

## ORIGINAL PAPER

## CONSUMPTION OF SWEETENED SOFT DRINKS AND ENERGY DRINKS IN ADOLESCENTS IN SLOVAKIA: IMPLICATIONS FOR PAEDIATRIC NURSING

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## Abstract

**Aim:** The study analyzed the consumption of sweetened soft drinks and energy drinks as well as attitudes towards their consumption. **Design:** Health Behaviour in School-aged Children (HBSC) is a cross-sectional school-based study focused on the target group of 11-, 13- and 15-year-old adolescents. It employs a universal, internationally standardized questionnaire. **Methods:** The study analyzes results of the HBSC survey carried out in Slovakia in 2014. A total of 10,179 schoolchildren from grades 5 through 9 participated (a response rate of 78.8%). Gender and age differences were analyzed in 11-, 13- and 15-year-old respondents. **Results:** The consumption of soft drinks varied from 16.9% (11-year-old girls) to 29.0% (15-year-old boys). More than 8 in 10 respondents accepted the consumption of soft drinks. As much as 34.4% of boys and 18.8% of girls aged 15 years reported the use of energy drinks at least weekly, with boys showing higher rates than girls in all age groups and the rates increasing with age. **Conclusion:** In Slovakia, consumption of sweetened soft drinks and energy drinks is widely popular and socially accepted among adolescents. There is a need for more effective interventions including adoption of appropriate legislative norms. Pediatric nursing plays an important role through outpatient primary as well as hospital care.

**Keywords:** HBSC, sweetened soft drinks, energy drinks, adolescents, pediatric nursing.

## Introduction

Nutrition during adolescence requires maximum attention, not only with respect to the need for the optimal biological and energy value of a diet, but also because during this period, dietary habits develop and can be effectively positively modified from the perspective of the future life. When managing the nutrition of children and adolescents, attention should be paid to the development of appropriate dietary habits since these will remain throughout the life. This is important as the attitudes and habits are easier to modify in young children than in the older age groups.

Sweetened soft drinks pose a risk mainly by affecting the appropriate dietary intake in children and adolescents.

Their high content of carbohydrates in the form of mono- and disaccharides increases the level of glucose in the blood immediately after their consumption, leading to a feeling of satiety followed by increased insulin production (Simon, Mosher, 2007). However, simple saccharides are quickly metabolized and the released insulin subsequently causes hypoglycemia triggering the feeling of hunger and craving for sweets. Thus, a vicious circle develops, potentially leading to overweight and obesity. Moreover, regular consumption of sweetened soft drinks significantly contributes to tooth decay.

Consumption of energy drinks represents a specific problem. In recent years, an increase in their use by children and adolescents has been evidenced in most developed countries (Pomeranz et al., 2013; Alsunni, 2015). Therefore, their adverse effects and consequent impacts in these age groups are legitimate reasons for concern (Marczinski, Fillmore, 2014; Alsunni, 2015). Besides the high amounts of simple saccharides, energy drinks contain stimulants, mostly caffeine, causing both physiological and behavioral changes (Sanchis-Gomar et al., 2015). They affect particularly the cardiovascular and nervous systems

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(Salamon, 2011; Ali et al., 2015) and association with hyperactivity and loss of concentration in children has been reported (Schwartz et al., 2015). Their consumption is also related to substance abuse, increased frequency of injury due to high-risk behavior (Hamilton et al., 2013; Ali et al., 2015), as well as an increased risk of problematic alcohol use later in the life course (Miyake, Marmorstein, 2015).

Health Behaviour of School-aged Children (HBSC) is an international project of cross-sectional surveys monitoring health and health-related behavior in school children aged 11, 13 and 15 years. Currently, more than 40 countries participate, mostly from Europe. These studies analyze various aspects of health and health-related behavior in adolescents. The project is coordinated by the Child and Adolescent Health Research Unit (CAHRU) at the University of St Andrews, UK and the University of Bergen, Norway, together with the WHO Regional Office for Europe.

## Aim

The aim was to analyze the consumption of sweetened soft drinks and energy drinks by school children as well as their attitudes towards the consumption of sweetened drinks in the HBSC survey carried out in Slovakia in the school year 2013/2014.

## Methods

### Design

The HBSC is an international school-based cross-sectional study. Its standardized design allows the production of harmonized datasets suitable for cross-country comparisons as well as identification of trends. The goals of the study are to monitor health and health-related behavior in the social context and to deepen understanding of the mechanisms influencing differences and changes in health and risk behavior of school children.

### Sample

The sample is created in accordance with the structure of the educational system in a particular country and is stratified by regions and types of school to obtain representative data on 11-, 13- and 15-year-old adolescents. The primary unit is a school class. The sample of schools was stratified by regions (eight administrative self-governing regions) and types of school (elementary schools including grades 1 through 9 and eight-year grammar schools including grades 6 through 13). A total of 151 larger and smaller elementary schools located in both rural and urban areas of all regions of Slovakia were

randomly selected using a list of all eligible schools in the country obtained from the Slovak Institute of Information and Prognoses of Education. Of those, 130 schools agreed to participate (a response rate of 86.1%). The data collection was carried out in the spring of 2014. Data were obtained from 10,179 adolescents from grades 5 through 9 of the schools (a response rate of 78.8%). Only 11-, 13- and 15-year-old respondents were included in the analysis. (Table 1)

**Table 1** Basic characteristics of analyzed samples obtained in a 2013/2014 HBSC survey in Slovakia

	Mean age	Boys (n)	Girls (n)	Total (n)
11 year olds	11.48 (SD = 0.28)	776	758	1,534
13 year olds	13.51 (SD = 0.27)	1,035	112	2,162
15 year olds	15.39 (SD = 0.26)	813	736	1,549

SD – standard deviation

### Data collection

Data are collected in school classes by trained field administrators using an anonymous questionnaire. The HBSC questionnaire includes both mandatory modules of questions used in all participating countries and optional modules containing sets of questions based on specific needs of individual countries. The mandatory modules contain questions on demographic data, indicators of health and disorders, health-related behavior (dietary habits, dental hygiene, weight control, physical activity, and substance use), violence, school environment, family, peers and leisure time activities. The optional modules based on specific needs of individual countries extend the basic groups of questions included in the mandatory modules (Roberts et al., 2007).

Answers to the following questions were analyzed:

- “On how many days a week do you usually drink coke or other soft drinks that contain sugar?” The possible answers were “never”, “less than once a week”, “once a week”, “2–4 days a week”, “5–6 days a week”, “once a day, everyday”, and “everyday more than once”. The rates of respondents claiming to consume sweetened soft drinks at least once a day are presented.
- “In your opinion, what is the best way to characterize the attitudes of the majority (at least 51%) of your schoolmates regarding drinking coke or other soft drinks that contain sugar?” The possible answers were “It is never OK”, “It is OK to try it”, “It is sometimes OK”, and “It is OK to do it frequently”. The rates of respondents

identifying “It is OK to try it”, “It is sometimes OK”, or “It is OK to do it frequently” are presented. Only 13- and 15-year-old respondents answered this question.

- “Is it OK if your classmates drink coke or other soft drinks that contain sugar?” The possible answers were “It is never OK”, “It is OK to try it”, “It is sometimes OK”, and “It is OK to do it frequently”. The rates of respondents identifying “It is OK to try it”, “it is sometimes OK”, or “It is OK to do it frequently” are presented. Only 13- and 15-year-old respondents answered this question.
- “In your opinion, how many of your classmates drink coke or other soft drinks that contain sugar?” The possible answers were “none of them”, “few of them”, “several of them”, “most of them” and “all of them”. The rates of respondents identifying “most of them” or “all of them” are presented. Only 13- and 15-year-old respondents answered this question.
- “How many days a week do you usually drink energy drinks such as Red Bull?” Possible answers were “never”, “less than once a week”, “once a week”, “2–4 days a week”, “5–6 days a week”, “once a day, everyday” and “everyday more than once”. The rates of respondents claiming to consume energy drinks more than once a week are presented.

### Data analysis

Differences in the variables between girls and boys, as well as between age groups were evaluated by univariate logistic regression. The reference groups were girls (comparison between genders) and 15-

year-old respondents (comparison between age groups). The differences were expressed as an odds ratio (OR) and 95% confidence interval (CI 95%). The odds ratio indicates how many times more probable the particular value of a variable is in the compared group than in the reference group. If the OR is greater than 1, the probability is increased. If the OR is less than 1, the probability is decreased. If the OR is equal to 1, the probability is the same in both the compared group and the reference group. The confidence interval expresses the level of uncertainty.

### Results

About one-quarter of respondents reported daily consumption of sweetened soft drinks. The highest and lowest prevalence rates were among 15-year-old boys (29%) and 11-year-old girls (17%), respectively. Gender differences were significant in only 11 year olds, with boys reporting daily consumption 1.4 times more frequently than girls. Eleven year olds reported daily consumption of soft drinks 0.6 or 0.7 times less frequently than 15 year olds. (Table 2) The other associations were not considered statistically significant since the confidence interval was greater than 1.

More than 80% of respondents thought that most of their classmates drank sweetened soft drinks. Among 15 year olds, this view is less frequent in boys than in girls (OR = 0.6). In girls, the prevalence increased with age, being less probable in 13 years olds than in 15 year olds (OR = 0.7). (Table 3)

**Table 2** Daily consumption of sweetened soft drinks

	Boys n (%)	Girls n (%)	Boys vs. girls OR (CI 95%)*
11 year olds	171 (23.2)	123 (16.9)	<b>1.4 (1.15–1.93)</b>
13 year olds	269 (26.7)	275 (24.5)	1.1 (0.91–1.34)
15 year olds	230 (29.0)	182 (25.2)	1.2 (0.96–1.52)
11 year olds vs. 15 year olds OR (CI 95%)*	<b>0.7 (0.59–0.93)</b>	<b>0.6 (0.46–0.77)</b>	
13 year olds vs. 15 year olds OR (CI 95%)*	0.8 (0.72–1.10)	0.9 (0.78–1.21)	

\*statistically significant differences are printed in bold type, OR – odds ratio, CI – confidence interval

**Table 3** An expressed view that most classmates drink sweetened soft drinks

	Boys n (%)	Girls n (%)	Boys vs. girls OR (CI 95%)*
13 year olds	853 (86.3)	957 (88.2)	0.8 (0.65–1.10)
15 year olds	694 (86.4)	664 (91.5)	<b>0.6 (0.43–0.83)</b>
13 year olds vs. 15 year olds OR (CI 95%)*	1.0 (0.76–1.3)	<b>0.7 (0.51–0.56)</b>	

\*statistically significant differences are printed in bold type, OR – odds ratio, CI – confidence interval

Similarly, an overwhelming majority of adolescents expressed a positive attitude towards consumption of soft drinks by their schoolmates. No significant

differences were found between boys and girls or between 13 and 15 year olds, with the ORs being close to 1. (Table 4)

**Table 4** An expressed view that it is OK if schoolmates drink sweetened soft drinks

	Boys n (%)	Girls n (%)	Boys vs. girls OR (CI 95%)
13 year olds	866 (87.6)	972 (89.7)	0.8 (0.62–1.07)
15 year olds	695 (86.7)	653 (89.8)	0.7 (0.54–1.01)
13 year olds vs. 15 year olds OR (CI 95%)	1.1 (0.82–1.43)	1.0 (0.72–1.34)	

OR – odds ratio, CI – confidence interval

An overwhelming majority of respondents (more girls than boys) also shared the view that most of their schoolmates think that consuming sweetened soft

drinks is OK. Among girls, the prevalence of the view increased with age. (Table 5)

**Table 5** An expressed view that most schoolmates think that drinking of sweetened soft drinks is OK

	Boys n (%)	Girls n (%)	Boys vs. girls OR (CI 95%)*
13 year olds	824 (85.5)	941 (88.9)	<b>0.7 (0.57–0.96)</b>
15 year olds	694 (87.8)	670 (93.8)	<b>0.5 (0.33–0.69)</b>
13 year olds vs. 15 year olds OR (CI 95%)*	0.8 (0.62–1.08)	<b>0.5 (0.37–0.75)</b>	

\*statistically significant differences are printed in bold type, OR – odds ratio, CI – confidence interval

The prevalence of weekly or more consumption of energy drinks varied, ranging from 20% (11 year olds) to 34% (15 year olds) among boys and from 6% (11 year olds) to 19% (15 year olds) among girls. Boys were considerably more likely to consume these

drinks than girls; the probability was more than four times as high among 11 year olds and approximately twice as high in 13 and 15 year olds. The prevalence rates were clearly lower in younger age groups of both boys and girls. (Table 6)

**Table 6** Weekly or more consumption of energy drinks

	Boys n (%)	Girls n (%)	Boys vs. girls OR (CI 95%)*
11 year olds	142 (19.5)	40 (5.5)	<b>4.1 (2.88–6.01)</b>
13 year olds	278 (27.7)	181 (16.3)	<b>1.9 (1.59–2.43)</b>
15 year olds	272 (34.4)	136 (18.8)	<b>2.2 (1.78–2.86)</b>
11 year olds vs. 15 year olds OR (CI 95%)*	<b>0.4 (0.36–0.58)</b>	<b>0.2 (0.17–0.36)</b>	
13 year olds vs 15 year olds OR (CI 95%)*	<b>0.7 (0.59–0.89)</b>	0.8 (0.65–1.07)	

\*statistically significant differences are printed in bold type, OR – odds ratio, CI – confidence interval

## Discussion

The results of the HBSC study indicate that drinking of sweetened soft drinks is rather widespread among boys and girls in Slovakia and should be considered as a significant determinant of the development of obesity as well as tooth decay in this target population group. In this respect, the mild increase in their consumption with age should be a matter of concern.

When compared with other countries participating in a previous HBSC survey carried out in 2005/2006, Slovakia was among the European countries with the

highest consumption rates (Currie et al., 2012). Given the fact that the situation in Slovakia has not changed considerably since the previous survey (Madarasova Geckova, Dankulinova, 2015), it may be assumed that the unfavorable position of Slovakia in the international context remains unchanged, suggesting the importance of more effective preventive interventions in that target group.

The HBSC study results summarizing the attitudes of respondents indicate a high level of social acceptance of soft drink consumption. An overwhelming majority of the respondents shared the opinion that their regular consumption is normal. Moreover, the

prevalence of positive attitudes increased with age, particularly in girls. This may be due to the fact that, besides their being widely marketed in almost all media, their adverse effects do not occur immediately but become apparent only after a long period of time. Although soft drinks are a rich source of simple saccharides and greatly contribute to the overall energy intake, their association with overweight and obesity is usually not yet apparent during adolescence (Coppinger et al., 2013). Therefore, children underestimate their effect and are not aware of their role in the development of obesity.

Although consumption of energy drink is particularly a domain of boys, it cannot be underestimated in girls either. The marked increase in their consumption with age indicates their greater popularity in older age groups. The unfavorable situation in Slovakia is accentuated by comparing the results with those from other countries. For example, a study carried out in Canada showed that less than one-fifth of children aged 9 to 12 years reported consuming these drinks on a weekly basis (Hamilton et al., 2013; Reid et al., 2015). In Poland, a weekly use was reported by almost 10% of girls and 20% of boys (Nowak, Jasionowski, 2015). In this context, the frequency of consumption in Slovakia should be considered very high and the situation calls for appropriate attention because of potential impacts of the adverse effects of energy drinks. Such widespread use may be caused by intensive advertising campaigns focused particularly on youth. On the other hand, there is currently no legislation regulating the advertising and sales of energy drinks. Moreover, the mass media only rarely inform about the possible health impacts, resulting in inadequate awareness of the risks among the general public (Costa, Hayley, Miller, 2014).

As for the practical implications, the results of the analysis indicate the need to focus attention on sweetened drinks as a special issue within dietary recommendations. One possibility is the implementation of school-based programs already proven to be effective (Nanney et al., 2014). Pediatric nursing can contribute to such activities by providing consultations or supervision and organizing lectures and discussions with children in cooperation with schools.

Given the widespread use of energy drinks in Slovakia as compared with other countries, the general public should be better informed about them (Blankson et al., 2013), particularly within primary pediatric care, but also through school programs and employment of the mass media, internet and social networks. Besides, a discussion should be initiated on proposing legislation to regulate some ingredients

(particularly caffeine), package labeling, and the distribution and sales of energy drinks (Pomeranz et al., 2013). Moreover, information on the use of energy drinks should be included in the patient's history taken in pediatric care as they may considerably contribute to the development of some cardiovascular or neurological disorders and behavioral changes and their use is associated with substance abuse (Ali et al., 2015).

Since the question on energy drinks was first included in the standard HBSC questionnaire only in the 2013/2014 survey, changes over time cannot be evaluated. Trends will be identified after the HBSC surveys to be performed in the future.

## Conclusion

The study results showed that sweetened soft drinks and energy drinks are highly popular among adolescents. There is a need for more effective interventions, including adoption of necessary legislative norms. In these activities, pediatric nursing can play an important role through outpatient primary care as well as hospital care.

## Ethical aspects and conflict of interest

The study was approved by the Ethics Committee of the Faculty of Medicine, P. J. Šafárik University in Košice. Parents were informed about the study via the school administration and could opt out if they disagreed with their child's participation. Participation in the study was fully voluntary and anonymous, with no explicit incentives provided for participation.

The authors declared no potential conflict of interests.

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## Author contribution

Conception and design (MB; TB), data analysis and interpretation (JH; TB), drafting the manuscript (MB), critical revision of the manuscript (MB), finalization of the manuscript (MB).

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