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The relationship between reported pain and depressive symptoms among adolescents

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Abstract

Pain and depressive symptoms are common reasons for adolescents to contact the school nurse. The aim was to describe the prevalence of pain (headache, abdominal and back pain) and depressive symptoms among adolescents, and to examine whether there is an association between pain and depressive symptoms. This cross-sectional survey included students (n = 639) in Sweden (median age: 16 years). Over half of the female participants (56 %) and one-third of male participants (33%) had weekly headaches, abdominal pain or back pain. Almost every second girl (48%) and one in four boys (25%) had depressive symptoms [as measured by the Center for Epidemiological Studies Depression Scale (CES-D), scores ≥ 16]. There was a significant association between having pain (headache, abdominal pain or back pain) and having depressive symptoms. It is of great importance for school nurses to adequately identify and treat the cause of pain and other factors contributing to depression.

Keywords: Pain, Depressive Symptoms, Adolescents, Cross-sectional study, School Nursing

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The relationship between reported pain and depression symptoms among adolescents
Stress and depressive symptoms are increasing among adolescents (Bor, Dean, Najman, & Hayatbakhsh, 2014), inhibiting well-being, school performance, and social interactions (Desrochers & Houck, 2014). It is, therefore, crucial for health professionals, such as school nurses, as well as teachers, parents, and guardians, to gain greater insight into how to promote well-being and to prevent mental health problems among youths (Bains & Diallo, 2016). Recurrent pain (e.g., headache or abdominal pain) is also increasing (The Public Health Agency of Sweden, 2014) and is one of the most common reasons for adolescents to contact the school nurse (Ellertsson, Garmy, & Clausson, 2017). Studies have indicated that there could be a link between experiences of pain and mental health problems (Shannon, Bergren, & Matthews, 2010; Joychan, 2016).

Background

The teenage years are a time of self-discovery, are particularly formative, and development during this time can have a high impact on an individual's future. Adolescents strive to become independent by forging their path and identity (Sawyer et al., 2012). Physical, cognitive, and social changes are a major part of the adolescent years and can be difficult experiences (Bucchianeri, Arikian, Hannan, Eisenberg, & Neumark-Sztainer, 2013). Receiving support from surrounding adults is important in reducing the risk of mental health problems. Support aims to ensure that young people on the journey to finding themselves do not end up in situations that adversely affect their future. Care and guidance are of great importance to the positive development of young people. In the presence of adolescents, adults should act as role models by showing respect and providing support, which might lead the young person to display similar attitudes in the future (Chappel, Suldo, & Ogg, 2014). The importance of confirmation plays a major part in the mood of a young person, as does the sense of belonging to a group. Young people can often experience lack of self-esteem and increased vulnerability for depressive symptoms (Kapıkıran, 2013). School nurses have the skills needed to implement several interventions for depressive symptoms (Desrochers & Houck, 2014).

Depression is a common cause of mental health problems in young people (World Health Organization, 2014). In Sweden, about 10% of adolescents suffer from mental health problems (National Board of Health and Welfare, 2017). The early detection of depressive symptoms contributes to a reduced risk of suffering from a longer and deeper depression. Common causes of pain in adolescents include stress (inducing tension headaches), menstrual pain or constipation (causing abdominal pain) and bad sitting positions (causing lower back pain) (Shannon et al., 2010; Alfven et al., 2008). Therefore, it is important to investigate the occurrence and possible associations of pain and depressive symptoms in adolescents.

Aim

The aim of this investigation was to describe the frequency of self-reported pain (headache, abdominal pain, and back pain) and depressive symptoms among adolescents. A secondary aim was to examine whether there is an association between pain and depressive symptoms.

Methods

Study Design and Population

This is a cross-sectional study in which data was collected using a web-based survey. The study was conducted between February and April 2015 in one municipality (67,000 inhabitants) in southern Sweden. All upper secondary schools (n = 3) in this municipality participated in the study. Upper secondary school is a voluntary education. However, about 98% of the Swedish adolescents continue to the upper secondary school after the mandatory

education for children aged 6–15 years. Students in upper secondary school are mainly 16–18-years-old. A web-based survey was distributed during school hours to all students in year 1 (n = 882; median age: 16 years). The survey was voluntary, and the declining students were not asked why they did not want to participate; however, the non-participants did not differ regarding age or gender compared to the study participants. The study was approved by the Regional Ethical Review Board in Lund (EPN 2012/462) and by the school administration in the included schools.

Power calculation: Primary outcome was a mean difference between groups in Center for Epidemiological Studies Scale (CES-D). For 80% power, a mean difference of 2.0 was regarded as clinically relevant. The sample sizes needed were 99 participants for each sample (standard deviation [SD]: 5.0; $\alpha = 0.05$).

Measures

The following selected items (with the response options in periods) were identical to the questions of the Health Behavior in School-aged Children (HBSC) questionnaire: gender (male/female), age (year), country of birth (student and parents), family situation (parents living together, separated parents or other), and economic situation (five response options ranging from very good to not good at all), as well as questions regarding pain (headache, abdominal pain, and back pain in the past week [five response options ranging from never to every day]). The HBSC questionnaire is a well-established instrument (available in Swedish) that has been used in several earlier studies among school-aged children and adolescents (Inchley et al., 2016).

Depressive symptoms were measured using the Center for Epidemiological Studies Depression Scale (CES-D). This instrument is based on 20 questions querying the individual's well-being over the last week. In the CES-D, there are four response options (from rarely or never [coded as 0], to most or all of the time [coded as 3]), and the resulting score is between 0 and 60, where values of 16 or more indicate depressive symptoms (Radloff, 1977). The CES-D has been tested for reliability and validity in this age group with satisfactory results (Roberts, Lewinsohn, & Seeley, 1991).

Statistical Analysis

Descriptive statistics with frequencies and percentages were used to describe the sample scores. Bivariate analyzes (Chi-square, Mann-Whitney U-test) were used to assess differences between females and males, as well as associations between pain and depressive symptoms. The factors identified from the bivariate analysis associated with depressive symptoms ($p < 0.05$) were analyzed in a multiple logistic regression model. The Hosmer-Lemeshow goodness-of-fit-test and Nagelkerke R^2 test were used to evaluate the quality of the regression model (Norman & Streiner, 2014). Significance levels were set at $p < 0.05$. Statistical analyzes were conducted in IBM SPSS version 24.

Ethics

Written information about the study, including that participation was voluntary, was provided to the students and their parents/guardians before recruitment. The web survey was conducted anonymously, for reasons of confidentiality.

Results

Description of the study participants

A total of 639 students (50.2% females) participated in this study (response rate 72.4%). Reasons for drop-out were that students were absent on the day of the survey distribution or

that they declined to participate. The median age was 16 years (range 15–18 years). Most of the students were born in Sweden (89%) and had Swedish parents, although around 12% had at least one parent from outside Europe, and 8% were born in a non-European country. The majority of the students reported that their parents were living together (70%) and that their economic situation was very good or good (70%) (Table 1).

Table 1. The background data of the study participants (n = 639).

Background variables	n (%)
Sex	
Male	318 (49.8)
Female	321 (50.2)
Age (years)	
15	13 (2.0)
16	569 (89.0)
17	32 (5.5)
18	22 (3.5)
Country of birth	
Sweden	569 (89.0)
Nordic countries	4 (0.6)
Europe	14 (2.2)
Non-Europe	52 (8.1)
Mother's Country of Origin	
Sweden	514 (80.4)
Nordic countries	5 (0.8)
Europe	38 (5.9)
Non-Europe	75 (12.0)
Father's Country of Origin	
Sweden	515 (80.6)
Nordic countries	7 (1.1)
Europe	37 (5.8)
Non-Europe	73 (11.9)
Family situation	
Parents living together	446 (69.8)
Separated parents	156 (24.4)
Other	37 (5.8)
Economic situation	
Very good or Good	450 (70.4)
Average	136 (21.3)
Not that good or not good at all	39 (6.1)
Do not know	14 (2.2)

Note. *Missing values < 1 %.*

The occurrence of pain and depressive symptoms

The occurrence of headaches, abdominal pain, and back pain were all frequently reported in both sexes, but with girls experiencing pain significantly more frequently than boys. Weekly headaches were reported by more than every second girl (56%) and by every third boy (33%). Abdominal pain every week was reported by 45% of the girls and 21% of the boys, and weekly back pain was reported by 39% of the girls and 27% of the boys. Almost every second girl (48 %) and every fourth boy (25 %) scored 16 or more on the CES-D scale, which indicates depressive symptoms (Table 2).

Table 2. Analysis of questions regarding headache, abdominal pain and back pain; and depressive symptoms as measured by the CES-D (n = 639).

Variables	Male, n (%)	Female, n (%)	p-values
How often have you had a headache during the past weeks?			0.011 ¹
Every day, n (%)	9 (2.8)	35 (10.9)	
More than once a week, n (%)	42 (13.2)	58 (18.1)	
Once a week, n (%)	55 (17.3)	85 (26.5)	
Once a month, n (%)	78 (24.5)	67 (20.9)	
Seldom or never, n (%)	131 (41.2)	76 (23.7)	
<i>Missing values, n (%)</i>	<i>3 (.9)</i>	<i>0 (0)</i>	
How often have you had abdominal pain during the past weeks?			< 0.0001 ¹
Every day, n (%)	5 (1.6)	19 (5.9)	
More than once a week, n (%)	21 (6.6)	61 (19.0)	
Once a week, n (%)	40 (12.6)	63 (19.6)	
Once a month, n (%)	95 (29.9)	103 (32.1)	
Seldom or never, n (%)	156 (49.1)	73 (22.7)	
<i>Missing values, n (%)</i>	<i>1 (.3)</i>	<i>2 (0.6)</i>	
How often have you had back pain during the past weeks?			< 0.0001 ¹
Every day, n (%)	18 (5.7)	48 (15.0)	
More than once a week, n (%)	26 (8.2)	35 (10.9)	
Once a week, n (%)	42 (13.2)	41 (12.8)	
Once a month, n (%)	70 (22.0)	63 (19.6)	
Seldom or never, n (%)	160 (53.0)	132 (41.1)	
<i>Missing values, n (%)</i>	<i>2 (0.6)</i>	<i>2 (0.6)</i>	
CES-D			< 0.0001 ²
0–15	239 (75.2)	168 (52.3)	
≥16	79 (24.8)	153 (47.7)	

Note. ¹Mann-Whitney U. ²Chi square-test.

Association of pain with depressive symptoms

Those factors identified from the bivariate analyses as being associated with depressive symptoms (p -values < 0.05) were further analyzed in a logistic regression analysis (Table 3). This analysis showed that depressive symptoms (as measured with CES-D scores ≥ 16) were associated with headache, abdominal pain, and back pain, even after controlling for sex, birth country, family situation, and economic situation. Half the population with weekly pain (50–55%) also had depressive symptoms (CES-D scores ≥ 16), compared with 19–25 % of the population without weekly pain. Being female and being born outside of Sweden were also significantly associated with having depressive symptoms (Table 3).

Table 3. Logistic regression analysis of factors associated with depressive symptoms (CES-D ≥ 16) (n = 639).

	Depressive symptoms (CES ≥ 16), n = 212, (33.0%)	Odds ratio	95% CI for odds ratio	p-value
Sex		.53	.36-.78	.001
Female, n(%)	140 (43.6%)			
Male, n(%)	72 (22.4%)			
Country of birth		1.78	1.01-3.13	.047
Born in Sweden, n(%)	177 (31.1%)			
Born abroad, n(%)	35 (48.6)			
Economic situation		1.35	.89-2.05	.159
Good economic situation, n(%)	130 (28.8%)			
Average or less good economic situation, n(%)	81 (42.6%)			
Family situation		1.46	.97-2.21	.071
Living with both parents, n(%)	129 (28.9%)			
Separated parent or not living with parents, n(%)	79 (41.4%)			
Headache		2.59	1.75-3.83	<.0001
Headache during the past week	143 (50.0%)			
No headache during the past week	67 (19.0%)			
Abdominal pain		2.55	1.71-3.81	<.0001
Abdominal pain during the past week	116 (55.0%)			
No abdominal pain during the past week	95 (22.2%)			
Back pain		1.84	1.24-2.72	.002
Back pain during the past week	105 (50.0%)			
No back pain during the past week	105 (25.0%)			

Note:

Hosmer and Lemeshow goodness-of-fit test $p = 0.422$; Nagelkerke $R^2 = 0.273$

$p < 0.05$ were considered significant and marked in boldface.

OR: odds ratio

CI: confidence intervals.

Discussion

In this study, the aim was to investigate the occurrence of pain and depressive symptoms, as well as the association between pain and depressive symptoms, among Swedish adolescents. We report three principal findings. First, pain and depressive symptoms were frequent among the students. Second, females reported more pain and depressive symptoms than males. Third, pain and depressive symptoms were related to each other.

More than every second girl (56%) and every third boy (33%) had weekly headaches, abdominal pain or back pain. Almost every second girl (48%) and one in four boys (25%) had depressive symptoms (CES-D, scores ≥ 16). Previous studies have shown that girls tend to experience lower levels of well-being than boys, with regards to both depressive symptoms and pain (Bohman et al., 2012; Dyb, Stensland, & Zwart, 2015; Hunfeld et al., 2001; Nuutinen et al., 2014). It has also been documented that girls experience greater stress and anxiety related to school work, where performance anxiety can lead to poorer level of well-being in the form of muscle tension, sleep disorders, and headaches (Joychan, 2016; Vanaelst et al., 2012), and stress in the school environment also has a major impact on perceived health (Skrove, Romundstad, & Indredavik, 2015). Heightened levels of stress are more common in girls and have a strong association with pain (Joychan, 2016; Piko, 2007). Both stress and pain increase with age (Alfven et al., 2008) and increased pain is associated with additional stress, a lower self-rated health level, and adversely affects adolescents quality of life (Dyb et al., 2015; Joychan, 2016). This is also observed in our study, where depressive symptoms were associated with pain.

Over the past decades, the prevalence of depressive symptoms has increased, and the proportion of female adolescents with depressive symptoms has tripled (from 12% in 1985 to 36% in 2014) (The Public Health Agency of Sweden, 2014). In our study, almost half of the girls are at risk of suffering from depressive symptoms. We also found that both girls and boys with depressive symptoms have an increased risk of also experience pain, which is in line with findings of Skrove et al. (2015).

As depressive symptoms and pain increase (The Public Health Agency of Sweden, 2014), there is also an increase in the use of analgesics (Skrove et al., 2015). Girls with depressive symptoms tend to use more analgesic drugs compared to those girls who only experience pain, with those experiencing pain and depressive symptoms consuming pain medication twice or more per week (Skrove et al., 2015). Moreover, prescription of antidepressants has doubled among adolescents over the past 10 years (National Board of Health and Welfare, 2017).

Limitations

This is a cross-sectional study and, therefore, cannot explain the reasons behind the observed frequencies of pain and depressive symptoms. Longitudinal studies are now needed to address these underlying causes. The questionnaires (CES-D and selected items from the HBSC questionnaire) are well-evaluated instruments. The response rate of our study was 72%, with a roughly equal number of females and male students, meaning that the research findings may be transferable to a larger population. The anonymous and voluntary nature of the study means that the participant's privacy is respected and data collected is likely to be truthful.

Implications for School Nursing

Pain (e.g., headache, abdominal pain, and back pain) is a common cause for students to approach the school nurse (Ellertsson, Garmy, & Clausson, 2017). However, since this study shows that pain is often associated with depressive symptoms, school nurses need to be aware of this link. Adolescents experiencing depressive symptoms and pain must be taken seriously, and the root cause of the symptoms must be identified and treated (Dyb et al., 2015). The

school environment has an impact on how young people experience depressive symptoms and pain and, therefore, constitutes an important part of preventive work (Joychan, 2016; Jönsson, Maltestam, Bengtsson-Tops, & Garmy, 2017). Positive relationships and support from the school health professionals, such as the school nurse, are crucial for reducing depressive symptoms and pain in adolescents (Larsson, Björk, Ekebergh, & Sundler, 2014), and depressive symptoms can be counteracted if early preventive interventions are applied (Garmy, Berg, & Clausson, 2014). Young people experience an increased sense of joy when they are treated with respect and opportunities for independence, with the freedom to make their own decisions (Kapıkıran, 2013). It is of great importance that the school nurse becomes involved if a young person experiences depressive symptoms and pain (Dyb et al., 2015; Jönsson et al., 2017). Therefore, it is important that the school nurse has a flexible approach in which mutual and trustworthy relationships are applied to achieve the health and well-being of adolescents (Larsson et al., 2014). Practical tips regarding prevention and treatment of depressive symptoms are presented in the NASN guidelines for school practice, entitled “Depression in Children and Adolescents” (Desrochers & Houck, 2014) (see fact box in Table 4).

Table 4. Fact box: Talking with students about depression (Desrochers & Houck, 2014, extract from handout I)

Adolescent students who are experiencing depressive symptoms often want information about their condition. At the same time, they are often cautious about talking to adults because they are unsure of the reaction they might get and what the consequences might be. Talking with adolescents about their depressive symptoms requires adults to strike a balance between providing guidance and promoting student autonomy.

- Actively listen to the student and express empathy.
- Convey concern about the student’s well-being.
- Do not simply process complaints.
- Communicate an authentic understanding of the experience of depression.
- Respect the adolescent’s desire to be normal.
- Use the *student’s* words to describe symptoms.
- Acknowledge that feelings are important to discuss and that it takes strength to seek help.
- Accept the symptoms of depression; do not try to talk the student out of these feelings.
- Point out (*notice* rather than *accuse*) behavior that seems different from the student’s usual behavior or that might indicate depression.
- Stay solution-focused.
- Present options that are congruent with solving the problems they identify.
- Confirm the student’s autonomy to make decisions for themselves.

Source: Extract from Handout I in Depression in Children and Adolescents, Guidelines for School Practice (Desrochers & Houck, 2014).

Conclusions

Weekly headache, abdominal pain or back pain affect every second girl and every third boy, and depressive symptoms are almost as common. Furthermore, having pain is a risk factor for also having depressive symptoms. Our findings reinforce the importance of adequately treating symptoms of pain and educating adolescents about healthy habits, thereby promoting wellbeing and preventing pain and depressive symptoms; and for this, the school nurse is crucial. The school nurse has the opportunity to detect mental health problems early in their interactions with students, and thus, have a positive impact on future development (Clausson, Berg, & Janlov, 2015; Garmy, 2013; Wilhsson, Svedberg, Hogdin, & Nygren, 2017).

Declaration of Conflicts of Interests

The authors(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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