Adolescents with chronic headaches - mental health and coping patterns

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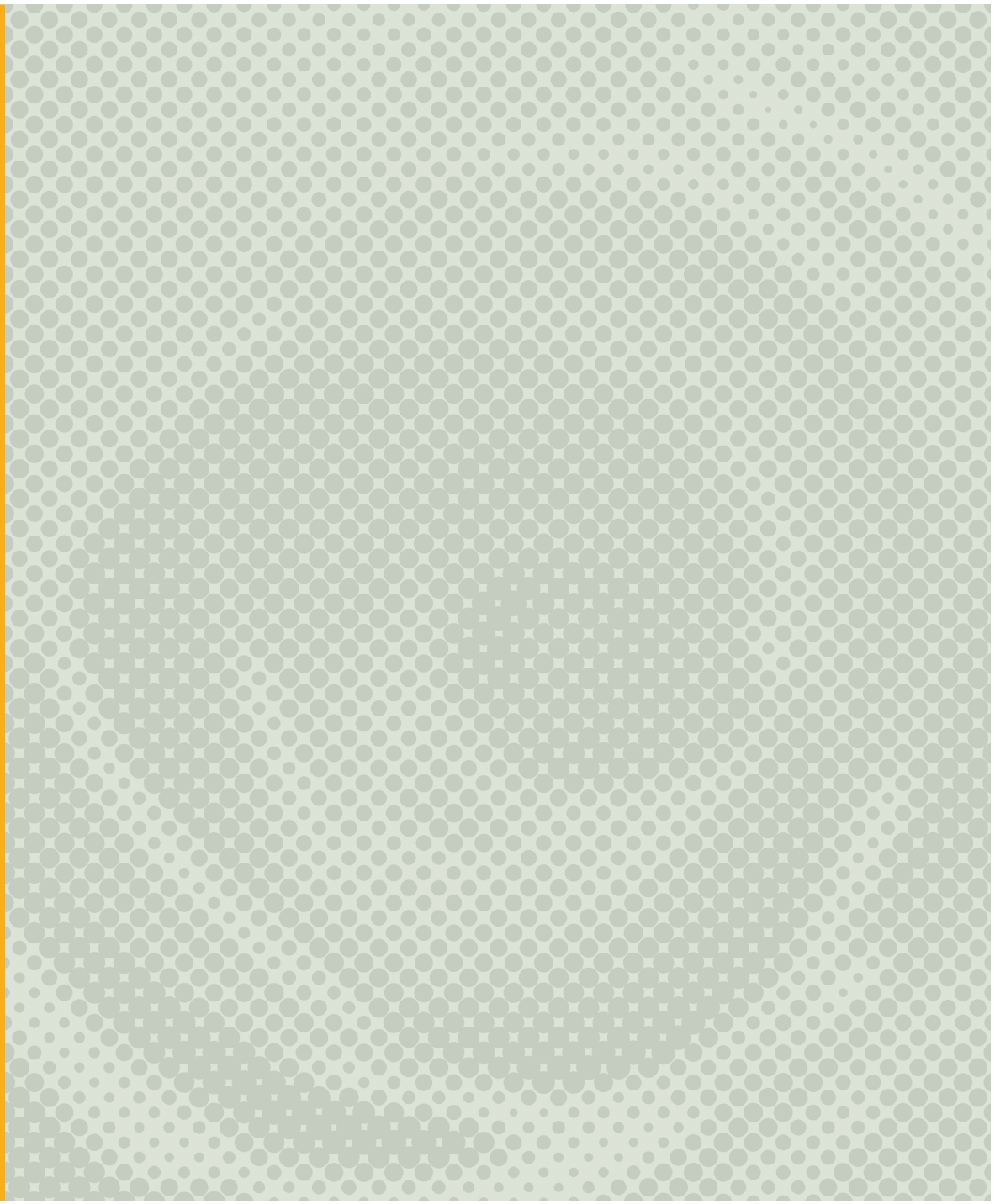

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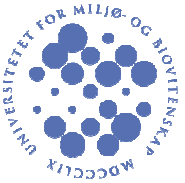

Norwegian Institute of Public Health

Department of Health Surveillance and Prevention

Summary

This study consists of two parts: first, the thesis with a general theoretical overview of the topic. Second, the article *Adolescents with chronic headaches - mental health and coping patterns*, which is intended to be published in "Pain", The Journal of the International Association for the Study of Pain.

The purpose of this study is to investigate coping strategies in adolescents with chronic headaches with and without mental health problems. An additional aim is to investigate the comorbidity of mental health problems in chronic headache sufferers, and whether some types of mental health problems in adolescents are more strongly associated with chronic headaches, than others.

This study is based on a self-report cross-sectional study undertaken in Akershus County in Norway in 2002. A total of 19 985 adolescents in lower secondary school and upper secondary school, aged 13-19 years, are included in this study.

Statistical analyses were performed with SPSS version 17.0. The analyses showed that chronic headaches among youth were associated with a higher risk of having mental health problems and vice versa. Furthermore, the analyses showed that, hyperactivity and emotional problems were the most common comorbid mental health problems in chronic headache sufferers.

Youth with chronic headaches and with additional mental health problems were more likely to use maladaptive internal coping strategies, like keeping feelings inside, using drugs and talking oneself out of problems, compared to those having chronic headaches alone, and compared to the control group. Furthermore, the comorbid group was less likely to seek support in family or friends, while they were more likely to visit health care services.

This study emphasizes the need for an increased focus on external coping strategies in adolescents, as well as a biopsychosocial approach when assessing the psychological and social impact of chronic headaches. This emphasis should enhance the long-term prognosis of the vulnerable comorbid group.

Sammendrag

Denne studien består av to deler: først kommer kappa, med en generell innføring i temaet denne studien dreier seg om. Deretter følger artikkelen *Adolescents with chronic headaches - mental health and coping patterns*, som er ment å bli publisert i tidsskriftet "Pain", the Journal of the International Association for the Study of Pain.

Formålet med studien er å undersøke hvilke mestringsstrategier ungdommer med kronisk hodepine, med og uten mentale helseproblemer benytter seg av. I tillegg har studien som formål å undersøke komorbiditet av mentale helseproblemer blant de som sliter med kronisk hodepine, og om det er spesielle typer mentale helseproblemer som er mer assosiert med kronisk hodepine enn andre.

Denne studien er basert på en selvrapportert tverrsnittstudie utført i Akershus fylke i Norge i 2002. Totalt 19 985 ungdommer i ungdomsskolen og videregående skole ble inkludert i denne studien.

Statistiske analyser ble uført i SPSS, versjon 17.0. Analysene viste at kronisk hodepine blant unge var knyttet til høyere risiko for mentale helseproblemer og vise versa. Blant ungdommer med kronisk hodepine var hyperaktivitet og emosjonelle problemer de hyppigste mentale helseproblemene.

Analysene viste også at ungdommer med kronisk hodepine som i tillegg hadde mentale helseproblemer var mer tilbøyelige til å bruke maladaptive mestringsstrategier, slik som å holde vonde tanker og følelser inne i seg, bruke rusmidler samt snakke seg bort fra problemene sine, sammenlignet med ungdommer med kronisk hodepine alene, og sammenlignet med kontrollgruppen. Videre var den komorbide gruppen mindre tilbøyelige til å søke støtte i venner og familie, mens de var mer tilbøyelige til å oppsøke helsetjenester.

Studien understreker behovet for et økt fokus på eksterne mestringsstrategier blant ungdom, i tillegg til en biopsykososial tilnærming når man skal vurdere de psykologiske og sosiale innvirkningene kronisk hodepine har på ungdommen. Denne vektleggingen bør styrke den langsiktige prognosen av den sårbare komorbide gruppen.

Acknowledgements

When I first started nursing school, I realized quite early that I wanted to focus on health promoting work. That is why it is exciting to be so close to reaching the goals I set back then. On that occasion, there are many people I wish to thank for making this come true.

First of all, I would like to extend a great deal of thanks to the Department of Health Surveillance and Prevention, Division of Mental Health, at the Norwegian Institute of Public Health, for allowing me to be part of the inspiring environment during this term. I would especially like to thank Jocelyne Clench-Aas at the Department of Health Surveillance and Prevention. Thank you so much! You have served multiple purposes: an excellent supervisor, 'mom', motivator and ray of sunshine. I would also like to thank Ruth Kjærsti Raanaas for constructive suggestions and thorough supervision. I would like to thank Professor Christofer Lundqvist, who provided new energy in the course of this research period with his expert knowledge on headache, as well as giving me lots of support.

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Finally, I think the coffee machine at the Division of Mental Health deserves thanks for providing loyal service these past months.

Silje Hartberg

Oslo, mai 2012

Forord

Da jeg begynte på min sykepleierutdannelse, ble jeg relativt raskt bevisst på at jeg ville jobbe med forebyggende og helsefremmende arbeid. Derfor er det gøy å se jeg er på vei til å nå det målet jeg satte meg den gang. I den anledning er det mange jeg ønsker å takke for at dette har blitt virkelighet.

Først og fremst en stor takk til Avdeling for helseundersøkelser og forebygging ved Divisjon for psykisk helse på Folkehelseinstituttet for at jeg fikk anledning til å være en del av det inspirerende miljøet på avdelingen denne perioden.
På denne avdelingen jobber ei dame som heter Jocelyne Clench-Aas. Tusen takk til deg. Du har fylt utallige roller; eksellent veileder, "mamma", motivatør og gledesspreder. Tusen takk til Ruth Kjærsti Raanaas, som har kommet med gode innspill og grundig veiledning. Og ikke minst takk til professor Christofer Lundqvist, som kom inn som et friskt pust i løpet av masteroppgaveperioden med sine ekspertkunnskaper på hodepine, samt masse god støtte.

Deretter en stor takk til mine fine medstudenter Gunvor, Maria, Karin, Anu, og Hilde. Dere har bidratt til mye latter, samt faglig og ikke-faglig innputt. Jeg kommer til å savne selskapet deres til frokost, lunsj, middag og kveldsmat framover.

Takk til niesene mine Fride, Alma og Maja, som alltid gir meg store og varme klemmer når jeg trenger det som mest. Takk til mamma og pappa, søsken, svogere og venner, som har gitt meg masse støtte og oppbacking, samt tid og rom til å prioritere innspurten av mastergraden min.
Til slutt synes jeg kaffemaskinen på Divisjon for psykisk helse på Folkehelseinstituttet fortjener en takk for trofast funksjon disse månedene.

Silje Hartberg
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List of figures and tables

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Abbreviations

CH	Chronic headaches without mental health problems
MH	Mental health problems without chronic headaches
CHMH	Chronic headaches with simultaneous mental health
ICHD-2	International Classification of Headache Disorders, 2nd edition

1.0 Introduction

First, general literature on headache, the comorbidity of mental health problems in chronic headaches, and different coping strategies will be presented, before highlighting the public health perspective. These factors are presented both generally, and with a focus on adolescents.

1.1 Headache

In the 1960s, the first classifications of headache disorders were presented, one from the Research Group on Migraine and Headache of the World Federation of Neurology, and another, quite similar, from an ad hoc committee of the US National Institutes of Health (Olesen and Steiner, 2004). These headache classifications gave only a short description of the few headache disorders accepted at that time, without any diagnostic criteria.
In 1988, the Headache Classification Committee of the International Headache Society published the first internationally acceptable and clinically useful classification system, "The International Classification of Headache Disorders, 1st edition". This classification system described explicit diagnostic criteria for most major headache disorders, and became universally accepted. In 2004, "The International Classification of Headache Disorders, 2nd edition (ICHD-2) was released, reflecting an improved understanding of some headache disorders, as well as describing new disorders (Olesen and Steiner, 2004).

According to The International Headache Society, the diagnosis criteria ICHD-2 divide headaches into primary and secondary headaches. Primary headaches are migraine, tension-type headache, cluster headache and other headaches. Secondary headaches are attributed to head and/or neck trauma, cranial or cervical vascular disorders, nonvascular intracranial disorders, substances (or withdrawal from substances), infection, disorders of homeostasis, disorders of other facial or cranial structures, or psychiatric disorders (Olesen and Steiner, 2004). Before the diagnosis for a primary headache disorder is made, secondary causes must be ruled out (Dodick, 2006). The four most common headache disorders in primary care are migraine, tension-type headache, cluster headache and medication- overuse headache. All have a neurobiological basis, and are disabling and impair quality of life. Three of these

(migraine, tension-type headache and medication-overuse headache) are responsible for almost all of the headache-related burden (Stovner et al., 2007).

1.1.1 Chronic headache

Chronic headache is a collective term for primary or secondary headaches occurring more than 15 days per month for longer than 3 months, according to the International Classification of Headache Disorders- 2 criteria (ICHD-2) (Dodick, 2006). ICHD-2 includes four types of primary chronic headache: chronic migraine, chronic tension-type headache, new daily persistent headache, hemicrania continua and chronic secondary headaches including medication-overuse headache (Seshia et al., 2010). Primary chronic headache can further be divided into long- or short-duration disorders, depending on whether the headache episodes last more or less than 4 hours.

Chronic migraine and chronic tension-type headache are the two most frequent subtypes of primary chronic headache, and are partly thought to evolve from migraine and tension-type headache (Scher et al., 1998, Castillo et al., 1999, Lu et al., 2001). Many chronic migraine patients have a history of episodic migraines. Severity decreases over time, while frequency increases. New daily persistent headache refers to headaches in which the patient has not had much headache in the past and then within a span of 24 to 72 hours develops a persistent daily headache. Hemicrania continua is a persistent unilateral, frontal headache with multiple daily severe aggravations with autonomic features, and is quite different from the other three varieties (Gladstein and Rothner, 2010). In clinical practice, the prevalence of chronic headaches ranges from 15 to 20 % of patients (Galli et al., 2004).

Recently, medication-overuse headache (MOH) was introduced as a distinct headache type in the ICHD-2, to describe daily or near daily (chronic) headache that occurs after regular intake (overuse) of any kind of anti-migraine or anti-headache drug. 30% to 50% of chronic headache attributes to overuse of anti-headache drugs (Katsarava et al., 2009).

1.1.2 Chronic headache and the comorbidity of mental health problems

The term comorbidity is defined as a medical condition that exists simultaneously but independently with another condition, although recent descriptions have implied causality between certain comorbid disorders (First, 2005).

Headache with a comorbid psychiatric disorder is an important risk factor for chronification of primary headache into adulthood (Galli et al., 2004). Psychiatric comorbidities are most prevalent in chronic headache sufferers, compared to other headache types (Heckman and

Holroyd, 2006). The presence of psychological distress in chronic headache patients is a major determinant of the overall level of functional impairment. A review by Wang and Juang (2002), discuss several studies reporting high levels of psychiatric disorders, mostly anxiety and depression, in chronic headache sufferers. A review by Baskin and colleagues (2006) refers to a study of 88 chronic headache patients, where 90% of the patients had at least one comorbid psychiatric disorder. Anxiety and depression in children and adolescents with headaches is related to enduring headache more than 8 years later (Just et al., 2003). Galli and colleagues (2004) found that among 59 patients with chronic headache, aged 7-17 years, sleep disorders (44.1 %), followed by anxiety (22 %) and mood disorders (6.8 %) were the most common psychiatric comorbidities. In a follow up study 4 years later, only eight out of 39 patients with diagnosed one/any psychiatric disorder in 1997 were headache-free in 2001 (Galli et al., 2004).

A cross- sectional study from the United States among 9264 children aged 4-17 years, based on a parent-report, found that children with frequent headaches were 3.2 times more likely than children without frequent headaches to have high levels of difficulties related to emotions, concentrations, behaviour, and social function, and 2.7 times more likely to have high levels of impairment, suggesting potential mental health problems (Strine et al., 2006). Mazzone and colleagues (2006) reported elevated symptoms of anxiety, hyperactivity and depression in children with chronic tension-type headache or chronic migraines compared to healthy peers.
Just and colleagues (2003) found high rates of emotional and behavioural problems in children and adolescents with both episodic and chronic headache. Battistutta and colleagues (2009) reported similar findings in their study among Italian adolescents with chronic tension-type headache.

According to Gentili and colleagues (2005), the out-dated psychometric approach considers headaches to be a symptom of mood and anxiety disorders, and this one-way relationship between headache and psychiatric disorders has been an assumption in contemporary psychiatry. For example, the well known clinical scale for depression, the Hamilton Rating Scale includes headache as an essential element of two items (Gentili et al., 2005). At the same time, Sheftell and Atlas (2002) report e.g. decreased concentration, decreased energy and sleep disorders associated with chronic headache, factors that are often associated with depression. More recent studies suggests a bi-directional relationship between the comorbidity

of headaches and psychiatric disorders, as patients with a psychiatric disorder seem to show more frequent and severe primary headaches, and vice versa that psychiatric comorbidity is increased in headache patients (Gentili et al., 2005, Wang and Juang, 2002). As discussed by Gentili and colleagues (2005), although headaches may be considered a symptom of depression, it may be that headaches, depression and anxiety share some of the same pathophysiological bases. On the basis of this view, a two-way relationship could link the conditions, primary headaches and psychopathology, with a common vulnerability between them (Gentili et al., 2005).

In mental and physical health research, there has been a paradigm shift from a biomedical reductionism approach to a more comprehensive biopsychosocial model (Gatchel, 2004). The biomedical model views pain as direct transmission of impulses from the periphery to structures within the central nervous system. Concerning headaches, this model has lead to important insights for pharmacological treatments. At the same time, the biomedical model has several limitations: explaining pain continuing in the absence of pathology, pathology that exists in the absence of pain, the varied individual responses to identical treatments, potent medications lack of success in providing steady pain relief and the absence of a strong association between pain, impairment and disability (Andrasik et al., 2005). So far, the most promising comorbidity- and pain-related clinical research has embraced a biopsychosocial perspective (Gatchel, 2004). The biopsychosocial perspective on mental health and pain disorders highlights the potentially significant role that biological, psychological and social factors play in the perception of pain, including headache pain (Andrasik et al., 2005). Chronic headaches in children and adolescents are often complex, and although headaches are the "presenting face" of chronic headaches, there is a wide range of other conditions connected to it. Psychosocial stress, e.g. related to home-/family-, school-, and peers are important factors in the development of chronic headaches (Seshia, 2004). Headaches are also assumed to have an impact on the child's psychosocial adaptation (Kroner-Herwig et al., 2007). According to Powers and colleagues (2006), using a biopsychosocial approach in the treatment of headaches makes it possible to assess the impact of headaches on a child's or adolescent's disability, quality of life and emotional functioning.

1.1.3 Risk factors associated with chronic headache

The prevalence of chronic headaches is two to three times higher in adolescent girls than in adolescent boys (Wang et al., 2006, Lipton et al., 2011). Socioeconomic status and the

prevalence of chronic headaches appear to be inversely related to each other, and low socioeconomic status is also associated with poorer prognosis (Scher et al., 2008). Medication overuse and the onset of chronic headaches before the age of 13 years and lasting for two years or longer are risk factors for persistence. According to a review by Seshia and colleagues (2010), genetic factors may facilitate chronification of headaches. Cultural and environmental factors are also important in causing chronic headaches. Lifestyle factors can play a role in the chronification of headaches, such as sleep deprivations, caffeine, low physical activity, smoking and hunger. Obesity has been related to elevated risk of chronification of migraines in girls (Seshia et al., 2010).

1.2 Coping strategies and correlates of mental health in adolescents

According to a review by Bandell-Hoekstra and colleagues (2000), coping can be described as cognitive and affective responses used by an individual to manage specific external or internal demands (and conflicts between them) appraised as stress because they are exceeding the person's resources. Coping is a process, consisting of a coping goal, the coping response itself and, finally, the coping outcome.

Coping can be classified in different ways, e.g. problem-focused versus emotion-focused coping, or approach versus avoidance styles of coping. The former distinguishes strategies directed at the troubling situation from those aimed at regulating emotions that are raised by the event. The approach- avoidance coping styles refer to incorporating information seeking versus information avoiding, attention versus distraction, and active versus passive strategies (Bandell-Hoekstra et al., 2000). The problem-focused coping strategies are directed at defining the problem and making an effort to solve it (Lazarus and Folkman, 1984), and are often associated with better psychological adjustment (Compas et al., 2001). The emotion-focused coping strategies involve one’s effort to regulate emotional distress, including avoidance (Lazarus and Folkman, 1984), e.g. by venting negative emotions, alcohol use and denying the stressor’s occurrence associated with the problem (Jorgensen and Dusek, 1990). Emotion-focused or avoidant/passive coping strategies are associated with negative mental health outcomes (Compas et al., 2001).

Previous studies suggest that distraction and support seeking are generally associated with decreased psychological symptoms in adolescents (Liu et al., 2004, Herman-Stahl and Petersen, 1996).

According to Seiffge-Krenke (2000), there is an increase with age in the use and repertoire of strategies employed. The increase in coping strategies has been related to the greater social and cognitive maturity of adolescents at this age, and being able to chose between coping strategies when dealing with stress (Griffith et al., 2000).

Previous research on coping in youth were based on models of coping in adults, and did not consist of the developmental component, while recently, there has been rapid growth in research in this area (Compas et al., 2001). However, these findings may be difficult to compare across studies because of a wide variety of age groups and partially overlapping coping categories (Holen et al., 2012). The variation in the results obtained on coping in children and adolescents may be influenced by the different age ranges considered, the lack of agreement about how to conceptualize coping, and the methodology used (cross- sectional or longitudinal) (Skinner et al., 2003). In addition, as discussed by Holen and colleagues (2012), previous studies on coping and mental health outcomes almost exclusively include clinical samples, uncontrollable stressors, or both.

1.2.1 Coping in children and adolescents with headaches

Coping styles in headache patients have been investigated in several studies. They have found that headache sufferers tend to use maladaptive coping strategies, such as withdrawal, avoidance and self-criticism (Ehde and Holm, 1992). Reliving and embellishing a negative event including the feeling of helplessness this often involves, is widely linked to chronic pain (France et al., 2002), and this maladaptive coping strategy has been found in headache patients (Ukestad and Wittrock, 1996).

The review by Bandell-Hoekstra and colleagues (2000) discusses coping in children with recurrent headaches. They state that quality of life is an important measure of the impact of headaches. The child's ability to cope with his/her headache is of importance for whether the headaches have an impact on quality of life. They present another view on coping and quality of life; dissatisfaction with essential aspects of their life becomes apparent in headaches through the influence of stress. They report that it has been confirmed in other studies that stress is a trigger for both migraine and tension-type headaches, as well as being responsible for most of the headaches in children. The assumption of this approach is that low quality of life leads to stress. If the ability to manage the stress is insufficient, the stress may trigger

headaches (Bandell-Hoekstra et al., 2000).

1.3 Headaches in a public health perspective

The burden related to headaches is a major public health problem (Jensen and Stovner, 2008). Headaches cause substantial levels of disability, and have been, and remain under-recognized and under-treated throughout the world, as well as underestimated in scope and scale (Jensen and Stovner, 2008). With WHO's ranking of the most disabling disorders, headaches are among the top ten for both sexes. In 2007, WHO released *Lifting the Burden: The Global Campaign to Reduce the Burden of Headache Worldwide*, which was a global campaign to reduce the incidence of headaches worldwide. The main purpose of this campaign was to increase the knowledge in the primary care sector in order to help those who suffered from headaches in an appropriate and more cost-effective manner (Steiner and Martelletti, 2007).

Chronic headaches is the most common chronic pain syndrome in adolescents in most part of the world (Seshia et al., 2010), and several studies report poor health-related quality of life in chronic headache patients (Wang and Juang, 2002). Chronic headaches among children can cause disability in terms of their daily activities, specifically in their ability to attend and function in school (Lewis 2009).

According to Jensen and Stovner (2008), the economic burden of migraines in the USA and Europe is related to absence from work or reduced efficiency. In the US, the total cost, both direct (consultations, investigations, medication and hospitalisations) and indirect, of 22 million migraineurs aged between 20 and 65 years were estimated to be 14.4 billion USD, whereas the indirect costs were responsible for 13.3 billion USD of the costs. In Europe, the total estimated cost of migraines was €579 per patient, or €27 billion for the 41 million patients aged between 18 and 65 years. Almost 90% were indirect costs, without the costs of drugs taken into account. There are less data on the costs of tension-type headaches, although two Danish studies found that total missing days at work were three times higher in tension-type headache patients than in migraineurs. The individual effects of tension-type headaches include loss of quality of life, physical suffering and economic effects (Jensen and Stovner, 2008).

1.3.1 Prevalence and prognosis of headaches

The percentage of the global adult population with a headache disorder is 46% for headaches in general, 11% for migraines, 42% for tension-type headaches and 3% for chronic headaches (Jensen and Stovner, 2008). Among Norwegian adolescents (aged 13-19 years), the prevalence of headaches in general is 29%, 7% for migraines, 18% for tension-type headaches (Jensen and Stovner, 2008) and 1.7% for chronic headaches (headaches more than 5 days a week) (Jacobsen et al., 2011). According to the review by Seshia and colleagues (2010), the prevalence of chronic headaches in Scottish schoolchildren was 0.9%, 1.5% in Sweden, 7.8% in China, 1.5% in Taiwan, and 1.68% in Brazil, respectively. Due to potential methodological differences, the prevalence is difficult to compare across studies (Seshia et al., 2010).
Two cross-sectional studies among Norwegian adolescents aged 16-20 years, found that the prevalence of daily headache (more than 5 days a week) increased from 1.2% to 1.7% over a four- year period (Jacobsen et al., 2011).

1.3.2 Early identification

Frequent headaches in childhood and adolescence are predictive of headaches in adulthood, which often becomes chronic (Brattberg, 2004). Early intervention, identification of risk factors and lifestyle factors are important to develop effective strategies to prevent that the headaches becomes chronic, and will have considerable benefits for the patient and society (Jensen and Stovner, 2008). Early intervention is also relevant for economic reasons, as patients with comorbid psychiatric disorders are associated with high medical service- seeking behaviour (Wang and Juang, 2002).

Psychiatric comorbidity is an important risk factor for chronification of primary headaches into adulthood (Galli et al., 2004). The negative prognosis associated with psychiatric comorbidity in headaches emphasizes the importance of identification of psychopathology in those having headaches at an early age (Baskin et al., 2006). The necessity of speaking with the chronic headache patient without parents, in order to address confidential and sensitive personal issues is recommended, as well as allowing the child to participate in decisions. The importance of dealing with stressors, keeping an informative diary and recognizing and avoiding triggers should be emphasized (Seshia, 2012). Seshia (2012) emphasizes the importance of medication overuse in connection to headaches, and suggests, if necessary, to stop taking medications as one of the first key steps. So far, despite the impact and

prevalence, screening instruments for psychiatric disorders in headache patients have not been developed (Maizels et al., 2006).
However, in efforts to treat chronic headaches, reduce comorbidity of psychiatric disorders, and to improve outcome, a family centered and often multidisciplinary, as well as a biopsychosocial approach is warranted, medication being only one component (Seshia, 2012, Andrasik et al., 2005).

1.3.3 Coping strategies in a public health perspective

According to Langaard (2006), there has been an increased interest concerning the theoretical basis of promoting coping-, and developmental practises in the treatment field of adolescents and mental health. Adolescence is a challenging period in life, require handling both internal and external changes (Langaard, 2006), and the adolescent's inner world is characterized by the reorganization of emotions, cognition and behaviour (Sundet, 2002).

To enhance coping skills in children and adolescents, a wide range of psychological interventions in children and adolescents in treatment and prevention of psychopathology are designed (Compas et al., 2001). Information on the basic nature and efficacy of coping in childhood and adolescence may help when planning interventions. Intervention research makes it possible to provide valuable data on the development of strategies, and how the social context can facilitate effective coping in children and adolescents (Compas et al., 2001).

1.4 Research objectives

Based on the introduction in this document, the main aim of this study is to investigate coping strategies in adolescents with chronic headaches both with and without the comorbidity of mental health problems. The focus will be on internal and external coping strategies, where the former are characterized by internalizing feelings and avoidance, while external coping strategies are directed at seeking help through health care services, or seeking social support in family and friends. The internal coping strategies can to some extent be compared with emotion-focused coping strategies as well as avoidance coping styles, described earlier in this chapter. The external coping strategies can to some extent be compared with problem-focused strategies as well as approach coping styles.

The hypothesis in our article (Hartberg et al., in prep.) was that the coping strategies defined as internal would be associated with a greater risk of chronic headaches and mental health problems than more external strategies.
In addition, this study is aimed at investigating whether some types of mental health problems in adolescents are more strongly associated with chronic headaches, than others.

2.0 Methods

Methods are described in our article (Hartberg et al., in prep.). This chapter will only give a more detailed description of some few sections.

2.1 The health profile

This study is based on a cross-sectional health survey undertaken in Akershus County in Norway. It was administered by the Norwegian Health Services Research Centre (HELTEF). Akershus County surrounds the capital of Norway, Oslo, and has urban, suburban and rural areas, and there are clear differences in socio-economic status among the inhabitants. The aim of the health profile was to give important information on health and well being in children and youth in the county. The health survey was conducted to provide all 22 municipalities in the county with information on different aspects of somatic and mental health in order to help the authorities to develop adequate strategies within the local public health policy. A number of different areas were covered in the health profile: socio-demographic data, physical health, mental health, nutrition and body image, school experiences and school boundaries, lifestyle, communication patterns, contact with health service and social anxiety.

Pupils from 3rd grade in primary school (8-9 years), up to the 3rd year of upper secondary school (18-19 years) were invited to participate in the health profile study, a total of 43 248 pupils. The data in lower secondary school was collected in April and May 2002, while the data in upper secondary school was collected in during spring and fall 2002, except from one upper secondary school, were the data was collected in fall 2003. 36 456 volunteered to participate in the health profile study, with a response rate of 84.3%. In primary school, 9707 pupils (age 10-13) participated, in lower secondary school, 9414 pupils participated (age 13-

16) and upper secondary school, 10 571 pupils participated (age 16-19). This study is based on responses from lower secondary school and upper secondary school, with a total sample size of 19 985 pupils.

Information concerning the health profile was handed out to headmasters, contact person in the municipalities, teachers, students and parents. All 22 municipalities in the county participated, and classes were selected at random to obtain a representative sample of the county as a whole. Before the health survey questionnaires were handed out, a pilot survey was undertaken to test the set of questions, as well as the methods.

2.1.1 Procedure

The pupils completed the set of questionnaires at school during one school-hour, under the supervision of the teacher. For pupils from 3rd grade in primary school to 10th grade in lower secondary school, parents were asked to give permission for the pupil to participate in the survey. The questionnaires were handled anonymously, and each questionnaire got a code without any possibilities for tracking the person who had answered. The health profile was conducted after approval from the Regional Ethics Committee.

2.2 Strengths and Difficulties Questionnaire (SDQ)

In this study, we have used the Strengths and Difficulties Questionnaire (SDQ) to assess mental health problems.

According to Goodman, SDQ is a self- reporting screening instrument for mental health, mapping psychological difficulty and resources in children and youth from 4-16 years (Goodman, 1997). Van Roy and colleagues (2008) suggest that SDQ is especially suitable for studies of general populations where the majority of children are healthy, because of the inclusion of items covering both strengths and difficulty. Robert Goodman created the SDQ, as a continuation of the well-known Rutter-scale (Obel et al., 2004). The SDQ functions at least as well as the Rutter- scale, correlating highly with this (Goodman, 1999). The SDQ exists in identical or nearly identical versions for teachers and parents of 3- 16- year olds, with a separate version for 11-16 year-olds (Goodman, 1997, Goodman, 1999). The SDQ can be used as a part of a clinical assessment in therapy, and as a research tool (Goodman). Although SDQ is a relatively new instrument, it has already been used several times in epidemiological as well as in other studies (Van Roy et al., 2006). On SDQ's website, the questionnaires are available to download free in more than 40 languages.

The SDQ consists of 25 items on psychological attributes, an impact supplement and follow-up questions. The 25 items on psychological attributes are divided between 5 subscales of 5 items each, some positive and some negative: 1. emotional symptoms, 2. conduct problems, 3. hyperactivity/inattention, 4. peer relationship problems and 5. prosocial behaviour (Goodman). In 1999, Goodman extended the SDQ with a brief impact supplement (Goodman, 1999). In the extended version two different scores are generated: one based on the symptom scale and one based on the impact supplement. The impact supplement asks whether the respondent thinks he has a problem, and if so, inquires further about chronicity, overall distress, social impairment, and burden for others. A combination of symptom and impact scores according to Goodman (1999), is the best indicator of caseness, and only few studies have utilised such information in their analyses (Rothenberger and Woerner, 2004). See our article (Hartberg et al., in prep.) for further description of the SDQ symptom and impact scales.

When assessing the mean scores in the SDQ subscales (emotional, conduct, hyperactivity, peer problems and prosocial behaviour) in this study, the Norwegian cut-off points by Van Roy and colleagues (2006) are used. Several Nordic surveys show a higher threshold for defining something as a problem in the Nordic countries, than in e.g. Great Britain. Therefore, Norwegian cut-offs were developed, with lower limits. These cut-off points are based on Goodman's cut-off points at the 80%-10%-10% of the distribution (Goodman). The five subscales have a total score of 10. According to Van Roy, the cut-off points for the subscale scores in the SDQ self-report are: emotional problems (0-4=normal, 5=borderline and 6-10=abnormal), conduct problems (0-3=normal, 4=borderline and 5-10=abnormal), hyperactivity (0-6=normal, 7=borderline and 8-10=abnormal), and peer problems (0-3=normal, 4=borderline and 5-10=abnormal) (Van Roy et al., 2006). We excluded prosocial behaviour in our analysis. The Norwegian version was available in 2001, and has been used in several Norwegian studies (Van Roy, 2010).

Although the SDQ self-report is designed for children and adolescents between 11 and 16 years of age, older adolescents in upper secondary school (aged 16-19 years) were also asked to participate. From 5th grade in primary school, the extended SDQ self-report was included in the health profile questionnaire (29631 pupils from age 10 to 19 years). For children in 3rd to

7th grade (age 8-13), the parents were asked to participate in the study. 14 576 parents completed the SDQ (response rate 78%).

2.3 Statistics

The Statistical Package for the Social Sciences (SPSS), version 17.0, was used for all statistical analyses in this study. The method selected was logistic regression. For details, see our article (Hartberg et al., in prep.).

3.0 Results

3.1 Summary of the main results in our study

19 029 students were included in the analysis in our article (Hartberg et al., in prep.). Of these, 3.5% had chronic headaches without mental health problems (CH), 1.3% had chronic headaches with simultaneous mental health problems (CHMH), and 7.3% had mental health problems without chronic headaches (MH). 27% of the chronic headache sufferers had additional mental health problems. The relative risk (RR) was calculated. We found a relative risk (RR) of developing chronic headaches when having mental health problems of being 3.6 (3.2-4.0), while the RR of developing mental health problems when having chronic headaches of being 4.0 (3.5-4.5).

In our article (Hartberg et al., in prep.), we found that chronic headaches among youth was associated with a higher risk of having mental health problems and vice versa. The mental health impact was similar in groups with mental health problems whether or not they had chronic headaches while those youngsters with chronic headache alone had a lower impact more close to that of the control group.

According to our article (Hartberg et al., in prep.), the CHMH group was significantly more likely to use the internal coping strategies like keeping their feelings inside of them and using drugs, and more likely to talk themselves out of their problems, compared to the two other groups (MH and CH) and to the control group. The CHMH group was significantly less likely to work more with other things, compared with the CH group. All three groups (CH, CHMH and MH) were significantly less likely to use the external coping strategies of visiting health care services, and speaking with friends or family, compared with controls. There were no

significantly differences in these coping strategies between the CHMH group and the CH group, and between the CHMH group and the MH group.

3.2 SDQ Symptoms subscales

All three groups (CH, CHMH and MH) had significantly higher mean levels of hyperactivity compared with the control group (figure 3). Compared with the other subscales, hyperactivity had significantly higher mean levels in all groups, including the control group. The CH group had significantly higher mean levels of emotional symptoms than the control group, but significantly lower levels than the two mental health groups. The CHMH group had significantly higher mean levels of emotional symptoms than the MH group, CH group and control group. The CH group had significantly higher mean levels of conduct problems and peer problems than control group, but significantly lower levels than the two mental health groups.

Figure 3: Mean SDQ subscale symptom score

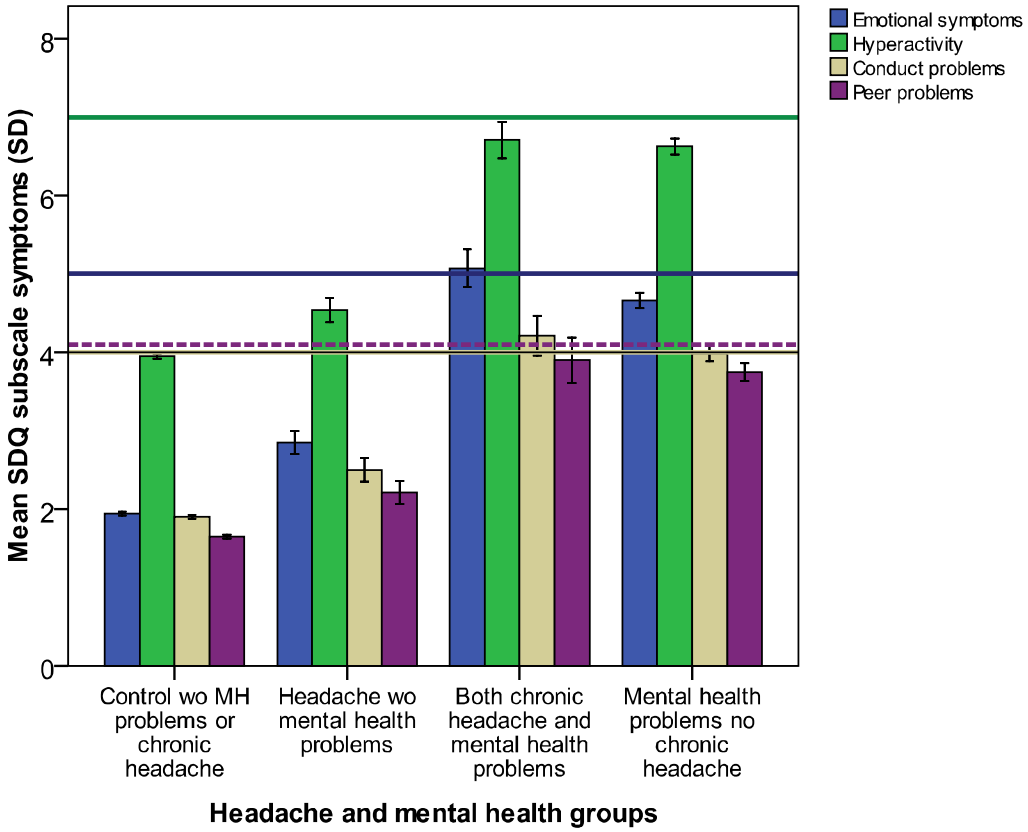

Figure 3. Mean SDQ subscale symptom score, ranging from 0-10. The cut-off points for borderline of the subscales, excluding the prosocial behaviour, are marked in the table, based on the Norwegian cut-off points by Van Roy. The three dependent variables: chronic headaches without mental health problems, chronic headaches with simultaneous mental health problems and mental health problems without chronic headaches, as well as the control group are shown on the x-axis. The error bars indicate the 95% confidence intervals.

4.0 Discussion

4.1 Methodological considerations

4.1.1 The Health profile

According to Shadish and colleagues (2002), external validity refers to the approximate truth for which the conclusions would hold for other persons in other places and at other times. The main criterion of external validity is generalization; whether the results obtained from a small sample can be generalized to the entire population.

This study is based on a cross-sectional health survey, undertaken in Akershus in 2002. A cross-sectional design means that causality cannot be addressed in an appropriate way, but we can instead describe the differences, as well as the association between two phenomena in the population. In order to assess the generalizations of the health profile, it is also important to consider the sample size, as well as the representativeness of the sample. Akershus County has urban, suburban and rural areas, as well as clear differences in socio-economic status among the inhabitants. Therefore, it is likely that the county is representative for Norway, which gives the opportunity to generalize the findings to the same age group in Norway.

The major advantage in the health survey was the sample size, as well as the high response rate. 9414 pupils in lower secondary school (age 13-16) participated, and the response rate was 86%. 10 571 upper secondary school pupils participated (age 16-19), with a response rate of 79%. Totally, the response rate for secondary and high school was 82%, which can be considered as high.
All 22 municipalities in the county participated, and all classes were randomly selected to obtain a representative sample of the county (Van Roy, 2010). A random sampling simplifies external validity (Shadish et al., 2002). The questionnaires were handled anonymously, which gives us reason to believe that the students responded honestly, and further most likely strengthens the validity.

According to Shadish and colleagues (2002), ecological validity refers to whether the environment influences behaviour. The students were in familiar surroundings in the classrooms when they responded the questionnaire, and therefore it is likely that the ecological validity is high.

4.1.2 Assessing mental health problems in the population

The Strengths and Difficulties Questionnaire (SDQ) is a screening instrument for mental health and psychological adjustment. Screens are suitable epidemiological tools, often less expensive than interviews, and can function well as the first stage when selecting a subpopulation for more detailed assessment. The main problem with screens is that an instrument with inadequate sensitivity and specificity can produce many false positives and negatives (Van Roy, 2010).

Construct validity is one of the most important properties of a measurement tool (Van Roy et al., 2008), whose main aspects are convergent validity and discriminant validity (Shadish et al., 2002). Regarding SDQ, the construct validity refers to which degree the questionnaire items are valid measures of the five constructs of the SDQ (Van Roy et al., 2008).

Convergent validity refers to the degree to which the measuring instrument in one study are related to other instruments that it is theoretically predicted to correlate with, and a threat to convergent validity is low correlation between two instruments that are meant to measure the same construct (Shadish et al., 2002). According to Van Roy and colleagues (2008), convergent validity of the SDQ has been evaluated, and shown substantial correlations with other instruments of psychological adjustment, such as the Child Behaviour Check List and the Youth Self-Report and the Rutter questionnaire.
Further, according to Goodman (2001), SDQ discriminates well between children with and without psychopathological symptoms, which is in accordance to the criteria of discriminant validity (Shadish et al., 2002).

Chronbach's alpha is a measure on the internal consistency of a scale, and refers to checking whether the items in the scale measure the same underlying construct. A Chronbach's alpha greater than 0.7 indicates high internal consistency (Pallant, 2010). The internal validity of the SDQ has been tested and found satisfactory, despite lower internal reliability for several subscales (Muris et al., 2003, Van Roy et al., 2008). Muris and colleagues (2003) suggest that low internal reliability for some of the subscales may be due to the positively worded reverse-scored items in the conduct, peer problems and hyperactivity subscales. In our article (Hartberg et al., in prep.), the Chronbach's alpha for the total difficulties score was 0.78, after excluding the headache question in the emotional subscale. The Chronbach's alpha for the

subscales were 0.45 for hyperactivity, 0.67 for emotional problems (after excluding question concerning headache), 0.56 for conduct problems and 0.61 for peer problems. The positively worded scores in some of the items were reversed before checking the reliability, in accordance with the suggestion by Muris and colleagues (2003). According to Pallant (2010), a scale with few items can give low Chronbach alpha values, which may explain the low Chronbach's alpha in some of the SDQ subscales.

4.1.2.1 SDQ as a measuring instrument for estimating a potential population at risk

In our article (Hartberg et al., in prep.), adolescents reporting symptoms exceeding the 80th percentile and impact greater than or equal to 1, were considered a group at risk for mental health problems. This does not mean that the students meeting the criteria of mental health problems qualify for a psychiatric diagnosis.

Furthermore, this estimate was based on self-reporting and there was no clinical validation. On the other hand, our article (Hartberg et al., in prep.) assumes that it is a plausible estimate. According to Van Roy and colleagues (2006), SDQ has a clinical predictive ability, showed in studies with independent clinical evaluations, and scores above the 90th percentile can predict a substantially raised probability of being diagnosed with a psychiatric disorder.

Questionnaires predicting psychiatric caseness on the basis of symptom scores, can result in implausibly high prevalence rates. Using the extended SDQ with the impact supplement alters prevalence for "caseness" and need for help (Goodman, 1999). Further, the results in our article (Hartberg et al., in prep.) are based on self-reporting in an anonymous health profile, which may strengthen the validity of the self-report information. This is supported by a Finnish study among adolescents (13-17 years), where the means of the SDQ total difficulties score, obtained from an anonymous sample, were two to three points higher than when the self-reports were obtained in an identifiable manner (Koskelainen et al., 2001).

In our article (Hartberg et al., in prep.), the participants ranged between 13 and 19 years of age. Although the original version of SDQ self-report by Goodman was developed for children and adolescents between 11 and 16 years old, Van Roy and colleagues (2008) found that SDQ also fit as a screening instrument for older adolescents (17-19 years). The conclusion in the latter study is further supported by Svedin & Priebe (2008), in an

application of the Swedish self-report to a representative sample of high school students (17-19 years).

Since our article (Hartberg et al., in prep.) is based on a cross-sectional study, meaning that causality cannot be addressed in an appropriate way. However, the findings concerning mental health problems in our study can help in identifying risk groups to target for prevention and early intervention.

The SDQ questions in the health profile were asked in retrospect, which means that the data may have been affected by memory bias.

4.1.3 Assessing chronic headaches in the population

According to the classification system ICHD-2 by The International Headache Society, the definition of chronic headaches is a headache occurring on more than 15 days per month for longer than 3 months (Olesen and Steiner, 2004). Our article (Hartberg et al., in prep.) is based on a cross-sectional study, which means one can only provide estimates of the association and not definite diagnosis as defined in the ICHD-2.

In our article (Hartberg et al., in prep.), the information from the health profile survey was used to assess headache complaints among the students. The question was: "During the last 6 months, how often have you had the following complaints", where headache was one of the complaints. There was only one question in the questionnaire concerning headache complaints, which may be a threat to the construct validity (Shadish et al., 2002). Further, there is no clinical validity for the headaches, as the results are based on self-reporting, and not a clinical interview or examination. According to Stovner and Andree (2010), a personal interview in epidemiological studies of headache will give the most reliable diagnosis and the highest prevalence estimates. On the other hand, when the aim is to map only the most bothersome of the headaches, questionnaires with questions about headache severity and frequency seem to be a sensitive method that functions quite well (Stovner and Andree, 2010).

According to Stovner and colleagues (2006), the way the introductory screening question is asked, makes a great difference in headache prevalence. A neutral screening question, e.g. "have you had headache/ migraine…" will give considerably higher estimates than questions specifying some severity/degree/frequency of headache suffering, e.g. "have you suffered from headache/migraine…". Therefore, when defining groups of headache suffers in epidemiologic studies, it may be best to use a neutral screening question with additional

questions on severity, frequency, impact e.g. in order to obtain answers from as many headache suffers as possible (Stovner et al., 2006). In order to this, and to explain the prevalence of chronic headache in our article (Hartberg et al., in prep.), the prevalence may be even higher than 3.5%, since the screening question included the word frequency.

The headache question was asked in retrospect, which requires that the student think and evaluate their headache complaints during the last six months. This question formulation may be a source of recall-bias, as the student may not remember the extent of their headache complaints. According to this question, we only got information about whether they had experienced any headache in a specified time, and how often. No information was provided on e.g. severity of the headache, if the headache was related to secondary causes, nor any information on what type of headache (e.g. migraine, tension-type headache).

Furthermore, there was no information on medication use in connection with the headaches. According to Dyb and colleagues (2006), analgesic use among adolescents is common and increases during adolescence. The latter study found that analgesics-use among Norwegian adolescents with headaches increased with the frequency of headaches (Dyb et al., 2006). In order to explain the prevalence of chronic headaches, the prevalence of chronic headaches in our article (Hartberg et al., in prep.), may have been influenced by medication use in the students, without giving us the possibility to map the frequency of medication use. On the other hand, the headache question gave us important information on the frequency of the headaches, and the possibility to find students with comprehensive headache complaints, independent of medication use.
In our article (Hartberg et al., in prep.), the inclusion criteria for chronic headaches was headaches almost every day. This is in close accordance to the ICHD-2 criteria, headaches more than 15 days per month. However, by having such strict criteria in the study, one can lose those answering more than once a week. These respondents may underestimate their headaches. One may also lose those who do not remember how often they experience headaches, which in turn may affect the prevalence of chronic headache, presented in our study. When comparing the prevalence estimate in our study with other studies, e.g. Seshia and colleagues (2010), our estimate is slightly higher than the mean prevalence of these studies among children and adolescents.

4.1.4 Assessing coping strategies in the population

In our article (Hartberg et al., in prep.), coping was assessed by the question: "What do you do/what happens when you are burdened by painful thoughts and feelings?" To the best of our knowledge, our study is the first study assessing coping strategies in adolescents based on this question in the health profile. The question had ten response alternatives, while three of the response alternatives were removed from the analysis. The coping strategies were further divided into internal and external coping strategies (Hartberg et al., in prep.). In recent years, studies on methods of coping among children have included three or more dimensions within coping (Holen et al., 2012). In our article (Hartberg et al., in prep.), the question on coping strategies only consisted of seven response alternatives, after excluding three response alternatives. Therefore, it was not possible to create more than two categories.
According to Compas and colleagues (2001), there is a wide range of instruments measuring coping, which makes integrating findings across studies and discussing the positive and negative aspects of each measuring instrument more challenging. Therefore, our article (Hartberg et al., in prep.) does not necessarily meet the criteria for construct validity, due to the lack of a basis for comparison with other studies measuring coping with other measuring instruments. In addition, because of the cross-sectional design our article (Hartberg et al., in prep.) was based on, more in-depth questions concerning coping strategies were not available. The question was worded in a way ("when you are burdened by painful thoughts and feelings…"), so that it was easy for most people to identify themselves with the condition. It is likely that the responses adequately reflect the coping strategies young people use in an everyday situation with painful feelings experienced by most people.

In statistics, Pearson´s product-moment correlation coefficient (Pearson's r) is a measure of the strength and direction of two variables. Pearson's r is designed for continuous variables, but is also usable when having one continuous and one dichotomous variable (Pallant, 2010). When SPSS calculates Pearson's r, the values are given between -1 and +1. The minus or plus sign indicates whether there is a negative or positive correlation.
In our article (Hartberg et al., in prep.), the Pearson's r ranged from 0 to 0.28 in the seven response alternatives in the question concerning coping strategies. When including the socio-demographic variables, the Pearson's r ranged from 0 to 0.29 (Table 5). According to Buda and Jarynowski (2010), a value between 0.1 and 0.5 indicates a small or weak correlation

between the variables. Therefore, the correlation between the independent variables can be considered as small.

Table 4: Correlation between the independent variables, Pearson's r

	Sex	**Grade**	**Well off**	**Living situation**	**School-related stress**	**Keep trouble innside**	**Do other things**	**Use drugs**	**Talk oneself out**	**Visit health care service**	**Speak with family**	**Speak with friends**
Sex												
Grade	.011											
Well off	.089**	.060**										
Living situation	.032**	.006	.219**									
School-related stress	.156**	.083**	.069**	.036**								
Keep trouble innside	-.049**	.017*	.085**	.041**	.080**							
Do other things	.031**	-0.15*	.007	-.005	.030**	.252**						
Use drugs	-.113**	.106**	.041**	.072**	.068**	.117**	.032**					
Talk oneself out	.061**	-.037**	.050**	.033**	.085**	.254**	.220**	.119**				
Visit health care service	.056**	.041**	.010	.035**	.033**	.017*	.030**	.135**	.090**			
Speak with family	.089**	-.080**	-.078**	-.008	-.051**	-.262**	-.057**	-.152**	-.087**	.121**		
Speak with friends	.286**	.063**	-.044**	.000	.033**	-.267**	-.047**	-.024**	-.002	.063**	.279**	

***p ≤ 0.05 **p ≤ 0.01**

4.1.5 Statistical considerations

The Statistical Package for the Social Sciences (SPSS), version 17.0, was used for all statistical analyses in this study. Because the dependent variables are dichotomous, we used logistic regression in the analysis. Logistic regression allows us to assess how well our set of explanatory variables predicts our categorical dependent variables (Pallant, 2010). The dependent variables in this study are categorical, and the explanatory variables are either categorical or continuous.

To correct for multiple comparisons, the significance level was adjusted, as suggested by Bonferroni, to be equivalent to 0.05/number of tests. In this study, we present 28 tests (7 items x 4 groups), which results in adjusted significance level of 0.0017.

When running a logistic regression analyse, missing data is excluded casewise. This means that only those having complete data (no missing) are included in the analysis.
In our article (Hartberg et al., in prep.), the variable concerning coping strategies has the most missing data. The missing values in the responses to the coping questions ranged between 925 and 1444, and the valid responses ranged between 18 439 and 18 958.

4.2 Coping strategies in adolescents with chronic headaches with and without mental health problems

In our article (Hartberg et al., in prep.), we divided coping strategies into internal and external coping strategies. The internal coping strategies involved keeping the feelings inside, distraction, drug use and a strategy directed at talking oneself out of one´s problems. The external coping strategies involved seeking help and support in health care services, family or friends.
Our article (Hartberg et al., in prep.) found that adolescents aged 13 to 19 in the CHMH group were more likely to use internal coping strategies, such as keeping their feelings inside, using drugs and talking themselves out of their problems compared to healthy adolescents. In addition, the CHMH group was more likely to use the internal coping strategies compared to the two other groups; MH problems group or CH group.

The internal coping strategies in our article (Hartberg et al., in prep.) can be compared with emotional or avoidance coping strategies described by others (Lazarus and Folkman, 1984, Bandell-Hoekstra et al., 2000). In a study by Liu and colleagues (2004) among Chinese high school students, coping strategies when facing problems or stressful situations were found in two main domains: active coping and avoidant coping. Active coping strategies were characterized by distancing, positive appraisal and thinking, help seeking and problem-solving (Liu et al., 2004). Avoidant coping is characterized by avoidance behaviours, like keep feelings inside, avoiding people and avoiding situations. Students high on active coping were associated with reduced risk for problems like aggression, anxiety and depression, while they saw the opposite effect when using avoidant coping strategies (Liu et al., 2004). These findings are consistent with our findings (Hartberg et al., in prep.), where adolescents with mental health problems more often used internal coping strategies. A review by Compas and colleagues (2001) confirmed that studies have shown that these coping styles are associated with increased negative and unwanted thoughts and distress. In order to explain the association between avoidant coping and the increase of negative, unwanted thoughts and distress, one can imagine that avoidant coping styles exacerbate the negative outcomes of stress, possibly leading to a more negative sense of loosing control, helplessness and more negative social interactions. This may lead to an increased risk of mental health problems. Using active coping strategies, however, may give a sense of control when the circumstances are chaotic, as well as creating opportunities for solid relationships with a supportive network. This may, in turn, reduce stress and enhance mental health (Folkman and Lazarus, 1988a, Folkman and Lazarus, 1988b).

According to our article (Hartberg et al., in prep.), the internal coping strategy of working more with other things was a significantly less used coping strategy in the CHMH group compared with the CH group. As discussed in our article (Hartberg et al., in prep.), distraction as a coping strategy is associated with decreased levels of distress and intrusive thoughts (Compas et al., 2001), and we suggested that adolescents with CHMH problems were less able to distract themselves from negative thoughts.

We found in our article that drug use was significantly more common in adolescents having CHMH problems, compared with the MH problems group, CH group and control group (Hartberg et al., in prep.). In contrast, according to Liu and colleagues (2004), smoking or alcohol use was less frequent in Chinese high school students when coping with problems or

stressful situations. The latter findings may be due to differences in drinking culture and drinking motives in China and Norway, although Kuntsche and colleagues (2006) reported that drinking as a coping strategy was stable across cultures. The latter study is a review, investigating drinking motives in young people. They report that the young people drinking for coping motives had negative self-esteem, and were further described to be neurotic, having problems with describing and identifying their emotions. Further, adolescent girls, rather than adolescent boys, seemed to have coping motives when drinking. Alcohol use was associated with coping with psychological problems (Kuntsche et al., 2006). This finding is in consistence with our findings (Hartberg et al., in prep.) whereas use of drugs was more common in the CHMH group. According to Lanzi and colleagues (2001), children and adolescents with headaches were more likely to internalize their feelings. Among the adolescents with CHMH problems, one can assume that adolescents will use alcohol or other substances as a coping strategy when handling difficulties, which are consistent with our findings (Hartberg et al., in prep.).

We found that the internal coping strategy of working more with other things to avoid bad thoughts or feelings was a little used coping strategy in all three groups, and was significantly less used in the CHMH problems group compared with the CH group (Hartberg et al., in prep.). Distraction, on the other hand, is found to be associated with decreased psychological problems (Compas et al., 2001).

According to our article (Hartberg et al., in prep.), the CHMH group was less likely to use the external coping strategy like speaking with family or friends, compared to the CH group and to healthy controls. This finding agrees with the well-known fact that mental health problems, e.g. depression, generally lead to isolation and withdrawal. When having the additional burden of chronic headache, our article (Hartberg et al., in prep.) suggests that this vulnerable group may be even less able to create and maintain social relationships. They were, however, more likely to visit health care services than others, which is in accordance with Wang and Juang (2002), who reported that patients with comorbid psychiatric disorders are associated with a high medical service- seeking behaviour. Such behaviour is associated with higher costs for the individual.

4.3 Comorbidity of mental health problems in adolescents with chronic headaches

In our article (Hartberg et al., in prep.), we found that the relative risk of developing chronic headaches when having mental health problems was 3.6 (3.2-4.0), while the relative risk of developing mental health problems when having chronic headache was 4.00 (3.5-4.5). In a longitudinal study on Norwegian adult headache sufferers, Zwart and colleagues (2003) found that the seriousness of the headache was positively associated with the risk of developing depression or anxiety. According to the on-going discussion on the suggested bi-directional relationship between the comorbidity of chronic headache and psychiatric disorders (Gentili et al., 2005, Wang and Juang, 2002), this finding may support the theory of the existence of a bi-directional relationship between chronic headaches and psychiatric disorders. In our article (Hartberg et al., in prep.), adolescents had chronic headaches with attacks almost every day, indicating a severe headache. The relative risk (3.96) indicates that these adolescents are at greater risk for developing mental health problems. However, since our article (Hartberg et al., in prep.) is based on a cross-sectional design, we cannot say anything about the "chicken and egg". There is therefore a need for more prospective studies regarding these associations.

There was a significantly higher level of peer problems in the chronic headache group compared with control group, but a significantly lower level than the two other groups (Figure 3). Battistutta and colleagues (2009) had similar findings in children and adolescents with chronic tension-type headache from a hospital-based sample. They found that the adolescents with chronic tension-type headache had high scores in a social problems scale, compared to healthy controls (Battistutta et al., 2009). This, together with our data, suggests that problems with peers and other social relationship are more common in chronic headache sufferers. Both of the mental health groups had high levels of peer problems. When having the additional load of mental health problems in chronic headache sufferers, it is likely that this group has greater difficulties in functioning in relation to friends and others.

We found that the level of conduct problems in the chronic headache group was significantly higher than in the control group, but yet significantly less than two other groups. We saw a difference between conduct problems in the group of chronic headaches with additional mental health problems, and the mental health problem only group. Pakalnis and colleagues (2005) found that male adolescents with chronic tension-type headaches were rated to have

significant conduct problems, although this was based on parent report. According to Galli and colleagues (2004), anxiety disorders (including conduct disorder) were common among 22 % of the patients with chronic headaches. The latter study did not distinguish between the anxiety disorders, so we cannot know how many of these patients have conduct problems. Strine and colleagues (2006) found that children and adolescents with frequent or severe headaches were 2.5 times more likely than children without frequent or severe headache to have conduct problems. This matches with our findings. This study used frequent or several headaches during the past 12 months as inclusion criteria for headaches, and no clear definition for severity was given. In addition, the latter study was based on parent reports. Therefore, our data are likely to represent a more realistic appraisal of what the affected individuals really experienced, both with respect to headache and psychopathological symptoms. On the other hand, Strine and colleagues (2006) also used SDQ to assess mental health, which makes the study more comparable with our study. In contrast, Milde-Busch and colleagues (2010) did not find significantly higher levels of conduct problems in their sample of adolescents with headaches.
Furthermore, Figure 3 shows significantly higher level of emotional symptoms among those having chronic headaches and mental health problems compared with those with mental health problems only. A review by Baskin and colleagues (2006) confirm our findings of emotional symptoms in chronic headache sufferers, reporting that several studies have found an increased risk of mood and anxiety disorders in patients with chronic headaches.

The chronic headache group showed significantly higher levels of hyperactivity than the control group, but significant lower levels compared with the two other groups. We did not find significant differences between the comorbidity group and the mental health problem only group on levels of hyperactivity, although hyperactivity had higher scores in both groups. Battistutta and colleagues (2009) also found higher scores of hyperactivity in chronic tension-type headache patients (aged 11-18 years) compared to controls. In addition, Strine and colleagues (2006) and Milde-Busch and colleagues (2010) found significantly higher levels of hyperactivity among the headache individuals, although they used a less stringent definition of headache than in our article (Hartberg et al., in prep.).

4.3.1 A biopsychosocial approach

In our article (Hartberg et al., in prep.), we have addressed a vulnerable group, consisting of adolescents with both chronic headaches and mental health problems. The comorbidity of

mental health problems in headaches is associated with poorer prognosis, as well as higher medical costs for the individual, which points to the need for investigating strategies to help this vulnerable group.

Furthermore, attention should be paid to the variations in coping skills in adolescents to enhance coping strategies in adolescents with chronic headache and mental health problems. This group was likely to use maladaptive coping strategies, like keeping their feelings inside, using drugs and talking themselves out of problems. In addition, they did not seek support from family or friends when experiencing negative thoughts (Hartberg et al., in prep.). In order to assess the impact of chronic headaches on the adolescent's disability, quality of life and psychological functioning, a biopsychosocial approach is warranted (Powers et al., 2006).

The chronic headache patient will normally seek a headache specialist in their effort to get rid of their headache. Therefore, it is important for clinicians to strengthen their interest in the psychiatric comorbidity of their primary headache patients in order to improve clinical outcomes and to prevent chronification of the headache in children and adolescents. Maizels and colleagues (2006) suggest that all clinicians who meet headache patients in their practise screen for psychiatric disorders as a routine clinical evaluation. Because headache is a medical disorder, it can seem irrelevant for the chronic headache patient to discuss psychological issues in a medical setting. Initially, the patient will often address psychological changes as "secondary" to chronic headaches, as there are some overlapping symptoms in mood and anxiety disorders and chronic headaches (Baskin et al., 2006). As major depression is a frequent comorbid psychiatric disorder in chronic headache patients, use of antidepressants are solidly supported by evidence for reducing the headache profile and comorbid psychological distress (Wang and Juang, 2002).

Headaches are assumed to have an impact on the child or adolescent's psychosocial adaption (Kroner-Herwig et al., 2007). This matches the findings in our article (Hartberg et al., in prep.), namely that adolescents with chronic headaches, especially when having the additional load of mental health problems, were less able to use their social environment and seek support in others as coping strategies when having negative thoughts. Therefore, a focus on building strong social networks in an early age can lead to increased use of external coping strategies in children and adolescents, and further lead to decreased use of maladaptive internal coping strategies, such as internalizing feelings and using drugs, since this is associated with poorer psychological prognosis.

5.0 Conclusion

In this study, we have found that chronic headaches in adolescents was associated with a higher risk of mental health problems, and vice versa. Furthermore, the group of adolescents having both chronic headaches and mental health problems appear to be the most vulnerable population, reporting high levels of hyperactivity and emotional problems, as well as being more likely to use maladaptive internal coping strategies, like keeping their feelings inside, using drugs and talking themselves out of problems to a greater extent, compared to adolescents with chronic headaches alone, and compared to the control group. This coping pattern is associated with increased psychological problems. In addition, the group having chronic headache and mental health problems were less likely to speak with friends and family than those having chronic headache alone group and than the control group.

Investigating coping strategies when having painful thoughts or feelings in adolescents may help in a further understanding of the problems of chronification and psychiatric comorbidity of chronic headaches. Prospective studies are emphasized and may, in the future, say something about the “chicken and egg” issue regarding these associations.

Adolescence is a critical phase entailing individual psychological and physical changes. Present studies have shown that seeking parental and peer support are important for good mental health. This study emphasizes the need for an increased focus on external coping strategies in adolescents, e.g. in school, where adolescents spend a great deal of time, and where they are available for learning.
In order to assess the psychological and social impact of chronic headaches, a biopsychosocial approach is warranted. This emphasis should improve the long-term prognosis of the vulnerable group of adolescents having chronic headache with the additional load of mental health problems.

6.0 Literature

ANDRASIK, F., FLOR, H. & TURK, D. C. 2005. An expanded view of psychological aspects in head pain: the biopsychosocial model. *Neurol Sci,* 26 Suppl 2**,** s87-91.

BANDELL-HOEKSTRA, I., ABU-SAAD, H. H., PASSCHIER, J. & KNIPSCHILD, P. 2000. Recurrent headache, coping, and quality of life in children: a review. *Headache,* 40**,** 357-70.

BASKIN, S. M., LIPCHIK, G. L. & SMITHERMAN, T. A. 2006. Mood and anxiety disorders in chronic headache. *Headache,* 46 Suppl 3**,** S76-87.

BATTISTUTTA, S., ALIVERTI, R., MONTICO, M., ZIN, R. & CARROZZI, M. 2009. Chronic tension-type headache in adolescents. Clinical and psychological characteristics analyzed through self- and parent-report questionnaires. *J Pediatr Psychol,* 34**,** 697-706.

BRATTBERG, G. 2004. Do pain problems in young school children persist into early adulthood? A 13-year follow-up. *European Journal of Pain,* 8**,** 187-199.

BUDA, A. & JARYNOWSKI, A. 2010. Life time of correlation between stocks prices on established and emerging markets. *Life-time Of Correlation And Its Application.* Wroclaw: Wydawnictwo Niezalezne.

CASTILLO, J., MUNOZ, P., GUITERA, V. & PASCUAL, J. 1999. Kaplan Award 1998. Epidemiology of chronic daily headache in the general population. *Headache,* 39**,** 190-6.

COMPAS, B. E., CONNOR-SMITH, J. K., SALTZMAN, H., THOMSEN, A. H. & WADSWORTH, M. E. 2001. Coping with stress during childhood and adolescence: problems, progress, and potential in theory and research. *Psychol Bull,* 127**,** 87-127.

DODICK, D. W. 2006. Clinical practice. Chronic daily headache. *N Engl J Med,* 354**,** 158-65.

DYB, G., HOLMEN, T. L. & ZWART, J. A. 2006. Analgesic overuse among adolescents with headache: the Head-HUNT-Youth Study. *Neurology,* 66**,** 198-201.

EHDE, D. M. & HOLM, J. E. 1992. Stress and headache: Comparisons of migraine, tension, and headache-free subjects. *Headache Quarterly,* 3**,** 54-60.

FIRST, M. B. 2005. Mutually exclusive versus co-occurring diagnostic categories: the challenge of diagnostic comorbidity. *Psychopathology,* 38**,** 206-10.

FOLKMAN, S. & LAZARUS, R. S. 1988a. Coping as a mediator of emotion. *Journal of Personality and Social Psychology,* 54**,** 466-475.

FOLKMAN, S. & LAZARUS, R. S. 1988b. The relationship between coping and emotion: Implications for theory and research. *Social Science & Medicine,* 26**,** 309-317.

FRANCE, C. R., FRANCE, J. L., AL'ABSI, M., RING, C. & MCINTYRE, D. 2002. Catastrophizing is related to pain ratings, but not nociceptive flexion reflex threshold. *Pain,* 99**,** 459-463.

GALLI, F., PATRON, L., RUSSO, P. M., BRUNI, O., FERINI-STRAMBI, L. & GUIDETTI, V. 2004. Chronic daily headache in childhood and adolescence: clinical aspects and a 4-year follow-up. *Cephalalgia,* 24**,** 850-8.

GATCHEL, R. J. 2004. Comorbidity of chronic pain and mental health disorders: the biopsychosocial perspective. *Am Psychol,* 59**,** 795-805.

GENTILI, C., PANICUCCI, P. & GUAZZELLI, M. 2005. Psychiatric comorbidity and chronicisation in primary headache. *J Headache Pain,* 6**,** 338-40.

GLADSTEIN, J. & ROTHNER, A. D. 2010. Chronic daily headache in children and adolescents. *Semin Pediatr Neurol,* 17**,** 88-92.

GOODMAN, R. *SDQ. Information for researchers and professionals about the Strenghts & Difficulties Questionnaires* [Online]. Available: http://www.sdqinfo.org.

GOODMAN, R. 1997. The Strengths and Difficulties Questionnaire: a research note. *J Child Psychol Psychiatry,* 38**,** 581-6.
GOODMAN, R. 1999. The Extended Version of the Strengths and Difficulties Questionnaire as a Guide to Child Psychiatric Caseness and Consequent Burden. *Journal of Child Psychology and Psychiatry,* 40**,** 791-799.
GOODMAN, R. 2001. Psychometric Properties of the Strengths and Difficulties Questionnaire. *Journal of the American Academy of Child & Adolescent Psychiatry,* 40**,** 1337-1345.
GORAN SVEDIN, C. & PRIEBE, G. 2008. The Strengths and Difficulties Questionnaire as a screening instrument in a community sample of high school seniors in Sweden. *Nordic Journal of Psychiatry,* 62**,** 225-232.
GRIFFITH, M. A., DUBOW, E. F. & IPPOLITO, M. F. 2000. Developmental and Cross-Situational Differences in Adolescents' Coping Strategies. *Journal of Youth and Adolescence,* 29**,** 183-204.
HARTBERG, S., LUNDQVIST, C., CLENCH-AAS, J. & RAANAAS, R. K. in prep. Adolescents with chronic headaches- mental health and coping strategies.
HECKMAN, B. D. & HOLROYD, K. A. 2006. Tension-type headache and psychiatric comorbidity. *Curr Pain Headache Rep,* 10**,** 439-47.
HERMAN-STAHL, M. & PETERSEN, A. C. 1996. The protective role of coping and social resources for depressive symptoms among young adolescents. *Journal of Youth and Adolescence,* 25**,** 733-753.
HOLEN, S., LERVÅG, A., WAAKTAAR, T. & YSTGAARD, M. 2012. Exploring the associations between coping patterns for everyday stressors and mental health in young schoolchildren. *Journal of School Psychology,* 50**,** 167-193.
JACOBSEN, B. A., DYB, G., HAGEN, K., STOVNER, L. J., HOLMEN, T. L. & ZWART, J.-A. 2011. The Nord-Trøndelag Health Study shows increased prevalence of primary recurrent headaches among adolescents over a four-year period. *Scandinavian Journal of Pain,* 2**,** 148-152.
JENSEN, R. & STOVNER, L. J. 2008. Epidemiology and comorbidity of headache. *Lancet Neurol,* 7**,** 354-61.
JORGENSEN, R. S. & DUSEK, J. B. 1990. Adolescent adjustment and coping strategies. *J Pers,* 58**,** 503-13.
JUST, U., OELKERS, R., BENDER, S., PARZER, P., EBINGER, F., WEISBROD, M. & RESCH, F. 2003. Emotional and behavioural problems in children and adolescents with primary headache. *Cephalalgia,* 23**,** 206-13.
KATSARAVA, Z., HOLLE, D. & DIENER, H. C. 2009. Medication overuse headache. *Curr Neurol Neurosci Rep,* 9**,** 115-9.
KOSKELAINEN, M., SOURANDER, A. & VAURAS, M. 2001. Self-reported strengths and difficulties in a community sample of Finnish adolescents. *Eur Child Adolesc Psychiatry,* 10**,** 180-185.
KRONER-HERWIG, B., HEINRICH, M. & MORRIS, L. 2007. Headache in German children and adolescents: a population-based epidemiological study. *Cephalalgia,* 27**,** 519-27.
KUNTSCHE, E., KNIBBE, R., GMEL, G. & ENGELS, R. 2006. Who drinks and why? A review of socio-demographic, personality, and contextual issues behind the drinking motives in young people. *Addictive Behaviors,* 31**,** 1844-1857.
LANGAARD, K. 2006. Ungdom, psykisk helse og profelsjonell hjelp. *Tidsskrift for ungdomsforskning,* 6**,** 25-40.

LANZI, G., ZAMBRINO, C., FERRARI-GINEVRA, O., TERMINE, C., D'ARRIGO, S., VERCELLI, P., DE SILVESTRI, A. & GUGLIELMINO, C. 2001. Personality traits in childhood and adolescent headache. *Cephalalgia,* 21**,** 53-60.

LAZARUS, R. S. & FOLKMAN, S. 1984. *Stress, appraisal, and coping,* New York, Springer.

LIPTON, R. B., MANACK, A., RICCI, J. A., CHEE, E., TURKEL, C. C. & WINNER, P. 2011. Prevalence and burden of chronic migraine in adolescents: results of the chronic daily headache in adolescents study (C-dAS). *Headache,* 51**,** 693-706.

LIU, X., TEIN, J. Y. & ZHAO, Z. 2004. Coping strategies and behavioral/emotional problems among Chinese adolescents. *Psychiatry Res,* 126**,** 275-85.

LU, S. R., FUH, J. L., CHEN, W. T., JUANG, K. D. & WANG, S. J. 2001. Chronic daily headache in Taipei, Taiwan: prevalence, follow-up and outcome predictors. *Cephalalgia,* 21**,** 980-6.

MAIZELS, M., SMITHERMAN, T. A. & PENZIEN, D. B. 2006. A Review of Screening Tools for Psychiatric Comorbidity in Headache Patients. *Headache: The Journal of Head and Face Pain,* 46**,** S98-S109.

MAZZONE, L., VITIELLO, B., INCORPORA, G. & MAZZONE, D. 2006. Behavioural and temperamental characteristics of children and adolescents suffering from primary headache. *Cephalalgia,* 26**,** 194-201.

MILDE-BUSCH, A., BONEBERGER, A., HEINRICH, S., THOMAS, S., KÜHNLEIN, A., RADON, K., STRAUBE, A. & VON KRIES, R. 2010. Higher Prevalence of Psychopathological Symptoms in Adolescents With Headache. A Population-Based Cross-Sectional Study. *Headache: The Journal of Head and Face Pain,* 50**,** 738-748.

MURIS, P., MEESTERS, C. & VAN DEN BERG, F. 2003. The Strengths and Difficulties Questionnaire (SDQ)--further evidence for its reliability and validity in a community sample of Dutch children and adolescents. *Eur Child Adolesc Psychiatry,* 12**,** 1-8.

OBEL, C., HEIERVANG, E., RODRIGUEZ, A., HEYERDAHL, S., SMEDJE, H., SOURANDER, A., GUETHMUNDSSON, O. O., CLENCH-AAS, J., CHRISTENSEN, E., HEIAN, F., MATHIESEN, K. S., MAGNUSSON, P., NJARETHVIK, U., KOSKELAINEN, M., RONNING, J. A., STORMARK, K. M. & OLSEN, J. 2004. The Strengths and Difficulties Questionnaire in the Nordic countries. *Eur Child Adolesc Psychiatry,* 13 Suppl 2**,** II32-9.

OLESEN, J. & STEINER, T. J. 2004. The International classification of headache disorders, 2nd edn (ICDH-II). *J Neurol Neurosurg Psychiatry,* 75**,** 808-11.

PAKALNIS, A., GIBSON, J. & COLVIN, A. 2005. Comorbidity of Psychiatric and Behavioral Disorders in Pediatric Migraine. *Headache: The Journal of Head and Face Pain,* 45**,** 590-596.

PALLANT, J. 2010. *SPSS. Survival Manual,* England, Open University Press.

POWERS, S. W., GILMAN, D. K. & HERSHEY, A. D. 2006. Headache and psychological functioning in children and adolescents. *Headache,* 46**,** 1404-15.

ROTHENBERGER, A. & WOERNER, W. 2004. Strengths and Difficulties Questionnaire (SDQ)--evaluations and applications. *Eur Child Adolesc Psychiatry,* 13 Suppl 2**,** II1-2.

SCHER, A. I., MIDGETTE, L. A. & LIPTON, R. B. 2008. Risk factors for headache chronification. *Headache,* 48**,** 16-25.

SCHER, A. I., STEWART, W. F., LIBERMAN, J. & LIPTON, R. B. 1998. Prevalence of frequent headache in a population sample. *Headache,* 38**,** 497-506.

SEIFFGE-KRENKE, I. 2000. Causal links between stressful events, coping style, and adolescent symptomatology. *J Adolesc,* 23**,** 675-691.

SESHIA, S. S. 2004. Chronic daily headache in children and adolescents. *Can J Neurol Sci,* 31**,** 319-23.

SESHIA, S. S. 2012. Chronic daily headache in children and adolescents. *Curr Pain Headache Rep,* 16**,** 60-72.
SESHIA, S. S., WANG, S. J., ABU-ARAFEH, I., HERSHEY, A. D., GUIDETTI, V., WINNER, P. & WOBER-BINGOL, C. 2010. Chronic daily headache in children and adolescents: a multi-faceted syndrome. *Can J Neurol Sci,* 37**,** 769-78.
SHADISH, W. R., COOK, T. D. & CAMPBELL, D. T. 2002. *Experimental and Quasi-Experimental Designs for Generalized Causal Inference.,* Boston, Houghton-Mifflin.
SHEFTELL, F. D. & ATLAS, S. J. 2002. Migraine and psychiatric comorbidity: from theory and hypotheses to clinical application. *Headache,* 42**,** 934-44.
SKINNER, E. A., EDGE, K., ALTMAN, J. & SHERWOOD, H. 2003. Searching for the structure of coping: a review and critique of category systems for classifying ways of coping. *Psychol Bull,* 129**,** 216-69.
STEINER, T. J. & MARTELLETTI, P. 2007. Aids for management of common headache disorders in primary care. *J Headache Pain,* 8 Suppl 1**,** S2.
STOVNER, L. & ANDREE, C. 2010. Prevalence of headache in Europe: a review for the Eurolight project. *J Headache Pain,* 11**,** 289-299.
STOVNER, L., HAGEN, K., JENSEN, R., KATSARAVA, Z., LIPTON, R., SCHER, A., STEINER, T. & ZWART, J. A. 2007. The global burden of headache: a documentation of headache prevalence and disability worldwide. *Cephalalgia,* 27**,** 193-210.
STOVNER, L. J., ZWART, J. A., HAGEN, K., TERWINDT, G. M. & PASCUAL, J. 2006. Epidemiology of headache in Europe. *European Journal of Neurology,* 13**,** 333-345.
STRINE, T. W., OKORO, C. A., MCGUIRE, L. C. & BALLUZ, L. S. 2006. The associations among childhood headaches, emotional and behavioral difficulties, and health care use. *Pediatrics,* 117**,** 1728-35.
SUNDET, R. 2002. Selvopplevelse og samspill som metafor for terapi med ungdom. *In:* JOHNSEN, A., SUNDET, R. & TORSTEINSSON, W. W. (eds.) *Samspill og selvopplevelse- nye veier i relasjonsorienterte terapier.* Oslo: Universitetsforlaget.
UKESTAD, L. K. & WITTROCK, D. A. 1996. Pain perception and coping in female tension headache sufferers and headache-free controls. *Health Psychology,* 15**,** 65-68.
VAN ROY, B. 2010. *Mental health problems and their impact in a cross-sectional study of norwegian children and adolescents aged 8-19 years.* PhD, University of Oslo.
VAN ROY, B., GRØHOLT, B., HEYERDAHL, S. & CLENCH-AAS, J. 2006. Self-reported strengths and difficulties in a large Norwegian population 10–19 years. *Eur Child Adolesc Psychiatry,* 15**,** 189-198.
VAN ROY, B., VEENSTRA, M. & CLENCH-AAS, J. 2008. Construct validity of the five-factor Strengths and Difficulties Questionnaire (SDQ) in pre-, early, and late adolescence. *J Child Psychol Psychiatry,* 49**,** 1304-12.
WANG, S. J., FUH, J. L., LU, S. R. & JUANG, K. D. 2006. Chronic daily headache in adolescents: prevalence, impact, and medication overuse. *Neurology,* 66**,** 193-7.
WANG, S. J. & JUANG, K. D. 2002. Psychiatric comorbidity of chronic daily headache: impact, treatment, outcome, and future studies. *Curr Pain Headache Rep,* 6**,** 505-10.
ZWART, J. A., DYB, G., HAGEN, K., ØDEGÅRD, K. J., DAHL, A. A., BOVIM, G. & STOVNER, L. J. 2003. Depression and anxiety disorders associated with headache frequency. The Nord-Trøndelag Health Study. *European Journal of Neurology,* 10**,** 147-152.

Article: Adolescents with chronic headaches- mental health and coping patterns

Adolescents with chronic headaches - mental health and coping patterns

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Abstract:

Purpose: To investigate coping strategies in adolescents with chronic headaches with and without mental health problems.

Methods: This study is based on a self-report cross-sectional study undertaken in Akershus County in Norway in 2002. A total of 19 985 adolescents were included in this study, covering lower secondary and upper secondary students, aged 13-19 years. Mental health was assessed by using the Strengths and Difficulties Questionnaire (SDQ). Chronic headache was measured with a single item, defined in close accordance with the classification of the International Headache Society (ICHD-2). Internal and external coping strategies was assessed through seven items, based on the question: What do you do/what happens when you are burdened by painful thoughts and feelings?

Results: Adolescents with chronic headaches showed more symptoms of mental health problems overall compared to those without chronic headache or with mental health problems alone. Logistic regression analyses showed that those adolescents having both chronic headaches and comorbid mental health problems to a greater extent used internal coping strategies, such as keeping feelings inside (OR 2.05), using drugs (OR 1.79) and talking oneself out of problems (OR 1.55), compared to those with chronic headache alone.

Conclusion: We suggest that attention should be paid towards coping strategies used by a high risk group that have both chronic headaches and mental health problems.

Keywords: mastery, tension-type headache, migraine, young adults/students, depression, anxiety

1. Introduction

According to the World Health Organization (WHO), headache disorders are among the top ten causes of disability in Europe (Steiner and Martelletti, 2007). The International Headache Society has published a consensus-based classification criteria for headaches in 2004: the ICHD-2 (Olesen and Steiner, 2004). The diagnosis criteria divided headaches into primary and secondary headaches. Primary headache includes migraine, tension-type headache and cluster headache, while secondary headaches are caused by another underlying disorder (Olesen and Steiner, 2004). According to the ICHD- 2 criteria, chronic headaches are a collective term for headaches occurring on more than 15 days per month for longer than 3 months. ICHD-2 include four types of primary chronic headaches: chronic migraine, chronic tension-type headache, new daily persistent headache, and hemicrania continua, and chronic secondary headaches including medication-overuse headache (Olesen and Steiner, 2004). Stovner and colleagues (2007) found that the worldwide prevalence of chronic headache in the adult population was 3%. The one-year prevalence of chronic headache in Norwegian adults is 2.4% (1.7% in men and 2.8% in women) based on a large questionnaire study (Stovner et al., 2006). Higher prevalences have been achieved in clinically interviewed populations with an overall prevalence close to 4% for all primary and secondary chronic headaches together (Aaseth et al., 2008, Grande et al., 2008).

According to Seshia and colleagues (2010), in children, it is more difficult to assign a diagnosis, and because of the pediatric age spectrum it is difficult to estimate a prevalence of chronic headache. Potential methodological differences further complicate precise comparisons (Lipton et al., 2011). The prevalence of chronic headache in Scottish schoolchildren was 0.9%, 1.5% in Sweden, 7.8% in China, 1.5% in Taiwan, and 1.68% in Brazil, respectively (Seshia et al., 2010).

Chronic headaches are probably lifelong fluctuating disorders, the prevalence of which tends to increase until the fifth decade, with a minor decline with increasing age (Jensen and Stovner, 2008). In a study among 81 children with chronic headache, Guidetti and colleagues (2000) found that the mean age of chronic headache presentation was 8.3 years in boys and 9.1 years in girls. Although most studies have focused on adults, chronic headache is also a major problem in children and adolescents (Gladstein, 2004).

Compared with other headache subtypes, chronic headache is characterized by a high degree of psychiatric comorbidity (Guidetti and Galli, 2002). The type of chronic headache may influence psychiatric comorbidity in different ways (Wang and Juang, 2002). The presence of psychiatric comorbidity among people with chronic headache, is associated with poorer

prognosis and decreased quality- of- life (Baskin et al., 2006), as well as increased psychosocial problems (Powers et al., 2006). For children and adolescents who experience headache problems, psychological issues are well-recognized, but poorly understood, clinical phenomena (Powers et al., 2006). Several studies suggests a bi-directional relationship between the comorbidity of headache and psychiatric disorders, as patients with a psychiatric disorder seem to show more frequent and severe primary headache, and, conversely, that psychiatric comorbidity is increased in headache patients (Gentili et al., 2005, Wang and Juang, 2002).

According to Holen and colleagues (2012), several studies have investigated the relationship between coping strategies and mental health problems among adolescents and they conclude that some forms of coping strategies are more strongly related to good mental health than others. Coping strategies are often discussed within a problem-emotion focused model (Lazarus and Folkman, 1984). Problem focused coping strategies are often directed at defining the problem and making effort to solve it (Lazarus and Folkman, 1984), and are associated with better psychological adjustment (Compas et al., 2001). The emotion focused coping strategy involves one's effort to regulate emotional distress, including avoidance (Lazarus and Folkman, 1984), e.g. by venting negative emotions, alcohol use and denying the stressor's occurrence associated with the problem (Jorgensen and Dusek, 1990). This coping strategy has been observed mainly in children and adolescents with depressive or anxiety symptoms (Seiffge-Krenke, 2000, Chan, 1995).

A review by Wittrock and Myers (1998) on stress and coping in tension-type headache patients found that, in general, tension-type headache sufferers experienced more stressful events than non-headache controls. They concluded that the headache sufferers used more maladaptive coping strategies, such as withdrawal, and wishful thinking than non-headache controls. Rollnik and colleagues (2001) found the same coping patterns in chronic tension-type headache patients when coping with illness. In addition, Lanzi and colleagues (2001) found that children and adolescents with headaches were more likely to internalize feelings. As reviewed by Compas and colleagues (2001), experimental studies have demonstrated that by actively avoiding thoughts, negative, unwanted thoughts and distress are increased, while distraction, on the other hand, decreases the levels of distress and intrusive thoughts.
Since there are gaps in knowledge between coping and mental health problems (Compas et al., 2001), the aim of the present study is thus to get a better understanding of the relationship

between different coping strategies and the presence of chronic headache either alone or in combination with mental health problems. Firstly, we want to describe prevalence of chronic headaches with and without mental health problems among adolescents in a large Norwegian primary population. Secondly we want to examine possible associations between internal and external coping strategies among youth with chronic headaches with and without comorbidity with mental health problems. We hypothesised that adolescents with chronic headache and mental health problems use internal coping strategies to a greater extent than adolescents without mental health problems or chronic headache.

2. Methods

2.1 Design and Participants

This study is based on a cross-sectional health survey undertaken in Akershus County, Norway in 2002. It was administered by the Norwegian Health Services Research Centre and included children and adolescents aged 10-19 (n=29 631). Akershus County surrounds Oslo, the capital of Norway, and has urban, suburban and rural areas. There are clear differences in socio-economic status among the inhabitants.

The present study includes pupils from lower secondary school and upper secondary school only, age being 13-19. Classes at each school in Akershus County were selected at random to participate in the study to obtain a sample representative of the county as a whole.

The participants finished the set of questionnaires at school, under the supervision of the teacher. A total of 10 924 questionnaires were handed out to pupils in secondary school. 9414 of these were returned. This corresponds to a response rate of 86%. In high school, 13 420 questionnaires were handed out, and 10 571 of these were returned, which corresponds to a response rate of 79%. Three dependent variables were defined in the present study; “chronic headaches without mental health problems”, “mental health problems without chronic headaches” and “chronic headaches with simultaneous mental health problems”. Independent variables were Internal Coping Strategy 1 (ICS 1), ICS 2, ICS 3, ICS 4, External Coping Strategy 1 (ECS 1), ECS 2 and ECS 3.

2.2 Measures

Chronic headache was assessed by the question “During the past 6 months, how often have you had the following complaints”, where headache is included as one of the complaints. The response possibilities were “almost every day”, “more than once a week”, “about every

week", "about every month", "seldom or never". "Almost every day" was defined as chronic headaches, and the other four alternatives were set as no chronic headaches. This is assumed to be in close accordance with the definition of chronic headaches according to the ICHD-2 with chronic headache defined as more than half of the days with headache (Headache Classification Subcommittee of the International Headache Society 2004).

Mental health problems were assessed using The Strengths and Difficulties Questionnaires (SDQ), self-report. SDQ is a general, concise and broad-spectrum self- reporting screening instrument for mental health, mapping psychological difficulty and resources in children and youth from 4-16 years (www.sdqinfo.org).

The SDQ symptom scale (25 items) contains five subscales, each with five items: emotional, conduct, hyperactivity and peer problems, as well as prosocial behaviour. Each item has a three point response scale (0=not true, 1=somewhat true, 2=certainly true). Responses can be rated 2-0 for positively worded items, and inversely coded for negatively worded items. Each of the five subscales has a total score of 10. A total difficulties score, excluding the prosocial behaviour, was calculated based on adding the first four subscales scores, giving a total ranging from 0-40.

One of the questions in the emotional subscale asks about headache symptoms. Therefore, to avoid confounding the exposure (headache) and the outcome (SDQ), the emotional sub-score and the total symptom score were calculated excluding the headache question prior to the analysis. When removing the question on headache, a new total difficulties score was calculated, ranging from 0-38. To define a normal (low-risk), borderline and abnormal/caseness (high-risk group), cut-off points at the 80% and 90% of the distribution of the SDQ scores were used (Goodman). Goodman based these cut-off points on the prevalence of 10% for mental disorders among children and adolescents aged from 5 to 15 years in the UK in 1999. The 10% with the highest score on the SDQ were used to define abnormal/caseness, the next 10% were considered as borderline and the remaining 80% as normal in the UK population (Goodman). Based on the cut-off points by Goodman, we made the cut-off points to define a normal group when the scores were from 0 to 15, borderline when scores were from 16 to 19 and abnormal when the scores were from 20 to 38. These values were for logistic regression further dichotomised into (0=normal, 1=borderline+abnormal/caseness).

To assess the impact of the mental health problem in everyday life, the extended version of the SDQ was used. This includes questions concerning whether the respondent thinks he has a problem, and if so, to what degree these problems influence the person´s life. Responses are

given in four categories (0=no, 0=little, 1=quite a lot, 2=a great deal). The five items generate an impact score, ranging from 0 to 10. According to Goodman, a total impact score of 1 is defined as borderline, and a score of 2 or more defines abnormal/caseness (Goodman). These values were for logistic regression further dichotomised into (0=normal, 1=borderline+abnormal/caseness).

A new variable was made that summed the dichotomous symptom score and the dichotomous impact score (Goodman). The resulting variable was further dichotomised into (0=no, 1=yes). To qualify as "yes", have a mental health problem, the participants had to be borderline or abnormal for both the total symptom score and the impact score. If they were borderline or abnormal for only one of these areas, or if they were normal, they qualified as "no". The Cronbach's alpha for the 19 questions of SDQ total symptoms excluding the headache question was found to be 0.78.

Based on the above outcomes, the population was in the analysis divided into the following four groups: i) controls (without chronic headaches or mental health problems), ii) cases with chronic headaches without mental health problems (CH), iii) cases with mental health problems without chronic headaches (MH) and iv) cases with both chronic headaches and mental health problems (CHMH).

Coping strategies were assessed by the question in the questionnaire: "What do you do/what happens when you are burdened by painful thoughts and feelings?" The question has ten response alternatives, with three outcomes (0=not true, 1=somewhat true and 2=certainly true). Three response alternatives were excluded from the analysis, as they referred to physical and mental symptoms, as well as undefined coping strategies. The excluded response alternatives were: "I get physical symptoms, e.g. headache, stomach ache" and "I get mental health problems, e.g. sad, depressed". We divided coping into internal and external coping strategies. The internal coping strategies includes the response alternatives: "Burdened by painful thoughts and feelings inside of me" (ICS 1), "Working more with other things to avoid thinking bad thoughts and feelings (ICS 2)", "Use drugs when I have bad thoughts or feelings" (ICS 3) and "I try to talk my self out of my problems" (ICS 4). The external coping strategies include the response alternatives: "I visit health care services when I have bad thoughts or feelings" (ECS 1), "I speak with someone in my family when I have bad thoughts or feelings" (ECS 2) and "I speak with friends when I have bad thoughts or feelings" (ECS 3). The correlation between the variables was tested by Pearson's r and found not to be substantial, ranging from 0 to 0.28.

2.3 Ethics

Participation was voluntary, all questionnaires were anonymous, and based on individual informed consent. For pupils in secondary school, parents were asked to give signed informed consent for the pupil to participate in the survey. The health profile was conducted after approval from the Regional Ethics Committee.

2.4 Statistical analyses

All analyses were performed with SPSS version 17.0. Multivariate logistic regression analyses were used to investigate associations between the three different dependent variables ("chronic headaches without mental health problems", "mental health problems without chronic headaches" and "chronic headaches with simultaneous mental health problems") and the explanatory variables. Odds ratio (with 95 % CI) was used to estimate outcome, for multiple comparisons Bonferroni corrected p-values (p=0.0017) were used to avoid the risk of mass significance.

3. Results

Table 1 shows the prevalence of the dependent variables CH, CHMH and MH. Of the three clinical groups, those with mental health problems alone were the largest, consisting of 1381 people (7.3%). Nearly 700 adolescents (3.5%) had chronic headaches, while 250 adolescents (1.3%) had both chronic headaches and mental health problems. Of the 924 adolescents with chronic headaches, 27% had comorbid mental health problems compared with 0.08% of those without chronic headache. We have calculated the relative risk (RR) of developing chronic headaches when having mental health problems of being 3.6 (3.2-4.0) while the RR of developing mental health problems when having chronic headaches of being 4.0 (3.5-4.5), with a 95% CI.

Mental health problems

Figure 1 shows the SDQ total mean symptoms scores. Both groups with mental health problems, whether with or without chronic headaches, had high mean SDQ symptoms scores. The CH group scored significantly higher than controls but clearly lower than both groups with mental health problems, whether with or without chronic headaches.

Figure 2 shows the SDQ mean impact scores. Both groups with mental health problems, whether with or without chronic headaches, had high mean SDQ impact scores. The CHMH group scored significantly higher than the MH group. The CH group scored significantly higher than control group, but clearly lower than both groups of mental health problems, whether with or without chronic headaches.

Chronic headaches without mental health problems

There was a relationship between having chronic headaches, and the internal coping strategies of keeping their trouble inside, and the abuse of drugs when bad thoughts and feelings create pressure (Table 2). There was also a tendency among the CH group to use the internal coping strategy of talking themselves out of their problems, and the external coping strategy of visiting health care services, compared with the control group. The CH subjects were less likely to use the external coping strategies of speaking with friends compared with the control group.

The rank order of odds ratios for coping strategies used more by this group was: use drugs > visit health care services > talk oneself out of problems > keep painful thoughts or feelings inside.

Chronic headaches with simultaneous mental health problems

The CHMH subjects were approximately 2.6 times more likely to use the internal coping strategy of keeping painful thoughts or feelings inside, compared with the control group. The chance of using drugs as an internal coping strategy increased 2.3 times in the CHMH group compared with the control group (Table 2). The probability of talking themselves out of their problems as an internal coping strategy among the CHMH group was two times higher than compared to the control group. The probability was two times higher for using the external coping strategy of visiting health care services when bad thoughts and feelings were present among the CHMH group, compared with the control group.

In comparison with the CH group, the CHMH group was significantly more likely to use the internal coping strategies of keeping painful thoughts or feelings inside, using drugs, talking oneself out of problems, and significantly less likely to use the internal coping strategy of working more with other things. The CHMH group was also less likely to use the external coping strategy of speaking with family compared with the CH group, but it was not a significant difference (Table 3).

In comparison with the MH group, the CHMH group was significantly more likely to use the internal coping strategies of keeping painful thoughts and feelings inside and using drugs. The internal coping strategy talking oneself out of problems had increased, but not significant values. The external coping strategies like visiting health care services, speaking with family or friends were not significantly different in the CHMH group and the MH group, and were only used a little in both groups (Table 3).

The rank order of odds ratios for coping strategies used more by this group was: keep painful thoughts or feelings inside > use drugs > talk oneself out of problems > visit health care service. Speaking with others (both friends and family) and doing other things were only used a little in this group.

Mental health problems without chronic headaches

The MH group used the internal coping strategy of keeping painful thoughts or feelings inside to a greater extent, compared with the control group (Table 2). The odds of using drugs as a coping strategy increased by a factor of 1.9 in the MH group, compared with the control group. There was a tendency among the MH group to use the external coping strategies of talking themselves out of problems, and seeking help from health care services when bad thoughts and feelings were present, compared to the control group.

The rank order of odds ratios used more by this group was: use drugs > talk oneself out of problems > keep painful thoughts or feelings inside > visit health care service. Speaking with others (friends and family) was also here a less used strategy than in the control population.

4. Discussion

The present study examined the relationship between chronic headaches and coping strategies in adolescents. Chronic headaches among youth are associated with a higher risk of having mental health problems and vice versa. Furthermore, our results suggest that different coping strategies are used among the CHMH group compared to the MH group. Mental health impact is similar in groups with mental health problems whether or not they have chronic headaches while youth with chronic headaches alone reported lower impact, closer to that of the control group.

The present study is based on a large sample size (secondary school n=9414, high school n=10 571), the response rate was high for the self- reports (82%), and the data represents the more populated area of Norway.

By having such a large sample, this study was able to identify a vulnerable group using strict criteria. Upper secondary school, where the adolescents were recruited, is not compulsory in Norway. Since no efforts were made to contact non-studying adolescents, e.g. those who attend vocational programmes, our sample is not representative for all Norwegian adolescents in the region.

To define mental health problems, both symptom score and impact in SDQ were combined. According to Goodman (2001), using both symptoms and impact are an advantage when assessing problems. Several studies show that SDQ is a useful tool for identifying mental health complications among children and adolescents (Mathai et al., 2004, Goodman, 2001).

This study is based on self-reports, and there is no clinical validation of the answers. We have no information concerning use of medication in connection with headaches, which may be of importance in relation both to contact with health services and other internal versus external coping strategies. In addition, we do not have information on headaches or psychiatric disorders in parents of the participants.

This is a cross-sectional study, which means that we cannot draw conclusions about causality and the direction of the associations found. The questionnaire was aimed at a broad description of health in youth and was not specific to the disease category of chronic headaches. Therefore, respondents could not know the purpose of the present study, namely mapping chronic headaches disorders in the adolescents.

The 6-month prevalence of chronic headaches (3.5%) was considerably higher than that found in other studies among young people (Seshia et al., 2010). One of the explanations of the discrepancy in prevalence in our study, compared to the other studies, may be the high number of participants (20.000), as well as variations in measuring instruments (e.g. how the

headache question was formulated) and the variations in the specified time frame for the headache and older age group in our study (13-19 years). Our results underline the need for prospectively designed studies with emphasis on prognosis and etiological factors.
We found that the relative risk (RR) of developing chronic headaches when having mental health problems was 3.6, while the RR of developing mental health problems when having chronic headaches was 4.0. Prospective studies may, in the future, say something about the "chicken and egg" issue regarding these associations.

The prevalence of mental health problems among those with chronic headaches was found to be 27%. A study by Wang and colleagues (2007) reported psychiatric disorders in almost half of the 121 Taiwanese school children aged 12-14 years with chronic headaches. Other studies have found psychiatric disorders in 64% to 90% of patients with chronic headaches (Verri et al., 1998, Puca, 2000). Differences across studies in the prevalence of psychiatric comorbidity in chronic headaches patients may be due to the measuring instrument used to define psychological functioning. However, compared with controls without chronic headache, our data show that the prevalence of mental health problems in youth with chronic headache is high.

We have focused on a group consisting of adolescents which, in addition to having chronic headache complaints, also have psychological problems. To the best of our knowledge, this is the first study examining the differences in coping strategies in adolescents with chronic headaches with or without comorbid psychiatric disorders. This makes it more challenging to compare our findings with other studies. Chronic headache patients show an overall avoidance coping pattern (Rollnik et al., 2001), which is associated with increased psychological problems (Seiffge-Krenke, 2000). It is likely that adolescents are even more inclined to use less mature coping strategies when having chronic headaches with comorbid mental health problems. This complies with our study.

As discussed by Holen and colleagues (2012), categorising coping strategies in problem-focused versus emotional-focused coping, has been criticized because it places potentially both maladaptive and adaptive coping strategies into the same category, as well as being too encompassing. For example, it is suggested that the reason that emotional coping strategies are usually found to be associated with increased mental health problems, is that the studies do not adequately distinguish between the types of emotional coping strategies. Some found

that a strategy based on emotion-focused coping is only related to risk if the use of other coping strategies are limited, while others suggest that children who are flexible in their use of coping strategies have better mental health outcomes. In recent years, studies on methods of coping among children have included three or more dimensions within coping (Holen et al., 2012).

The CHMH group in the present study used internal coping strategies, like keeping their feelings inside of them, using drugs and talking themselves out of their problems, to a larger degree than the two other groups. These findings are similar to Jorgensen and Dusek (1990), where less psychologically adjusted adolescents used less mature coping strategies like alcohol use and minimizing the problem to a greater degree. Ebata and Moos (1991) had a similar finding in a longitudinal study of life stressors, social resources and coping among adolescents aged 12-18, where depressed adolescents and adolescents with conduct disorder used more avoidance coping mechanisms than healthy adolescents, which is also consistent with our findings. In contrast, Murberg and Bru (2005) did not find an effect of problem-focused coping strategies on symptoms of depression among Norwegian adolescents. According to Holen and colleagues (2012), the internal coping strategy like keeping their feelings inside of them, or rumination, is widely seen in both depression and anxiety disorders, and the coping strategy may reflect, rather than cause, psychological distress. Lanzi and colleagues (2001) found that headache sufferers internalized their feelings, which to some extent may seem to support our findings, namely that we found a slight tendency in the CH group to keep their feelings inside of them. The CH group was more likely to work more with other things, compared to the CHMH group. According to Compas and colleagues (2001), distraction decreased the levels of distress and intrusive thoughts. This, together with our data, suggests that the presence of mental health problems in adolescents with chronic headaches make the youth less able to distract themselves from troubled thoughts.

External coping strategies, like visiting health care services when having bad thoughts or feelings were more common in the CHMH group compared to the control group. Visiting health care services can be considered as a problem-focused coping strategy, and contradicts studies saying that adolescents struggling with mental health problems show an overall coping strategy of avoidance (Seiffge-Krenke, 2000, Chan, 1995, Ebata and Moos, 1991).

Speaking with family and friends were little used coping strategies in all groups, especially in the groups with mental health problems, and may reflect the social isolation aspects in adolescents struggling with mental health problems with or without additional chronic headaches. According to Martin and Theunissen (1993), adults with chronic headaches score

significantly lower on social support, compared to non-headache subjects, which can be an indicator that chronic headache sufferers are less able to seek support from family or peers. They conclude with the importance of focusing on the social aspects of headaches. The study by Murberg and Bru (2005) found decreased levels of symptoms of depression in Norwegian adolescents that seek parental support in stressful situations. According to the latter study, the importance of the external coping strategies seeking parental or friend support are essential for mental health among adolescents, and may be even more important when having the additional load of a chronic headache.

5. Conclusion

In this study we have found that adolescents with chronic headaches show more symptoms of mental health problems than do those without chronic headaches. The group of adolescents having both chronic headaches and mental health problems appear to be the most vulnerable population. Compared to adolescents with chronic headaches alone, adolescents with chronic headaches that have simultaneous mental health problems to a greater extent use internal coping strategies, especially like keeping their feelings inside, using drugs and talking themselves out of problems.

We suggest that attention should be paid towards coping strategies used by a high risk group that have both chronic headache and mental health problems. In addition, increasing awareness about less efficient coping strategies may be important in order to give advice and help young people handle the named health issues more adequately. As this study indicates, adolescents with chronic headaches with additional mental health problems to a lesser degree seek support in their social networks. Therefore, attention should be paid on building strong social relationships, as social support is associated with less psychological problems.

Table 1: Prevalence of the three disease categories

	Frequency	Percent
CH	674	3.5
CHMH	250	1.3
MH	1381	7.3
Control group	16 724	87.9
Total	19 029	100.0

Table 1. Prevalence of the three disease categories: Chronic headaches without mental health problems (CH), Chronic headaches with simultaneous Mental Health problems (CHMH) and Mental Health problems without chronic headaches (MH) and control group without chronic headaches or mental health problems in 13-19 years old adolescents in the Health profile study.

Table 2: Odds ratios of internal and external coping strategies

Table 2. Odds ratios with 95% confidence intervals of both internal (ICS) and external (ECS) coping strategies on the three disease categories: Chronic headaches without mental health problems (CH), Chronic headaches with simultaneous mental health problems (CHMH) and Mental health problems without chronic headaches (MH) versus controls.

	CH	**CHMH**	**MH**
	OR (95% CI)[A]	**OR (95% CI)[A]**	**OR (95% CI)[A]**
	N=15 828	**N=15 463**	**N=16 487**
ICS[B] 1- "keep painful thoughts and feelings inside" (Reference "not true")	1.27 (1.10-1.47)*	2.56 (1.99-3.30)*	1.62 (1.46-1.80)*
ICS[B] 2- "work more with other things to avoid thinking bad thoughts"	1.04 (0.92-1.18)	0.79 (0.64-0.97)	0.98 (0.90-1.08)
ICS[B] 3- "use drugs when having bad thoughts or feelings"	1.49 (1.26-1.76)*	2.33 (1.89-2.87)*	1.85 (1.67-2.05)*
ICS[B] 4- "try to talk oneself out of the problems"	1.31 (1.16-1.49)*	2.08 (1.70-2.54)*	1.68 (1.53-1.84)*
ECS[C] 1- "visit health care service when having bad thoughts or feelings"	1.41 (1.15-1.73)*	2.02 (1.53-2.65)*	1.61 (1.39-1.87)*
ECS[C] 2- speak with family when having bad thoughts or feelings"	0.89 (0.79-1.01)	0.65 (0.51-0.82)*	0.67 (0.61-0.74)*
ECS[C] 3- "speak with friends when having bad thoughts or feelings"	0.84 (0.73-0.96)*	0.72 (0.58-0.89)	0.72 (0.65-0.79)*

Controlled for sex, grade, socio-economic status, lives with both parents and school-related stress.
***p≤0.0017 Significance limits based on predecided limits which are corrected for 28 multiple comparisons by dividing p= 0.05 by 30. OR (95% CI).**

[A] Reference group: no chronic headaches or mental health problems
[B] ICS= Internal Coping Strategy
[C] ECS= External Coping Strategy

Table 3: Odds ratios of internal and external coping strategies on the combined disease category

Table 3. Odds ratios with 95% confidence intervals of both internal (ICS) and external (ECS) coping strategies on the combined disease category: Chronic headaches with simultaneous mental health problems (CHMH) versus Chronic headaches without mental health problems (CH) alone and Mental health problems without chronic headaches (MH) alone.

	CHMH OR (95% CI)[A]	**CHMH OR (95% CI)[B]**
	N=809	**N=1468**
ICS[C] 1- "keep painful thoughts and feelings inside" (Reference "not true")	2.05 (1.54-2.72)*	1.61 (1.25-2.09)*
ICS[C] 2- "work more with other things to avoid thinking bad thoughts"	0.69 (0.54-0.89)*	0.81 (0.66-0.99)
ICS[C] 3- "use drugs when having bad thoughts or feelings"	1.79 (1.35-2.39)*	1.30 (1.05-1.60)*
ICS[C] 4- "try to talk oneself out of problems"	1.55 (1.22-1.96)*	1.32 (1.08-1.60)
ECS[D] 1- "visit health care service when having bad thoughts or feelings"	1.28 (0.88-1.87)	1.35 (1.02-1.79)
ECS[D] 2- speak with family when having bad thoughts or feelings"	0.70 (0.53-0.91)	0.91 (0.72-1.15)
ECS[D] 3- "speak with friends when having bad thoughts or feelings"	0.78 (0.61-1.01)	1.07 (0.86-1.33)

Controlled for sex, grade, socio-economic status, lives with both parents and school-related stress.
***p≤0.0017 Significance limits based on predecided limits which are corrected for 28 multiple comparisons by dividing p= 0.05 by 30. OR (95% CI).**

[A] Reference group: Chronic headaches without mental health problems
[B] Reference group: Mental health problems without chronic headaches
[C] ICS= Internal Coping Strategy
[D] ECS= External Coping Strategy

Figure 1: Mean SDQ total symptom score

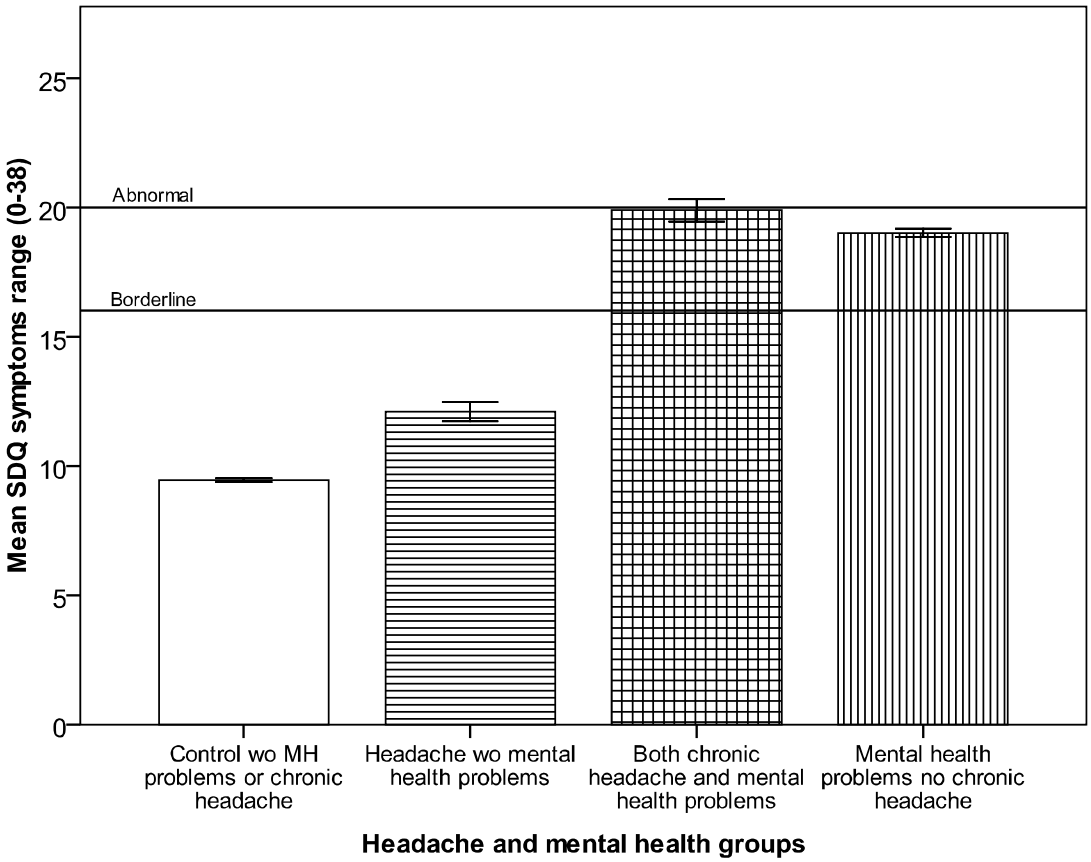

Fig. 1 The mean SDQ total symptoms score, ranging from 0-38. The three dependent variables; Chronic headaches without mental health problems, Chronic headaches with simultaneous mental health problems and Mental health problems without chronic headaches, as well as the control group are shown on the x - axis. According to the cut-off points by Goodman, borderline is set as a score of 16 or more, and abnormal is set as 20 or more, as shown in the figure. The error bars indicate the 95% confidence intervals.

Figure 2: Mean SDQ total impact score

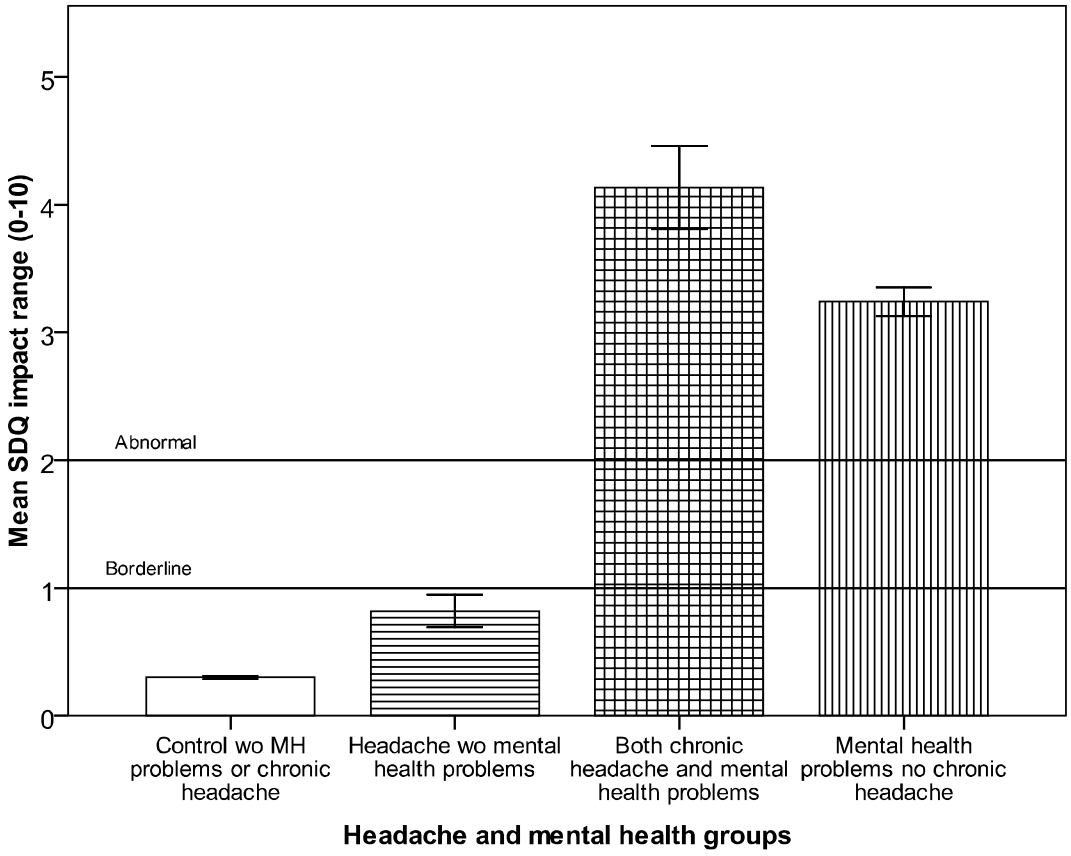

Fig. 2 The mean SDQ total impact score, ranging from 0-10. The three dependent variables; Chronic headaches without mental health problems, Chronic headaches with simultaneous mental health problems and Mental health problems without chronic headaches, as well as the control group are shown on the x-axis. According to the cut-off points by Goodman, borderline is set as 1 and abnormal is set as 2. The error bars indicate the 95% confidence intervals.

6. Literature

AASETH, K., GRANDE, R. B., KVÆRNER, K. J., GULBRANDSEN, P., LUNDQVIST, C. & RUSSELL, M. B. 2008. Prevalence of secondary chronic headaches in a population-based sample of 30–44-year-old persons. The Akershus study of chronic headache. *Cephalalgia,* 28**,** 705-713.

BASKIN, S. M., LIPCHIK, G. L. & SMITHERMAN, T. A. 2006. Mood and anxiety disorders in chronic headache. *Headache,* 46 Suppl 3**,** S76-87.

CHAN, D. W. 1995. Depressive symptoms and coping strategies among Chinese adolescents in Hong Kong. *Journal of Youth and Adolescence,* 24**,** 267-279.

COMPAS, B. E., CONNOR-SMITH, J. K., SALTZMAN, H., THOMSEN, A. H. & WADSWORTH, M. E. 2001. Coping with stress during childhood and adolescence: problems, progress, and potential in theory and research. *Psychol Bull,* 127**,** 87-127.

EBATA, A. T. & MOOS, R. H. 1991. Coping and adjustment in distressed and healthy adolescents. *Journal of Applied Developmental Psychology,* 12**,** 33-54.

GENTILI, C., PANICUCCI, P. & GUAZZELLI, M. 2005. Psychiatric comorbidity and chronicisation in primary headache. *J Headache Pain,* 6**,** 338-40.

GLADSTEIN, J. 2004. Children and adolescents with chronic daily headache. *Curr Pain Headache Rep,* 8**,** 71-75.

GOODMAN, R. *SDQ. Information for researchers and professionals about the Strenghts & Difficulties Questionnaires* [Online]. Available: http://www.sdqinfo.org.

GOODMAN, R. 2001. Psychometric Properties of the Strengths and Difficulties Questionnaire. *Journal of the American Academy of Child & Adolescent Psychiatry,* 40**,** 1337-1345.

GRANDE, R. B., AASETH, K., GULBRANDSEN, P., LUNDQVIST, C. & RUSSELL, M. B. 2008. Prevalence of primary chronic headache in a population-based sample of 30- to 44-year-old persons. The Akershus study of chronic headache. *Neuroepidemiology,* 30**,** 76-83.

GUIDETTI, V. & GALLI, F. 2002. Psychiatric comorbidity in chronic daily headache: Pathophysiology, etiology, and diagnosis. *Curr Pain Headache Rep,* 6**,** 492-497.

GUIDETTI, V., GALLI, F., CERUTTI, R. & FABRIZI, P. 2000. Chronic daily headache in developmental ages: diagnostic issues. *J Headache Pain,* 1**,** S89-S93.

HOLEN, S., LERVÅG, A., WAAKTAAR, T. & YSTGAARD, M. 2012. Exploring the associations between coping patterns for everyday stressors and mental health in young schoolchildren. *Journal of School Psychology,* 50**,** 167-193.

JENSEN, R. & STOVNER, L. J. 2008. Epidemiology and comorbidity of headache. *Lancet Neurol,* 7**,** 354-61.

JORGENSEN, R. S. & DUSEK, J. B. 1990. Adolescent adjustment and coping strategies. *J Pers,* 58**,** 503-13.

LANZI, G., ZAMBRINO, C., FERRARI-GINEVRA, O., TERMINE, C., D'ARRIGO, S., VERCELLI, P., DE SILVESTRI, A. & GUGLIELMINO, C. 2001. Personality traits in childhood and adolescent headache. *Cephalalgia,* 21**,** 53-60.

LAZARUS, R. S. & FOLKMAN, S. 1984. *Stress, appraisal, and coping,* New York, Springer.

LIPTON, R. B., MANACK, A., RICCI, J. A., CHEE, E., TURKEL, C. C. & WINNER, P. 2011. Prevalence and burden of chronic migraine in adolescents: results of the chronic daily headache in adolescents study (C-dAS). *Headache,* 51**,** 693-706.

MARTIN, P. R. & THEUNISSEN, C. 1993. The Role of Life Event Stress, Coping and Social Support in Chronic Headaches. *Headache: The Journal of Head and Face Pain,* 33**,** 301-306.

MATHAI, J., ANDERSON, P. & BOURNE, A. 2004. Comparing psychiatric diagnoses generated by the Strengths and Difficulties Questionnaire with diagnoses made by clinicians. *Australian and New Zealand Journal of Psychiatry,* 38**,** 639-643.

MURBERG, T. A. & BRU, E. 2005. The role of coping styles as predictors of depressive symptoms among adolescents: A prospective study. *Scandinavian Journal of Psychology,* 46**,** 385-393.

OLESEN, J. & STEINER, T. J. 2004. The International classification of headache disorders, 2nd edn (ICDH-II). *J Neurol Neurosurg Psychiatry,* 75**,** 808-11.

POWERS, S. W., GILMAN, D. K. & HERSHEY, A. D. 2006. Headache and psychological functioning in children and adolescents. *Headache,* 46**,** 1404-15.

PUCA, F. 2000. Psychological and social stressors and psychiatric comorbidity in patients with migraine without aura from headache centers in Italy: a comparison with tension-type headache patients. *J Headache Pain,* 1**,** 17-25.

ROLLNIK, J. D., KARST, M., FINK, M. & DENGLER, R. 2001. Coping Strategies in Episodic and Chronic Tension-type Headache. *Headache: The Journal of Head and Face Pain,* 41**,** 297-302.

SEIFFGE-KRENKE, I. 2000. Causal links between stressful events, coping style, and adolescent symptomatology. *J Adolesc,* 23**,** 675-691.

SESHIA, S. S., WANG, S. J., ABU-ARAFEH, I., HERSHEY, A. D., GUIDETTI, V., WINNER, P. & WOBER-BINGOL, C. 2010. Chronic daily headache in children and adolescents: a multi-faceted syndrome. *Can J Neurol Sci,* 37**,** 769-78.

STEINER, T. J. & MARTELLETTI, P. 2007. Aids for management of common headache disorders in primary care. *J Headache Pain,* 8 Suppl 1**,** S2.

STOVNER, L., HAGEN, K., JENSEN, R., KATSARAVA, Z., LIPTON, R., SCHER, A., STEINER, T. & ZWART, J. A. 2007. The global burden of headache: a documentation of headache prevalence and disability worldwide. *Cephalalgia,* 27**,** 193-210.

STOVNER, L. J., ZWART, J. A., HAGEN, K., TERWINDT, G. M. & PASCUAL, J. 2006. Epidemiology of headache in Europe. *European Journal of Neurology,* 13**,** 333-345.

VERRI, A. P., PROIETTI CECCHINI, A., GALLI, C., GRANELLA, F., SANDRINI, G. & NAPPI, G. 1998. Psychiatric comorbidity in chronic daily headache. *Cephalalgia,* 18 Suppl 21**,** 45-9.

WANG, S.-J., JUANG, K.-D., FUH, J.-L. & LU, S.-R. 2007. Psychiatric comorbidity and suicide risk in adolescents with chronic daily headache. *Neurology,* 68**,** 1468-1473.

WANG, S. J. & JUANG, K. D. 2002. Psychiatric comorbidity of chronic daily headache: impact, treatment, outcome, and future studies. *Curr Pain Headache Rep,* 6**,** 505-10.

WITTROCK, D. & MYERS, T. 1998. The comparison of individuals with recurrent tension-type headache and headache-free controls in physiological response, appraisal, and coping with stressors: A review of the literature. *Annals of Behavioral Medicine,* 20**,** 118-134.

Appendix I: Approval letter from the Regional Ethics Committee

REGIONAL KOMITE FOR MEDISINSK FORSKNINGSETIKK

Helseregion Øst

Seniorforsker Jocelyne Clench-Aas
HELTEF – Stiftelse for helsetjenesteforskning
1474 Nordbyhagen

Deres ref.: Vår ref.: 40-02022 Dato: 31. januar 2002

Helseprofil for barn og ungdom i Akershus

Regional komite for medisinsk forskningsetikk, helseregion Øst, vurderte prosjektet på sitt møte 25.01.02.

Komiteen vil ikke motsette seg at studien blir gjennomført.

Komiteen synes at spørreskjemaundersøkelsen er svært omfattende og lite fokusert, og er noe i tvil om hva søker kan få ut av en slik undersøkelse. Det savnes en redegjørelse både for hvordan man har tenkt å følge opp med tiltak, og for evaluering av tiltakene.

Med vennlig hilsen

Knut Engedal
professor dr.med.
leder

Ida Nyquist
sekretær

Postboks 1130, Blindern, 0318 Oslo. Tlf.: 22 84 46 67. Fax: 22 84 46 61
Besøksadresse: Frederik Holsts hus, Ullevål sykehus

Appendix II: The SDQ and impact supplement for self-completion by 11-16 years old

Strengths and Difficulties Questionnaire

S 11-17

For each item, please mark the box for Not True, Somewhat True or Certainly True. It would help us if you answered all items as best you can even if you are not absolutely certain or the item seems daft! Please give your answers on the basis of how things have been for you over the last six months.

Your Name ..... Male/Female

Date of Birth.....

	Not True	Somewhat True	Certainly True
I try to be nice to other people. I care about their feelings	☐	☐	☐
I am restless, I cannot stay still for long	☐	☐	☐
I get a lot of headaches, stomach-aches or sickness	☐	☐	☐
I usually share with others (food, games, pens etc.)	☐	☐	☐
I get very angry and often lose my temper	☐	☐	☐
I am usually on my own. I generally play alone or keep to myself	☐	☐	☐
I usually do as I am told	☐	☐	☐
I worry a lot	☐	☐	☐
I am helpful if someone is hurt, upset or feeling ill	☐	☐	☐
I am constantly fidgeting or squirming	☐	☐	☐
I have one good friend or more	☐	☐	☐
I fight a lot. I can make other people do what I want	☐	☐	☐
I am often unhappy, down-hearted or tearful	☐	☐	☐
Other people my age generally like me	☐	☐	☐
I am easily distracted, I find it difficult to concentrate	☐	☐	☐
I am nervous in new situations. I easily lose confidence	☐	☐	☐
I am kind to younger children	☐	☐	☐
I am often accused of lying or cheating	☐	☐	☐
Other children or young people pick on me or bully me	☐	☐	☐
I often volunteer to help others (parents, teachers, children)	☐	☐	☐
I think before I do things	☐	☐	☐
I take things that are not mine from home, school or elsewhere	☐	☐	☐
I get on better with adults than with people my own age	☐	☐	☐
I have many fears, I am easily scared	☐	☐	☐
I finish the work I'm doing. My attention is good	☐	☐	☐

Do you have any other comments or concerns?

Please turn over - there are a few more questions on the other side

Overall, do you think that you have difficulties in one or more of the following areas: emotions, concentration, behaviour or being able to get on with other people?

No	Yes- minor difficulties	Yes- definite difficulties	Yes- severe difficulties
☐	☐	☐	☐

If you have answered "Yes", please answer the following questions about these difficulties:

• How long have these difficulties been present?

Less than a month	1-5 months	6-12 months	Over a year
☐	☐	☐	☐

• Do the difficulties upset or distress you?

Not at all	Only a little	Quite a lot	A great deal
☐	☐	☐	☐

• Do the difficulties interfere with your everyday life in the following areas?

	Not at all	Only a little	Quite a lot	A great deal
HOME LIFE	☐	☐	☐	☐
FRIENDSHIPS	☐	☐	☐	☐
CLASSROOM LEARNING	☐	☐	☐	☐
LEISURE ACTIVITIES	☐	☐	☐	☐

• Do the difficulties make it harder for those around you (family, friends, teachers, etc.)?

Not at all	Only a little	Quite a lot	A great deal
☐	☐	☐	☐

Your Signature .....

Today's Date .....

Thank you very much for your help

The questions in SDQ are shown below, scale for scale.
In this study, we have excluded the question concerning headaches in the Emotional Symptoms Scale in our analyses. We have also excluded the questions in the Prosocial Scale in the analyses.

Emotional Symptoms Scale
I get a lot of headaches, stomach-aches or sickness
I worry a lot
I am often unhappy, downhearted or tearful
I am nervous in new situations
I have many fears, I am easily scared

Conduct problems
I get very angry and often lose my temper
I usually do as I am told
I fight a lot
I am often accused of lying or cheating
I take things that are not mine

Hyperactivity Scale
I am restless. I cannot stay still for long
I am constantly fidgeting or squirming
I am easily distracted
I think before I do things
I finish the work I am doing

Peer Problems Scale
I am usually on my own
I have one good friend or more
Other people my age generally like me
Other children or young people pick on me
I get better on with adults than with people my age

Prosocial Scale
I try to be nice to other people
I usually share with others
I am helpful if someone is hurt, upset or feeling ill
I am kind to younger children
I often volunteer to help others