



Changes in the association between health complaint frequency and medicine use among adolescents in Scotland between 1998 and 2010



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ABSTRACT

Objective: Medicines have the potential to cause harm, particularly when adolescents do not follow recommendations for use. In addition, medicine use in adolescence has been shown to track into adulthood. There is therefore a strong rationale to monitor changes in adolescent medicine use over time and understand the mechanisms behind these changes

Methods: Data from the 1998, 2006 and 2010 Scotland Health Behaviour in School-aged Children Survey were modelled using multilevel logistic regression, modelling medicine use for: headache, stomachache, sleeping difficulties and nervousness, as well as a combined medicine use measure. Models adjusted for year and frequency of health complaints to measure trends in medicine use, and an interaction term to measure the relationship between medicine use and health complaint frequency.

Results: Medicine use reduced between 1998 and 2010. However having the majority of the reduction was observed between 1998 and 2006 for all five outcomes. Adjustment for health complaint frequency only explained some of this reduction. When an interaction term was added between year and health complaint frequency this was significant for boys' medicine use, suggesting that health complaint frequency became a better predictor of medicine use with time. Medicine use for stomachache among girls increased over time, and this increase became more pronounced after adjustment for stomachache frequency.

Conclusion: Changes in health complaint frequency were only partly associated with reductions in medicine use between 1998 and 2010. Further monitoring of medicine use is recommended, particularly the use of medicine for sleep difficulties, and for stomachache among girls.

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Introduction

Medicine use in childhood can be effective in providing relief from symptoms, however medicines also have the potential to cause harm, particularly when children and parents do not follow dosage recommendations [1–4]. Self-medication is common among children and adolescents, potentially exacerbating this issue [5,6]. Furthermore, unnecessary medicine use is likely to place a financial burden on families and health services. As medicine use in adolescence has been shown to track into adulthood [7], there is a strong rationale to monitor

changes in adolescent medicine use over time and understand the mechanisms behind these changes.

As may be intuitively expected, adolescent illness is strongly associated with adolescent medicine use [8–11]. However previous research has shown that several other factors additionally predict medicine use among young people, including stress, availability of medicines in the home, autonomy in use of medicines and parental medicine use [9,11,12]. Further, there are gender and age differences in adolescent medicine use and these differ by medicine type. A higher prevalence of medicine use is seen among adolescent girls compared with boys overall [8], but gender differences differ by medicine type [10]. International comparisons show particularly high rates of adolescent medicine use for headaches in France, Scotland and the US, but highest rates of medicine use for nervousness in Macedonia, more than four times the national average of most other countries [8]. Socioeconomic status has been negatively associated with adolescent medicine use in Denmark

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[13], while a positive association was shown in Holland [14] and among young children in the US [15], and no association was observed in Finland [9].

National regulations are in place for the use of medicine among children and adolescents in the UK [16], and are continually re-examined and updated appropriately. A recent example in the UK was the change in dosage of liquid paracetamol recommended for young children [17]. Medicine use, therefore, is likely to be determined by a number of factors, at both individual and national levels. Accordingly, while trends in medicine use may be a reflection of trends in population health status or perceived health status, they may also reflect changes in pharmaceutical regulations. Also, specifically among adolescents, medicine use may reflect changes in psycho-social determinants, including accessibility or availability of medicines, or parents' medicine use.

Although data on prescribed medication and over the counter (OTC) sales are available in the UK, little is known about actual medicine use, and especially medicine use of adolescents as in many cases parents purchase the medicine for their offspring. Reported medicine use is therefore a key data source of medicine use in the adolescent population. Little research has considered predictors of adolescent medicine use in the UK or sought to monitor trends in medicine use over time.

The Health Behaviour in School-aged Children (HBSC) study collects health information from 11–15 year-olds every four years, including reports of medicine use for specific health complaints and frequency of corresponding health complaints. This data therefore provides an opportunity to examine the frequency of adolescent medicine use, and its relationship with health. The present study therefore aimed to (1) describe how medicine use for four health complaints – headache, stomachache, sleeping difficulties and nervousness – changed over a 12-year period in Scotland, (2) examine whether any observed trend is associated with changes in reported frequency of corresponding health complaints and (3) determine to what extent the relationship between reported health complaints and reported use of medicine has changed over time, for each of the four health complaints.

Methods

Study design

This paper examines Scottish data from the 1998, 2006 and 2010 HBSC surveys. HBSC is a WHO collaborative cross-national study conducted in 43 countries across Europe and North America using a standardised protocol devised by the HBSC study network [18]. At each survey, the population was stratified by education authority and school type, defined as state-funded or independent, and a nationally representative sample was selected using systematic random sampling. Pupils aged on average 11.5, 13.5 and 15.5 years in Primary 7 (P7), Secondary 2 (S2), and Secondary 4 (S4) classes respectively, received a questionnaire which was completed anonymously in class under teacher supervision. The research protocol was approved by the University of Edinburgh's School of Education Ethics Committee. Passive parental consent was obtained at the beginning of the study except where active consent was required.

Outcome variables

Medicine use was examined by ailment, i.e. medicine for headaches, stomachache, sleep difficulties and nervousness. An overall medicine use variable was also computed combining all four types. Medicine use was examined using the question: 'During the last month have you taken any medicine or tablets for the following?'; 'headache'; 'stomachache'; 'difficulties in getting to sleep'; and 'nervousness', with response options 'No', 'Yes, once', and 'Yes, more than once'. Responses were recorded to reflect the presence or absence of medicine use for each health complaint in the last month. The medicine use items used in this study have been validated previously using parental reports [19].

Explanatory variables

Young people's age and year of survey were included in the analyses. Health complaint frequency was measured using the question: 'In the last 6 months how often have you had the following...?'; 'headache'; 'stomachache'; 'difficulties in getting to sleep'; and 'feeling nervous' with response options 'About every day', 'More than once a week', 'About every week', 'About every month', 'and Hardly ever or never'. Each of the four items was included in the model for its respective medicine type. These items have been previously validated for use among adolescent populations [20,21].

Of the original 18,592 young people surveyed, 122 (0.7%) were excluded due to missing age, leaving 18,470 cases in the final dataset. For each medicine and corresponding ailment, however, further cases were omitted from analyses due to missing information. 591 adolescents did not respond to the headache medicine item. A further 116 had missing headache information. The final dataset for headache analysis therefore had 17,763 cases (equivalent to 3.8% of the original dataset missing). Similarly, the final dataset for stomachache had 17,591 cases (4.7% missing), for sleeping problems, 17,413 cases (5.7% missing), and for nervousness, 18,260 cases (1.3% missing). There was no notable difference between missing and non-missing datasets in terms of gender or family affluence.

Statistical analysis

Preliminary analyses described the data, presenting frequencies for each variable. Correlations between dichotomous measures of medicine use for each of headache, stomachache, nervousness, and sleeping difficulties were calculated, using a Pearson Correlation statistic, in order to ensure that medicines of differing types were used by different children and could be classed as being different behaviours; if these were highly correlated it could be argued that one set of analyses would suffice. Logistic multilevel regression models were then fitted for each of the four outcome variables, as well as the combined overall medicine use measure, for boys and girls, using RIGLS estimation in the statistical package MLwiN 2.02 [22]. Wald tests were carried out to identify the significance of parameter estimates. The models had three levels: education authority, school, and individual child. The models were first fitted, adjusting for age, and categorical year, to describe changes over time. Parameter estimates were tabulated and discussed. A second set of models included health complaint frequency. For the overall medicine use outcome, the model was adjusted for frequencies of all four health complaints. The models for each of the four medicine types were then remodelled with year as a continuous variable and a squared year term to allow for a quadratic relationship. This was included in the model where it was found to be significant but removed if not. An interaction term was then added between continuous year and health complaint frequency, to assess whether associations between medicine use and health status have changed over time. Interaction terms were not significant within any of the models for girls' medicine use and were therefore not presented. Odds ratios (ORs) were calculated and corrected to give prevalence ratios (PRs) using Zhang and Yu's method [23]. As ORs were greater than 2.5 for several of the risk behaviours examined, these are more appropriate in interpreting the magnitude of association in cross-sectional studies with binary outcomes [23,24]. PRs were tabulated with 95% confidence intervals.

Results

Preliminary analyses showed a reduction in the prevalence of medicine use for headaches between 1998 and 2006, with no significant difference thereafter (Table 1). The frequency of headaches also reduced between 1998 and 2006, with 31.0% of young people reporting headaches at least weekly in 1998 compared with 23.8% in 2006. The prevalence of medicine use for stomachache increased between 2006 and 2010. Medicine for sleeping difficulties and for nervousness were only used by very low proportions of young people (approximately 7% and less than 6% respectively) but there was some significant reduction

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