Research brief

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Research Brief: Persistent social inequality in medicine use for headache among adolescents in Denmark 1991-2014

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Abstract

Background: Socioeconomic variation in adolescents’ medicine use behaviour is an understudied issue.

Objectives: To examine the association between socioeconomic background and medicine use for headache among adolescents, and how this association changes over time.

Methods: Data stem from the Danish part of the international Health Behaviour in School-aged Children (HBSC) study 1991-2014 with data about parents’ occupational social class (OSC) and self-reported medicine use for headache, n=26,685. The analyses show absolute social inequality (percent difference between high and low OSC) and relative social inequality (odds ratio for medicine use by OSC).

Results: In total, 40.5% used medicine for headache in the past month. There was a significant increase from 32.3% in 1991 to 42.8% in 2002 (test for trend, p<0.0001) and very little change 2002-2014. This pattern was similar in high, middle and low OSC. The prevalence of medicine use for headache in high, middle and low OSC was 36.2%, 41.5% and 44.8% (p<0.0001). The OR (95% CI) for medicine use was 1.25 (1.18-1.324) in middle and 1.43 (1.33-1.54) in low OSC.

Conclusions: Medicine use for headache increased 1991-2002 and remained stable 2002-2014. There was increasing medicine use for headache with decreasing OSC; this social inequality was persistent 1991-2014.

Key words: Adolescents, children, headache, medicine use, social inequality, trend
Introduction

Medicine use for headaches is common among adolescents and a considerable part of the medicines used are over the counter medicines. In these age groups, unsupervised medicine use for headaches can be problematic: Adolescents know very little about medicines for headache and they may use it inappropriately, e.g. to treat general discomfort or to quickly alleviate pain-related discomfort in a time pressured life in modern families. Further, medicine use for aches in adolescence is predictive of medicine use in young adulthood, i.e., inappropriate medicine use may continue over the life course. Therefore, it is important to know the prevalence, demographic patterns and trends of self-medication with medicines for headache.

There are few published studies about socioeconomic variations in self-medication for headache among children and adolescents. Two studies from Germany and the Netherlands show that the prevalence of self-medication for headache is highest in high socioeconomic groups and a study from Denmark show the opposite pattern. It is unknown whether the socioeconomic patterning of medicine use for headache is stable over time. Therefore, the aim of this paper is to examine the association between socioeconomic background and self-reported medicine use for headache among adolescents, and how this association changes over time.

Methods

Design and study population: The analyses applied data from seven Danish contributions to the international cross-sectional Health Behaviour in School-aged Children (HBSC) study in 1991, 1994, 1998, 2002, 2006, 2010 and 2014. Each survey included all children in the fifth, seventh, and ninth grade (11-, 13- and 15-year-olds) in random samples of schools, drawn from complete lists of public and private schools. The total response rate (participants as percentage of all students enrolled in the participating classes) was 88.4%, n=31,660. This paper includes participants with full data about all applied variables, n=26,685.

Data collection and measurements: The participants answered the internationally standardized HBSC questionnaire at school. The study does not include data about the specific medicines but it does include self-medication with both prescription and over the counter medicines. The dependent variable was measured by the item “Within the past month, did you take any pills or medicine for headache?” The response categories were “no”, “yes once” and “yes several times”, dichotomized into no and yes. There is little available information about the validity of adolescents’ self-reported medicine use. A study by Andersen et al. found a fair agreement between adolescents’ self-report and parents’ information, gamma correlation = 0.67, Kappa coefficient = 0.41. A study by Gobina et al. found a systematic
relationship between frequency of pain and use of medicines which also suggest that the measurement is
valid on population basis.

The independent variable socioeconomic background was measured by the questions: “Does your father/
mother has a job?”, “If yes, please say in what place he/she works (for example: hospital, bank,
restaurant)” and “Please write down exactly what job he/she does there (for example: teacher, bus
driver)”. The research group coded the answers into OSC from I (high) to V (low). The research group coded
this information into occupational social class (OSC), from I (high) to V (low) with an additional category VI
for parents outside the labor market, living from social welfare transfer income. Each student was
categorized into high (I-II), middle (III-IV) or low (V-VI) OSC. The coding instruction was consistent across all
seven waves of data collection. Jobs change over time but the coding reflects two general features which
are more stable than occupations: 1) required educational qualifications and 2) the control (over capital or
people) connected with the occupation. Several studies have shown that children in these age groups are
able to provide valid information about parent’s occupation.13-17

The analyses included four control variables, sex, age group, survey year, and frequency of headache,
measured by the item “during the past six months, how often have you had headache (response categories:
almost every day; more than once a week; about every week; about every month; rarely or never).

Statistical procedures: Time trends were tested by the Cochran-Armitage test for trend. The analyses of
social inequality in medicine use for headache included 1) absolute social inequality (per cent difference
between high and low OSC) and 2) relative social inequality by logistic regression analyses, i.e. odds ratio
(OR) and 95% confidence interval (CI) for medicine use by OSC, using high OSC as the reference group. The
logistic regression analyses applied multilevel modelling because of the cluster sampling (SAS, PROC
GLIMMIX). The analyses were adjusted for sex, age group, survey year and frequency of headache. The final
step was inclusion of an interaction term between survey year and OSC to examine whether the social
inequality in medicine use changed over time.

Ethical issues: There is no formal agency for approval of population surveys in Denmark. Instead, the
research group asked the parents’ representatives (school board), the school leader, and the pupils’ council
in each of the participating schools to approve the study. The pupils received oral and written information
that participation was voluntary and anonymous. From 2014 the Danish Data Protection Authority has
requested notification of such studies and has granted acceptance (Case No. 2013-54-0576).

Results
Table 1 shows the study population by survey year, sex, age group, OSC, pct. with medicine use past month and pct. with headache at least monthly. The proportion of participants who used medicine for headache within the past month was 40.5%, showing a significantly increasing trend from 32.3% in 1991 to 42.8% in 2002 (Cochran-Armitage test for trend, p<0.0001) and very little change 2002-2014. The proportion who reported having headache at least once a month was 48.1% with some variations across survey years.

Table 1 and Figure 1 here

Figure 1 shows the trend in high, middle and low OSC. There was a similar trend in all three OSC groups with an increase from 1991 to 2002 and stability thereafter. The trend was significantly increasing in all three OSC-groups from 1991 to 2002, all p-values <0.001.

Table 2 shows the prevalence of medicine use for headache: 36.2% in high, 41.5% in middle and 44.8% in low OSC, p-value from chi²-test <0.0001. The difference in percent between low and high OSC in the seven surveys varied across survey years with no clear trend which suggests that the absolute social inequality in medicine use for headache was persistent from 1991 to 2014.

Table 2 here

Table 2 also shows the relative social inequality in medicine use for headache. In the total study population, the OR (95% CI) for medicine use was 1.25 (1.18-1.32) in the middle and 1.43 (1.33-1.54) in low OSC. These figures did not change much when adjusted for sex, age group, survey year and frequency of headache.

There was a similar pattern of increasing OR for medicine use with decreasing OSC in all seven surveys and the OR for medicine use was significantly higher in low than high OSC in five of the seven surveys. These data suggests that the relative social inequality was persistent from 1991 to 2014. The interaction of survey year and OSC on medicine use was insignificant, p=0.9416.

Discussion

**Main findings:** This is the first study to examine trends in social inequality in adolescents’ medicine use for headache. The proportion of adolescents who used medicine for headache was increasing from the 1990s to 2002 and stable thereafter. This trend was similar in high, middle and low OSC groups. There was an increasing medicine use for headache with decreasing OSC, even after adjustment for sex, age group and frequency of headache. This social inequality did not change substantially between 1991 and 2014.
The finding of a social gradient in adolescents’ medicine use for headache corresponds with a study from the same HBSC-project in 2001\textsuperscript{10} but is in contrast with two studies from Germany and the Netherlands which showed that children’s medicine use for headache was highest in higher socioeconomic groups. \textsuperscript{8,9} There is a need for studies which enhance the understanding of this socioeconomic patterning of medicine use for headache.

**Methodological issues:** The main strength of the study is the design with seven comparable surveys conducted during a 23 year period, all adhering to the HBSC research protocol regarding sampling, data collection and measurements. \textsuperscript{11} The available studies about the validity and reliability of the two main variables, OSC and medicine use, suggest that the data quality is good. \textsuperscript{12-14} An important limitation is that the study lacks data about which kinds of medicine the participants used but only has data about behaviour, i.e. whether the participants had used medicine for one specific symptom, headache. Another limitation is that the study lacks data to interpret why there is a social inequality in medicine use for headache and why this social inequality is persistent.

**Implications:** The high prevalence of medicine use for headache combined with insufficient knowledge about medicines among adolescents \textsuperscript{1} call for more health education about the proper use of medicines. The conflicting findings of a socioeconomic gradient in adolescents’ medicine use for headache calls for more studies about the social patterning of medicine use, e.g. studies in other countries and study populations. Further, there is a need to identify the processes which contribute to this social inequality and a need to study the reasons for the increasing medicine use for headache among adolescent. New findings could inform future health education about medicine use for headache.

**Conclusions:** There was an increasing trend in prevalence of medicine use for headache from the 1990s to 2002 and stability from 2002 to 2014. There was an increasing medicine use for headache with decreasing OSC in all survey years and this social inequality was persistent from 1991 to 2014, both in terms of absolute and relative social inequality.
References


Table 1: Study population by year, sex, age group, occupational social class (OSC), medicine use for headache past month and pct. with headache monthly or more frequent

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation rate&lt;sup&gt;a&lt;/sup&gt;</td>
<td>90.2%</td>
<td>89.5%</td>
<td>89.9%</td>
<td>89.3%</td>
<td>88.8%</td>
<td>86.3%</td>
<td>85.7%</td>
<td>88.4%</td>
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<tr>
<td>Study population</td>
<td>1860</td>
<td>4046</td>
<td>5205</td>
<td>4824</td>
<td>6269</td>
<td>4922</td>
<td>4534</td>
<td>31,660</td>
</tr>
<tr>
<td>Included in this study</td>
<td>1628</td>
<td>3544</td>
<td>4676</td>
<td>4202</td>
<td>4861</td>
<td>4046</td>
<td>3728</td>
<td>26,685</td>
</tr>
<tr>
<td>Pct. boys</td>
<td>50.6</td>
<td>49.0</td>
<td>49.7</td>
<td>48.4</td>
<td>48.6</td>
<td>49.0</td>
<td>47.6</td>
<td>48.9</td>
</tr>
<tr>
<td>Pct. girls</td>
<td>49.4</td>
<td>51.0</td>
<td>50.3</td>
<td>51.6</td>
<td>51.4</td>
<td>51.0</td>
<td>52.4</td>
<td>49.1</td>
</tr>
<tr>
<td>Pct. 11-year-olds</td>
<td>29.6</td>
<td>30.7</td>
<td>33.5</td>
<td>35.6</td>
<td>36.3</td>
<td>35.0</td>
<td>28.8</td>
<td>33.3</td>
</tr>
<tr>
<td>Pct. 13-year-olds</td>
<td>35.3</td>
<td>34.3</td>
<td>35.5</td>
<td>33.1</td>
<td>35.9</td>
<td>34.6</td>
<td>35.7</td>
<td>34.9</td>
</tr>
<tr>
<td>Pct. 15-year-olds</td>
<td>35.1</td>
<td>35.0</td>
<td>31.0</td>
<td>31.3</td>
<td>27.8</td>
<td>30.5</td>
<td>35.5</td>
<td>31.8</td>
</tr>
<tr>
<td>Pct. high OSC</td>
<td>28.5</td>
<td>33.2</td>
<td>28.0</td>
<td>24.8</td>
<td>27.4</td>
<td>38.8</td>
<td>42.8</td>
<td>31.8</td>
</tr>
<tr>
<td>Pct. middle OSC</td>
<td>51.8</td>
<td>48.4</td>
<td>49.7</td>
<td>54.5</td>
<td>49.7</td>
<td>42.1</td>
<td>41.2</td>
<td>48.1</td>
</tr>
<tr>
<td>Pct. low OSC</td>
<td>19.7</td>
<td>18.5</td>
<td>22.4</td>
<td>20.8</td>
<td>22.9</td>
<td>19.1</td>
<td>16.0</td>
<td>20.1</td>
</tr>
<tr>
<td>Pct. used medicine for headache past month</td>
<td>32.4</td>
<td>35.7</td>
<td>40.5</td>
<td>43.0</td>
<td>42.4</td>
<td>42.3</td>
<td>41.3</td>
<td>40.5</td>
</tr>
<tr>
<td>Pct. with headache monthly or more frequent</td>
<td>50.0</td>
<td>53.6</td>
<td>45.5</td>
<td>46.0</td>
<td>43.2</td>
<td>43.6</td>
<td>46.2</td>
<td>48.1</td>
</tr>
</tbody>
</table>

<sup>a</sup> Number of participants in the surveys as percentage of schoolchildren enrolled in the participating classes.
### Table 2 Medicine use for headache past month by occupational social class, percentage and OR (95% CI)

<table>
<thead>
<tr>
<th>Year of data collection</th>
<th>% who used medicine for headache past month</th>
<th>OR (95% CI) for medicine use past month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Occupational social class</td>
<td>Occupational social class</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>Middle</td>
</tr>
<tr>
<td>Full study population (n=26,685)</td>
<td>36.2</td>
<td>41.5</td>
</tr>
<tr>
<td>Model 1 * (n=26,685)</td>
<td>28.0</td>
<td>32.1</td>
</tr>
<tr>
<td>Model 2 * (n=26,685)</td>
<td>30.5</td>
<td>36.6</td>
</tr>
<tr>
<td>1991 (n=1628) d</td>
<td>38.0</td>
<td>41.4</td>
</tr>
<tr>
<td>1994 (n=3544) d</td>
<td>38.5</td>
<td>43.3</td>
</tr>
<tr>
<td>1998 (n=4676) d</td>
<td>36.6</td>
<td>44.1</td>
</tr>
<tr>
<td>2002 (n=4202) d</td>
<td>37.7</td>
<td>44.0</td>
</tr>
<tr>
<td>2006 (n=4861) d</td>
<td>38.2</td>
<td>42.5</td>
</tr>
</tbody>
</table>

* Model 1 crude, Model 2 adjusted for sex, age group, survey year and frequency of headache.

b The difference between the occupational social classes is statistically significant assessed by chi²-test, p<0.0001.

c The difference between the occupational social classes is statistically significant assessed by chi²-test, p<0.01.

d Adjusted for sex, age group, and frequency of headache.

e Percent difference between low and high OSC

Estimates in bold are significantly different from 1.0.
Figure 1 Pct. who used medicine for headache past month

High | Medium | Low
---|---|---
39.7 | 42.7 | 44.1
36.6 | 41.4 | 44.0
32.1 | 38.0 | 37.7
28.0 | 30.5 | 38.2

---|---|---|---|---|---|---