

Adolescents' medicine use for headache: secular trends in 20 countries from 1986 to 2010

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Background: This study reports secular trends in medicine use for headache among adolescents in 20 countries from 1986 to 2010. **Methods:** The international Health Behaviour in School-aged Children (HBSC) survey includes self-reported data about medicine use for headaches among nationally representative samples of 11-, 13- and 15-year-olds. We included 20 countries with data from at least three data collection waves, with a total of 380 129 participants. **Results:** The prevalence of medicine use for headaches varied from 16.5% among Hungarian boys in 1994 to 62.9% among girls in Wales in 1998. The prevalence was higher among girls than boys in every country and data collection year. The prevalence of medicine use for headaches increased in 12 of 20 countries, most notably in the Czech Republic, Poland, Russia, Sweden and Wales. **Conclusion:** The prevalence of medicine use for headaches among adolescents is high and increasing in many countries. As some medicines are toxic this may constitute a public health problem.

Introduction

Medicine use for headaches is common among adolescents.^{1–3} Unsupervised medicine use for headaches in adolescents can be problematic: Some adolescents misuse prescription drugs as they know little about medicines for headaches^{4,5} and they may use headache medicines inappropriately, e.g. to treat general discomfort.^{6,7} A qualitative study based on interviews with parents of children under 5 years old suggests that due to time pressures in modern families, medicines are often readily given to children by their parents in order to quickly mitigate pain-related discomfort.⁸ Use of common over-the-counter (OTC) pain killers are often reported by children and adolescents attempting suicide.⁹ Medicine use for aches in adolescence is predictive of medicine use in young adulthood, i.e. inappropriate medicine use may continue or increase over the life course.¹⁰ It seems necessary to promote appropriate use of medicines among adolescents. Therefore, it is important to know the prevalence, demographic patterns and secular trends of medicine use.

It is difficult to get appropriate data since sales statistics do not indicate user characteristics and prescription studies do not include OTC medicines. Self-reported use is potentially the most appropriate data source for analysis of prevalence and trends in medicine use for headache.^{11–13}

There are few studies about time trends in adolescents' medicine use for headaches. Reports from Spain and Denmark showed increasing use of painkillers over the past two decades.^{13,14} Data from the USA showed no major changes over time in the use of painkillers.¹¹ The Spanish study¹³ focused on the age group 0–15 and included data from parents about their children's use of specific

drugs. The Danish study¹⁴ used data from 11- to 15-year-olds about medicine use for headache. The American study¹¹ focused on 0- to 12-year-olds and collected data from parents about use of specific drugs. These few available studies are difficult to compare because of differences in study population, data collection and measurements. Many factors such as need for medication, increased marketing, increased availability, and changing norms about medicine use may result in increasing trends in medicine use. Allotey et al.⁷ suggest that there is an increasing propensity to turn to medication as a possible way of improving lifestyle. They interpret the findings as a progressive medicalization of present day society. We have not been able to find systematic information about these issues and are hesitant to formulate specific hypotheses about time trends in adolescents' medicine use for headache.

The objective of this article is descriptive: to present international secular trends in adolescent boys' and girls' self-reported medicine use for headaches over an extended period from 1986 to 2010. The study is about medicine use behaviour, not specific drugs or active ingredients. The international Health Behaviour in School-aged Children (HBSC) study provides a unique opportunity to study secular trends in adolescents' self-reported use of medicine for headache.

Methods

The HBSC study comprises cross-sectional surveys carried out every 4 years in the participating countries.¹⁵ HBSC uses a standardized protocol for sampling students in three age groups (11-, 13- and 15-year-olds) in nationally representative samples of schools. The data file includes data about medicine use for headaches in at least

three waves of data collection in 20 countries (see table 1, $n=380\,129$), among 13- and 15-year-old girls and boys. The response rate varied by country but was generally high, over 70%.

Students answered the internationally standardized HBSC questionnaire during a class period. The participants received oral and written information about the study and were informed that participation was voluntary and anonymous. In each country, the study complied with national research ethical and data protection regulations.¹⁶

Medicine use was measured by the following survey item: 'Within the past month, did you take any pills or medicine for headache?' In the first two waves of data collection 1987–88 and 1993–94, the response categories were 'yes' and 'no'. In the last three waves of data collection 1997–98, 2005–06 and 2009–10, the response categories were 'no', 'yes once' and 'yes several times', probably in order to study adolescents with frequent medicine use. The item was not included in 2001–02. There is little available information about the validity of adolescents' self-reported medicine use. One study asked both adolescents and their parents about medicine use for headache in the past month. The agreement between the two parties was fairly high, gamma correlation = 0.67, Kappa coefficient = 0.41.¹⁷

We dichotomized the responses into no and yes. The proportion of missing responses was less than 4.5% in all countries and all data collection waves with only two exceptions where the proportion of missing was 7.7 and 8.8%. We included missing in the no category to avoid inflated prevalence rates. Three countries have data from six data collection waves, four countries from five waves, four countries from four waves and nine countries from three waves of data collection (table 1).

Statistical procedures included contingency tables and the Cochran–Armitage test for trend.¹⁸ This test is based on the regression coefficient for a weighted linear regression of a binomial proportion of a variable (here: prevalence of medicine use for headache) on an explanatory variable (here: year of data collection). Tests for trends only included years of data collection with data about medicine use. All tests were stratified by gender and age group

Results

Table 2 shows that the prevalence of medicine use for headache varied substantially across country, gender and data collection wave. For instance, in the 2009–10 waves of data collection, the lowest prevalence was among boys in Austria (25.6%) and the highest prevalence was among girls in France (55.8%). The prevalence was higher for girls than boys in every country and wave of data collection all P values from Chi-square tests were under 0.01 with two exceptions: Germany in 2001 ($P=0.0919$) and Greenland in 1998 ($P=0.1666$).

There was an increase in medicine use over time in 12 countries: Austria, Czech Republic, Denmark, Finland (for boys but not girls), France, Hungary, Latvia, Poland, Russia, Scotland, Sweden and Wales. The increase was substantial—more than double among girls in the Czech Republic and boys and girls in Hungary. In three countries, Finland, Scotland and Sweden, the trend was not linear but fluctuated over time. There was a decrease over time among girls but not boys in Germany and among boys but not girls in Greece. There was no clear increasing or decreasing trend in eight countries: Canada, Finland (girls), Germany (boys), Greece (girls), Ireland, Norway or Switzerland, and Flemish- and French-speaking parts of Belgium. Secular trends were fairly similar for the three age groups (data not shown).

Discussion

In 12 of the 20 countries, there was an increasing trend in the prevalence of medicine use for headaches. In the remaining countries, the prevalence was stable or characterized by increasing and decreasing fluctuations. There was a more consistent increasing pattern for girls than for boys. This comparative study confirms prior studies which show different secular trends in use of medicine for headache.^{11,13,14} There are no apparent geographic patterns, nor specific time periods with more consistent increasing patterns.

We have not been able to identify publications which provide a sound explanation for the general increasing trend in adolescents'

Table 1 Study population by country and year of data collection

Country	Year of data collection ^a						Total
	1985–86	1989–90	1993–94	1997–98	2005–6	2009–10	
Austria	–	2982	5349	4316	4848	5033	22 528
Belgium (Flemish)	–	–	4506	4824	–	4180	13 510
Belgium (French)	3575	–	5196	2505	4476	4012	19 764
Canada	–	5565	6758	6567	–	–	18 890
Czech Republic	–	–	3585	3703	–	4425	11 713
Denmark	–	–	3912	5066	5741	4330	19 049
Finland	3216	2996	4187	4864	3410 ^b	6723	25 396
France	–	–	4023	4133	7155	6160	21 471
Germany	–	–	3275	4792	7274	–	15 341
Greece	–	–	–	4299	3715	4944	12 958
Hungary	4461	6498	5775	3609	–	4864	25 207
Ireland	–	–	–	4394	4894	4965	14 253
Latvia	–	3008	3818	3775	4245	4284	19 130
Norway	3955	5037	4952	5025	–	–	18 969
Poland	–	4613	4527	4861	–	–	14 001
Russia	–	–	4001	3997	–	5174	13 172
Scotland	4760	3719	4959	5632	6190	6771	32 031
Sweden	2933	3553	3584	3802	4415	6718	15 005
Switzerland	4973	–	–	–	4621	6678	16 272
Wales	6338	6724	3870	4537	–	–	21 469
Total	34 211	44 695	76 277	84 701	60 984	79 261	380 129

a: Items about medicine use were mandatory in the three first waves. The HBSC data collection in 2001–02 did not include medicine use. The items about medicine use were optional in 2005–06 and 2009–10.

b: The data from Finland 2005–06 includes 13- and 15-year-olds but not 11-year-olds.

Table 2 Prevalence (%) of 11-, 13- and 15-year-old boys and girls who used medicine for headache during the past month, including test for trend

Country	Sex	Year of data collection ^a						Cochran-Armitage test ^b	Difference between first and last observation
		1985–6	1989–90	1993–4	1997–8	2005–6	2009–10		
Austria	Boys	–	18.9	20.5	26.8	27.0	25.6	*	Up 6.7%
	Girls	–	27.8	27.9	31.4	33.9	32.7	*	Up 4.7%
Belgium Flemish	Boys	–	–	31.2	31.7	–	29.7		Down 1.5%
	Girls	–	–	41.9	43.4	–	40.4		Down 1.5%
Belgium, French	Boys	37.2	–	36.1	37.9	31.2	34.8		Down 2.4%
	Girls	51.8	–	51.4	52.2	43.2	52.6		Up 0.8%
Canada	Boys	–	43.2	42.9	44.7	–	–		Up 1.5%
	Girls	–	58.1	57.8	58.0	–	–		Down 0.1%
Czech Republic	Boys	–	–	15.4	22.6	–	27.8	*	Up 12.4%
	Girls	–	–	21.1	30.7	–	43.3	*	Up 22.2%
Denmark	Boys	–	–	28.7	34.1	35.3	35.1	*	Up 6.4%
	Girls	–	–	40.8	45.8	47.5	46.8	*	Up 6.0%
Finland	Boys	29.7	33.1	31.4	44.8	33.3 ^c	32.9	*	Up 3.2%
	Girls	36.1	44.9	43.4	52.6	41.2 ^c	42.3		Up 6.1%
France	Boys	–	–	34.1	36.6	41.9	41.6	*	Up 7.5%
	Girls	–	–	48.4	51.8	53.6	55.8	*	Up 7.4%
Germany	Boys	–	–	20.5	24.1	19.5	–		Down 1.0%
	Girls	–	–	28.5	33.1	25.5	–	*	Down 3.0%
Greece	Boys	–	–	–	38.3	31.2	33.2	*	Down 5.1%
	Girls	–	–	–	47.2	46.5	45.6		Down 1.6%
Hungary	Boys	17.9	18.2	16.5	33.7	–	40.3	*	Up 22.4%
	Girls	25.1	26.9	27.6	42.7	–	50.3	*	Up 25.2%
Ireland	Boys	–	–	–	42.7	38.3	40.3		Down 2.4%
	Girls	–	–	–	49.1	45.6	48.1		Down 1.0%
Latvia	Boys	–	24.6	21.8	29.2	34.9	39.0	*	Up 14.4%
	Girls	–	36.5	34.2	39.2	50.1	49.6	*	Up 13.1%
Norway	Boys	22.7	24.0	25.3	24.7	–	–		Up 2.0%
	Girls	35.2	34.2	35.0	34.6	–	–		Down 0.6%
Poland	Boys	–	18.8	17.5	29.1	–	–	*	Up 10.3%
	Girls	–	26.3	28.5	42.4	–	–	*	Up 16.1%
Russia	Boys	–	–	18.2	30.1	–	35.4	*	Up 17.2%
	Girls	–	–	36.4	39.7	–	43.5	*	Up 7.1%
Scotland	Boys	34.0	37.3	35.2	48.7	37.9	38.5	*	Up 4.5%
	Girls	44.1	53.0	49.5	60.7	50.2	52.4	*	Up 8.3%
Sweden	Boys	28.1	32.1	36.1	33.8	35.2	39.7	*	Up 11.6%
	Girls	39.2	39.8	49.6	47.3	48.3	54.6	*	Up 15.4%
Switzerland	Boys	29.0	–	–	–	25.2	30.0		Up 1.0%
	Girls	39.3	–	–	–	32.9	38.6		Down 0.7%
Wales	Boys	34.9	40.7	42.5	45.6	–	–	*	Up 10.7%
	Girls	48.9	55.7	55.3	62.9	–	–	*	Up 14.0%

a: The HBSC data collection in 2001–02 did not include medicine use.

b: Inclusion of data collection waves with data about medicine use.

c: The data from Finland 2005–06 includes 13- and 15-year-olds but not 11-year-olds.

Level of significance * $P < 0.01$.

use of medicine for headache. The findings correspond with the studies which suggest that increase in perceived stress,⁶ time pressure in the families,^{7,8} and a general medicalization of the society⁷ result in increasing medicine use. Other factors may contribute to the increase in medicine use, e.g. a more aggressive marketing of painkillers, higher availability, and changing norms about medicine use. From a drug safety point of view, the results of this study may be worrying. The findings may reflect an increasing need for medication, but also changes in social norms and availability resulting in an increase in medicine use. Further research is needed to understand why medicine use for headaches has increased.

The main merit of this study is the large sample and representative study population and the use of standardized and comparable data. There are important limitations as well. The study does not include information about specific drugs or active ingredients. Recent studies suggest that the medicines used for headaches among adolescents are mainly common OTC medicines such as acetaminophen/paracetamol, ibuprofen and acetylsalicylic acid.^{6,13,19} While selection bias due to non-participating schools and pupils may be a limiting factor, we have no means to carry out rigorous non-participation analyses. It may be a limitation that the item about

medicine use for headache had two response categories until 1993–94 and three response categories from 1997–98 onwards. In most of the countries with data from 1993–94 to 1997–98 there was an increase in the prevalence of medicine use for headache, i.e. the change of response categories may influence the findings. The unknown validity of the medicine use measurement is an important limitation of the study. The measurement includes OTC medicine and may provide a more realistic representation of medicine use in the general population than register-based studies which only include prescription medicine.

Given the possible medicine use beyond indication, the potential side effects and the modest knowledge among adolescents about medicines,⁴ there is a need to promote appropriate medicine use. In their comprehensive literature review, Hämeen-Anttila and Bush concluded that children of the same age in different cultures appear similar in their attitudes, beliefs and behaviour related to medicines and they wish to learn about medicines.⁴ They proposed that health educators and health care professionals should take a more active role in educating children about rational medicine use.⁴

Both health education and sales restrictions are potential components of future efforts to promote rational medicine use.²⁰

Parents, health educators, health professionals, health authorities and the pharmaceutical industry are potential stakeholders of future health promotion and control policies.²⁰ From a research point of view, we need better data about young people's medicine use and attitudes towards medicines. We also need insight into individual, social and cultural forces that influence medicine use.

To conclude, this is the first study which reports systematic data about time trends in adolescents' use of medicine for headache in a large number of countries. There was an increasing trend in 12 countries and inconsistent changes over time in 8 countries. There was a more consistent increasing pattern for girls than boys.

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Key points

- This is the first report about time trends in adolescents' use of medicine for headache in a large number of countries.
- There was an increasing trend in 12 countries and inconsistent changes over time in 8 countries.
- There was a more consistent increasing pattern for girls than boys.
- There is a need to promote rational medicine use, e.g. by means of health education and control policies such as sales restrictions

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