# Impact of headache on young people in a school population

David Kernick, Deborah Reinhold and John L Campbell


## ABSTRACT

### Background
Headache is the most frequent neurological symptom and the most common manifestation of pain in childhood. Estimates of the prevalence of headache in children and adolescents vary widely (depending on the setting, methodology, and diagnostic criteria applied) and the impact is not well understood.

### Aim
To quantify the impact of headache in a school population.

### Design of study
A questionnaire survey.

### Setting
Exeter schools.

### Method
A total of 1037 school children between the ages of 12 and 15 years were surveyed, of whom 49% were female. Main outcome measures were headache frequency, disease-specific impact using the Pediatric Migraine Disability Assessment Score (PedMIDAS), and generic quality of life impact using the Pediatric Quality of Life Inventory (PedsQL4).

### Results
Twenty per cent of the study population had headache one or more times a week, with an average PedMIDAS score of over 12.1 (and an impact on over 12 days in a 3-month period). Ten per cent of the population had a PedMIDAS score of 16.8 and a PedsQL4 generic quality of life score of 70.1, indicating a poorer quality of life than that of children with asthma, diabetes, or cancer. An average of 0.6 days of school was lost in a 3-month period across all school children.

### Conclusion
There is a significant impact of headache on the quality of life of children. This impact is both unrecognised and unmet. GPs have an important role in identification and management of this problem.



### Keywords
children; headache; quality of life.


## INTRODUCTION

Headache is the most frequent neurological symptom and commonest manifestation of pain in childhood.[1] It has a high risk of development into a chronic condition and persisting into adulthood,[2] with an associated risk of developing other physical and psychiatric morbidities.[3]

Estimates of the prevalence of headache in children and adolescents vary widely, depending on the setting, methodology, and diagnostic criteria applied. Studies have reported annual prevalence rates in children of between 3% and 11% for migraine,[4–6] and between 10% and 24% for tension-type headache.[4,7] The prevalence of 'self-reported' headache is higher. Between 6.5% and 30% of children and adolescents report headaches weekly or more frequently.[8–14]

The recognition that personal burden of illness cannot be fully described by clinical measures alone has led to the development of instruments that measure both disease-related and generic impact on quality of life. In a critical review of the literature measuring the impact of headache in children and adolescents, considerable methodological limitations were found. These included poorly validated impact measures, absence of power calculations for adequate sampling, and inadequate description of study design and data analysis.[15] There was no population description of headache impact on generic quality of life that allowed comparison to be made with other diseases.


***D Kernick**, BSc, MD, FRCGP, DA, DCH, DRCOG, honorary lecturer; **JL Campbell**, MRCGP, MD, professor of general practice and primary care, Peninsula College of Medicine and Dentistry, Exeter; **D Reinhold**, research assistant, St Thomas Health Centre, Exeter.*

**Address for correspondence**
Dr David Kernick, St Thomas Health Centre, Cowick Street, Exeter, EX4 1HJ. E-mail: su1838@eclipse.co.uk



**Submitted:** 30 September 2008; **Editor's response:** 9 December 2008; **final acceptance:** 10 March 2009.




This article was originally online first on 11 Aug 2009. Cite this article as: *Br J Gen Pract* 2009; **59:** 678–681. Advance online publication. DOI: 10.3399/bjgp09X454142

The aim of this study is to describe the frequency of headache and its functional impact in terms of disease-specific and generic quality of life measures in a population of school children between the ages of 12 and 15 years.

## How this fits in

Although it is recognised that headache has a significant impact on the adult population, the prevalence and impact in children is not well recognised. This demonstrates a considerable unmet need of headache sufferers in a paediatric population, in terms of both headache-related and generic quality of life. As headache sits within a biopsychosocial framework, the direction of causality that is described remains contested.

## METHOD

### Setting

The study was undertaken in three schools in Exeter, UK. Exeter has a population of 119 600, of whom 5800 children are in the target group (aged 12–15 years). The city is of average socioeconomic status, lying on the 48th centile of the England and Wales Index of Multiple Deprivation (IMD). The IMD contains seven domains of deprivation that are available at a small area level and is a proxy for socioeconomic status.[16]

### Statistics

The power calculation was based on a pilot study of 100 pupils in a school that was not used in the survey. It was estimated that for a 95% confidence level to identify a 10% (standard deviation [SD] 2%) population rate of the variable of interest (the percentage of participants that had headache more frequently than once a week), a sample size of 737 participants would be needed.

### Measures

The disease-specific measure was the Pediatric Migraine Disability Assessment Score (PedMIDAS). This is a validated instrument that measures the impact of headache-related quality of life in terms of days in the previous 3-month period where headache has had a total or partial impact on school or home life.[17] The generic measure was the Pediatric Quality of Life Inventory (PedsQL4), the most widely used generic measure in paediatric practice.[18] It has been validated in UK school children,[19] and also for use in headache.[20]

### Data collection

Students completed an anonymous questionnaire in school tutorial groups. Questionnaires that were incomplete or that did not conform to the defined marking schema were rejected. It was not possible to follow up the estimated 6% of students who were absent on the day of study. After an initial introduction, students completed questionnaires independently without further assistance to prevent bias in the results.

## RESULTS

A total of 1037 participants between the ages of 12 and 15 years took part, of whom 49% were female. The average age was 13.5 years (SD 1.1). Mean IMD of the catchment areas of the schools taking part was 18.7.

All questionnaires were returned and 100 (9.6%) were rejected. The reasons for rejection were questionnaires incomplete (78 questionnaires, 78%) or questionnaires with qualitative comments given rather than quantitative evaluation of headache impact (22 questionnaires, 22%). Mean age of students whose questionnaires were rejected was 13.4 years, of whom 60% were female. It was not possible to access details of the students absent from school on the day of study.

Table 1 shows PedMIDAS and PedsQL4 scores as a function of frequency of headache. For comparison, the PedsQL4 UK population norm and values for other conditions are also given.[21]

**Table 1. Frequency of headache with associated PedMIDAS and PedsQL4 scores.[a]**

| Category of headache | Participants, *n* = 937, *n* (%) | PedMIDAS (number of days over 3-months that headache impacts school or home activities), mean (SD) | PedsQL4 (generic quality of life score), mean (SD) |
|---|---|---|---|
| No headache | 289 (31) | 0 | 82.2 (10.9) |
| Less than once a month | 186 (20) | 2.9 (4.7) | 79.4 (11.5) |
| Once a month | 120 (13) | 4.3 (7.1) | 77.7 (9.8) |
| 2–3 times a month | 153 (16) | 8.4 (14.3) | 74.9 (12.3) |
| Once a week | 96 (10) | 12.1 (12.1) | 73.4 (11.8) |
| Two or more times a week | 93 (10) | 16.8 (23.9) | 70.1 (12.7) |

*[a]UK population norm 82.3 (SD 13.1), children with diabetes 77.5 (SD 12.2), asthma 72.0 (SD 17.5), and cancer 71.0 (SD 17.1).[21] PedMIDAS = Pediatric Migraine Disability Assessment Score. PedsQL4 = Pediatric Quality of Life Inventory.*

For the 31% of participants that had no headache, the PedsQL4 score matched the UK population norm. PedMIDAS increased and PedsQL4 decreased with frequency of headache. Both measures showed an increase in impact with increasing headache frequency. Across all participants the average school loss was 0.6 days in a 3-month period and 2.2 days in the 10% who were most affected.

## DISCUSSION

### Summary of main findings

The study demonstrated high levels of headache morbidity. Twenty per cent of the study population reported headache on one or more occasions a week, with an impact on functioning at home or school over 12 days in a 3-month period. Of note, those that had a high impact, defined here as those participants with a headache frequency of two or more times a week (10% of the population), had an impact of headache on 16.8 days in the previous 3-month period and a generic quality of life score lower than that of children with asthma, diabetes, or cancer.

The direction of causality of the relationship described is not known. The current understanding of headache sits within a biopsychosocial framework.[22] The interplay between headache, anxiety, depression, somatisation, and quality of life is complex and likely to be bidirectional. Therefore increased frequency of headache may have an impact on lower quality of life or headache may be the result of psychosocial factors, which are a cause of poor quality of life.

### Strengths and limitations of the study

There is an emerging consensus that for chronic health conditions both generic and disease-specific health-related quality of life measures should be used when measuring the impact of a condition in paediatric practice.[23] This is the first study that compares validated disease-specific and generic measures with frequency of headache in a school population.

The research described headache as a symptom and made no attempt at establishing a diagnosis. Although diagnostic screening questionnaires are available, the difficulties of making headache diagnoses, particularly in children, are well recognised.[24] Although a validated instrument was used to measure headache impact, it must be acknowledged that recall may be unreliable when compared with diary measurement. It was not possible to follow up the estimated 6% of students who were absent on the day of study. Some of these absences may have been due to headache, which could underestimate the impact described.

### Comparison with existing literature

Two population studies have reported on PedMIDAS. A Turkish study found that 9.7% of a school population had migraine, with an average PedMIDAS score of 9.9 for boys and 11.5 for girls.[25] Thirty-two per cent of the children had already been diagnosed with migraine. The current authors have previously described a high-impact group of 3% of a primary care practice population with an average PedMIDAS score of 23.4.[26]

There have been no adequately powered studies describing the generic impact on quality of life of children. One small study of 31 children using the Short Form-36 found significant reductions across six of the eight domains. A study in a specialist paediatric headache centre found an average PedsQL4 score of 72.[27]

### Implications for clinical practice

This study has identified a reduced quality of life and impact of functioning in headache sufferers in a school population. Other childhood problems such as asthma and diabetes have both a lower prevalence and a lower impact on quality of life than headache, yet receive considerable attention. The needs of many children with headache may be unmet.[26]

In an adult population, headache sufferers do not consult their doctors, patients may not receive the correct diagnosis, and even when a correct diagnosis is made, effective treatment may not be given.[28] These problems are likely to be more prominent in a paediatric population, where individuals are less able to articulate their problems and seek attention. GPs are well placed to identify and manage this unmet need.

**Funding body**
None
**Ethics committee**
Ethical approval was not required
**Competing interests**
The authors have stated that there are none.
**Discuss this article**
Contribute and read comments about this article on the Discussion Forum: http://www.rcgp.org.uk/bjgp–discuss

## REFERENCES

1. Goodman J, McGrath P. The epidemiology of pain in children and adolescents: a review. *Pain* 1991; **46(3):** 247–264.
2. Guidetti V, Galli F. Evolution of headache in childhood and adolescents: an 8-year follow-up. *Cephalalgia* 1998; **18(7):** 449–454.
3. Fearon P, Hotopf M. Relation between headache in childhood and physical and psychiatric symptoms in adulthood: national birth cohort study. *BMJ* 2001; **322(7295):** 1–6.
4. Bille B. Migraine in school children. *Acta Paediatr* 1962; **51(Suppl 136):** 1–151.
5. Zwart J, Dyb G, Holmen T, *et al*. The prevalence of migraine and tension-type headaches among adolescents in Norway. The Nord-Trøndelag Health Study (Head-HUNT-Youth), a large population-based epidemiological study. *Cephalalgia* 2004; **24(5):** 373–379.
6. Abu-Arefeh I, Russell G. Prevalence of headache and migraine in

school children. *BMJ* 1994; **309(6957):** 765–769.

7. Laurell K, Larsson B, Eeg-Olofsson O. Prevalence of headache in Swedish school children: the focus on tension type headache. *Cephalalgia* 2004; **24(5):** 380–388.
8. Bandell-Hoekstra I, Abu-Saad H, Passchier J, *et al.* Prevalence and characteristics of headache in Dutch schoolchildren. *Eur J Pain* 2001; **5(2):** 145–153.
9. Ghandour RM, Overpeck MD, Huang ZJ, *et al.* Headache, stomach ache, backache and morning fatigue among adolescent girls in the United States. *Arch Pediatr Adolesc Med* 2004; **158(8):** 797–803.
10. Rhee H. Prevalence and predictors of headache in US adolescents. *Headache* 2000; **40(7):** 528–538.
11. Kristjanstottir G, Wahlberg V. Sociodemographic differences in the prevalence of self reported headache in Icelandic schoolchildren. *Headache* 1993; **33(7):** 376–380.
12. Carlsson J. Prevalence of headache in schoolchildren: relation to family and school factors. *Acta Paediatr* 1996; **85(6):** 692–696.
13. Fendrich K, Vennemann M, Pfaffenrath V, *et al.* Headache prevalence among adolescents — the German DMKG headache study. *Cephalalgia* 2007; **27(4):** 347–354.
14. Kröner-Herwig B, Heinrich M, Morris L. Headache in German children and adolescents: a population-based epidemiological study. *Cephalalgia* 2007; **27(6):** 519–527.
15. Kernick D, Campbell JC. Measuring the impact of headache in children: a critical review of the literature. *Cephalalgia* 2009; **29(1):** 3–16.
16. Office of the Deputy Prime Minister. *The English Indices of Deprivation 2004 (revised).* London: HMSO, 2007. http://www.communities.gov.uk/documents/communities/pdf/131209.pdf (accessed 25 Mar 2009).
17. Hershey A, Powers S, Vockell A, *et al.* PedMIDAS: development of a questionnaire to assess disability of migraines in children. *Neurology* 2001; **57(11):** 2034–2039.
18. Varni J, Seid M, Rode C. The PedsQL: measurement model for the paediatric quality of life inventory. *Med Care* 1999; **37(2):** 126–139.
19. Upton P, Eiser C, Cheung I, *et al.* Measurement properties of the UK-English version of the Pediatric Quality of Life Inventory 4.0 (PedsQL) generic core scales. *Health Qual Life Outcomes* 2005; **3:** 22.
20. Connelly M, Rapoff M. Assessing health related quality of life in children with recurrent headache: reliability and validity of the PedsQL 4.0 in a paediatric headache sample. *J Pediatr Psychol* 2006; **31(7):** 698–702.
21. Upton P, Eiser C, Cheung I, Hutchins H, *et al.* Measurement properties of the UK English version of the paediatric quality of life inventory generic core scales. *Health Qual Life Outcomes* 2005; **3:** 22–29.
22. Andrasik F, Flor H, Turk D. An expanded view of psychological aspects in head pain: the biopsychosocial model. *Neurol Sci* 2005; **26(Suppl 2):** 87–91.
23 Varni J, Burwinkle T, Lane M. Health related quality of life measurement in paediatric clinical practice: an appraisal and precept for future research and application. *Health Qual Life Outcomes* 2005; **3:** 34.
24. Lipton R, Bigal M, Amatniek J, Stewart W. Tools for diagnosing migraine and measuring its severity. *Headache* 2004; **44(5):** 387–398.
25 Akyol A, Kiylioglu N, Aydin I, *et al.* Epidemiology and clinical characteristics of migraine among school children in the Menderes region. *Cephalalgia* 2007; **27(7):** 781–787.
26. Kernick D, Reinhold D. Children and adolescents with headache. What do they need? *J Headache Pain* 2008; **9(4):** 225–231.
27. Hershey A, Powers S, Vockell A, *et al.* Development of a patient based grading scale for PedMIDAS. *Cephalalgia* 2004; **24(10):** 844–849.
28. Lipton R, Amatniek J, Ferrari M, Gross M. Migraine. Identifying and removing barriers to care. *Neurology* 1994; **44(6):** S63–S68.