

## Is Healthy Lifestyle a Science Education Topic? – Study of a Healthy Way of Life, Beverages and Meal Choices among Primary School Children

### Sağlıklı Yaşam Stili Bir Fen Eğitimi Konusu mudur? – İlköğretim Öğrencilerinde Sağlıklı Yaşam Biçimi, İçecek ve Yemek Seçimleri Çalışması

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#### *Abstract*

A healthy lifestyle is a somewhat neglected science topic in the field of science education. In order to provide a more nuanced understanding of young people's decision-making, this study examines 138 primary school students (from 9 to 12 years old from Maribor, Slovenia) and their decisions regarding a healthy way of living, consumption of liquids and meal choices. A questionnaire with close type questions for pupils served as the research instrument. The results show that an important shift towards an unhealthy way of life, such as more TV-watching, skipping breakfast and drinking more sweet carbonated beverages, is already occurring in the early teenage period and is more distinct in boys, who choose more salty and sweet snacks than girls. The paper provides suggestions for improving the current situation, which can be particularly affected by the school's use of beverage machines and even more through the hidden curriculum and the way of life in school, including the relevant selection of food and beverages; the suggestions include the engagement of student emotions, which could serve as potential motivators to raise the level of interest in science.

*Keywords:* science education, healthy lifestyle, beverage consumption, nutrition, school factors

#### *Öz*

Sağlıklı yaşam stili, fen eğitiminin ihmal edilmiş bir konusudur. Genç bireylerin seçimlerinin daha incelikli bir şekilde anlaşılması için bu çalışmada (Maribor, Slovenya'dan yaşları 9-12 arasında değişen) 138 öğrencinin sağlıklı yaşam stili, sıvı tüketimi ve yemek tercihlerindeki kararları incelenmiştir. Kapalı uçlu sorulardan oluşan bir anket, araştırmanın veri toplama aracı olarak kullanılmıştır. Sonuçlar, erken yaşlardan itibaren, daha çok televizyon izleme, kahvaltıyı atlama, şekerli-gazlı içeceklerin daha fazla tüketilmesi gibi sağlıksız yaşam biçimlerine doğru önemli bir eğilim olduğunu göstermektedir. Bu eğilim, tuzlu ve şekerli çerezleri daha çok tercih eden erkeklerde daha belirgin bir biçimde görülmektedir. Çalışma, okulda içecek makinelerinin kullanımı, örtük program, okulda sunulan yiyecek seçenekleri, okuldaki yaşam tarzı gibi faktörlerden etkilenen mevcut durumun iyileştirilmesi için öneriler getirmektedir. Getirilen öneriler, fen bilimlerine ilgiyi artırabilecek bir güdüleyici olabilecek olan öğrenci duygularının devreye sokulmasını kapsamaktadır.

*Anahtar Sözcükler:* Fen eğitimi, sağlıklı yaşam stili, içecek tüketimi, beslenme, okul faktörleri.

#### Introduction

Teaching a healthy lifestyle, positive values, "character education", and responsible citizenship has long been recognized as one of the primary responsibilities of the formal school

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system. At the present time, educators should, among other things, be worried by evidence of students' self-destructive eating patterns. Ill or incapacitated young people are often dependent ones, whereas healthy young people at least have the potential to be functional and contributing citizens.

Many official messages delivered to children in the formal educational system come through the school curriculum (Hus & Ivanuš Grmek, 2010): i.e., through textbooks and examples presented by teachers, as well as through the organisation of life and selection of meals at school. An effective balance between bodily and social pleasure and health responsibility remains one of education's most important and difficult tasks (Cook, 2008).

During mandatory education, Slovenian primary school students are often encouraged to drink adequate amounts of water. This encouragement comes from the teachers at schools that are part of the Network of Health Promoting Schools, and from curriculum objectives that emphasize the importance of drinking water and healthy nutrition; it also comes from certain parents, from advertisements and from the installation of water fountains and self-service machines, as well as from eating habits promoted by school nutrition and daily nutrition at home.

Insufficient water consumption can lead to various forms of dehydration and reduced mental capacity, which can in turn affect the cognitive development of children and adolescents. Because children and adolescents have the option of using sweet non-alcoholic beverages for quenching their thirst, experts warn of the phenomenon of weight gain and obesity (Health Behaviour in School-aged Children (HBSC) (Currie et al., 2004). Accustoming children to healthy eating habits and to healthy consumption of liquids (drinking culture) during their adolescence is one of the most important factors that can affect the prevention of illnesses later in life, so sufficient room must be made in curricula for these topics and habits even within the school's hidden curriculum. Our study focuses on consumption of liquids among primary school students, on their healthy way of life and on establishing differences by age and between the genders.

#### *Theoretical background*

Water constitutes 60% of the body mass of an average 70 kg adult, which is about 43 litres of water. Guyton and Hall (2011) write that two-thirds of the water in the body consists of cytosol, the intracellular fluid, and the remaining one-third is extracellular fluid. Extracellular fluid denotes all body fluid outside the cells, whose main purpose is to transport materials throughout the organism. The volume of extracellular fluid is typically about 14 litres. The essential difference between the two fluids (intracellular and extracellular) is in the composition of electrolytes. The kidneys play a key role in regulating the concentrations of potassium, calcium and magnesium.

Water is the basic component of all cells, tissues and bodily fluids. In the human organism it performs a number of roles. It is essential for the process of eating, digestion, absorption and excretion. All metabolic reactions happen in a water environment. Water also contains nutrients and transports them to various parts of the body. It transports waste and toxic material excreted by the cells-waste, which is produced during the metabolism of nutrients and by direct intake into the body. Furthermore, water plays an important role in maintaining normal humidity of the mucus membranes in the body and prevents friction between the surfaces of various tissues. It is also the most important agent for regulation of body temperature, as drinking water in hot, humid weather, especially during physical activity, reduces the chance of the body's overheating (Barasi, 2003).

The total amount of liquid consumed, including water produced through oxidation of carbohydrates in the body (water oxidation), is about 2300 mL/day. Of that amount, 2100 mL of water should be consumed daily through liquids and food and 200 mL in the form of oxidised water (Guyton & Hall, 2011). Dehydration is often related to exhaustion of the body during activity or the result of a longer period without drinking liquids. It is assumed that dehydration that sets in because of at least 2% loss of body mass due to loss of liquid lowers body endurance

and work abilities in adolescents (Petrie et al., 2004).

*Review of previous studies regarding the choice of drinks among children and adolescents*

In a study among US adolescents of both genders, it was discovered that soft drinks represent 37% of all added sugars in girls' diet and 41% in boys' diet (Guthrie & Morton, 2000). Thirst influences the choice and the amount of beverages consumed. Kassem and Lee (2004) claim that in the study as many as 1/3 of all respondents chose carbonated drinks to quench their thirst, while Brouns et al. (1998) are worried that carbonated drinks (especially colas) cause additional dehydration in thirsty people.

Forshee and Storey (2003) state that, on average, boys drink about 1.5 and girls about 1.1 cans (370 g) of carbonated, non-alcoholic beverages per day, which represents about 8% of their daily energy intake. Demory-Luce et al. (2004) found that drinking sweet beverages (sweet non-alcoholic beverages, fruit juice, tea and coffee with sugar) during adulthood changed drastically compared to childhood and adolescence, since drinking those beverages during adulthood is very common. Among all sweet drinks, the consumption of sweet carbonated beverages went up by 52% during adulthood. However, in adults, there is a notable decrease in the drinking of fruit juice. The authors of the survey state that moving from primary to secondary school drastically increases the quantity of carbonated drinks that adolescents consume.

In 2001/02, the World Health Organization carried out an international survey in 35 European and North American countries entitled "Health Behaviour in School-aged Children (HBSC)". The survey encompassed more than 162,000 adolescents aged 11, 13 and 15 years. Survey results show that the habits of this population regarding the choice of food and beverages were mostly unhealthy. Girls, in particular, consume too little milk and too few milk beverages, and all adolescents too often choose sweet carbonated beverages and beverages with low fruit content. As many as 40% of adolescents who participated in the survey (Currie et al., 2004) drink cola beverages or other sweet non-alcoholic beverages at least once or twice daily. Unsuitable drinking habits are often reflected in the nutrition condition of this population and in an increasing number of overfed and malnourished adolescents.

Cebin (2006) established that most Slovenian high school students aged 16 to 18 observe nutritionists' recommendations regarding the choice of beverages, but not regarding the appropriate quantity of beverages consumed. Between morning and noon, students should daily consume about 2 litres of water or other healthy liquids, while almost 80% of high school students during that time (between 8 a.m. and 2 p.m.) drink merely half a litre of liquid. Considering these results, we find that we must accordingly increase initiatives in schools that would lead to more balanced drinking habits among students in the morning.

Numerous studies abroad (Frary et al., 2004; French et al., 2003; Nielsen & Popkin, 2004) have confirmed giant disparities in adolescent habits regarding the consumption of milk and other non-alcoholic carbonated, non-carbonated and fruit beverages. They have found that, among children and adolescents, drinking of non-alcoholic carbonated, non-carbonated and fruit beverages increased during a certain time period. Nielsen and Popkin (2004), for example, have confirmed that for the period between 1977 and 2001 in that age group, an increase in the consumption of non-alcoholic carbonated and non-carbonated beverages from 3.0 to 6.9% and consumption of fruit beverages from 1.8 to 3.4%.

An increasing number of researchers find that consumption of larger amounts of non-alcoholic carbonated and non-carbonated beverages and fruit beverages is particularly related to an increased intake of energy (intake of "empty calories"), which can increase the risk of obesity in children and adolescents (Collison et al., 2010; Frary et al., 2004; French et al., 2003; Gleason and Suitor, 2001; Huang & McCrory, 2005; Ludwig et al., 2001; Nielsen & Popkin, 2004; Raben et al., 2002; WHO, 2003). Jacobson (2005) points out that the number one source of added sugar in adolescent diets is actually non-alcoholic beverages, soft drinks. This is also the period when many

adolescents are no longer as physically active as before; they spend considerable time behind the computer or watching television. However, there is no proof that moderate consumption of said beverages in addition to adequate nutritional habits and exercise leads to increased body mass in adolescents.

Increased risk of obesity is also facilitated by the ever larger amounts of carbonated and non-carbonated non-alcoholic beverages for sale. The size of drink servings, especially in fast food restaurants, is increasing. Thus, a former medium-sized drink (e.g., Coca-Cola) is now considered small; a former large-sized drink is today considered medium-sized (Huang & McCrory, 2005).

Regarding gender differences, surveys (Harnack et al., 1999; Kassem & Lee, 2004) have found that boys drink more sweet carbonated beverages (particularly cola drinks) than diet carbonated beverages, where sugar is replaced with artificial sweeteners. Bowman (2002) also finds that girls' interest in diet drinks increases with age.

## Method

### *Research Design*

As the majority of studies on drinking habits in Slovenia and abroad were carried out on secondary school populations, we decided to focus ours on the primary school population. We were interested in any differences in the choice of beverages with regard to grade year (age) and gender. Additionally, we were interested in their lifestyle (sports activities, free time activity, physical activity) and meal choices.

We posed the following research questions as implicit hypotheses:

What are the differences in healthy lifestyle in regard to pupil's age and gender?

What are the differences in choice of beverage in regard to pupil's age and gender?

What are the differences in pupil's choice of meals in regard to the (pupil's) choice of beverage?

Only the above mentioned research questions are discussed in this paper; however, the study has a much greater extent regarding gender and grade level, as well as relationships among students' choices.

The survey is based on the descriptive and causal-non-experimental method of empirical pedagogical research (Sagadin, 1993).

### *Research Instrument*

The instrument used in the study was a closed type questionnaire (mostly dichotomous questions) for pupils, (see English translation in Appendix) developed in the Slovenian language for the purpose of this study. The questionnaire, based on relevant previewed literature (Collison et al., 2010; Currie et al., 2004; Demory-Luce et al., 2004; Kassem & Lee, 2004; Nielsen & Popkin, 2004), was first used as a pilot study on a different sample of 20 pupils from 3<sup>rd</sup> to 6<sup>th</sup> grade of different primary school in Maribor, Slovenia. After the pilot study, a final check was conducted on pupils' understanding of the questions and the statements. Content and face validity have been established through the input of experts and pilot testing.

The revised instrument contained questions on respondents' attitudes toward a healthy lifestyle, choice of meals, water and other beverages. The questionnaire was administered by a student from the Faculty of Education during her final-year research in April 2010 and took approximately 15 minutes. The instrument was created in accordance with the following measurement characteristics:

*Validity* is based on a rational assessment of the test questionnaire by experts for content- and

format-related properties and its pre-test use.

*Reliability* was ensured with detailed instructions, single meaning, specific questions and a comparison of the answers to questions with similar content.

*Objectivity* in the data collection stage is based on the use of paper questionnaire and in the validation phase on the recognition of the answers with no subjective intervention.

#### *Sample*

The survey is based on a non probability sample of 138 schoolchildren from the 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> primary school grade with ages of 9 to 12 from a school in the vicinity of Maribor. Maribor is the second biggest city in the Eastern part of Slovenia, with a population of 140,000. The non probability sample (convenience) represents a simple probability sample of a hypothetical population. Findings from our sample are therefore not generalized to the concrete population of schoolchildren in Maribor, but to a hypothetical population – a population similar to our sample.

We polled the same number of boys (50%) and girls (50%). In certain questions we used data based on pupils' grade years, owing to statistical differences. In this way, 30.4% of polled pupils were from the 3<sup>rd</sup> grade (9 years old), 18.8% from the 4<sup>th</sup> grade (10 years old), 21.1% from the 5<sup>th</sup> grade (11 years old) and 29.7% from the 6<sup>th</sup> grade (12 years old).

#### *Data Analyses*

We statistically analysed the data with the SPSS software for statistical data processing on the descriptive (tables of frequency distributions -  $f$ ,  $f$  %) and inferential statistics ( $\chi^2$ - test).

### Findings

We checked all relevant relations between variables in the research, but owing to the scope of the article we will present a selection of the results that stand out and are important for shaping the awareness and orientation regarding the effect the school can have on these pupil habits and choices. The presentations of findings is organised according to the research questions.

#### *Differences in healthy lifestyle in regard to pupil's age and gender*

In asking the question about a healthy way of life, we were interested in the following aspects: sports activities, breakfast, choice of lunch, free time activities, choice of in-between meals and the average duration of physical activity per day. Based on the results, we concluded that more than 73% of these schoolchildren do sports every day, eat breakfast every morning or at least almost every morning, would prefer vegetables with chicken to a hamburger for lunch, prefer riding bicycles or skateboarding to watching TV in their free time and would prefer fruit to salty or sweet snacks between meals. However, we found that there is a statistically significant difference between pupil's age regarding breakfast, which appears in the results of Table 1. A larger number of schoolchildren from lower grade years eat every morning or almost every morning (84.6 % - 90.5%) compared to 6<sup>th</sup> grade pupils (merely 58.5%). In the analysis of differences between genders regarding the choice of a healthy lifestyle, the result shown in Table 2 stands out. The results presented in Table 2 show that there is a statistically significant difference among these pupils in regard to their gender and choice of in-between meals. Boys are more likely (26.1%) to choose salty and sweet snacks than girls, where the percentage is lower (4.35%). Furthermore, we noticed statistically significant differences in regard to the pupils' grade year and choice of in-between meals (Table 3). Once again, sixth graders stand out, as they more often choose salty or sweet snacks (34.1%) than their younger counterparts (3.8% - 10.3%) if offered a choice between those snacks and fruit.

Table 1.  
*Eating breakfast based on pupil's age*

Age group	9 years		10 years		11 years		12 years		Total	
	f	f%	f	f%	f	f%	f	f%	f	f%
Usually not	4	9.52	4	15.4	3	10.3	17	41.5	28	20.3
Every morning or almost every morning	38	90.5	22	84.6	26	89.7	24	58.5	110	79.7
Total	42	100	26	100	29	100	41	100	138	100

$\chi^2 = 15.543$ ;  $g = 3$ ;  $P = 0.001$

Table 2.  
*Choice of in-between meals by gender*

In-between meals	Boys		Girls		Total	
	f	f%	f	f%	f	f%
Salty and sweet snacks	18	26.1	3	4.4	21	15.2
Fruit	51	73.9	66	95.6	117	84.8
Total	69	100	69	100	138	100

$\chi^2 = 13.816$ ;  $g = 1$ ;  $P = 0.000$

Table 3.  
*Choice of in-between meals by pupil's age*

Age group	9 years		10 years		11 years		12 years		Total	
	f	f%	f	f%	f	f%	f	f%	f	f%
Salty and sweet snacks	3	7,1	1	3,8	3	10,3	14	34,1	21	15,2
Fruit	39	92,9	25	96,2	26	89,7	27	65,9	117	84,8
Total	42	100	26	100	29	100	41	100	138	100

$\chi^2 = 15,677$ ;  $g = 3$ ;  $P = 0,001$

In the survey, pupils also had to make a choice between riding a bicycle or skateboarding and watching a television broadcast in their free time, whereby we found a statistically significant difference in regard to the grade year (Table 4). Pupils from lower grade years are more likely to choose bicycling and skateboarding (88.1% - 100%) compared to sixth graders (78.0%). No other difference between pupil's age or gender was statistically confirmed.

Table 4.  
*Choice of free-time activities by age*

Free-time activities	9 years		10 years		11 years		12 years		Total	
	f	f%	f	f%	f	f%	f	f%	f	f%
Watching TV	5	11.9	2	7.7	0	0.0	9	22.0	16	100
Riding a bicycle or skateboarding	37	88.1	24	92.3	29	100	32	78.0	122	100
Total	42	100	26	100	29	100	41	100	138	100

$\chi^2 = 11.098$ ;  $g = 3$ ;  $P = 0.011$

*The differences in choice of beverage in regard to pupil's age and gender*

Similar to our findings regarding breakfast, we found that there is a statistically significant difference regarding the polled pupils' age in the choice of beverage (Tables 5 and 6). 6<sup>th</sup> grade children are more likely to choose sweet carbonated beverages (58.5%) and energy drinks (31.7%) than their younger counterparts. Additionally, there is a statistically significant difference

regarding the grade year of these pupils in the choice of beverage between meals, when a choice is offered between cola, herbal tea or fruit juice (Table 7). Nine-year-olds are more likely to choose water (61.9%) than children from higher grades (9.8% - 37.9%). On the other hand, sixth grade students (12-year-olds) more often choose cola (34.1%) than pupils from lower grades. They do not like herbal tea, while fruit juice is most popular among the fourth, fifth and sixth graders.

Table 5.

*Choice of beverage based on pupils' age (water – sweet carbonated beverages)*

Age group Choice of beverage	9 years		10 years		11 years		12 years		Total	
	f	f%	f	f%	f	f%	f	f%	f	f%
Water	36	85.7	19	73.1	23	79.3	17	41.5	95	68.8
Sweet carbonated beverages	6	14.3	7	26.9	6	20.7	24	58.5	43	31.2
Total	42	100	26	100	29	100	41	100	138	100

$$\chi^2 = 21.276; g = 3; P = 0.000$$

Table 6.

*Choice of beverage based on pupils' age (energy drink – iced tea)*

Age group Choice of beverages	9 years		10 years		11 years		12 years		Total	
	f	f%	f	f%	f	f%	f	f%	f	f%
Energy drink	1	2.4	3	11.5	3	10.3	13	31.7	20	14.5
Iced tea	41	97.6	23	88.5	26	89.7	28	68.3	118	85.5
Total	42	100	26	100	29	100	41	100	138	100

$$\chi^2 = 15.652; g = 3; P = 0.001$$

Table 7.

*Choice of beverage between meals among the polled pupils based on their age*

Choice of beverages between meals	9 years		10 years		11 years		12 years		Total	
	f	f%	f	f%	f	f%	f	f%	f	f%
Water	26	61.9	5	19.2	11	37.9	4	9.8	46	33.4
Cola	5	11.9	5	19.2	5	17.3	14	34.1	29	21.0
Herbal tea	3	7.2	0	0.00	0	0.00	2	4.9	5	3.6
Fruit juice	8	19.0	16	61.6	13	44.8	21	51.2	58	42.0
Total	42	100	26	100	29	100	41	100	138	100

$$\chi^2 = 39.530; g = 9; P = 0.000$$

*The differences in pupil's choice of meals in regard to the (pupil's) choice of beverage*

Among the established relations, we found a statistically significant difference between the choice of lunch and of beverage among this sample of students (Table 8). Students choosing vegetable dishes prefer water (79.6%) to carbonated beverages (20.4%). Pupils choosing hamburgers prefer sweet carbonated beverages (62.9%) to water (37.1%). Something similar is true for the relation between the choice of in-between meal and beverage, where we found a statistically significant difference (Table 9). Pupils choosing fruit for their in-between meal prefer water to quench their thirst (77.8%) over sweet carbonated beverages (19.0%). Pupils choosing salty or sweet snacks for their in-between meals prefer sweet carbonated beverages (81.0%) to water (19.0%).

Table 8.

*Relation between the choice of lunch and the choice of beverage for polled pupils*

Relation between the choice of lunch and the choice of beverage			Lunch		Total
			Hamburger	Vegetable dish with chicken	
Beverage	Water	f	13	82	95
		f%	37.1	79.6	68.8
	Sweet carbonated beverages	f	22	21	43
		f%	62.9	20.4	31.2
Total	f	35	103	138	
	f%	100	100	100	

$\chi^2 = 20.860; g = 1; P = 0.000$

Table 9.

*Relation between the choice of beverage and the in-between meal for polled students*

Relation between the choice of beverage and the in-between meal			In-between meal		Total
			Salty and sweet snacks	Fruit	
Beverage	Water	f	4	91	95
		f%	19.0	77.8	68.8
	Sweet carbonated beverages	f	17	26	43
		f%	81.0	22.2	31.2
Total	f	21	117	138	
	f%	100	100	100	

$\chi^2 = 26.821; g = 1; P = 0.000$

### Discussion

When presenting the most typical results, we cannot ignore the fact that the habits of these pupils change with age and that they point to a less healthy lifestyle, which usually becomes evident during the sixth grade of primary school, when pupils reach the age of 11 or 12. This refers to the deterioration not only in healthy habits of physical or bodily activity but also in eating habits. Studies mostly emphasize the unhealthy habits observed in adolescents or secondary school students aged 14 or more (Guthrie & Morton, 2000; Demory-Luce et al., 2004; Jacobson, 2005). On the other hand, an extensive international study (Currie et al., 2004), warns that unhealthy habits are already visible in children aged 11, as in our study. This age also coincides with the onset of puberty when rapid changes begin in the physical, emotional as well as social areas, which could be one of the more important causes behind this shift away from a healthier lifestyle. Passivity in the physical area can be one of the possible, established answers to excessive emotional stress during this period (Greenspan and Greenspan, 2002). The situation is similar for increased consumption of soft drinks, which represents a new field of experimentation for pupils. In this case, it is not merely enough to inform them during lessons that such drinks are as a rule unhealthy. It is also crucial for them to internalize the legitimate decisions into their emotional world, in the best case scenario as a whole, as a peer group. During science lessons however, there is usually not enough time for experiential teaching supported by emotional experience. The requirements for integration of emotional experience into lessons, admittedly from other content-related aspects, have also been confirmed by Šorgo et al. (2011). In this study, they see the integration of emotional experience not only as an educational option, but as a possible motivator to increase pupils' interest in Science.

In Slovenia this age period is also marked by a transfer from the first cycle of primary school, marked by "class-based" teaching, to the second cycle, characterised by "subject-based" teaching,

which means that pupils are no longer taught everything by a single teacher as before, but now have a separate teacher for each subject. Additionally, during this period pupils are expected to show greater maturity and independence. This combination of early puberty and expected independence can lead to a shift from the healthy lifestyle emphasized in school towards the advertised consumer mentality, with boys being more susceptible than girls, based on the results of this survey. Ma (2007) has come to similar conclusions. Our data shows that changes in the direction of an unhealthier lifestyle are not so much individual, isolated habits, but an individual's integrated approach, since the selection of unhealthy food is linked to the choice of unhealthy beverages. Therefore, we must think about how to address individuals as a whole, both boys and girls, whose experience differs slightly between the two groups (Brody and Hall, 2004). When teaching is divided into individual subjects and taught by several teachers, this requires even greater cooperation and planning with pupils of this age group in order to achieve the desired goal of suitable healthy habits. By learning more about their pupils and teenage culture, teachers, especially those teaching science, will be better able to make important connections between knowledge and a healthy lifestyle in the classroom.

Another factor that has to be considered is the influence of parents and their example, which has been confirmed in other studies and is especially evident in the breakfast habits of pupils (Cheng et al. 2008, Ma 2007). In our study we did not focus on parental influence; however, we did notice that older pupils eat breakfast less often. During the period after a child reaches the age of 10, energy requirements actually increase (Barasi, 2003), and it is very likely that some children seek out substitutes that are rich in energy owing to a shortage of energy because they skipped breakfast. School management should therefore think about adopting breakfast for pupils in higher grades of elementary school, since in Slovene schools breakfast is offered almost exclusively to younger pupils. During science activity days at schools, emphasis should be placed on independently prepared breakfast for higher grade students and on raising awareness about the importance of breakfast for young people with various slogans and experiments, as well as through ads for healthy breakfast, drinking water and a healthy lifestyle in general.

## Conclusion

### *Implications for school practice*

Considering these survey results and findings by other researchers (Park et al. 2010), we propose that schools should consider developing policies to reduce the availability of less-healthy choices in vending machines and to reduce access to beverage vending machines. In far too many schools and school centres, vending machines offering unhealthy beverages have become a fixed part of the school inventory. The beverages provided in schools have significantly changed since 2006, as reported by Storey (2010), when the beverage industry implemented School Beverage Guidelines in the USA. This voluntary action has removed full-calorie soft drinks from participating schools. This shift to lower-calorie and smaller-portion beverages in school has led to a significant decrease in total beverage calories in schools. Policies on the availability of sweetened beverages "makes an independent contribution to children's purchase and consumption of sweetened beverages in the 5th grade year" as reported by Jones et al. (2010) in their survey. Similar results have been obtained by Phillips et al. (2010) in their evaluation of the impact of Arkansas state Act 1220 on reducing the selection of sweet beverages. In Boston, MA, they tried to achieve a positive shift in this area through an action that included mostly the secondary school population and that actively integrated schools, businesses and community partners to develop, implement, and evaluate a multicomponent pilot program designed to promote healthier beverage purchases at corner stores (Hoffman et al. 2009). At the same time, they did not neglect the role parents play in drinking habits, which is pointed out in a study by van der Horst and others (2007).

Despite everything, Storey (2010) warns that the problem is far more complex, as "these data

support the concept that to prevent and treat obesity, public health efforts should focus on energy balance and that a narrow focus on sweetened beverages is unlikely to have any meaningful impact on this complex problem". In addition to being aware of a problem whose scope is growing ever larger, it is definitely reasonable to support such actions in schools and in the community at large, while not ignoring the fact that adolescents with school difficulties, an unhealthy lifestyle and poor perceived health form a particularly vulnerable group (Huurte et al. 2006).

A number of years ago Hodson (2003) warned that changes were required, especially in science education, because it no longer met the needs, interests and aspirations of young citizens in the sphere of human health, among others. One solution proposed by Hodson (2003) is action research linked to community involvement in curriculum development and in science teacher education (for more about the importance of teacher education, see Javornik Krečič & Ivanuš Grmek 2008).

Such efforts can be successfully supported by school work performed in a positive disciplinary climate, a positive peer environment, and a positive sense of belonging to school (Ma 2007).

#### References

- Barasi, M. E. (2003). *Human nutrition: a health perspective*. (2nd ed.). London: Arnold.
- Brody, L. R., & Hall, J. A. (2004). Gender, emotion and expression. In M. Lewis, & J. M. Haviland-Jones, (Eds.) *Handbook of emotions, second edition* (pp. 338 – 349). New York, London: The Guilford Press.
- Brouns, F., Kovacs, E., & Senden, J. M. (1998). The effect of different rehydration drinks on post-exercise electrolyte excretion in trained athletes. *International Journal of Sports Medicine*, 19(1), 56-60.
- Bowman, S. A. (2002). Beverage choices of young females: Changes and impact on nutrient intakes. *Journal of the American Dietetic Association*, 102(9), 1234-1239.
- Cebin, N. (2006). *Prehranjevanje in prehransko izobraževanje gimnazijskih maturantov v Sloveniji [Nutrition and nutrition education of last year secondary school students in Slovenia]*. Unpublished master's thesis. Biotechnical Faculty, University of Ljubljana, Ljubljana, Slovenia.
- Cheng, T. S. Y., Tse, L. A., Yu, I. T. S., & Griffiths, S. (2008). Children's perceptions of parental attitude affecting breakfast skipping in primary sixth-grade students. *Journal of School Health*, 78(4), 203-208.
- Collison, K. S., Zaidi, M. Z., Subhani, S. N., Al-Rubeaan, K., Shoukri M., & Al-Mohanna, F. A., (2010). Sugar-sweetened carbonated beverage consumption correlates with BMI, waist circumference, and poor dietary choices in school children. *Bmc Public Health*, 10(234), 2458-1471.
- Cook, S. A. (2008). From 'evil influence' to social facilitator: representations of youth smoking, drinking, and citizenship in Canadian health textbooks, 1890–1960. *J. Curriculum studies*, 40(6), 771–802.
- Demory-Luce, D., Morales, M., Nicklas, T., Baranowski, T., Zakeri, I., & Berenson, G. (2004). Changes in food group consumption patterns from childhood to young adulthood: the Bogalusa heart study. *Journal of the American Dietetic Association*, 104(11), 1684-1691.
- Forshee, R. A., & Storey, M. L. (2003). Total beverage consumption and beverage choice among children and adolescents. *International Journal of Food Sciences and Nutrition*, 54(4), 297-307.
- Frery, C.D., Johnson, R.K., & Wang, M.Q. (2004). Children and adolescents' choices of foods and beverages high in added sugars are associated with intakes of key nutrients and food

- groups. *Journal of Adolescent Health*, 34, 56-63.
- French, S. A., Lin, B., & Guthrie, J. F. (2003). National trends in soft drink consumption among children and adolescents age 6 to 17 years: Prevalence, amounts, and sources, 1977/1978 to 1994/1998. *Journal of the American Dietetic Association*, 103, 1326-1331.
- Gleason, P., & Sutor, C. (2001). *Children's diets in the mid-1990s: dietary intake and its relationship with school meal participation*. (Special nutrition programs Report No. CN01-CD1). Retrieved January 20, 2011, from United States Department of Agriculture, Food and Nutrition Service website: <http://www.fns.usda.gov>
- Greenspan, J., & Greenspan, S. I. (2002). Functional emotional developmental questionnaire (FEDQ) for childhood: A Preliminary Report on the Questions and their Clinical Meaning. *Journal of Developmental and Learning Disorders*, 6, 71- 116.
- Guthrie, J. F., & Morton, J. F. (2000). Food sources of added sweeteners in the diets of Americans. *Journal of the American Dietetic Association*, 100(1), 43-51.
- Guyton, A. C., & Hall, J. E. (2011). *Guyton and Hall textbook of medical physiology*. (12th ed.). Philadelphia: Elsevier Saunders.
- Harnack, L., Stang, J., & Story, M. (1999). Soft drink consumption among US children and adolescents: Nutritional consequences. *Journal of the American Dietetic Association*, 99(4), 436-441.
- Currie, C., Roberts, C., Morgan, A., Smith, R., Settertobulte, W., Samdal, O., & Barnekow Rasmussen V. (Eds.). (2004). *Health behaviour in school-aged children (HBSC) study: international report from the 2001/2002 survey*. (Health policy for children and adolescents No. 4). Retrieved December 14, 2010, from WHO webpage: <http://www.euro.who.int>
- Hodson, D. (2003). Time for action: science education for an alternative future. *International Journal of Science Education*, 25(6), 645-670.
- Hoffman, J. A., Morris, V., & Cook, J. (2009). The Boston middle school-corner store initiative: development, implementation, and initial evaluation of a program designed to improve adolescents' beverage-purchasing behaviors. *Psychology in the Schools*, 46(8), 756-766.
- Huang, T. T. K., & McCrory, M. A. (2005). Dairy intake, obesity, and metabolic health in children and adolescents: Knowledge and gaps. *Nutrition Reviews*, 63(3), 71-80.
- Hus, V., & Ivanuš-Grmek, M. (2010). Didactic strategies in early science teaching. *Educational Studies*, 37(2), 159-169.
- Huurre, T., Aro, H., Rahkonen, O., & Komulainen, E. (2006). Health, lifestyle, family and school factors in adolescence: predicting adult educational level. *Educational Research*, 48(1), 41-53.
- Javornik Krečič, M., & Ivanuš Grmek, M. (2008). Cooperative learning and team culture in schools: Conditions for teachers' professional development. *Teaching and Teacher Education*, 24, 59-68.
- Jacobson, M. F. (2005). *Liquid candy: How soft drinks are harming Americans' health*. Washington, Center for Science in the Public Interest. Retrieved December 11, 2010, from Washington, Center for Science in the Public Interest webpage: <http://www.cspinet.org>
- Jones, S. J., Gonzalez, W., & Frongillo, E. A. (2010). Policies that restrict sweetened beverage availability may reduce consumption in elementary-school children. *Public Health Nutrition*, 13(4), 589-595.
- Kassem, N. O., & Lee, J. W. (2004). Understanding soft drink consumption among male adolescents using the theory of planned behavior. *Journal of Behavioral Medicine*, 27(3), 273-296.
- Ludwig, D. S., Peterson, K. E., & Gormakaer, S.L. (2001). Relation between consumption of sugar-sweetened drinks and childhood obesity: a prospective, observational analysis. *Lancet*,

357, 505-508.

- Ma, X. (2007). Assessing school effects on dental hygiene and nutrition behaviors of Canadian adolescents. *Educational Review*, 59(1), 37-54.
- Nielsen, S. J., & Popkin, B. M. (2004). Changes in beverage intake between 1977 and 2001. *American Journal of Preventive Medicine*, 27(3), 205-210.
- Park, S., Sappenfield, W. M., Huang, Y. J., Sherry, B., & Bensyl, D. M. (2010). The Impact of the Availability of School Vending Machines on Eating Behavior during Lunch: The Youth Physical Activity and Nutrition Survey, *Journal of the American Dietetic Association*, 110(10), 1532-1536.
- Petrie, H. J., Stover, E. A., & Horswill, C. A. (2004). Nutritional concerns for the child and adolescent competitor. *Nutrition*, 20(7-8), 620-631.
- Phillips, M. M., Raczynski, J. M., West, D. S., Pulley, L., Bursac, Z., Gauss, C. H., & Walker, J.F. (2010). Changes in School Environments With Implementation of Arkansas Act 1220 of 2003. *Obesity*, 18, S54-S61.
- Raben, A., Vasilaras, T. H., Moller, A. C., & Astrup, A. (2002). Sucrose compared with artificial sweeteners: different effects on ad libitum food intake and body weight after 10 wk of supplementation in overweight subjects. *American Journal of Clinical Nutrition*, 76(4), 721-729.
- Sagadin, J. (1993). *Poglavja iz metodologije pedagoškega raziskovanja [Chapters from pedagogical research methodology]*. Ljubljana: Zavod Republike Slovenije za šolstvo in šport.
- Šorgo, A., Ambrožič-Dolinšek, J., Tomažič, I., & Janžekovič, F. (2011) Emotions expressed toward genetically modified organisms among secondary school students and pre-service teachers. *J. Balt. Sci. Educ.*, 10(1), 53-64.
- Storey, M. (2010). The shifting beverage landscape. *Psychol. Behav.*, 100(1), 10-14.
- Van der Horst, K., Kremers, S., Ferreira, I., Singh, A., Oenema, A., & Brug, J. (2007). Perceived parenting style and practices and the consumption of sugar-sweetened beverages by adolescents. *Health Education Research*, 22(2), 295-304.
- WHO. (2003). *Diet, nutrition and the prevention of chronic diseases*. (Technical Report Series No. 916). Retrieved December 14, 2010, from [http://whqlibdoc.who.int/trs/WHO\\_TRS\\_916.pdf](http://whqlibdoc.who.int/trs/WHO_TRS_916.pdf)

#### Appendix: Questionnaire – Lifestyle (translation from Slovenian)

Gender: 1. Boy 2. Girl

Grade: 3rd 4th 5th 6th

Choose only one answer that best describes how true this statement is as applied to you.

#### 1. Frequency of sports activities:

- a.) every day
- b.) once or twice per week

#### 2. Eating breakfast:

- a.) usually not
- b.) every morning or almost every morning

#### 3. Preferred choice for lunch:

- a.) hamburger
- b.) vegetable dish with chicken

4. Preferred choice of beverage:

- a.) water
- b.) cola or other similar drinks

5. Preferred free time activity:

- a.) watching TV
- b.) riding a bicycle or skateboarding

6. Preferred choice for in between meal:

- a.) Salty or sweet snacks (cookies, candy or crisps)
- b.) fruit

7.) Preferred choice of beverage:

- a.) energy drink (Red Bull or similar)
- b.) iced tea

8.) The average duration of physical activity per day:

- a.) at least 60 minutes or more
- b.) 30 minutes or less

9.) Preferred choice of beverage between meals at school:

- a.) water
- b.) cola
- c.) herbal tea
- d.) fruit juice