Subjects were encouraged to take active control of their own headache management using relaxation training, attention control strategies and coping self-statements each time a headache was experienced. The behavioral component involved operant change strategies directed at helping the parents change the reinforcement of inappropriate headache behavior and helping parents reinforce "well behavior" or non-sick role behavior. The individual session format was one where for the first 5-7 minutes both parents and the subject were present. During this time an agenda for the day's session was established, the child's previous week's homework was reviewed, and any specific difficulties in completing tasks was discussed with both child and parent. Parents provided feedback about the subject's progress and problems in utilizing implementing self-management strategies.

The next 40 minutes were taken up with one-to-one therapy with the child. The final five minutes involved reviewing with the parents and the child what the child had done and what was expected for homework in the coming week. This provided an opportunity to review skills and ensured that parents were fully informed about their child's therapy and ways they could assist. For example, it cued the parent as to specific homework exercises the child should complete.

The first treatment session provided basic educational information on the nature of migraine and tension headaches with the emphasis on stress as being a potential mediator in headaches. The child was encouraged not to be a passive and dependent victim of the headaches but to take an active role in their own headache management. During this session they were provided with a series of myths about headaches and a simplified version of Melzack and Wall's (1965) gate control hypothesis which they were asked to read at home.

The second session taught the child how to scan their bodies for signs of tension and to use these signs to initiate relaxation skills. The subject was then taught breathing skills related to relaxation and then further relaxation skills derived from Cautela and Groden (1978), which were a variant of standard progressive muscle relaxation. Each child was instructed to practise scanning, breathing and muscle relaxation skills twice daily and to monitor this practice using an audiotape of relaxation instructions.

Session three provided the child with skills in using imagery to enhance relaxation. It was provided as an alternative or adjunctive method to help relaxation as it was considered that not all subjects would find one particular method of relaxation effective. The subjects could then pick which method they found had the greatest effect. This session outlined the nature of imagery and its relation to emotion and specifically to relaxation. Several handouts summarizing these points were given to the subjects to read.

The fourth session introduced the idea of directed attention as a way of coping with headache pain. Subjects were taught three strategies of directed attention. These were firstly, "focussing on things outside yourself" such as reading, examining something closely or listening to something closely. Secondly, the strategy of "focussing on thinking" was taught. This included singing a song to themselves, doing

arithmetic in their heads, and imagining the precise way and what they would see on a trip to a friend's place. Lastly, "focussing on the pain and changing its meaning" was taught. This involved imagining being hurt in the head while scoring the winning goal in sport, or pretending they were a favorite movie hero or heroine saving people, despite a headache.

These three strategies were individualized as much as possible and each subject was encouraged to choose at least two that they found helpful, and to change strategies and be inventive if strategies didn't work. Handouts summarizing these strategies were given to the subjects so they could practise.

The fifth session involved encouraging subjects to view the headache as a problem to solve rather than an illness to suffer. It drew on Meichenbaum's (1976) stress coping model and each child was encouraged to view the headache as the "enemy team to beat" (using a sporting analogy). Thus each subject was drawn into outlining a "game plan" to beat the "enemy team" headache! This involved: (a) preparing for the onset of headaches—noting high risk times and actively preparing each day to cope with the headache. As well, the child could remind him or herself about what options he or she had. (b) Confronting the headache—this was the point where the various specific skills could be utilized. The subjects were encouraged to use strategies before the headache became too intense. (c) Coping with headaches when they are intense—at the very least subjects were encouraged to try to do something and not to give in. If specific strategies could not be employed, then at least they could talk to themselves in an encouraging manner. (d) Reviewing how they went—this was where the subjects were to give themselves some positive feedback about the coping they did achieve rather than what they didn't achieve.

The sixth session addressed issues of maintenance and generalization. Subjects identified high risk situations when or where they occurred which would make it difficult to put into practice the skills learnt (e.g. in the classroom). A variety of ways of dealing with each high risk situation was then devised and discussed in terms of their individual suitability, with a summary of potential strategies given to each child. Examples of maintenance strategies included encouraging children to make skills part of their normal daily routine, to recruit support and encouragement from parents and friends, to practise skills outside the home, to practise skills unobtrusively in high risk situations, and to use positive self-talk for continued practice of skills.

The seventh session was the first operant session. A rationale for this component of treatment was presented by noting how headache behaviors may be accidentally reinforced by parents and other family members. A review of baseline parent collected data of the child's headache behavior was undertaken to specify what potential excesses of headache behavior or deficits of "well behavior" were occurring due to the headache. Specific parental responses towards changing positive reinforcement of headache behavior were then outlined and rehearsed if applicable. Examples included ignoring excessive headache complaints and prompting the child to use the cognitive components previously taught to cope with the headaches.

Session eight addressed problems arising from the negative reinforcement of

headache behavior as evident from baseline records. Specific alternative responses the parent could use to prevent the reinforcement of pain behavior if applicable were rehearsed (such as encouraging the child to complete tasks).

Session nine was the final operant component session and introduced the notion of "well behavior" and discussed ways of helping the child behave in as normal a fashion as possible despite the headaches. Here emphasis was on attending positively to the child when engaged in well behavior.

Follow-up phase. Six months following the completion of therapy all pain measures were recompleted by children and their parents.

Results

Headache intensity

Figure 1 presents the mean intensity of headaches per week for each subject. Subject 1 showed a gradual decrease in the intensity of headaches during treatment from a high baseline intensity to a low mean weekly level by the end of treatment. This decrease continued so that by follow-up no headaches at all were reported. Table 2 shows the phase means for each experimental subject and the percentage improvement obtained with treatment. For subject 1 by the end of treatment there was a 58.5% improvement in headache intensity and by follow-up this had increased to 100%.

TABLE 2. Mean weekly frequencies and intensities and percentage improvement at various experimental phases

Subject	Headache measure	Experimental phase				
		Baseline	Treatment	% Improvement ¹	Follow-up	% Improvement
1	Frequency	16.33	8.57		0.00	100.00
	Intensity	4.00	1.66		0.00	100.00
2	Frequency	2.12	0.83	60.84	0.33	84.43
	Intensity	1.72	0.66	61.62	0.66	61.62

$$\% \text{ improvement} = \frac{\text{baseline mean} - \text{treatment or follow up mean} \times 100}{\text{baseline mean}}$$

Subject 2 had a descending then ascending baseline. The introduction of treatment was associated with increased variability initially, then by the fourth week of treatment the mean weekly intensity had reduced to 0 and remained at that level till the end of treatment. At follow-up the improvement was maintained with two of the three recording weeks having a 0 mean weekly intensity although one headache of moderate intensity was experienced. Table 2 shows that by the end of treatment there was 61.6% improvement in headache intensity for this subject and by follow-

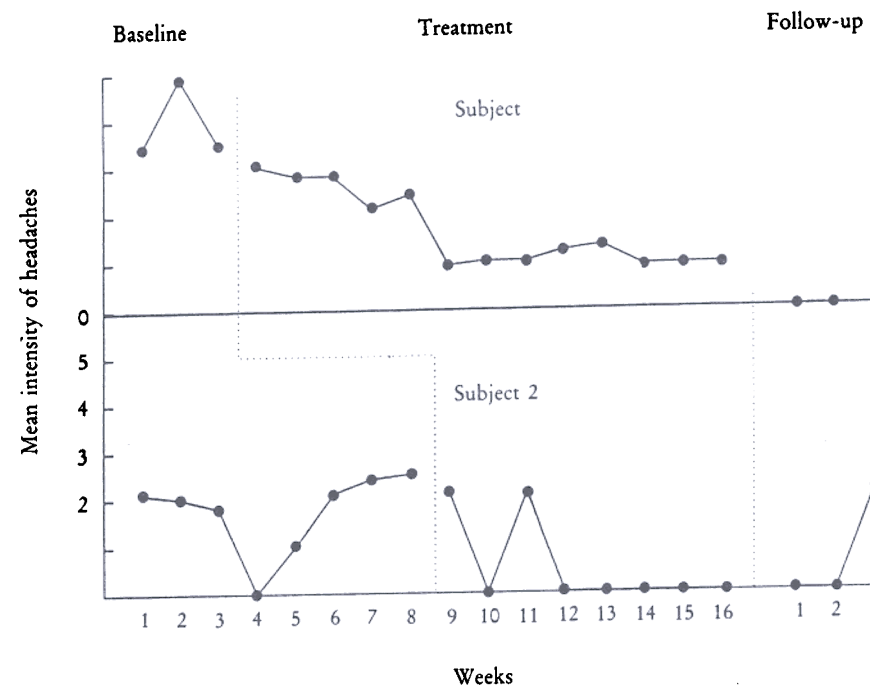


FIGURE 1. Mean intensity of children's headaches during each experimental phase

up this improvement was maintained at that level. Thus across the two subjects the mean weekly headache intensity diminished following treatment with a significant clinical improvement evident (i.e. > 50% at follow-up) for both subjects.

Headache frequency

Figure 2 presents the weekly headache frequency (maximum 21) of each subject. Subject 1 showed a high and slightly ascending weekly headache frequency at baseline which gradually decreased over the treatment period to a frequency of less than 4 per week, and by follow-up this subject was headache free.

Table 2 shows that for Subject 1 there was 47.5% improvement in headache frequency and by follow-up this increased to 100% compared to baseline frequencies. As with the intensity data for Subject 1 there was even more improvement from the end of treatment to follow-up.

Subject 2 experienced a baseline of low levels of headache frequency and with treatment these are reduced to 0 by the fourth week of treatment. This headache-free pattern continued until the end of treatment and by follow-up this improvement

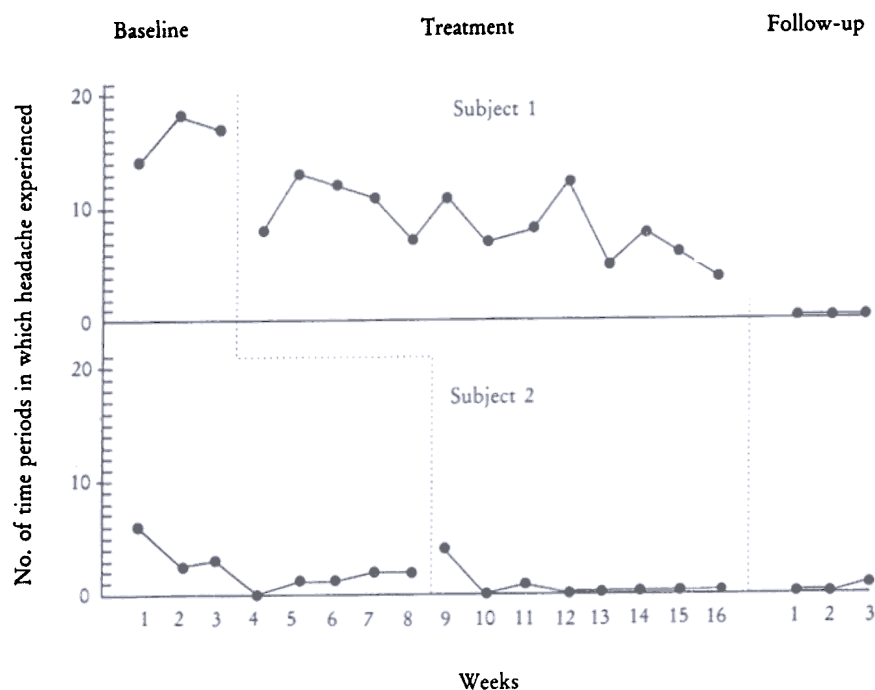


FIGURE 2. Mean weekly frequency of headaches during each experimental phase

is maintained with two out of the three recording weeks headache free. There was only one headache occurrence in the third week. Table 2 indicates that there was an improvement of 60.84% in headache frequency from baseline to the end of treatment which had increased to 84.43% improvement by follow-up compared to baseline.

Headache behavior and parental care-giving behavior

Table 3 presents pre- and post-treatment data on the six categories of headache behavior and the six categories of contingent parental response to pain. Subject 1 had quite high frequencies of these behaviors, especially complaints. Parental responses tended to parallel headache behavior in the subjects with low levels of headache behavior accompanied by low levels of parental response and vice versa.

When comparing pre- and post-measures in subjects where frequencies are greater than zero the greatest change occurred for Subject 1 who evidenced no headache behaviors or parental responses at post-treatment after quite high levels at baseline.

A less dramatic but still important decrease in these behaviors is seen in Subject 2, who at post-treatment has very few of these occurring.

TABLE 3. Home and school headache behavior,¹ time engaged in rest² and CDI scores

	Subject 1		Subject 2	
	Pre	Post	Pre	Post
Home headache behavior:				
Complaint	92.0	0.0	9.0	1.0
Moan/groan	15.0	0.0	0.0	0.0
Medication request	7.0	0.0	3.0	1.0
Non-verbal expression	3.0	0.0	12.0	0.0
Interrupted activity	0.0	0.0	15.0	0.0
Rest	6.0	0.0	11.0	0.0
Parent care-giving behaviors:				
Ignore	2.0	0.0	9.0	1.0
Compliance with med. request	8.0	0.0	2.0	1.0
Makes suggestions	22.0	0.0	9.0	0.0
Acknowledgement of pain	76.0	0.0	11.0	0.0
Direct helping behavior	9.0	0.0	3.0	0.0
Indirect helping behavior	0.0	0.0	6.0	0.0
School headache behavior:				
Pain complaint	0.0	0.0	2.0	0.0
Request to go to sick room	0.0	0.0	0.0	0.0
Sick room attendance	0.0	0.0	0.0	0/0
School absences	0.0	0.0	0.0	0.0
Time engaged in rest	0.0	0.0	2.9	0.0
CDI scores				
	3.0	2.0	6.0	0.0

¹Percentages based on a three week recording period at baseline and post-treatment using a 12 hourly daily time period.

²Percentages are based on a three week recording period at baseline and post-treatment using a 12 hourly daily time period.

Other measures

Table 3 also presents the results of teacher observation of headache behavior at school. As baseline frequencies of these behaviors were very low, floor effects largely preclude demonstration of any treatment effect. It is important to note, however, that no negative side effects of treatment were recorded. Table 3 also presents data for the mean percentage of time per week that subjects engaged in rest due to headache. Again it can be seen that these data are quite variable with Subject 1 experiencing no rest at all due to the headaches at either pre- or post-treatment while Subject 2 experienced similar amounts of rest at baseline but none

at post-treatment. None of the depression scores on the CDI were clinically significant at either pre- or post-treatment.

Discussion

This study provides further support for the effectiveness of cognitive-behavioral interventions in the treatment of recurrent headaches in children. Specifically, it shows the potential benefits of training children in self-coping behaviors when combined with concurrent training of the parent in alternative management strategies. The present results are consistent with other studies which have effectively involved parents in the management of children's pain behaviors (Sanders *et al.*, 1989).

The results show that changes in the intensity and frequency of child reported pain episodes were associated with reductions in specific headache behaviors of the two subjects and corresponding changes in their parents' contingent care-giving behavior. These changes in parent care-giving could reflect either that parents by the end of treatment were substantially complying with therapist suggestions or, alternatively, that they simply had fewer opportunities to engage in specific contingent responses because of lower levels of child headache behavior. These data highlight the importance of examining the effects of treatment on parent's actual care-giving behaviors after controlling for the number of opportunities to engage in such behavior.

Activity level which can be effected by headaches was a problem for Subject 2. Interestingly, this subject had one parent (mother) who also had a history of severe migraine and who also had to rest at times due to her own headache. The subject experienced the highest levels of rest and this may have been a function of the level of severity of the headaches or social learning influences from the parent. Thus rest, prior to treatment, may have been suggested or modeled as a first option to cope with the headaches by the parent or allowed more readily if engaged in by the child. While rest or sleep are commonly used by children with migraine to abort the headaches, other social learning factors that influence the use of this strategy might be involved. Some work suggests that the affective reaction of the parent may be more influential in the type of response by the child to the pain than the nature of the pain stimulus itself (Crockett, Prkachin and Craig, 1977).

The headache behaviors displayed at school by the subjects were not consistently related to the levels displayed at home. Subject 1, for example, had high levels of headache behavior at home but none at school. This difference may have reflected different contingencies operating in the two environments. The subject's mother was quite sensitive to the expressions of headache by the child and responded readily to them. This subject also enjoyed schoolwork very much and this may have had either a distracting effect or made the occurrence of behaviors such as complaints less likely due to the consequence of missing out on a preferred activity (*viz.* school work).

The findings of the present study relating to parental behavior need to be viewed as exploratory, given that the reliability of the self-monitoring measures were not

assessed. However, important parent-child interactions surrounding headaches expression tend to be low rate, reactive to observer presence and therefore difficult to capture through the use of independent observational procedures which would enable monitoring of inter-observer agreement (*e.g.* Sanders *et al.*, 1989).

Future research needs to determine whether changes in parental behaviors contingent upon child pain behaviors maintain over time, and whether systematic parental involvement in the child's therapy produces other benefits, such as higher levels of consumer satisfaction from both the perspective of parent and child.

References

- CAUTELA, J. and GRODEN, J. (1978). *Relaxation: A Comprehensive Manual for Adults, Children and Children with Special Needs*. Champaign, Illinois: Research Press.
- CRAIG, K. D. (1983). Modeling and social learning factors in chronic pain. In J. J. Bonica, U. Lindblom and A. Iggo (Eds). *Advances in Pain Research and Therapy: Vol. 5*. (pp. 813-828). New York: Raven Press.
- CROCKETT, D. J., PRKACHIN, K. M. and CRAIG, K. D. (1977). Factors of the language of pain in patient and volunteer groups. *Pain* 4, 175.
- DUCKRO, D. N. and CANTWELL-SIMMONS, E. (1989). A review of studies evaluating biofeedback and relaxation training in the management of pediatric headaches. *Headache* 29, 428-433.
- DUNNE-GEIER, B., McGRATH, P. J., ROURKE, B. P., LATTER, J. and D'ASTOUS, J. (1986). Adolescent chronic pain: the ability to cope. *Pain* 26, 23-32.
- FENTRESS, D. W., MASEK, B. J., MEHEGAN, J. E. and BENSON, H. (1986). Biofeedback and relaxation-response training in the treatment of pediatric migraine. *Developmental Medicine and Child Neurology* 28, 139-146.
- FEUERSTEIN, M. and ADAMS, H. E. (1977). Cephalic vasomotor feedback in the modification of migraine headache. *Biofeedback and Self-Regulation* 2, 241-254.
- FORDYCE, W. E. (1975). Behavioral concepts in chronic pain and illness. In P. O. Davison (Ed). *Behavioral Management of Anxiety, Depression and Pain* (pp. 147-188). New York: Bruner/Mazel.
- HOUTS, A. C. (1982). Relaxation and thermal feedback treatment of child migraine headache: a case study. *American Journal of Clinical Biofeedback* 5, 154-157.
- KAZDIN, A. E. (1981). Assessment techniques for childhood depression. *Journal of the American Academy of Child Psychiatry* 20, 358-375.
- KOVACS, M. (1981). Rating scales to assess depression in school-aged children. *Acta Paedopsychiatry* 46, 305-315.
- LARSSON, B. and MELIN, L. (1986). Chronic headaches in adolescents: treatment in a school setting with relaxation training as compared with information-contact and self-registration. *Pain* 25, 325-336.
- LICHSTEIN, K. L., HOELSCHER, T. J., NICKEL, R. and HOON, P. W. (1983). An integrated blood volume pulse biofeedback system for migraine treatment. *Biofeedback and Self-Regulation* 8, 127-134.
- MARRAZO, M. J. and HICKLING, E. J. (1983). The psychological treatment of childhood migraine: a review and case presentation. Paper presented at the meeting of the Biofeedback Society of America, Denver, Colorado (March).
- MEICHENBAUM, D. (1976). Cognitive factors in biofeedback therapy. *Biofeedback and Self-Regulation* 1, 201-216.
- MELZACK, R. and WALL, P. D. (1965). Pain mechanisms: a new theory. *Science* 150, 971-979.

- MELZACK, R. and WALL, P. D. (1982). *The Challenge of Pain*. New York: Basic Books.
- PAYNE, B. and NORFLEET, M. A. (1986). Chronic pain and the family. *Pain* 26, 1-22.
- PEPPER, E. and GROSSMAN, E. R. (1974). Preliminary observation of thermal biofeedback in children with migraine. Paper presented at the meeting of the Biofeedback Research Society, Colorado Springs (February).
- RAMSDEN, R., FRIEDMAN, B. A. and WILLIAMSON, D. A. (1983). Treatment of childhood headache reports with contingency management procedures. *Journal of Clinical Child Psychology* 12, 202-206.
- RICHARDSON, G. M., MCGRATH, P. J., CUNNINGHAM, S. T. and HUMPHREYS, P. (1983). Validity of the headache diary for children. *Headache* 23, 184-187.
- RICHTER, I. L., MCGRATH, P. J., HUMPHREYS, P. J., GOODMAN, J. T., FIRESTONE, P. and KEENE, D. (1986). Cognitive and relaxation treatment of paediatric migraine. *Pain* 25, 195-203.
- SANDERS, M., REBGETZ, M., MORRISON, M., BOR, W., GORDON, A., DADDS, M. and SHEPHERD, R. (1989). Cognitive-behavioural treatment of recurrent non-specific abdominal pain: acquisition, generalization and side effects. *Journal of Consulting and Clinical Psychology* 57, 294-300.
- SAYLOR, C. F., FINCH, A. J., SPIRITO, A. and BENNETT, B. (1984). The Children's Depression Inventory: systematic evaluation of psychometric properties. *Journal of Consulting and Clinical Psychology* 52, 955-967.
- TURK, D. C., MEICHENBAUM, D. and GENEST, M. (1983). *Pain and behavioral medicine: a cognitive-behavioral perspective*. New York: Guilford Press.
- WARANCH, H. R. and KEENAN, D. M. (1985). Behavioral treatment of children with recurrent headaches. *Journal of Behavior Therapy and Experimental Psychiatry* 16(1), 31-38.
- WEISENBERG, M. (1977). Pain and pain control. *Psychological Bulletin* 84, 1008.
- WERDER, D. (1978). An exploratory study of childhood migraine using thermal biofeedback as a treatment alternative. *Biofeedback and Self Regulation* 3(3), 251-255.
- WERDER, D. S. and SARGENT, J. D. (1984). A study of childhood headache using biofeedback as a treatment alternative. *Headache* 24, 122-126.