

Personality and Behavioural Characteristics in Pediatric Migraine

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SYNOPSIS

Personality and behavioural features in pediatric migraine were investigated in a comparison study of 20 boys and girls with migraine, matched for age and sex with a "pain" control group of 20 children with musculoskeletal pain, and with a "no-pain" control group of 20 children. When the amount of pain experienced by children was controlled, the only discriminating variable was that of somatic complaints which included vomiting, nausea, and perceptual disturbances, all migraine-related phenomena. The inclusion of the "pain" control group in this investigation yielded results which indicated that the behavioural and personality features thought to be characteristic of childhood migraine are common to a chronic pain disorder and in fact, the manifestation of many of these features correlate directly with the amount of pain experienced. It is suggested that the personality and behavioural characteristics evident in many children with migraine may result from the recurrent chronic pain episodes rather than in some way being causative of the pain.

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Migraine headaches in children are a common phenomenon¹ and a number of investigators have described personality and behavioural characteristics which they believe contribute to the occurrence of the headaches. This view was first espoused by Harold Wolff (described by Anderson)² in his description of the childhood personalities of his adult migraine patients, as reported retrospectively by the patients and their families. More than half of the migraineurs were described as delicate, shy, withdrawn, sober, polite, well-mannered, conscientious, responsible, unusually thoughtful, and extremely obedient to parental wishes. These sterling, if somewhat submissive qualities were said to co-exist with unusual obstinacy, stubbornness and inflexibility. As children, these individuals were remembered as being very neat and clean and as adolescents, more than usually concerned with moral and ethical issues.

Wolff's observations, although of heuristic value, are fraught with major methodological problems. This population included only people who continued to have headaches in adulthood and who sought help from a specialist. The reliance on retrospective family and self-descriptions may well have been biased. The use of an unstructured clinical interview to gather information may have elicited recollections that were in keeping with the interviewer's own opinions. Finally, the lack of any control group prevented meaningful comparisons with individuals who did not have headaches.

Wolff's observations, with some variations, have been supported by numerous subsequent investigations with children with migraine, rather than with adult migraineurs recalling their childhood.³⁻⁹ However, most have been marred by major methodological flaws that have compromised their validity.

For example, Koch and Melchoir⁴ found that 39 of their 136 pediatric migraine patients exhibited some degree of mental symptoms related to stress. Similarly, Krupp and Friedman⁵ noted superior intelligence, sensitivity, thoroughness, high need for approval, seriousness, orderliness, reliability, feelings of inadequacy, excessive guilt, strong superego, and psychogenic symptoms. Vahlquist⁹ reported that children with migraine were "characterized by neuro-vegetative instability, overdue ambition and perfectionism" (p. 155). None of these studies report standardized assessment procedures, nor do they provide adequate descriptions of the severity of headaches experienced by the children. In addition, the lack of control groups precludes comparison with children without headaches.

The lack of a control group is also a major difficulty in a recent epidemiological study.⁷ Passchier and Orlebeke found that stress, fear of failure and school difficulties such as worrying and problems with con-

centration, showed significant but small correlations with headache complaints in their large group of 10-17 year old school children. These authors suggest that these variables cause headaches for their sample of children, but report no comparison of these variables with children without headaches.

Many of these methodological flaws have been corrected in two significant studies.^{10,1} Bille¹ tested 73 children with migraine occurring at least once per month, and 73 headache-free children, matched on age, sex, social class and school grade. A comprehensive battery of tests including self-reports, parental reports, direct behavioural ratings, sensory-motor, perception and intelligence tests was administered. Migraine children described themselves as more anxious, fearful, tense and nervous while parents described them as more anxious, sensitive, vulnerable to frustration, more tidy and less physically enduring than children without headaches. Children with migraine were less confident and tended to block on some test items, displayed more deliberateness, caution and restraint, and less active effort. The study, although generally methodologically superior, suffered from the fact that the rating scales were not normed, or validated. The use of only a headache-free control group precludes determining whether the differences found between the groups are a cause of migraine, an effect of migraine or some combination of these.

In a similar, recent study, Andrasik et al.¹⁰ tested 32 children with migraine and 32 children without headaches, matched on age, sex and some demographic variables. Standardized, validated scales of psychological functioning were administered. Results indicated that headache sufferers were significantly more depressed, expressed a greater number of somatic complaints, and experienced more internalizing behaviour problems. Adolescent migraineurs were more anxious than controls and male adolescents showed poorer overall psychological adjustment. Except for the adolescent boys' adjustment scores, all means were within the normal range, indicating that although the headache children were statistically more depressed and anxious and showed more somatic complaints, they were not clinically maladjusted.

The major methodological difficulty in this well-designed study is the inclusion of only one control group. As the authors note, this no-headache group does not control for the effects of having a long standing pain disorder. It may be that the reported personality differences noted are the result of having a pain disorder rather than causing migraine headaches. A group of children with other long-term chronic pain would serve as an appropriate control for this factor.

METHOD

Subjects. Twenty children (10 boys and 10 girls) with migraine headaches severe enough to interfere with some of their activities constituted the first group of subjects. These children had been referred to a headache treatment study at a children's hospital by their primary care physicians. They were diagnosed by a pediatric neurologist using the criteria of paroxysmal headache and any two of the following four symptoms: throbbing pain, scotoma or related neurological phenomena, nausea and/or vomiting, and a positive family history.

Two control groups, matched on age and sex with the headache group, were recruited. The pain control group consisted of 20 children suffering from chronic musculoskeletal pain, including juvenile rheumatoid arthritis and patella-femoral knee pain, who had attended outpatient clinics in the children's hospital. Other inclusion criteria for the two pain groups were a minimum pain history of three months, an average reported pain frequency of at least once a week, and pain not linked to diet, allergy or menstruation. The third group, the no-pain control group, was randomly selected from children who had attended outpatient clinics at the hospital, but had not suffered from a long-term pain problem. Common inclusion criteria for all three groups were: no major medical, neurological, or psychological problems; nine to seventeen years of age. The mean ages were 13 years 3 months for the headache group, 13 years 5 months for the pain control group and 13 years 5 months for the no-pain control group. Informed consent was obtained from all children and their parents prior to data collection.

Instruments. Four standardized instruments were administered to each of the children in the study to measure personality and behavioural characteristics. In addition questions were asked about sleep patterns and family history of pain in a structured interview.

(1) The State-Trait Anxiety Inventory is a self-report scale designed by Spielberger.^{11,12} The adult version, labelled the Self Evaluation Questionnaire, was administered to children who were at the secondary school level, and the How I Feel Questionnaire was used with children attending primary grades. The trait scale requires the child to respond to 20 items, such as "I feel like crying" according to how they generally feel most of the time. The state scale includes 20 similar items. For the purposes of this study the child was asked to respond to these according to how he feels in a particular stressful situation that occurs about once a week. The stressful situation was chosen by each child, and was usually such a situation as "when I have a fight with my best friend" or "when my brother takes my things". Both the child and adult versions have adequate internal reliability, good test-retest reliability for the trait scale and extensive evidence of validity reported in the test manuals.^{11,12} This assessment yields T scores for two variables: state anxiety and trait anxiety.

(2) The Children's Depression Rating Scale¹³ is

based on the Hamilton Depression Rating Scale. Each of 16 items contributes up to five points towards a total depression score and every item has two to four subcategories of increasing severity. The scale was designed to be administered by structured interview and scoring is based on operational definitions of subcategories in the scale from information provided both by the parents and the child. Excellent validity and good inter-rater reliability data is available.¹³

(3) The Birlson Self Rating Scale¹⁴ for depressive disorder in children is an 18-item scale with items oriented in a positive and a negative direction. Children respond on a three-point scale, for example, "I feel very lonely" - *most of the time, sometimes, or never*. A higher total score indicates a greater degree of depression. Birlson reported internal validity and good discrimination between a clinical, non-depressed control group as well as a normal control group. Reliability data is unavailable. This scale was used in addition to the previous measure of depression because it is a self-report rather than clinician-rated measure.

(4) The Child Behaviour Checklists (CBCL)^{15,16} have been developed by Achenbach and his associates to provide measures of social competence, school performance and behavioural problems. The scales are in checklist format to be completed by the child's parent and teacher. Good test-retest and inter-rater reliability have been demonstrated for these scales and as well the scales discriminate between clinic and non-clinic children.¹⁶

The parent report version yields three social competence-related factors, social activities, social functioning and school performance, as well as a number of behaviour-related factors which differ according to age and sex of the child. For the purpose of this study, only those behavioural factors common to both sexes and ages nine to seventeen were included: somatic complaints, delinquent, schizoid, aggressive and hyperactive. In addition, overall scores for internalizing behaviour problems and externalizing behaviour problems were of interest. T scores for each of these scales were used as dependent variables.

The teacher report form of the CBCL yields measures of school performance and adaptive functioning in addition to a similar set of behavioural factors. Those common to both sexes and our age range include anxious, social withdrawal, unpopular, self-destructive, inattentive and aggressive as well as the overall internalizing and externalizing behaviour scores. T scores were determined for each of these variables.

(5) Pain diaries were also kept by children in the two pain groups as a record of the pain they experienced for a one week period. Pain was rated on a scale from zero to five at four different times each day. The scale contained behavioural anchors such as 1 = *pain that I'm only aware of when I pay attention to it*, and 5 = *pain such that I can't do anything*. The pain diary yields a weekly pain index which is a composite score, taking into account intensity, frequency and duration of pain episodes during one week. The usefulness of the pain diary as a self-report measuring device has been discussed and good validity reported.¹⁷

Other measures collected by standardized interview include questions about sleep patterns and about family history of pain. A sleep disturbance index was determined from a measure of sleep habits developed by Anders¹⁸ with a maximum raw score of 12. A family history of pain was determined in the interview by asking about chronic pain in the child's siblings as well as parents, both at the present time and in the past, including parents during their childhood. This measure yielded a family index of pain with a maximum score of 24.

Procedure. Subjects in the headache group were part of a larger treatment study and data for their study was collected as part of the baseline information for the treatment study. Potential subjects for the two control groups were contacted by letter and subsequently by telephone to elicit their participation in the study. Informed consent was obtained from the parents and the child. Subjects were tested either in their homes or at the hospital, according to their preference, by a research assistant. Pain diaries and teacher checklists were returned by mail

RESULTS

Personality and behavioural variables were submitted to one-way analyses of variance which resulted in five significant group differences. All of these were on variables measured by the Child Behaviour Checklists (CBCL). Means for these variables appear in Table 1. Multiple comparisons were conducted by the Fishers' Least Significant Difference (LSD) method.¹⁹

Parent CBCL scores on the social functioning scale ($F(2,57) = 4.15, p < .05$) indicated that the children with headaches were less socially competent than either the children with other pain problems or the no-pain control group. In terms of behaviour problems, the headache and the pain control groups of children scored higher on the composite internalizing scale than the no-pain control group, but did not differ from each other ($F(2,57) = 5.4, p < .01$). Somatic complaints was the only internalizing factor of the parent CBCL to show significant group differences ($F(2,57) = 19.5, p < .01$). In this case both the headache and pain control groups of children were reported to have more somatic complaints than the no-pain control group. In addition, the headache group was significantly higher on this measure than the pain control group.

The teacher form of the CBCL did not reveal a similar overall internalizing difference between groups. This scale did, however, indicate group differ-

Table 1
Means for Personality and Behavioural Variables that Showed Significant Group Differences

Tscore	Headache	Groups		Significant Differences*
		Pain Control	No Pain Control	
Social Competence (Parent CBCL)	41.1	48.1	50.6	HA<PC HA<NPC
Internalizing Behaviour Problems (Parent CBCL)	63.7	60.4	53.6	HA>NPC PC>NPC
Somatic Complaints (Parent CBCL)	74.5	66.0	59.1	HA>NPC PC>NPC HA>PC
Anxiety (Teacher CBCL)	61.9	57.4	57.2	HA>PC HA>NPC
Happiness (Teacher CBCL)	47.6	55.4	59.2	HA<NPC

*Groups

HA headache group

PC pain control group

NPC no-pain control group

ences on the internalizing factor of anxiety ($F(2,48)=3.4, p<.05$) in which the headache group showed significantly greater anxiety than either of the two control groups. The teacher CBCL measure of happiness also suggested that children in the headache group were less happy than those in the no-pain control group ($F(2,48)=4.0, p<.05$).

No group differences were apparent on other measures of anxiety, depression, sleep problems or family history of pain.

In general, mean scores for the headache group were most extreme, with those for the pain control group falling in the middle and those for the no-pain control group being lowest for the raw score variables and being less extreme for the standardized variables. This was apparent in the significant differences outlined in Table 1 and was also the case for means on most of the other personality and behavioural variables which were not statistically different.

The mean pain index for one week reported by the children in the headache group was 35.2 while that of the pain control group was 20.6 ($t(33)=-2.011, p=.053$), with no pain reported by the no-pain control group. Because differences in personality variables might be due to differences in amount of pain, analyses of covariance were conducted for the personality and behavioral variables with the pain index as the covariate. These analyses resulted in significant group differences only for the somatic complaints variable of the parent CBCL ($F(2,57)=9.51, p<.01$) As reported above, children with headaches scored higher on somatic complaints than those in either control group and in addition children in the pain control group scored higher than the no-pain controls. These analyses also indicated a number of significant correlations between amount of pain and the personality and behavioural variables as outlined in Table 2.

DISCUSSION

Migraineurs have traditionally been considered nervous, tense and anxious perfectionists with the suggestion that such personality and behavioural features were somehow related to the occurrence of migraine headaches. Studies by Bille¹ and Andrasik¹⁰ have suggested that childhood migraine is also characterized by such features as depression, anxiety, poor adjustment, poor self-confidence, fearfulness, low motivation and endurance for physical activity and increased somatic complaints.

The results of this study indicated similar differences between children with headaches and those without, and also some similarities of children with headaches and children experiencing musculoskeletal pain. Children with headaches showed less social participation and more somatic complaints, were higher on the internalizing behaviour problems score, were less happy at school, and scored higher on one of the measures of anxiety than did the children with no pain. However, children who experienced musculoskeletal pain also showed a greater incidence of somatic complaints and of internalizing behaviour problems than the children with no pain. Although scores for children in the two pain groups were elevated on these variables, the only variable to fall into the clinical range was somatic complaints. These results suggested that perhaps the personality and behavioural features thought to be characteristic of migraine may instead be related to the experience of chronic pain. When amount of pain was statistically controlled in analyses of covariance all group differences disappeared except the differences related to somatic complaints, indicating that the personality and behavioral characteristics are

Table 2
Significant Pearson Correlations Between Amount of Pain and Personality and

	Pearson r	n	p
State Anxiety (t score)	.30	60	.011
Depression (CDR total score)	.34	60	.004
Social Competence (Parent CBCL t score)	.39	58	.001
Internalizing (Parent CBCL t score)	.37	58	.002
Externalizing (Parent CBCL t score)	.23	58	.039
Somatic Complaints (Parent CBCL t score)	.47	58	.000
Hyperactive (Parent CBCL t score)	.29	58	.015
Working Hard (Teacher CBCL t score)	-.38	49	.004
Happy (Teacher CBCL t score)	-.28	49	.026
Adaptive Functioning (Teacher CBCL t score)	-.29	49	.020
Internalizing (Teacher CBCL t score)	.36	49	.005
Anxiety (Teacher CBCL t score)	.49	49	.000
Social Withdrawal (Teacher CBCL t score)	.26	49	.034
Unpopular (Teacher CBCL t score)	.25	49	.043
Inattentive (Teacher CBCL t score)	.29	49	.021

directly related to having a pain disorder and to the amount of pain the child experiences, rather than specifically to migraine headache pain.

There were no characteristics of children with migraine, other than the frequency of somatic complaints, that could not be accounted for by the fact that they most often experience more severe pain. The difference between the migraine and the pain control group for somatic complaints would be expected due to the nature of this disorder. Migraine is often accompanied by nausea, vomiting, visual, auditory and perceptual disturbances, and dizziness, whereas musculoskeletal pain usually occurs with few other physical symptoms. These somatic complaints are in fact inclusion criteria for the diagnosis of migraine.

In summary, the behavioural and personality features thought to be characteristic of migraine are not distinctive when children with migraine are compared to children with other chronic pain and the amount of pain experienced is statistically controlled. Characteristics such as anxiety, depression, poor social competence, social withdrawal, unhappiness, unpopularity, inattentiveness, and poor adaptive functioning appear to be related to the severity of a pain disorder rather than specifically to migraine headache.

This conclusion lends weight to the argument that personality and behavioural characteristics of childhood migraine may be the result of chronic severe pain which interferes with a child's regular activities, rather than causative of the headaches as suggested in the early literature.

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REFERENCES

1. Bille B: Migraine in school children. *Acta Paed Scandinav (suppl)* 51:1-151, 1962.
2. Anderson RW: The relation of life situations, personality features and reactions to the migraine syndrome, in Dalessio DJ (ed): *Wolff's Headache and Other Head Pain (4th Ed)*. New York, Oxford, 1980, pp 403-417.
3. Blumenthal LS, Fuchs M: Headache in children. *Med Annals D.C.* 28:268-272, 1959.
4. Koch C, Melchoir JC: Headache in childhood: A five year material from a pediatric university clinic. *Dan Med Bull* 16:109-114, 1969.
5. Krupp GR, Friedman AP: Migraine in children: A study of 100 children. *NY State J Med* 53:43-45, 1953.
6. Ling W, Oftedal G, Weinberg W: Depressive illness in childhood presenting as severe headache. *Am J Dis Child* 120:122-124, 1970.
7. Passchier J, Orlebeke JF: Headaches and stress in school-children: An epidemiological study. *Cephalalgia* 5:167-176, 1985.
8. Prensley AL: Migraine and migraine variants in pediatric patients. *Pediatr Clin N Amer* 23:461-471, 1976.
9. Vahlquist B: Migraine in children. *Int Arch Allergy* 7:348-355, 1955.
10. Andrasik F, Kabela E, Quinn S, Blanchard EB, Rosenblum EL: Psychological functioning of children who have recurrent migraine. Manuscript under review, 1986.
11. Spielberger CD: *State-Trait Anxiety Inventory for Children*. Palo Alto, Consulting Psychologists Press, 1973.
12. Spielberger CD, Gorsuch RL, Lushene RE: *STAI Manual for the State-Trait Anxiety Inventory*. Palo Alto, Consulting Psychologists Press, 1970.
13. Poznanski ED, Cook SC, Carroll B J: A depression rating scale for children. *Pediatrics* 64:442-450, 1979.
14. Birleson P: The validity of depressive disorders in childhood and the development of a self-rating scale: A research report. *J Child Psychol Psychiat* 22:73-78, 1981.
15. Achenbach TM, Edelbrock CS: *Manual for the Child Behavior Checklist and Revised Child Behavior Profile*. Vermont, Queen City Printers, 1983.
16. Achenbach TM, Edelbrock CS: Psychopathology of childhood. *Ann Rev Psychol* 35:231-256, 1984.
17. Richardson GM, McGrath PJ, Cunningham SJ, Humphreys P: Validity of the headache diary for children. *Headache* 23:184-187, 1983.
18. Anders TF, Karskadon MA, Demerit WC, Harvey K: Sleep habits of children and the identification of pathologically sleepy children. *Child Psychiat Hum Dev* 9:56-63, 1978.
19. Kirk R: *Experimental Design: Procedures for the Behavioural Sciences*. New York, Wadsworth, 1968.