

# Association of Depressive Symptoms with Consumption of Analgesics among Adolescents

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## **Conflict of Interest**

None declared

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## Association of Depressive Symptoms with Consumption of Analgesics among Adolescents

### Abstract

*Purpose:* To investigate the prevalence of depressive symptoms, pain (headaches and stomachaches), and analgesic consumption in addition to the association between depressive symptoms and analgesic consumption among adolescents.

*Design and Methods:* This cross-sectional study was conducted in southern Sweden. The survey was distributed among students in grade 8 (aged 13–15 years, n=878).

*Results:* The prevalence of depressive symptoms (Center for Epidemiological Studies Depression Scale  $\geq 16$ ) was 37% among girls and 13% among boys. The prevalence rate of analgesic consumption to ease headaches and/or stomachaches during the last several weeks was 57% among girls and 29% among boys. Depressive symptoms are significantly associated with analgesic consumption among adolescents even after controlling for pain.

*Conclusion:* The knowledge that there is a higher use of analgesics in adolescents with depressive symptoms implies that healthcare professionals should focus on complex psychosocial problems, not only physiological pain, in adolescents.

*Practice Implications:* Over the counter analgesics are frequently used by adolescents. Head and stomachaches are common reasons for students to visit the school nurse and primary healthcare facility. School nurses and pediatric nurses have to be aware of the link between depressive symptoms and pain in addition to the higher use of analgesics in adolescents with depressive symptoms. It is important to reduce the cause of the pain in order to prevent depressive symptoms and also analgesic overuse.

**Keywords:** Pain, headache, stomachache, depressive symptoms, analgesics, adolescents

### Highlights

- Depressive symptoms and pain (headache and stomachache) are common among adolescents, especially among adolescent girls.
- There is lack of research regarding relationship between use of analgesics and depressive symptoms.
- The results of this study show that use of analgesics is significantly more common among adolescents with depressive symptoms even after controlling for self-reported pain.

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## Introduction

Pain and depressive symptoms are common in adolescents (Bhatta, Champion, Young, & Loika, 2018; Inchley et al., 2016), and pain, including headaches and stomachaches, is significantly more frequent among students with depressive symptoms (Borgman, Ericsson, Clausson, & Garmy, 2018). There is, however, a lack of recent studies regarding associations between analgesic use and depressive symptoms in adolescents.

## Background

Depression is a major cause of morbidity and disability worldwide, and according to the World Health Organization, it is the fourth leading cause of disease burden (World Health Organization, 2008). Depression is a complex condition that can have disabling effects on an individual's personal relationships, productivity, and general health (Nardi, Francesconi, Catena-Dell'osso, & Bellantuono, 2013; World Health Organization, 2008). The worldwide prevalence rate of depression among adolescents is approximately 4%–8% (World Health Organization, 2008); however, lack of recognition and appropriate treatment of depressive symptoms can lead to serious long-term psychological and educational consequences (Kovacs, Akiskal, Gatsonis, & Parrone, 1994). Adolescent depression, often with onset around the age of 14, is associated with impaired academic performance, social difficulties, abuse, neglect, and substance abuse (World Health Organization, 2008). Moreover, children and adolescents with depressive symptoms are more likely to have pain (Borgman et al., 2018; Sansone, Watts, & Wiederman, 2014).

It has been suggested that being a victim of psychological distress is associated with elevated self-reported use of medicine for headaches, stomachaches, sleep difficulties, and nervousness, which is not warranted by the higher prevalence of symptoms (Shrier, Harris, Kurland, & Knight, 2003). This should be taken seriously because elevated analgesic use has been associated with a significantly higher risk for future health risks (Zwart, Dyb, Hagen, Svebak, & Holmen, 2003). Migraines, headaches, and backaches are often reported when people are experiencing psychological distress (Borgman et al., 2018; Gini, Pozzoli, Lenzi, & Vieno, 2014; Politis, Bellou, Belbasis, & Skapinakis, 2014). Parents, pediatric nurses, and other healthcare professionals should be aware of potential analgesic overuse among adolescents in order to reduce the possibility of negative effects on this population (Dyb, Stensland, & Zwart, 2015).

Continuous use of over-the-counter (OTC) analgesics to combat pain and avoid stress can prevent adolescents from learning healthier coping strategies (Kristoffersen & Lundqvist, 2014). They may then be more likely to use OTC analgesics to cope with pain, and such behavioral patterns might progress into adulthood. Inappropriate long-term use of OTC analgesics can also lead to rebound headaches (Kristoffersen & Lundqvist, 2014) in addition to toxicity and adverse drug interactions (Fendrick, Pan, & Johnson, 2008). In

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Sweden, non-prescription medicines (NPMs) have been available in retail outlets since 2009. The Medicine Product Agency (MPA) is responsible for checking the legality of the retail shops, but the actual control is the responsibility of municipalities (Nordén-Hägg, Shamoon, & Sporrang, 2012). Over-the-counter (OTC) drugs are medicines sold directly to consumers without a prescription from a healthcare professional, and those sold in Swedish retail stores include analgesics (mainly paracetamol and ibuprofen) (Holmström, Bastholm-Rahmner, Bernsten, Röing, & Björkman, 2014).

Studies on the use of OTC drugs in Sweden reveal that Swedish teenagers can be vulnerable as new customers due to gaps in knowledge and misconceptions about OTC drugs (Holmström et al., 2014). Moreover, research on OTC use among teenagers in Sweden also suggests a need for further research in order to develop effective intervention plans. Depression onset is commonly after puberty, mean age at onset of first episode was about 14 years (Lewinsohn, Clarke, Seeley, & Rohde, 1994). Therefore, this paper examines depressive symptoms, their association with pain, and analgesic use among adolescents. The aim of this study was to investigate the prevalence of depressive symptoms, physiological pain, and analgesic consumption in addition to the association between depressive symptoms and analgesic consumption among Swedish girls and boys between 13 and 15 years old.

## Methods

This study was conducted in six municipalities in southern Sweden from 2012 to 2014. All schools with students in grade 8 were asked to participate in the study, and 21 of the 23 eligible schools agreed to participate. All data were collected during the school day in grade 8 classrooms (students aged 13–15 years, median 14 years). Teachers and school nurses distributed the questionnaire to the students and were available to answer students' questions. The students were told that there were no right or wrong answers and that they should answer according to their own opinion.

## Instrument

The following items from the Health Behavior in School-aged Children (HBSC) questionnaire were used: questions regarding gender, age, country of birth, family situation (*parents living together or separated*), economic situation (five response options ranging from *very good* to *not good at all*), academic success (four response options ranging from *very good* to *poor*), pain – headache and stomachache (five response options ranging from *almost every day* to *seldom or never*), analgesic use for headache and stomachache during the last weeks (three response options: *No*; *yes once*; and *yes, more than once*). The HBSC questionnaire is a well-established instrument used for this

age group (Inchley et al., 2016). The responses were dichotomized in the following way: having pain (headache/stomachache) less frequently than weekly was coded 0, and all other options 1; and no analgesic use during the last weeks was coded 0, and all other options 1.

The Center for Epidemiological Studies Depression Scale (CES-D) was used to measure depressive symptoms. This is a well-established questionnaire (Roberts, Lewinsohn, & Seeley, 1991) based on 20 questions regarding the individual's wellbeing over the last week. The result score can vary between 0 and 60, and values of 16 or more indicate depressive symptoms in adolescents (Radloff, 1977). The result was dichotomized so that a scores from 0 to 15 was coded 0, and  $\geq 16$  was coded 1.

## Ethics

The Regional Ethical Review Board in Lund approved the study before participant recruitment began. Students and their parents/guardians were provided written information about the study and were informed that it was voluntary. Written informed consent was obtained, and confidentiality was maintained during data collection and management process. The survey was de-identified during the analyze process. The study was conducted in accordance with the tenets of the Declaration of Helsinki.

## Data Analysis

Descriptive statistics with frequencies and percentages were used to describe the results. We have used the conventional technique to first run the univariate analyses (i.e., relation of the outcome with each predictor, one at a time) and then use only those variables which met significant level to run a multiple logistic regression model (Ranganathan, Pramesh, & Aggarwal, 2017). Association between depressive symptoms among boys and girls and the following variables was investigated using the chi-squared test: sociodemographic variables (country of birth, parents born in Sweden, family situation, economic situation, academic success), pain (headache and/or stomachache) and use of analgesics. The multiple logistic regression model was used to find confounders and associations between dependent and independent variables. Goodness-of-fit test models were used to evaluate the quality of the regression model. IBM SPSS version 24 was used to conduct the statistical analyses. Significance levels were set at  $p < 0.05$ .

## Results

### Sample description

The potential population was 1128 students in grade 8 in the included schools. A total of 878 students aged 13–15 (mean age  $13.8 \pm 0.48$ ) participated in the study. All data were collected during the school day in grade 8 classrooms. The total response rate was 77.8%,

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and 61.8% were female. Those who did not participate in the study were either absent the day for data collection, or did not want to participate. Participation was voluntary, and the students did not have to explain the reasons for not taking part of the study. Not all students responded to all of the included questions, and therefore only 790 students are included in the analysis (response rate: 70.0%). The 88 students who omitted some of the questions, did not significantly differ from the remaining students regarding age ( $\chi^2=1.0$ ;  $df=2$ ,  $p=.60$ ), sex ( $\chi^2=4.8$ ;  $df=1$ ,  $p=.39$ ), family situation ( $\chi^2=3.5$ ;  $df=1$ ,  $p=.06$ ), and economic situation ( $\chi^2=.74$ ;  $df=1$ ,  $p=.49$ ).

Most of the participants were born in Sweden ( $n=724$ , 91.6%), and most of their parents had been born in Sweden ( $n=624$ , 79.0%). The prevalence of depressive symptoms (as measured by CES-D  $\geq 16$ ) did not significantly differ between those born in Sweden or abroad/with parents' country of birth, see Table 1. Most of the students reported that their parents lived together ( $n=537$ , 68.0%). However, among adolescent girls, it was significantly more common to have depressive symptoms if the parents were separated ( $p < 0.0001$ ). Most of the students reported that they perceived the economic situation of the family as good or very good (76.2%). However, it was significantly more common to have depressive symptoms for girls and boys who perceived their economic situation to be poorer ( $p < 0.05$ ). More than one in two students found themselves to be good or very good at school ( $n=442$ , 55.9%); however, having depressive symptoms were associated with poor school performance ( $p < 0.05$ ) as shown in Table 1.

#### **Prevalence of depressive symptoms, pain, and analgesic use**

Depressive symptoms were more common among adolescent girls ( $n=182$ , 36.6%) than boys ( $n=39$ , 13.3%;  $\chi^2=49.7$ ;  $df=1$ ,  $p < .0001$ ) as shown in Table 1. Weekly pain (headache and/or stomach ache) was also more common among girls ( $n=273$ , 54.9%) than boys ( $n=78$ , 26.6%;  $\chi^2=62.2$ ;  $df=1$ ,  $p < .0001$ ). Use of analgesics to ease headache and/or stomachache was also more common among girls ( $n=284$ , 57.1%) compared to boys ( $n=84$ , 28.7%;  $\chi^2=65.3$ ;  $df=1$ ,  $p < .0001$ ). Use of analgesics to ease pain from both headache and/or stomachache during last several weeks was reported by 94 (18.9%) girls and 10 (3.4%) boys ( $\chi^2=46.2$ ;  $df=1$ ,  $p < .0001$ ).

#### **Associations between depressive symptoms and use of analgesics**

Factors that were found to be significantly associated with depressive symptoms in the bivariate analyzes (see Table 1) were subject to a multiple logistic regression analysis as shown in Table 2. Depressive symptoms were found to be significantly associated with female sex, separated parents, poor economic situation, poor school performance, pain (headache and/or stomachache) in addition to analgesic use for headache and stomachache during the last several weeks (Table 2). Students with depressive symptoms were more likely to experience headache and/or stomachache weekly than students without depressive symptoms. Students with depressive symptoms were also more likely

to use analgesics for headache and stomachache during the last weeks, compared to students without depressive symptoms.

## Discussion

This cross-sectional study investigated the association between depressive symptoms and the analgesic consumption among Swedish adolescents aged 13–15. The results showed high frequencies of medication use among both participants with depressive and non-depressive symptoms. However, analgesic use was significantly higher among participants with depressive symptoms. Participants with depressive symptoms were also more likely to experience more pain. The major findings were the following: female participants had more pain, depressive symptoms, and higher analgesic consumption than male participants, pain and depressive symptoms were associated, and depressive symptoms were associated with analgesic consumption.

The prevalence of depressive symptoms in the current study (37% among girls and 13% among boys) is in line with the HBSC-study in Sweden with data collection in 2013-2014 showing similar results for depressive symptoms among the 15 year olds (36% among girls, and 14% among boys) (Inchley et al., 2016).

Other studies have found a significant association between having pain (headache, abdominal pain, and/or back pain) and depressive symptoms among adolescents (Borgman et al., 2018). Psychological distress and painkiller consumption in adolescents have been found to be frequent and related to each other (Shrier et al., 2003), which was also the case in the present study. Potential analgesic overuse in adolescents can be related to comorbidity and have to be taken seriously (Dyb et al., 2015).

The experience of pain appears to be highly linked with coping strategies (Yetwin, Mahrer, John, & Gold, 2018). Among adolescents, continuous analgesic use for reducing pain in association with depressive symptoms could prevent them from learning healthier strategies for coping with stress and depressive symptoms while progressing into and through adulthood (Holmström et al., 2014; Skarstein, Lagerløv, Kvarme, & Helseth, 2018). Moreover, the data present similar results in which female students expressed more depressive symptoms than male students (Asgeirsdottir & Sigfusdottir, 2015)..

## Implications for pediatric nursing

Common causes school for nurse visits by adolescents are headache and stomachache (Ellertsson, Garmy, & Clausson, 2017) in addition to mental health issues (Jonsson, Maltestam, Bengtsson Tops, & Garmy, 2017; Kraft & Eriksson, 2015). The results of this study show that adolescents with depressive symptoms experience more pain and also consume more analgesics even after controlling for pain. It is of great importance for

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school nurses, pediatric nurses and parents to support adolescents and to guide them towards helpful coping strategies when pain occurs. In a recent study, school nurses could refer adolescent girls with depressive symptoms to a dance program. This intervention was appreciated by the target group and was found to be cost-effective (Duberg, Hagberg, Sunvisson, & Möller, 2013). Depression prevention programs conducted by school nurses and teachers have also been found to be effective (Garmy, Clausson, Berg, Steen Carlsson, & Jakobsson, 2017). Adolescents with depressive symptoms generally want a connection with a professional they can trust and who will work with them to find solutions (Desrochers & Houck, 2014).

## Strengths and limitations

The questionnaire used to collect data was a self-administered questionnaire, which gave participants independence to answer the questions with fewer possibilities of biased answers. This study includes the major indicators of depressive symptoms via the use of the CES-D questionnaire. A limitation is that not all students succeeded to respond to all questions, and therefore the final sample in the analysis were 790 students (response rate 70.0%). The large number and diversity of the participants, including both sexes with a relative high response rate, gave strength to generalization of the study results. The relative high response rate, voluntary participation of the students, and maintenance of confidentiality also give the study more credibility. However, this is a cross-sectional study, so the direction of the occurrences cannot be determined.

## Conclusion

The most significant result of this study was the association between depressive symptoms among adolescents and the way in which depressive symptoms were linked with physiological pain and an increase in analgesic consumption. This finding warrants action and concern in health-related research. Higher analgesic consumption or a growing habit of consumption at an early age can result in other physiological consequences later in life. In conclusion, ignorance of adolescents' psychological health can have significant negative consequences on both their psychological and physiological wellbeing. To help adolescents with the high OTC analgesic consumption in Sweden, it is crucial to consider interventions to provide guidance about pain management and knowledge about analgesics (Skarstein et al., 2018).

Further research is needed to determine what to target when supporting adolescents who are struggling with pain and higher consumption of analgesics to educate them about pain management strategies (Skarstein et al., 2018).

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Table 1. Prevalence of pain among boys and girls with and without depressive symptoms (n = 790)

	Girls (n=497)				Boys (n=293)			
	No depressive symptoms (CES-D <16), n=315 (63.4%)	Depressive symptoms (CES-D ≥16), n=182 (36.6%)	χ <sup>2</sup> -value	p-value <sup>1</sup>	No depressive symptoms (CES-D <16), n=254 (86.7)	Depressive symptoms (CES-D ≥16), n=39 (13.3%)	χ <sup>2</sup> -value	p-value <sup>1</sup>
<b>Country of birth</b>								
Born in Sweden, n (%)	294 (93.3)	172 (94.5)	.3	.690	223 (87.8)	35 (89.7)	.01	.918
Parents born in Sweden, n (%)	258 (81.9)	146 (80.2)	.1	.806	189 (74.4)	31 (79.5)	.6	.540
<b>Family situation</b>								
Parents living together, n (%)	237 (75.2)	94 (51.6)	23.3	<b>&lt;.0001</b>	181 (71.2)	25 (64.1)	.1	.839
<b>Economic situation</b>								
Good economic situation, n (%)	249 (79.0)	118 (64.8)	11.6	<b>.001</b>	210 (82.7)	25 (64.1)	8.4	<b>.007</b>
<b>Academic success</b>								
Good or very good at school, n (%)	194 (61.6)	77 (42.3)	18.7	<b>&lt;.0001</b>	157 (61.8)	14 (35.9)	9.5	<b>.003</b>
<b>Pains (weekly)</b>								
Headache, n(%)	105 (33.3)	116 (63.7)	43.2	<b>&lt;.0001</b>	46 (18.1)	17 (43.6)	13.0	<b>.001</b>
Stomachache, n(%)	55 (17.5)	105 (57.7)	85.5	<b>&lt;.0001</b>	26 (10.2)	15 (38.5)	22.4	<b>&lt;.0001</b>
Headache and/or stomachache, n (%)	130 (41.3)	143 (78.6)	64.8	<b>&lt;.0001</b>	57 (22.4)	21 (53.8)	17.1	<b>&lt;.0001</b>

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Both headache and stomachache, n (%)	30 (9.5)	78 (42.9)	75.4	<b>&lt;0.0001</b>	15 (5.9)	11(28.2)	28.8	<b>&lt;0.0001</b>
<b>Use of analgesics</b>								
Have used analgesics for headache last weeks, n (%)	130 (41.2)	116 (63.7)	23.3	<b>&lt;0.0001</b>	65 (25.6)	13 (33.3)	1.0	0.332
Have used analgesics for stomachache last weeks, n (%)	67 (21.2)	65 (35.7)	12.3	<b>0.001</b>	12 (4.7)	4 (10.3)	2.0	0.244
Have used analgesics last weeks, n (%)	156 (49.5)	128 (70.3)	20.4	<b>&lt;0.0001</b>	71 (30.0)	13 (33.3)	.5	0.568
Have used analgesics for both headache and stomachache last weeks, n (%)	41 (13.0)	53 (29.1)	19.5	<b>&lt;0.0001</b>	6 (2.3)	4 (10.3)	6.4	<b>0.031</b>

Note. CES-D = Center for Epidemiological Studies Depression Scale

<sup>1</sup> Chi-square test. Degrees of freedom = 1.  $\chi^2$ -value = Chi-square value.

p< .05 were considered significant and marked in boldface.

Table 2. Logistic regression analysis of factors associated with depressive symptoms (CES-D  $\geq 16$ ) in adolescents (n = 790).

	Depressive Symptoms (CES-D $\geq 16$ ), n=221, (28.0%)	OR (95% CI for odds ratio)	B, Standard Error, Wald	p-value
<b>Sex</b>				
Female, n (%)	182 (36.6)	2.48 (1.53– 4.02)	.90, .25, 13.6	<b>&lt;0.001</b>
Male, n (%)	39 (13.3)			
<b>Family situation</b>				
Living with both parents, n (%)	119 (22.2)	.63 (.41-.96)	-.46, .21, 4.6	<b>0.032</b>
Separated parents or not living with parents, n (%)	88 (38.6)			
<b>Economic situation</b>				
Good or very good economic situation n (%)	143 (23.8)	1.35 (1.06– 1.72)	.30, .12, 5.9	<b>.015</b>
Average economic situation, n (%)	47 (37.3)			
Poor economic situation, n (%)	18 (78.3)			
<b>Accademic success</b>				
Good or very good at school, n (%)	91 (20.6)	1.84 (1.38- 2.46)	.61, .15, 17.0	<b>&lt;0.001</b>
Average at school, n (%)	106 (34.3)			
Poor performance at school, n (%)	24 (70.6)			
<b>Pain</b>				
Having headache and/or stomachache last week, n (%)	164 (46.7)	4.83 (3.11- 7.51)	1.57, .22, 49.0	<b>&lt;0.001</b>
Not having headache or stomachache last week, n (%)	57 (13.0)			
<b>Analgesics</b>				
Have used analgesics for headache and stomachache during the last weeks, n (%)	57 (54.8)	1.75 (1.04- 2.93)	.56, .26, 4.5	<b>.035</b>
Have not used analgesic for headache and stomachache during the last weeks	164 (23.9)			

Hosmer and Lemeshow goodness-of-fit test  $p = .629$ ; Nagelkerke  $R^2 = .324$

OR: odds ratio.

CI: confidence intervals.

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