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LA THÈSE A ÉTÉ  
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RELAXATION TRAINING AND COGNITIVE COPING  
IN THE TREATMENT OF PEDIATRIC MIGRAINE

by Iris L. Richter

Thesis presented to the School of  
Graduate Studies of the University  
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## ABSTRACT

The present study compared the efficacy of two active treatments, relaxation training and cognitive coping, with a nonspecific placebo control in the treatment of forty-two children and adolescents with migraine. The results demonstrated that each active treatment was superior to the nonspecific intervention in reducing overall headache activity and frequency but not duration or intensity. There were no differences between the experimental groups, and they continued to improve through a sixteen-week follow-up period.

Initial level of headache severity was an important factor in treatment outcome, with children with severe headaches responding better than those with milder headaches. Similarly, initial level of depression was positively correlated with headache improvement. Although all three groups were less depressed after treatment, there were no differences among the groups.

Based upon these results, it appears that both relaxation training and cognitive coping are effective interventions in pediatric migraine. Possible mechanisms which account for the treatment effects are discussed, and the implications for future research are considered.

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TABLE OF CONTENTS

Chapter	page
I. INTRODUCTION AND REVIEW OF THE LITERATURE. . . . .	1
The Concept of Headache	2
The Definition and Classification of Migraine	3
Diagnostic Criteria and Incidence	5
Etiology	7
Biological Factors	7
Psychological Factors	14
The Treatment of Migraine	20
Pharmacological Methods	20
Behavioral Methods	21
Biofeedback Training	23
Relaxation Training	25
Cognitive Methods	28
Relaxation Training and Cognitive Methods	33
Cognitive Applications in Pediatric Treatment	39
Statement of the Problem and Hypotheses	42
II. METHOD . . . . .	44
Subjects	44
Diagnostic Criteria	44
Inclusion and Exclusion Criteria	45
Research Staff	45
Measurement Instruments and Measures	46
Headache Diary	46
School Attendance	48
State-Trait Anxiety Inventory and State-Trait Anxiety Inventory for Children	48
Childrens Depression Rating Scale	50
Credibility	52
Therapist Assessment	52
Procedure	56
Informed Consent	56
Relaxation Training	56
Cognitive Coping	58
Nonspecific Treatment	62
Posttreatment	64
Follow-up	65

Chapter	page
III. RESULTS . . . . .	66
Sample Description	66
Efficacy of Training in Reducing Migraine Headaches	69
Statistical Analysis	69
General Findings	70
Headache Index	70
Headache Frequency	79
Peak Intensity	84
Duration	86
School Attendance	86
Secondary Analysis	86
The Effects of Training on Anxiety and Depression	93
Statistical Analysis	93
State Anxiety	93
Trait Anxiety	93
Depression	100
Alternate Explanations of Treatment Effects	100
Credibility	100
Demographic Equivalence	101
The Relationship of Anxiety and Depression to Treatment Outcome	103
Relaxation Training versus Cognitive Coping	105
IV. DISCUSSION . . . . .	106
Efficacy of Training in Reducing Migraine Headaches	
The Effects of Training on Anxiety and Depression	
The Relationship of Anxiety and Depression to Treatment Outcome	
The Problem of Attrition Effects	
Theoretical Considerations	
Conclusions and Implications for Future Research	
REFERENCES . . . . .	122
Appendix	
A. HEADACHE DIARY . . . . .	144
B. HEADACHE VARIABLES: OPERATIONAL DEFINITIONS . . . . .	147
C. SCHOOL ATTENDANCE . . . . .	150
D. CREDIBILITY: PRETEST AND POSTTEST . . . . .	152
E. TREATMENT PROTOCOLS . . . . .	155
F. TREATMENT RATIONALES . . . . .	218

Appendix

page

G. THINKING STRAIGHT DIARY . . . . .	223
H. STRESS REDUCTION DIARIES . . . . .	225
I. DIAGNOSTIC CHECKLIST . . . . .	232
J. CAUSES OF ATTRITION . . . . .	234

LIST OF TABLES

Table	page
1. Initial Equivalence of Headache Measures: Means, Standard Deviations and Analyses. . . . .	67
2. Initial Equivalence of Personality Measures: Means, Standard Deviations and Analyses. . . . .	68
3. Means and Standard Deviations of Headache Index for Groups and Level of Severity. . . . .	71
4. Means and Standard Deviations of Headache Frequency for Groups and Level of Severity. . . . .	72
5. Means and Standard Deviations of Headache Peak Intensity for Groups and Level of Severity. . . . .	73
6. Means and Standard Deviations of Headache Duration for Groups and Level of Severity. . . . .	74
7. Repeated Measures ANOVA of Headache Index by Treatment Group and Level of Severity. . . . .	75
8. Repeated Measures ANOVA of Headache Frequency by Treatment Group and Level of Severity. . . . .	81
9. Repeated Measures ANOVA of Peak Intensity by Treatment Group and Level of Severity . . . . .	87
10. Repeated Measures ANOVA of Headache Duration by Treatment Group and Level of Severity. . . . .	88
11. Repeated Measures ANOVA of Headache Index Change Scores by Treatment Group and Level of Severity. . . . .	90
12. Repeated Measures ANOVA of Headache Frequency Change Scores by Treatment Group and Level of Severity. . . . .	91
13. Means and Standard Deviations of State Anxiety for Groups and Level of Severity. . . . .	94
14. Means and Standard Deviations of Trait Anxiety for Groups and Level of Severity. . . . .	95

Table	page
15. Means and Standard Deviations of Depression Rating for Groups and Level of Severity. . . . .	96
16. Repeated Measures ANOVA of State Anxiety by Treatment Group and Level of Severity. . . . .	97
17. Repeated Measures ANOVA of Trait Anxiety by Treatment Group and Level of Severity. . . . .	98
18. Repeated Measures ANOVA of Depression Rating by Treatment Group and Level of Severity. . . . .	99
19. Repeated Measures ANOVA of Credibility by Treatment Group and Level of Severity. . . . .	102
20. Pearson Correlation Coefficients of Anxiety and Depression with Headache Index and Change Scores. . . . .	104

LIST OF FIGURES

Figure	page
1. Changes in Headache Index at Two Levels of Headache Severity from Posttest to Follow-up. . . . .	77
2. Mean Headache Index after Treatment According to Treatment Group and Level of Severity. . . . .	78
3. Mean Headache Index at Baseline, Posttest and Follow-up According to Treatment Group and Level of Severity . . . . .	80
4. Changes in Headache Frequency after Intervention According to Treatment Group. . . . .	83
5. Mean Headache Frequency at Baseline, Posttest and Follow-up According to Treatment Group and Level of Severity. . . . .	85

## CHAPTER I

### INTRODUCTION AND REVIEW OF THE • LITERATURE

Migraine is an ancient affliction which has plagued mankind since the beginning of written history (Friedman, 1972). It was known to Hippocrates (460-377B.C.) as "hemicrania" or a syndrome of periodic, unilateral, often intense headaches, associated with visual disturbances, nausea, and vomiting (Bille, 1962). Today it is a common cause of chronic pain, with various studies reporting an adult incidence of approximately nineteen to twenty-five percent depending upon diagnostic criteria and sampling procedures (Waters and O'Connor, 1975). Unfortunately the problem often begins in childhood. The best available survey data shows an average childhood incidence of approximately four percent, with the frequency increasing to about eleven percent by adolescence (Bille, 1962; Sillanpää, 1983a, 1983b). Pediatric migraine is a major source of neurological referrals (Dalessio, 1980), and it exacts a high toll in terms of health care costs, emotional distress, and disruptions of family and school activities.

Although potent drugs are available for adults, contraindications and side-effects are not infrequent, and physicians and parents generally prefer to avoid their use in children and adolescents if at all possible. In the past decade a sizeable

literature has documented the effectiveness of behavioral methods in the treatment of adult migraine, but thus far there have been no controlled group outcome studies on their use in pediatric migraine. Consequently, the therapeutic choices for children are limited and research which evaluates the effectiveness of behavioral treatment methods is needed. The purpose of this study is to evaluate the effectiveness of two behavioral methods, relaxation training and cognitive coping, in the treatment of children and adolescents with migraine headaches.

#### The Concept of Headache

Headache has been called the most common ailment of civilized man (Dalessio, 1980). The terms headache and migraine are often interchanged with little awareness of the distinction. Common useage defines headache as the experience of head pain from the brow level up. The Ad Hoc Committee on the Classification of Headache (1962) defines the term more broadly as discomfort of the entire head, including the face and the nape of the neck. It lists fifteen types of headache with the classification based upon the pain mechanism involved and/or the underlying physiological dysfunction. The most common are migraine, muscle-contraction headaches, a combination of the two, and hypochondriacal or conversion headaches (Ad Hoc Committee, 1962). These headaches are thought to be non-organic, related to ~~the~~ tension, and potentially responsive to

psychotherapeutic interventions (Blanchard, Ahles and Shaw, 1979). The remaining types of headaches are relatively infrequent; all are caused by inflammation or traction which is secondary to a pathological process (Dalessio, 1980). When organic pathology and systemic disease are excluded, migraine is the most frequent and debilitating of pediatric headaches (Jay and Tomasi, 1981).

#### The Definition and Classification of Migraine

The Ad Hoc Committee (1962) reserves the term migraine for vascular headaches and define it as follows:

Recurrent attacks of headache, widely varied in intensity, frequency and duration. The attacks are commonly unilateral in onset; are usually associated with anorexia and sometimes with nausea and vomiting; in some are preceded by or associated with conspicuous sensory, motor, and mood disturbances; and are often familial (p. 717).

The Ad Hoc Committee (1962) lists five types of migraine which are classified as follows:

- (A) "Classic" Migraine - Vascular headache with sharply defined, transient, and other sensory or motor prodromes or both.
- (B) "Common" Migraine - Vascular headache without striking prodromes and less often unilateral than A and C. Synonyms are "atypical migraine" or "sick" headache, "summer", "Monday", "weekend", "relaxation", "premenstrual" and "menstrual" headache.
- (C) "Cluster" Headache - Vascular headache, predominantly unilateral on the same side, usually associated with flushing, sweating, rhinorrhea, and increased lacrimation; brief in duration and usually occurring in closely packed groups separated by long remissions....

- (D) "Hemiplegic" Migraine and "Ophthalmoplegic" Migraine - Vascular headache featured by sensory and motor phenomena which persist during and after the headache.
- (E) "Lower-Half" Headache - Headache of possibly vascular mechanism, centered primarily in the lower face... (p. 717).

Recently the headache classification system has been questioned, and it has been suggested that the migraine types may be separate syndromes which have been mistakenly united (Olesen, Lauritzen, Tfelt-Hansen, Henriksen and Larsen, 1982). Moreover other investigators have questioned the distinction between muscle contraction and migraine based on factor analytic and physiological studies, and they have suggested that the two are simply opposite poles on a severity continuum (Bakal and Kaganov, 1977; Anderson and Franks, 1981).

The classification of pediatric migraine is also controversial, and there are at least two additional syndromes which are often classified as migraine or migraine equivalents. One is a vascular disorder, described as basilar artery migraine by Bickerstaff (1961), which involves complex brainstem symptoms including vertigo, gait ataxia, ophthalmoplegia, and tinnitus in varying combinations. There is often a family history of migraine but headaches are an irregular feature (Bickerstaff, 1961). The second syndrome is a paroxysmal condition involving sudden attacks of recurrent anorexia, nausea and vomiting, and/or episodes of severe abdominal pain in the absence of headache (Barlow, 1978; Congdon and Forsythe, 1979). Occurring separately or associated with these symptoms may be various autonomic

disturbances such as paroxysmal vertigo, hot and cold sweats, unexplained fevers, and "growing pains" of inexplicable origin (Prensky, 1976; Tomasi, 1979; Golden, 1979). A follow-up study has shown that children who suffer from this syndrome develop typical migraine patterns significantly more frequently than normal controls as they mature (Hammond, 1974).

#### Diagnostic Criteria and Incidence

The efforts of the Ad Hoc Committee to standardize diagnosis have not been entirely successful, and significant differences occur because essential features have not been specified. Many researchers in pediatric migraine follow the method of Vahlquist and Hackzell (1949) in using as their criteria intermittent paroxysmal headache and any two of the following four symptoms: unilateral pain, nausea, visual disturbances, and a positive family history. Prensky (1976), on the other hand, requires any three of the following six symptoms: abdominal pain, nausea or vomiting, hemicrania, throbbing pain, complete relief following sleep, aura, and a positive family history.

As might be expected, the reported incidence of migraine in both adults and children varies widely, depending upon diagnostic criteria, sex, age, and sampling procedures. Bille (1962) used Vahlquist's criteria to establish incidence in an unselected sample of over 9000 Swedish school children. He reported a four percent incidence between the ages of seven

to fifteen years with the rate increasing with age. Until the age of eleven both sexes were equally affected but in later years the frequency was higher in girls. This is consistent with the incidence reported by Vanlquist (1951, 1955) who found a rate of two percent before two years, and 4.5 percent in the two to twelve year group. On the other hand, using unspecified criteria, Oster (1972) reported a somewhat higher incidence in a large unselected sample of Danish students between the ages of six and sixteen. Indeed, recent findings suggest that all these figures are an underestimate. In a follow-up study of an unselected Finnish sample of fourteen-year-olds, Sillanpää (1983a) has just reported an incidence of 10.6 percent. In addition, a study of thirteen-year olds yielded an incidence of 11.3 percent (Sillanpää, 1983b).

Three factors probably contribute to the underestimation: first is the difficulty in obtaining an accurate description of the symptoms of young children, and second is the greater variability of symptoms in children (Joffe, Bakal and Kaganov, 1983). More important, however, is the question of the appropriateness of applying adult criteria to children. Prensky (1976), in a review of the pediatric literature, found a lesser frequency of such diagnostic symptoms as unilateral pain and visual aura. On the other hand, nausea and vomiting were more frequent. Moreover, many children have migraine equivalents which do not fit the Ad Hoc Committee's classification scheme and may not be diagnosed as migraine in the

absence of headache. For these reasons it appears likely that on occasion childhood migraine may be undiagnosed or perhaps misdiagnosed.

### Etiology

In spite of the growing literature on the subject, the etiology of migraine remain elusive. A frequent viewpoint is that it represents a maladaptive somatic response to environmental stressors and/or associated mood changes in genetically vulnerable individuals (Kudrow, 1978; Dalessio, 1980; Bakal, 1982). Consistent with this conceptualization, the search for etiological factors has encompassed both biological and psychological variables. A common assumption appears to be that the etiology is the same in adults and children and the literature on the latter is limited. Unless otherwise stated, the studies reviewed here have involved adults.

### Biological Factors

Research in this area has concerned itself with the genetic, vascular, and biochemical aspects of the disorder. There are two major sources of evidence which support the theory of a genetic predisposition to migraine: first, investigations of family incidence among the immediate relatives of patients, and second, twin studies. While high familial concordance rates have been reported (e.g. fifty-five percent by Selby and Lance, 1960; sixty-five to ninety-

one percent by Dalsgaard-Nielson, 1965; and fifty-eight to ninety percent in children by Tomasi, 1979), the methodological inadequacies inherent in clinical interviews and retrospective data necessitate a cautious interpretation. Waters (1971) noted that much of this work has involved hearsay reports by patients concerning their relatives' symptoms. In contrast, his own results indicated a concordance rate of only ten percent when he himself interviewed relatives. However, this figure is probably too low because Waters' criterion stipulated both a prodromal phase and associated nausea limiting the sample to patients with classical migraine only. Moreover, much higher rates were reported in a series of methodologically sound European twin studies that were summarized by Refsum (1968) e.g. sixty to one hundred percent for monozygotic twins and ten to forty percent for dizygotic twins. Nevertheless, the status of the genetic theory of migraine remains ambiguous because of methodological limitations in much of the supportive research. Furthermore, even if the theory were correct, it says nothing about the method of expression of the genetic factor - a critical issue in its own right.

To clarify this issue, investigation has focussed on the vascular functioning of migraineurs. Our understanding of the pathophysiology has increased considerably following the pioneering impetus of H.G. Wolff (1937, 1962). There is now

widespread agreement that the headache process per se is essentially biphasic. The warning or prodromal phase involves vasoconstriction of the cranial and cerebral arteries and a concomitant reduction of cerebral blood flow in the cortical areas responsible for the characteristic symptoms (Dalessio, 1980; Williamson, 1981). During the headache phase, marked extracranial and lesser intracranial vasodilation occurs, followed by a sterile inflammation of the arterial wall, vascular edema, and the release of vasoactive biochemical substances (Amery, 1982). It is the inflammatory process with its associated biochemical changes rather than the vasodilation which is thought to be the major pain mechanism (Dalessio, 1980). The headache process in children is believed to be the same but prodromal symptoms are less common, and nausea and vomiting are more frequent (Trued, 1974; Joffe, Bakal and Kaganov, 1983). This suggests a more dominant autonomic involvement.

A frequent etiological theory is that migraineurs have an unstable autonomic nervous system which is expressed in defective vasomotor regulation (Raskin and Appenzeller, 1980). Supporting evidence first came from several studies which suggested that migraineurs show exaggerated cranial responsiveness and greater variability of vasomotor function even when free of headaches compared to normal controls (Dalessio, 1963; Appenzeller, 1969; Price and Tursky, 1976). Bakal (1975) hypothesized that these vascular irregularities may reflect a

more basic problem with autonomic stabilizing mechanisms, a view consistent with Selby and Lance's (1960) theory of generalized instability of autonomic functioning. Nevertheless, other investigators have disputed this theory because of difficulty in replicating the original results (Morley, 1977; Anderson and Franks, 1981). For example, Andrasik and his colleagues (Andrasik, Blanchard, Arena, Saunders and Barron, 1982) recently reported no significant differences among migraineurs, tension headache patients, and non-headache controls on numerous psychophysiological indices under stressful and relaxed conditions. However, as the authors themselves suggest, one must note the questionable relevance of the laboratory stressors and the lack of data on the critical recovery-from-stress phase.

In a recent review article Blanchard and Andrasik (1982) commented that the methodological complexities of research in this area are such that one must conclude that the issue of vasomotor dysfunction in migraine remains unresolved. However, many of the negative results pertain to the generalized vasomotor theory, and a model combining a general autonomic dysfunction with localized vasomotor instability remains possible. This would be consistent with recent physiological findings documenting a pattern of focal hyperemia prior to headache, followed by spreading oligemia in the prodrome, and culminating in the impaired activation of regional cerebral blood flow in the painful phase (Olesen,

Larsen and Lauritzen, 1981).

Investigators have hypothesized that, if vascular function is indeed deranged, one or more vasoactive mediators may be implicated in the headache process since it is known that various hormones and neurotransmitters cause, augment, or are by-products of pain and inflammation. Research has focussed on such substances as histamine, serotonin, the catecholamines, tyramine, the prostaglandins, and a polypeptide dubbed neurokinin. This paper will discuss briefly selected highlights from this work. The interested reader will find comprehensive reviews in Dalessio (1980), Raskin and Appenzeller (1980), or Amery (1982).

Because it is commonly believed that migraine is a maladaptive response to stress and anxiety, investigators have sought to measure catecholamine (adrenalin and noradrenalin) in migraine patients. It has been shown that noradrenalin is significantly elevated before awakening in patients whose headaches frequently waken them from sleep (Hsu, Kalucy, Crisp, Koval, Chen, Carruthers and Zilka, 1977), and vascular headache is a common symptom in patients with noradrenalin-secreting tumours (Amery, 1982). Also, measurements in migraineurs suggest chronic sympathetic overactivity (Hockaday, 1978) and noradrenalin is released on activation of the sympathetic nervous system (Amery, 1982). Moreover, the usual response to the increased secretion of noradrenalin is a small decrease in regional cerebral blood

flow followed by a later increase as cerebral metabolism increases (Amery, 1982). This pattern is consistent with observed blood flow changes during the migraine process (Olesen et al, 1981; Olesen et al, 1982) suggesting a significant etiological role for noradrenalin. However, one must first reconcile this with the observation that the infusion of noradrenalin in headache-free migraineurs did not induce an attack (Ostfeld and Wolff, 1955). Perhaps the amount used was too low to increase metabolism sufficiently to potentiate headache (Amery, 1982).

The etiological role of serotonin, which is believed to increase the pain threshold, has also generated much interest. It is known that serotonin constricts the scalp arteries in man (Lance, Anthony and Gonsky, 1967), and it has been demonstrated that platelet serotonin is elevated in the prodromal phase and falls sharply to a low level in the headache phase (Anthony, Hinterberger and Lance, 1967). Sicuteri, Testi and Anselmi (1961) observed that the urinary turnover rate of the catabolic breakdown product of serotonin (5-HIAA) was increased during an attack. It is also known that serotonin antagonist drugs such as methysergide are effective in the prophylactic treatment of migraine if taken in the prodromal phase (Anthony et al, 1967). Taken together, this evidence suggests an etiological role for serotonin in the development of migraine headaches. However, as we observed with noradrenalin, the injection of serotonin fails to induce

an attack in migraineurs (Kimball, Friedman and Vallejo, 1960) - a significant flaw in the serotonin theory of etiology.

It is important to note that the noradrenalin and serotonin hypotheses are not mutually exclusive. The recent work of Olesen et al (1981) has suggested a possible linking mechanism. It has been established that a large variety of physical and psychological stressors may elevate sympathetic arousal and catecholamine production (Selye, 1976). Amery (1982) has hypothesized that elevated sympathetic arousal may increase cerebral metabolism, causing excessive oxygen demands and provoking brain hypoxia. This would cause the aggregation of platelets and their subsequent release of serotonin (Amery, 1982). The depletion of serotonin levels would then initiate the vascular changes which characterize the migraine process (Amery, 1982).

This model is especially attractive because it integrates much of the current research on the pathophysiology of migraine (Olesen, Lauritzen, Tfelt-Hansen, Henriksen and Larsen, 1982) and it can be entered at several levels. It therefore takes into account the triggering action of the numerous physical, psychological and situational variables discussed below.

### Psychological Factors

The search for psychological factors of etiological significance has concentrated largely on personality, motivation, and situational variables. With respect to personality, much of the research has been based on the theory that a specific personality profile with unique conflicts and motivations is a major determinant of the disorder. The migraine patient is typically characterized as a "...tense, driving obsessional perfectionist, with an inflexible personality..." (Henryk-Gutt and Rees, 1973, p. 142). The specific pattern is usually viewed as a coping response which results from repressed hostility arising in a situation which arouses a resentment which cannot be acknowledged or expressed (Bakal, 1975). The bottled-up resentment assumes etiological importance when the defensive stance fails to keep the hostility in check and anxiety threatens to break through. Migraine then develops as a maladaptive second-level coping response (Wolf and Goodell, 1968).

The pattern in children is apparently similar. Young migraineurs are described as overcontrolled and obliged to meet strict behavioral norms that deny aggression and demonstrative feeling (Friedman, 1968). Family tensions and excessive extracurricular activities are reported to lead to frequent anxiety or depressive reactions in response to stress (Ling, Oftedal and Weinberg, 1970). Sensitivity

and a need for approval are also considered common (Anderson, 1980). However, despite this apparent consensus, the construct of migraine personality rests largely on uncontrolled clinical case studies. Obviously validation requires research of better methodology.

Harrison (1975) argued that studies using personality tests are a source of more objective and reliable data. However, in a critical review of this type of literature on the migraine personality, he found meagre support for the construct. Although there were few consistent results, two studies reported that migraineurs are stronger on such traits as emotional control, conventionality and perfectionism than nonheadache controls (Ross and McNaughton, 1945; Kaldegg, 1952); two other studies found that they scored significantly higher than controls on neuroticism, which is considered a measure of autonomic lability (Maxwell, 1966; Henryk-Gutt and Rees, 1973). With respect to the hypothetical hostility conflict, Henryk-Gutt and Rees (1973) found evidence of hostility and guilt only in females with severe migraine, and in males with the classic syndrome. Bihldorf (1969), on the other hand, found that tension headache patients scored higher than migraineurs on measures of indirect hostility and direct expressions of anger. More recently, however, a well-designed study found no differences among different types of headache patients and nonheadache controls on hostile press (Andrasik, Blanchard, Arena, Teders, Teevan

and Rodichok, 1982).

The findings regarding the connection with depression are more positive. Couch, Ziegler and Hassanein (1975) reported mild to severe depression in about sixty percent of migraineurs and a significant correlation between severity of migraine and degree of depression. Rogado, Harrison and Graham (1974) also found moderately elevated depression scores in their patients, and Werder, Sargent and Coyne (1981) reported that elevated depression predicted a good response to treatment. However, Kudrow (1978) was able to confirm depression in only ten percent of his migraineurs.

In a review of the research using the Minnesota Multiphasic Personality Inventory, Harrison (1975) found that there was only one consistent finding. The typical conversion "V" pattern of elevated Hypochondriasis and Hysteria indicating bound anxiety was reported by both the Mayo Clinic (Harrison, 1975) and Rogado et al (1973). This configuration was recently confirmed by Andrasik who also found significantly elevated depression scores (Andrasik, Blanchard, Arena, Teders, Teevan and Rodichok, 1982). However, the etiological significance of this pattern must be interpreted cautiously since it occurs in a variety of psychological and somatic disorders involving chronic pain (Sternbach, 1974). It is unknown whether the pattern develops in response to pain, as was suggested by Adams, Feuerstein and Fowler (1980), or whether it preexists and

is exacerbated by pain as Sternbach (1974) has indicated. It is possible that the development of pain syndromes in patients with a hypochondriacal personality pattern may serve to keep depression masked - a hypothesis consistent with the results of Werder et al (1981) who also found that headache patients with this personality configuration did not respond well to treatment, while more depressed patients did.

In reviewing these results it is apparent that there is little consistent support for the construct of migraine personality. A more plausible hypothesis is that similar dynamics occur in many psychophysiological disorders. It is suspected that autonomic lability is the common denominator of all these disorders, and that which symptom complex develops depends upon the environmental demands, the individual's reaction pattern, and his/her specific organic vulnerability (Lazarus, 1977).

The role of situational factors in the precipitation of migraine headaches is generally accepted. Through questionnaires, structured interviews and environmental manipulation, several investigators have documented the capacity of a wide variety of specific physical stimuli to elicit an attack (Bille, 1962; Wolff, 1963). Implicated are such diverse stimuli as intense noise, stroboscopic light effects, foods, various allergens, oral contraceptives, barometric pressure changes, and physical exercise in both

adults (Graham, 1968; Adams et al, 1980) and children (Bille, 1962; Fenichel, 1968). Moreover, there is evidence that, in some cases, such naturally occurring cyclical phenomena as the estrogen changes associated with the menstrual cycle and pregnancy (Sommerville, 1972; Kudrow, 1978) or the neurohumoral changes associated with the circadian rhythm and sleep may precipitate migraine headaches (Wolf and Goodell, 1968; Dexter and Weitzman, 1970).

It is also recognized that many psychological stimuli such as holidays, work projects, job changes, schoolwork and examinations, or interpersonal demands may serve as a trigger (Wolff, 1937; Selby and Lance, 1960; Vahlquist, 1961). Wolff (1963) considered that any environmental event which requires an adaptive reaction may elicit a stress response as a result of previous experiences and acquired symbolic meaning. What is critical is not the event per se but the individual's perception of the event and his available reaction patterns (Selye, 1976; Lazarus, 1977). If the situation is experienced as threatening and the coping repertoire is inadequate, a primitive adaptive reaction, namely a migraine headache, will develop in the genetically predisposed and constitutionally vulnerable individual (Marcussen and Wolff, 1949).

That psychological stress can act as a precipitant for a large proportion of migraineurs has been confirmed with both adults (Henryk-Gutt and Rees, 1973) and children

(Vahlquist, 1955; Bille, 1962). Indeed in the latter study school stress was identified as the most common cause of pediatric migraine. However, it remains necessary to explain how the headache process is triggered in those patients who deny the relevance of situational stress.

Bakal (1982) has developed a psychobiological theory which postulates that the autonomic responses which mediate headache may, over time, acquire a degree of autonomy from the events which originally triggered the attacks and become highly resistant to extinction. He views headaches as containing a sensory component which consists of afferent pain transmission and a reactive or cognitive component which consists of the thoughts and feelings which maintain the disorder. It is hypothesized that the former is amenable to relaxation training, and the latter to cognitive strategies (Bakal, 1982).

It is noteworthy that this model is consistent with the gate control theory of pain (Melzack and Wall, 1965), and it is basic to many of the multifaceted cognitive-behavioral treatment regimes which are now being used successfully in the treatment of chronic pain syndromes, (Tan, 1982; Turner and Chapman, 1982a, 1982b). It also resembles Williamson's (1981) biobehavioral model and Diamond and Dalessio's (1978) unified theory of migraine. The latter integrated Wolff's original theory with recent biochemical

and physiological findings and accounted for the role of stress and other triggers in the migraine process.

In the final analysis all these theories postulate that headaches arise in constitutionally vulnerable individuals in response to psychological or physical stressors and are maintained by a failure of coping skills. The development of behavioral coping programs including relaxation and/or cognitive strategies was a natural outgrowth of this viewpoint.

### The Treatment of Migraine

#### Pharmacological Methods

Traditionally treatment usually begins with a pharmaceutical intervention. For milder headaches, palliative treatment with analgesics such as aspirin or codeine may serve to relieve pain. If this is inadequate, abortive treatment with ergot derivatives such as ergotamine tartrate may be prescribed to stop an attack in progress. When taken on a continual basis, the ergotamines and methysergide have also been used successfully in the prophylactic treatment of severe migraine. However, both these drugs can cause unpleasant and potentially serious side-effects or complications (Beeson, McDermott and Wyngaarder, 1979).

Dalessio (1980) recommended that both drugs be avoided.

in children unless there is no alternative. Recently two studies have reported good results with the prophylactic use of propranolol in children (Ludvigsson, 1974; Bille, Ludvigsson and Sanner, 1977), but its long-term use may lead to cardiac complications (Beeson et al, 1979). Moreover, new drugs are often suggested, but clinicians and parents prefer non-pharmacological alternatives whenever feasible because of the unknown developmental implications.

#### Behavioral Methods

Biofeedback and relaxation training have become the primary nonpharmacological treatment approaches in the management of migraine (Blanchard and Andrasik, 1982). Cognitive applications, while promising, have not been frequent. A complete review of biofeedback treatment is beyond the scope of this paper, but the interested reader is referred to comprehensive articles by Adams et al (1980) and Williamson (1981). Presented below is a brief overview and a review of biofeedback interventions in pediatric migraine. The literature comparing biofeedback with relaxation or cognitive strategies is discussed under the latter headings.

Biofeedback Training. Of the various biofeedback techniques, thermal biofeedback has been used most frequently. This method involves training in peripheral temperature control (usually by finger warming), on the assumption that

voluntary peripheral vasodilation will reduce cranial blood flow and prevent or abort the migraine process. It is often combined with autogenic training, a form of self-induced relaxation which uses cognitive self-statements to control tension, breathing, blood flow and body temperature. Together the combination is known as autogenic feedback. Cephalic vasomotor biofeedback is a related application which teaches the direct control of the vasomotor response of the temporal or frontal artery. There have also been reports on the use of electromyographic (EMG) or alpha biofeedback, both of which are believed to have the capacity to moderate migraine by inducing relaxation. According to a recent meta-analysis of the migraine literature, autogenic feedback and relaxation are the most successful interventions to date (Blanchard and Andrasik, 1982).

The first successful group outcome studies using autogenic feedback were reported by the Menninger Clinic (Sargent, Green and Walters, 1972, 1973). Their method combined thermal biofeedback with autogenic training. The latter used self-talk, autosuggestion, and imagery to induce relaxation and peripheral vasodilation. Sargent et al (1972, 1973) reasoned that this combination would provide voluntary control of sympathetic nervous system activity leading to the relief of migraine, and in three studies they reported significant improvement in seventy-six out of 110 longstanding migraineurs. Moreover a five-month follow-up showed good maintenance of

clinical gains (Sargent, Walters and Green, 1973). Although this work was methodologically flawed (i.e. no statistical comparisons, no pre- or posttreatment data, and a global clinical criterion), numerous other authors have replicated the Menninger results in both single group designs and multiple case studies (e.g. Mitch, McGrady and Iannone, 1976; Reading and Mohr, 1976; and Boller and Flom, 1978). In addition, many controlled group outcome studies have compared autogenic feedback with other methods. This work is discussed later.

Autogenic feedback has also been successfully utilized in pediatric migraine, and it is noteworthy that this method combines both cognitive and relaxation components. There have been several uncontrolled studies, e.g. Peper and Grossman (1974) with two children; Werder (1978) with four children followed for two years; and Diamond and Franklin (1976) with thirty-two children using a combination of autogenic and EMG biofeedback. Furthermore two controlled comparisons have reported good results. In a multiple-baseline-across-subjects design, the first documented better than fifty percent improvement on all headache variables in two girls with a six-year history of migraine (Andrasik, Blanchard, Edlund and Rosenblum, 1982). Similarly, in a controlled group study with twenty-eight children, Labbe and Williamson (1982) reported that autogenic feedback yielded a significantly better outcome than a waiting-list control. Despite some

methodological problems, the consistently good results suggest that autogenic feedback may be an efficacious intervention in pediatric migraine. Further research to define its mechanism of action appears warranted.

After autogenic feedback and relaxation, thermal biofeedback (e.g. Mitch, McGrady and Iannone; Mullinex, Morton, Hack, and Fishman, 1978) and vasomotor biofeedback (e.g. Bild and Adams, 1980; Knapp and Florin, 1981) are the most successful interventions in adult migraine (Blanchard and Andrasik, 1982). However, while all these methods have yielded significant relief, some studies indicate that their effectiveness does not depend upon the successful acquisition of the targetted responses. Therefore investigators have suggested that either a nonspecific placebo effect or some unrecognized potent mechanism may be operating (Mullinex, Norton, Hackman and Fishman, 1978; Gauthier, Bois, Allaire and Drolet, 1981; Blanchard and Andrasik, 1982). Because the relaxation response is a significant factor in all types of biofeedback training, one may hypothesize that it is the active treatment component (Attfield, and Peck, 1979). On the other hand, Bakal (1982) has argued that biofeedback may act by altering the patient's cognitive schema concerning headache and the potential for self-control. This suggests that cognitive restructuring is the critical ingredient, and it is consistent with Bandura's (1982) theory that alterations in perceptions of self-efficacy underlie behavioral change.

Thus far the literature on this issue is limited. There have been frequent studies of relaxation training and some on cognitive methods, but much of this work is uncontrolled or methodologically flawed. There have also been a small number of direct comparisons in controlled studies which have yielded contradictory results, and several reports which have confounded the effects of the two approaches.

Relaxation Training. This term is generally used synonymously with progressive relaxation (Jacobson, 1938), and involves alternately tensing and relaxing individual muscle groups in sequence. It excludes cognitive relaxation methods such as Zen, hypnosis and meditation which operate through attentional focussing. After biofeedback, relaxation training is the most frequent behavioral intervention in migraine. Derivatives are passive relaxation which omits the tensing phase, and cue-controlled relaxation (Paul, 1969) which links the relaxation response to a verbal or motor stimulus.

One of the first successes with relaxation training was reported by Lutker (1971) who obtained total remission in a woman with an eight-year history of daily migraines. Similarly, in an uncontrolled clinical study, Hay and Madders(1971) reported that seventy percent of ninety-eight patients showed good improvement after six group sessions of relaxation training, and fifty-five percent maintained

their gains at a three month follow-up. In another single group study, Warner and Lance(1975) obtained complete remission in two cases, seventy-five percent improvement in six, and no change in the remaining four, for a total of two-thirds improvement.

Unfortunately, all these studies lack control groups, and with no comparisons to rule out spontaneous remissions or improvements, they must be interpreted cautiously. However, these initial successes did stimulate controlled comparisons. For example, Blanchard, Theobald, Williamson, Silver and Brown(1978) compared progressive relaxation, autogenic feedback, and a no-treatment control in subjects matched for headache severity. They found that during treatment both experimental groups improved significantly on measures of total headache activity, duration, intensity, and analgesic use, whereas the control group did not. After treatment, the relaxation group was significantly better than the biofeedback group on measures of headache frequency and intensity. Follow-up data of three months and one year showed no differences between the treatment groups and good maintenance of clinical gains, with the relaxation group continuing to improve (Silver, Blanchard, Williamson, Theobald and Brown, 1979).

Further support for the efficacy of relaxation training came from a group outcome study by Attfield and Peck(1979) who compared progressive relaxation and finger temperature biofeedback in ten migraine patients and ten normal individuals. Although the biofeedback group did achieve greater increases in finger temperature, they did not improve in terms of total headache

activity. The relaxation group, on the other hand, significantly reduced their headache activity without raising finger temperature.

Both of the above studies obtained good results with relaxation training. However, a more recent report is more equivocal (Blanchard, Andrasik, Neff, Arena, Ahles, Jurish, Pallmeyer, Saunders, Teders, Barron and Rodichok, 1982). This research used a step-wise procedure with migraine, combined headache and muscle-contraction patients to determine whether relaxation nonresponders would improve with subsequent biofeedback. Although all groups responded significantly to relaxation, only thirty percent of the migraine patients and twenty-two percent of the mixed group were greatly improved compared to eighty-one percent in the earlier Blanchard study (Blanchard et al, 1978). It is difficult to interpret these results since the design did not include a control group. However, sampling differences may provide an explanation of the contrasting results in the two projects. The patients in the last study were all chronic, severe headache sufferers, a group which is relatively unresponsive to intervention (Bakal, Demjen and Kaganov, 1981). This could explain the lower success rate in this study.

In summary, with the exception of the last study, all of the research discussed above supports the efficacy of relaxation training as a migraine intervention.

Unfortunately, much of the work is methodologically flawed. Only one study has included a no-treatment control group, and none have contained a placebo-type intervention. Therefore the nature of the active component remains unclear. Nevertheless, in a recent meta-analysis of the migraine literature, Blanchard and Andrasik (1982) concluded that autogenic biofeedback and relaxation training are significantly better than all other active and control conditions. However, cognitive techniques were not included in this analysis. (Comparisons of relaxation and cognitive methods are reviewed in a later section).

Cognitive Methods These are a heterogeneous assortment of techniques whose goal is the modification of thought processes in order to prevent or attenuate pain. They include such strategies as educational information, meditation and hypnosis, attention diversion, the manipulation of imagery, and a variety of cognitive therapies; e.g., Beck's (1976) depression therapy; Ellis' (1962) rational-emotive therapy or RET; self-instructional training (Meichenbaum, 1974); coping-skills training (Goldfried, 1971), problem-solving therapy (Spivack and Shure, 1974; Spivack, Platt and Shure, 1976); and stress-innocation training (Meichenbaum, 1975).

Some authors distinguish the cognitive-behavioral methods which contain a behavioral component from the purportedly pure cognitive methods, but in practice

the distinction is arbitrary (Tan, 1982). Cognitive methods have been applied with good results to a broad range of problems such as fears and phobias, pain, deficient self-control, depression, anxiety, and interpersonal problems.

Cognitive restructuring is the basis of the cognitive methods. This is essentially a cognitive retraining procedure designed to modify maladaptive emotional responses and behaviors by changing the way the individual labels his experiences. The emphasis is upon modifying negative internalized sentences, which are considered the sources of anxiety, anger and depression, to more constructive covert verbalizations. An example would be altering "This is awful for me!" to "This is not what I wanted to happen, but lets see what I can do about it". Cognitive coping is an extension which combines elements of cognitive restructuring and problem-solving. The salient characteristic is a focus upon building a behavioral repertoire of skills to help the patient to cope with the problem being experienced e.g. test anxiety, pain etc. (Mahoney and Arnkoff, 1978).

The application of cognitive methods to the management of headache is relatively recent, and the literature is not extensive. This review is arbitrarily divided into two sections: first, studies which use a cognitive method alone or compare it to something other than relaxation, and lastly research which contrasts or combines the two

interventions. For classification purposes, EMG biofeedback is considered a relaxation technique because the targetted response is the reduction of muscle tension.

One of the early cognitive successes was a controlled group outcome study with forty-six migraine patients which compared hypnosis and prochlorperazine, an antiemetic agent (Anderson, Basker and Dalton, 1976). Follow-up consisted of monthly assessments for one year. By the sixth month, the hypnosis group had ten complete remissions and significantly fewer headaches than the drug group which had three remissions. Since hypnotic trance was not induced, the improvement in the hypnosis group may be explained by another treatment element such as attention diversion, suggestion, anxiety-reducing imagery or self-relaxation. However, the interpretation of these results is problematic because the amount of attention received was not controlled, and only nonspecific effects may be operative.

More equivocal results with respect to hypnosis were reported by Andreychuck and Skriver (1975) who found no significant differences in a comparison of thermal biofeedback, alpha biofeedback and self-hypnosis, although all patients had decreased headache activity. However, all three groups shared cognitive and relaxation treatment components as well as nonspecific elements such as attention and positive expectations. This makes interpretation difficult but, since the treatment response was significantly

correlated with suggestibility, nonspecific factors alone could account for the results.

On the other hand, a study by Benson, Klemchuk and Graham(1974) suggests that more than a nonspecific effect is required to induce change. These investigators found no significant improvement in headache activity in seventeen migraine patients trained in transcendental meditation, although six patients had improved clinical ratings. However, the meaning of these results must be tempered by the weakness of the experimental design which included neither a control group nor a follow-up assessment.

More recently in a controlled group outcome study, Knapp and Florin(1981) treated twenty migraine patients with cognitive stress coping, vasomotor biofeedback, a combination of the two, or a waiting-list control. Again all the active treatment groups were significantly improved on headache and medication measures from pretest to posttest compared to the controls, with no differences between the treatment groups. In addition, the two groups receiving cognitive coping showed a greater reduction of irritability, emotionality, and depression than the vasomotor biofeedback group, suggesting that specific treatment effects were involved. The fact that the treatment effects on headaches were non-additive may indicate that the experimental conditions are equivalent procedures with the same mechanism of action. Alternately, a within-groups factor may be implicated, with

different types of subjects responding to the different treatments. However, the small sample sizes in this study suggest that it may have lacked the power to detect small to moderate experimental effects.

A perusal of these results shows two strongly positive outcomes (Anderson et al, 1976; Knapp and Florin, 1981), one negative finding (Benson et al, 1974), and one more ambiguous outcome (Andreychuk and Skriver, 1975; which appeared to demonstrate equivalent treatment effects for cognitive and biofeedback methods. Several interpretations of these differences are possible. Firstly, the active treatment component may be a non-specific placebo-type factor since all the papers reviewed are consistent with this interpretation. It is also possible that individual differences predispose patients to respond to different treatment components, causing apparent but false equivalency. Obviously research into the correlates of responsiveness would be required to clarify this issue. A third possibility is that both biofeedback and cognitive methods act through the same mechanism of action. This could be a relaxation effect or a cognitive response such as a change in attitudes and expectations. Certainly future research which includes a nonspecific treatment group is required to elucidate this issue.

Relaxation Training and Cognitive Methods. Comparisons of these approaches in the headache literature are relatively few. A search identified four studies on the treatment of migraine, and five on muscle-contraction headache. However in some instances, their effects are confounded.

The earliest controlled research combining relaxation and cognitive techniques was reported by Mitchell and his colleagues (Mitchell and Mitchell, 1971; Mitchell and White, 1977). This group developed a comprehensive treatment package which combined progressive relaxation, applied relaxation, systematic desensitization, and cognitive-behavioral methods such as assertiveness training and problem solving. In two preliminary studies evaluating the relative contribution of the relaxation components versus the total package they found the latter to be superior to any single component. In the first study, Mitchell and Mitchell (1971) reported that seven patients who received the total treatment showed significantly greater improvement on headache frequency and duration than three no-treatment control subjects. Although the relaxation group of seven improved considerably, their results were not significantly better than the controls. Unfortunately, there was no statistical comparison between the two active treatments. The second study mirrored the first in that the combined package was significantly superior to either desensitization alone or the no-treatment controls (Mitchell and Mitchell, 1971).

In a later extension of this work, Mitchell and White (1977) designed a dismantling strategy involving the sequential addition of treatment components. Although the two phases of recording and monitoring had negligible effects, a significant reduction in migraine frequency occurred when physical and mental relaxation and self-desensitization were added in the third phase. However, the fourth phase which also included self-control techniques such as cognitive restructuring, cognitive coping, thought-stopping and assertion training, yielded the best results. Mitchell and White (1977) interpreted their data as showing that migraine is a stress-induced disorder which responds best when a wide range of behavioral skills are taught to provide a flexible repertoire of coping techniques. They noted that the most dramatic treatment response occurred in the fourth phase which included cognitive-behavioral strategies. However, these results must be interpreted with caution because the subjects were university volunteers with relatively infrequent headaches. Also tranquilizer use was high, suggesting this was an atypical migraine sample. Moreover, relaxation was taught totally with taped instruction, suggesting it may not have been mastered well enough to facilitate a strong treatment effect.

A study by Lake, Rainey and Papsdorf (1979) reported more equivocal results with the application of cognitive therapy to the treatment of migraine. A comparison of self-monitoring, EMG biofeedback, and finger temperature biofeedback

alone or combined with rational therapy indicated a significant improvement in all groups in pre- and posttreatment comparisons. There was no main treatment effect on a measure of headache activity, but a significant difference resulted when the three treatment groups were combined and contrasted with the self-monitoring group. The interpretation of these results is difficult; it is unclear whether only nonspecific effects were operative, or whether there were too few subjects per group (six), or too few rational therapy sessions (three) to provide an adequate test of the technique.

Success with a cognitive-behavioral program was obtained by Kohlenberg and Cahn (1981), but a high drop-out rate necessitates a cautious interpretation. In a controlled group design, these investigators found that a self-help home program which taught cognitive restructuring, meditation, thermal biofeedback, and progressive relaxation was significantly better than a control condition of information only at both three and six-month follow-ups. Comparable results with a cognitive-behavioral program for chronic headache were also reported by Bakal, Demjen and Kaganov (1981). Although this was a single group design, all patients improved significantly from pre- to posttest, and a regression analysis showed that baseline trends did not explain a significant portion of the post-treatment variance. Nevertheless, because both of these studies combined components of relaxation training, biofeedback, and a variety of cognitive techniques, the active treatment component cannot be identified, and the

possibility of nonspecific effects cannot be excluded.

A more definitive analysis of the efficacy of cognitive coping was conducted by Holroyd, Andrasik and Westbrook (1977) with thirty-one muscle-contraction patients. Using a within-sample-matching design, this study compared cognitive restructuring, presented within a stress-coping framework, with EMG biofeedback and a waiting-list control group. The rationale for treatment emphasized the role of maladaptive cognitions in causing stress and thereby mediating headaches. Patients were taught to monitor self-talk and interrupt negative sequences by substituting more constructive cognitions. The outcome was that only the cognitive-coping group was significantly improved at the posttreatment and fifteen-week follow-up. Moreover, in a recent two-year follow-up, Holroyd and Andrasik (1982) reported that eighty percent of the cognitive-coping group were substantially improved as compared to 37.5 percent of the biofeedback-assisted relaxation group. Only the former change was significant.

In a series of single-case experiments, Kremsdorf, Kochanowicz, and Costell (1981) corroborated the superiority of cognitive training over EMG biofeedback for the relief of tension headaches. These authors reported that the cognitive method reduced headache activity, whereas EMG biofeedback reduced frontalis EMG levels with no concomitant improvement in headache activity.

Somewhat different results were reported by Anderson, Lawrence and Olson(1981), who used a multiple-baseline-across-subjects design to evaluate the separate and combined effects of cognitive coping and relaxation training in fourteen muscle-contraction headache patients. These authors found that both interventions resulted in substantial improvements in headache activity and, for some patients, the combination produced an additive effect. All patients had zero headache activity at the follow-up assessment.

Somewhat more ambiguous results were reported by Holroyd and Andrasik(1978) who compared cognitive coping, cognitive coping plus relaxation, stress monitoring and discussion, and a control condition. All three treatment conditions reduced headache activity between pre- and post-treatment, while the control condition did not. Moreover there were no differences among the treatment groups at post-treatment. While these results would appear to suggest that only nonspecific effects were operative, this interpretation is inappropriate since all three experimental groups reported using cognitive-coping strategies. Thus the intended placebo condition probably stimulated the same change processes as the active conditions. Moreover the fact that relaxation did not augment the treatment effect suggests that cognitive change regarding self-control and expectations for improvement may be the common mechanism of action.

In reviewing the literature comparing relaxation and

cognitive methods, a contradiction is evident. At least five papers indicate that cognitive interventions are either superior or augment the effects of relaxation training (Mitchell and Mitchell, 1971; Mitchell and White, 1977; Holroyd et al, 1977; Kremsdorf et al, 1981, and Anderson et al, 1981). However, two studies found no differences between these two conditions (Holroyd and Andrasik, 1978; and Lake et al, 1979). These last two papers also suggested that the treatment effects of relaxation and cognitive training are not additive, but Anderson et al (1981) came to the opposite conclusion at least for some cases.

In attempting to reconcile these findings one must assume that methodological deficiencies and differences have not been inconsequential in contributing to the confusion. Even in controlled group outcome studies, methodological problems are not uncommon. Examples are too few subjects, too few training sessions, the use of tapes for training, failure to control for patient expectations and face validity, inadequate baselines and follow-ups, total reliance on self-report data, and the use of university volunteers as subjects. However, the overall balance suggests that both methods warrant further research in spite of these methodological problems. In addition, the fact is that few of the studies reviewed have contained a credible placebo condition, and those which did tended to report equivalent treatment effects across conditions. Moreover the efficacy of either relaxation

training or cognitive interventions in children is essentially untested although autogenic feedback which contains elements of both methods, has yielded positive results. It would appear that a direct comparison of these two approaches with a non-specific intervention in the treatment of pediatric migraine is in order.

#### Cognitive Applications in Pediatric Treatment\*

There are no published reports on the application of these techniques to the treatment of pediatric migraine. However, a broad spectrum of cognitive-change therapies which are suitable for use with children have been applied to a variety of pediatric problems such as deficient self-control, anxieties and fears, and social and interpersonal problems. Some of this literature is summarized below to illustrate the scope and flexibility of the cognitive restructuring approach.

Hyperactivity, impulsiveness, poor attention span, and aggressiveness are all considered aspects of deficient self-control, and cognitive techniques are becoming increasingly common in the remediation of these problems. In a pioneering study Meichenbaum and Goodman (1971) explored a cognitive-restructuring approach in training impulsive children to improve their performance through the modelling and rehearsal of instrumental self-talk. This took the form

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\*New references in this section are given on p.143a.

of "think and do" graded sequences of self-statements designed to guide the children in task-oriented behaviors. Relative to placebo and assessment control groups, children receiving cognitive restructuring training showed significant improvement on several paper-and-pencil criterion measures and the WISC Performance IQ.

Expanding on this work, Bornstein and Quevillon(1976) have developed a treatment package based on verbally mediated self-control training for the treatment of hyperactivity and impulsivity. Using the amount of time "on task" in the classroom as their criterion, they were able to demonstrate dramatic decreases in inappropriate behaviors and highly significant increases in task-appropriate behaviors. Moreover, assessment by different teachers in a five month follow-up showed a complete maintenance of therapeutic gains as measured by "on-task" time.

Other investigators using similar methods to develop self-control in children include Palkes, Stewart and Freedman (1972), Douglas (1975), with hyperactive children; Camp (1977) with aggressive youngsters; and Kendall and Finch (1978), Kendall and Wilcox (1980), with impulsive children.

An important application of cognitive restructuring involves teaching children to cope with various fears, anxieties, and stresses, e.g.-darkness, hospitals, surgery,

test and speech anxieties. For example, Kanfer, Karoly, and Newman (1975) divided dark-phobic children into two groups which both received cognitive restructuring training. A competence group was taught to cope by making self-statements emphasizing their strength, courage, and ability to look after themselves, and a stimulus group was taught to think positively about the darkness. On post-test measures of the intensity and duration of dark tolerance, both groups showed a significantly greater decrease of dark phobia than an untreated control group, with some analyses favouring the competence group.

Similarly Peterson and Shigetomi (1981) evaluated the effectiveness of cognitive coping compared to filmed modelling, a combination, or informational preparation in children awaiting tonsillectomies. Children who received coping alone or in combination ate significantly better than the others, and they experienced significantly less distress according to ratings by parents and hospital staff. In addition, those who received cognitive coping plus modelling were more calm and cooperative during the actual invasive procedures.

Another major application of cognitive coping has involved teaching social cognitive problem-solving skills to children with social and interpersonal problems. This useage is consistent with D'Zurilla and Goldfried's (1971)

conceptualization of anxiety, depression and other behavioral problems as a function of an inability to deal with situational problems. Applying this model, Spivak and Shure (1974) developed a training program to teach interpersonal problem-solving skills to emotionally disturbed children. Their program presents a series of typical social problems to teach children to generate solutions, consider the options and consequences, and make a choice based upon the desirability of the outcome and the potential success rate. Their results showed that, relative to an untreated control group, treated children improved on measures of overt behavioral adjustment and gains were maintained at a one year follow-up. Gottman, Gonso, and Schuler (1976) replicated these results with socially withdrawn children.

In conclusion, the above overview of the cognitive literature on pediatric interventions suggests that this is an adaptable method which may be applied to many different problems. Its inherent strength is that it is basically a set of principles which guide the researcher in modifying programs as required. Therefore it appears logical that adult cognitive-coping strategies for migraine could be suitably adapted for use with children.

#### Statement of the Problem and Hypotheses

The purpose of the proposed research is to evaluate the effectiveness of two therapeutic inter-

ventions in the treatment of migraine headache in children - relaxation training and a cognitive-coping technique. Relaxation training has proved effective in reducing or eliminating migraine headaches in adults, and clinical experience in this laboratory indicate that it has promise for use with children. Cognitive-coping techniques have yielded positive results in the management of headache in adults. They have also proved effective, in the treatment of numerous childhood disorders, ranging from deficient self-control to social and interpersonal problems and the stress of hospitalization and surgery. Based on this empirical evidence it is therefore hypothesized that these two techniques will yield positive results in the treatment of children with migraine.

This study will also evaluate the efficacy of the treatment procedures in alleviating anxiety and depression. This is pertinent because a prevailing model of migraine postulates the co-existence of maladaptive emotional reaction patterns in the form of anxiety and depression which have been found to be significantly elevated in migraine patients. Moreover several authors have suggested that these variables may predict response to treatment in a variety of pain disorders. Whether this relationship also occurs in pediatric migraine requires elucidation if the clinical goal is the assignment of patients to treatment according to those characteristics which enhance the probability of success.

Hypothesis I:

Subjects in both the relaxation training and cognitive coping treatment groups will show a significantly greater reduction on the dependent headache measures than will subjects in the non-specific placebo condition, and this relationship will be maintained at follow-up.

Hypothesis II:

Subjects in both the relaxation training and cognitive coping treatment groups will show a significantly greater reduction on the dependent variables of anxiety and depression than will subjects in the nonspecific placebo condition, and this relationship will be maintained at follow-up.

Because of the dearth of literature on psychotherapeutic interventions in pediatric migraine, there was no empirical or theoretical basis on which to formulate a hypothesis concerning the differential effectiveness of the two active treatments. Based on the adult literature, one might hypothesize that cognitive coping would be more effective than relaxation training (Mitchell and Mitchell, 1971; Mitchell and White, 1977). However, it has not been established that the etiology of adult and pediatric migraine are identical or even similar. Therefore to extrapolate from the adult literature is inappropriate.

Nevertheless the treatment of pediatric migraine is a problem of sufficient clinical magnitude to justify the evaluation of all effective adult interventions. It was therefore decided that the inclusion of two active treatments in this study was warranted despite the resulting loss of statistical power. This view was reinforced by the calculation that the design provided sufficient power to demonstrate moderate treatment effects. It was therefore concluded that a trade-off of power for additional information was warranted.

## CHAPTER II

### METHOD

#### Subjects

The subjects in this study were fifty-one children and adolescents, between nine and eighteen years of age, who were referred to the Children's Hospital of Eastern Ontario (CHEO) by pediatricians and family physicians in the Ottawa-Hull area for consultation regarding migraine headaches. Participation in the study depended upon confirmation of the migraine diagnosis by a staff neurologist and adherence to the inclusion and exclusion criteria described below. All children who did not meet criteria were offered treatment in the regular service programs of the hospital.

The choice of sample size requires some explanation. There were two major considerations. Firstly, a review of the adult migraine literature showed that a sample of ten per group is commonplace, and apparently it provides sufficient power to reject the null hypothesis. This suggests that psychotherapeutic interventions in migraine have moderately large effects. Certainly it is generally agreed that small effects are of little clinical utility, and clinical trials in psychology with more than ten per group are exceedingly rare. A second consideration was the power of the

planned ANOVA's. Power was set at .80 since a Type II error was regarded as more serious than a Type I error for an exploratory study.

To determine N, a procedure was followed which is recommended by Kirk (1983) for situations where an accurate estimate of  $\sigma^2$  is not available from previous research. If  $1 - \beta = .80$ ,  $\alpha = .05$ ,  $p = 3$ , and  $C = 1.25$  (i.e. a moderate effect), then  $n = 14$  (Table E.15, p.840). This was increased to 17 per group in order to allow for probable drop-outs. By this method a total N of 51 was suggested.

The target population for this study was the type of pediatric migraineur who is referred to a hospital or clinic setting. Obviously our subjects are not a true random sample of this universe because of the predetermined setting and some degree of self-selection. A small number (11%) declined to participate, pleading temporary remission, schedule conflicts, or excessive distance. However, it is assumed that comparable self-selection occurs in other institutional settings, and there is no reason to suspect systematic bias related to the specific locale of this study. Nevertheless, it follows that the results must be interpreted cautiously until it is replicated with different pediatric samples.

#### Diagnostic Criteria

The general guidelines for headache diagnosis and

classification established by the Ad Hoc Committee on Classification of Headache (1962) were used. More specifically, the diagnostic criteria were intermittent paroxysmal headache and any two of the following four symptoms: throbbing pain; scotomata or related neurologic phenomena; nausea and/or vomiting; and a positive family history. This follows the criteria of Vahliquist and Hackzell (1949) which have gained widespread acceptance. However throbbing

pain has been substituted for unilateral pain since it is generally acknowledged that unilaterality is relatively infrequent in children (Bille, 1962; Tomasi, 1979; Bille, 1981; Shinnar and D'Souza, 1982).

#### Inclusion and Exclusion Criteria

The inclusion criteria stipulated that subjects must be between nine and eighteen years; that the diagnosis must be classic or common migraine; that the duration of the headaches was a minimum of three months; that the average frequency was once a week; and that no new prophylactic medication had been prescribed in the last two months. Children whose headaches were generally linked to allergies, dietary factors or the menstrual cycle were excluded, as were children with behavioral, neurological or major medical problems likely to require other interventions during the course of the project. Also, in order to ensure a minimum level of verbal comprehension, children who obtained less than a standard score of 80 on the Peabody Picture Vocabulary Test, Form L, were excluded.

#### Research Staff

Three female research assistants conducted all the assessments and therapy sessions under the supervision of the project director who is a registered psychologist in the Province of Ontario. All the research staff are

psychology graduates; two have master's degrees, and the third has extensive experience as a research assistant. In order to ensure the standardization of assessment procedures and treatments, the staff were carefully trained using observation, rehearsal, feedback and role-playing. In addition, all treatment sessions were taped and a random sample was spot-checked by the director or co-investigator of the project.

#### Measurement Instruments and Measures

Headache Diary. Since headache is essentially a phenomenological experience available only to the subject, the use of a Headache Diary is common practice in the treatment literature. This self-report measure, which was first introduced by Budzynski, Stoyva, Adler and Mullaney (1973), involves regular periodic rating of pain intensity according to a numerical scale with verbal anchors. Our method was adapted from the work of Epstein and Abel (1977), and it uses a six point rating scale ranging from 0, which indicates the absence of headache, to 5, which indicates an incapacitating headache. Subjects assess headache activity four times per day at mealtime and at bedtime. Simultaneously they record quantity and type of medication used, if any, symptoms, and possible causes of the headache. An example of the Headache Diary is included in Appendix A.

Some of the advantages of this format include its ease and acceptability to subjects, its capacity to reflect pain variability, and its sensitivity to treatment effects (Andrasik, Blanchard, Ahles, Pallmeyer and Barron, 1981). Collins and Thompson (1979) have argued that this method provides the maximum likelihood of compliance and reproducibility of data; they have also demonstrated reasonable reliability in a study with this format (Collins and Thompson, 1979; Collins and Martin, 1980). Recently, several studies have presented evidence of acceptable levels of construct validity (Thompson and Figueroa, 1980; Blanchard, Andrasik, Neff, Jurish and O'Keefe, 1981; Andrasik, Blanchard, Ahles, Pallmeyer and Barron, 1981). Our own laboratory has documented a high degree of concordance between the subject's rating of headache intensity and the parent's independent rating of the same event based upon behavioral observations (Richardson, McGrath, Cunningham and Humphreys, 1983).

A number of dependent variables were extracted from the Headache Diary. The Headache Index is a composite weekly score which is considered the most sensitive single headache measure (Andrasik, Blanchard, Arena, Saunders and Barron, 1982). Because it is calculated by summing the twenty-eight weekly ratings, it reflects frequency, duration and intensity of headaches. Frequency was defined as the number of times a headache was reported weekly, and mean duration refers to the number of successive ratings of pain per headache. Intensity

is simply the highest weekly score. Medication Count is the number of pills taken weekly. Operational definitions are given in Appendix B.

School Attendance Because headache is an experiential phenomenon, direct objective measurement by independent observers is not possible. Nevertheless, it is methodologically desirable to obtain behavioral indices, albeit indirect ones, of the degree of associated handicap or disability if possible (Adams et al, 1980; Blanchard and Andrasik, 1982). Since migraine patients often prefer bed-rest during headaches of moderate or greater severity, the number of days absent from school may be expected to be an indirect objective index of headaches of at least moderate severity. Therefore, teachers were asked to complete records documenting school attendance (see Appendix C). These records were collected simultaneously with the Headache Diary during baseline and each follow-up period. Absences pertaining to appointments for treatment were not scored.

State-Trait Anxiety Inventory (STAI) and State-Trait Anxiety Inventory for Children (STAIC)

In the past decade, a growing literature has documented the role of anxiety as a contributor to the experience of pain (Turk, 1977; Price and Blackwell, 1980; Turner and Chapman, 1982; Khatami and Rush, 1982). The STAI and STAIC were selected as measures of anxiety because of their statistical and structural properties (Spielberger, Gorsuch, and Lushene, 1970; Spielberger,

1973). Each test provides a measure of State Anxiety, which is sensitive to transitory or situational factors, and Trait Anxiety, which reflects dispositional or cross-situational factors, i.e. generalized anxiety. Because our experimental protocol involved training in dealing with situational stressors, the ability to separate these two components of anxiety was an important consideration in selecting this test.

The State Anxiety Scale was administered by having the subjects, through imagery and role-playing, evoke the most stressful situation they frequently experienced. They then responded to the test as if they were in that situation. Each child generated his/her own situation. This variation is within the uses suggested by Spielberger for this scale. The Trait Anxiety Scale was administered after completion of the State Scale.

Both the State Scales and the Trait Scales consist of twenty items presented in a forced-choice format with higher scores reflecting higher anxiety levels. STAIC Scales have a range of 0 to 60 points, while the STAI Scales range from 0 to 80 points. The STAIC is administered to subjects in elementary school, and the STAI to high school subjects. Both tests have good internal reliability ( $\alpha = .78$  to  $.92$ ) and acceptable test-retest reliability for the Trait Scales. However, the test-retest reliability for the State Scales is considerably lower ( $r = .16$  to  $.47$ ) as

would be predicted from their transitory focus (Endler, 1978; Dreger, 1978). Extensive evidence of content, criterion and construct validity is provided in the test manuals (Spielberger 1973; Spielberger, Gorush and Lushene 1970). Also in a factor analysis of a battery of anxiety scales, Cattell (1972) reported that the STAI had the highest loading on the first factor extracted, indicating excellent construct validity.

Children's Depression Rating Scale(CDRS). Many studies have reported elevated depression scores in both chronic pain and headache patients but the exact nature of the relationship requires elucidation (Sternbach and Timmermans, 1975; Cox and Thomas, 1981; Strassberg, Reimherr, Ward, Russell and Cole, 1981; Mathew, Stubits and Nigam, 1982). Because the two variables may interact, it is important to assess depression in pain treatment studies. However, all the measures suitable for children are relatively recent (Kazdin and Petti, 1982). The CDRS is a fifteen-item observer-scored scale, based upon DSM III diagnostic criteria, which is completed after a structured interview. It was developed by Poznanski (Poznanski, Cook and Carroll, 1979) as a downward extension of the Hamilton Rating Scale.

Every item has two to four subcategories indicating increasing severity of depression and it contributes 0 to 5 points to the total score. Inter-rater reliability is .92

and the criterion validity of the scale has been assessed by showing excellent separation of scores of depressed versus non-depressed children (Poznanski, Cook and Carroll, 1979). The method of development suggests inherent construct validity.

Credibility. It is necessary to assess credibility in research designs involving the multiple comparison of treatment intervention because confounding may occur when there is differential credibility across treatment groups (Holroyd, Andrasik and Noble, 1980). This is especially critical when a placebo treatment group is involved. In this study credibility was measured by means of parallel pretreatment and posttreatment questionnaires designed to measure the face validity of the interventions. The questionnaires consist of four questions reflecting the extent to which the treatments make sense to the subjects, beliefs about treatment efficacy, and expectations for improvement. Each question has five anchor points ranging from "not at all", which is scored 0, to "very(much so)", which is scored 4. A sum score is calculated by adding the assigned values. Subjects completed the questionnaires immediately after the first and last treatments under the supervision of a therapist "blind" to their experimental group membership. Examples of the questionnaires are included in Appendix D.

Therapist Assessment. This is a measure of perceived effectiveness which is included with the posttreatment credibility questionnaire. It consists of three items evaluating the skill, warmth and understanding of the therapist, each of which has a range of 0 to 4 points. The total score is obtained by summing the assigned values.

#### Procedure

There were five major components involved in this study: (1) subject selection based upon diagnosis and inclusion and exclusion criteria; (2) pretreatment, consisting of assessment with the measurement instruments described earlier and four weeks of baseline recording of headache activity; (3) treatment, involving six weekly one-hour sessions, homework assignments and the continual completion of Headache Diaries; (4) posttreatment, beginning with four additional weeks of headache monitoring with telephone supervision and ending with reassessment; and (5) follow-up, which paralleled posttreatment but took place twelve to sixteen weeks after the termination of treatment.

In the subject selection component, all prospective subjects were examined by a pediatric staff neurologist to confirm the diagnosis, using the diagnostic criteria described previously, and to rule out complicating medical conditions. A member of the research staff, assigned on a

sequential basis whenever possible, also met with the patient and parent(s) to explain the nature, purpose and conditions of the study and to ensure that diagnostic and inclusion and exclusion criteria were met. If they wished to participate, subjects were required to make a commitment to attend all sessions, to keep the Headache Diaries throughout the study, and to complete homework assignments as required. They were then taught to monitor headache activity on the Headache Diary by means of instructions, modelling, rehearsal and feedback.

At this point four weeks of baseline recording began. During this period, two assessments were scheduled: the first, to review the headache monitoring procedure and to obtain a detailed pediatric and headache history; and the second, to complete the measurements described above. At the end of this period, subjects who averaged less than one headache per week were excluded from the study. Also excluded were subjects who did not complete a minimum of twenty days of the Headache Diary during the baseline period. Patients excluded from the study were offered treatment in the regular service programs of the Children's Hospital and they were replaced by other subjects.

Subjects who met criteria were classified into two groups, according to degree of headache severity during baseline, using as a cut-off score a weekly mean of more than 20.66 points on the Headache Index. (This number was

selected because it was the mean score for a group of pilot subjects). This procedure was followed in an effort to obtain equivalency on headache severity across treatment groups because there is some evidence that severity may interact with treatment variables (Gauthier, 1978). Subjects were then assigned to one of three treatment conditions on a random basis. In order to maintain rapport, the researcher who had done the baseline assessments with a subject continued on as therapist.

During the treatment phase, all therapists followed detailed treatment manuals to standardize procedures as much as possible and ensure that every subject was instructed in all elements of the treatment. However, some manipulation of the ordering of the treatment elements did occur to allow for individual differences and permit a natural flow of dialogue. To facilitate compliance with the protocols, therapists were provided with a checklist which they completed immediately after each session. In addition, approximately twenty per cent of the treatment tapes were checked at random to encourage adherence to the treatment manuals. Copies of the treatment protocols are provided in Appendix E.

Following the treatment paradigm for pain outlined by Meichenbaum (1974) and Turk and Genest (1979), all the treatments contained an educational phase, a skills-training phase, and an application-training phase. The function of the educational or information phase was to provide subjects

with a conceptual framework and to augment motivation to learn and practise the different techniques. Methodologically, another function was to control credibility across experimental groups to prevent confounding this variable with treatment effects (Borkovec, 1972; Kazdin, 1979). For this purpose, parallel treatment rationales were constructed. These were essentially identical except for slight differences in the explanation of the respective mechanisms of action. These rationales were tested in a pilot project with 125 normal analogue subjects which yielded no significant differences in credibility for the specific and nonspecific treatment groups (Richter, Bartoli, Cunningham, Firestone, Goodman and McGrath, 1982).

These rationales were subsequently used in the first treatment sessions with all the experimental groups. Basically, children were told that the way genetically susceptible individuals cope with stress can lead to physical tension, strong emotional reactions and biochemical changes which alter the cranial circulation and set up a chain reaction ending with a migraine headache. The model presented was based upon an integration of Wolff's (1963) model of migraine with Schachter's (1964) theory of emotion and Lazarus' (1981) stress and coping paradigm. In using these sources, the focus was less upon a strict adherence to empirically validated models and more upon the need for a logical and comprehensible

conceptual framework which could be used, with minor modifications, for all treatment modalities and for subjects of all ages. Copies of all the treatment rationales are included in Appendix F.

### Informed Consent

Before initiating treatment, therapists reviewed with children and parents the purpose and conditions of the study, and an informed consent was obtained from one or both depending upon age.

### Relaxation Training

Subjects were seen once a week for one hour for the six-week experimental period to learn various relaxation skills. The first session began with a presentation of the treatment rationale described above. It was explained that relaxation training is effective in the treatment of migraine because it counteracts the stress and tension which mediate the headache process. Subjects received an initial training session in progressive relaxation which closely followed the procedure developed for children by Cautela and Groden (1978). This is a simplification of the Jacobson (1938) method involving the sequential tensing and relaxing of large muscle groups and the use of deep breathing to achieve total body relaxation. This training session was taped and subjects

were instructed to practise at home with the tape once daily for the next week in a quiet room free from disturbances. Each session ended with the therapist reinforcing the importance of regular practice and accurate record-keeping of headache activity and medication intake.

In the second session, subjects were taught to relax without the prior tensing of muscle groups, and another tape to be used for practice at home was made. Subjects were instructed to practise daily with the tape of their preference. Sessions three and four taught partial or differential relaxation and "mini" relaxation through deep breathing and self-cueing. In session five, the emphasis was on the application of relaxation skills to individually selected stressful situations through the use of role-playing, coaching and feedback. Subjects were taught to put the relaxation procedure into effect as soon as they noticed their stress levels rising, if they were involved in a stress-producing situation, or at the onset of a headache. The sixth (last) session was basically a review geared to individual needs. Therapists reiterated motivational instructions emphasizing the need for continued regular home practice and the application of the new skills in the natural environment to facilitate generalization. The follow-up arrangements were described and treatment ended with the administration of the post-treatment credibility questionnaire.

### Cognitive Coping

This program, which is entitled "Thinking Straight", was developed by the author as a downward extension for children of Holroyd and Andrasik's (1978) cognitive-coping program for tension headaches and Bakal's (1982) cognitive-behavioral treatment for chronic headaches. The program uses elements of cognitive restructuring (Goldfried, Decentecio and Weinberg, 1974), stress-inoculation training (Meichenbaum, 1974), rational-emotive therapy (Ellis, 1962), and the cognitive control of pain (Turk, 1977). The title occurred spontaneously when the author described Ellis' (1962) concept of irrational beliefs as "crooked thoughts" while working with a young pilot patient. This led to an explanation of the program as a method of Thinking Straight to counteract those crooked thoughts which trip us up accidentally.

The program began with a presentation of the treatment rationale described earlier (see Appendix F). This rationale emphasized the role of negative self-talk in producing tension and stress and the effectiveness of Thinking Straight in reducing stress by substituting positive self-talk for the negative. To clarify the model, therapists used a common stressful experience, writing a test in school, to demonstrate how self-statements mediate arousal and colour emotional and somatic experiences.

A

They then modelled the use of Thinking Straight to relieve stress and facilitate coping, and subjects were coached to repeat the process, first with the same situation, and later with an emotionally charged situation from their own experience. It was explained that Thinking Straight is effective in the treatment of migraine because positive self-talk can counteract the stress and tension which mediates the headache process. The therapist then introduced the concept of headaches as stressors which can perpetuate themselves regardless of external experience and reinforced the advantage of using Thinking Straight as a self-control method to cope with all types of stressors and thereby short-circuit the headache process. Finally, subjects were taught to use the Thinking Straight Diary to help monitor self-talk and identify negative self-statements (see Appendix G). For homework they were instructed to review each day's experiences every evening to link self-talk, emotions and outcome. They were also asked to describe at least two stressful situations and associated cognitions on the Thinking Straight Diary and to continue monitoring headache activity and medication intake.

The second session reviewed the treatment rationale, the use of the Headache Diary, and the homework based on the Thinking Straight Diary. The therapist then introduced the concept of crooked thoughts or beliefs as frequent

unconscious determinants of negative self-statements and presented common examples, e.g. the need for universal love or approval, the need to be perfect, and the denial of personal control. After the subject identified characteristic examples, the therapist helped him/her to develop and substitute personalized coping statements, e.g. "I'm an O.K. kid even if I don't do so well in math" or "Even if Mom yells at me sometimes, she still loves me". This was followed by an examination of negative self-talk during headaches, and again, alternative coping statements were developed. All coping statements were written out on small cards for subjects to keep, and they were encouraged to modify and expand their collection at home. Homework consisted of monitoring negative self-talk daily, identifying the related crooked thought, and substituting positive coping statements. At least three examples, one of which involved a headache, were to be reported as homework on the Thinking Straight Diary.

After this the format for the subsequent sessions was always the same: a review of the rationale and previous week's homework, a lesson in a new skill, and a homework assignment to practise daily all the skills learned thus far and record progress on the Thinking Straight Diary. In reviewing the previous week's homework, the focus was always on helping subjects to identify negative self-talk and substitute personalized cognitive coping statements.

All sessions ended with the reinforcement of the need for regular home practice and accurate records on both diaries.

In the third session subjects were taught to use attention deployment as a coping skill to minimize pain and to expand their repertoire of personal coping statements for headaches. New small cards recording these statements were prepared, and subjects were encouraged to continue to add to their collection. The fourth session taught the use of fantasy and imagery as distractors and inducers of pleasant feelings. Therapist and subject then reviewed all the prior Diaries to try to identify and modify characteristic patterns of self-statements during stress reactions. However, the weight attached to the idea of patterns varied with its relevance and the subject's receptivity to the concept. The next session introduced simple problem-solving ideas to deal with stressful situations such as identifying options, making a choice based on probable outcome, implementing the choice, monitoring progress, and making changes if necessary. The subject was then helped to apply the method to current problems. The last session focussed on the application of the whole repertoire of coping skills to all types of stressors. This was basically a review session with the emphasis varying according to individual needs. Motivational instructions were repeated to encourage the application of the method in the natural environment, and

arrangements for reassessment were made.

#### Placebo Treatment

This is an attention control or nonspecific condition which was titled "Stress Reduction Training". Structurally it was identical to the experimental groups. Subjects received all the same treatment components except for the omission of the theoretical active ingredients. They were seen individually for six one-hour treatments, and they received homework assignments comparable to the other groups.

In the first session a credible rationale which was very similar to that of the two specific treatment groups was presented. It used the same model of migraine and a parallel explanation of the mode of action of the treatment. Essentially subjects were told that holding feelings in check and failing to identify or understand them causes stress and tension which can build to a point where biochemical and vascular changes cause a migraine headache. They were informed that by learning to identify and express their feelings, they would experience less stress and tension and thus short-circuit the headache process. In this session subjects were taught to relate the feelings of happiness and sadness to the situation in which they occurred and to identify what aspects of that situation aroused those feelings. Their homework for the first week was to continue monitoring headache activity and to fill in a

Stress Reduction Diary every evening with an example of a good or happy feeling and the related circumstances. In subsequent weeks the homework focussed respectively on the following feelings: sadness, anger, calm, and frustration. A complete set of Diaries is provided in Appendix H.

All subsequent sessions began with a review of the model of migraine and the treatment rationale, followed by a discussion of the previous week's homework. In the second session, subjects were told that sometimes it is easier to identify other people's feelings, and this can help us to understand our own emotions. The therapist then used selected projective test cards to elicit a story focussing on feelings like joy or sadness, and each subject was encouraged to relate this story to a personal experience. The same procedure was followed in the fourth treatment session, but the emphasis was on angry or calm feelings. The third and fifth sessions were similar except that statements about common feelings and experiences, selected from a variety of self-report personality tests, were used as the stimulus to elicit emotions and discussions of personal experiences. All sessions ended with a demonstration and explanation of the homework for the following week with help provided as required to label feelings appropriately. In addition subjects were encouraged to set aside a regular period

each day to practise expressing their feelings with a sympathetic friend or parent. As in the other treatment groups, the last session was a general review with the content selected to meet individual needs. Therapists discussed the application of the stress reduction model to stressful situations chosen by the subject, and they reiterated motivational instructions encouraging subjects to continue to practise in the natural environment. Treatment ended with a discussion of the posttreatment procedure.

#### Posttreatment

This phase was similar in structure to the baseline procedure. It was identical for all treatment groups. Subjects continued to monitor headache activity and medication on the Headache Diary for four weeks. During this period therapists telephoned subjects weekly to discuss any problems and encourage them to continue to practise the skills they had learned. After four weeks, subjects were reassessed with the same tests used during baseline by a therapist who had not treated the child and did not know his/her treatment group. Arrangements were then made for the follow-up process.

Follow-up

This phase followed the same procedure as post-treatment. Subjects were asked to keep Headache Diaries commencing twelve weeks after treatment and continuing for a four-week period. Therapists made weekly phone calls to promote compliance and discuss any difficulties. The period ended with reassessment by a blind therapist using the complete test battery which had been used in the baseline assessment.

## CHAPTER III

### RESULTS

#### Sample Description

Fifty-one children, dichotomized for headache severity and randomly assigned to treatment, participated in this study. There were seventeen boys and thirty-four girls with a mean age of 12.87 years and mean score of 108.67 on the Peabody Picture Vocabulary Test. Analyses of variance across treatment groups on these two variables were not significant ( $p > .75$ ), suggesting that the randomization process had been successful in achieving group equivalence.

Over the course of treatment there were eight drop-outs and one child was omitted from the analyses because of insufficient posttreatment data. This left a final pool of forty-two subjects. A chi-square analysis comparing attrition rates across treatment groups was not significant. Causes of attrition, as documented by the therapists, are provided in Appendix J.

In order to establish group equivalence on the dependent variables, baseline data were subjected to analyses of variance and Hartley's F-maximum test for homogeneity of variance (Kirk, 1982). The results are presented in Tables 1 and 2. All of the tests were nonsignificant, suggesting that the groups were indeed approximately equivalent. Although the variances for the Headache Index and frequency are relatively large, this is not considered problematic because they are homogeneous

TABLE 1  
Initial Equivalence of Headache Measures:  
Means Standard Deviations, and Analyses

Measure	Relaxation	Cognitive Coping	Placebo	F	Fmax.	P
Index	n = 15	n = 15	n = 12			
$\bar{x}$	30.33	26.29	25.17	.21	-	.81
S.D.	24.60	21.26	20.14	-	1.49	>.05
Frequency						
$\bar{x}$	9.03	8.14	7.26	.19	-	.83
S.D.	8.05	7.82	6.12	-	1.72	>.05
Duration						
$\bar{x}$	1.80	1.81	1.68	.11	-	.90
S.D.	.92	.83	.61	-	2.27	>.05
Peak Intensity						
$\bar{x}$	3.60	3.37	3.58	.30	-	.74
S.D.	1.07	.77	.76	-	2.00	>.05

TABLE 2

Initial Equivalence of Personality Measures:  
Means Standard Deviations, and Analyses

Measure	Relaxation	Cognitive Coping	Placebo	F	F Max	P
State Anxiety*	n = 15	n = 15	n = 11***			
$\bar{x}$	67.07	68.53	66.91	.20*	-	.82
S.D.	9.61	5.08	6.95	-	3.51	>.05
Trait Anxiety*						
$\bar{x}$	49.20	52.07	52.00	.47	-	.62
S.D.	8.99	8.08	10.22	-	1.60	>.05
Depression						
$\bar{x}$	21.36**	20.33	22.46	.50	-	.61
S.D.	4.34	5.49	6.43	-	2.20	>.05

\* T - Score

\*\* n = 14; one subject did not complete this test at posttest

\*\*\* n = 11; one subject moved to another city and only Headache Diaries were available at follow-up

across the treatment groups (Kirk, 1982).

Efficacy of Training in Reducing  
Migraine Headaches

Statistical Analyses

Analyses were performed to elucidate three basic issues:  
(a) whether intervention would lead to significant improvement,  
(b) whether there would be significant differences among the  
placebo and active treatments, and (c) whether improvement  
would be maintained at the sixteen-week follow-up assessment.

To answer these questions headache data were analyzed  
as a 3 x 2 x 2 randomized factorial experiment, with repeated  
measures on the last factor (Winer, 1971). The first factor  
contained the three levels of treatment groups, and the second,  
the two levels of headache severity. The two repeated  
measures were the average weekly scores derived from the  
Headache Diaries during the post-treatment and follow-up  
phases respectively. Because the dependent variables are  
regarded as separate parameters which have important clinical  
significance in their own right rather than being alternate  
measures of the same phenomenological event, they were treated  
separately in univariate analyses (Kendall and Braswell, 1982).  
This is consistent with established methodology in the headache  
literature.

Following a significant F test or Dunn's planned  
comparison test, within-group changes were evaluated by one-  
tailed t tests. Significant interactions were assessed for

simple main effects and then tested with the Newman-Keuls method if warranted (Kirk, 1982). For all analyses significance was established at the .05 level. However, because this was a relatively small exploratory study, probabilities between .05 and .10 are noted and interpreted as trends.

The major dependent variables relevant to the efficacy of training are all derived from the Headache Diary. They are the Headache Index, frequency, mean duration, and peak intensity. Although a medication count was calculated, this variable was not analyzed because approximately half the children took no medicine, and the others, very little. Similarly, the school attendance measure was not analyzed because teachers reported no absences at all during baseline for many of the children.

General Findings. Two effects occurred on all measures. As was expected because of the blocking procedure, the main effect for the severity factor was always significant ( $p < .001$ ). In addition there was always a significant time effect on the repeated measure ( $p < .001$ ). Inspection of the group means (Tables 3-6) indicated that overall subjects were more improved at follow-up than they were at posttreatment.

Headache Index. Beyond these two effects, Table 7 documents a trend toward a significant main effect for treatment groups,  $F(2,36) = 2.94$ ,  $p = .07$ , indicating that part of the variance in the Headache Index depends upon the treatment received. A comparison of the group means

TABLE 3

Means and Standard Deviations of Headache Index for Groups and Level of Severity

Group	n	Baseline		Posttest		Follow-up	
		x	S.D.	x	S.D.	x	S.D.
Relaxation	15	30.33	(24.60)	17.66	(16.34)	10.32	(11.06)
Low*	7	11.83	( 6.47)	5.15	( 4.62)	4.08	( 5.61)
High**	8	46.52	(23.06)	28.60	(14.92)	15.78	(12.04)
Cognitive	15	26.29	(21.26)	14.04	(15.15)	9.17	(10.37)
Low	8	11.64	( 4.25)	6.69	( 5.42)	4.83	( 4.55)
High	7	43.04	(20.48)	22.43	(18.64)	14.13	(13.16)
Placebo	12	25.17	(20.14)	20.47	(19.15)	14.80	(17.97)
Low	7	10.21	( 3.39)	6.18	( 5.86)	3.14	( 1.65)
High	5	46.10	(12.59)	40.49	( 9.92)	31.13	(17.68)

\* Low severity level of headache activity at baseline

\*\* High severity level of headache activity at baseline

TABLE 4

Means and Standard Deviations of Headache Frequency for Groups and Level of Severity

Group	n	Baseline		Posttest		Follow-up	
		X	S.D.	X	S.D.	X	S.D.
Relaxation	15	9.03	(8.05)	5.17	(5.16)	2.91	(3.40)
Low*	7	3.21	(1.82)	1.36	(1.25)	1.14	(1.64)
High**	8	14.13	(7.94)	8.51	(4.97)	4.47	(3.86)
Cognitive	15	8.14	(7.82)	4.50	(5.29)	2.52	(2.94)
Low	8	3.32	(1.62)	1.96	(1.84)	1.10	(1.10)
High	7	13.64	(8.55)	7.39	(6.55)	4.14	(3.61)
Placebo	12	7.26	(6.12)	6.45	(6.09)	4.68	(5.83)
Low	7	2.56	(.90)	1.89	(1.75)	.91	(.59)
High	5	13.85	(2.98)	12.83	(3.20)	9.95	(5.77)

\* Low severity level of headache activity at baseline

\*\* High severity level of headache activity at baseline

TABLE 5

Means and Standard Deviations of Headache  
Peak Intensity for Groups and Level of Severity

Group	n	Baseline		Posttest		Follow-up	
		$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Relaxation	15	3.60	(1.08)	2.52	(1.19)	2.08	(1.73)
Low*	7	2.79	(.92)	1.79	(1.12)	1.14	(1.43)
High**	8	4.31	(.59)	3.17	(.86)	2.91	(1.61)
Cognitive	15	3.37	(.77)	2.52	(1.14)	1.96	(1.23)
Low	8	3.13	(.95)	2.16	(1.27)	1.67	(1.30)
High	7	3.65	(.37)	2.94	(.88)	2.29	(1.16)
Placebo	12	3.58	(.76)	2.39	(1.33)	2.02	(1.39)
Low	7	3.11	(.28)	1.54	(.99)	1.21	(.73)
High	5	4.25	(.72)	3.58	(.57)	3.15	(1.34)

\* Low severity level of headache activity at baseline

\*\* High severity level of headache activity at baseline

TABLE 6

Means and Standard Deviations of Headache Duration for Groups and Level of Severity

Group	n	Baseline		Posttest		Follow-up	
		$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Relaxation	15	1.80	(.92)	1.36	(.65)	.88	(.80)
Low*	7	1.20	(.44)	.91	(.65)	.49	(.62)
High**	8	2.32	(.92)	1.74	(.33)	1.23	(.81)
Cognitive	15	1.81	(.83)	1.34	(.87)	.89	(.68)
Low	8	1.44	(.67)	1.19	(1.07)	.63	(.54)
High	7	2.24	(.84)	1.50	(.60)	1.20	(.72)
Placebo	12	1.68	(.61)	1.45	(.89)	1.08	(.81)
Low	7	1.43	(.69)	.93	(.74)	.57	(.31)
High	5	2.02	(.22)	2.18	(.48)	1.79	(.77)

\* Low severity level of headache activity at baseline

\*\* High severity level of headache activity at baseline

TABLE 7

Repeated Measures ANOVA of Headache Index  
by Treatment Group and Level of Severity

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F-Ratio</u>	<u>p</u>
Group	2	977.48	488.74	2.94	.07
Severity	1	8536.71	8536.71	51.27	.00
Group x Severity	2	1182.48	591.24	3.55	.04
Error	36	5994.49	166.51	-	-
Time	1	755.72	755.72	12.17	.00
Time x Group	2	13.09	6.55	.11	.90
Time x Severity	1	342.09	342.09	5.51	.03
Group x Time x Severity	2	34.35	17.18	.28	.76
Error	36	2234.82	62.08	-	-

after treatment suggests that, as was hypothesized, both the cognitive coping group ( $\bar{X} = 11.60$ ) and the relaxation group ( $\bar{X} = 13.99$ ) reported less headache activity than the placebo group ( $\bar{X} = 17.64$ ). This was confirmed using Dunn's a priori planned comparison,  $tD = 3.52, p < .05$  and  $tD = 2.79, p < .05$  respectively (Kirk, 1982). Thus this finding lends support to the major hypothesis of this study.

In terms of interaction effects, it was found that the severity factor interacted significantly with time of assessment  $F(1,36) = 5.51, p < .05$  (Table 7). A graphic representation of this interaction (Figure 1) shows that at the follow-up assessment the difference between the high and low severity conditions has diminished, and it is smaller than at posttest. More importantly, the group and severity factors also interacted,  $F(2,36) = 3.55, p < .05$  (Table 7), indicating that the effect of treatment intervention depended upon both group membership and initial level of severity. A test of this interaction for simple main effects resulted in no difference at the low level of severity, but a significant difference among treatment groups at the high severity level  $F(.05/3,36) = 5.72$ . This test followed Dunn's procedure to hold the overall error rate at .05 (Kirk, 1982). This interaction effect is depicted in Figure 2. Newman-Keuls comparisons of group means (Table 3) established that the high severity cognitive coping group had significantly less headache activity than the high severity placebo group ( $\hat{\psi} = 17.53, p < .05$ ).

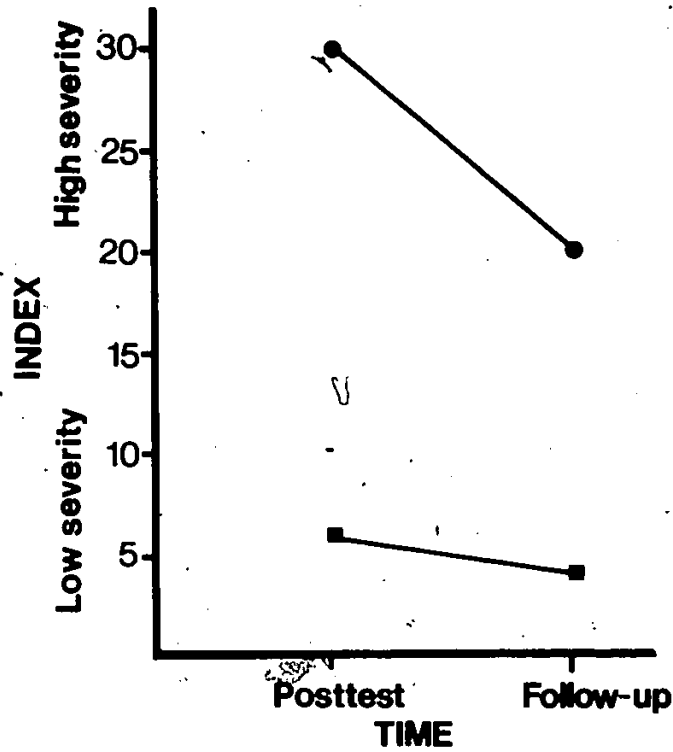


Figure 1. Changes in Headache Index at two levels of headache severity from posttest to follow-up.

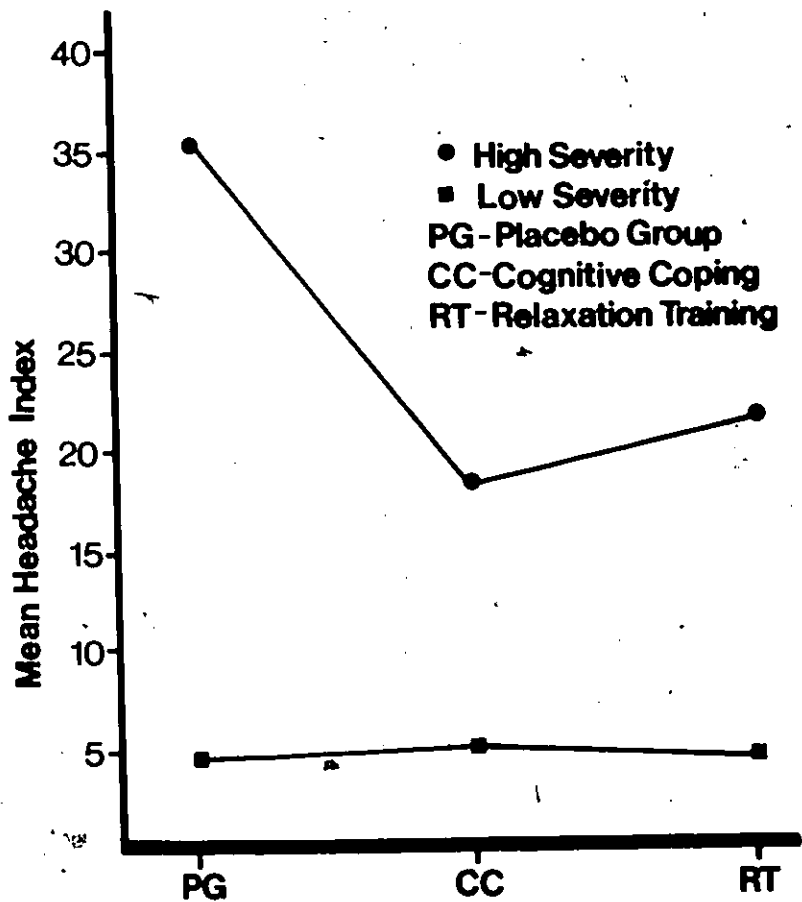


Figure 2. Mean Headache Index after treatment according to treatment group and level of severity.

In addition there was a trend suggesting that the relaxation group was more improved than the placebo group ( $\hat{\psi} = 13.62$ ,  $p < .10$ ). Moreover, within-group comparisons of high severity children revealed that both the relaxation and cognitive groups improved significantly between posttreatment and follow-up,  $t(7) = 2.18$ ,  $p < .05$ ;  $t(6) = 2.26$ ,  $p < .05$  respectively, while there was no significant change in the nonspecific placebo group. These results are graphed in Figure 3. It can be seen that there were no significant differences among the low severity groups.

The failure to obtain a significant group-by-time interaction suggests that the observed group differences on this dependent measure were maintained at the follow-up (Table 7). Moreover, within-groups  $t$  tests indicated that both the relaxation and cognitive groups continued to improve between the posttreatment and follow-up,  $t(14) = 2.11$ ,  $p < .05$ , and  $t(14) = 2.48$ ,  $p < .025$ , while the placebo group did not.

Headache Frequency. These findings parallel those on the Headache Index, and therefore the presentation is brief. The outcome of the repeated measures ANOVA is presented in Table 8, and the associated means and standard deviations are in Table 4. Beyond the significant main effects associated with headache severity and time of assessment which were described earlier, differences among the groups following intervention yielded a significant main group effect,  $F(2,36) = 3.54$ ,  $p < .05$ , indicating that response

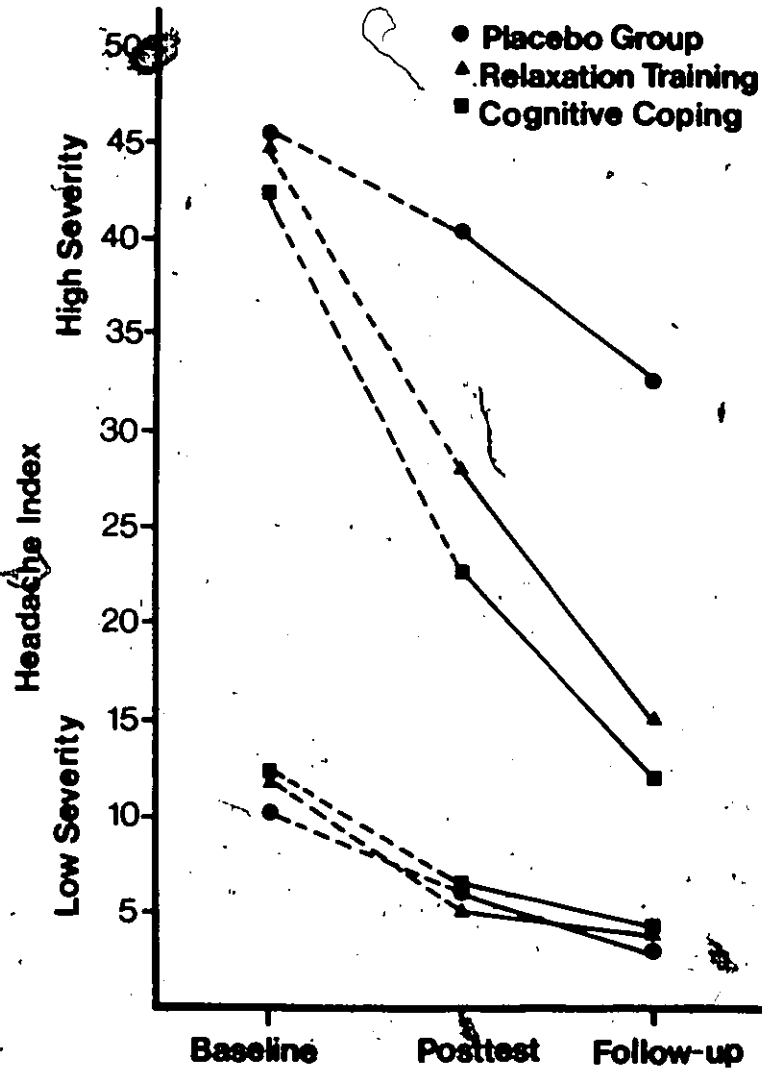


Figure 3. Mean Headache Index at baseline, posttest and follow-up according to treatment group and level of severity.

TABLE 8

Repeated Measures ANOVA of Headache Frequency  
By treatment Group and Level of Severity

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>	<u>P</u>
Group	2	117.42	58.71	3.54	.04
Severity	1	861.86	861.86	52.01	.00
Group x Severity	2	119.34	59.67	3.60	.04
Error	36	596.54	16.57	-	-
Time	1	85.25	85.25	11.41	.00
Time x Group	2	.14	.07	.01	.99
Time x Severity	1	37.36	37.36	5.00	.03
Time x Group x Severity	2	3.41	1.71	.23	.80
Error	36	268.91	7.47	-	-

to treatment varied with group membership. A Dunn's comparison test confirmed that both the relaxation and cognitive coping groups were significantly lower than the placebo group in terms of Headache Frequency,  $t_D = 2.56$ ,  $p < .05$ , and  $t_D = 3.50$ ,  $p < .05$  respectively (Kirk, 1982). Therefore this result supports the major hypothesis of this experiment. Figure 4 graphically displays the differences among the interventions at the posttest and follow-up.

Referring to Table 8, it is apparent that as before, the time factor interacted significantly with severity,  $F(1,36) = 5.0$ ,  $p < .05$ . Table 4 shows that frequency declined more between the posttest and follow-up in the higher severity groups than in the lower. Once again, there was a significant group by severity interaction (Table 8), suggesting that the differences among the treatment groups depended upon degree of severity,  $F(2,36) = 3.60$ ,  $p < .05$ . This was confirmed by a test for simple main effects which was negative when severity was low, but yielded a significant difference among treatment groups when severity was high,  $F(.05/3,36) = 6.50$ ,  $p < .05$ . The method used followed Dunn's procedure to control overall error rate (Kirk, 1982). Moreover, Newman-Keuls group comparisons established that, at the high severity level, subjects receiving both cognitive coping and relaxation training experienced headache significantly less frequently after treatment than those in the control condition ( $\hat{\psi} = 5.62$  and  $\hat{\psi} = 4.90$ ,  $p < .05$  respectively). Differences

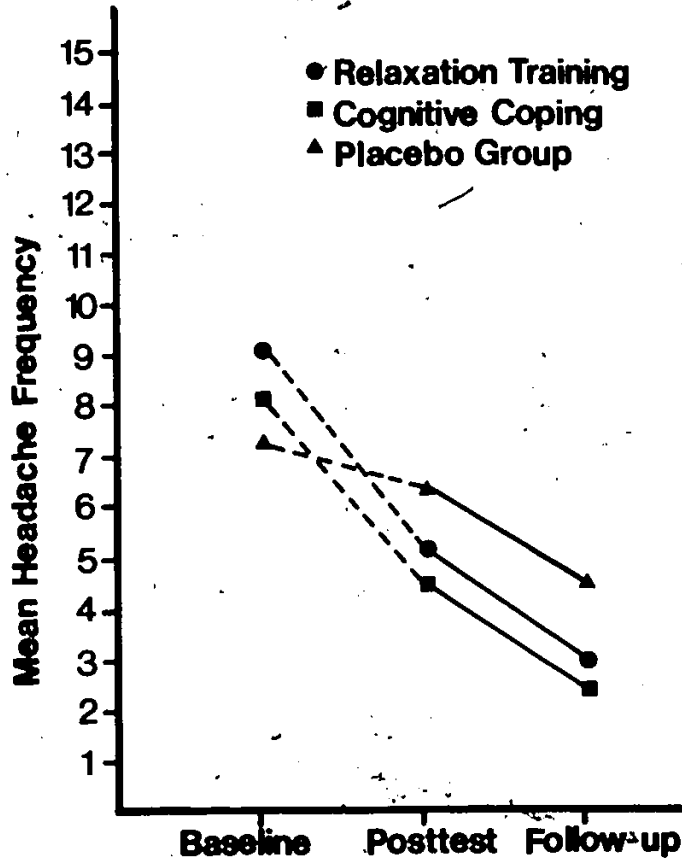


Figure 4. Changes in Headache Frequency after intervention according to treatment group.

between the two active conditions were not significant.

To verify that these results were maintained at the follow-up, within-groups one-tailed  $t$  tests were calculated at both levels of severity. These analyses revealed that, when severity was high, both active treatment groups improved between the posttest and follow-up,  $t(7) = 1.98$ , and  $t(6) = 2.29$ ,  $p < .05$ , whereas the placebo group did not. At the low severity level only the cognitive group improved in this period,  $t(7) = 2.01$ ,  $p < .05$ . These findings are depicted in Figure 5. Inspection shows minor changes in frequency over time when severity is low, and considerable change following treatment when severity is high. This improvement is especially pronounced in the cognitive coping and relaxation training groups, a result consistent with our main hypothesis.

Similar results were obtained in within-groups  $t$  tests when the severity levels were combined. The results showed continuing improvement in the relaxation group,  $t(14) = 1.92$ ,  $p < .05$ , as well as in the cognitive group  $t(14) = 2.65$ ,  $p < .01$ . There were no significant improvements in the placebo condition.

Peak Intensity. The analyses on this variable were essentially negative. There was a significant main effect for severity as one would expect. In addition, there was a significant main effect for time, indicating an overall improvement for all subjects, regardless of group, over the

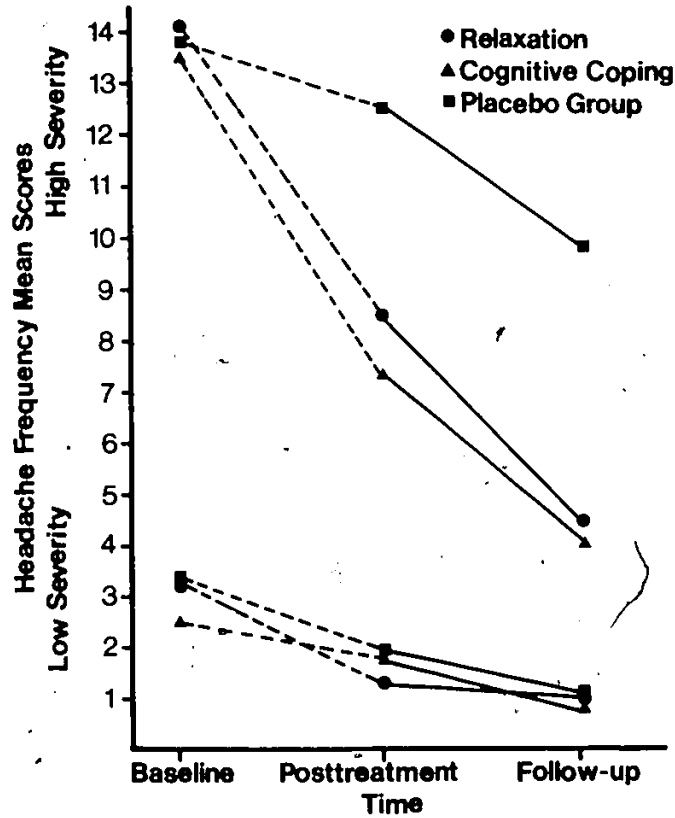


Figure 5. Mean Headache Frequency at baseline, posttest and follow-up according to treatment group and level of severity.

course of the study. However, the important group effects and group interactions were all non-significant. The ANOVA results are documented in Table 9, and means are in Table 5.

Duration. This variable yielded results which parallel those described above. There were no significant findings beyond the significant main effects for the time and severity factors. The ANOVA analysis is described in Table 10, and means are given in Table 6.

School Attendance. The purpose of using this variable was to provide an objective behavioral measure of incapacity due to headache. However, this proved to be impossible because more than half the children reported no absences at all during baseline. This left too little "floor" for any improvement to occur.

### Secondary Analyses

The data presented above were analyzed using a randomized factorial repeated measures model because it provides the best fit for the data, and it maximizes power and precision in randomized experiments where the regression of the posttest on the pretest departs considerably from unity (Cook and Campbell, 1979). Given the relatively small size of this study, this was a primary consideration. Unfortunately this method does not directly address the question of major clinical interest - pretest-posttest changes.

TABLE 9

Repeated Measures ANOVA of Peak Intensity  
by Treatment Group and Level of Severity

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	2	.22	.11	.05	.95
Severity	1	41.41	41.41	19.84	.00
Group x Severity	2	5.90	2.95	1.41	.26
Error	36	75.15	2.09	-	-
Time	1	4.47	4.47	7.45	.01
Time x Group	2	.13	.06	.11	.90
Time x Severity	1	.01	.01	.01	.92
Group x Time x Severity	2	.33	.17	.28	.76
Error	36	21.57	.60	-	-

TABLE 10

Repeated Measures ANOVA of Headache Duration  
by Treatment Groups and Level of Severity

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>	<u>P</u>
Group	2	1.12	.56	.86	.43
Severity	1	13.71	13.71	20.90	.00
Group x Severity	2	2.09	1.05	1.59	.22
Error	36	23.62	.66	-	-
Time	1	3.69	3.69	14.34	.00
Time x Group	2	.03	.01	.05	.95
Time x Severity	1	.01	.01	.04	.84
Time x Group x Severity	2	.13	.07	.26	.77
Error	36	9.26	.26	-	-

To clarify this question, parallel secondary analyses were performed using change scores on Headache Index and Frequency as the two dependent variables. The two levels of the repeated measure were the pretest-posttest difference and the pretest-follow-up difference. The independent variables were intervention group and level of severity. The results, which were essentially identical, are presented in Tables 11 and 12.

An examination of these tables reveals that there was a significant main effect for means on both dependent measures. This indicates that overall group change scores were significantly greater than zero ( $p < .01$ ), or, in general, significant alteration in headache activity occurred both on the Index and Headache Frequency over the course of treatment. There was also a significant main effect for severity, with the greatest differences being recorded in the more severe cases. Moreover there were significant effects on both the repeated measures, with greater improvement overall at follow-up than at posttest ( $p < .01$ ). In addition, the time factor interacted significantly with severity, indicating that the greatest reduction in headache activity was recorded in children with severe headaches at the follow-up assessment. [For the Headache Index,  $F(1,36) = 5.51$ ,  $p < .025$ , and for frequency,  $F(1,36) = 8.06$ ,  $p < .01$ ; see Tables 11 and 12.]

To clarify these results, within-groups comparisons were made using one-tailed  $t$  tests on each dependent variable.

TABLE 11

Repeated Measures ANOVA of Headache Index Change Scores\*  
By Treatment Group and Level of Severity

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>	<u>P</u>
Mean	1	13858.20	13858.20	37.84	.00
Group	2	977.48	488.74	1.33	.28
Severity	1	3781.14	3781.14	10.32	.00
Group x Severity	2	748.49	374.25	1.02	.37
Error	36	13184.03	366.22	-	-
Time	1	755.72	755.72	12.17	.00
Time x Group	2	13.09	6.55	.11	.90
Time x Severity	1	342.09	342.09	5.51	.03
Time x Group x Severity	2	34.35	17.08	.28	.76
Error	36	2234.82	62.08	-	-

\* Baseline to Posttest difference and Baseline to Follow-up difference

TABLE 12

Repeated Measures ANOVA of Headache Frequency Change Scores\*  
by Treatment Group and Level of Severity

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>	<u>P</u>
Mean	1	1191.45	1191.45	28.49	.00
Group	2	151.99	75.99	1.82	.18
Severity	1	389.26	389.26	9.31	.00
Group x Severity	2	88.42	44.21	1.06	.36
Error	36	1505.58	41.82	-	-
Time	1	85.25	85.25	11.41	.00
Time x Group	2	.14	.07	.01	.99
Time x Severity	1	37.36	37.36	5.00	.03
Time x Group x Severity	2	3.41	1.71	.23	.80
Error	36	268.91	7.47	-	-

\*Baseline to Posttest difference and Baseline to Follow-up  
difference

These tests confirmed that in the high severity condition, both the relaxation and cognitive coping groups improved significantly between baseline and posttest on the Headache Index,  $t(7) = 2.76$ ,  $p < .025$ , and  $t(6) = 3.58$ ,  $p < .01$  respectively, but there was no change in the placebo group. With respect to the frequency variable, the relaxation group improved  $t(7) = 2.40$ ,  $p < .025$ , as did the cognitive group  $t(6) = 3.02$ ,  $p < .025$ , whereas the placebo group did not change significantly. Comparable results were obtained in the low severity condition on the Headache Index. For the relaxation group  $t(6) = 2.31$ ,  $p < .05$ , and  $t(7) = 2.39$ ,  $p < .05$  in the cognitive group. In terms of frequency, only the cognitive group showed a trend to improvement  $t(7) = 1.88$ ,  $p < .10$ . There were no changes in the placebo condition on either variable.

The within-groups changes between the posttest and follow-up have already been presented. The reader will recall that there was only one significant change in the low severity level - the cognitive group continued to improve in terms of Headache Frequency. When headaches were severe, there were no changes in the placebo group, but both active treatment groups improved. Taken together these findings give additional support to the hypothesis that both active treatment groups would improve as a result of intervention, while the non-specific group would not. However they also suggest that initial headache severity was an important moderator of treatment effects in this study.

The Effects of Training on  
Anxiety and Depression

Statistical Analyses

Analyses were performed to answer the following questions: (a) Would training lead to significant change? (b) Would the active treatments differ significantly from the placebo condition? (c) Would changes be maintained at the follow-up assessment? The model was a 3 x 2 x 3 randomized factorial experiment with repeated measures on the last factor. The independent variables were treatment group and headache severity. The dependent variables were measures of depression and State and Trait Anxiety. The latter two scores were converted to T-Scores using age- and sex-appropriate norms. Alpha was set at the .05 level.

Tables 13-15 give means and standard deviations for the dependent variables and Tables 16-18 summarize the results of the repeated measures ANOVA's. There were no significant effects associated with assignment to treatment group.

State Anxiety. All analyses were nonsignificant.

Trait Anxiety. This variable yielded a significant effect associated with time (see Table 17),  $F(2,70) = 4.31$ ,  $p < .025$ . An examination of the appropriate means (Table 14- baseline  $\bar{x} = 51$ , posttest  $\bar{x} = 47$ , follow-up  $\bar{x} = 46.5$ ) revealed that there was a decrease in anxiety between baseline

TABLE 13  
Means and Standard Deviations of State  
Anxiety\* for Groups and Level of Severity

Group	n	Baseline		Posttest		Follow-up	
		x	S.D.	x	S.D.	x	S.D.
Relaxation	15	67.07	(9.61)	65.47	(7.68)	66.53	(9.21)
Low**	7	66.71	(6.24)	63.57	(7.74)	62.57	(11.46)
High***	8	67.38	(12.29)	67.12	(7.74)	70.00	(5.29)
Cognitive	15	68.53	(5.08)	64.26	(7.97)	63.93	(7.62)
Low	8	67.00	(2.83)	61.13	(6.88)	61.75	(7.46)
High	7	70.28	(6.65)	67.86	(8.05)	66.43	(.55)
Placebo	11	66.91	(6.95)	68.63	(6.19)	68.09	(4.48)
Low	7	67.14	(7.58)	70.71	(5.62)	68.71	(5.44)
High	4	66.50	(6.76)	65.00	(6.06)	67.00	(2.31)

\* T - Score

\*\* Low severity level of headache activity at baseline

\*\*\* High severity level of headache activity at baseline

TABLE 14

Means and Standard Deviations of Trait Anxiety\* for Groups and Level of Severity

Group	n	Baseline		Posttest		Follow-up	
		$\bar{x}$	S.D.	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Relaxation	15	49.20	( 8.89)	44.93	( 9.34)	47.67	(11.09)
Low**	7	43.86	( 9.96)	42.57	(12.71)	42.43	( 9.98)
High***	8	53.88	( 4.82)	47.00	( 5.04)	52.25	(10.46)
Cognitive	15	52.07	( 8.98)	47.20	(11.61)	47.07	(10.63)
Low	8	49.63	( 9.75)	47.38	(15.31)	45.75	(13.02)
High	7	54.86	( 4.95)	47.00	( 6.40)	48.57	( 7.79)
Placebo	11	52.00	(10.22)	49.55	(13.02)	44.18	(11.66)
Low	7	52.29	( 9.09)	50.00	(12.26)	41.71	(10.48)
High	4	51.50	(13.50)	48.75	(16.21)	48.50	(13.92)

\* T - Score

\*\* Low severity level of headache activity at baseline

\*\*\* High severity level of headache activity at baseline

TABLE 15  
Means and Standard Deviations of Depression  
Rating for Groups and Level of Severity

Group	n	Baseline		Posttest		Follow-up	
		x	S.D.	x	S.D.	x	S.D.
Relaxation	14	21.36	(4.34)	19.71	(4.50)	20.93	(5.11)
Low*	7	18.71	(2.56)	19.57	(5.59)	19.57	(4.89)
High**	7	24.00	(4.24)	19.86	(3.53)	22.29	(5.31)
Cognitive	15	20.33	(5.49)	19.80	(3.45)	19.33	(3.98)
Low	8	17.25	(2.76)	18.25	(2.60)	17.75	(2.76)
High	7	23.86	(5.84)	21.57	(3.60)	21.14	(4.56)
Placebo	11	21.36	(4.34)	18.81	(3.02)	17.00	(1.73)
Low	7	22.00	(6.98)	18.71	(3.82)	16.85	(1.68)
High	4	23.25	(5.56)	19.00	(1.15)	17.25	(2.06)

\* Low severity level of headache activity at baseline

\*\* High severity level of headache activity at baseline

TABLE 16

Repeated Measures ANOVA of State Anxiety\*  
by Treatment Group and Level of Severity

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	2	58.48	29.24	.26	.78
Severity	1	119.80	119.80	1.05	.31
Group x Severity	2	291.30	145.65	1.27	.29
Error	35	4004.72	114.42	-	-
Time	2	59.93	29.97	1.17	.32
Time x Group	4	129.68	32.42	1.26	.29
Time x Severity	2	30.78	15.39	.60	.55
Time x Group x Severity	4	105.85	26.46	1.03	.40
Error	70	1795.98	25.66	-	-

\* T - Score

TABLE 17

Repeated Measures ANOVA of Trait Anxiety\*  
by Treatment Group and Level of Severity

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	2	94.91	47.46	.21	.81
Severity	1	483.41	483.41	2.17	.15
Group x Severity	2	250.94	125.47	.56	.57
Error	35	7779.23	222.26	-	-
Time	2	456.85	228.43	4.31	.02
Time x Group	4	169.11	42.28	.80	.53
Time x Severity	2	156.88	78.44	1.48	.24
Time x Group x Severity	4	81.43	20.36	.38	.82
Error	70	3712.86	53.04	-	-

\* T - Score

TABLE 18

Repeated Measures ANOVA of Depression Rating  
by Treatment Group and Level of Severity

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>	<u>p*</u>
Group	2	24.81	12.40	.38	.68
Severity	1	195.09	195.09	6.02	.02
Group x Severity	2	65.61	32.81	1.01	.37
Error	34	1101.88	32.41	-	-
Time	2	124.35	62.18	6.14	.01
Time x Group	4	97.10	24.28	2.40	.08
Time x Severity	2	48.07	24.04	2.37	.12
Time x Group x Severity	4	14.99	3.75	.37	.78
Error	68	688.98	10.13	-	-

\* Conservative F test with Greenhouse-Geisser correction

and posttreatment. However, interpretation of these results is difficult because the same effect occurred in all groups including the placebo condition.

Depression. A comparable drop during treatment occurred on this measure,  $F(2,68) = 6.14, p < .01$  (Table 18), and there was a significant main effect associated with level of headache severity  $F(1,34) = 6.02, p < .025$ . Not surprisingly, depression was higher when headaches were more severe (e.g. high severity  $\bar{x} = 21.59$ , low severity  $\bar{x} = 18.7$ ). There was also a trend toward an interaction between treatment group and time,  $F(4,68) = 2.40, p < .10$  with a Greenhouse-Geisser conservative  $F$  test (Kirk, 1982). However, tests for simple main effects using Dunn's procedure to control error rate did not approach significance,  $p > .10$ . Therefore these results do not support the hypothesis of superior outcomes in the active treatment groups. However, they do show significant change in all groups over the course of training.

#### Alternate Explanations of Treatment Effects

##### Credibility

It is recognized that the credibility of treatment can contribute to outcome by increasing patient expectancy for improvement (Kazdin, 1974). Thus differential credibility among interventions could account for the superiority of the treatments over the placebo condition in reducing headache

activity. Although equivalent credibility was established in a pilot study, it was necessary to determine that equivalence existed in the experimental groups and that it had not deteriorated during treatment particularly in the placebo condition. To this end subjects completed credibility questionnaires at the end of the first and last treatments. (See Appendix D for a copy of the questionnaire.)

This data was analyzed with a 3 x 2 x 2 repeated measures ANOVA, where the first two factors were group and severity; the last was the credibility ratings. There were no significant results on this analysis, nor were any trends observed. This is documented in Table 19. This failure to reject the null hypothesis suggests that equivalent credibility was indeed established and maintained to the last.

#### Demographic Equivalence

The initial equivalence of the experimental groups on the dependent variables as well as age and IQ has already been described. However it remained possible that non-equivalence on a demographic variable might account for the treatment effects. To test this hypothesis, one-way ANOVA's were performed on the following variables: father's level of education, mother's level of education, child's school grade, and family size. The null hypothesis was upheld in each case. Moreover chi-square analyses of sex by treatment group and therapist by treatment group were

TABLE 19

Repeated Measures ANOVA of Credibility Scores  
by Treatment Group and Level of Severity

Source	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>	<u>p</u>
Group	2	11.51	5.75	.67	.52
Severity	1	.01	.01	.00	.98
Group x Severity	2	1.88	.94	.11	.90
Error	35	301.89	8.63	-	-
Time	1	1.94	1.94	.80	.38
Time x Group	2	1.20	.60	.25	.78
Time x Severity	1	2.77	2.77	1.14	.29
Time x Group x Severity	2	6.72	3.36	1.38	.26
Error	35	85.13	2.43	-	-

Group Means and Standard Deviations at the Pretest and Posttest

	<u>n</u>	<u>Pretest</u>		<u>Posttest</u>	
		<u><math>\bar{x}</math></u>	<u>S.D.</u>	<u><math>\bar{x}</math></u>	<u>S.D.</u>
Relaxation Training	15	12.67	(3.20)	12.66	(1.95)
Cognitive Coping	14	13.29	(2.37)	13.71	(1.90)
Placebo Group	12	12.50	(2.07)	13.25	(1.76)

both nonsignificant. These results suggest that the randomization process was in fact successful, and it is unlikely that nonequivalent groups could explain the obtained results.

The Relationship of Anxiety and Depression to Treatment Outcome

There has been some evidence that these variables are elevated in migraine patients, and that they may predict treatment outcome in pain syndromes. This possibility was investigated by calculating Pearson correlations coefficients between pretreatment scores on State Anxiety, Trait Anxiety, and depression with Headache Index and change scores at each assessment. These results are presented in Table 20. They reveal moderate but significant negative correlations between baseline values on State and Trait Anxiety and the Headache Index at both posttest and follow-up ( $r = -.30-.39$ ). Neither variable correlated significantly with the change scores. Depression was negatively correlated with the posttest headache Index,  $r = -.28$ ,  $p < .05$ , but positively correlated with the baseline-posttest change score,  $r = .28$ ,  $p < .05$ , as well as the baseline-follow-up change score,  $r = .26$ ,  $p < .05$ .

TABLE 20

Pearson Correlation Coefficients of Anxiety and Depression with Headache Index and Change Scores

	Baseline (Index 1)	Posttest (Index 2)	Follow-up (Index 3)	Change Score 1-2	Change Score 1-3
State Anxiety	-.27	-.36 <sup>x</sup>	-.34 <sup>x</sup>	-.11	-.19
Trait Anxiety	-.13	-.39 <sup>xx</sup>	-.30 <sup>x</sup>	.20	.25
Depression	-.15	-.28 <sup>x</sup>	-.23	.28 <sup>x</sup>	.26 <sup>x</sup>

<sup>x</sup>p <.05  
<sup>xx</sup>p <.01

Relaxation Training versus Cognitive Coping

Because of the dearth of relevant pediatric behavioral literature, no hypotheses were formulated with respect to the comparison of relaxation training and cognitive coping. Nevertheless, because the data was available and the subject is of some current interest, post hoc Newman-Keuls comparisons between the two groups were made on all the dependent variables. There was no significant differences nor did any trends emerge on either the headache or personality measures.

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## CHAPTER IV

### DISCUSSION

The purpose of this study was to evaluate the effectiveness of two psychotherapeutic interventions in the treatment of pediatric migraine - relaxation training and cognitive coping. It was hypothesized that subjects trained in either method would have significantly less headache activity following treatment than subjects in a nonspecific placebo condition, and that treatment gains would be maintained at follow-up. A subordinate objective was to evaluate the effects of the interventions on anxiety and depression and to assess the correlation of these variables with migraine activity and response to treatment. The hypothesis was that the active treatments would lead to a greater reduction in anxiety and depression than the placebo intervention, and that this reduction would be maintained at follow-up.


#### Efficacy of Training in Reducing Migraine Headaches

Generally, the results support the major hypothesis of this study. Both the relaxation and cognitive coping groups had fewer headaches and less overall headache activity after treatment than the nonspecific control group. Moreover, they maintained their gains and continued to improve between the four-week posttest and the sixteen-week

follow-up, while the latter group did not. However, there were no significant differences among the groups in terms of headache duration or peak intensity, nor did the active treatment groups differ on any measure.

These results are generally consistent with those reported in the adult migraine literature on relaxation training (Blanchard et al, 1978) or cognitive training (Knapp and Florin, 1981). However, both of these studies used a waiting-list control as opposed to a more stringent placebo procedure, and it was possible that nonspecific effects alone could explain the results. In fact the literature on tension headache is inconsistent on this issue. For example, Holroyd et al (1977) found that active treatment was superior to a placebo condition, but Holroyd and Andrasik (1978) later failed to confirm this finding.

The present results therefore take on added significance because of the demonstration of the inferiority of the nonspecific placebo intervention under conditions of controlled experimenter demand and equivalent credibility. The latter point is important since the effects of credibility and the various components of treatment are usually confounded. However, it is noteworthy that the active treatments were superior to the nonspecific condition only on two variables - the Headache Index and frequency. While all groups improved as measured by headache duration and intensity, there were no differential group effects.



The reader is cautioned that the clinical significance of these findings is not clearly established. If one defines major improvement using fifty percent change as the criterion (a common, albeit stringent clinical convention), then the observed differences among the interventions are not large. For example, at the posttest, forty percent of those receiving active treatment had achieved major improvement, compared to twenty-five percent of those in the placebo condition. At the sixteen-week follow-up, the major improvement rates were 73.33 percent, 66.67 percent and fifty percent respectively for the cognitive, relaxation and placebo groups. While the former changes are impressive and consistent with those reported with adults, the improvement in the placebo group is unusually large. In comparison, Blanchard and Andrasik (1982) found that the mean improvement score for psychological placebo in adults was 27.6 per cent. This may mean that the spontaneous remission rate in children is higher than in adults, or that the non-specific effects are more potent. Alternately, it is possible that the validity of the placebo condition was compromised by some unforeseen factor. This issue will be addressed when considering possible mechanisms of change. However, one must conclude that this study will require replication in order to establish the clinical significance of the present results.

The different results among the dependent headache

variables in the present study may reflect real variations in the responsivity of the various dimensions of headache activity to treatment. However methodological differences and statistical properties of the variables could also explain the results. The Headache Index is generally considered the best overall indicator of headache activity because it is a multifaceted measure which responds to changes in frequency, duration, or intensity, and improvement in any one dimension will be reflected in improvement on the index. Thus it is a sensitive measure with demonstrable validity (Blanchard et al, 1981). A similar situation exists in terms of frequency. A literature review suggested that, of all the single measures of migraine activity, frequency may be the most responsive to intervention (e.g. Mitchell and White, 1977; Holroyd et al, 1977; Knapp and Florin, 1981). However it is possible that good reliability explains its fruitfulness since frequency is simply the number of times headache is reported and it is relatively insensitive to transient factors like mood.

On the other hand, the duration and intensity variables are being used less frequently in the headache literature. Duration presents methodological problems in terms of calculation when subjects self-monitor only four times per day. Theoretically one would expect the acquisition of coping skills to shorten headaches, but the variable may lack sufficient external validity to be productive. Conversely, the intensity

variable has responded to treatment effects in several adult studies (Blanchard et al, 1978, Knäpp and Florin, 1981). However, it is conceptually difficult to relate the acquisition of coping skills to the moderation of headache intensity in children. Coping behaviors may reduce the reactive rather than the sensory aspect of pain, but the reactive component does not correspond closely to intensity (Blanchard and Andrasik, 1982). Moreover, anxiety and depression may exacerbate pain less in children than in adults. Certainly the relatively low Trait Anxiety and depression scores of our children before beginning treatment suggest this. If this is so, one would expect intensity to be more responsive to treatment effects in adults than in children.

Before coming to any conclusions based on the present results, there is an additional point which merits discussion, namely the moderating effect of headache severity on response to treatment. Although children in both treatment groups improved significantly while the nonspecific group did not, this response was significantly superior in the severe condition. Indeed, in the low severity condition, there were no significant differences among the interventions, and the only significant improvement was less headache frequency in the cognitive-coping group. Moreover it is unlikely that regression to the mean would explain this contrast between the two severity levels since one would expect equal regression among the interventions.

In addition, a floor effect is improbable since the relatively high scores even in the less severe condition left considerable room for improvement. Therefore it would appear that initial headache severity may be a good predictor of response to treatment.

This finding is apparently discordant with Bakal's observation that patients with almost continual pain were the most refractory to treatment (Bakal et al, 1981). On the other hand, in a review of the literature, Gauthier and Marshall (1978) suggested that relaxation techniques may be effective only in the case of severe migraine, and they noted that the subjects in the Blanchard et al (1978) study who improved significantly after relaxation training had more severe headaches initially than did those in the Mitchell and Mitchell (1971) study who improved minimally. The Blanchard et al (1978) admission criteria were at least two headaches per month while ours were four per month. Therefore it may be that severe migraine responds well to treatment provided it has not yet progressed to the point of chronic, almost continual, intractable pain which has become the focus of an entire lifestyle.

This hypothesis could explain some of the apparent contradictions in the migraine literature. It is also consistent with Bakal et al's (1981) results and the present observation that even children who averaged only two headache-

free days per week responded well to the active treatments in our study. Certainly research to clarify the relationship between degree of headache severity and response to treatment is warranted. In the interim it is incumbent upon researchers to document their inclusion criteria carefully.

#### The Effects of Training on Anxiety and Depression

The results of this study with respect to the effects of treatment on anxiety and depression are ambiguous and difficult to interpret. The hypothesis of superior response to treatment in the active treatment groups was not substantiated. There were no significant findings in terms of State Anxiety. However, on two variables, Trait Anxiety and depression, there was general improvement over the course of the study irrespective of treatment group.

The failure to observe any changes in State Anxiety was probably the result of the method of test administration, which was designed to simulate a naturally occurring stress-inducing event. Perhaps a measure of normal levels of State Anxiety would be more responsive to treatment. In any case it appears unlikely that intervention would reduce the initial stress response in a threatening situation. At best it may reduce the duration of upset, or speed the recovery from stress. A delay between stress induction and

test administration would be required to detect such changes.

The observed reduction in Trait Anxiety and depression suggest that all the interventions were equally effective or, conversely, that none were effective, and that the observed changes were attributable to an external variable such as natural history or regression to the mean. Given that all the interventions were equally credible and that the placebo condition was in many ways not unlike non-directive psychotherapy, the hypothesis of equal effectiveness may be more probable.

It is possible that the nonspecific training program unwittingly included an active component in addition to the intended provision of information and attention. Since it emphasized the expression and sharing of emotions, a "working-through" of conflicts and improved communications within the family may have resulted. The net effect may have been a more facilitative and supportive milieu which may explain the observed changes. Statements by two children about a more pleasant atmosphere at home lend some support to this argument. However, it will require further research with a different type of placebo to clarify these findings.

The present results are somewhat inconsistent with frequently published reports indicating good to excellent results with both cognitive and relaxation techniques in the treatment of anxious and depressed adults. Insofar as could be ascertained, there are no published reports on the

use of these methods in the treatment of pediatric anxiety and depression. Therefore it may be that these techniques are better suited to the needs of adults than children. However, behavioral interventions have given good results in the treatment of the phobic child (Graziano, De Giovanni, and Garcia, 1979), and cognitive-behavioral techniques have been shown to reduce post-surgical distress as well as social and interpersonal problems (Urbain and Kendall, 1980). Thus it appears that children do respond to these methods, and the present failure to obtain a differential group effect may be explained in terms of the unwitting inclusion of a potent active ingredient in the nonspecific control condition. Alternately, one could argue that since the present subjects were not clinically anxious or depressed, they would not be expected to respond to treatment components specific to anxiety or depression. Therefore the observed changes may simply reflect a response to the nonspecific elements in all the interventions.

#### The Relationship of Anxiety and Depression to Treatment Outcome

The correlational analyses of these variables yielded somewhat unexpected results. Higher initial levels of Trait Anxiety and depression were associated with less overall headache activity following treatment than were lower levels. Moreover children with more depression at baseline had higher change scores, indicating that they improved more than the less depressed group. The reader will recall that the ANOVA

on the depression data showed that children in the more severe headache group were also more depressed than their peers with less pain. This suggests that higher initial levels of both headache activity and depression are associated with a better response to treatment.

Although there is no relevant literature on pediatric migraine, the present results are consistent with two studies in the adult literature, both of which reported that higher baseline depression scores on the Minnesota Multiphasic Personality Inventory were associated with a better response to behavioral intervention (Werder, Sargent, and Coyne, 1981; Blanchard et al, 1982). However, it must be emphasized that the correlation of depression and improvement in the present study was small, and although significant, it accounted for only about five percent of the observed variance. Moreover, the small negative correlations between baseline depression and initial headache activity were contrary to expectations, and even though they were not significant, they indicate the need for a cautious interpretation of the observed relationships. Therefore replication of the observed correlation between initial level of depression and response to treatment is essential before these results can be assigned any weight.

The Problem of Attrition Effects

Although statistical analyses showed no systematic bias with respect to treatment groups in attrition rates, two clinical impressions deserve discussion. Firstly, the attrition rate was higher in the nonspecific intervention in the severe headache condition, and it was precisely this group which improved the least. By contrast one severe headache sufferer who dropped out of relaxation training had actually experienced substantial improvement. Thus attrition may have slightly blurred group differences.

Another impression was that the inclusion criterion on the Peabody Picture Vocabulary Test (score of 80) was too low, and this accounted for some attrition. Indeed, a larger study in our laboratory found that drop-outs had lower Peabody scores than children who completed treatment, and they also had more severe headaches in their last week of treatment (Gosselin, McGrath, Firestone, Cunningham, and Goodman, 1983). This suggests that intelligence may have been related to response to treatment. However a correlation of these two variables did not confirm this hypothesis. Alternately, it is possible that children with low average verbal comprehension and severe headaches found the programs too abstract and did not have the ability to delay gratification which is required in psychotherapeutic intervention. However such a conclusion

is premature in view of the small number of cases involved.

### Theoretical Considerations

Given that both relaxation training and cognitive coping were more effective in reducing headache activity than the nonspecific condition, what would account for their superior efficacy? Early explanations of the mechanism of change in migraine arose in the context of biofeedback training and they usually postulated a haemodynamic process involving alterations of blood flow. However this view was seriously challenged by repeated demonstrations that the acquisition of the targetted response was not essential for clinical improvement. More recent theories have hypothesized possible behavioral and cognitive mechanisms.

Among the alternatives proposed are the following:

- (1) a general relaxation response and a concomitant decrease in autonomic arousal;
- (2) the acquisition of one or more coping skills which may be applied to precipitating stressors and/or headaches per se; and
- (3) cognitive or attitudinal changes in the appraisal of the self and environmental demands. (This is similar to Bandura's (1982) concept of an emerging perception of self-efficacy). With respect to the first theory, one should note that a relaxation response may be achieved by either musculoskeletal or cognitive manipulations.

Because the present study was exploratory, the programs used a multifaceted approach to facilitate change processes. For example, relaxation training taught musculoskeletal tension reduction, deep breathing, and cue-controlled relaxation in a coping skills framework. Thinking Straight included cognitive restructuring, attention diversion, fantasy, and problem-solving. This broad band approach does not permit a components analysis since both programs combined change mechanisms. However, the results suggest certain possibilities and discount others.

For example, the fact that relaxation training was not superior to cognitive coping suggests that musculoskeletal relaxation is not critical. It does not however discount the relevance of a general relaxation response. On the other hand, both groups developed at least one coping skill, and both improved, suggesting that this new skill and/or the associated perception that one can cope are important. However, if the provision of a repertoire of coping skills were critical, one would expect the cognitive program with its broader focus to be superior, and this was not established. An explanation is that the six-week training program did not provide enough time and practice to permit the mastery of the different cognitive strategies. This view was supported by comments from two children that the program was too short. Alternatively, it may simply be that there is no advantage in a repertoire of

coping skills. It will require a components analysis to clarify this issue.

The comments of the children after treatment suggested that both experimental groups experienced attitudinal changes and both acquired a heightened sense of control. Therefore this may have been a factor in their improvement. However, it is surprising that the cognitive program, with its emphasis on appraisal modification, was not clearly superior. It may be that the confidence and positive attitude which are associated with the acquisition of coping skills are more important than the elimination of negative appraisals. Nevertheless, under one important condition there was a slight suggestion that cognitive training was advantageous, namely in terms of improvement of overall headache activity in the severe headache sufferers. Thus the modification of faulty appraisals may be desirable in the case of severe migraine. This is consistent with conjecture that there is a large reactive component in severe pain, and this component may be amenable to behavioral intervention (Tan, 1982).

From this discussion it is clear that the postulated mechanisms of change are not mutually exclusive. One may hypothesize that the acquisition of one or more coping behaviors increases the sense of control and this leads to attitudinal change with respect to potential stressors and self-efficacy. Therefore less stress is experienced, and

there is decreased sympathetic outflow. Perhaps this moderation stabilizes levels of arousal and catecholamine production both of which have been hypothesized to be part of the migraine process. It would be interesting to test this hypothesis using appropriate physiological measures. However a major problem is the difficulty of simulating natural stress in the laboratory and the equal difficulty inherent in "in vivo" testing.

#### Conclusions and Implications for Future Research

The major findings of this study were that both cognitive coping and relaxation training were more effective than a nonspecific intervention in the treatment of pediatric migraine, and treatment gains were maintained and indeed increased during the follow-up phase. The results also indicated that initial level of headache severity was an important factor in response to treatment.

The need to clarify the parameters of the latter relationship in both adults and children is the most important implication of this study. Research is required to evaluate how such factors as the patient's age, the acuteness, chronicity or cyclicity of the headaches and pain intensity and its variability affect outcome. Such information would have important clinical applications, and it would be valuable in establishing inclusion and exclusion criteria in future research.

The present study also raises some other notable issues. First is the question of whether the effects of relaxation training and cognitive coping are additive. Research on this issue would be helpful in clarifying the mechanism(s) of change. Also valuable would be studies dismantling each procedure, in order to test the effectiveness of the separate components. Would relaxation training without the coping framework be equally effective? Would cognitive coping statements alone result in improvement? How much change does information by itself induce? In addition to theoretical interest such studies would contribute to increasing the cost effectiveness of clinical intervention.

We previously noted that it may be that six weeks of training was insufficient for complete mastery of all the treatment components in the cognitive-coping package. It would be desirable to replicate this study with a longer treatment phase in order to determine whether differences between the active treatments would then ensue.

Another important question concerns the separate roles of the reactive and sensory components of pain in determining response to treatment. Clarification will require new assessment techniques which can separate the two aspects of pain, and such instruments are now being developed; e.g. Gracely and Wolskee, (1983). Research with these tools will help to clarify how the various behavioral interventions act.

Still another issue pertains to the potential effectiveness of a group intervention, given the observed value of modelling by the therapist in the present study. Since it may be easier for children to identify with their peers, the modelling inherent in group training may facilitate the skill acquisition process.

There are myriad other research questions which come to mind. How important is continued practice in the maintenance of treatment gains? How do the effects of the experimental interventions compare with a pharmacological treatment such as propranolol or a calcium blocker? Would the effects be additive? Hopefully the reader will develop his/her own questions according to areas of interest and expertise.

REFERENCES

- Adams, H.E., Feuerstein, M., and Fowler, J.L. Migraine headache: Review of parameters, etiology, and intervention. Psychological Bulletin, 1980, 87, 217-237.
- Ad Hoc Committee on the Classification of Headache. Classification of headache, Journal of American Medical Association, 1962, 179, 127-128.
- Amery, W.K. Brain hypoxia: The turning point in the genesis of the migraine attack. Cephalagia, 1982, 2, 83-109.
- Anderson, C.D., and Franks, R.D. Migraine and tension headache: Is there a difference? Headache, 1981, 21, 63-71.
- Anderson, J.A.D., Basker, M.A., and Dalton, R. Migraine and hypnotherapy. International Journal of Clinical and Experimental Hypnosis, 1975, 23, 48-58.
- Anderson, N.B., Lawrence, P.S., and Olson, T.W. Within-subject analysis of autogenic training and cognitive-coping training in the treatment of tension headache pain. Journal of Behavior Therapy and Experimental Psychiatry, 1981, 12, 219-223.
- Anderson, R.W. The relation of life situations, personality features and reactions to the migraine syndrome. In D.J. Dalessio (Ed.) Wolff's Headache and Other Head Pain, (4th ed.), New York: Oxford University Press, 1980.
- Andrasik, F., Blanchard, E.B., Ahles, T., Pallmeyer, T., and Barron, K.D. Assessing the reactions as well as the sensory component of headache pain. Headache, 1981, 21, 218-221.

- Andrasik, F., Blanchard, E.B., Arena, J.G., Saunders, N.L. and Barron, K.D. Psychophysiology of recurrent headache: Methodological issues and new empirical findings. Behavior Therapy, 1982, 13, 407-429.
- Andrasik, F., Blanchard, E.B., Arena, J.G., Teders, S.J., Teevan, R.C., and Rodichok, L.D. Psychological functioning in headache sufferers. Psychosomatic Medicine, 1982, 44, 171-182.
- Andrasik, F., Blanchard, E.B., Edlund, S.R., and Rosenblum, E.L. Autogenic feedback in the treatment of two children with migraine headache. Child and Family Behavior Therapy, 1982, 4, 13-24.
- Andreychuk, T., and Skriver, C. Hypnosis and biofeedback in the treatment of migraine headache. International Journal of Clinical and Experimental Hypnosis, 1975, 3, 172-183.
- Anthony, M., Hinterberger, H., and Lance, J. Plasma serotonin in migraine and stress. Archives of Neurology, 1967, 16, 544-558.
- Appenzeller, O. Vasomotor function in migraine. Headache, 1969, 9, 147-155.
- Attfield, M., and Peck, D.F. Temperature self-regulation and relaxation with migraine patients and normals. Behaviour Research and Therapy, 1979, 17, 591-595.
- Bakal, D.A. Headache: A biopsychological perspective. Psychological Bulletin, 1975, 83, 369-382.
- Bakal, D.A. The psychobiology of chronic headache. New York: Springer, 1982.

- Bakal, D.A., Demjen, S., and Kaganov, J.A. Cognitive behavioral treatment of chronic headache. Headache, 1981, 21, 81-86.
- Bakal, D.A., and Kaganov, J.A. Muscle contraction and migraine headache: Psychophysiological comparison. Headache, 1977, 17, 208-215.
- Bandura, A. The assessment and predictive generality of self-percepts of efficacy. Journal of Behavior Therapy and Experimental Psychiatry, 1982, 13, 195-199.
- Barlow, C.F. Migraine in childhood. Research and Clinical Studies of Headache, 1978, 5, 34-46.
- Beck, A.T. Cognitive therapy and the emotional disorders. New York: International Universities Press, 1976.
- Beeson, P.B., McDermott, W. and Wyngaarder, J.B. Cecil Textbook of Medicine. Philadelphia: Saunders, 1979.
- Benson, H., Klemchuk, H.P., and Graham, J.R. The usefulness of the relaxation response in the therapy of headache. Headache, 1974, 14, 49-52.
- Bickerstaff, E.R. Basilar artery migraine. Lancet, 1961, I, 15-17.
- Bihldorf, J.P. Psychological factors in headache. Unpublished dissertation, Harvard University, 1969.
- Bild, R., and Adams, H.E. Modification of migraine headaches by cephalic blood volume pulse and EMG biofeedback. Journal of Consulting and Clinical Psychology, 1980, 48, 51-57.
- Bille, B. Migraine in school children. Acta Paediatrica Scandinavia, 1962, 51, (supplement 136), 1-151.

- Bille, B., Ludvigsson, J., and Sanner, G. Prophylaxis of migraine in children. Headache, 1977, 17, 61-63.
- Blanchard, E.B., Ahles, T.A., and Shaw, E.R. Behavioral treatment of headaches. In M. Hersen, R.M. Eisler, and P.M. Miller (Eds.), Progress in Behavior Modification. (Vol. 8). New York: Academic Press, 1979.
- Blanchard, E.B., and Andrasik, F. Psychophysiological assessment and treatment of headache: Recent developments and emerging issues. Journal of Consulting and Clinical Psychology, 1982, 50, 859-879.
- Blanchard, E.B., Andrasik, F., Ahles, T.A., Teders, S.J., and O'Keefe, D. Migraine and tension headache: A meta-analytic review. Behavior Therapy, 1980, 11, 613-631.
- Blanchard, E.B., Andrasik, F., Neff, D.F., Arena, J.G., Ahles, T.A., Jurish, S.E., Pallmeyer, T.P., Saunders, N.L., Teders, S.J., Barron, K.D., and Rodichok, I.D. Biofeedback and relaxation training with three kinds of headache: Treatment effects and their predictions. Journal of Consulting and Clinical Psychology, 1982, 50, 562-575.
- Blanchard, E.B., Andrasik, F., Neff, D.F., Jurish, S.E., and O'Keefe, D.A. Social validation of the headache diary. Behavior Therapy, 1981, 12, 711-715.

- Blanchard, E.B., Andrasik, F., Neff, D.F., Saunders, N.L., Arena, T.G., Pallmeyer, T.P., Teders, S.J., and Jurish, S.E. Four process studies in the behavioural treatment of chronic headache. Behaviour Research and Therapy, 1983, 21, 209-220.
- Blanchard, E.B., Theobald, D.E., Williamson, D.A., Silver, B.V., and Brown, D.A. Temperature biofeedback in the treatment of migraine headaches. Archives of General Psychiatry, 1978, 35, 581-588.
- Boller, J.D., and Flom, R.P. Treatment of the common migraine: Systematic application of biofeedback and autogenic training. Proceedings of the Biofeedback Society of America, Ninth Annual Meeting, 1978, 24-26.
- Borkovac, T.D. Effects of expectancy on the outcome of systematic desensitization and implosive treatments for analogue anxiety. Behavior Therapy, 1972, 3, 29-40.
- Budzynski, T.H., Stoyva, J.M., Adler, C.S., and Mullaney, D.J. EMG biofeedback and tension headache: A controlled outcome study. Psychosomatic Medicine, 1973, 6, 509-514.
- Cattell, R.B. The nature and genesis of mood states: A theoretical model with experimental measurements concerning anxiety, depression, arousal and other mood states. In C.D. Spielberger (Ed.), Anxiety: Current trends in theory and research. (Vol. 1). New York: Academic Press, 1972.

- Cautela, J., and Groden, J. Relaxation: A comprehensive manual for adults, children and children with special needs. Champaign, Illinois: Research Press, 1978.
- Collins, F.L., and Martin, J.E. Assessing self-report of pain. A comparison of two recording procedures. Journal of Behavioral Assessment, 1980, 2, 55-63.
- Collins, F.L., and Thompson, J.K. Reliability and standardization in the assessment of self-reported headache pain. Journal of Behavioral Assessment, 1979, 1, 73-86.
- Congdon, P.J., and Forsythe, W.I. Migraine in childhood: A review. Clinical Pediatrics, 1979, 18, 353-359.
- Cook, T.D., and Campbell, D.T. Quasi-experimentation: Design and analysis issues for field settings. Chicago: Rand-McNally, 1979.
- Couch, J.R., Ziegler, D.K., and Hassanein, R.S. Evaluation of the relationship between migraine headache and depression. Headache, 1975, 13, 41-50.
- Cox, D., and Thomas, D. Relationship between headaches and depression. Headache, 1981, 21, 261-263.
- Dalessio, D.J. Recent experimental studies on headache. Neurology, 1963, 13, 7-10.
- Dalessio, D.J. Wolff's headache and other head pain, (4rth ed.), New York: Oxford University Press, 1980.

- Dalsgaard-Nielson, T. Migraine and heredity. Acta Neurologia Scandinavica, 1965, 41, 287-300.
- Dexter, J.D. and Weitzman, E.D. Relationship of nocturnal headaches to sleep stage patterns. Neurology, 1970, 20, 513-518.
- Diamond, S., and Dalessio, D.J. The practicing physician's approach to headache. Baltimore: Williams and Wilkins, 1978.
- Diamond, S., and Franklin, M. Biofeedback: Choice of treatment in childhood migraine. Paper presented at Biofeedback Research Society meeting, Colorado Springs, 1976.
- Dreger, R.M. The state-trait anxiety inventory. In O.K. Buros (Ed.), The eighth mental measurements yearbook. Highland Park: Gryphon Press, 1978.
- Ellis, A. Reason and emotion in psychotherapy. New York: Lyle Stuart, 1962.
- Endler, N.S. The state-trait anxiety inventory for children. In O.K. Buros (Ed.) The eighth mental measurements yearbook. Highland Park: Gryphon Press, 1978.
- Epstein, L.H., and Abel, G.G. An analysis of biofeedback training effects for tension headache patients. Behavior Therapy, 1977, 8, 37-47.
- Fenichel, G.M. Migraine in childhood. Clinical Pediatrics, 1968, 7, 192-194.

Friedman, A.P. The migraine syndrome. Bulletin of the New York Academy of Medicine, 1968, 44, 45-62.

Friedman, A.P. The headache in history, literature and legend. Bulletin of the New York Academy of Medicine, 1972, 48, 661-681.

Gauthier, J., Bois, K., Allaire, D., and Drolet, M.  
Evaluation of skin temperature biofeedback training at two different sites for migraine. Journal of Behavioral Medicine, 1981, 4, 407-419.

Gauthier, J., and Marshall, W.L. Biofeedback and relaxation training in the treatment of migraine headaches: Review and critique. Unpublished manuscript, Laval University, 1978.

Golden, G.S. The Alice in Wonderland syndrome in juvenile migraine. Pediatrics, 1979, 63, 517-519.

Goldfried, M.R. Systematic desensitization as training in self-control. Journal of Consulting and Clinical Psychology, 1971, 37, 228-234.

Goldfried, M.R., Decenteceo, E.T., and Weinberg, L.  
Systematic rational restructuring as a self-control technique. Behavior Therapy, 1974, 5, 247-254.

Gosselin, M., McGrath, P., Firestone, P., Cunningham, S.J., and Goodman, J.T. Compliance factors in the treatment of juvenile migraine. Paper presented at Canadian Psychological Association Conference, Winnipeg, 1983.

- Gracely, R.H., and Wolskee, P.J. Semantic functional measurement of pain: Integrating perception and language. Pain, 1983, 15, 389-398.
- Graham, J.R. Migraine: Clinical aspects. In P.J. Viaken and G.W. Bruyn (Eds.). Handbook of clinical neurology. (Vol. 5). Headaches and cranial neuralgias. New York: Wiley, 1968.
- Graziano, A.M., DeGiovanni, I.S., and Garcia, K.A. Behavioral treatment of children's fears: A review. Psychological Bulletin, 1979, 86, 804-830.
- Hammond, J. The late sequelae of recurrent vomiting of childhood. Developmental Medicine and Child Neurology, 1974, 16, 15-22.
- Harrison, R.H. Psychological testing in headache: A review. Headache, 1975, 14, 177-185.
- Hay, K.M., and Madders, J. Migraine treated by relaxation therapy. Journal of Royal College of General Practitioners, 1971, 21, 664-669.
- Henryk-Gutt, R., and Rees, W.L. Psychological aspects of migraine. Journal of Psychosomatic Research, 1973, 17, 141-153.
- Hockaday, J.M. Late outcome of childhood onset migraine and factors affecting outcome, with particular reference to early and late EEG findings. In R. Greene (Ed.), Current concepts in migraine research. New York: Raven Press, 1978.

- Holroyd, K.A., and Andrasik, F. Coping and the self-control of chronic tension headaches. Journal of Consulting and Clinical Psychology, 1978, 46, 1036-1045.
- Holroyd, K.A., and Andrasik, F. Do the effects of cognitive therapy endure? A two-year follow-up of tension headache sufferers treated with cognitive therapy or biofeedback. Cognitive Therapy and Research, 1982, 6, 325-334.
- Holroyd, K.A., Andrasik, F., and Noble, J. A comparison of EMG biofeedback and a credible pseudotherapy in treating tension headache. Journal of Behavioral Medicine, 1980, 3, 29-39.
- Holroyd, K.A., Andrasik, F., and Westbrook, T. Cognitive control of tension headache. Cognitive Therapy and Research, 1977, 1, 121-133.
- Hsu, L.K.G., Kalucy, R.S., Crisp, A.H., Koval, J., Chen, C.H., Carruthers, M., and Zilka, K.J. Early morning migraine. Nocturnal plasma levels of catecholamines, tryptophan, glucose and free fatty acids. Lancet, 1977, I, 447-450.
- Jacobson, E. Progressive relaxation. Chicago: University of Chicago Press, 1938.
- Jay, G.W., and Tomasi, L.G. Pediatric headaches: A one year retrospective analysis. Headache, 1981, 21, 5-9.

- Joffe, R., Bakal, D.A., and Kaganov, J. A self-observation study of headache symptoms in children. Headache, 1983, 23, 20-25.
- Kaldegg, A. Migraine patients: Discovery of some test results. Journal of Mental Science, 1952, 98, 672-682.
- Kazdin, A.E. Nonspecific treatment factors in psychotherapy outcome research. Journal of Consulting and Clinical Psychology, 1979, 47, 846-851.
- Kazdin, A.E., and Petti, T.A. Self-report and interview measures of childhood and adolescent depression. Journal of Child Psychology and Psychiatry, 1982, 23, 437-457.
- Kendall, P.C., and Braswell, L. Cognitive-behavioral self-control therapy for children: A components analysis. Journal of Consulting and Clinical Psychology, 1982, 50, 672-689.
- Khatami, M., and Rush, A.J. A one-year follow-up of the multimodal treatment for chronic pain. Pain, 1982, 14, 45-52.
- Kimball, R.W., Friedman, A.P., Vallejo, E.. Effects of serotonin in migraine patients. Neurology, 1960, 10, 107-111.
- Kirk, R.E. Experimental design: Procedures for the behavioral sciences. Monterey, California: Brooks/Cole, 1982.

- Knapp, T.W., and Florin, I. The treatment of migraine headache by training in vasoconstriction of the temporal artery and a cognitive stress-coping training. Behavior Analysis and Modification, 1981, 4, 267-274.
- Kohlenberg, R.J., and Cahn, T. Self-help treatment for migraine headaches. Headache, 1981, 21, 196-200.
- Kremsdorf, R.B., Kochanowicz, N.A., and Costell, S. Cognitive skills training vs. EMG biofeedback in the treatment of tension headaches. Biofeedback and Self-Regulation, 1981, 6, 93-103.
- Kudrow, L. Current aspects of migraine headache. Psychosomatics, 1978, 19, 48-57.
- Labbe, E.E., and Williamson, D.A. Skin temperature feedback with autogenic training and home practice in the treatment of childhood migraine. Unpublished Manuscript, Louisiana State University, 1982.
- Lake, A., Rainey, J., Papsdorf, J.D. Biofeedback and rational-emotive therapy in the management of migraine headache. Journal of Applied Behavior Analysis, 1979, 12, 127-140.
- Lance, J.W., Anthony, M., and Gonsky, A. Serotonin, the carotid body, and cranial vessels in migraine. Archives of Neurology, 1967, 16, 553-558.

Lazarus, R.S. Psychological stress and coping in adaptation and illness. In Z.L. Lipowski, D.R. Lipsitt, and P.C. Whybrow (Eds.), Psychosomatic medicine: Current trends and clinical applications. New York: Oxford University Press, 1977.

Lazarus, R.S. The stress and coping paradigm. In C. Eisdorfer, D. Cohen, A. Kleinman, and P. Maxim (Eds.), Theoretical causes for psychopathology. New York: Spectrum, 1981.

Ling, W., Oftedal, G., and Weinberg, W. Depressive illness in children presenting as severe headache. American Journal of Diseases of Children, 1970, 120, 122-124.

Ludvigsson, T. Propranolol used in prophylaxis of migraine in children. Acta. Neurologica Scandinavica, 1974, 50, 109-115.

Lutker, E.R. Treatment of migraine headache by conditional relaxation: A case study. Behavior Therapy, 1971, 2, 592-593.

Mahoney, M.J., and Arnkoff, D. Cognitive and self-control therapies. In S.L. Garfield and A.E. Bergin (Eds.) Handbook of psychotherapy and behavior change: An empirical analysis. New York: Wiley, 1978.

Marcussen, R.M., and Wolff, H.G. A Formulation of the dynamics of the migraine attack. Psychosomatic Medicine, 1949, 11, 251-265.

- Mathew, N.T., Stubits, E., and Nigam, M.P. Transformation of episodic migraine into daily headache: Analysis of factors. Headache, 1982, 22, 66-68.
- Maxwell, H. Migraine: Background and treatment. Bristol, Pa.: J. Wright, 1966.
- Meichenbaum, D. Cognitive behavior modification. Morristown, N.J.: General Learning Press, 1974.
- Meichenbaum, D. A self-instructional approach to stress management: A proposal for stress-inoculation training. In I. Larason and C.D. Spielberger (Eds.), Stress and anxiety. Vol. 2, New York: Wiley, 1975.
- Melzack, R., and Wall, P.D. Pain mechanisms: A new theory. Science, 1965, 150, 971-979.
- Mitch, P.S., McGrady, A., and Ianonne, A. Autogenic feedback training in migraine: A treatment report. Headache, 1976, 15, 267-270.
- Mitchell, K.R., and Mitchell, D.M. Migraine: An exploratory treatment application of programmed behavior therapy techniques. Journal of Psychosomatic Research, 1971, 15, 137-157.
- Mitchell, K.R., and White, R.G. Behavioral self-management: An application to the problem of migraine headaches. Behavior Therapy, 1977, 8, 213-222.
- Morley, S. Migraine: A generalized vasomotor dysfunction? A critical review of the evidence. Headache, 1977, 17, 71-74.

Mullinex, J., Norton, B., Hackman, S., and Fishman, M.

Skin temperature biofeedback and migraine.

Headache, 1978, 17, 242-244.

Olesen, J., Larsen, B., and Lauritzen, M. Focal hyperemia

followed by spreading oligemia and impaired

activation of rCBF in classic migraine. Annals

of Neurology, 1981, 9, 344-352.

Olesen, J., Lauritzen, M., Tfelt-Hansen, P., Henriksen, L.,

and Larsen, B. Spreading cerebral oligemia in

classical and normal cerebral blood flow in common

migraine. Headache, 1982, 22, 173-179.

Oster, J. Recurrent abdominal pain, headache and limb

pains in children and adolescents. Pediatrics,

1972, 50, 429-436.

Ostfeld, A.M., and Wolff, H.G. Studies on headache:

Arterenol (norepinephrine) and vascular headache

of the migraine type. Archives of Neurology

and Psychiatry, 1955, 74, 131-143.

Paul, G.L. Inhibition of physiological response to

stressful imagery by relaxation training and

hypnotically suggested relaxation. Behaviour

Research and Therapy, 1969, 7, 249-256.

Peper, E., and Grossman, E.R. Thermal biofeedback

training in children with headache. Paper presented,

at the Biofeedback Research Society Meeting,

Colorado Springs, 1974.

- Poznanski, E.O., and Cook, S.C., and Carroll, B.J. A depression rating scale for children. Pediatrics, 1979, 64, 442-450.
- Prensky, A.L. Migraine and migrainous variants in pediatric patients. Pediatric Clinics of North America, 1976, 23, 461-471.
- Price, K.P. and Blackwell, S. Trait levels of anxiety and psychological responses to stress in migraineurs and normal controls. Journal of Clinical Psychology, 1980, 26, 658-660.
- Price, K.P. and Tursky, B. Vascular reactivity of migraineurs and non-migraineurs: A comparison of responses to self-control procedures. Headache, 1976, 16, 210-217.
- Raskin, N.H. and Appenzeller, O. Headache. In L.H. Smith Jr., (Ed.), Major problems in internal medicine (Vol.19). Philadelphia: Saunders, 1980.
- Raczynski, J.M., and Thompson, J.K. Methodological guidelines for clinical headache research. Pain, 1983, 15, 1 - 18.
- Reading, C. and Mohr, P.D. Biofeedback control of migraine: A pilot study. British Journal of Social and Clinical Psychology, 1976, 15, 429-433.
- Refsum, S. Genetic aspects of migraine. In P.J. Vinken and G.W. Bruyn (Eds.), Handbook of clinical neurology (Vol.5). Headaches and cranial neuralgias. New York: Wiley, 1968.

- Richardson, G.M., McGrath, P.J., Cunningham, S.J., and Humphreys, P. Validity of the headache diary in children. Headache, 1983, 23, 184-187.
- Richter, I.L., Bartoli, E., Cunningham, S.J., Firestone, P., Goodman, J.T., and McGrath, P.J. The assessment of credibility in the behavioral treatment of migraine. Poster presented at Canadian Psychological Association Conference, Montreal, 1982.
- Rogado, A.Z., Harrison, R.H., and Graham, J.R. Personality profiles in cluster headache, migraine, and normal controls. Archives Neurobiology (Madrid), 1974, 37, (Suppl.), 227-241.
- Ross, W.D., and McNaughton, F.L. Objective personality studies in migraine by means of the Rorschach method. Psychosomatic Medicine, 1945, 7, 73-79.
- Sargent, J.D., Green, E.E., and Walters, E.D. The use of autogenic feedback training in a pilot study of migraine and tension headaches. Headache, 1972, 12, 120-125.
- Sargent, J.D., Green, E.E., and Walters, E.D. Preliminary report on the use of autogenic feedback training in the treatment of migraine and tension headaches. Psychosomatic Medicine, 1973, 35, 129-135.
- Sargent, J.D., Walters, E.D., and Green, E.E. Psychosomatic self-regulation of migraine headache Seminars in Psychiatry, 1973, 5, 415-418..

- Schachter, S. The interaction of cognitive and physiological determinants of emotional state. In L. Berkowitz (Ed.), Advances in experimental social psychology, Vol 1. New York: Academic Press, 1964.
- Selby, G., and Lance, J.W. Observations on 500 cases of migraine and allied vascular headache. Journal of Neurology, Neurosurgery and Psychiatry, 1960, 23, 23-32.
- Selye, H. The stress of life (2nd ed.), New York: McGraw-Hill, 1976.
- Shinnar, S., and D'Souza, B. Migraine in Children and adolescents. Pediatrics in Review, 1982, 3, 257-262.
- Sicuteri, F., Testi, A., and Anselmi, R. Biochemical investigations in headache: increase in the hydroxy-indoleacetic acid excretion during migraine attacks. International Archives of Allergy, 1961, 19, 55-58.
- Sillanpää, M. Prevalence of headache in prepuberty. Headache, 1983, 23, 15-19. (b)
- Sillanpää, M. Changes in the prevalence of migraine and other headaches during the first seven school years. Headache, 1983, 23, 15-19. (b)
- Silver, B.V., Blanchard, E.B., Williamson, D.A., Theobald, D.E., and Brown, D.A. Temperature biofeedback and relaxation training in the treatment of migraine headaches: One-year follow-up. Biofeedback and Self-Regulation, 1979, 4, 359-366.
- Somerville, B.W. The role of extradiol withdrawal in the etiology of menstrual migraine. Neurology, 1972, 22, 355-365.

- Spielberger, C.D. Manual for the state-trait anxiety inventory for children (How I feel questionnaire). Palo Alto, California: Consulting Psychologists Press, 1973.
- Spielberger, C.D., Gorsuch, R.L., and Lushene, R.E. Manual for the state-trait anxiety inventory (Self-evaluation questionnaire), Palo Alto, California: Consulting Psychologists Press, 1970.
- Spivack, G., and Shure, M.B. Social adjustment of young children. San Francisco: Jossey-Bass, 1974.
- Spivack, G., Platt, J., and Shure, M.B. The problem-solving approach to adjustment. San Francisco: Jossey-Bass, 1976.
- Sternbach, R.A. Pain patients: Traits and treatment. New York: Academic Press, 1974.
- Sternbach, R.A., and Timmermans, G. Personality changes associated with reduction of pain. Pain, 1975, 1, 177-181.
- Strassberg, D.S., Reimherr, F., Ward, M., Russell, S., and Cole, A. The MMPI and chronic pain. Journal of Consulting and Clinical Psychology, 1981, 49, 220-226.
- Tan, S.Y. Cognitive and cognitive-behavioral methods for pain control: A selective review. Pain, 1982, 12, 201-228.

- Thompson, J.K. and Figueroa, J.L. Dichotomous vs. interval rating of headache symptomology: An investigation in the reliability of headache assessment. Headache, 1980, 20, 261-265.
- Tomasi, L.G. Headaches in children. Comprehensive Therapy, 1979, 5, 13-19.
- Trued, S. Migraines in childhood. Journal of the American Medical Women's Association, 1974, 29, 78-86.
- Turk, D.C. A coping skills-training approach for the control of experimentally produced pain. Unpublished doctoral dissertation, University of Waterloo, 1977.
- Turk, D.C. and Genest, M. Regulation of pain: The application of cognitive and behavioral techniques for prevention and remediation. In P.C. Kendall and S.D. Hollon (Eds.), Cognitive-behavioral intervention: Theory, research and procedures. New York: Academic Press, 1979.
- Turk, D.C., Meichenbaum, D., and Genest, M. Pain and behavioral medicine: A cognitive-behavioral perspective. New York: Guilford Press, 1983.
- Turner, J.A. Comparison of group progressive-relaxation training and cognitive-behavioral group therapy for chronic low back pain. Journal of Consulting and Clinical Psychology, 1982, 50, 757-765.
- Turner, J.A., and Chapman, C.R. Psychological interventions for chronic pain: A critical review. I Relaxation and biofeedback. Pain, 1982, 12, 1-22. (a)

Turner J.A., and Chapman, C.R. Psychological interventions for chronic pain: A critical review. II Operant conditioning, hypnosis, and cognitive-behavioral therapy. Pain, 1982, 12, 23-46. (b)

Urbain, E.S. and Kendall, P.C. Review of social-cognitive problem-solving interventions with children. Psychological Bulletin, 1980, 88, 109-143.

Vahlquist, B. Some experiences from psychiatric work in a pediatric unit with children suffering from psychosomatic disease. Acta Paediatrica Scandinavica, (Supplement), 1951, 48, 48-53.

Vahlquist, B. Migraine in children. International Archives of Allergy and Applied Immunology, 1955, 7, 348-355.

Vahlquist, B. Migrane-bu kindern (Migraine in children). Triangel (Triangle), 1961, 5, 89-97.

Vahlquist, B. and Hackzell, G. Migraine of early onset: A study of thirty-one cases in which the disease first appeared between one and four years of age. Acta Paediatrica Scandinavica, 1949, 38, 622-636.

Warner, G., and Lance, J.W. Relaxation therapy in migraine and chronic tension headache. Medical Journal of Australia, 1975, 1, 298-301.

Waters, W.E. Migraine: Intelligence, social class and familial prevalence. British Medical Journal, 1971, 2, 77-78.

- Waters, W.E., and O'Connor, P.J. Prevalence of migraine. Journal of Neurology, Neurosurgery, and Psychiatry, 1975, 38, 613-616.
- Werder, D.S. An exploratory study of childhood migraine using thermal biofeedback as a treatment alternative. Biofeedback Research Society of America, 1978, 9, 45-47.
- Werder, D.S., Sargent, J.D., and Coyne, L. MMPI profiles of headache patients using self-regulation to control headache activity. Headache, 1981, 21, 164-169.
- Williamson, D.A. Behavioral treatment of migraine and muscle-contraction headache: Outcome and theoretical explanation. In Hersen, M., Eisler, R.M., and P.M. Miller (Eds.), Progress in Behavior Modification, (Vol. II), New York: Academic Press, 1981.
- Winer, B.J. Statistical principles in experimental design. New York: McGraw-Hill, 1971.
- Wolf, S. and Goodell, B.S. (Eds.), Harold G. Wolff's Stress and disease. Springfield, Illinois: Thomas, 1968.
- Wolff, H.G. Personality features and reactions of patients with migraine. Archives of Neurology and Psychiatry, 1937, 37, 895-921.
- Wolff, H.G. The pathophysiology of Headache (compiled by H. Goodell and L.E. Hinkle, Jr.). International Journal of Neurology, 1962, 3, 287-314.
- Wolff, H.G. Headache and other head pain. (3rd ed.), London: Oxford University Press, 1963.

- Bornstein, P., and Quevillion, R. The effects of a self-instructional package on overactive preschool boys. Journal of Applied Behavioral Analysis, 1976, 9, 179-188.
- Camp, B.W. Verbal mediation in young aggressive boys. Journal of Abnormal Psychology, 1977, 5, 157-168.
- Douglas, V. Are drugs enough? To treat or train the hyperactive child. International Journal of Mental Health, 1975, 4, 199-212.
- D'Zurilla, T., and Goldfried, M. Problem solving and behavior modifications. Journal of Abnormal Psychology, 1971, 78, 107-126.
- Gottman, J., Gonso, J., and Schuler, P. Teaching social skills to isolated children. Journal of Abnormal Child Psychology, 1976, 4, 179-197.
- Kanfer, F., Karoly, P., and Newman, A. Reduction of children's fears of the dark by competence related and situational threat related verbal cures. Journal of Consulting and Clinical Psychology, 1975, 43, 251-258.
- Kendall, P.C., and Finch, A.J. Jr. A cognitive behavioral treatment for impulsivity: A group comparison study. Journal of Consulting and Clinical Psychology, 1978, 46, 110-118.
- Kendall, P.C. and Wilcox, L.E. A cognitive behavioral treatment for impulsivity: Concrete versus conceptual training in non-self-controller problem children. Journal of Consulting and Clinical Psychology, 1980, 48, 80-91.

Peterson, L., and Shigetomi, C. The use of coping techniques  
to minimize anxiety in hospitalized children.

Behavior Therapy, 1981, 12, 1-14.

Spivack, G., and Shure, M.B. Social adjustment of young  
children. San Francisco: Jossey-Bass, 1974.

Urbain, E.S., and Kendall, P.C. Review of social-cognitive  
problems-solving interventions with children.

Psychological Bulletin, 1980, 88, 109-143.

APPENDIX A

HEADACHE DIARY

APPENDIX A

NAME: \_\_\_\_\_

HEADACHE DIARY

WEEK BEGINNING: \_\_\_\_\_

FILL IN THIS FORM AT BREAKFAST, LUNCH, DINNER AND BEDTIME EACH DAY

Time	Intensity Rating	Other Symptoms	Medication	Possible Cause
Breakfast				
Lunch				
Dinner				
Bedtime				
Breakfast				
Lunch				
Dinner				
Bedtime				
Breakfast				
Lunch				
Dinner				
Bedtime				
Breakfast				
Lunch				
Dinner				
Bedtime				
Breakfast				
Lunch				
Dinner				
Bedtime				
Breakfast				
Lunch				
Dinner				
Bedtime				
Breakfast				
Lunch				
Dinner				
Bedtime				

INTENSITY RATINGS

- 0 - No Headache
- 1 - Headache - I am only aware of it if I pay attention to it.
- 2 - Headache - but I can ignore it at times.
- 3 - Headache - I can't ignore it but I can do my usual activities.
- 4 - Headache - it's difficult for me to concentrate, I can only do easy activities.
- 5 - Headache - such that I can't do anything.

INSTRUCTIONS FOR HEADACHE DIARY

1. Be sure to fill out your own headache diary at breakfast, lunch, dinner and bedtime each day.
2. Fill in the diary, for how you are at the time.
3. Intensity Rating: Use the numbers from the Intensity Ratings chart at the bottom of the page to show how you are at the time. Be sure to mark an "0" if you have no headache. Please do not discuss this rating with your parents.
4. Other symptoms: Write in anything else you feel at this time, such as nausea, vomiting, dizziness, visual disturbance, loss of appetite... etc. If you feel nothing else draw a line through the space.
5. Medication: Please write in the name and amount of any medicine you have taken since the last time period. If none was taken draw a line through the space.
6. Possible Cause: Write in anything you think might have caused the headache such as a change in weather, an exam, an argument with parents or friends, a particular food, an allergy... etc. If you don't know, draw a line through the space.

G

APPENDIX B

HEADACHE VARIABLES:

OPERATIONAL DEFINITIONS

APPENDIX B

1. Headache Index

The Headache Index is a measure of total headache activity in a week. It is the sum of all 28 ratings (4 per day for 7 days). This value is prorated if there are more or less than 28 ratings in a study week. This value is not calculated if there are less than 20 ratings, i.e., more than 8 missing data points.

2. Frequency of Ratings

This is a frequency count of the number of times in the week that a headache has been rated. This value omits ratings less than or equal to one. Frequency is prorated if there are more or less than 28 ratings in a study week, and it is not calculated if there are less than 20 ratings.

3. Peak Intensity

This measure is the highest rated score in the study week. It is not prorated and is calculated according to whatever data is available for the week, provided that there are 20 or more data points.

4A. Mean Duration of Headache

Duration is defined as the length of time each headache lasts. A headache exists whenever there are one or more sequential intensity ratings on any one day. In cases of sequential activity on successive days, a new headache is counted each day. Duration is calculated by counting the number of ratings in each sequence of headache activity per day, then summing over the week, prorating this value to 7 days, if necessary, and dividing by the frequency of headaches for that week as calculated below. (Note if appropriate, use the prorated frequency values).

Missing Data (9) between ratings of headache activity are treated as headache data within one day. Missing data outside of headache activity are treated as no headache. Do not calculate this value if the day has less than 3 data points.

e.g. 3943 = 1 headache, duration of 4  
3439 = 1 headache, duration of 3  
0390 = 1 headache, duration of 1

#### 4B. Frequency of Headaches

A headache is counted if there are one or more sequential intensity ratings of head pain on any one day. Whenever there is continual headache activity on successive days, a new headache is counted each day. Frequency is calculated by determining the number of headaches per day and summing to determine the weekly total. It is calculated only if the day has at least 3 data points.

Frequency values are prorated to 7 days if there are more or less than 7 days in the study week. It is not calculated if there are less than 20 ratings.

Missing data (9) between ratings of headache activity are treated as headache activity within a day.

e.g. 3943 = 1

#### 5. Medication Count

This is a measure of the total number of pills taken for headache in a week irrespective of type. It includes analgesics and prophylactic medication such as Fiorinal or Propranolol, but it does not include medication taken for other conditions.

APPENDIX C

SCHOOL ATTENDANCE



APPENDIX D

CREDIBILITY:

PRETEST AND POSTTEST

APPENDIX D

PRETEST CREDIBILITY

NAME: \_\_\_\_\_ parent  child  DATE: \_\_\_\_\_ S: \_\_\_\_\_

	not at all	just a little	moderately	quite a bit	very
1. How logical does this type of treatment seem to you?					
2. How confident would you be that this type of treatment would be successful in reducing headaches?					
3. How confident would you be in recommending this treatment to someone who has headaches?					
4. How confident would you be that children and adolescents could learn this technique?					

I CREDIBILITY: POST-TEST	not at all	just a little	moderately	quite a bit	very
1. How logical does the treatment you received seem to you?					
2. How confident would you be in recommending this treatment to someone who has headaches?					
3. How confident would you be that children and adolescents could learn this technique?					

	very definitely no	no	perhaps	yes	very definitely yes
Do you think The Children's Hospital should make this treatment available to other children suffering from headaches?					

II THERAPIST RATINGS	not at all	just a little	moderately	quite a bit	very
1. How skilled do you think your therapist is?					
2. How understanding do you think your therapist is?					
3. How warm and friendly do you think your therapist is?					

III TREATMENT RATING	not at all	just a little	moderately	quite a bit	very
How beneficial was your treatment in improving your migraine headaches?					

APPENDIX E

TREATMENT PROTOCOLS

APPENDIX E

RELAXATION TRAINING

Session 1

I Rationale for Treatment

1. Causes of migraine.

- a) Today we're going to talk about some of the causes of migraine headaches and what we can do about it.
- b) Migraine runs in certain families and some people inherit a tendency to develop migraine headaches.
- c) One of the other things we think is involved is stress.

2. Relationship of stress, bodily reactions, migraine.

- a) Stress is a normal part of life, normal experience for everyone.
- b) For people with migraine, normal stresses and emotional upsets of everyday living can sometimes bring on a headache.
- c) Stress affects us physically by causing muscle tension, chemical reactions that cause blood flow changes by making the blood vessels contract too much, then swell and expand too much. (show relevant pictures)
- d) Muscle tension and swollen blood vessels cause the pain of headache.
- e) Pain itself causes more stress and tension and this makes the pain worse.
- f) Do you understand how we think migraines happen? Can you tell me simply in your own words?

3. Use of relaxation technique.

- a) The relaxation exercises are designed to reduce tension and emotional stress which will have the effect of reducing the pain of a headache and also the number of headaches that occur.
- b) In progressive relaxation you are taught to relax your whole body by individually relaxing all the different muscle groups.
- c) Relaxation is the opposite of stress and tension, therefore relaxation of muscle tension in the body acts to reduce stress.

- d) Method can be used to reduce stress in a particularly upsetting situation by blocking the strong emotional reactions that result in the physical changes in the blood vessels.
- e) Method can also be used to reduce the tension experienced from the pain of the headache and therefore reduce the severity of the pain.
- f) Discuss how relaxation works with the posters.
- g) Does this make sense to you? Can you tell me how relaxation can help your headaches?

## II Course of Treatment

- a) We'll begin relaxation training today.
- b) We'll give you a tape of relaxation exercises for daily practice at home.
- c) Training sessions once a week for 5 more weeks.
- d) Continue to keep diaries.

## III Relaxation Overview

### 1. Explanation.

- a) In this session we'll do some deep breathing and a complete body relaxation exercise.
- b) You might feel some funny feelings in your body and that's o.k. You might feel tingling in your arms or legs, or you might feel cool or light-headed or strange.
- c) Deep breathing is an important part of relaxation. It feels relaxing to breathe deeply. Demonstrate with a sigh. It feels good to sigh.
- d) When you're doing deep breathing (think of relaxation flowing in with the breath and tension flowing out as you let the breath out.
- e) Practise with a few long deep relaxing breaths.
- f) We will pay attention to all the important muscle groups in the body.

- g) First we'll create tension in a muscle and then we'll relax it. This way you will learn how to recognize tension in your muscles.

2. Demonstration.

a) Demonstrate:

- make a fist and squeeze tight. Squeeze hard until it hurts.
- Now let go. Let your hand go limp. Let the muscles relax.
- Feel how the tension is released and your hand relaxes.

- b) This is how tension causes pain. This kind of muscle tension can cause the pain of your headaches.

- c) Check relaxation in arm -- keep your arm and hand relaxed while I lift it.

- d) Demonstrate other body movements used in exercise:

hand, arm  
shoulders up, back, forward  
head to each side, forward  
jaw clenched (note: not enough to cause pain),  
eyebrows up, feel scalp  
stomach in, out  
thigh, lower leg, toes up, under

IV Relaxation Exercise

\* Record this on a tape

- a) "Make yourself comfortable."  
b) "Begin relaxation exercise by breathing slowly with deep breaths. Breathe relaxation in and breathe tension out."  
c) Proceed with the progressive relaxation exercise in the following order.

d) Use such tension and relaxation terms as:

TENSION PHASE

create some tension ...  
tense the muscles in ...  
tighten the muscles in ...  
feel the muscles pulling in  
feel the muscles tensing in

RELAXATION PHASE

release the tension  
feel the muscles relax  
feel the muscles loosen  
notice your arm (leg, etc.) feels heavier  
Notice how relaxed it feels  
Notice the muscles are softer or looser  
Notice how calm and peaceful  
Let the relaxation flow .....

\*\*\*\*\*

- left hand
- left arm (press your wrist down)
- right hand
- right arm
- shoulders up towards ears
- pull shoulders back
- pull shoulders forward
- right ear towards right shoulder
- left ear towards left shoulder
- head forward, chin to chest
- feel how relaxed your shoulders and neck are
- clench jaw, when relaxed let your tongue fall to the bottom of your mouth
- screw up face, purse lips
- eyebrows up, crinkle forehead, feel scalp

- notice relaxation in arms, shoulders, neck and head, allow relaxation to flow down your body
- breathe slowly, deeply, relaxation in, tension out
- hold breath in
- hold breath out
- hold stomach in
- hold stomach out
- left thigh
- right thigh
- lower left leg, push down
- lower right leg, push down
- left foot, toes up
- left foot, toes under
- right foot, toes up
- right foot, toes under

- e) Feel relaxation throughout body. Breathe slowly and deeply. Breathe in relaxation, breathe out tension.
- f) Now I'm going to count backwards from five. Let your muscles stay calm, peaceful and relaxed and come out of the deep relaxed state and open your eyes. Five, four, three, two, one .....
- g) Discuss how relaxation felt.

V Review Rationale

- a) Can you tell me again how relaxation can help your headaches?
- b) Do you have any questions? Ask parent as well as child.

VI Credibility Ratings (with Parents and child)

VII Homework

- a) Do the relaxation exercises at least once a day with the tape.
- b) Discuss with the child where and when might be the best place and time to do relaxation.
- c) Continue diaries
- d) Make appointment for next week.

Tape recorder borrowed

YES

NO

RELAXATION TRAINING

Session II

With Child Only

I Review of Rationale

- 1) Stress and body changes
- 2) Headache as stressor
- 3) Can you describe how we think you get a headache and how relaxation can help? Use Posters.

II Relaxation Homework Check

- 1) When did you do the relaxation exercises?
- 2) How often?
- 3) Where?
- 4) How did it feel?
- 5) Were there any parts of your body that you couldn't relax very well?

III Relaxation without the tension phase

- 1) Discussion:
  - a) Today we will try another type of relaxation exercise and we'll make another tape.
  - b) You have been practising how to tense and then relax the different muscles in your body.
  - c) So now you should have a good idea of how different your muscles feel when they are tense and when they relax.
  - d) In today's exercise we'll pay attention to each of the important muscles and relax them, without tensing them first.
- 2) Relaxation: Record this on the reverse side of the cassette used in Treatment #1.
  - a) "Make yourself comfortable".
  - b) "Begin relaxing by breathing slowly with deep breaths. Breathe relaxation in and breathe tension out".

c) Use such relaxation terms as:

Release the tension ...  
Let the muscles relax ...  
Let the muscles loosen ...  
Let the muscles soften ...  
Notice your arms (legs, etc.) feel heavier ...  
Notice how calm and peaceful ...  
Notice the muscles are softer and looser ...  
Let the relaxation flow ...  
Notice how relaxed it feels ...

d) Proceed with the progressive relaxation in the following order:

- |   |   |
|---|---|
| <input type="checkbox"/> left hand  | <input type="checkbox"/> notice relaxation in arms, shoulders, neck and head.   |
| <input type="checkbox"/> left arm   | <input type="checkbox"/> allow relaxation to flow down your body.               |
| <input type="checkbox"/> right hand   | <input type="checkbox"/> breathe slowly and deeply, relaxation in, tension out. |
| <input type="checkbox"/> right arm  | <input type="checkbox"/> relax chest and stomach muscles                        |
| <input type="checkbox"/> shoulders, let them drop                               | <input type="checkbox"/> left leg   |
| <input type="checkbox"/> muscles in neck  | <input type="checkbox"/> right leg  |
| <input type="checkbox"/> jaw, let your tongue fall to the bottom of your mouth. | <input type="checkbox"/> left foot  |
| <input type="checkbox"/> face and cheeks  | <input type="checkbox"/> right foot   |
| <input type="checkbox"/> eyebrows & forehead                                    |   |
| <input type="checkbox"/> scalp  |   |

- e) "Feel the relaxation throughout your body. Let the relaxation flow from the top of your head to the bottom of your feet".
- f) "Let the tension flow out with the breath and breathe in relaxation".
- g) Pretend that you are lying on a beach. You can feel the warm sun shining on your body. Your arms and legs feel very heavy, like they are sinking into the warm sand. All your muscles feel soft and warm. Your whole body feels relaxed and calm and peaceful.
- h) Now I'm going to count backwards from five. Let your muscles stay calm, peaceful and relaxed. Come out of the deep relaxation state and open your eyes. Five, four, three, two, one .....
- i) Discuss how this relaxation exercise felt.

#### IV Homework.

- a) Do a relaxation exercise at least once a day. Use either side of the tape -- the one you like best.
- b) Continue diaries.
- c) Appointment for next week.

RELAXATION TRAINING

Session III

With Child Only

I Review of Rationale

- 1) Can you describe how we think you get a headache and how relaxation can help?
- 2) With posters review of stress and body changes and headache as increased stress.
- 3) With posters review how relaxation training works.

II Relaxation Homework Check

- 1) Which type of relaxation exercise did you like best? i.e. Which side of the tape did you use most often? - with tension or without tension?
- 2) When did you do the exercises and where?
- 3) Everyday?
- 4) Where there any parts of you body that you couldn't relax very well?

III Partial Relaxation

1) Introduction:

- a) Today we'll talk about partial relaxation.
- b) Partial relaxation is something you can do to keep your body relaxed when you're doing other activities.
- c) With partial relaxation you will learn to let some parts of your body be relaxed and to use only the muscles that you need for what you are doing.
- d) This will keep your muscles from tensing too much and let your body stay relaxed and help you to have fewer headaches.

2) Modelling Partial Relaxation:

a) Walking.

- Demonstrate walking across the room keeping your muscles very stiff and tense in an exaggerated way.
- Ask the child to point out to you the muscle parts that are too tense and that could be relaxed.
- Relax the muscles as he points them out and continue until you are walking with a relaxed walk.
- Discuss with the child how some muscles must be tensed in order to stand upright and to walk but other muscles can be relaxed while walking.
- Stress relaxing arms, shoulders, jaw and face muscles while walking.
- Ask the child to try walking in a relaxed way.
- Check that his arms, shoulders, jaw and face muscles are relaxed.

b) Writing

- Demonstrate writing while sitting at the desk with stiff, tense muscles, in your legs, arms, fingers, shoulders, jaw and face.
- Ask the child to point out parts of your body that could be relaxed and relax these as he mentions them.
- Discuss how arms and finger muscles must be tensed to write but not too tense.
- Muscles in the other arm, shoulders, jaw, face and legs can be very relaxed.
- Ask the child to try writing in a relaxed way. (Make up some arithmetic questions or sentences to copy.)
- Check that his writing hand is not too tense. Suggest holding the pen loosely and pressing lightly when writing.

c) Watching T.V.

- Demonstrate sitting in a chair with muscles unnecessarily tensed.
- Ask the child to point out parts of your body that could be relaxed and relax these as he mentions them.
- Ask the child to sit in a relaxed way and check for unnecessarily tensed muscles, as above

3) When to do Partial Relaxation:

- a) It is important to remember to tense only the muscles that are needed to do what you are doing - walking, writing, watching T.V., or whatever.
- b) Do you think you'll be able to do this? How will you remember to do the partial relaxation exercises when you are walking, writing or watching T.V.? (Discuss environmental clues and reminders the child could use to remember to do partial relaxation.)
- c) Does the partial relaxation exercise make sense to you? Can you tell me how we think it will help your headaches?

IV Review of full relaxation exercise

- 1) In the time we have left today let's do a full relaxation exercise.
- 2) Would you rather do the exercise with the tension part or without?
- 3) Follow instructions for progressive relaxation in Session I or II?

V Homework (Write this out for the child to take home.)

- 1) Do a full relaxation with the tape at least once each day. Use either side of the tape.
- 2) Practise partial relaxation exercises while walking, writing and watching T.V. Try to figure out the best way of reminding yourself to do these?
- 3) Continue to do diaries.
- 4) Appointment for next week.

## Relaxation Training

### Session IV

#### With Child Only

#### I Review of Rationale

- 1) Let's review how we think you get a headache and how relaxation can help. Can you tell me?
- 2) Review posters.
- 3) Review role of full relaxation (to calm and relax muscles in the body) and partial relaxation (to keep unused muscles relaxed).

#### II Homework Check

- 1) Full Relaxation Exercises with the tape.
  - a) When did you do them?
  - b) How often?
  - c) Where?
  - d) Which side of the tape did you use?
  - e) Are there any parts of your body that you have trouble relaxing? Try tensing these parts first.
  - f) Try doing full relaxation without the tape. But use the tape sometimes for review to make sure you are remembering all the body parts.
- 2) Partial Relaxation Exercises
  - a) What partial relaxation exercises did you do?
  - b) How did you remember to do these?
  - c) How could you remember to do these more often?

#### III Mini-Relaxation

- 1) Introduction
  - a) Today you'll learn about mini-relaxation.

- b) This exercise is like the full body relaxation, but it's short. It only takes 5 seconds, and you can do it without anybody knowing that you are doing a relaxation exercise.
- c) A mini-relaxation helps to relieve the tension in your body and make it more relaxed and calm.
- d) You can do a mini-relaxation exercise if you feel yourself getting uptight or upset about something, or when you want to settle down to work at school, or anytime, just for fun.

## 2) Demonstration

- a) Mini-relaxation is like a sigh. (Demonstrate a sigh). Sighing feels good.
- b) In a mini-relaxation exercise you take a deep breath and let it out slowly. As you let your breath out, let all the stress and tension flow out of your body. Relax all your muscles. Like this (demonstrate).
- c) Give it a try. Take a breath and then feel the stress and tension flowing out of your body as you let the breath out.
- d) How did that feel?
- e) Remember to relax the muscles in your arms, shoulders, jaw and face, especially. Let's do it again. As you let the breath out, count backwards from five. When you reach one, feel how relaxed and calm and peaceful your body feels. (Check that the child's arms, shoulders, jaw and face relax.)
- f) You can do the mini-relaxation very quietly without anyone knowing.
- g) Mini-relaxations are also a way of reminding your body that it's better to be in a relaxed state than to be tensed.
- h) If you do it often during the day you can keep your body more relaxed and you'll feel less stress and tension.
- i) When would be a good time of the day for you to do a mini-relaxation? (Discuss 3 times during the day, eg)
  - i) when sitting down at desk at school after recess or at the beginning of each class;
  - ii) when sitting down to eat;
  - iii) when waiting in line for something;
  - iv) when you find yourself getting upset, angry or frustrated.)

3) Review rationale.

- a) Does the mini-relaxation exercise make sense to you?
- b) Can you tell me how it will help your headaches?

IV Review

1) Partial.

- a) Show me how you would sit relaxed as you are watching TV or reading a book. (Check that the child's arms, legs, shoulders, jaw and face are relaxed.)
- b) How would you walk in a relaxed way? (Check that arms, shoulders, jaw and face are relaxed.)
- c) Show me how you do partial relaxation exercises when you are at your desk writing. (Check that appropriate body parts are relaxed.)
- d) When are some other times that your body is tense, that you could do partial relaxation?

2) Full.

If time permits, complete a full progressive relaxation exercise following the outline in Session I or II.

V Homework (make a list for the child to take home)

- 1) Do a full relaxation once a day. Practise this without the tape a few times.
- 2) Do partial relaxation exercises when walking, writing, watching TV and any other time you notice that some muscles you are not using are tense.
- 3) Do mini-relaxation according to the times chosen above.
- 4) Continue diaries.
- 5) Appointment for next week.

RELAXATION TRAINING

Session V

With Child Only

I Review of Rationale

- 1) Let's review how we think you get a headache and how relaxation can help. Can you tell me?
- 2) Review posters..
- 3) Review role of:
  - 1) full relaxation (to calm and relax muscles in the body)
  - 2) partial relaxation (to keep unused muscles relaxed)
  - 3) mini-relaxation (a brief relaxation and reminder to keep the whole body calm and relaxed.)

II Homework Check

- 1) Full Relaxation Exercises
  - a) When did you do them?
  - b) How often?
  - c) Are you using the tension-relaxation method or the straight relaxation method?
  - d) Did you try it without the tape?
  - e) Where there any parts of your body that you had trouble relaxing? Discuss these.
  - f) Continue to do this daily and practise without using the tape.
- 2) Partial Relaxation Exercises
  - a) What partial relaxation exercises did you do?
  - b) When did you do them?
  - c) What helped you remember to do them?
  - d) Did you notice any other time that you were tensing muscles unnecessarily?

- e) How could you better remember to do partial relaxation exercises during these times?

3) Mini-Relaxation

- a) Did you remember to do any mini-relaxation?
- b) When did you do these?
- c) How does a mini-relaxation exercise make you feel?
- d) Can you think of any other times that it would be good for you to do the mini-relaxation exercise?

III Stressful Situations

1) Introduction

- a) Today we'll talk about ways to relax during stressful situations.
- b) Remember we've talked about stress and how stress can cause more body tension and other body changes that can result in headaches.
- c) Relaxation is the opposite of tension
- d) If you can remind you body to relax during a stressful time, this will reduce the amount of body tension that results from the stress.
- e) And if you are less tense you will be able to avoid headaches.
- f) You could use mini-relaxation or partial relaxation exercises when you are right in the middle of a stressful situation, when you start to get tense. Nobody would even know that you were doing relaxation exercises.
- g) Or you could do a full relaxation when you're feeling really tense if you can be by yourself for a while.

2) Demonstration

- 1) Let's think of a situation that might be stressful for you. This situation would probably be stressful for most people.
- 2) Say you're going to have a test at school. What subject gives you the most difficulty?

- 3) You're having a test in \_\_\_\_\_ today. You studied after school yesterday, but not last night. A friend called and invited you out to a concert. He/she had free tickets and you couldn't pass that up, so you went. But you didn't do any studying in the evening as you had planned.
- 4) Today is the test. You go into the classroom, sit at your desk, and the teacher passes out the test. You glance at it quickly and begin to get upset when you realize you don't know the first question. You can feel yourself getting really uptight and anxious and tense as you are worrying about this test.
- 5) What could you do to stay calm and to keep yourself from getting too tense and uptight?
  - a) Discuss mini-relaxations to relieve tension (as in a sigh) and to keep your cool, keep you relaxed and calm. Discuss when to do mini-relaxation exercise and how to think of doing them when getting upset.
  - b) Discuss role of partial relaxation exercises to practise while writing the test. Be careful to let unused muscles relax in legs, other arm, shoulders, and face. Be careful not to let the muscles in your writing hand be too tense, let them stay relaxed and calm with just enough tension to write. Discuss how to remember to do partial relaxation while writing the test. What could you use to trigger your memory?
  - c) Discuss regular practice with full relaxation exercise as a way of keeping body relaxed and prepared to handle stressful situations.
- 6) How do you think you would feel during the test if you remembered to do mini and partial relaxations?
  - a) more relaxed, calmer
  - b) less tense
  - c) better able to think and write test
  - d) feel less stress.
- 7) Let's think of another stressful situation for you. What sometimes happens to you that causes you to get upset or tense?

(Have the child describe the situation, where, when, who is involved, etc...)

- 8) Discuss how mini and partial relaxation exercises could be used to enable you to stay calm, keep from getting too tense and feel less stress.
- 9) Repeat 7 and 8 if the child is having difficulty with this approach.

#### VI Review

- 1) If time allows, complete a full progressive relaxation exercise, following Session I or II.

#### V Homework (make a list for the child to take home)

- 1) Do a full relaxation once a day. Practise without the tape.
- 2) Do partial relaxation during activities when unused muscles may be tense. (Discuss appropriate activities, eg, walking, writing, watching T.V., etc..)
- 3) Do mini-relaxation whenever you think to do it. (Discuss appropriate times)
- 4) Use partial and mini relaxation exercises in stressful situations. We will discuss these next week.
- 5) Continue diaries
- 6) Appointment for next week.
- 7) Reminder 1 - Next appointment with parent as well as child.  
2 - Return tape recorder next week if borrowed. (children can keep the tape.)

RELAXATION TRAINING

Session VI

I Review of Rationale

1. Causes of Migraine.

- a) Today is our last meeting until next month. Let's review what you have learned. Can you tell what happens when you get a migraine? How does relaxation help?
- b) Review posters.
- c) Review use of full relaxation, partial relaxation, mini relaxation. Check for difficulties. Ask child to demonstrate if he/she appears uncertain. Coach or model as necessary.

II. Homework Check

1. Full relaxation exercise.

- a) How has it been going?
- b) When do you do it? Where? How often?
- c) Can you do it without the tape?
- d) Let's see how you do it.
- e) That's very good. You look really relaxed. How does it feel?
- f) Review relaxation of any body part which appears to be at all tense. Demonstrate, given suggestions, coach.
- g) Now remember the relaxation will only work for you if you use it and continue to practise regularly. We find that, usually, kids who stop practising forget how to do it after a while, and then it doesn't work when they need it.
- h) Help child make a plan for continued home practise and use in stressful situations.

2. Review of Diaries.

- a) Lets see how the headaches have been? Review diaries.

III Review of "In Vivo" Applications.

1. Check for use.
2. Discuss difficulties, offer pointers, demonstration.
3. Ask child about current problem.
  - a) Is there anything happening now that upsets you or makes you tense? Tell me about it.
4. Help child to role-play by creating scenario and participating.
4. Give feedback.

IV Procedure for Follow-up

1. Ask child to continue filling in diaries and mail them in each week.
  - a) I'll be calling each week to see how you're doing.
  - b) We're meeting again in four weeks.
2. Make appointment.

V Credibility Ratings

1. Explain procedure.
2. Ask another therapist to help child with the form.

TRAINING IN THINKING STRAIGHT

Session I

I Rationale for Treatment

1. Causes of migraine.

- a) Today we're going to talk about some of the causes of migraine headaches and what we can do about it.
- b) Migraine runs in certain families and some people inherit a tendency to develop migraine headaches.
- c) One of the other things we think is involved is stress.

2. Relationship of stress, bodily reactions, migraine.

- a) Stress is a normal part of life, normal experience for everyone.
- b) For people with migraine, normal stresses and emotional upsets of everyday living can sometimes bring on a headache.
- c) Stress affects us physically by causing muscle tension, chemical reactions that cause blood flow changes by making the blood vessels contract too much, then swell and expand too much (show relevant pictures).
- d) Muscle tension and swollen blood vessels cause the pain of headache.
- e) Pain itself causes more stress and tension and this makes the pain worse.
- f) Do you understand how we think migraines happen? Can you tell me simply in your own words?

3. Use of "Thinking Straight" technique.

- a) Today we're going to teach you a technique called Thinking Straight.
- b) We will teach you Thinking Straight exercises you can use to reduce the stress and tension that you feel.
- c) This will help to prevent the changes in the blood vessels and the muscle tension that causes the pain of migraine.
- d) and this will reduce the amount of pain and the number of headaches.

4. Relationship of self-talk, stress, strong emotional reactions.

- a) To learn Thinking Straight you'll need to pay attention to the things that you think or say to yourself in your head.
- b) This is called self-talk.
- c) Stress is the result of what we say to ourselves in our heads about our experiences and especially about our problems.
- d) so self-talk determines how we feel. It's very important in causing good or bad feelings like joy or anger or resentment.
- e) This means that self-talk causes the strong emotional reactions that affect migraines.

5. What is thinking straight?

- a) Thinking Straight is a method of changing your thoughts and attitudes by changing what you say to yourself in your head (self-talk).
- b) You will learn to think positive or good thoughts that work for you instead of negative or bad thoughts that make things worse.
- c) You will also learn to use self-talk to improve how you handle problems.
- d) We will show you how to come up with other ideas on how to handle problems in your head and choose the best way for each problem.
- e) Learning to think straight about your experiences and problems will lead to less stress and tension.
- f) Thinking Straight can be used to reduce stress in particularly upsetting situations and this will block the strong emotional reactions that lead to the swollen blood vessels and headache.
- g) Thinking Straight can also be used to reduce the stress and upset of having a headache and so reduce the pain.

6. Checking child's rationale.

- a) Do you understand? Tell me simply in your own words how Thinking Straight works and how it will help migraine headaches.

II Explaining the course of Treatment.

1. Today we'll work on how self-talk works and how you can use it to cope with stress.

2. We'll also give you a Thinking Straight diary to work on each night to help you learn the Thinking Straight exercises.
3. We'll meet once a week for 5 more sessions to teach you to use the Thinking Straight method well and to use it to deal with stress.
4. How does that sound? Any questions?

### III. Beginning Treatment

1. Remember we said that emotional reactions are the result of self-talk or what we say in our heads. I'll show you how it works.
2. We'll talk about writing a test at school. Lots of kids have trouble with certain subjects. What subject gives you the most difficulty?
3. Setting up the situation.
  - a) Let's say you're having a test in \_\_\_\_\_ today. You studied after school yesterday but not last night. A friend called and invited you out to a concert. He (she) had free tickets and you couldn't pass that up, so you went and you couldn't get any studying done.
  - b) Today is the test. You go into the classroom; sit at your desk; the teacher passes out the test. You read it quickly and wouldn't you know it -- you don't understand the first question.
  - c) Right away you're down on yourself. You say negative things. (I don't know this stuff at all, I didn't study enough, I'm going to flunk, the teacher will think I'm stupid, my mother will be furious, etc.)
  - d) As you're saying all these things to yourself, how would you feel? (upset, unhappy, embarrassed, etc.)
  - e) What if you said positive things? (I'll leave that question out and come back to it later. I've been doing this stuff all month and I know it quite well. I'll start with what I know and maybe I'll get the other one later. One question is not going to make that much difference. I'll do my best and my best is usually O.K.)
  - f) This is what we call Thinking Straight.
  - g) How would you feel then? (more comfortable, eager to get started, relieved).
  - h) Right. That's how self-talk can make you feel good. When you say positive things, you feel less upset, less stress.
4. Setting up another example using experience of child.

- a) Let's try that again with something that happens to you.  
(\* alternate situations)
- b) What sometimes happens to you that causes you to get upset or tense? Maybe you get butterflies in your stomach, or you feel really nervous or your hands get cold and clammy, or maybe you become flushed and flustered?
- c) What would you say to yourself?
- d) So it seems you're saying a lot of negative things.
- e) How does that make you feel?
- f) So it seems that when you say negative things you really feel bad.
- g) What could you say to yourself that could make you feel better?  
(Model if necessary).

Repeat a-f substituting positive for negative aspects.

5. Repeat process using another example from the child's experience if child is having difficulty with the approach.

#### IV Summary of Thinking Straight as a method of Coping with stress.

1. Let's just review how thinking straight works.
2. Goal of program is to learn to cope with stress by changing thoughts and attitudes. We call that Thinking Straight.
3. Involves substituting positive or good thoughts for negative thoughts.
4. Leads to good feelings rather than bad and helps you to cope with a problem.
5. Also learn to reason through a problem and figure it out in your head so that you can choose the best action to take.
6. Action that works better for you leads to good feelings.
7. New approach to problems: result -- less stress -- less migraine.
8. Method works in all kinds of situations. Can also be used to cope with migraine.
9. We'll do Thinking Straight exercises by examining self-talk in many situations, how you felt afterwards, how it worked out. If it didn't work out well, you'll learn what you could say to yourself to make things work out better.

V Use of Thinking Straight Diary.

1. I'd like you to start practising Thinking Straight at home.
2. I'll give you a Thinking Straight Diary which you can use to help you.
3. Place to record what happened in simple language, noting all important details (with whom, where, when, what).
4. Record thoughts or self-talk.
5. Record feelings.
6. Provides a record of types of self-talk and their effects.
7. Record of how they work.
8. Permits development of more positive thoughts.

VII Homework Instructions

1. Every day before bedtime, take a few minutes to review in your thoughts what happened that day. Remember what you thought, what you felt, how it worked out.
2. Twice during the week if you felt upset or stressed about something, describe the situation in your diary. Also write down everything you said in your head and how you felt. (model how it works).
3. If nothing upset you choose something that didn't work out well, and use it instead.
4. If can't find anything choose something from yesterday or the day before, etc.
5. Once in the week, describe what happened when you had a headache. Write down what you said to yourself about the headache and how you felt.
6. Explore when is the best time to do homework. Set up time and place.
7. Continue headache diary. Give child forms.
8. Make next appointment.
9. Do credibility rating.

\* Alternate Situations

If child is unable to identify an upsetting situation, ask if he (she) has every been bothered by one of the following:

1. Giving a talk in front of the class.
2. Having a part in a school play parents and friends are attending. You forget your lines and become flustered.
3. Talking to a new girlfriend (or boy) and not knowing what to say.
4. Going to the dentist to have a tooth pulled and worrying about it.
5. Not being invited to a party and a lot of friends are going.

TRAINING IN THINKING STRAIGHT

Session II

I Review rationale for Treatment

1. Stress and physical changes
2. Headache as a stressor

II Review role of self-talk in stress

1. What you say to yourself in your head can cause stress, bad feelings and bodily changes that cause migraine.
2. Often can control migraine by getting rid of negative thoughts and ideas and substituting positive thoughts; i.e. thoughts that can work better for you.
3. Now let's look at your homework and see if you can do that. (Review each situation, self-talk and how child felt). What can you say to yourself that would work better?
4. Good. You can also say \_\_\_\_\_ (therapist adds appropriate positive self-talk).
5. How do you think you'd feel then?
6. So you see you can make yourself feel better by practising Thinking Straight.

III Role of "Crooked Thoughts" in negative self-talk.

1. Experience with many children has shown, that behind negative thoughts or ideas we often find "crooked Thoughts". By "Crooked Thoughts" we mean certain beliefs that don't help us but work against us.
2. Some kids think that they have to do everything perfect and they get really upset if they don't.
3. Or some kids think that if something doesn't work out the way they'd like, it'll be just terrible, a real disaster.
4. Or some kids think that everybody has to love them all the time, and they get very upset if someone criticizes them.
5. Another "Crooked Thought" that lots of kids have is that other people cause their problems, and there's nothing they can do about it.

6. Let's look at your homework and see if you have ideas like that sometimes. The focus is on relating negative cognition to "Crooked Thoughts", associated feeling and outcome. Try to state "Crooked Thoughts" as a broad principle which is specific to the child's situation, but will permit generalization.
7. Often we find that kids have "Crooked Thoughts" because they expect too much of themselves or their parents (relate to child's homework as appropriate). Or, they attach too much importance to everything that happens to them. Or, they say things that just make the situation worse instead of things that will help them to work it out. Does that make sense?
8. So you see, sometimes we can feel bad about something, but it doesn't mean it's going to be a disaster for us. How we feel and what will happen can be quite different. And, we can change how we feel by Thinking Straight.
9. Now let's look at what you say to yourself when you have a headache. Imagine you're beginning to get a headache (use imagery to evoke situation). What do you think about? What do you say to yourself?
10. How do you feel? When you feel upset about getting a headache and you're all worried and tense about it, the pain will be worse and last longer.
11. You can cope with your headache by Thinking Straight. If you think positively about your headache, it won't hurt so much, and it may go away faster.
12. Here are some positive things you can say to yourself when you have a headache (present list of coping self-talk to child, SEE ATTACHED).
13. Have you ever said anything like that to yourself? Which ones do you think might help you?
14. For next week I'd like you to try saying these things when you have a headache, and see how it works.
15. Discussion of homework:
  - a) I'd like you to write down two situations that upset you, just as you did last week.
  - b) This time I'd like you to think of what's wrong with what you're saying. Are you exaggerating the problem? Is it as bad as you think it is? Then write down some positive thoughts that might work better. Take each negative thought and try to turn it around.
  - c) Also do the same thing with headaches. Write down what you usually say and then try to change that to more positive things you could say that would help you to handle the headache.
16. Remember to keep your Headache Diary.
17. Make appointment for following week.

SESSION II

UNREASONABLE BELIEFS

- A: Everyone must always love me and approve of (like) what I do.
- B. I must always be the best in everything I do.
- C. If I don't do something important (if I do something wrong), I'm a bad person.
- D. If something doesn't work out, it will be a disaster.
- E. Other people cause my problem(s), and I can't do anything about it.

SESSION II

Thinking Straight About A Headache

1. What is it I have to do? I can make a plan to deal with this headache.
2. Don't worry. Worry won't help any thing. Just think of what I have to do and what I can do about the headache.
3. I can think of the headache as a test. I won't let it get to me. I can handle it. I've had lots of headaches before.
4. Just take one step at a time. Follow my plan. It will be easier to handle the pain.
5. I won't think about the pain. I'll just think about what I have to do.
6. I'll just relax, take it easier and do the best I can.
7. Now don't panic. What do I need to do to get through the next little while?
8. I can handle it. I won't let it get to me.

SESSION III

I Review of Homework on Stress Situations

- 1) Check especially for quality of positive thoughts.
- 2) Discuss difficulties. Identify "Crooked Thoughts". Use role playing or modelling to illustrate how to counter.
- 3) Focus on outcome which follows positive thoughts versus negative thoughts.

II How to Learn to Think Straight

- 1) A good trick to stop "Thinking Crooked" is to ask yourself some questions whenever you catch yourself doing it:
  - (a) Am I reading the situation right, or am I making a mountain out of a molehill?
  - (b) Am I underestimating my ability to handle it?
  - (c) What are the chances of it working out as bad as I'm afraid it will?
  - (d) What if it does? What will probably happen?
  - (e) What can I say that will work better?
- 2) Let's do that with your homework. Using example of child's, ask questions a, b, c, d, and e above.

III Review and Elaboration of Thinking Straight for Headaches

- 1) Check how it worked.
- 2) Model more appropriate cognitions if there are difficulties.
- 3) Present list of self-talk to use at beginning of headache, to cope with the pain, to cope with the scary feelings, and self-talk for compliments.
- 4) Have child select items he would like to try. Model use of self-talk.

IV Using Attention Deployment for Headaches

- 1) There are other ways you can control your headaches by changing what you think about.

- 2) A good way to do this is to change what you pay attention to. Instead of thinking about your pain, you can think of other things.
- 3) We know that pain is reduced or can even disappear when we don't pay attention to it, but think of other things. This is because we can usually only pay attention to one thing at a time.
- 4) Have you ever seen someone get badly cut, perhaps in a hockey game? Often the person goes on playing, and he doesn't realize he's cut until he sees blood. Only then does it begin to hurt. That's because he's now aware of the injury.
- 5) Did anything like that ever happen to you?
- 6) You can deal with migraine the same way. You can use your attention to help you control the pain. We'll do some exercises to teach you how to direct your attention to other things. O.K.?

#### V Exercises for Attention Diversion

- 1) Close your eyes, relax and make yourself comfortable. Now let your attention go wherever it wants.
- 2) Attention is like a searchlight. Just let it wander around until it fixes on something. When your attention stops on something, say out loud ... "I am aware of ...." and finish the sentence.
- 3) Where is your attention? Is it on your body, or outside your body, somewhere in the room?
- 4) (If it's inside the body) Are you aware of the noises in the hall? (or flickering lights, or humming sound, etc. as appropriate) Not really because you're attending to what's going on in your body.
- 5) (If it's outside the body on external environment) Are you aware of your heart beating or your growling stomach or your cold hands, etc.? Not really because you're attending to what's going on around you.
- 6) Just go on playing with your attention. Let it stop wherever it wants ..... Where is it? Notice how things outside (or inside) fade from your attention.
- 7) Now I want you to use that trick to take your attention away from your body. First pay attention to your hands. How do they feel? Are they warm or cool? Wet or dry? Notice that they feel \_\_\_\_\_. Now pay attention to the sounds in the hall. Listen to the typewriter, footsteps, voices, etc. Notice that you are less aware of how your hands feel.
- 8) When you have a headache you can do the same thing. You can pay attention to whatever you like to take your mind off the pain.

- 9) You could do this by paying attention to your breathing. Just concentrate on breathing in and out. Say "in" as you inhale, and "out" as you exhale.
- 10) You can also focus on other feelings in your body that you notice. For example, the beating of your heart, your pulse, or even the number of times you blink.
- 11) Sometimes it's easier to pay attention to things outside us. You could pay attention to the sounds around you, or to the different colours in the room, or different kinds of materials like wood, carpet, steel, plastic, rubber, leather, etc. You can count ceiling tiles or floor tiles, or the number of pieces of furniture.
- 12) You can also play games in your head. For example, you can do mental arithmetic. Start with any number, add or subtract 3 (or whatever number you like) and keep doing that until you can't do anymore.
- 13) You could also play alphabet games. Do you know the game "I packed my bag and in it I put one apple, one elephant, one telephone, one eraser, some roses, etc." (explain how it is played). You can play another variation of this game using different countries. You say "I planned a trip around the world and first I went to Austria, then Australia, then Albany, then Yalta, etc."
- 14) Using these methods when you have a headache will help you to cope with the pain, so that you will feel less stressed, and experience less pain. Does that make sense to you?

## VI Homework

- 1) I'd like you to try to use the Thinking Straight whenever you can when you feel a headache beginning. Take out the cards, and put them in order the way you want to use them. Remember to make a plan and try to stick to it. Then check how you're doing and be nice to yourself. Give yourself a compliment if you're doing well or some encouragement if you could do better.
- 2) I'd also like you to try to stop your "Crooked Thoughts" when you can. Use the tricks we talked about to help you to think straight instead.
- 3) I'd like you to keep a record of two times that you did that and how it worked. Just write two things that happened to upset you, and what you thought and felt about it. Then write down the straight thoughts you used or would like to have used, and how that would feel.
- 4) Also, do the same thing for one headache.
- 5) You'll also learn some other strategies you can use to help you cope with the headaches. O.K.?
- 6) Make appointment for next week.

At the beginning of a headache:

WHAT IS IT I HAVE TO DO?  
I CAN COPE WITH THIS  
HEADACHE.

At the beginning of a headache:

I CAN USE MY THINKING  
STRAIGHT TO HELP ME COPE.  
I'LL JUST THINK OF THE  
THINGS I CAN DO.

At the beginning of a headache:

I CAN COPE WITH THIS  
HEADACHE. I CAN MAKE A  
PLAN TO DEAL WITH IT  
AND ADJUST MY OTHER PLANS.

At the beginning of a headache:

DON'T WORRY!  
WORRYING WON'T HELP ANYTHING.  
JUST THINK ABOUT WHAT YOU  
HAVE TO DO AND FOLLOW  
THE PLAN.

At the beginning of a headache:

I CAN HANDLE IT. I'VE  
HAD LOTS OF HEADACHES BEFORE.  
I WON'T LET IT GET TO ME.

To cope with the pain:

I CAN THINK OF THE PAIN  
AS A TEST. I'LL JUST TAKE  
ONE STEP AT A TIME  
AND FOLLOW MY PLAN.

To cope with the pain:

I CAN HANDLE THE PAIN.  
I'LL JUST RELAX, TAKE IT  
EASY AND DO THE BEST I CAN.

To cope with the pain:

I WON'T THINK ABOUT THE  
PAIN. I'LL THINK ABOUT WHAT  
I CAN DO ABOUT IT AND DO IT.

To cope with the pain:

NOW DON'T PANIC. IF I  
CAN GET THROUGH THE NEXT  
FIFTEEN MINUTES I'LL  
BE ALL RIGHT. I'LL JUST  
THINK ABOUT WHAT  
I NEED TO DO.

To cope with the pain:

THERE, I DID IT! NOW  
I CAN HANDLE THE NEXT  
FIFTEEN MINUTES. I'LL  
FOLLOW MY PLAN.

To cope with the scary feelings:

WHEN THE PAIN COMES, I'LL  
JUST STOP AND KEEP  
THINKING ABOUT WHAT I  
HAVE TO DO.

To cope with the scary feelings:

DON'T PANIC. TRY TO TUNE  
OUT THE PAIN AND TUNE IN TO  
SOMETHING ELSE.

To cope with the scary feelings:

DON'T TRY TO GET RID OF  
THE PAIN. JUST KEEP IT  
UNDER CONTROL. TAKE IT  
ONE STEP AT A TIME AND  
IT'LL BE ALL RIGHT.

To cope with the scary feelings:

IT'S NOT GOING WELL.  
I'LL REVIEW MY PLAN AND  
TRY ANOTHER STRATEGY.

To cope with the scary feelings:

I WON'T LET  
CROOKED THOUGHTS MESS  
ME UP. I'LL JUST  
FOCUS ON THINKING STRAIGHT.

189

Being nice to yourself:

I'M MAKING IT! I'LL  
PASS THE TEST. I CAN  
HANDLE IT NOW. )

Being nice to yourself:

I DID IT! I PASSED THE TEST  
AND I FEEL GOOD ABOUT IT.  
THE NEXT TIME WILL  
BE EASIER.

Being nice to yourself:

I'M DOING PRETTY WELL.  
IT'S NOT AS HARD AS I THOUGHT.  
I'M DOING BETTER ALL THE  
TIME.

ATTENTION GAMES AND DAYDREAMS

1. Try to get involved in an activity you enjoy. Choose one which is not too hard. For example, playing cards, listening to records, working on a hobby, etc.
2. Direct your attention to your surroundings. Look around the room or place you are in and study it for possibilities. Perhaps you can count ceiling tiles or floor tiles. Count the number of colours or materials you see. Try studying the way the room is built and rearrange the doors, windows, cupboards, etc. so that it will work better, studying the way the room is furnished, and rearranging the furniture in your head so that it works better or is more attractive. Choose new furniture if you like and arrange that.
3. Play attention games such as mental arithmetic or spelling or "I packed my bag and in it I put ...". Try to remember the words of a song or a poem you like. Play rhyming games. How many words can you think of that rhyme with cat, thing, etc. Try to write a verse in your head. Fix it up until you get it the way you like it.
4. Direct your attention away from your head to other parts of your body. For example, count your breaths, or take your pulse, or study your heart beat, etc.
5. Choose a favorite daydream and run it in your head like a movie. You are the movie director and you can include any scenes you like. Add scenes of activities you really enjoy. For example, imagine spending a day at your favorite beach, lying in the sun doing nothing, listening to the waves lapping the shore, see yourself drifting on a raft on the water, etc. Or else imagine yourself playing a game in a sport you like. Think about every play you make and what follows. Then imagine what you do next, and how the game works out. Imagine yourself playing especially well and everyone applauding you.

TRAINING IN THINKING STRAIGHT

Session IV

I Review of Use of Thinking Straight for Headaches

1. Use of Cards.

- a) Have you been using the Thinking Straight cards when you feel a headache coming on?
- b) How is it going? (discuss difficulties, suggest alternates, etc.)
- c) Sometimes children like to change the wording on the cards. It may feel more natural if you use your own words. You could write your own words on the back of the cards.

2. Use of attention deployment.

- a) Have you practised the attention exercises? (discuss problems, make suggestions).
- b) Are there any activities you like to do that sometimes take your mind off your headaches?
- c) Sometimes getting involved in a really good mystery, or some other kind of book, or a game of some kind can help.
- d) Try to use anything like that if it helped before, or if you think it could work.

II The Use of Fantasy and Imagery.

1. The use of daydreams.

- a) Daydreaming is a method you can use to take your attention off your pain.
- b) Have you ever noticed that if you get caught up in an absorbing daydream you don't notice what's happening around you? Tell me about how it happened.
- c) Thinking about something pleasant is easier than not think about the pain when you have a headache.
- d) Thinking about pleasant things can also make you feel good and reduce the stress and tension of the headache.
- e) A good way to do this is to "daydream on purpose", or to run a movie in your head.

- f) The more real your daydream is, the better it will work.
- g) Really powerful daydreams can cause bodily reactions, almost as if the experience were real.
- h) I'll show you how that works.

2. Preparing for the fantasy.

- a) Close your eyes, relax, and make yourself comfortable. Take it easy and forget what you've been thinking about.
- b) Try to imagine that your mind is a movie screen and it's gone completely blank.
- c) Now just listen to my voice, and try to make the image as real as you can on the movie screen.

3. Demonstration of the lemon fantasy.

- a) On the screen you see a table with a pure white dinner plate, all clean and shiny, with a bright yellow lemon on it.
- b) You can see that the skin of the lemon is glistening almost as if there were dew on it. You see little bumps on the skin like goose bumps. You can almost touch the round, leathery, bumpy surface. It's very yellow and very bright against the white plate. It looks very real.
- c) On the table beside the plate, there's a sharp steel knife, pick up the knife and, holding the lemon steady, cut it through the middle. As you cut, you can feel the cool, wet, sticky, juice running onto your fingers.
- d) The smell fills your nose: it's sharp, tangy, tart -- so sour you can almost taste it. Your nostrils open wide with the sharp, sour smell.
- e) Now pick up one half, and taste it, it's so sour your mouth puckers. You taste the lemony flavour, and it's so tart you almost have to spit it out.
- f) Did you smell the lemon? Did your mouth pucker? What else did you feel?

4. Demonstration of the beach fantasy.

- a) Now we're going to pretend to see a movie that makes most people feel really good.

- b) First make yourself really comfortable in your chair again, then close your eyes, and let yourself imagine the following scene on a movie screen. You're standing on a lovely white sandy beach overlooking a sparkling blue lake. Behind the beach there are cool, shady woods of pine and spruce and cedar.
- c) It's a beautiful hot summer day, about noon. The sun is shining brightly. The sky is deep blue, so intense it almost doesn't look real. There are fat, white, fluffy clouds drifting slowly across the sky. Watch the clouds drift lazily here and there.
- d) It's a perfect summer day, absolutely beautiful, and you have nothing to do -- just laze around and enjoy yourself.
- e) The sun is high in the sky, and very bright, very strong, very hot. Feel the heat on you. Feel the sun warming your skin. Feel little beads of perspiration forming on your forehead. Now there's a cool breeze gently blowing on your cheek. It feels so relaxing.
- f) You start walking across the hot sand to the water. The sand is so hot your feet can hardly stand it. They're beginning to burn so you move swiftly into the waters.
- g) Now you feel the cool, refreshing water on your feet and legs. You laugh and dive in quickly and you feel cold, you're almost shivering.
- h) You start to swim and soon you feel warmer and you're really enjoying your swim. You're all alone on the lake, except for a tiny sailboat way off in the distance, and everything is just perfect.
- i) You decide to go lie down and enjoy the sun. You walk across the hot sand to your towel, dry off briskly, then stretch it out and lie down in the warm sun. You feel the rays of the sun tanning your skin.
- j) You hear the lake gently lapping against the shore. You hear birds chirping and singing in the woods nearby.
- k) The woods smell of pine and spruce, a tangy, spicy, delicious smell, sharp and refreshing. You walk into the woods, strolling slowly, aimlessly. You wander around, exploring rocks and flowers, and enjoying every moment.
- l) Take a minute to really enjoy it, and then open your eyes slowly.

5. Reinforcing the use of fantasy to control pain.

- a) Were the images real for you?

- b) Did the feelings in your body fit the daydream? Did you feel good, happy about having a truly nice day?
- c) If you can become involved in a daydream like that when you have a headache, you'll find you'll be less conscious of the pain, and it won't hurt so much.
- d) I'd like you to try using daydreams like this during the week, and next week we'll talk about how it worked. Use any daydream you like, whichever one you'll enjoy the most.

### III. Patterns in Stress Reactions

#### 1. Looking for patterns.

- a) I'd like to go over your Thinking Straight homework now. How did it go? Are you able to change the negative self-talk to more positive self-talk?
- b) We find that very often there's a pattern in terms of the kinds of situations that make a person upset. Some people always get upset if they think they're being put down; other people get uptight if they have too many things to do at the same time and there's not enough time.
- c) Do you notice any pattern in the things that bother you?
- d) Let's look at your homework and see if we can find a pattern. (Ask client for suggestions).
- e) I was looking through your homework and I think I see a pattern. It seems like very often you get upset when ..... (describe).

#### 2. Role of self-statements in the pattern.

- a) What do you say to yourself in such a situation at the beginning?
- b) In the middle?
- c) At the end?
- d) How do you feel as you're saying these things?
- e) So it seems that very often you say negative things about what this situation means to you. You're really hard on yourself and you think that ..... (refer to negative appraisal of meaning of situation, potential danger, ability to cope, self worth, or probable outcome).
- f) When you're negative like that the chances are you won't do the things that might work out well, and things will end up in a mess.

- g) What's even worse is that it's a vicious circle. Things don't work out, you feel bad; you say more negative things, and you're off on the merry-go-round again.

3. Identifying the cues that trigger the sequence.

- a) When you find yourself saying things like that, you can use it as a signal to start Thinking Straight. Just tell yourself that you're wrong because ..... (offer appropriate reason)... and start thinking positively. Make a plan and start coping.
- b) Let's use an example from your homework that gave you trouble to practise that. (Using imagery focus on feelings and identify negative self-statements).
- c) Remember whenever you find yourself thinking ..... that's a signal for you, like an orange warning light, that you need to start Thinking Straight.

4. Looking at the entire sequence.

- a) Let's review what the pattern is. What kind of situation usually upsets you?
- b) What kind of negative things do you say to yourself?
- c) What kind of feelings do you have?
- d) How does that usually work out for you?
- e) So it seems that very often you're hard on yourself and it just makes things worse.

5. Interrupting the sequence at the earliest possible moment.

- a) If you can nip the pattern in the bud, before it really takes off you'll find very often you can turn things around so you won't get upset, and things will work out better.
- b) What is the feeling that can work as your signal?
- c) What is the negative self-talk that goes with it?

6. Countering negative self-talk.

- a) Remember whenever that happens it's time to go on the offensive. Start countering with positive self-talk and straight thinking.
- b) If you're doing it well your feelings will tell you that. Use your feelings as a barometer to tell you how you are doing. When you're doing well, you'll start feeling better.

- c) Repeat the process with another example from homework if necessary.

#### IV Homework

1. For homework I'd like you to describe two situations that happened to upset you, then write down how you felt, and what you said to yourself. Write down the negative self-talk that you started with, and then write down the positive self-talk you used.
2. Also continue to use your Thinking Straight to cope with your headaches. Make a plan and use the different methods you've learned to cope with the pain. Remember you can distract yourself by directing your attention onto other things or using a daydream or fantasy; or you can play some of the games you learned. Next week we'll talk about how it worked out and what else you can do.
3. Remember to continue to record your headaches and triggers so we can see how you're doing.
4. We'll make your appointment for next week at the same time. Is that all right?

TRAINING IN THINKING STRAIGHT

Session V

I Review of the Rationale

1. Causes of migraine.

- a) Let's review how we think you get a headache and how Thinking Straight helps. Can you tell me?
- b) Review posters.
- c) Review coping statements for headache. Offer additions if required.

II Review of Homework

1. Using Thinking Straight.

- a) Let's look at your diary. Tell me what happened. Did you use the Thinking Straight?
- b) Pretend it's happening now and show me how you cope.
- c) Offer reinforcement, suggestions, alternative coping statements.
- d) Tell me about something else where you used the Thinking Straight.
- e) Discuss application, problems. Point out the cue value of negative feelings. Emphasize need to counter cognitions before, during and after. Reinforce need to evaluate progress.

2. Review of Headache Diary.

- a) Lets see how the headaches have been.
- b) How do you cope with the pain?
- c) Can you make a plan which helps? Offer help if necessary. Suggest attention deployment games, fantasy, coping self-statements.

III Review role of stress.

- a) Sometimes things happen that we don't know how to handle. Then we might feel helpless or confused.

- b) When we feel that way we experience stress.
- c) If we know how to go about solving the problem we feel better, less stressed.
- d) Problem-solving is a simple method you can use to help you deal with anything when you're not sure what to do.

## 2. Defining the options.

- a) Whenever we have a problem, we also have certain choices or options because there are different things we can do.
- b) Let's take an example from your diary and I'll show you how it works. What would you like to work on?
- c) Tell me about the problem. What can you do about it? Help child to generate additional options.
- d) What would your Dad do? Your Mum? Can you do that?
- e) Now lets review the choices. What would you really like to do best? Can you do it? Will it work? Is it too much trouble?
- f) If it won't work, let's try another idea. (Repeat process until an appropriate choice is found).

## 3. Choosing a solution.

- a) Whenever you use problem-solving you start by making a list of choices. Think of all the things you can do.
- b) To help you decide which to do you have to think like this: Can I do it? Will it work? How hard is it to do? Is it worth it?
- c) Then you can choose whatever you can do that will work for you and is worth the effort.
- d) After that you have to make a plan to help you do it.

## 4. Practice.

- a) Using examples from earlier sessions have child generate options and choose a solution. (Include headache and missing school as a problem). Repeat process until child can do it alone.

IV Homework

1. Have child continue with Thinking Straight Diary and Headache Diary.
2. Reinforce need to use the method "live" as events occur.
3. Ask child to write down options for one problem that happened during the week.
4. Make appointment for next week.

TRAINING IN THINKING STRAIGHT

Session VI

I Review of Rationale

1. Causes of migraine.
  - a) Today is our last meeting for four weeks. I'd like to spend our time reviewing what you've learned and helping you with any difficulties. Is that O.K.?
  - b) Lets start with what happens when you get a migraine. Tell me in your own words. How does Thinking Straight help?
  - c) Review posters.

II Homework Review

1. Using Thinking Straight.
  - a) Have you been using it? When? With what kind of situation? Did it help?
  - b) Can you talk yourself out of the crooked thoughts?
  - c) Lets see how you do it. Tell me about something that is happening now and how you think about it.
  - d) Offer reinforcement. Suggest alternative coping statements if necessary. Role-play or coach as appropriate.
  - e) Now remember the Thinking Straight will only work for you if you use it all the time. It has to become a habit, a part of you. We find that kids who stop practising forget how to do it, and then it doesn't help when they need it.
2. Review of Thinking Straight Diary.
  - a) Would you like help with anything that happened this week? Let's review your diary.
  - b) Tell me when you used the Thinking Straight and how it worked.
  - c) Did you try to use problem-solving when ..... happened. Show me how you do it. Close your eyes and pretend it's happening now.
  - d) Offer reinforcement, suggestions, etc...

3. Review of Headache Diary.

- a) Lets see how the headaches have been. Review diary.
- b) Can you cope with the pain now?
- c) Help child to review plan to cope with bad headaches using attention deployment, fantasy, coping self-statements, etc.

III Review of program as required by child.

1. Check for use of various components.
2. Discuss difficulties, offer pointers, demonstration.

IV Review of "in vivo" application

1. Ask child for important current situation.
2. Have him/her recreate situation and role-play Thinking Straight.
3. Give reinforcement. Suggest other coping statements if appropriate.

V Procedure for Follow-up

1. Ask child to continue filling in diaries and mail them in each week.
  - a) I'll be calling each week to see how you're doing.
  - b) We'll meet again in four weeks.
2. Make appointment.

VI Credibility Rating

1. Explain procedure.
2. Ask another therapist to help child complete form.

STRESS REDUCTION THERAPY

Session 1

1 Rationale for Treatment

1. Causes of migraine.

- a) Today we're going to talk about some of the causes of migraine headaches and what we can do about it.
- b) Migraine runs in certain families and some people inherit a tendency to develop migraine headaches.
- c) One of the other things we think is involved is stress.

2. Relationship of stress, bodily reactions, migraine.

- a) Stress is a normal part of life, normal experience for everyone.
- b) For people with migraine, normal stresses and emotional upsets of everyday living can sometimes bring on a headache.
- c) Stress affects us physically by causing muscle tension, chemical reactions that cause blood flow changes by making the blood vessels contract too much, then swell and expand too much. (show relevant pictures)
- d) Muscle tension and swollen blood vessels cause the pain of headache.
- e) Pain itself causes more stress and tension and this makes the pain worse.
- f) Do you understand how we think migraines happen? Can you tell me simply in your own words?

3. Use of stress reduction therapy.

- a) We think our feelings or emotions play an important part in the stress we feel.
- b) If we sometimes don't understand our emotions, this can cause us to feel more stress.
- c) And if we sometimes don't express our feelings - if we don't let our feelings out, this can cause us to feel tense after awhile.

- d) So the stress and tension that we sometimes have because of our feelings can cause more headaches.
- e) What we'll teach you is called stress reduction training. We'll use different types of psychological tools to help you to better understand your feelings.
- f) You'll also learn about how you react in different situations and how you get different feelings.
- g) This will lead to a deeper understanding of feelings and emotions and will give you a better understanding of your own feelings.
- h) When you know some more about your own emotions and how you get different feelings you'll feel less stress and your body can be less tense.
- i) Discuss with posters how stress reduction training can work.
- j) You can use your stress reduction training in any upsetting situation. It can help you to block the strong emotional reactions that increase stress and tension and cause headaches.
- k) Learning stress reduction techniques will also help you to cope with a headache by helping you to reduce the tension you feel from the pain of a headache.
- l) Do you have any questions?
- m) Can you tell me back again how we think stress reduction training works?

## 11 Method

### 1. Introduction

- a) Today we'll begin talking about thoughts and feelings and how to figure out our own thoughts about what we feel.
- b) We'll be using methods that psychologists have developed to help identify feelings that we may not be fully aware of.
- c) We'll also learn good ways of expressing feelings.
- d) Feelings can sometimes cause stress.
- e) By learning to express our feelings, by letting them out, we can reduce stress. It's like blowing off steam.

### 2. Discussion of Feelings

- a) We all have lots of different emotions.. We sometimes have good feelings and sometimes bad feelings.
- b) You've probably felt lots of different emotions.. You've probably felt angry, confused, sad, upset, sorry, helpless and you've also probably felt happy, excited, pleased, content, calm and relaxed.
- c) The things that make us feel good or bad - the things that we feel happy or sad about - are often different for each of us.
- d) Let's talk about some happy and sad feelings you have had.
- e) Think of the time when you were the happiest you've ever been. Where were you? Who else was there? What about the situation made you happy?
- f) When was another time you were very happy? (Ask the child to describe this situation as above and discuss the feelings.)
- g) What other things would make you feel happy?
- h) Now think of the time when you felt very sad. (Ask the child to describe the situation and discuss the feelings, as above)
- i) What other things might make you feel sad?
- j) We think that it's good for you to think about your emotions and about the things that cause you to have different feelings.

- k) This will give you a better understanding of your feelings and will make them less stressful.
- l) And when you're feeling less stress, your body will be less tense and you will have less headaches.

### III Review Rationale

- 1) Can you tell me again how stress reduction training can help your headaches?
- 2) Do you have any questions? Ask both parent and child.

### IV Credibility Ratings - Both parent and child

### V Homework

- 1) With the stress reduction diary describe one happy experience each day.
- 2) Discuss when and where it would be best to fill out the diary.
- 3) Continue the headache diaries.
- 4) Appointment for next session.

STRESS REDUCTION TRAINING

Session II

With Child Only

I Review of Rationale

- 1) Let's review how we think you get a headache. Can you tell me?
- 2) How are feelings and emotions involved?
- 3) How do we think stress reduction training can help?
- 4) Review posters

II Homework Check

- 1) Discuss each homework example of happy feelings.
- 2) Discuss what factors in each situation resulted in the happy feelings.
- 3) Discuss what type of happy emotion was felt.

III Expressing Emotions

- 1) What you've been doing in your homework is expressing some of your feelings by writing them down and then discussing them with me.
- 2) By talking about these feelings you are letting out some of the tension that comes from the feelings. It's like letting air out of a balloon.
- 3) It's important to release the tension from feelings before feelings become strong enough to cause so much stress that the tension makes the balloon burst - like when you get angry that you blow up and lose your temper. This is usually hard on the blood vessels and muscles that are so sensitive to stress and tension in people with migraine.
- 4) But if you let your feelings out before the tension is so great you release the tension a little bit at a time - like letting a little bit of air out of the balloon at a time.
- 5) You can do this by expressing your emotions - talking to people about what you are feeling.
- 6) Who would be a good person for you to practise this with?
- 7) When would you have a chance to talk to this person?
- 8) What kind of feelings could you express to this person?  
( Suggest for example,.. Would you tell this person about a worry that you had or something that you were angry about?)

- 9) Role play a situation if the child has difficulty figuring out how he might express an emotion or let a feeling out.
- 10) Practise expressing feelings with this person for the next week.

#### IV Stories from Pictures

Present any of the first ten TAT pictures appropriate to age and sex.

- 1) Now I'm going to show you some pictures? Make up a story for each picture by using your imagination.
- 2) Tell what happened before. What is happening now? What are the people feeling? What are they saying and thinking? How will the story turn out?
- 3) You can make up any kind of story you please. Here's the first picture. Let me know when you're ready to tell the story.
- 4) Give the child a few minutes to make up a story. Encourage him while he is telling the story. Ask questions about the story content as in 2 above
- 5) Then relate the story to the child's own feelings, with such questions as:
  - Did something like that ever happen to you?
  - How did you feel?
  - Did you ever feel that way? When?
  - What makes you feel like that?
  - If something like that happened, how would you feel? etc...
- 6) Continue with different pictures according to available time.
- 7) What we've been doing is looking at what was happening in your stories and seeing how what happens to people can make them feel differently.
- 8) We've also been talking about some of your feelings. By expressing these feelings you've released some of the tension in your body from these feelings.

#### V Homework

Give the child a personalized written list of stress reduction things to do during the week.

- 1) With the stress reduction diary describe one unhappy, or sad, experience each day. Try to recognize the feeling when it happens so you can remember about it when you do your homework. (Review when it would be best to fill out the homework sheet.)
- 2) Practise expressing your feelings to \_\_\_\_\_ (as discussed in III above)
- 3) Continue headache diaries.

STRESS REDUCTION TRAINING

Session III

With Child Only

I Review of Rationale

- 1) Let's review how we think migraine headaches happen. Can you tell me?  
(Review migraine, body changes, role of stress.)
- 2) How are feelings and emotions involved?
- 3) How will stress reduction training help?  
(Stress importance of releasing tension a little bit at a time by thinking about and talking about emotions. Review the balloon analogy.)
- 4) Review posters.

II Homework Check

- 1) For each homework example of sad feelings discuss the situation, people involved, what factors are related to the sad feelings and details of sad feelings.
- 2) Last week we talked about practising expressing your feelings. Who did you try this with? (Check from homework assigned in Session II). What did you talk to them about? Anything else?
- 3) That's good. The more you can talk to others about your emotions, the more air you can let out of the balloon and you will be less tense.
- 4) Practise this some more this week. Continue to talk to \_\_\_\_\_ about your feelings. Is there someone else that would be good for you to talk to about what you feel?

III Answering statements

- 1) Today I'm going to read some statements to you about things you might like or not like or about things you might feel or not feel.
- 2) You tell me if what I read is true or false for you.
- 3) Let's try one: I am happiest when I'm alone?
  - a) Is this true or false for you?
  - b) Do you ever like to be alone? When?
  - c) When would you not want to be alone?
  - d) What do you like (not like) about being alone?
- 4) Continue with other statements as in 3.

IV Review Rationale

- 1) What we've been doing today is talking about lots of different feelings that you have.
- 2) Whenever you think about, or talk about, or notice something that you feel, it releases some of the pressure from that feeling and this releases tension.
- 3) How can that help your headache?

V. Homework

Give the child a personalized written list of stress reduction things to do during the week.

- 1) With the stress reduction diary, describe something that made you angry each day. Try to recognize angry emotions when you feel them and describe the feeling in the diary.
- 2) Review when it would be best to complete the diary to ensure compliance if necessary.
- 3) Practise expressing your feelings and we'll talk about this again next week.

STRESS REDUCTION TRAINING STATEMENTS: SESSION III

1. I wish I were not so shy.
2. My family treats me more like a child than a grown-up.
3. There is very little love and companionship in my family as compared to other homes.
4. I often find myself worrying about something.
5. It does not bother me to see animals suffer.
6. It is hard for me to ask help from my friends when I cannot return the favor.
7. My parents often object to my friends.
8. I should like to belong to several clubs or teams.
9. I get mad easily and then get over it soon.
10. Sometimes I get so restless that I can't sit for long in a chair.
11. I never worry about my looks.
12. I believe I am no more nervous than most others.
13. I have reason for feeling jealous of one or more members of my family.
14. No one cares much what happens to me.
15. I like to be with a crowd who play jokes on one another.
16. When in a group of people I have trouble thinking of the right things to talk about.
17. I have very few fears compared to my friends.
18. In school I find it very hard to talk in front of the class.
19. Even when I am with people I feel lonely a lot of the time.
20. At times I very much want to leave home.
21. I seem to make friends about as quickly as others do.
22. I am more sensitive than most other people.
23. My mother or father often make me obey even when I think that it is unreasonable.
24. No one seems to understand me.
25. I cannot keep my mind on one thing.

26. I easily become impatient with people.
27. I enjoy doing things which are hard.
28. If others disagree with me, I usually decide that I am wrong.
29. Others think I am lively and clever.
30. I almost always accept a dare.
31. I feel that adults who still like to play have never really grown up.
32. I consider it important that my friends think very well of me.
33. I am not very stubborn in an argument.
34. I am too shy to tell jokes.
35. I get disgusted with myself when I have not learned something properly.
36. Trying to please people is a waste of time.
37. Adventures where I am on my own are a little frightening to me.
38. I very much enjoy being complemented.
39. Loyalty to my friends is quite important to me.
40. If someone does something I don't like, I seldom say anything.
41. Rarely, if ever, do I do anything reckless.
42. I feel very sorry for lonely people.
43. I will keep working on a problem after others have given up.
44. I don't like to be away from my family too much.
45. I feel confident when telling other people what to do.
46. I am considered friendly.
47. I am quite soft-spoken or quiet.
48. I usually try to share my problems with someone who can help me.
49. I seldom feel like hitting anyone.
50. I am one of the quietest children in my group.

STRESS REDUCTION TRAINING

Session IV

1. Follow procedure for Session II.
2. In discussing the expression of emotions, phrase questions in imperfect tense, i.e. "Whom have you been talking to about your feelings?"
3. Ask about difficulties. Suggest that it is appropriate to talk to different people depending upon the situation. Help him/her to find alternatives.
4. In giving homework, ask child to talk about calm, contented feelings. Provide examples.

STRESS REDUCTION TRAINING

Session V

1. Follow procedure for Session III.
2. In reviewing homework, use examples of calm, contented feelings provided by child.
3. Assign homework involving frustrated feelings. Help child to identify situations in which such emotions arise. Discuss circumstances, how they react, etc...

STRESS REDUCTION TRAINING STATEMENTS: SESSION V

1. I am easily embarrassed.
2. I have more than my share of things to worry about.
3. Sometimes I become so excited that I find it hard to get to sleep.
4. I get anxious and upset when I have to make a short trip away from home.
5. I have sometimes given up doing a thing because I thought I couldn't do it well.
6. I am inclined to take things hard.
7. I hate to have to rush when working.
8. I am not usually self-conscious.
9. I very seldom have the blues.
10. I am often said to be hotheaded, or have a quick temper.
11. People often disappoint me.
12. I am afraid to be alone in the dark.
13. I often ask people for advice.
14. Often, even though everything is going fine for me, I feel that I don't care about anything.
15. I sometimes feel that my difficulties are piling up so high that I won't be able to overcome them.
16. I am usually calm and not easily upset.
17. I am apt to take disappointments so hard that I can't put them out of my mind.
18. It bothers me to have someone watch me at work even though I know I can do it well.
19. One or more members of my family is very nervous.
20. It makes me nervous to have to wait.
21. My worries seem to disappear when I get into a crowd of lively friends.
22. My father is very strict with me.
23. I do not mind meeting strangers.
24. I feel like giving up quickly when things go wrong.
25. It is always a good thing to be honest and open.

26. I usually work things out for myself rather than get someone to show me how.
27. I sometimes find it hard to stick up for my rights because I am so shy.
28. Some of my family have quick tempers.
29. I am made nervous by certain animals.
30. It makes me angry to have people hurry me.
31. Sometimes I have the same dream over and over.
32. Sometimes I am sure that other people can tell what I am thinking.
33. I am very bothered by forgetting where I put things.
34. My feelings are not easily hurt.
35. I do many things which I am sorry about afterwards.
36. I have very few quarrels with members of my family.
37. I often stand up for what I think is right.
38. I seem to be about as smart as most others around me.
39. Often I can't understand why I am so cross and grouchy.
40. Criticism or scolding hurts me terribly.
41. I feel useless at times.
42. At times I feel like picking a fight with someone.
43. I would rather win than lose in a game.
44. I feel that I have often been punished without reason.
45. If I have a problem, I like to work it out alone.
46. I am not one of those people who blurt out things without thinking.
47. I am usually the first to offer help when it is needed.
48. Family duties make me feel important.
49. I often make people angry by teasing them.
50. I do not mind being made fun of.

STRESS REDUCTION TRAINING

.Session VI

I Review of Rationale

1. Causes of Migraine

- a) Today is our last meeting for a month. Let's start by reviewing what you have learned about migraine? How does talking about your feelings help?
- c) Discuss posters.

II Homework Review

1. Talking about feelings.

- a) Whom have you been talking with?
- b) When do you do it? Where? How often?
- c) How does it work? Discuss difficulties. Offer suggestions.
- d) Lets see how you do it. Tell me about something that happened this week.
- e) Offer suggestions about listening to the other person, replying to their ideas, giving them enough time, etc...
- f) Review specific examples in Stress Reduction Diary. Be supportive, encouraging.

2. Review of Headache Diary.

- a) Let's see how the headaches have been? Review diary. Offer comments on situations which caused headaches.

III Procedure for Follow-up

1. Ask child to continue filling in diaries and to mail them in each week. Provide diaries and stamped envelopes:

- a) I'll be calling each week to see how you're doing.
- b) We meet again in four weeks for a check-up.

2. Make appointment.

IV Credibility Ratings

1. Explain procedure.
2. Ask another therapist to help child with the form.

APPENDIX F

TREATMENT RATIONALES

APPENDIX F

Rationale for Relaxation Training Group

We define headache as pain in the head, usually from the eyes up. Migraine is a certain kind of headache. Migraine headaches come and go, and they are often one-sided. The pain is usually throbbing and sharp, and it can be very strong. The pain is caused by the stretching and swelling of the cranial blood vessels on the outside of the head. These changes in the blood vessels can be caused by many different things such as certain foods, bright lights, physical tension and strong emotional reactions.

Evidence indicates that many headaches are the result of negative emotional reactions to the normal experiences of growing up which cause stress and strain. Emotional reactions are negative when they interfere with your ability to cope with events in a helpful way. Examples are worry, tension, fear and anxiety, anger and resentment, or depression.

Relaxation training is a method to teach you to relax your whole body by relaxing all the different muscle groups in order. Since relaxation is the opposite of tension, it is believed that learning relaxation training will give you a technique which you can use to reduce tension whenever you are feeling upset. By using this method to cope with stress and tension, you may be able to prevent migraine headaches

by blocking the strong emotional reactions. This should stop the changes in the blood vessels that cause the pain. You will also learn to use relaxation to help you feel better when you have a headache.

#### Rationale for Cognitive Coping Treatment

We define headache as pain in the head, usually from the eyes up. Migraine is a certain kind of headache. Migraine headaches come and go, and they are often one-sided. The pain is usually throbbing and sharp, and it can be very strong. The pain is caused by the stretching and swelling of the cranial blood vessels on the outside of the head. These changes in the blood vessels can be caused by many different things such as certain foods, bright lights, physical tension and strong emotional reactions.

Evidence indicates that many headaches are the result of negative emotional reactions to the normal experiences of growing up which cause stress and strain. Emotional reactions are negative when they interfere with your ability to cope with events in a helpful way. Examples are worry, tension, fear and anxiety, anger and resentment, or depression.

Cognitive coping training is a method to block negative emotional reactions by teaching you to change your thoughts and attitudes about your experiences. You will learn to think positively and to do helpful things to deal with problems. In this way it is believed that learning

cognitive coping training will give you a technique which you can use to reduce tension whenever you are feeling upset. By using this method to cope with stress and tension, you may be able to prevent the headache by blocking the strong emotional reactions. This should stop the changes in the blood vessels that cause the pain. You will also learn to use cognitive coping to help you feel better when you have a headache.

#### Rationale for Non-Specific Treatment

We define headache as pain in the head, usually from the eyes up. Migraine is a certain kind of headache. Migraine headaches come and go, and they are often one-sided. The pain is usually throbbing and sharp, and it can very strong. The pain is caused by the stretching and swelling of the cranial blood vessels on the outside of the head. These changes in the blood vessels can be caused by many different things such as certain foods, bright lights, physical tension and strong emotional reactions.

Evidence indicates that many headaches are the result of negative emotional reactions to the normal experiences of growing up which cause stress and strain. Emotional reactions are negative when they interfere with your ability to cope with events in a helpful way. Examples are worry, tension, fear and anxiety, anger and resentment, or depression.

Stress reduction training is a method to teach you

to talk about your thoughts and feelings and your experiences. Since we can "blow off steam" by talking things over, and help our friends and family to understand us, it is believed that learning to express your feelings will provide you with a technique which you can use to reduce tension whenever you are feeling upset. By using this method to cope with stress and tension, you may be able to prevent migraine headaches by blocking the strong emotional reactions. This should stop the changes in the blood vessels that cause the pain. You will also learn to use stress reduction to help you feel better when you have a headache.

APPENDIX G

THINKING STRAIGHT DIARY

APPENDIX G

THINKING STRAIGHT DIARY

NAME:	NO:	WEEK:	DATE:
What happened that upset you or made you tense?	<u>What did you say to yourself in your head about it?</u>		How did you feel?
1.			
2.			
3.			

APPENDIX H

STRESS REDUCTION DIARIES

APPENDIX H

STRESS REDUCTION DIARY

NAME:		NO:		WEEK 1	DATE:
SITUATION: What happened that pleased you or made you <u>happy</u> ?			FEELINGS: What kind of feelings did you have?		
1.					
2.					
3.					
4.					
5.					
6.					
7.					
EXAMPLES OF HAPPY FEELINGS					
Pleased	Joyful	Joyous	Excited	Bubbly	
Victorious	Pleasant	High	Loving	Sunny	

STRESS REDUCTION DIARY

NAME:		NO:		WEEK II		DATE:	
SITUATION: What happened that bothered you or made you <u>sad</u> ?				FEELINGS: What kind of sad feelings did you have?			
1.							
2.							
3.							
4.							
5.							
6.							
7.							
EXAMPLES OF SAD FEELINGS							
Unhappy		Sorry		Sorrowful		Depressed	
Down		Miserable		Tearful		Weepy	

STRESS REDUCTION DIARY

NAME:		NO:		WEEK III		DATE:	
SITUATION: What happened that bothered you or made you angry?				FEELINGS: What kind of angry feelings did you have?			
1.							
2.							
3.							
4.							
5.							
6.							
7.							
EXAMPLES OF ANGRY FEELINGS							
Furious		Hostile		Resentful		Vicious	
Mean		Hateful		Explosive		Murderous	

STRESS REDUCTION DIARY

NAME:		NO:		WEEK IV		DATE:	
SITUATION: What happened that made you feel <u>calm</u> ?				FEELINGS: What kind of calm feelings did you have?			
1.							
2.							
3.							
4.							
5.							
6.							
7.							
EXAMPLES OF CALM FEELINGS							
Relaxed		Comfortable		Lazy		Content	
Rested		Peaceful		Sleepy		Easy going	

STRESS REDUCTION DIARY

NAME:		NO:		WEEK V DATE:	
SITUATION: What happened that upset you or made you feel <u>frustrated</u> ?			FEELINGS: What kind of frustrated feelings did you have?		
1.					
2.					
3.					
4.					
5.					
6.					
7.					
EXAMPLES OF FRUSTRATED FEELINGS					
Stuck		Trapped		Hopeless	
Desperate		Discouraged		Useless	
				Helpless	
				Disappointed	

STRESS REDUCTION DIARY

NAME:		NO:		WEEK VI	DATE:
SITUATION: What happened that upset or pleased you?			FEELINGS: What kind of bad or good feelings did you have?		
1.					
2.					
3.					
4.					
5.					
6.					
7.					
EXAMPLES OF FEELINGS					
Pleased	Hostile	Sorry	Relaxed	Trapped	
Furious	Content	Unhappy	Mean	Rested	
Vicious	Down	Comfortable	Helpless	Disappointed	
Excited	Miserable	Hopeless	Loving	Depressed	

APPENDIX I

DIAGNOSTIC CHECKLIST

APPENDIX I

CHECKLIST FOR MIGRAINE RESEARCH STUDY

NAME: \_\_\_\_\_ D.O.B. \_\_\_\_\_ DATE: \_\_\_\_\_

PHYSICIAN: \_\_\_\_\_

1.	<u>DIAGNOSTIC CRITERIA*</u>	<u>TRUE</u>	<u>FALSE</u>
A.	paroxysmal headache	_____	_____
B.			
1.	positive family history, e.g. parents, siblings, grandparents, aunts, uncles	_____	_____
2.	scotoma or related phenomena e.g. transient hemiparesis	_____	_____
3.	throbbing pain	_____	_____
4.	vomiting	_____	_____

\*Diagnostic criteria = A and any 2 of the 4 items of B.

DIAGNOSTIC CRITERIA MET YES \_\_\_\_\_ NO \_\_\_\_\_

11.	<u>INCLUSION CRITERIA*</u>	<u>TRUE</u>	<u>FALSE</u>
A.	9-17 years of age	_____	_____
B.	recurrent headaches for three months or longer	_____	_____
C.	no new medication within the past two months	_____	_____
D.	headaches not generally linked to diet or allergy	_____	_____
E.	headaches average one or more per week	_____	_____
F.	no neurological problems present	_____	_____
G.	no other major medical problems present e.g. mental retardation, asthma, diabetes	_____	_____
H.	child speaks English	_____	_____

\* all of the inclusion criteria must be answered TRUE.

ALL CRITERIA MET YES \_\_\_\_\_ NO \_\_\_\_\_

APPENDIX J

CAUSES OF ATTRITION

APPENDIX J

CAUSES OF ATTRITION

<u>SUBJECT</u>	<u>TREATMENT GROUP</u>	<u>CAUSE</u>
S 89	Relaxation	Behavior problem, consistently thwarts mother's wishes. Failure to practise.
S 146	Relaxation	Severe headache activity at baseline. Good improvement. Good motivation.
S 66	Cognitive coping	Learning problems, program too abstract.
S 107	Cognitive coping	Behavior and academic problems. Program too abstract.
S 27	Stress Reduction	Poor motivation. Lack of family support.
S 132	Stress Reduction	Parental disinterest. Transportation problem.
S 140	Stress Reduction	Lack of parental support. Poor response to treatment.
S 69	Stress Reduction	Very active adolescent. Scheduling problem.