Anxiety in Children with Headaches

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Abstract

The aim of this study was to examine the different aspects of anxiety symptoms: separation anxiety, social anxiety, test anxiety, obsessive-compulsive symptoms, worry, anxiety sensitivity, somatic symptoms in four groups of subjects: 1) children with headaches in pediatric care, 2) nonclinical headachers, 3) subjects with anxiety disorders, and 4) healthy controls.

The sample consisted of 187 schoolchildren: 43 patients with headaches as a primary complaint, 59 headachers recruited from the general population, 43 patients with a diagnosis of anxiety disorders and 42 healthy children in control group. Two questionnaires for children and adolescents were used: *The Fear and Anxiety Scale* and *The Psychosomatic Symptoms Questionnaire.* Headache problems were rated by experienced pediatric specialists.

There were no age and gender differences in anxiety symptoms in the two headache groups and control group. No significant differences were found on any of the anxiety subscales between headachers in pediatric care and headachers who did not ask for medical help. Significant differences in anxiety scales were found between headachers, anxious children and healthy controls. Headachers suffer from more anxiety problems than healthy controls. In the clinical sample of children suffering headaches anxiety problems of clinical relevance were found in range from 7% on the measures of excessive worry and anxiety sensitivity to 32% on the separation anxiety. In the community sample anxiety problems of clinical relevance were found in range from 5% on the measure of obsessive compulsive symptoms to 17% on the test anxiety.

The majority of children with headaches complaints do not have a clinically significant anxiety symptomathology, but the incidence of anxiety symptoms is higher than in a population of non-headachers.

Keywords: headache, anxiety, psychosomatic symptoms, children

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Introduction

Medically unexplained neurological symptoms such as headaches, dizziness, fainting and vertigo are common in pediatric primary care throughout the world and they may be associated with marked distress and functional disability during childhood and adolescence. Headaches among children have not been a major research interest until the middle of the 20th century. Serious work in the field is connected with Bo Bille (1997), a pediatrician who started an extended 40-year longitudinal study about prevalence, characteristics and prognosis of migraine and nonmigrainous headaches among more than 9000 school children 7-15 years of age. Since 1988, headaches are classified according to the International Headache Society (IHS) classification criteria and more than 150 different types and sub-types of headaches are described (IHS, 2004). According to the IHS headaches are divided into primary and secondary headaches. Primary headaches do not have an underlying disease and the most common types are migraine, tension-type and cluster headaches. Secondary headaches are part of a syndrome and underlying causes of these headaches are organic disorders or physical diseases.

In a representative population-based study the migraine prevalence was found in 55% of the children, and tension type headaches in 36% of the children suffering from disturbing headaches during the preceding 6 months (Aromaa, Sillanpaa, Rautava & Helenius, 2000). But, it seems that in children and adolescents a clear distinction between migraine and tension-type headaches is usually very difficult to make and the co-occurrence of both types is not rare.

Prevalence

The number of children suffering headaches has increased over the last decade, while the age of onset has decreased (Just, Oelkers, Bender, Parzer, Ebinger, Weisbrod & Resch, 2003). Sillanpaa and Anttila (1996) found an increase in the prevalence of headaches among 7-year-old children from 14.4% in 1974 to 51.5% in 1992. These results were confirmed ten years later in study by Santalahti, Aromaa, Sourander, Helenius and Piha (2005).

The prevalence estimate based on community surveys suggests that occasional headaches occur in up to 70% of children and adolescents with about 23% to 51% of children suffering headaches at least once a month, 10% to 30% children reported having weekly headaches, and chronic daily headaches (more than 15 days a month) were reported by 0.2% to 2.5% of children and adolescents (Carr, 1999; Egger, Angold & Costello, 1998; Santalahtin et al., 2005). In a Croatian sample of 275 schoolchildren (11 to 16 years old) headaches were reported by 69% of children, with 55% suffering a few headaches a month, 8% a few headaches a week, and 6% suffering headaches almost every day (Vulić-Prtorić, 2005).

Fortunately, less than 5% of children's headaches are the result of a serious disease or physical problem such as abscess, head trauma, tumors, blood clots, intracranial bleeding or bacterial or viral meningitis (Liakopoulou-Kairis, Alifieraki, Protagora, Korpa, Kondyli, Dimosthenous, Christopoulos & Kovanis, 2002).

Headache and psychological problems

Headache symptoms have been associated with different psychological and psychosocial problems, as well as child and parental psychopathology in both community and clinical samples. It is quite common for individuals with headache complaints to have other somatic problems like abdominal pain, chronic fatigue syndrome, back pain, shoulder pain, neck pain, etc. (Carlsson, Larsson & Mark, 1996; Egger, Costello, Erkanli & Angold, 1999; Just et al., 2003; Liakopoulou-Kairis et al., 2002; Smith, Martin-Herz, Womack & Marsigan, 2003). They also have more problems in the social and school domain (Bernstein, Massie, Thuras, Perwien, Borchardt & Crosby, 1997). In a school sample study, Martin–Herz, Smith and McMahon (1999) found that those with frequent headaches had lower levels of physical functioning, more interference with daily activities, as well as more missed school days in the past six months compared to subjects with infrequent headaches. It appears that severe recurrent headaches and associated illness behavior can lead to serious developmental problems when they are accompanied by school absence, academic problems and withdrawal from usual social activities.

Headaches can pose great diagnostic problems in pediatric practice because they could be the common sign of psychiatric disturbances. According to *The International Classification of Headache Disorders- 2nd Edition (ICHD-II)* (IHS, 2004) primary headache disorders (migraine, episodic tension-type and especially chronic tension-type headaches) in childhood and adolescence are often comorbid with psychiatric disorders. In most cases comorbid disorders are sleep disorders, separation anxiety disorders, school phobia, adjustment disorders, and other disorders usually first diagnosed in infancy, childhood or adolescence, particularly ADHD, conduct disorder, learning disorder, enuresis, encopresis (ICHD-II, pg. 121).

In a group of 31 patients with medically unexplained neurological symptoms (such as headaches, vertigo, dizziness and fainting) between the ages of 7 and 17 years Emiroglu, Kurul, Akay, Miral and Dirik (2004) found that about 94% of the patients have at least one mental disorder according to the DSM-IV. The most frequent psychiatric disorders were depressive disorders (more than 40% of the children and adolescents in their sample), conversion disorder (28%), somatization disorders (16%) and different comorbid psychiatric disorders (24%). Several

studies have found high rates of anxiety and depressive symptoms and disorders among children with headaches (Fritz, Fritsch & Hagino, 1997).

Some hypotheses regarding the etiology of the association between headaches and anxiety indicated bi-directional influence where each disorder increased the risk of the other disorder (Breslau, Davis & Andreski, 1991). Others claim that childhood anxiety disorders precede the advent of headaches, and depression developing as a result of long lasting and frequent headaches (Merikangas, Angst & Isler, 1990). However, a few later findings have contradict these hypotheses suggesting that instead of linear causality, it appears that there are gender differences in associations between headaches and different anxiety. In a large epidemiological study, Egger et al. (1998) found significant association between anxiety disorders and headaches in females: girls with anxiety disorder had three times as many headaches as girls who did not have anxiety disorder. Nevertheless interesting results were found for the connection between anxiety, depressive symptoms and headaches: depressive girls reported headaches more frequently and had more severe effects, as a result of headaches, on their lives than anxious girls. This is a very important finding because it indicates that, despite the significant comorbidity of anxiety and depressive disorders, and their similar association with headaches, these two disorders are differently associated with the effects of headaches.

The present study

Although the majority of studies in this field report more anxiety symptoms among headache sufferers, it should be noted that a few studies have examined anxiety symptomathology with regard to symptom clusters according to the DSM-IV criteria. Therefore the general aims of the present study were to examine the differences between headache sufferers in pediatric care and matched controls with and without headaches, as well as subjects with a primary diagnosis of anxiety disorders, for different aspects of anxiety symptoms.

Additionally, two headache groups were included in this research: a clinical group of children who suffered headaches and were already included in pediatric and psychological examination, and a non-clinical group of children who suffered headache symptoms but had not yet ask for a physician or psychological help. The underlying reasons for the two headache groups were to avoid two very common problems that occur in investigations in this field.

The first reason is methodological. Namely, a very common limitation in the studies like these is related to the psychological assessment procedure. Children in clinical groups are usually assessed individually, while healthy controls are very often part of a community sample that complete their questionnaires in the classroom.

The second reason is connected with recognizing the severity of the problem. Parents are usually the ones who decide if the headache symptoms their child reports are the reason for medical evaluation. According to research results in this field, parents often fail to recognize their children's psychosomatic problems or they may be unaware of their children's experience of pain and physical and emotional distress. There have been significant differences in parent and child reports: of the children who reported headaches almost every day, 14% were considered to be totally headache-free by their parents (Santalahti et al., 2005).

METHODS

Participants

The participants in this study represent a sub-sample consisting of 187 subjects aged between 10 to 15 years (86 boys and 101 girls) from an ongoing study of psychosocial aspects of psychopathology in children and adolescence in eight cities in Croatia. For the purpose of the present study we focused our attention on four samples: a sample of schoolchildren who were admitted to pediatric unit and psychological examination because of their headache problems, and three matched samples - a group of children with headaches from a community sample, a group of children with anxiety disorders, and healthy controls. Age and gender characteristics of the samples are presented in Table 1. Age groups were formed according to the school class subjects were attending. The mean age ± SD (years) for each group are also presented in Table 1.

1) A group of schoolchildren with headaches (N = 43) in pediatric care. This sample comprised of individuals who met established criteria for identifying headaches and were referred for examination by pediatric care. The children originally were seen through an outpatient clinic at 4 hospitals in Croatia over a 6 month period because of their complaints about headaches. The children's headache problems were rated by an experienced pediatric specialist. Children with headaches due to a serious disease, physical or psychiatric problem were excluded.

   A total of 43 subjects (20 boys and 23 girls) were included in the study.

2) A group of schoolchildren with headaches (N = 59) who didn't ask for medical help about their headache symptoms. This sample comprised subjects from the *Psychosomatic Symptoms Questionnaire for Children and Adolescents – PSS* (described later) standardization sample of 278 primary school children. Three inclusion criteria for this group were established according to three answers in PSS:

- Answer Yes to the question *Did you suffer from headaches in the last 3 months?*
- Answer 2 (a few times a month), 3 (a few times a week), or 4 (almost every day) to the question *How often did you have this problems in the last 3 months?*
- Answer *No* to the question *Did you go to a physician due to the problems you experienced?*

In the total sample of 278 schoolchildren, headaches were reported by 188 of the children (62% boys and 75% girls), with 55% suffering a few headaches a month, 8% a few headaches a week and 6% suffering headaches almost every day. Amongst those who reported headaches (N = 188), 44.6% did not go to a physician because of the symptoms they suffered.

A total of 59 subjects (29 boys and 30 girls) fulfilled all three inclusion criteria and were enrolled.

3) A group of child psychiatric outpatients given a clinical DSM-IV diagnosis of anxiety disorder (N = 43). This sample comprised of individuals who met established DSM-IV criteria for identifying anxiety disorders and were referred for examination by the psychiatric and psychological care unit. The participants originally were a sub-sample of 156 children and adolescents seen through an outpatient clinic at 3 hospitals in Croatia over a 6 month period because of their complaints about different emotional problems.

A total of 43 subjects (17 boys and 26 girls) were enrolled due to a diagnosis of anxiety disorder.

4) A group of healthy children (N = 42) from the *Psychosomatic Symptoms Questionnaire for Children and Adolescents – PSS* (described later) standardization sample. PSS was applied in the sample of 278 primary school children. Four inclusion criteria for this group were established according to the following answers in PSS:
- Answer *Very good* or *Excellent* to the first PSS question *How would you range your health generally?*
- Answer *No* to the second question *Did you go to a physician due to the problems you experienced?* This referred to the 35 symptoms listed above the question;
- Answer *No* to the third question *Do you suffer from an illness such as asthma, allergy, diabetes, etc.?*
- The total score on the 35 symptom list in the lower quartile established on the PSS standardization sample.

A total of 42 subjects (20 boys and 22 girls) fulfilled the four inclusion criteria and were enrolled. Matching was conducted because it was not possible to

randomly assign participants to the headache and headache-free control group and it was the most reasonable method for equating the two groups.

Table 1. Sample description (number of subjects in each group)

SAMPLES	CLASS				GENDER		
	5	6	7	8	M	F	N
Headachers – clinical sample	16	13	8	6	20	23	43
Headachers – nonclinical sample	15	12	15	17	29	30	59
Anxious – clinical sample	18	9	7	9	17	26	43
Healthy controls	9	12	8	13	20	22	42
MEAN AGE	11.36 ±.62	12.22 ±.52	13.41 ±.59	14.16 ±.53			
N	58	46	38	45	86	101	187

Measures

Two self-report questionnaires were used in this study. Their main characteristics are established in previous standardization procedures and they are presented in Table 2.

The Psychosomatic Symptoms Questionnaire for Children and Adolescents (PSS) (Vulić-Prtorić, 2005) is a 35-item scale that inquires about 35 somatic symptoms and sensations (cardiovascular, respiratory, gastrointestinal, dermatological, pseudoneurological, and pain/weakness). The subjects scored each symptom for frequency (*How often did you have this problems in the last 3 months?)* as 1 (never), 2 (a few times a month), 3 (a few times a week), 4 (almost every day. Thus, in determinining the PSS score, frequency subscale total score ranges from 35 to 140.

Integral parts of the PSS are also 3 questions: the first one was posited at the beginning of the list of symptoms. Subjects were asked *How would you range your health, generally?* (1 = bad, 2 = moderate, 3 = very good, 4 = excellent). The second one was at the end of the symptom list and it was an additional question about the severity of symptoms subjects experienced and rated on the list. Subjects were asked *Did you need to go to a physician due to the problems you experienced?* (1 = yes, 0 = no). The third question was about the general health status of the subjects and it asked *Do you suffer from any illnesses such as asthma, allergies, diabetes, etc.?* (1 = yes, 0 = no).

In this research PSS was not an outcome measure, but is used to help construct the study groups.

The Fear and Anxiety Scale for Children and Adolescents (SKAD-62) (Vulić-Prtorić, 2004) is a 62-item self-report measure developed to assess anxiety and specific fears in children and adolescents aged between 9 and 18 years. Data on age and sex norms are available. The scale is divided into subscales – mostly tapping a specific aspect of child and adolescent anxiety corresponding to DSM-IV criteria (separation anxiety, social anxiety, test anxiety, specific fears and phobias, obsessive-compulsive symptoms, worry scale, anxiety sensitivity, somatic symptoms of anxiety, anxiety total score). Items required respondents to rate how true each item was with respect to their usual feelings. Items were scored on a 5-point scale from 1 = *Not true for me at all* to 5 = *Absolutely true for me*.

The SKAD-62 has been evaluated in several studies in Croatia and has been shown to have satisfactory internal reliability in different samples (Vulić-Prtorić, 2000; Vulić-Prtorić & Galić, 2003; Vulić-Prtorić & Macuka, 2004; Tomljenović & Nikčević-Milković, 2005; Vulić-Prtorić & Macuka, 2006; Glavina & Keresteš, 2007). It was found that the scale distinguished between child psychiatric outpatients given a clinical DSM-IV diagnosis of anxiety disorder, and outpatients who have other disorders diagnosed, and ability to differentiate children and adolescents with anxiety disorders from nonanxious controls (Vulić-Prtorić, 2004).

Table 2. Instruments used in this research (subscales, number of items, range, means (M), standard deviations (SD) and Cronbach alpha)

Measures	No. of items	Range	M	SD	α
PSS-The Psychosomatic Symptoms Questionnaire for Children and Adolescents	35	35-140	50.38	11.10	.89
SKAD-62 The Fear and Anxiety Scale for Children and Adolescents					
Test Anxiety	11	11-55	26.1	9.25	.87
Social Anxiety	10	10-49	23.0	7.53	.82
Separation Anxiety	11	11-53	23.2	7.87	.81
Obsessive- Compulsive Symptoms	8	8-40	18.9	5.50	.67
Anxiety Sensitivity/Panic Attacks/ Agoraphobia	12	12-60	20.6	6.97	.80
Worry	9	9-45	24.3	8.22	.86
Somatic Symptoms of Anxiety	15	15-75	28.6	9.10	.83
Total score	62	61-275	136.3	36.02	.95

Procedure

Self report questionnaires were individually administered in the sample of children with headaches and anxiety disorders, and group administered in the community sample of non-clinical headachers and healthy controls during a regularly scheduled classroom period. The study presented here is part of a larger research project (in a three year period from 2002 to 2005) that was organized in collaboration with eleven schools and five hospitals in Croatia. The questionnaires and results presented in this paper were only a part of the broader battery of instruments dealing with psychopathology in childhood and adolescence, as well as different personal and contextual risk and protective factors.

The research project was approved by the Ethical Committee of the University of Zadar and was carried out according to the ethic principles of the Croatian Psychological Society.

RESULTS

The ANOVA was used to assess gender differences in four samples (the clinical headache group, non-clinical headache group, anxiety group and healthy controls), separately on the following anxiety measures: test anxiety, social anxiety, separation anxiety, obsessive compulsive symptoms, anxiety sensitivity / panic attacks/ agoraphobia, worry, somatic symptoms of anxiety. Significant differences were found only in the anxiety group on two scales: *Anxiety Sensitivity /Panic Attacks/ Agoraphobia* ($F = 10.88$; $p = .002$) and *Somatic Symptoms of Anxiety* ($F = 6,405$; $p = .015$). In both cases girls scored higher than boys.

The nonparametric statistic procedure (Kruskal-Wallis ANOVA, median test) was used to assess age differences in four samples. No significant differences were found on any of the anxiety subscales neither in children with headaches and anxiety nor in their healthy counterparts. No significant Gender x Age interaction effects were obtained in these analyses, as well.

Since age and gender differences were not significant, further analysis was carried out on both headache samples, anxiety sample and control group.

In the next step, univariate analysis of variance was calculated to compare prevalence of different anxiety symptoms between children suffering from headaches, anxiety and healthy control. The results are presented in Table 3. Significant differences were found between these four groups in all anxiety scales. Post-hoc analysis was carried out by Scheffe's test (see Table 3.).

Table 3. Anxiety mean scores and ANOVA differences between headachers in pediatric care, nonclinical headachers, subjects with anxiety disorders and healthy controls

SKAD-62 scales	Clinical headachers	Nonclinical headachers	Clinical anxious	Healthy controls	F (3,183)
	1	2	3	4	
Test Anxiety	25.69_4	24.75_4	29.65_4	$18.07_{1,2,3}$	9.84***
Social Anxiety	22.82_4	22.03_4	25.51_4	$17.22_{1,2,3}$	8.31***
Separation Anxiety	25.68_4	21.90_3	$29.28_{2,4}$	$17.81_{1,3}$	13.19***
Obsessive-Compulsive Symptoms	$17.32_{3,4}$	$17.47_{3,4}$	$20.94_{1,2,4}$	$13.12_{1,2,3}$	15.50***
Anxiety Sensitivity/ Panic Attacks/ Agoraphobia	$19.98_{3,4}$	18.86_3	$24.49_{1,2,4}$	$15.18_{1,3}$	13.11***
Worry	$21.18_{3,4}$	$19.97_{3,4}$	$26.70_{1,2,4}$	$15.38_{1,2,3}$	15.31***
Somatic Symptoms of Anxiety	$27.92_{3,4}$	25.88_3	$34.60_{1,2,4}$	$20.78_{1,3}$	14.93***
Total score	$131.64_{3,4}$	$124.98_{3,4}$	$156.57_{1,2,4}$	$96.79_{1,2,3}$	18.46***
N	43	59	43	42	

*** p < .001; Razlike među grupama prikazane su indeksiranim brojevima (Scheffeov post-hoc test)

CH = clinical headachers: subjects with headache in pediatric care (N=43),
NCH = nonclinical headachers: subjects with headache in community sample (N=59),
ANX = subjects with anxiety disorders (N=43),
CO = healthy controls (N=42)

Compared to healthy controls, children with headaches in clinical sample showed significantly more anxiety problems in all self-report SKAD-62 subscales. Compared to healthy controls, children with headaches in nonclinical sample showed more anxiety problem on the *Test Anxiety* subscale, *Social Anxiety* subscale, *Obssessive Compulsive* subscale, *Worry* subscale and Total score. Compared to anxiety disordered group, clinical and nonclinical headache sufferers showed significantly less anxiety problems in all self-report SKAD-62 subscales except on the *Test Anxiety* and *Social Anxiety* subscale, and on the *Separation Anxiety* subscale only in the nonclinical group of headachers.

Cut-off points were established and were used as a basis to examine those children who reported "high" anxiety scores. These cut-off points were established during the SKAD-62 standardization procedure in the community sample of 2,438 school children aged 10 to 18 years (Vulić-Prtorić, 2004). These points were taken as reflecting the score equivalent to the results above nine deciles. Table 4 shows that the area most commonly reported as highly problematic is related to separation anxiety, with 32.5% of clinical headachers reporting a score above nine deciles. It was interesting to note that test anxiety was a relatively common problem in the nonclinical headache sample.

Table 4. The number of subjects (and %) who had results above the 9. decile on the SKAD-62 anxiety subscales

SKAD-62 scales	Clinical headache		Nonclinical headache		Anxious		Healthy controls	
	N	N%	N	N%	N	N%	N	N%
Test Anxiety	7	16.0	10	17.0	9	20.9	0	0.0
Social Anxiety	6	14.0	4	6.8	8	18.6	0	0.0
Separation Anxiety	14	32.5	6	10.2	13	30.2	1	2.4
Obsessive-Compulsive Symptoms	5	11.6	3	5.1	8	18.6	1	2.4
Anxiety sensitivity/ Panic Attacks/ Agoraphobia	3	7.0	6	10.2	12	27.9	1	2.4
Worry	3	7.0	7	11.8	5	11.6	1	2.4
Somatic Symptoms of Anxiety	7	16.0	4	6.8	11	25.6	2	4.8
Total score	7	16.0	4	6.8	9	20.9	1	2.4

DISCUSSION

The key findings in this study are:

(1) There were no age and gender differences in the anxiety symptoms in two headache groups and control group. The only gender differences were found in the anxious group of children in two anxiety subscales (*Anxiety Sensitivity /Panic Attacks/ Agoraphobia* and *Somatic Symptoms of Anxiety*) with girls performing higher scores than boys.

(2) No significant differences were found on any of the anxiety subscales between subjects with headache in pediatric care and subjects with headache who did not ask for medical help.

(3) Significant differences were found in all anxiety scales between clinical headachers and healthy controls. Significant differences were found in four of seven anxiety scales between nonclinical headachers and healthy controls. Headachers suffer from more anxiety problems than healthy controls.

(4) Anxiety problems of clinical relevance were found in range from 7% of headachers (for excessive worry and anxiety sensitivity) to 32% of headachers (for separation anxiety) in the clinical sample and in range from 5% (obsessive compulsive symptoms) to 17% (test anxiety) of headachers in the community sample.

Age and gender differences

The finding of no age and gender differences concurs with some recent studies in this field. In the standardization SKAD-62 study in the community and clinical samples, as well as in some later studies with the same measure, it was found that gender and age differences started in age 14 and later, with girls evidenced an increase in anxiety symptoms, whereas the anxiety symptoms level for boys remained relatively constant (Vulić-Prtorić, 2004; Vulić-Prtorić & Macuka, 2003). Research suggests that this outcome could be related to the biological changes which occur from the pre-adolescent period to adulthood (especially advancing sexual development and associated changes in sex hormones) and may influence the emergence of differences between adolescent males and females in anxiety symptomathology as well as body sensitivity and pseudoneurological symptoms like headaches (Garber, 1998). These findings are in line with those of Anttila, Metsahonkala, Helenius and Sillanpaa (2000). In their sample of 513 children suffering from headaches (aged from 8 to 9 years), they reported no significant gender differences. The longitudinal study by Waldie and Poulton (2002) also found no gender differences in childhood history of headaches in a sample of 26-old headache patients. The authors concluded that headaches were strongly and consistently related to anxiety (from childhood through to young adulthood) and certain personality traits like nervousness, sensitivity and proneness to worry, which were nevertheless independent of sex, headache history or maternal headache status.

Anxiety in clinical vs. nonclinical headachers

There were no significant differences in the level of different anxiety symptoms between children who were involved in medical and psychological examination due to their headache problems (clinical headachers) and children in the community sample who reported headache problems but did not ask for medical or psychological assistance (nonclinical headachers). Although nonclinical headachers have slightly lower scores, it could be concluded that they suffer almost an equal number of anxiety symptoms as their clinical counterparts, but they differ in the preponderance of some specific aspects of anxiety symptomathology. Compared to nonclinical headachers, clinical headachers performed higher scores on the *Separation Anxiety*, *Anxiety Sensitivity* and *Somatic Symptoms of Anxiety*. According to the results on these three anxiety scales, nonclinical headachers did not differ from the healthy controls. One explanation for these results could be that children suffering from headaches, who are seeking counseling and medical treatment (clinical headachers), sometimes might experience more subjective distress and anxiety than non-clinical headache sufferers and that could be due to

the exhausting medical procedures and examination, school absences and other changes in everyday activities connected with the illness.

Anxiety in headachers vs. healthy controls

According to the results of this study almost double the number of anxiety symptoms was found in both clinical and non-clinical headachers, as opposed to their healthy counterparts. Children and adolescents with headaches showed significantly more anxiety problems in self-report SKAD-62 than healthy controls. For clinical headachers differences were most pronounced in all aspects of anxiety, and for the nonclinical headachers, significantly high scores were found in the *Test Anxiety, Social Anxiety, Obsessive-Compulsive Symptoms and Worry Scale.* This result, that children and adolescents suffering from headaches (in clinical and nonclinical group) show more anxiety symptoms, is in line with the findings of other investigators (Carlsson et al., 1996; Emiroglu et al., 2004; Just et al., 2003; Liakopoulou-Kairis et al., 2002;).

According to the *cutoff points* the majority of children with headache complaints do not have a clinically significant anxiety symptomathology, but the incidence of anxiety symptoms is much higher than in a population of non-headachers. Anxiety problems of clinical relevance in this study were found in 7% (for excessive worry and anxiety sensitivity) to 32% (for separation anxiety) of headachers in the clinical sample and 5% (obsessive compulsive symptoms) to 17% (test anxiety) of headachers in the community sample (see Table 4). These results are in line with those of previous studies in headache samples of children and adolescents. In the study of children with headaches (aged 8-13 years) Liakopoulou-Kairis and al. (2002) found that anxiety disorders were the most prevalent (35.4% subjects in headache group and 11.7% subjects in controls). Just and coworkers (2003) found that in about 30% of patients with headache, psychiatric problems are clinically relevant and require separate therapy.

Since the majority of studies did not report specific anxiety syndromes and their clinical significance in children with headaches, analyses of the results of each anxiety subscale separately were included in this study.

Test anxiety

It was found that test anxiety symptoms are very common in children with headaches, in this study. Amongst all the aspects of anxiety symptomathology, these symptoms are the most highly reported anxieties among nonclinical headachers, with 17% of the children in that group suffering test anxiety symptoms of clinical relevance (Table 4). These results, which showing more test anxiety

symptoms in headache sufferers that did not ask for medical help, are well documented in other research suggesting that anxieties about school tests and conflicts at school could be described as precipitants for headaches in children. Children with headaches were described as showing a tendency towards high achievement motivation in school, to be very stressed by having too many leisure activities, extremely concerned about their performance and as having high achievement goals (Aromaa et al., 2000; Liakopoulou-Kairis et al., 2002).

Schoolchildren with headaches are absent from school more often (due to illness) and experience less satisfaction with school than headache-free controls (Carlsson et al., 1996; Smith et al., 2003). Children have also reported that headaches affect their ability to concentrate in class and to do their homework. Bernstein et al. (1997) studied adolescent school refusers and found out that one third of those who presented gastrointestinal and autonomic somatic symptoms were also anxious or depressed. They found that the presence of headaches, dizziness and other autonomic symptoms are among the most common symptoms teenagers report as reasons for non-attendance at school. Poor attendance is of particular importance because it affects academic achievement and the development of peer relationships. The relatedness of somatic symptoms and school absenteeism could be helpful in identifing possible school triggers that relate to expression or exacerbation of somatic complaints. This might provide a model for *school avoiding* somatic complaints. It is important to mention that a lot of cases of school refusal reflect separation anxiety.

Social anxiety

High social anxiety symptoms were significantly more often reported in children suffering headaches in this sample – 14% of clinical headachers and 6.8% of nonclinical headachers suffer social anxiety symptoms of clinical relevance (Table 4). Children with headaches suffer from anxieties in different social situations, for example in the classroom, at parties, talking in front of their peers, and so on. They are usually described as having fewer peer relations and as avoiding play or games and hobbies, such as scout or club meetings, often because they were afraid of hurting themselves (Aromaa et al., 2000; Liakopoulou-Kairis et al., 2002). Social relationships are very important in moderating the effect of stressful life events on children's health (Walker, Garber & Greene, 1994). Peer support may help the child feel less overwhelmed by stressors and thereby reducing the subjective threat of these stressors. Peer activities may be an effective coping strategy in distracting the child from focusing on stressors and symptoms. It appears that a child's ability to obtain peer support, and this ability among headachers is lacking, buffers children from the effect of different stressors on their health.

Some authors warned that the increase in the number of headaches in children is connected with the increasing amount of time children spend using information technology equipment and electronic entertainment (Anttila, Metsahonkala, Mikkelsson, Aromaa, Kautiainen, Salminen, Viander, Jappila & Sillanpaa, 2002; Santalahti et al., 2005). On the one hand, these are usually very solitary activities that do not stimulate development of social skills and on the other hand, they can cause static strain in the neck and shoulder area, and headaches consequently. It was found that one of the most common environmental factors provoking migraine attacks was playing on the computer. Children with migraines had increased overall muscle tenderness and they also reported pain symptoms in the neck–shoulder region more frequently (Anttila et al., 2002).

Separation anxiety

Symptoms of separation anxiety are very common in clinical sample of children with headaches in this study. Amongst all the aspects of anxiety symptomathology, these symptoms together with test anxiety and worry were one of the most frequently reported anxieties amongst clinical headachers, with 32.5% children in that group suffering separation anxiety symptoms of clinical relevance (Table 4).

A major feature of this anxiety syndrome is excessive anxiety about separation from parents or attachment figures. Children suffering separation anxiety show unrealistic worry about harm happening to parents during their absence from home, they manifest school refusal, reluctance to sleep alone or away from home, they have physical complaints and distress in anticipation or at the time of separation. Adolescents with this disorder usually manifest school refusal and somatic complaints (Bernstein & Borchardt, 1991).

It was found that families of somatizing children (and children with headaches as well) are characterized by fear of loss, overprotection, communication problems and lower levels of emotional expressiveness. Additionally, in many cases somatization represents a kind of *emotional communication family style* (Anttila et al., 2000; Campo & Fritsch, 1994; Liakopoulou-Kairis et al., 2002; Walker, Garber & Greene, 1994). Parents of somatizing children are overprotective and promote separation fears that can increase a child's sense of vulnerability and fragility which leads to separation problems and anxieties. The children's somatic symptoms such as headaches can serve to maintain proximity to important attachment figures, and may be the consequences of children's anxiety about being separated from their parents. In extreme cases, children may even abuse medical services as an excuse for avoiding separation or for school absenteeism.

Moreover, sometimes the absence of organic pathology seems to be associated with less protection of the sick child, which leads parents to view the child as not

really being sick (Wood, 1994; Wood, Klebba & Miller, 2000). This could be a very painful experience for a child since the symptoms he or she is suffering can be as intense and severe as an organic disease. These feelings may also contribute to more intensive separation anxiety.

Obsessive-compulsive symptoms

Children suffering headaches had significantly more obsessive and compulsive problems than healthy controls, in this study. These symptoms were reported in 11.6% of clinical headachers, and 5.1% of non-clinical headachers (Table 4).

Obsessive–compulsive symptoms are typically characterized by distressing obsessional thoughts or impulses on the one hand, and compulsive rituals which reduce the anxiety associated with the obsessions on the other. Their connection with somatic complaints can be described through the different rituals children can use to avoid the appearance of physical symptoms (for instance, excessive washing and cleaning, if afraid of contamination or poisoning). Since, common obsessions are related to illness, body injures and death, they can lead to more sensitivity for somatic symptoms and more misinterpretations of these symptoms (Carr, 1999). It is important to note that in some cases school refusal could reflect the onset of obsessive-compulsive disorder.

Anxiety sensitivity / panic attacks / agoraphobia

Anxiety sensitivity, panic attacks and agoraphobia have been found to be the least common anxiety category among children in this study – 7% of clinical headachers and 10.2% of non-clinical headachers suffer from these anxiety symptoms of clinical relevance (Table 4).

Anxiety sensitivity refers to the tendency to interpret anxiety related bodily sensations as dangerous (Taylor, 1995). It is considered as a relatively stable dispositional or trait construct that has been described as vulnerability to other anxiety disorders, especially panic and agoraphobia. But recent studies have found that anxiety sensitivity is an important predictor of pain responses, as well (Muris, Vlaeyen & Meesters, 2001). More precisely, anxiety sensitivity would exacerbate fear of pain and, in its wake, can lead to pain specific avoidance behavior.

The *Anxiety Sensitivity / Panic / Agoraphobia Scale* is a SKAD-62 subscale measuring specific domains of anxiety sensitivity (fear of cardiovascular symptoms, fear of respiratory symptoms, fear of cognitive dyscontrol and fear of publicly observable anxiety symptoms), including two items about panic reactions and two items about agoraphobic reactions.

It appears that children with headaches are more sensitive to everyday stressful elements of life and their bodily sensations. In the study by Cooper, Bawden,

Camfield and Camfield (1987) children with migraines do not experience life events more stressfully compared to children without headaches, but they do react with a headache attack to a normal amount of stress and anxiety. Anxiety sensitivity is one of the factors that mediates fear of pain and ultimately contributes to the etiology of chronic pain complaints (Muris et al., 2001).

Symptoms of panic include physiologic complaints that can be present in children with headaches as an exacerbation of their illness. This association can be explained by the increased sensitivity to physical complaints among anxious patients. They become more aware of their bodies and their threshold for symptomatic illnesses is lower. In the representative study of 6-years-old, Aromaa et al. (2000) found that parents of children with headaches assessed their child as extremely sensitive to pain, who often get more excited about clinical examinations, and cry more often during blood sampling and vaccination. It was noted that they would even avoid playing for fear of getting hurt.

Worry

According to the results of this study, it could be concluded that children who suffer headaches are worriers. Amongst all the aspects of anxiety symptomathology, these symptoms together with test anxiety and separation anxiety were one of the most highly reported anxieties among headachers (according to the mean scores on the subscales). However, these features are not sufficiently severe, and do not negatively affect personal functioning to the degree that warrants clinical significance. For example, only 7% of the children in the clinical headachers group and 11.8% of the children in the nonclinical headachers worry to such an intensity that is of clinical relevance (Table 4).

This outcome lends support to some previous findings that indicate the connections between excessive worry and headache. In the longitudinal study of Waldie and Poulton (2002) it was found that the likelihood of having migraines at age 26 was significantly increased among those with high ratings on the worry/fearful scale at the ages of 5 to 9. One source of worry stems from concerns regarding the cause of headaches. Children suffering from headaches, as well as their parents, are often fearful of brain tumors. Children, even at the age of 5 or 6 report overwhelming worry that their headaches could be due to some brain disease, which is a thought planted by their parents, siblings or TV.

The *Worry Scale* is a SKAD-62 subscale consisting of items describing different worries: about future events, about past behavior, about low self-competence, about personal performance, etc., that represents a cognitive part of generalized anxiety disorder. The second part of generalized anxiety symptoms represents somatic aspects of anxiety such as palpitations, dizziness, nausea, etc., in the *Somatic Symptoms of Anxiety Scale*.

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Somatic symptoms of anxiety

Children with headaches in clinical sample report significantly more somatic complaints connected with anxiety than healthy children. In this study 16% of clinical headachers and 6.8% of nonclinical headachers suffer somatic anxiety symptoms of clinical relevance (Table 4).

Children and adolescents who suffer from headaches generally have more of other types of pain (abdominal, neck, shoulders, back), more complaints of increased tiredness, appetite loss, breathing problems and "eye tiredness" than headache-free controls. These findings suggest that children with headaches are more somatically sensitive and more focused and concerned with their health and bodily functioning than their counterparts. This means that under conditions of stress, high somatic sensitivity will increase the likelihood that symptoms of affective arousal will be translated into somatic symptoms. Moreover, a number of somatic complaints in children with headaches could be attributed to a somatization disorder as well (Carlsson, 1996). Therefore, the high values of headachers in the *Somatic Symptoms of Anxiety* might represent somatization.

Headaches and anxiety in childhood

According to the results in this study, it could be concluded that headaches are strongly related to anxiety and certain personality traits such as proneness to worry and somatic sensitivity, independently of age and gender. But the direction of causality remains unclear and couldn't be answered in this study.

There are different views concerning the underlying psychological causes linking headaches and anxiety in childhood. The first presumption is that one disorder predisposes the other. Some authors suggest that anxiety is a headache trigger factor and that it predicts migraines, and migraines in childhood predicts depression in adults (Merikangas et al., 1990). That is, anxiety may trigger headache attacks, or conversely, it may result from chronic pain. Waldie and Poulton (2002) have found that a history of childhood headaches confers a particular risk for anxiety disorders at ages 18 and 21, as well as combined headaches in adulthood.

The second presumption is that both disorders have a common underlying genetic and environmental risk factor, which causes a dysregulation in serotonergic and noradrenergic systems, which are the common neurotransmitter systems involved in migraines and anxiety. It appears that CNS serotoninergic dysfunction may be the underlying central mechanisms linking seemingly disparate functional disorders (Emiroglu et al., 2004; Just et al., 2003).

The third presumption concerns different environmental factors, especially inhibited emotional expression and distress communication through somatic complaints in family, overprotection and insecure attachment (Vulić-Prtorić, 2000). One of the most clearly articulated family model has been conceptualized by Beatrice Wood (Wood, 1994; Wood et al., 2000). According to Wood's model, specific maladaptive family processes, like emotional enmeshment and overinvolvement, negative parental relationship and discord, triangulation, extremely high or low family responsivity to the child's symptoms, determine the extent to which children develop somatization or develop adjustment problems to illness. Somatic problems like headaches could be considered as a kind of communication pattern the child develops in situations when the emotional dialog with parents or significant others are disturbed. The greater the maladaptive processes the greater the probability of somatic symptoms.

Limitations of the present study

There are some limitations of this study. Firstly, according to the headache diagnoses, migraine and tense-type headaches were not distinguished in separate groups, because the numbers in each group were too small to give reasonable interpretations. The second limitation pertains to the assessment of headache severity: all the children were included independently of the frequency and the degree of distress they experienced because of their headache problems.

CONCLUSIONS

In the present study, a sample of schoolchildren who were admitted to pediatric unit and psychological examination because of their headache problems, were compared with three matched samples with regard to their anxiety symptoms: a group of children with headaches from a community sample, a group of children with anxiety disorders, and healthy controls.

Overall, the children with headaches reported more anxiety symptoms (especially separation anxiety, test anxiety, worry and somatic sensitivity) than their non-headache counterparts. Additionally, the data was examined to determine the proportion of children who reported high scores on each of the anxiety subscales. According to the results, it could be concluded that pediatric headache shows elevation on measures of anxiety (equally headachers in a clinical and nonclinical setting), but these features are generally not sufficiently severe to the degree that could warrant a clinical diagnosis. The findings of the present study suggest that anxiety symptoms could be the problem in headache sufferers. Child psychologists and clinicians treating such children should address symptoms related to anxiety disorders and assist them with the expression and control of feelings relevant to

worry, separation anxiety, test anxiety, etc. In order to prevent the development of chronic headaches, comorbidity with respective anxiety problems should be detected early and treated sufficiently which, consequently, may make medical treatment of headaches more effective.

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