ADHERENCE TO HEALTHY LIFESTYLE PRINCIPLES AMONG COLLEGE STUDENTS: A CASE STUDY

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Abstract

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Dietary habits of every human impact her or his health. The society-wide situation with regard to the dietary habits is not positive according to the existent surveys, and the same applies to the college students. This paper goal is to identify the dietary habits frequented among the college students at a selected institution (a case study); evaluate the habits; and, propose actions for the institution under review, aimed to positively influence their students' dietary habits. The paper has been designed as a case study, while the data has been obtained from the evaluation of a quantitative survey (based on an executed questionnaire survey) including the total of $n = 219$ college students of the selected educational institution. As revealed by the results, there is a statistically significant difference in the students' dietary habits according to gender and age category.

Keywords: Nutrition, students, diet

INTRODUCTION

According to Reeves and Rafferty (2005) a healthy lifestyle can be defined as a combination of four characteristics: non-smoking, healthy weight, vegetables and fruit consumption and regular physical activity. Fang *et al.* (2016) or Larsson *et al.* (2015) added the fifth element – no or limited alcohol intake. It can be also understood as a combination of four healthy behaviors: non-smoking, healthy weight, moderate alcohol consumption and regular walking (Ryu *et al.*, 2014). Considering the breadth of topics covered in presented definitions, this study was planned to keeping in view just a few elements, as is explained below.

Human nutrition is of the entirely central, unique importance in people's lives, ever more highlighted in the current world heavily burdened with civilisation diseases. Proper nutrition is one of the healthy lifestyle constituents (Dima-Cozma *et al.*, 2014; Machová and Kubátová, 2015). Unlike that, malnutrition, smoking, excessive alcohol consumption or poor physical activity are seen by Machová and Kubátová (2015) as the main injurious factors to health. The focus of this paper, therefore, is to identify specific dietary habits of college students in a selected institution (a case study). As a secondary goal, interdependencies are tested of the set quality features (see, Methodology) that impact dietary habits according to Gregor (2004) or Musaiger, Gregory (1992), and, actions are suggested for the institution in question that would positively motivate the students' dietary habits.

During one's childhood, we are predominantly influenced by our parents in terms of nutrition, whilst during the higher education or university studies, most of the students would encounter their first experience of freedom and relaxed control feelings (Emmons *et al.*, 1998). The fact has consequences for numerous areas of the respective individual's life, including her or his dietary habits. Fraser *et al.* (2011), Wengreen and Moncur (2009) have concluded that the habits suffer obvious deterioration during the student years.

Dietary composition among the college students is subject to multiple factors. Those include, without limitation, the already hinted behaviour patterns acquired in childhood (Gregora, 2004), religious faith, gender, age and social status (Musaiger and Gregory, 1992), advertising and other marketing communication vehicles (Fořt, 2007), or e.g. financial position of the respective individual. In 2006, the average monthly expense of a college student in general was CZK 1,182 (CSVŠ, 2006), while the figure was CZK 1,300 for the private college students in that same year (Menclová and Baštová, 2006). More recent data has already reached CZK 2,500–3,000 month (Maršálková, 2017), while the lower threshold has been confirmed also by Mazouch *et al.* (2016); the latter compiled a model student profile in their study who is a college student in Prague, for whom they calculated CZK 2,550 spent on nutrition.

Nutrition may be considered from two viewpoints, defined by Machová and Kubátová (2015) as (i) quantitative aspect, i.e. of nutrition taken as a source of an adequate energy intake, and (ii) qualitative aspect, concentrating on food as desirably balanced and diverse. The qualitative human nutrition aspect is emphasised also by Kunová (2011), and Clark (2000). The Healthy Nutrition Forum (in: Kunová, 2011) have set up a graphic, simple assistant in efforts to maintain nutrition recommendations for the Czech population, defining what should be eaten but exceptionally and what frequently, providing also arrays of the most suitable frequent-to-eat foodstuffs (such as tomatoes, paprikas, cabbage etc.) versus those not-so-frequent-to-eat (such as strawberries, bread, bananas etc.).

Similar principles regarding nutrition were already known almost twenty years ago, as shown in Nešpor *et al.* (1999). The authors identified the following as foodstuffs unsuitable for (not only) young people: alcoholic beverages and black coffee, fried food, sweets, chips, salted and roasted nuts, white flour or foods with high animal fat contents (such as burgers and eggs). The applicability of most of the rules has been confirmed also e.g. by Dostálová (2012), who added the necessity to cut down the sugar intake in general, noting further that the fat milk product proportion should be curbed either. Machová and Kubátová (2015) recommend consumption of vegetables and fruits, with the gross daily intake ideally about 600 grams, further supported by Suchánková *et al.* (2015) affirmation that vegetables contain more beneficial nutrients than fruits. Babicz-Zielińska (2001) notes that freshness, taste and – last but not least – health value rank among the key features when making one's choice of the vegetables and fruits. Nuts, legumes and fish also qualify as suitable due to their nutrition values, the recommended weekly intake being 400 grams (Dostálová, 2012). Similar findings, directly relevant for the target group of our present study, were arrived to also by numerous subsequent studies: quality foods and the emphasis on varied and balanced diet may importantly and beneficially influence students' performance (Florence *et al.*, 2008; Li *et al.*, 2012). Further important for students are the B group vitamins (B-Complex), specifically B12, that are present in e.g. meat, legumes, milk, cheese, eggs or leaf vegetables and support proper functioning of the nervous system and brain activity (Alpers, 2005), as well as e.g. vitamin C (hippophae rhamnoides (sea buckthorn), rosehips, strawberries, lemons etc.) as an antistressant (Catani *et al.*, 2005). Subpar intake of certain substances may be obviously complemented with nutritional supplements, such as various vitamin and mineral pills and other substances; however, one has to be cautious not to attempt substituting varied diet that way (Eberhardie, 2007).

Unfortunately, many students rather tend to consume foods rich in fat, sugar and sodium, which corresponds to the fast food products (Kirkpatrick *et al.*, 2014): they evade fresh vegetables and fruits (Gopinath *et al.*, 2016), while according to e.g. Chourdakis *et al.* (2009) or the Czech Society for Nutrition (2011) an appropriate daily amount of vegetables and fruits is at least 5 portions. Fast food facilities may adversely affect an individual's body weight (mass) and overall health condition (Schröder *et al.*, 2007).

In terms of meals per day, students fall under the group of those typically skipping a number of daily meals (Shim *et al.*, 2007), hence failing to comply with the recommended five or six meals a day (Cruz, 2000), or three up to five meals at a minimum (Tom, 2012). Still worse, the number of individuals consuming at least three full meals has been dropping constantly (St-Onge *et al.*, 2017). In their survey, Abu-Hussein (2016) documented that students are neither much aware of the breakfast importance, nor of its proper and recommended configuration, despite the proven importance of breakfast for the young people (Keski-Rahkonen, 2003; Triches and Giugliani, 2005). The survey conducted by Nmor *et al.* (2014) revealed that only 67 % of students have their breakfast regularly day by day. At least one hot meal per day has been further recommended in this connection (Mohnen *et al.*, 2012). Also, the last meal of the day should be eaten by 6 pm at the latest (Maughan and Burke, 2006) or two or three hours before going to bed (Blahutková, 2008).

Daily fluid intake, too, is a significant element of human nutrition and health. An individual should drink at least 1.5 litres of fluids a day (Dostálová, *et al.*, 2012), or more commendably 2 litres, while water is naturally the preferable beverage (Kunová, 2011). According to the results of a survey by Tam *et al.* (2017), water in particular was the most widely adopted beverage by 75 % of respondents aged 18–24, followed by hot drinks (coffee and tea), fruit juices, milk drinks and soft drinks, such as coke-based beverages. Quite similar results were identified also in a survey by Drewnowski *et al.* (2013).

Alcohol consumption remains highly common among the college students (Jones *et al.*, 2014).

With regard to the amounts of consumed alcoholic beverages, Dostálová *et al.* (2012) states the acceptable daily intake for men as 20 grams at a maximum (equalling approx. 250 ml of wine/0.5 litre of beer/60 ml of spirits), while the recommended daily dose for women is approximately one half less. Shi *et al.* (2011) recommend 2–6 alcoholic beverages as the maximum weekly consumption.

As part of healthy lifestyles, the role of sleep cannot be omitted: a sleep of 7 to 9 hours is recommended for the 18–25 and 26–64 age groups for the optimum functioning of the human body by Hirshkowitz *et al.* (2015) or by the National Sleep Foundation (2008).

As noted in the beginning of this paper, smoking is yet another factor with pronounced adverse effects for human health. In that regard, CDC (2006) have defined a smoker as any individual who smoked at least 100 throughout her or his life, while currently keeps on smoking every day or someday.

MATERIALS AND METHODS

The questionnaire was completed by 219 respondents in total during the period from 21 May 2017 to 1 November 2017; the survey has been conducted as a case study focuses on the dietary habits of students of VŠEM, a. s. (University of Economics and Management, Prague). The questions were split into two groups – those directed at obtaining respondents' identification data and substantive questions about the respective students' lifestyles. Selective closed questions were presented to the respondents, as well as semi-closed questions for which the respondent could choose and state her or his answer option. The questions were sequenced in a manner sustaining their logical order, while the questions concerning identification details were placed at the questionnaire end.

The questions were tested for their clarity, disambiguation and meaningful value through a precursory survey attended by 6 students. Based on the obtained information, selected questions were further specified, complemented, or, reworded.

The participants responding in the survey included 147 women and 72 men. More than 64% of the respondents were aged 18–26, approx. 19% were aged 27–35, more than 13% were aged 36–44, and, approx. 2% were aged 45–53. The survey generalizes students of full-time and part-time study therefore the age categories are at the above intervals. Both full-time (110 respondents in total) and part-time students (109 respondents) were invited. The Bachelor Programme students represented a majority (56%) of the respondents (see Tab I.).

The respondents were contacted using an e-questionnaire (developed at the Click4Survey server), primarily by e-mail (161 e-mails were sent out in total). Social network groups with a focus on the VŠEM, a. s. studies were used as another distribution channel. An improbability selection technique was employed, specifically purpose-based selection (Disman, 2002) relying entirely on the researcher's judgement about what should be observed and what can be observed. The conclusions derived from the purpose-based selection may be generalised for the students of the involved university; therefore, it is a case study the outputs of which may be used to draw supporting information for the analyses of dietary habits of students at other institutions.

The selection sample size was defined using the Krejcie and Morgan (1970) formula, taking account of the VŠEM student average number during the survey performance period ($N = 1,400$), with the required confidence rate of 95% (out of 1.96). The acceptable deviation rate was $d = 0.03$ and the expected deviation rate was $r = 0.04$. Using this statistical approach to the sample size computation and based on the above rates, the minimum number of respondents was set as 147, while the requirement was met by the conducted survey ($n = 219$).

Selected categorical variables were integrated in the matrix of absolute (n_i) and relative (p_i) frequencies. The relative frequency p_i determines the part of the basic population in which the variable under review contains a modification. The data is then multiplied by 100 and expressed as

I: *Basic data for the questionnaire survey*

Age structure of the respondents	Absolute frequencies
18–26	141
27–35	42
36–44	30
45–53	5
53 and more	1
Type of the study	
Part-time study	109
Full-time study	110
Studyprogram	
Bachelor	123
Master	96

a percentage. Mutability represents a differential of the categorical variable under review. The mutability rate is a figure determining the amounts of difference in the categorical nominal variable for the statistical population elements. The mutability rate gains values from 0 to 1, while it applies that the higher the mutability rate, the larger is the number of modifications in the variable. The mutability rate M may be computed using the following formula (1):

$$M = \frac{n^2 - \sum_{i=1}^{k} n_i^2}{n(n-1)} \tag{1}$$

The highest mutability rate (1) occurs where the random sample scope equals the number of modifications. The nominal variable position is described by the modal class. Where the modal class relative frequency exceeds 50%, the class may be considered a majority one.

Since this is a quality-based survey, involving nominal and ordinal variables, Pearson's chi-square test of independence was applied throughout the contingency table. The observed (empirical) frequencies and expected frequencies (calculated upon the assumed validity of H_0) were compared for separate combinations of random variables X and Y. The hypothesis H_0 was tested: X, Y are stochastically independent random variables versus the alternative hypothesis H_1: X, Y are not stochastically independent random variables. The test statistic formula is (2):

$$K = \sum_{j=1}^{r} \sum_{k=1}^{s} \frac{(n_{jk} - \frac{n_{j.} n_{.k}}{n})^2}{\frac{n_{j.} n_{.k}}{n}} \tag{2}$$

If H_0, applies then K is asymptotically governed by the distribution $x^2((r-1)(s-1)$. We therefore reject the independence hypothesis of the X, Y variables at the asymptotic significance level α, if $K \geq x_1 - \alpha^2((r-1)(s-1))$. The significance level value was chosen as $\alpha = 0.05$. Good approximation requirements were always met at the computations, i.e. theoretical frequencies reached the values of more than or equal to 5 in 80% of instances, while they never dropped below 2 in the remaining 20%. The dependence strength was computed using the Cramér's V measure (3) that is within $0 \leq V \leq 1$, irrespective of the contingency table volume.

$$V = \sqrt{\frac{K}{n \times \min(r-1, s-1)}}. \tag{3}$$

The following hypotheses were set, see Tab. II.

The Results section presents evaluated data and proposed actions suitable for improving dietary habits of the college students of the said research organisation.

RESULTS

Out of all the respondents, 46% described their lifestyle as generally healthy with some exceptions, 36% described it as an average healthy/unhealthy lifestyle and 10% referred to it as an unhealthy lifestyle. Also, this nominal variable was measured for its variability: the mutability rate (2) is 64.5% in this case which shows a high variability degree of the variable.

At testing H_0: The proportion of smokers is independent of gender, the Pearson's chi-square test significance level was identified at 0.06. The obtained statistical significance level is more than 0.05, hence the zero hypothesis cannot be

II: *Defined hypotheses*

H_0	H_1
The proportion of smokers is independent of gender.	non H_0
The proportion of smokers is independent of age.	non H_0
The proportion of students consuming alcohol is independent of gender.	non H_0
The proportion of students consuming alcohol is independent of age.	non H_0
The proportion of students eating in fast food facilities is independent of gender.	non H_0
The proportion of students eating in fast food facilities is independent of age.	non H_0
The proportion of students taking vitamins and minerals is independent of gender.	non H_0
The proportion of students taking vitamins and minerals is independent of age.	non H_0
The proportion of students taking substances enhancing physical performance is independent of gender.	non H_0
The proportion of students taking substances enhancing physical performance is independent of age.	non H_0
The proportion of students taking substances enhancing mental performance is independent of gender.	non H_0
The proportion of students taking substances enhancing physical performance is independent of age.	non H_0
The proportion of students taking substances supporting metabolism is independent of gender.	non H_0
The proportion of students taking substances supporting metabolism is independent of age.	non H_0
Beverage type and student's gender are stochastically independent random variables.	non H_0

Source: Own research

rejected, and there is no statistically significant relationship (or difference) between smoking (or proportion of smokers) and gender. At testing H_0: The proportion of smokers is independent of age, the Pearson's chi-square test significance level was identified at 0.8. There is no significant relationship between smokers in all age groups under review. More than 78% of respondents stated they do not smoke. Those providing an affirmative answer were stating high smoking intensity. A high mutability rate was computed in this area in excess of 77% (28% consuming more than 11 cigarettes per day; 24% declaring irregular consumption; 24% stating 6 to 10 cigarettes per day; and, 21% up to 5 cigarettes per day). Taking the average cigarette pack price of CZK 80 as a basis (Sovinová and Csémy, 2016), this bad habit, with a reference to the foregoing figures, may result in a considerable amount in a student's budget.

Another area under review as part of the lifestyles covered drinking of alcoholic beverages. More than 74% of the respondents stated they drink alcohol (83% of men and 70% of women). A specification based on the Pearson's chi-square test arrived to 0.04 at testing H_0, therefore we reject the zero hypothesis that the proportion of students consuming alcohol is independent of gender – instead, we have adopted

the alternative hypothesis H_1. With regard to the age groups, the significance level of $\alpha = 0.05$ prohibits rejection of H_0 that the proportion of students consuming alcohol is independent across all age groups. As stated by 56% of the respondents, they drink alcohol approx. 4 to 8 times a month, 29% only very exceptionally, while 15% declared regular drinking several times a week, most often wine (53%) and beer (35%).

Daily fluid intake was another area under review included in our questionnaire survey. In response to the question "What amount of fluids – water, mineral water or unsweetened herbal tea – do you as a rule drink during 24 hours?", 52% of the respondents answered 1–2 litres, 35% declared more than 2 litres, while 13% of the students declared less than 1 litre. The below Tab. III lists relative frequencies for specified beverage types.

Tab IV. provides empirical absolute frequencies. Next, Tab. V. provides values of expected relative frequencies for specified types of beverages differentiated for the both genders.

The foregoing expected relative frequencies were used in computing the test statistics K value of 11.197. Given the resulting value $x_{0,95}^2(5) = 11.07$, we reject the zero independence hypothesis at the asymptotic significance level of

III: *Answers to the question: Do you regularly drink the following types of drinks?*

	p_i	
	No	**Yes**
Packaged mineral water	41.55%	58.45%
Tap water	12.33%	87.67%
Syrups and juices	62.10%	37.90%
Coke-based and sundry sweet drinks	77.63%	22.37%
Teas	26.03%	73.97%
Caffeine-containing coffee	37.44%	62.56%

Source: Own research

IV: *Empirical absolute frequencies*

	Packaged mineral water	Tap water	Syrups and juices	Coke-based and sundry sweet drinks	Teas	Caffeine-containing coffee	Σ
Man	46	63	32	26	47	43	257
Woman	82	129	51	23	115	94	494
Σ	128	192	83	49	162	137	751

Source: Own research

V: *Expected relative frequencies for computation of test statistics K*

	Packaged mineral water	Tap water	Syrups and juices	Coke-based and sundry sweet drinks	Teas	Caffeine-containing coffee
Man	43.803	65.704	28.403	16.768	55.438	46.883
Woman	84.197	126.296	54.597	32.232	106.562	90.117

Source: Own research

0.05. The closeness of dependence for the nominal features was measured using the Cramer's V measure that landed at 0.122.

Next questions were already dealing with the dietary habits of the students of VŠEM, a. s. More than 53 % of the respondents stated they eat 4 or 5 times a day, 31 % declared 3 meals a day and 10 % declared 1 or 2 meals a day, while precisely 74 % out of all invited students have a regular breakfast. Of the students, 90 % have as a rule at least one hot meal every day. In response to the question "At what hour do you as a rule eat your last meal of the day?", 51 % of the respondents said between 7 pm to 9 pm; 25 % declared their last meal time between 5 pm and 7 pm, while 23 % declared the time as 9 pm and later.

Eating in the fast food facilities is a great trend of our hurried times, most prominently in the young generation. The fact was documented also by the questionnaire survey in which 52 % of the respondents stated they eat in such facilities. We reject a zero hypothesis that the proportion of students eating in fast food facilities is independent of gender – instead, we have adopted an alternative hypothesis as the chi-square test significance level arrived to 0.0017. Eating in the fast food facilities was stated by 68 % of men and 46 % of women, while the others eat in the fast foods either "never" or "quite exceptionally, a couple of times a year". Furthermore, H_0 has to be rejected: the proportion of students eating in fast food facilities is independent of age – because the obtained statistical significance level is below 0.05. The proportion of respondents eating in the fast foods is 57 % in the 18–26 age

group, 60 % in the 27–35 age group and only 27 % in the 36–44 age group.

Furthermore, the students were selecting answers to the question "How often do you eat the following foods?" Using the scales "daily, several times a month, several times a week, never, exceptionally", they provided markings for separate foods. The below Fig. 1 lists relative frequencies across a 100 % stacked chart.

It may be summed up based on the results that larger volumes (more than 35 %) of the following are consumed daily: cereals, raw vegetables, fresh fruits and milk and milk products. Referring however to the recommendations made by the Healthy Nutrition Forum (Kunová, 2011), it is worthwhile to realise that even the fresh fruits should not be eaten excessively considering the daily dose of sugar. Meals with relevant fat contents prevail several times per month (such as beef, pork, eggs etc.) Potato crisps, snacks, salted sticks and fried meals are preferred only exceptionally, which is in accordance with the recommendation (Kunová, 2011).

The below Tab. VI provides relative frequencies regarding dietary supplements, while optional answers could be selected.

The following zero hypotheses: "The proportion of students taking vitamins and minerals is independent on gender"; "The proportion of students taking substances enhancing physical performance is independent on gender"; "The proportion of students taking substances enhancing mental performance is independent on gender" and "The proportion of students taking substances supporting metabolism is independent on
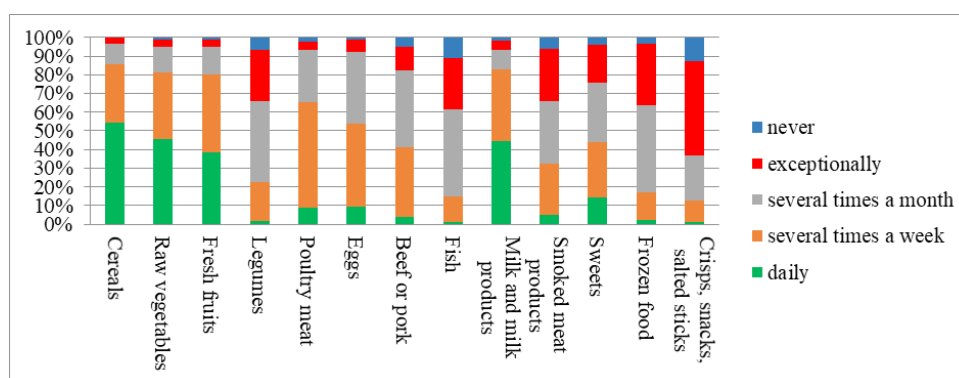
1: *Relative frequencies regarding question "How often do you eat the following foods?"*
Source: Own research

VI: *Answers to the question: Are you using any of the following dietary supplements? (you can provide more than one answer option)*

Vitamins, minerals	53.4 %
Substances enhancing physical performance	12.3 %
Substances enhancing mental performance	8.2 %
Substances supporting metabolism	10.0 %
I do not take any dietary supplements	39.3 %
Other	7.8 %

Source: Own research

gender" cannot be rejected since the chi-square test significance level was more than 0.05. Nor can be the above hypotheses rejected when related to the age groups. Under the "Other" category, the students prevalently declared bone joints preparations, superfoods, proteins, herbal infusions and dietary fibre.

It may be summed up based on the foregoing that 3 alternative hypotheses were adopted:
- The proportion of students drinking alcohol differs subject to gender.
- The consumed beverage types differ subject to gender.

Eating in the fast food restaurants differs subject to gender and also subject to age.

DISCUSSION

The obtained results which come from students at full-time study program and part-timestudy program, also clearly indicate the tap water as the most favoured drink among the participating students followed by various teas, coffee or packaged mineral water. This order of preference may be explained by a shift in peoples' behaviour – they begin to focus on more healthy foods, while e.g. the interest in the coke-based drinks has been mildly dropping (Řeháková, 2017). According to the same source, the packaged water consumption in the Czech Republic has been posting a stable increase every year. More specifically in 2015, the consumption of mineral water per capita reached 56.4 litres (ČSÚ, 2016). Regarding coffee drinking, the most recent research has concluded that 3 or 4 cups of coffee per day bring numerous health benefits (Gulland, 2017).

The results obtained by our case study demonstrated dependencies of dietary habits on the gender and age category, which is in line with the results of the National Institute for Children and Youth (Štursová a Bocan, 2006), with women eating fruits and vegetables significantly more often than men, while the fruit and vegetable consumption has been slightly decreasing along the age path. Most of the invited male population students are the fast food service users, no matter that a canteen in the adjacent building is available to the students. Eating in the fast foods, while disfavouring catering facilities, who offer lesser volumes of fried meals, may be interpreted as connected to the feelings of freedom and relaxed parental control – the judgement is further supported by Emmons *et al.* (1998). The results obtained from our survey of the selected educational institution make it hard to entirely agree with the conclusions by Fraser *et al.* (2011) or by Wengreen, Moncur (2009) that students' dietary habits have been permanently deteriorating. It is possible to agree with the conclusions from the surveys by Maršálková (2017) or Mazouch *et al.* (2016),) that the spendings for food of the college students in Prague have been increasing. These finances could be beneficially used if efficiently spent on the portfolio of health and nutrition-rich foodstuffs, which has been confirmed also by Alpers (2005), while according to Catani *et al.* (2005) such foodstuffs support correct functioning of the nervous system and brain activity, and eliminate stress that accompanies the studies.

Based on the results it is seen as suitable to recommend to the educational institution under review to regularly share general dietary recommendations with its students. Also, cooperation will be beneficial with the nearby canteen operated by a private entity with whom a rapport should be established to include such meals on their menu that are otherwise missing in students' meals range – primarily more of fish-based food. An aspect to realize on the other hand is that the unprocessed foodstuff prices are an important element, while possibilities to organize a nutrition-themed event should be considered. Making a quality coffee available across the educational institution under review could be also recommended. A "nutrition consultancy" could be implemented as a developmental activity, with an option to make regular use of consultations with the nutrition experts.

We were additionally provided professional comments on the conducted survey results by Michal Kabelka. Reflecting on his knowledge of the Olympic sports environment, he further noted that an ideal diet for a top-level athlete would differ considerably from nutrition that is commonly ideal for people and that in many ways it is utterly dissimilar from a healthy diet or healthy lifestyles. Unfortunately, in the Czech Republic, there is hardly room for fruits and vegetables during certain stages of training. When it comes to the body-building stage of training, the Czech sportsmen definitely eat after 9 pm. Supplementing vitamins, minerals, as well as proteins and carbohydrates is a must for the sportsmen. Compared to the standard population, eating and sleeping is even more important for the sportsmen.

When engaged in sports, however, one gets a clear idea of the importance of the quality food for the sportsmen health. There were rare individuals, "blessed" by their robust genetic setup, who would stay in good health irrespective of their habits and doings. The majority, however, were showing clear interdependencies between their lifestyles and health (injuries).

He concluded by noting the while he agrees with the healthy diet as described in the paper, he must emphasise on the other hand that quality nutrition does not come cheap, which may pose an obstacle for at least some of the students. Moreover, he would not assume that young people would be exceedingly careful about their health.

(Feedback provider: Michal Kabelka, active sportsman during 2004—2015, high jump. A contestant of the 2012 Olympics in London. Graduated in 2015 from the Informatics Department of the Brno University of Technology. Currently a Java developer employed with CGI)

CONCLUSION

The case study evaluated the situation concerning the dietary habits of the college students of a selected university (*n* = 219). It may be concluded based on the results that the invited students consume larger volumes of unsweetened beverages (water, tea, coffee) than of the coke-based or other sweet drinks (22.37 %). They daily consume increased volumes of cereals, raw vegetables, fresh fruits and milk and milk products, compared to ever decreasing consumption of fried meals, potato crisps, snacks or salted sticks. The largest proportion of the respondents (53.4 %) consumes vitamins and minerals, which is a positive fact. Continuous information action on the healthy dietary habits is however necessary by the university, while consideration should be afforded to the range of meals offered by the canteen.

While this paper has limited itself to the selected higher education institution, the case study may nevertheless help to motivate other educational institutions to map the current situation with regard to the dietary habits and to set up strategies for positively enhancing the nutrition approaches adopted by the young generation.

REFERENCES

ABU-HUSSEIN, L. A. 2016. Nutrition's Students Awareness of Breakfast. *Journal of Health, Medicine and Nursing*, 30: 56–62.

ALAPERS, D. H. 2005. What is new in vitamin B12? *Current opinion in gastroenterology*, 21(2): 183-186.

BABICZ-ZIELIŃSKA, E. 2001. Food preferences and choice among the Polish students. *Czech Journal Food Science*, 19: 154–160.

BLAHUTKOVÁ, M. *et al.* 2008. *Get up and go* [in Czech: *Zvedni se a běž*]. 1st Edition. Brno: Masarykova univerzita.

CATANI, M. V., SAVINI, I., ROSSI, A. *et al.* 2005. Biological role of vitamin C in keratinocytes. *Nutrition reviews*, 63(3): 81–90.

CDC. 2006. Tobacco use among adults—United States. *Centers for Disease Control and Prevention*. [Online]. Available at: www.cdc.gov/mmwr/preview/mmwrhtml/mm5542al.htm [Accessed: 2017, November 13].

CHOURDAKIS, M., TZELLOS, T., PAPAZISIS, G. *et al.* 2010. Eating habits, health attitudes and obesity indices among medical students in northern Greece. *Appetite*, 55(3): 722–725.

CLARK, N. 2000. *Sport nutrition* [in Czech: *Sportovní* výživa]. 1st Edition. Praha: Grada Publishing.

CRUZ, J. A. 2000. Dietary habits and nutritional status in adolescents over Europe--Southern Europe. *European journal of clinical nutrition*, 54(1): 29–35.

CSVŠ. 2006. *How much is the Czech college student?* [in Czech: *Kolik stojí český vysokoškolák?*]. [Online]. Available at: iforum.cuni.cz/IFORUM-2641-version1.pdf [Accessed: 2017, November 23].

CZECH SOCIETY FOR NUTRITION. 2011. *Reference values for nutrient intake in CR* [in Czech: *Referenční hodnoty pro příjem živin v ČR*]. 1st Edition. Praha: Výživaservis.

ČSÚ. 2016. *Consumption of food and non-alcoholic beverages* [in Czech: *Spotřeba potravin a nealkoholických nápojů*]. [Online]. Available at: www.czso.cz/documents/10180/32782524/2701391601.pdf/ceb2a48c-c8b3-4383-b684-f12ff8bcd1fe?version=1.0 [Accessed: 2017, November 25].

DIMA-COZMA, C., GAVRILUTA, C., MITREA, G. *et al.* 2014. The importance of healthy lifestyle in modern society: a medical, social and spiritual perspective. *European Journal of Science and Theology*, 10(3): 111-120.

DISMAN, M. 2002. *How to create sociological knowledge* [in Czech: *Jak se vyrábí sociologická znalost*]. 3rd Edition. Praha: Karolinum.

DOSTÁLOVÁ, J. *et al.* 2012. Nutrition recommendations for the population of the Czech Republic [in Czech: Výživová doporučení pro obyvatelstvo České republiky]. *Společnost pro výživu*. [Online]. Available at: www.vyzivaspol.cz/vyzivova-doporuceni-pro-obyvatelstvo-ceske-republiky/ [Accessed: 2017, November 21].

DREWNOWSKI, A., REHM, C. D. and CONSTANT, F. 2013. Water and beverage consumption among adults in the United States: cross-sectional study using data from NHANES 2005–2010. *BMC Public Health*, 13(1): 1068.

EBERHARDIE, C. 2007. Nutritional supplements and the EU: is anyone happy? *Proceedings of the Nutrition Society*, 66(4): 508–511.

EMMONS, K. M., WECHSLER, H., DOWDALL, G. *et al.* 1998. Predictors of smoking among US college students. *American journal of public health*, 88(1): 104–107.

FANG, J., MOORE, L., LOUSTALOT, F. *et al.* 2016. Reporting of adherence to healthy lifestyle behaviors among hypertensive adults in the 50 states and the District of Columbia, 2013. *Journal of the American Society of Hypertension*, 10(3): 252–262.

FLORENCE, M. D., ASBRIDGE, M. and VEUGELERS, P. J. 2008. Diet quality and academic performance. *Journal of School Health*, 78(4): 209–215.

FOŘT, P. 2007. *What should I eat* [in Czech: *Tak co mám jíst*]. 1st Edition. Praha: Grada Publishing.

FRASER, L. K., EDWARDS, K. L., CADE, G. P. *et al.* 2011. Fast food, other food choices and body mass index in teenagers in the United Kingdom (ALSPAC): a structural equation modelling approach. *International Journal of Obesity*, 35(10): 1325–1330.

GOPINATH, B., FLOOD, V. M., BURLUTSKY, G. *et al.* 2016. Frequency of takeaway food consumption and its association with major food group consumption, anthropometric measures and blood pressure during adolescence. *British Journal of Nutrition*, 115(11): 2025–2030.

GREGORA, M. 2004. *Young children's nutrition* [in Czech: *Výživa malých dětí*]. 1st Edition. Praha: Grada Publishing.

GULLAND, A. 2017. Scientists wake up to coffee's benefits. *BMJ: British Medical Journal*, 359: j5381.

HIRSHKOWITZ, M., WHITON, K., ALBERT, S. M. *et al.* 2015. National Sleep Foundation's sleep time duration recommendations: methodology and results summary. *Sleep Health*, 1(1): 40–43.

JONES, K. A., CHRYSSANTHAKIS, A. and GROOM, M. J. 2014. Impulsivity and drinking motives predict problem behaviours relating to alcohol use in university students. *Addictive behaviors*, 39(1): 289–296.

KESKI-RAHKONEN, A., KAPRIO, J., RISSANEN, A. *et al.* 2003. Breakfast skipping and healthcompromising behaviors in adolescents and adults. *European Journal of Clinical Nutrition*, 57(7): 842–53.

KIRKPATRICK, S. I., REEDY, J., KAHLE, L. L. et al 2014. Fast-food menu offerings vary in dietary quality, but are consistently poor. *Public health nutrition*, 17(4): 924–931.

KREJCIE, R. V. and MORGAN, D. W. 1970. Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3): 607–610.

KUNOVÁ, V. 2011. *Healthy food* [in Czech: *Zdravá výživa*]. 2nd Edition. Praha: Grada Publishing.

LARSSON, S. C., ÅKESSON, A. and WOLK, A. 2015. Primary prevention of stroke by a healthy lifestyle in a high-risk group. *Neurology*, 84(22): 2224–2228.

LI, J. and O'CONNELL, A. A. 2012. Obesity, high-calorie food intake, and academic achievement trends among U.S. school children. *The Journal of Educational Research,* 105(6): 391–403.

MACHOVÁ, J. and KUBÁTOVÁ, D. 2015. *Health education* [in Czech: *Výchova ke zdraví*]. 2nd Edition. Praha: Grada Publishing.

MARŠÁLKOVÁ, L. 2017. How much does a student's life in Prague cost and how you can save as much as possible [in Czech: Kolik stojí život studenta v Praze a jak můžete co nejvíc ušetřit]. *StudentMag.* [Online]. Available at: studentmag.topzine.cz/kolik-stoji-zivot-studenta-v-praze-a-jak-muzete-co-nejvic-usetrit/ [Accessed: 2017, November 11].

MAUGHAN, J. R. and BURKE, M. L. 2006. *The Nutrition in Sport* [in Czech: *Výživa ve sportu: Příručka pro sportovní medicínu*]. 1st Edition. Praha: Galén.

MAZOUCH, P., FISCHER, J., VLTAVSKÁ, K. *et al.* 2016. *Comparison of higher education costs in selected cities* [in Czech: *Srovnání nákladů na studium vysoké školy ve vybraných městech*]. Available at: kest.vse.cz/wp-content/uploads/2016/08/Studie.pdf [Accessed: 2017, November 16].

MENCLOVÁ, L. and BAŠTOVÁ, J. 2006. Selected results from sociological survey of public and private universities students in 2005 in the Czech Republic [in Czech: Vybrané výsledky ze sociologického šetření studentů veřejných a soukromých vysokých škol roku 2005 v České republice]. *AULA*, 14(3): 30–38.

MOHNEN, S. M., VÖLKER, B., FLAP, H. *et al.* 2012. Health-related behavior as a mechanism behind the relationship between neighborhood social capital and individual health-a multilevel analysis. *BMC public health*, 12(1): 116.

MUSAIGER, A. O. and GREGORY, W. B. 1992. Dietary habits of school-children in Bahrain. *Journal of the Royal Society of Health*, 112(4): 159–162.

NATIONAL SLEEP FOUNDATION. 2008. *Sleep in American Poll*. Washington, DC: National Sleep Foundation.

NEŠPOR, K., PERNICOVÁ, H., SCÉMY, L. 1999. *How to stay fit and avoid addictions [Jak zůstat fit a předejít závislostem].* 1. vyd. Praha: Portál.

NMOR, J., NWAKA, K. H. and NMOR, J. C. 2014. Eating behaviours of university students in Southern Nigeria: An evaluation of sex differences. *Science*, 2(1): 23–37.

REEVES, M. J. and RAFFERTY, A. P. 2005. Healthy lifestyle characteristics among adults in the United States. *Archives of Internal Medicine*, 165(8): 854–857.

RYU, S. Y., PARK, J., CHOI, S. W. *et al.* 2014. Associations between socio-demographic characteristics and healthy lifestyles in Korean Adults: the result of the 2010 Community Health Survey. *Journal of Preventive Medicine and Public Health*, 47(2): 113.

ŘEHÁKOVÁ, M. 2017. Interest in Coca-Cola in the world is falling, people think more about health. The Czechs are behind [in Czech: Zájem o Coca-Colu ve světě klesá, lidé myslí více na zdraví. Češi jsou ale pozadu]. [Online]. *Hospodářské Noviny*. Available at: byznys.ihned.cz/c1-65712340-zajem-o-coca-colu-ve-svete-klesa-lide-mysli-vice-na-zdravi-cesi-jsou-ale-pozadu [Accessed: 2017, November 28].

SHI, L., MORRISON, J. A., WIECHA, J. *et al.* 2011. Healthy lifestyle factors associated with reduced cardiometabolic risk. *British journal of nutrition*, 105(5): 747–754.

SHIM, J. E., PAIK, H. Y. and MOON, H. K. 2007. Breakfast consumption pattern, diet quality and health outcomes in adults from 2001 National Health and Nutrition Survey. *Korean Journal of Nutrition*, 40(5): 451–462.

SCHRÖDER, H., FITO, M. and COVAS, M. I. 2007. Association of fast food consumption with energy intake, diet quality, body mass index and the risk of obesity in a representative Mediterranean population. *British Journal of Nutrition*, 98(6): 1274–1280.

SOVINOVÁ, H. and CSÉMY, L. 2016. *Tobacco use in the Czech Republic 2015* [in Czech: *Užívání tabáku v České republice 2015*]. [Online]. Státní zdravotní ústav. Available at: www.szu.cz/uploads/documents/czzp/zavislosti/Uzivani_tabaku_2015.pdf [Accessed: 2017, November 28].

ST-ONGE, M. P., ARD, J., BASKIN, M. L. *et al.* 2017. Meal timing and frequency: implications for cardiovascular disease prevention: a scientific statement from the American Heart Association. *Circulation*, 135(9): 96–121.

SUCHÁNKOVÁ, M., KAPOUNOVÁ, Z., DOFKOVÁ, M. *et al.* 2015. Selected fruits and vegetables: comparison of nutritional value and affordability. *Czech Journal of Food Sciences*, 33(3): 242–246.

ŠTURSOVÁ, T. and BOCAN, M. 2006. *Current issues of the young generation in CR* [in Czech: *Aktuální problémy mladé generace ČR*]. Závěrečná zpráva MŠMT. [Online]. Available at: www.vyzkum-mladez.cz/zprava/1174039212.pdf [Accessed: 2017, November 25].

TAM, R., YASSA, B., PARKER, H. *et al.* 2017. University students' on-campus food purchasing behaviors, preferences, and opinions on food availability. *Nutrition*, 37: 7–13.

TOM, M. 2012. Computational intelligence using Fuzzy Multicriteria Decision Making for DIligenS: Dietary Intelligence System. In: *IEEE International Conference on Fuzzy Systems,* 23 October, pp. 1–7.

TRICHES, R. M. and GIUGLIANI, E. R. J. 2005. Obesity, eating habits and nutritional knowledge among school children. *Revista de saúde pública*, 39(4): 541–547.

WENGREEN, H. J. and MONCUR, C. 2009. Change in diet, physical activity, and body weight among young-adults during the transition from high school to college. *Nutrition journal*, 8(1): 32.

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