Are adolescents with frequent pain symptoms more depressed?

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Objective – To study predicting value of pain symptoms in detecting depression among adolescents.
Design – A population-based classroom survey of 14–16-year-old adolescents.
Setting – Secondary schools in two regions of Finland (Vaasa and Pirkanmaa).
Subjects – Every secondary school in these two regions was asked to participate in the study. The final sample comprised 17 643 adolescents in 8th and 9th grades (mean age 15.3 years).
Main outcome measures – The subjects were asked to rate the frequency of headache, stomach-ache, low back pain and neck or shoulder pain. Depression was measured using the Finnish modification of the short Beck Depression Inventory (R-BDI). Trait anxiety was questioned in an item formulated analogously to R-BDI questions.

Results – Prevalence of depression was higher among adolescents with recurrent pain symptoms. Each of the four measured pain symptoms predicted depression independently and accumulation of different pain symptoms increased the odd ratios for depression. Anxiety did not change the association between pain symptoms and depression.
Conclusion – Recurrent pain symptoms are associated with depression among adolescents. Clinicians working with adolescents should be aware of this association and interview adolescents with recurrent pains for possible underlying depression.

Key words: adolescents, depression, frequent pain, pain symptoms.

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Different somatic symptoms are common among adolescents, and one of the most common is pain, usually in the head or stomach (1,2). According to the epidemiological literature, between 10% and 30% of children and adolescents report weekly or frequent headaches; between 10% and 25% have recurrent abdominal pains; and between 5% and 33% report musculoskeletal pains (1,3–5).

Several studies on clinical samples have been published about the association between somatic symptoms and depression or anxiety (6–8). It seems that recurrent abdominal pain and headache are often concurrent symptoms in emotionally disordered patients. It has also been speculated whether somatic symptoms are related to depression independently or by possibly co-occurring anxiety disorder (7,9). Anxiety is known to be highly comorbid with depression (10).

So far, epidemiological studies on this matter have been rare. In a Swedish study on 13–18-year-old adolescents, a connection was found between depressive and somatic symptoms (11). Abdominal pain was one of the symptoms that could differentiate the depressive from the non-depressive state in female adolescents. A fairly recent study in the United States found gender-specific patterns of association between somatic complaints and DSM-IV-based psychopathology (12). Overall, somatic complaints were strongly associated with emotional disorders in girls and with disruptive behaviour disorders in boys. The results of these clinical and survey studies suggest a link between pain symptoms and depression. Our large survey data provided the opportunity to offer more information about this association. We were interested in predicting value of pain symptoms in detecting depression among adolescents. We also studied how anxiety affects this association.

MATERIAL AND METHODS

The School Health Promotion Study, an anonymous classroom survey among adolescents about their health, health behaviour and school behaviour, has been carried out annually since 1995. In the present study, the sample comprised 17 643 adolescents in the 8th and 9th grades of secondary school in two different regions of Finland in 1997. All the secondary schools in both regions were contacted and asked to participate and almost all did so. The pupils of the participating schools comprised 90% of the whole population of this age in the study region, and, of the eligible pupils, 87% were reached and participated in the study. The questionnaire was answered during a normal school lesson under the supervision of a teacher. Those absent from school (13%) on the day of the survey were not contacted.

Adolescents reporting any chronic disease diagnosed by a doctor (9%) were excluded. In the final analysis, there were 15 965 adolescents, of whom 49.4% were girls. The mean age (SD) of the sample was 15.3 (0.60) years. The majority of the respondents had stable living conditions: 81.2% were living with both their parents, and 74.4% had lived in the same residential area for at least 10 years; 12.6% of the respondents had parents with academic education.

Depression was measured using a modified, 13-item version of the Beck Depression Inventory (13), which has been shown to be a valid measure for detecting depression among adolescents, and has good psychometric properties in this population (14). Students who scored from 0 to 7 were classified as having no depression to mild depression, and those who had scores of 8 to 39 were classified as having moderate to severe depression (13). Later in this paper we refer to scores 8 + as depression.

Anxiety was asked about in an item formulated analogously to the 13 items of the Finnish modified S-BDI (14). The respondents were asked to rate the alternative that best described them today: I don't easily lose my nerve or get anxious (= 0); I don't feel anxious or nervous (= 0); I get anxious and nervous rather easily (= 1); I very easily get distressed, anxious or nervous (= 2); I am constantly anxious and distressed, my nerves are always on edge (= 3). Anxiety was therefore measured by a single question focusing on the cognitive aspect of being anxious. Because we have limited experience of the validity of the question, only responses at the most severe range, scores 2 and 3, were considered significant anxiety.

Psychosomatic symptoms were measured by asking, "During the past six months, did you experience any of the following symptoms? How frequently?" The list of symptoms comprised neck and shoulder pain, low back pain, stomach-ache and headache. The response alternatives to each symptom were rarely or not at all/about once a month/about once a week/daily or almost daily. A symptom occurring once a week or daily or almost daily was considered frequent. This frequency also excludes most menstrual pains.

Statistical analyses were carried out with SPSS 6.1 for Windows. The chi-squared test was used to analyse associations between different pain symptoms and depression. Multivariate associations were tested with logistic regression. Depression was used as a dependent variable and the four pain symptoms as well as anxiety were included as independent variables. Statistical analyses were carried out separately for girls and for boys. Age was controlled for in the model. Association of accumulated pain symptoms with depression was tested in a similar way.

RESULTS

Moderate to severe depression had a prevalence of 10.3% in girls and 5.5% in boys. The prevalence of trait anxiety was 3.9% in girls and 2.2% in boys. Girls (boys) reported at least once a week: headache 31.5% (17.0%), stomach-ache 13.2% (6.7%), low back pain 26.2% (12.8%) and neck- or shoulder pains 9.7% (9.1%). The prevalence of depression was higher than average among adolescents with recurrent pain symptoms (Table I).

Each of the four pain symptoms predicted depression independently and with approximately equal value (Table II). Adding anxiety to the model did not affect the associations between depression and pain symptoms, but anxiety had the strongest association. Age had no effect in this analysis.

Accumulation of pain symptoms increased the odd ratios for depression (Table III). The tendency of increasing predictive value persisted, thus anxiety was taken into the model. Age had no effect in this analysis either.

DISCUSSION

The present study provides an opportunity to evaluate associations between pain symptoms and depression in a large non-selected school sample of 14–16-year-old adolescents. Prevalence of depression was higher among adolescents with recurrent pain symptoms in both sexes. Each of the four pain symptoms predicted depression independently and with approximately the same value. Having more than one kind of recurrent pain symptom further increased the risk for depression. Because anxiety is a well-known comorbid disorder to depression, and pain symptoms could be associated with anxiety more than with depression, anxiety was taken into the logistic regression modelling. The association of pain symptoms with depression persisted after controlling for anxiety.

Table I. Prevalence of depression according to pain symptoms and sex*.

Weekly pain symptoms		Depression (%)	
		Girls (n = 7850)	Boys (n = 8115)
Headache	Yes	18.6	11.7
	No	6.5	4.2
Stomach-ache	Yes	24.2	16.2
	No	8.2	4.7
Low back pain	Yes	17.3	13.0
	No	7.8	4.4
Neck or shoulder pain	Yes	19.5	13.0
	No	9.3	4.7

* p-value for each yes/no comparison is <0.001.

Table II. Odds ratios and 95% CI for depression according to pain symptoms when age is controlled for (Model 1) and anxiety is added to the model (Model 2).

Weekly pain symptoms	Model 1				Model 2			
	Girls (n = 7850)		Boys (n = 8115)		Girls (n = 7850)		Boys (n = 8115)	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Headache	2.3	2.0–2.8	2.2	1.7–2.7	2.0	1.7–2.4	2.0	1.6–2.7
Stomach-ache	2.4	2.0–2.9	2.3	1.7–3.1	2.2	1.8–2.7	2.1	1.5–2.9
Low back pain	1.6	1.4–2.0	2.0	1.5–2.6	1.7	1.4–2.0	1.9	1.4–2.6
Neck or shoulder pains	1.4	1.1–1.8	1.6	1.2–2.2	1.4	1.1–1.8	1.5	1.1–2.1
Anxiety					18.0	13.6–23.8	39.3	27.0–57.3

Table III. Odds ratios and 95% CI for depression according to number of pain symptoms when age is controlled for (Model 1), and anxiety is added into the model (Model 2).

No. of weekly pain symptoms	Model 1 − anxiety				Model 2 + anxiety			
	Girls (n = 7850)		Boys (n = 8115)		Girls (n = 7850)		Boys (n = 8115)	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
0	Ref.		Ref.		Ref.		Ref.	
1	2.5	2.0–3.1	2.7	2.1–3.4	2.3	1.8–2.8	2.6	2.0–3.4
2	4.2	3.4–5.2	4.5	3.4–6.1	3.5	2.7–4.4	4.0	2.9–5.6
3	8.1	6.2–10.6	6.7	4.4–10.3	6.4	4.8–8.6	5.9	3.6–9.6
4	12.1	8.1–18.0	16.4	9.1–29.7	11.0	7.2–16.7	10.7	5.2–21.9

There are few population-based studies concentrated on the association between somatic pain symptoms and depression among adolescents. Larsson (11) stated that there was a significant correlation between depressive symptoms and somatic complaints, though the power of the most potent somatic items to discriminate between a depressive and non-depressive state among adolescents was weak. Headache was one of the most important factors for both sexes when the correlation with depressive symptom scores was examined. In a recently reported and competently measured study by Egger et al. (12), gender-specific patterns of association were found between somatic complaints and psychopathology. Somatic complaints were associated with depression and anxiety disorders in girls, but musculoskeletal pain was the only complaint associated with emotional disorders in boys. In our data, no gender differences were found. Even if there were more depression and somatic complaints among girls, the association of pain symptoms with depression was approximately the same in both sexes.

Frequency of somatic complaints may increase with severity of depression (9). In the present study too, the more pain symptoms adolescents reported the more depressed they were. Jolly et al. (7) concluded that somatic symptoms might play a significant role in adolescent depression only to the extent that significant anxiety is also present. However, in the present study, anxiety did not significantly influence the association of pain symptoms with depression.

As in the study by Egger et al. (12), headache was the most common of the four somatic pain symptoms in this study. The prevalence of headache (24.2%) is higher than Egger's et al. (12) (10%), but consistent with Osters (15) (20.6%), Larsson's (11) (30%) and Kristjánsdóttir's (4) (20.1%). Our prevalence of stomach-ache (9.9%) is much the same as (12%) in Swedish (11) and (14.4%) in Danish studies (15). Egger et al. (11) reported a significantly lower prevalence of stomach-ache (2.8%), which may be due to the fairly limited duration and the frequency criteria they used.

Prevalence of low back pain (19.4%) in this study is consistent with 20.1% for back pain among 12–13 and 15–16-year-old children in Iceland (4). The methods of measuring somatic symptoms in the previously mentioned Swedish and Icelandic studies were very much the same as in our study. The prevalence of moderate to severe depression in our data of 10.3% in girls and 5.5% in boys also concurs with the previous studies (see Introduction).

The study design contacting adolescents through school ensured that the target population was reached, as the coverage of comprehensive school in Finland is more than 99% of the age group. Eligible pupils comprised 90% of the total age group in the study areas. Of the eligible pupils, 87% participated in the study, which is a high rate compared to survey studies in general. There were two types of dropouts: absence from school and skipping the depression rating scale or certain items on it. The vast majority of dropout was due to absence from school. An absence rate of 10–15% on one day is known to be normal from previous School Health Promotion studies. Much of the absenteeism on a certain day may be due to temporary reasons, such as transient minor illnesses. Some of the absenteeism is most certainly due to psychosomatic symptoms or depressiveness. Therefore the prevalence of pain symptoms, depressiveness and trait anxiety are likely to be underestimates, but dropout is unlikely to change the relationships between the phenomena.

Before analysing the data, we decided to exclude adolescents with a chronic disease diagnosed by a doctor. This decision was made to exclude pains that might be caused by a physical illness. In doing this, we ensured that the pains reported in our data were more likely to be of psychosomatic origin.

A limitation of the study is that depression was assessed based only on the BDI scores. Although the BDI has been reported to differentiate between depressed adolescents and non-depressed adolescents in clinical samples (16), one cannot make categorical diagnoses of depressive disorders based only on BDI scores. In a heterogeneous population, high scores on the BDI may not be specific to a depressive disorder, but reflect general dysphoria or psychological distress (17). However, moderate to severe depression as measured by the BDI is likely to represent mood disturbances that warrant attention. Severe depressive symptoms in adolescence are often persistent (18). Symptoms of major depression in adolescence are strongly predictive of an episode of clinically diagnosable major depression in adulthood, even if depressive symptoms in adolescence remain below diagnostic level (19). Adolescents scoring moderate to severe depression on the BDI are thus likely to need clinical attention.

CONCLUSION

Adolescent depression should be treated in the early stages of mood changes. Attention and early intervention could be aimed at in the early stages of the process, when the adolescent has depressive symp-

toms but has not yet developed a full disorder. Our results suggest that recurrent pain symptoms are predictive of depression among adolescents. To detect depression earlier, more attention should be paid to adolescents reporting recurrent pain symptoms. Clinicians working with adolescents, for example in school health services and paediatric health services, should interview adolescents with recurrent pains or numerous pain symptoms carefully for possible underlying depression.

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