

The Influence of Nutrition Education on the Food Consumption and Nutrition Attitude of Schoolchildren in Slovenia

Stojan Kostanjevec, Janez Jerman, Verena Koch
University of Ljubljana, Ljubljana, Slovenia

In Slovenia, nutrition education is included in the compulsory education curriculum of the nine-year elementary school. The aim of nutrition education is for schoolchildren to acquire knowledge on nutrition to help them form healthy nutritional habits. This research aims at establishing whether the formal nutrition education carried out at schools influenced children's nutrition knowledge, attitudes, and nutritional habits. The research included 630 11-year-old children from 28 randomly selected schools. During the research, Grade 6 children of the nine-year elementary school on average listened to 38.6 hours of nutrition contents, which are planned in the curriculum for home economics. At the beginning and at the end of the school year, a knowledge test was used to assess their nutrition knowledge. Through a questionnaire, the researchers established their attitudes to healthy eating and nutritional habits. Immediately after completing nutrition education, the children's behavior did not show a statistically significant change, and the connection between the newly-acquired nutrition knowledge and consumption of meals and various foodstuffs was negligible. In the researchers' view, formal education improved the nutrition knowledge of children, but had no significant influence on their attitude to healthy eating habits and their nutrition behavior immediately after the education was completed. However, the researchers did establish that children formed positive attitudes towards healthy eating habits, although they were less frequently applied in practice. To achieve goals of children's nutritional education, the researchers suggested an increased number of nutrition education hours, supported with the positive example of teachers and the school setting that ensures the availability of healthy food.

Keywords: nutrition, schoolchildren, education, attitude, nutrition knowledge, food consumption, Slovenia

Introduction

The international study HBSC (health behavior in school-aged children) carried out in 43 countries shows that the eating habits of Slovenian children are poor. Children and young people have breakfast irregularly and less often consume fruits and vegetables. Slovenia is the top of the list of countries with a high share of young people who very often consume drinks with added sugar, which represents a major health risk for children and the young. The share of overweight or obese children and young people is also high, reaching 22% in 11-year-old boys and 16% in girls (Currie et al., 2012).

Understanding various factors connected to the nutrition behavior of children is the first step to design efficient interventions which may influence children's nutrition (Cullen, Rittenberry, Olivera, & Baranowski,

Stojan Kostanjevec, Ph.D., Faculty of Education, University of Ljubljana.
Janez Jerman, Ph.D., Faculty of Education, University of Ljubljana.
Verena Koch, Ph.D., Faculty of Education, University of Ljubljana.

2000). In order to improve the nutritional status and eating habits of children and the young, it is important to design a proper nutrition strategy at the national level. An important part of the strategy is presented by various forms of formal and informal education of children and the young included in compulsory education, and through that the biggest share of children population is reached. Nutritional recommendations and nutrition education programs included in the strategy should be adapted to the cognitive and also cultural characteristics of the target group (Rodrigues et al., 2004; Schneider, 2000). Besides education, Sichert Hellert et al. (2011) emphasized the important role of the school setting, which should ensure the availability and accessibility of healthy food.

Study results that refer to the way nutrition education and nutrition knowledge influence children's nutrition behavior often contradict each other. Many studies were carried out on groups of people with specific health problems (for example, diabetes and cardio-vascular diseases), which consequently influenced their inner motivation and also the success of their education indirectly. Success of the education was analyzed at the level of the acquired nutrition knowledge and modification of nutrition behavior of the participants after education (Salminen, Vahlberg, Ojanlatva, & Kivela, 2005; Barlow & Dietz, 1998).

Certain studies confirm the assumption that children's nutrition behavior and nutrition knowledge can improve with education (Lytle et al., 1996; Jaycox, Baranowski, Nader, Dworkin, & Vanderpool, 1983; Powers, Struempfer, Guarino, & Parmer, 2005; Reynolds, Winton, Shewchuk, & Hickey, 1999; Shariff et al., 2008). Worsley (2002) established that nutrition education may be needed, but warned that this factor alone cannot trigger a person's nutrition behavior to change.

Children meet nutrition education early in their childhood. Information on nutrition and eating habits is conveyed to children by their parents through short verbal and non-verbal messages. Positive and specific parents' messages can positively influence their nutrition knowledge (Anliker, Laus, Samonds, & Beal, 1990). Although education and nutrition knowledge do not always exert a direct influence on a person's nutrition behavior, they can significantly affect their attitudes, intentions, and some other psychic and social factors that indirectly influence their behavior (Conner & Armitage, 2002). Attitudes are socially acquired structures for which no biological predispositions exist, thus people form and change them on the basis of their own life experiences, knowledge, and norms presented by the environment. Attitudes are an independent determinant of a person's behavior or behavioral intentions (Radovan, 2001). In the theory of planned behavior, Ajzen (1991) defined attitudes as an important determinant of a person's intentions and knowledge while assuming that stability of behavior depends on stability of attitudes. Based on information and knowledge on healthy eating habits, children form attitudes and intentions in reference to nutrition, and these also influence their nutritional behavior.

Nutrition education intended for children and young people has to include activities and methods to encourage and strengthen self-efficacy linked to healthy eating habits. Education gains in efficacy when factors restraining healthy eating are removed and children and young people have sufficient access to healthy food (Gracey, Stanley, Burke, Corti, & Beilin, 1996). Restraining factors of healthy nutrition among Slovenian young people were defined by Tivadar and Kamin (2005). They divided them into nine groups:

- (1) Overworking and a lack of time;
- (2) The tyranny of slimness;
- (3) Beliefs about the body;
- (4) The higher cost of healthy food;

- (5) Deficient health recommendations and bad examples of the health authorities;
- (6) Pervasiveness of risk in the modern society;
- (7) Lack of self-discipline, search for pleasure instead;
- (8) Liking the taste of unhealthy food;
- (9) The desire to be “cool”.

The school setting may also be linked to the restraining factor of “deficient health recommendations and bad examples of the health authorities”, as children’s nutrition behavior can also be influenced by the examples set by their teachers. Kubik, Lytle, Hannan, Story, and Perry (2002) pointed out that teachers can only succeed as positive role models and contribute to normative practices that support development of healthy eating behaviors by students, if school and health professionals consistently advocate policies and programs that support both students and teachers.

Table 1

Operative Goals and Basic Concepts in the Food and Nutrition Module for the Home Economics Subject in Grade 6 of the Nine-Year Elementary School

Operative goals	Concepts
Subject area: Food and nutrition	
Students: <ul style="list-style-type: none"> • Understand recommendations regarding healthy food • Interpret nutritional habits • Get familiar with certain eating habits • Analyze human needs for nutritional and energy value 	Healthy diet Balanced diet Nutritional value Energy value
Subject area: Food labeling	
Students: <ul style="list-style-type: none"> • Understand information they read in on food labels • Differentiate between quality marks • Distinguish between brands 	Food labels Expiry date Brands Quality mark
Subject area: Food hygiene	
Students: <ul style="list-style-type: none"> • Understand the importance of correctly storing food • Understand the correct way of food processing • Know the signs of food poisoning 	Hygiene Microorganism Infection Food poisoning
Subject area: Mechanical and heat treatment of foodstuffs	
Students: <ul style="list-style-type: none"> • Classify foodstuffs in groups according to the nutrients • Interpret changes of nutritional and protective substances during mechanical and heat treatment of foodstuffs • Analyze properties of foodstuffs used in preparation • Acquire skills of how to prepare and serve food • Become familiar with tools and appliances for processing foodstuffs and preparing food • Become familiar with cooking utensils and tableware for serving food • Prepare table sets for various occasions • Get familiar with proper table behavior 	Nutrients Protective substances Water Consistency Basic cooking procedures Tasting of dishes Sensory properties of dishes

Various nutrition contents are included in the curriculum of the nine-year elementary school in Slovenia. The curriculum of the compulsory subject home economics in Grade 6 and elective subjects modern food preparation and eating habits in Grade 3 of elementary school include many learning goals and knowledge standards connected to acquiring skills and familiarizing students with new nutrition knowledge. Contents and goals featuring in the curriculum show a tendency of connecting nutrition contents with a healthy lifestyle.

Most nutrition education hours are included in the home economics subject. From the table of goals and terminology used (see Table 1), it is evident that at home economics, students familiarize themselves with the most important nutrition contents that can help them form healthy eating habits (Koch & Kostanjevec, 2005).

In the study carried out with Grade 6 students visiting the nine-year elementary school, the researchers aimed to determine the influence of formal education on children's nutrition knowledge, attitudes, and nutrition behavior. Typical for formal nutrition education, which for the most part takes place as part of the home economics subject, is the fact that all Grade 6 elementary school students are included in compulsory education, regardless of their general and specific interests to assimilate new knowledge on nutrition and healthy eating habits. It is assumed that education improves the nutrition knowledge of children and positively influences their attitudes related to healthy eating and nutritional habits.

Material and Methods

Sample

Students. The study included 630 11-year-old children from 28 randomly selected Slovenian schools. Children, 11 years old on average, attended the Grade 6 of the nine-year elementary school and compulsory home economics lessons which took place throughout the school year. On average, they attended 38.6 hours of nutrition contents, as foreseen in the home economics syllabus.

Teachers. Twenty-seven teachers who taught home economics and nutrition contents to students included in the study participated in the research. The teachers had various levels and types of education. Eight teachers (29.6%) had not finished the field of study required for teaching home economics. At the time of the research, less than a fifth of the teachers (18.5%) had been teaching home economics for 10 years or less, 37.0% of teachers had been teaching the subject from 11 to 19 years, and 44.5% for more than 20 years. Considering the span of time teaching home economics, it can be inferred from the above data that the vast majority of teachers had ample experience of teaching the contents of the subject and thus also the nutrition contents included in the syllabus.

Instrument

Home economics—Organization of the courses. At each individual school included in the study, teaching of the subject was adapted to the conditions of work at that school and the elementary school work program. According to the Grade 6 syllabus, the home economics course consists of 52.5 school periods, and it is recommended to dedicate 42 periods to nutrition contents. A large majority of schools (70.4%) held the course weekly, i.e., students attended home economics each week, while lessons were conducted every second week in a quarter of schools (26.0%).

Students included in the research had on average 50.7 periods of home economics. When teaching, teachers used face-to-face, individual, and group work. Within a teaching unit, various types of work were combined. Students most often worked in pairs or in groups and less often worked individually or face-to-face.

When teaching the course, methods of practical work skills and the problem-solving method were usually used, while the project work method was less often used by the teachers included in the study. Study tours were rare.

When teaching home economics and nutrition education, teachers used the syllabus for the Grade 6 home economics subject. During the course, they took account of general goals of the subject as well as basic and

minimum knowledge standards set for home economics (see Table 1).

Testing the nutrition knowledge of students. The nutrition knowledge of students was tested with knowledge tests at the beginning and at the end of the course. Each knowledge test included 27 multiple-choice questions. Questions were designed on the basis of knowledge standards defined in the home economics syllabus. Students' knowledge, understanding, and skills to make use of the acquired knowledge were tested.

The reliability of the knowledge tests was established through determining internal consistency of the questionnaire. The Cronbach alpha test was applied. Its value exceeded 0.60, which indicated an appropriate reliability level of the instruments used.

Establishing eating habits. Children's eating habits were assessed at the beginning and at the end of the education. The researchers used a questionnaire containing questions on the frequency of consuming meals of food and foodstuffs. The test instrument is modelled after questions applied in the HBSC study.

The frequency of consuming meals was defined as follows: every day, 4–6 times a week, 1–3 times a week, less than once a week, once or less than once a month, and never. The frequency of consuming foodstuffs was defined as follows: several times a day, once a day, 3–5 times a week, once to twice a week, once a month or less, and never.

Establishing attitudes to healthy eating habits. Children's attitudes to healthy eating habits were examined with a questionnaire that contained 10 statements. Statements were summed up from various means of communication and literature dedicated to promote the healthy eating habits of children. Children expressed their level of agreement using a 5-point Likert scale (1—"I absolutely disagree", 2—"I disagree", 3—"I neither agree nor disagree", 4—"I agree", and 5—"I absolutely agree").

Data Analysis

Answers of the knowledge test were evaluated with points. The highest number of points that a student could obtain at the knowledge test was 27.

Points were attributed to the frequency of consuming a certain meal and the M (mean value) calculated for an individual meal. To calculate mean values, the following system of attributing points was applied: 6—"Every day", 5—"Four to six times a week", 4—"One to three times a week", 3—"Less than once a week", 2—"Once or less than once a month", and 1—"Never". The average frequency of consuming foodstuffs was defined with following attribution of points: 6—"Several times a day", 5—"Once a day", 4—"Three to five times a week", 3—"Once to twice a week", 2—"Once a month or less", and 1—"Never".

The mean values were compared in reference to the time of the students' survey. The paired-samples *t*-test and one-way ANOVA (variance analysis) were applied.

The influence of education on the frequency of consuming meals and specified foodstuffs was examined through the partial correlation method. This served to eliminate the linear influence of nutrition knowledge at the beginning of the course on the correlation between variables of the knowledge at the end of the course and the frequency of consuming meals and specified foodstuffs.

Children's attitudes to healthy eating habits were evaluated by calculating the mean value in reference to the degree of agreement according to the 5-point Likert scale we applied. To calculate mean values, the same point awarding system was used: 1—"I absolutely disagree", 2—"I disagree", 3—"I neither agree nor disagree", 4—"I agree", and 5—"I absolutely agree".

Data analysis and statistical analysis were performed with the SPSS (Statistical Package for the Social

Sciences) version 19. For statistical inference, the risk level 0.05 was taken into account.

Results and Discussion

Students' Nutrition Knowledge

Table 2 indicates that the nutrition knowledge of students improved during the course. At the final examination of knowledge, students' results showed statistically significant improvement in comparison to the examination of knowledge carried out before the course. Both boys and girls advanced in knowledge.

Table 2

Comparison of Average Point Values Students Achieved at the First and Second Knowledge Tests With Reference to the Gender

		<i>N</i>	<i>M^a</i>	<i>SD</i>	<i>t</i>	<i>P</i>
Boys	First knowledge test	268	14.52	3.471	-5.835	0.000
	Second knowledge test	268	15.81	3.909		
Girls	First knowledge test	256	14.68	3.386	-5.715	0.000
	Second knowledge test	256	16.01	4.114		
Total	First knowledge test	524	14.60	3.428	-8.174	0.000
	Second knowledge test	524	15.91	4.008		

Note. ^a The maximum number of points is 27.

Comparison of the mean values of points gathered in specified knowledge tests shows that the average number of total points gathered by boys presented no statistically significant difference in comparison to the average points gathered by the group of girls. This finding applies to both the first and second knowledge tests (see Table 2). Results indicate that there is no difference in the nutrition knowledge of 11-year-old girls and boys. However, differences in gender are to be expected in the period of youth, when girls dedicate more attention to nutrition and information on nutrition than boys. In her study, Pirouznia (2001) pointed out that there are no differences in nutrition knowledge between 11-year-old boys and girls; however, it was found that girls of 12 and 13 years old have a better knowledge of nutrition than boys.

From the data presented, it can be deduced that students progressed in knowledge during the nutrition education process and that formal education positively influenced their nutrition knowledge. Wilks' lambda was used to confirm the statistically significant difference of mean values. The researchers' calculation confirmed that mean values of the collected points in knowledge test prior to and after nutrition education showed statistically significant differences (Wilks' lambda = 0.887; $F = 66.819$; $P < 0.001$).

Links Between Education and the Frequency of Consuming Daily Meals and Specified Foodstuffs

In order to establish the influence of education on the frequency of daily meals and specified foodstuffs consumed by students, the calculation of partial correlation was applied. The partial correlation method was used to eliminate the linear influence of nutrition knowledge at the beginning of the education on the correlation between variables of knowledge at the end of the education and the frequency of consuming meals and specified foodstuffs.

The data analysis showed that the knowledge acquired during the course of nutrition education had no significant influence on the consumption of daily meals in the surveyed children's diet. This link is statistically significant, although the correlation coefficients are positive, but very low ($r < 0.20$). This means that correlations are insignificant and there is almost no statistical connection (see Table 3).

Table 3

Partial Correlation Between the Nutrition Knowledge and the Frequency of Children Consuming Individual Meals and Foodstuffs (K2F2.K1)

Meal or food	Students' nutrition knowledge (the second test)	
	<i>r</i>	<i>P</i>
Breakfast	0.040	0.188
Lunch	0.073	0.054
Dinner	0.084	0.032
Milk	0.049	0.178
Low fat milk	0.100	0.030
Yogurt	-0.078	0.071
Fruit yogurt	-0.080	0.065
Low fat yogurt	0.035	0.253
Cheese	0.070	0.094
Butter	-0.019	0.357
Fruit	0.056	0.146
Vegetables	0.079	0.067
Salami	-0.046	0.192
Meat	0.108	0.020
Fish	0.017	0.372
Frankfurter	-0.030	0.285
Egg	0.044	0.205
Margarine	0.017	0.371
Mayonnaise	-0.026	0.309
Cereal	0.129	0.007
Porridge	-0.046	0.193
White bread	-0.005	0.459
Black bread	-0.039	0.232
Whole grain bread	-0.072	0.087
Biscuits	0.057	0.140
Chocolate, bonbons and other sweets	0.048	0.181
Crisps	0.018	0.370
Sandwich	-0.016	0.365
Pizza	-0.071	0.059
French fries	-0.100	0.014
Hamburger	-0.088	0.027
Fruit juice	0.078	0.071
Carbonated drink	-0.102	0.027
Other non-carbonated drink	-0.042	0.214
Energy drink	-0.165	0.001
Alcohol drinks	-0.161	0.001

Notes. K1—knowledge (the first test); K2—knowledge (the second test); F2—food consumption (the second interview).

By eliminating the nutrition knowledge of students at the beginning of the school year, the calculation of the partial correlation between the frequency of consuming fast food (pizza, sandwich, French fries, and hamburger) and the nutrition knowledge at the end of the school year showed that the link between variables is negative and statistically significant in reference to consumption of French fries and hamburgers as well as in

reference to the total consumption of foodstuffs classified as fast food. In all described cases, we estimate this negative correlation as low and insignificant and that the statistical connection is almost inexistent ($r < 0.20$). This negative statistical connection indicates that children with better nutrition knowledge less often consume fast food than children with weaker nutrition knowledge (see Table 3).

The influence of nutrition education on consumption of individual foodstuffs in children was analyzed. The calculation of the partial correlation showed that in particular foodstuffs (meat, cereals), there was a weak statistically significant connection ($r < 0.20$) between the acquired nutrition knowledge and the frequency of consuming the above mentioned foodstuffs by children.

The calculation of the partial correlation also revealed a weak negative statistically significant connection between the acquired nutrition knowledge and the frequency of consuming carbonated drinks, energy and alcoholic drinks by children (see Table 4). Considering the results, it can be inferred that education had no significant influence on the consumption of individual foodstuffs by children immediately after concluding the course.

The study assumed that during the formal nutrition education process, children acquired new knowledge on nutrition. The results showed that the nutrition knowledge of children indeed improved in the education process; however, it had no significant influence on their nutrition behavior. The connection between the newly-acquired nutrition knowledge and consumption of meals and various foods in children was insignificant. Croll, Neumark-Sztainer, and Story (2001) established that young people have acquired a significant quantity of nutrition knowledge connected to healthy eating habits and linked to a belief that moderation, balance, and variety of food consumed by a person are important for healthy dietary habits. However, Croll et al. (2001) established that in their everyday lives, young people find it difficult to abide by nutritional recommendations that suggest consuming unhealthy food less frequently. This is a result of various restraining factors, such as a lack of time, poor accessibility of healthy food at school, and general lack of interest to respect recommendations on healthy dietary habits. In Slovenian young people, the above mentioned restraining factors were also established by Tivadar and Kamin (2005).

Link Between Education and Children's Attitudes Towards the Principles of Healthy Eating

The results of the study highlighted children's beliefs that regularly eating breakfast, lunch, and dinner as well as fruit and vegetables can influence their health. They strongly agreed with the statement that eating breakfast positively affects work at school, and that having lunch at school improves their well-being (see Table 4). Children expressed their agreement with the statement that due to increased fat content, fast food negatively affects their health, while they agreed less with the statement that decreasing the quantity of candy they consume would improve their well-being.

Children had no clearly defined opinion as regards the suggested removal of food and drink vending machines ($M = 3.25$). The Slovenian School Meals Act adopted in 2010 forbids placing of food vending machines in kindergartens, schools, and educational institutions. An average estimate of agreement regarding the statement in question is close to "3", defined as "I neither agree nor disagree". Children agreed (albeit weakly) that schools should offer more fruit and vegetables ($M = 3.90$). Children did not change their attitudes towards healthy eating habits between the first and the second tests (see Table 4).

Calculation of the partial correlation between the nutrition knowledge of children at the end of the school

year and their agreement with statements referring to healthy dietary habits, eliminating nutrition knowledge of children at the beginning of the school year, showed that the statistical connection between the mentioned variables is almost inexistent ($r < 0.20$), which indicates that nutrition education had an insignificant influence on changing children's attitudes towards healthy dietary habits (see Table 5).

Table 4

Children's Confidence in Statements Connected to Healthy Dietary Habits in Reference to the Time of the Survey

	Time of the survey ^a	N	M ^b	SD	t	2P
Regularly eating breakfast, lunch and dinner helps preserve my health.	1	594	4.25	0.997	-1.201	0.230
	2	594	4.30	0.991		
If I consume enough fruit and vegetables, I will be healthy!	1	595	4.40	0.933	1.119	0.263
	2	595	4.35	0.917		
Fast food (hamburgers, hot dogs, French fries, etc.) contains a lot of fat and negatively affects health.	1	580	4.30	1.055	-0.436	0.663
	2	580	4.33	1.051		
If I eat fruit as my school meal, I feel better.	1	565	4.00	1.101	0.157	0.875
	2	565	3.99	1.094		
Regular breakfasting can improve my health.	1	575	4.13	1.036	0.234	0.815
	2	575	4.11	1.064		
When I have breakfast, I find it easier to participate in classes.	1	571	4.24	1.090	1.011	0.312
	2	571	4.18	1.094		
Daily consumption of fruit can improve my health.	1	587	4.46	0.838	2.511	0.012
	2	587	4.36	0.900		
Daily consumption of vegetables can improve my health.	1	591	4.38	0.899	0.656	0.512
	2	591	4.35	0.884		
Children should be offered more fruit and vegetables at school.	1	587	3.95	1.101	0.915	0.360
	2	587	3.90	1.198		
Food and drink vending machines should be removed from the school premises.	1	578	3.15	1.495	-1.595	0.111
	2	578	3.25	1.480		

Notes. ^a 1—before education; 2—after education; ^b The average value is calculated on the basis of the 5-point Likert scale (1—“I absolutely disagree”, 2—“I disagree”, 3—“I neither agree nor disagree”, 4—“I agree”, and 5—“I absolutely agree”).

In this study, the researchers anticipated that education can influence children's attitudes to healthy eating habits. However, they could not confirm a change of attitudes due to the education. Children participating in the study expressed a high level of trust in statements which are often used in an attempt to encourage them to eat healthy food. The above mentioned statements refer primarily to encouraging children to regular breakfasting and consuming fruit, and vegetables. This study revealed children's belief that regularly eating meals, fruits, and vegetables positively influences their health. They also agreed that consuming fruit at school lunch positively influences their well-being, and that having breakfast facilitates their participation in classes. The researchers established that children agree more with statements mentioning a general impact of eating on their health (for example, “Consuming vegetables can improve my health”), while they somewhat less agree with statements mentioning their direct influence of eating on their well-being (for example, “When I have breakfast I find it easier to cooperate in classes” and “If I eat less sweets, I feel better”).

Table 5

Partial Correlation Between the Nutrition Knowledge of Children and Their Trust in Statements Referring to Healthy Eating Habits (K2S2.K1)

	Nutrition knowledge of students (the second test)	
	<i>r</i>	<i>P</i>
Regularly eating breakfast, lunch and dinner helps preserve my health.	0.228	0.000
If I consume enough fruit and vegetables, I will be healthy!	0.048	0.160
Fast food (hamburgers, hot dogs, French fries, etc.) contains a lot of fat and negatively affects health.	0.129	0.004
If I eat fruit as my school meal, I feel better.	0.053	0.132
Regular breakfasting can improve my health.	0.141	0.002
When I have breakfast, I find it easier to participate in classes.	0.166	0.000
Daily consumption of fruit can improve my health.	0.139	0.002
Daily consumption of vegetables can improve my health.	0.145	0.001
Children should be offered more fruit and vegetables at school.	0.056	0.121
Food and drink vending machines should be removed from the school premises.	0.053	0.134

Notes. K1—knowledge (the first test); K2—knowledge (the second test); S2—statements referring to healthy eating habits (the second survey taking).

A positive attitude to healthy dietary habits encourages children to follow recommendations taken as healthy eating habits, while a negative attitude to unhealthy eating habits can prevent unhealthy forms of nutrition behavior. During education and realization of communication strategies intended to promote healthy nourishment of children, children's positive experiences acquired directly through respecting the principles of healthy nourishment should be stressed. Children's own positive experiences can increase the level of inner motivation necessary for a shift in behavior. Motivation is important for learning, since forming and changing attitudes, intentions, and behavior, together with further adherence to newly acquired behavior, depend on the source of the learning incentive and its degree. Gracey, Stanley, Burke, Corti, and Beilin (1996) emphasized that nutrition education involving children and young people needs to include primarily activities and methods that encourage and strengthen their self-efficacy. Self-efficacy is defined by Woolfolk (2010) as a person's expectation to cope successfully with the planned tasks and their fulfilment. Results of the study showed that children often justified their own decision to eat healthy food merely by stating that they consume it, because it is "more healthy", which indicates a lack of more detailed knowledge on nutrition to give a grounded explanation of their decision. It can be concluded that in the formal education process, the information on healthy nutrition is accepted by children as one that has to be acquired as an academic achievement, and that they do not develop and strengthen their intentions referring to healthy eating habits.

Conclusions and Suggestions

Children did not change their eating habits and attitudes to the healthy dietary habits directly after education, which means that nutrition education did not significantly influence their habits and attitudes. Within the frame of home economics, children were provided 38.6 hours of education on average. On the basis of the above mentioned findings, the researchers suggest that nutrition education should be carried out in an increased scope of hours and during the entire elementary school education system, which would influence quality and durability of the acquired knowledge and allow them to achieve goals connected to forming healthy eating

habits. Planned and continuous nutrition education should also be carried out at secondary and tertiary levels of the education system, as it is important for the nutrition knowledge to be upgraded and form interdisciplinary connections. Nutrition education should become a national interest and contribute to increased quality of eating habits and living.

Determining the modification level of individual measured variables due to the influence of nutrition education also enables critical evaluation of the existing educational nutrition contents and goals in the curriculum. When teaching children, they have to be capacitated for solving problems that are related to nutrition and require analytical and logic thinking. The acquired and strengthened nutrition knowledge may contribute to formation of children's positive attitudes to healthy eating habits, which in later years also influences the forming of healthy eating habits and decreases their susceptibility to adopting less desirable eating habits of their peers.

In designing curricula of subjects in which nutrition contents appear, it is necessary to take into account the level of cognitive development of children, the latest findings of the nutritional science and to clearly define individual concepts used in the nutrition education. Considering the cognitive development level of a child, it is to be expected that more complex problems in the area of nutrition (for example, planning healthy nutrition, and classifying food in groups in reference to the prevailing nutrient, energy needs of the body) would be more easily solved by children in higher grades of compulsory education, when at the age of 11 and above, they pass to the formal operational stage of their cognitive development. Continuous education must be properly planned and upgraded with an interdisciplinary and constructivist approach that allows development of processing knowledge, needed to critically evaluate one's own eating habits.

In order to improve the quality of nutrition education, the researchers suggest that teachers who teach nutrition contents, foreseen in curricula of compulsory and elective subjects, are included in permanent professional training that will provide them with appropriate knowledge related to nutritional science and knowledge from the field of didactics. Through teachers' regular and permanent education, it is necessary to influence formation of their positive attitudes towards healthy eating habits and nutrition behavior, since in their professional and private roles, teachers present an example for students. Teachers need to be qualified for efficient follow-up and inclusion of the latest findings of nutritional science in their educational work. DeCicco and Bergman (1997) stressed that a teacher's nutrition knowledge and his/her relationship to nutrition are connected to the number of hours of nutrition education in which the teacher was involved during the studies and his/her experience obtained through teaching. Kealey, Peterson, Gaul, and Dinh (2000) stressed that during teachers' training, it is necessary to pay special attention to encouraging teacher's motivation for healthy nourishment, which positively influences efficiency in teaching children. It is estimated that the quality of nutrition education that was carried out during our survey could also be under the influence of inadequate education of teachers who taught students included in the survey.

Future Research

Future studies could aim to establish the contents and methodological suitability of the contents of nutrition education carried out in the compulsory education program. It is important to determine the quality of a teacher's work based on both the implementation of learning process and teachers' attitudes and behavior related to healthy eating.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Anliker, J. A., Laus, M. J., Samonds, K. W., & Beal, V. A. (1990). Parental messages and the nutrition awareness of preschool children. *Journal of Nutrition Education*, 22(1), 24-29.
- Barlow, S., & Dietz, W. (1998). Obesity evaluation and treatment: Expert committee recommendations. *Pediatrics*, 102(3), 1-13.
- Conner, M., & Armitage, C. (2002). *The social psychology of food*. Buckingham: Open University Press.
- Croll, J. K., Neumark-Sztainer, D., & Story, M. (2001). Healthy eating: What does it mean to adolescents? *Journal of Nutrition Education and Behavior*, 33(4), 193-199.
- Cullen, K. W., Rittenberry, L., Olivera, N., & Baranowski, T. (2000). Environmental influences on children's diets: Results from focus groups with African-, Euro- and Mexican- American children and their parents. *Health Education Research*, 15, 581-590.
- Currie, C., Zanotti, C., Morgan, A., Currie, D., De Looze, M., Roberts, C., ... Barnekow, V. (2012). Social determinants of health and well-being among young people. In *Health Behaviour in School-aged Children (HBSC) study: International Report from the 2009/2010 Survey*. Copenhagen: WHO Regional Office for Europe.
- DeCicco, C. M., & Bergman, E. A. (1997). Nutrition knowledge and attitudes of elementary school teachers in Washington state. *Journal of the American Dietetic Association*, 97(9), A38.
- Gracey, D., Stanley, N., Burke, V., Corti, B., & Beilin, L. J. (1996). Nutritional knowledge, beliefs and behaviours in teenage school students. *Health Education Research*, 11(2), 187-204.
- Jaycox, S., Baranowski, T., Nader, P., Dworkin, R., & Vanderpool, N. (1983). Theory-based health education activities for third- to sixth-grade children. *Journal of School Health*, 53(10), 584-588.
- Kealey, K., Peterson, A. J., Gaul, M., & Dinh, K. (2000). Teacher training as a behavior change process: Principles and results from a longitudinal study. *Health Education and Behavior*, 27(1), 64-81.
- Koch, V., & Kostanjevec, S. (2005). Nutrition education in Slovenia. *Aktuelle Ernährungsmedizin*, 30(3), 130-130.
- Kubik, M. Y., Lytle, L. A., Hannan, Story, M., & Perry, C. L. (2002). Food-related beliefs, eating behavior, and classroom food practices of middle school teachers. *Journal of School Health*, 72(8), 339-345.
- Lytle, L., Stone, E., Nichaman, M., Perry, C., Montgomery, D., Nicklas, T., ... Galati, T. (1996). Changes in nutrition intakes of elementary school children following a school children following a school-based intervention: Results from the CATCH study. *Preventive Medicine*, 25(4), 465-477.
- Pirouznia, M. (2001). The association between nutrition knowledge and eating behavior in male and female adolescents in the US. *International Journal of Food Sciences and Nutrition*, 52(2), 127-132.
- Powers, A., Struempfer, B., Guarino, A., & Parmer, S. (2005). Effect of a nutrition education program on the dietary behavior and nutrition knowledge of second-grade and third-grade students. *Journal of School Health*, 75(4), 129-133.
- Radovan, M. (2001). What determines our behavior. *Horizons of Psychology*, 10(2), 101-112.
- Reynolds, K., Winton, A., Shewchuk R., & Hickey C. (1999). Social cognitive model of fruit and vegetable consumption in elementary school children. *Journal of Nutrition Education and Behavior*, 31(1), 23-30.
- Rodrigues, G., Moreno, L., Blay, M., Blay, V., Garagorri, J., Sarria, A., & Bueno, M. (2004). Body composition in adolescents: Measurements and metabolic aspects. *International Journal of Obesity Related Metabolic Disorders*, 28(3), S54-S58.
- Salminen, M., Vahlberg, T., Ojanlatva, A., & Kivela, S. (2005). Effects of a controlled family-based health education/counseling intervention. *American Journal of Health Behavior*, 29(5), 395-406.
- Schneider, D. (2000). International trends in adolescent nutrition. *Social Science & Medicine*, 51(6), 955-967.
- Shariff, Z. M., Bukhari, S. S., Othman, N., Hashim, N., Ismail, M., Jamil, Z., ... Hussein, Z. A. M. (2008). Nutrition education intervention improves nutrition knowledge, attitude and practices of primary school children: A pilot study. *International Electronic Journal of Health Education*, 11, 119-132.
- Sichert Hellert, W., Beghin, L., De Henauw, S., Grammatikaki, E., Hallström, L., Manios, Y., ... Kersting, M. (2011). Nutritional knowledge in European adolescents: Results from the HELENA (healthy lifestyle in Europe by nutrition in adolescence) study. *Public Health Nutrition*, 14(12), 2083-2091.
- Tivadar, B., & Kamin, T. (2005). *Development of health promotion approaches for healthy eating and physical activity in secondary schools*. Ljubljana: Institute of Public Health of the Republic of Slovenia.
- Worsley, A. (2002). Nutrition knowledge and food consumption: Can nutrition knowledge change food behaviour. *Asia Pacific Journal of Clinical Nutrition*, 11(3), S579-S585.
- Woolfolk, A. (2010). *Educational psychology*. Upper Saddle River: Pearson Education.