Health behaviour and self-rated health of medical students

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Introduction

The main four factors influencing our health status are genetic factors, lifestyle, natural and artificial environment, and the healthcare system has also be taken into consideration. The WHO report about the European Region emphasized among others unhealthy eating habits, lack of exercise, tobacco smoking, frequent alcohol and drug use as risk factors within the general lifestyle. Health status and behaviour are crucial for professionals who are devoted to improve the health of the whole population. Medical doctors are not only engaged to cure their patients, they are rather active in prevention, and in case of prevalent illness maintaining and promoting residual health of them. Through these activities, consciously or even not, they become role models for patients thus credibility may be at stake if their behaviour does not correspond with given advices.

Related to health behaviour, future physicians must be concerned as living in a special situation because of the multiple influences on their lifestyle if compared with the general population. Basically they follow the typical pattern of their peers as young adults having just emerged out of the experimenting age of teenagers thus they can generally be considered to enjoy the perfect health. As at any facilities of higher education, medical students are facing positive and negative effects alike and they respond these with their lifestyle choices. A good example for a positive situation is that first year students experience new contacts in a new social environment and become members of new communities. At the same time, as a negative and stressful effect may be the serious intellectual burden of learning mediated by the strong academic requirements. Freshmen need to acquire a significant amount of new body of knowledge and join without conflicts new corporations. Many students also face financial shortcomings during the whole training. Another remarkable aspect in the medical students' lifestyle is the preparation for a special role model of professionalism. Many of them face it consciously and are committed to a healthy lifestyle to be able to show up their own example for their future patients' health promotion. Based on these, we need a very complex picture prepared by the medical students' lifestyle in-depths analysis results of which may help us to discover the relevant features of domestic and foreign student populations.

Goals

Research topics and reasons of this PhD theses can be summarized at it follows.

1) To explore demographic characteristics of the target population

The standard electronic registry of study administration (NEPTUN) used at the Faculty of Medicine of the Semmelweis University stores also information on the students' basic demographic data. This information however – being individual and under special protection – is not obtainable for research reasons in its original edition. However, processing anonymous data is legitimate to classify students of both in the Hungarian and English language courses in terms of country of origin, age and gender. By conducting a questionnaire-based research, we gained further information about the respondents' family background, family planning attitudes and career plans after the graduation.

2) Assessment of lifestyle factors

It is relatively simple to identify the main elements of lifestyle choices that determine the individuals' health status. Among others, such elements are healthy nutrition, regular and even vigorous physical exercise, and the students' attitudes toward tobacco smoking and alcohol consumption. The next step is to define their prevalence among domestic and foreign students respectively.

3) Assessment of self-rated health status

By general assumption, young people must be healthy. However, when taking in account also the mental component of the personal health the picture will be more complex in the young adult population. One of the tools to explore the mental component is self-rating by internationally accepted and used measurement tools (i.e. questionnaires). This way, the third main goal was to assess physical and mental health alike by self-rating in the Hungarian and foreign medical student populations. Among domestic students, we completed the program by comparison to the average Hungarian peer population.

Methods

As a target group, we selected fourth-year students in medical and dental training at the Semmelweis University. Using repeated cross-sectional data sampling, we questioned always the fourth year between the academic terms 2009/2010 and 2012/2013. Students of the English training program were involved since the academic year 2009/2010, those of the Hungarian program since 2011/2012. According to the data gained out of the NEPTUN system, the total number of the population we targeted was 1683. We collected no sensitive data of individual identification under special legislation in Hungary. Junior lecturers distributed the printed questionnaires during the practical courses of the subject Public Health in the students' randomly selected representative sample. The main season of data collecting fell on the second half of the autumn semester (in October and November). Students were always made aware of voluntary participation and the right to reject filling out the questionnaire.

For data collection, we used a self-administered questionnaire English version of which was easily understandable also for non-native English speakers. The questions contained eight separated entries:

1. demographic features,
2. dietary habits,
3. physical exercise,
4. alcohol consumption,
5. tobacco smoking,
6. religious beliefs,
7. attitude to professional service,
8. self-rated health status

1) Demographic questions

Age, sex, the country they lived in for a decisive period, further questions related to parents and siblings, the respondent's marital status (married or not). Not married students had the options to indicate the age they plan to get married at, and the number of children desired.

2) Dietary habits

We used the modified version of a questionnaire developed by Canadian researchers. The original setup offers six frequency categories for consuming three dietary ingredients (vegetables, fruit and whole grains). Following the original methodology of evaluation, we converted first the frequency answers into scores then summarized them. Thus, each respondent's eating habits we measured by a score

ranging between 0 and 15 points (dietary score). In our own extension, we indicated four additional food options we assumed as consumed frequently too (legumes, fish, red meat and dairy products). The set of answers was identical with the original one, but we did not compute scores in lack of comparison.

3) Physical exercise
While exploring frequency and strength we used the same questionnaire mentioned above and we took over unchanged three levels of difficulty with 4 frequency categories. After the score conversion of the answers as defined by the original research team, we classified physical activity by a range 0 - 24 points (sports score). Based on these, we created three distinct categories (inactive, moderately active, and active).

4) Alcohol consumption
Answer options were open-ended related to three main types of beverages (wine, beer and spirits), with marking the amount consumed in an average calendar week. As a standard consumption unit accepted also in this country, we used a drink containing 10 grams of alcohol. Taking the amount of drinks admitted in the answers, we transformed them into standard units and summed up for an average week. If the respondents jumped this open-ended question, we coded it as missing data. Weekly alcohol consumption was defined excessive if it passed the limit of 14 standard units for men, and 7 standard units for women.

5) Tobacco smoking
The first one of eight questions asked for current, the second one to past smoking without indicating the present or past amount of consumption. Further six questions – identical with the original Fagerström Test – referred only to current smokers.

6) Religious beliefs (spirituality)
We used our self-developed five questions, three of them concerned the depths of spirituality and the remaining two taking part in religious events of the community, and the significance of religion in the doctor-patient relationship.

7) Attitude to professional service
After asking for future specialization, two questions concerned the attitude towards working overtime, and the last two examined the membership in the so-called civil organizations and the respondents' personal opinion about them.

8) Self-rated health status

We adopted without any changes the original self-rating Short Form Health Survey (SF-36) questionnaire widely used in international projects. There are category variables in each closed question with different answer options, which can be converted into a numeric scale ranging from 0 to 100. After conversion, the individual respondents' self-rated health status can be determined in 8 categories. The higher the score in a given category, the more favourably evaluated the respondents their own health status.

While creating our database, we transformed 777 questionnaires first manually to the Microsoft Office Excel program. This was later moved to the data table of the statistics software SPSS v.17 (later IBM-SPSS v.20) adding parallel the electronic structure of all variables. Some primary variables were transformed to new variables if it was necessary for more sophisticated analytic procedures. Among the nominal variables, the country of origin plays a distinct role, thus we created two subdivisions first along the domestic versus foreign dichotomy. Taking into consideration the geographical and cultural environment and the number of students too, the setup of the foreign sub-sample was as it follows, *European Mediterranean countries* (Spain, France, Italy, Greece and Cyprus), *Israel, the Scandinavian countries* (Norway and Sweden), and *Iran*.

For creating numerical variables of diet, physical exercise, tobacco smoking, alcohol consumption and self-rated health status, we used the scoring scales demonstrated above. The distribution pattern of primary data within these variables was controlled before each statistical analysis. For binary analyses, we transformed our categorical and ordinal variables into dichotomized ones. For analytic reasons, we aimed always to opt for the optimal statistical method. The study questionnaire contained also scoring scales with positive whole numbers. In such cases means, standard deviations and median values were also calculated. For nominal and ordinal variables, we controlled the frequency and distribution patterns. In several cases, dichotomous variables were also created by collapsing the answer options, or – in case of numerical values – we used the median splitting technique.

Our baseline analyses were determined by dependent variables of our choice if we had the relevant data. As to numerical variables, we controlled first the type of distribution. Graphic exploratory technique and if necessary adjusted to the number of individuals in the sample, the Shapiro-Wilks test was applied. We controlled also the histogram and Q-Q plot figures. Without any significant deviation from the normal distribution, the variable was managed accordingly. We proceeded the same way if the Shapiro-Wilks test turned out not to be significant. Thus, we decided for normal and non-normal distribution according to the graphic exploratory analysis or by the relevant probe of the distribution analysis. In case of normal

distribution, we used two-sample T test or one-way ANOVA. If variables showed up non-normal distribution, Mann-Whitney test or Kruskal-Wallis test was our decision while exploring presumed associations. Looking for interrelations between continuous variables, correlation analyses were performed.

Related to the SF-36 questionnaire, there were available also the normal values of the domestic healthy population. In case of Hungarian students, deviations from these mean values were indicated by means of the one-sample T test. Considering that in most of the cases the distribution deviated from the normal type, the outcome of the one-sample T test was regarded as significant only at $p<0.001$. Binary comparison of nominal and ordinal variables was performed by cross tabulation with chi-squared test. When looking for associations among originally or derivatively dichotomous variables, combined with chi-squared test or even without it odds ratios were taken into consideration, with 95% confidence interval (95% CI).

Keeping in mind that output variables were significantly influenced by multiple factors, we performed beyond the simple binary analyses multivariate tests too namely in case of continuous variables the multivariate linear regression, or with dichotomized variables the multivariate binary regression. The principal component analysis of the four sub-scales of SF-36 for mental health was carried out by means of multi-way ANOVA.

Results

Table 1 shows the basic statistical outcomes of our demographic data in domestic versus foreign subdivision.

Table 1. Comparison of basic demographic data of domestic and foreign subsamples

Variables	Domestic	Foreign	p-value*
Mean age	22.84 (SD: 1.48)	25.05 (SD: 2.67)	0.001
Male / Female (%)	91/184 (33/67)	245/220 (52.68/47.32)	0.001
Parents alive Yes / No (%)	261/15 (94.56 / 5.44)	460/25 (94.84 / 5.16)	0.742
Siblings Yes / No (%)	241/35 (87.3/12.7)	456/35 (92.9/7.1)	0.010
Married Yes / No (%)	8/267 (2.9/97.1)	33/456 (6.7/93.3)	0.024

** p-value refers to unpaired student t test in case of mean age, in every other case it refers to Chi-squared test.*
Note: Grey shading indicates significant ($p<0.05$) association.

While comparing the means of diet scores based on frequency of fruit, vegetable and dietary fibre consumption if related to genders, domestic students scored lower, then those from abroad. Mean of domestic value of males was 5.83 (SD: 2.89), that of foreigners 6.67 (SD: 3.23) ($t_{(322)}$= -2.148, p=0.032). Female students scored 7.4 (SD: 3.28) in the domestic subsample and 8.2 (SD: 3.1) in the foreign subsample ($t_{(388)}$= -2.485, p=0.013).

There was no significant difference in the consumption of legumes, fish, red meat and poultry among male domestic and foreign students. Females showed overall significant differences, except dairy products (Table 2).

Table 2. Dietary differences of domestic and foreign female medical students

Frequency of consumption	Legumes n (%)		Fish n (%)		Red meat+poultry n (%)	
	Domestic n (%)	Foreigner n (%)	Domestic n (%)	Foreigner n (%)	Domestic n (%)	Foreigner n (%)
Less than once a week	77 (42.1)	69 (31.7)	126 (68.9)	95 (43.6)	10 (5.5)	31 (14.4)
Once a week	69 (37.7)	67 (30.7)	49 (26.8)	75 (34.4)	14 (7.7)	33 (15.3)
2-3x a week	30 (16.4)	50 (22.9)	6 (3.3)	35 (16.1)	91 (50.0)	80 (37.2)
4-6x a week	3 (1.6)	18 (8.3)	1 (0.5)	12 (5.5)	50 (27.5)	50 (23.3)
Daily	3 (1.6)	8 (3.7)	1 (0.5)	0 (0.0)	16 (8.8)	21 (9.8)
More than once daily	1 (0.5)	6 (2.8)	0 (0.0)	1 (0.5)	1 (0.5)	0 (0.0)
Total	183 (100)	218 (100)	184 (100)	220 (100)	182 (100)	215 (100)
	p=0.002		p=0.001		p=0.003	

Note: due to the rounding of percentage values to one decimal the total of a column is not necessarily 100%

The mean of sport scores indicating light, moderate and vigorous exercise for physical activity was 12.00 (SD: 4.91) in domestic, 12.7 (SD:5.62) in foreign male sample without significant differences. Females represented similar data with a domestic mean of 11.68 (SD: 4.68) and a foreign mean of 11.87 (SD: 5.84). Analysing vigorous exercise alone, there was a significant difference in gender and geographic terms alike (Table 3.).

Table 3. Frequency of vigorous exercise in domestic and foreign subsamples

Frequency	Male		Female	
	Domestic n (%)	Foreign n (%)	Domestic n (%)	Foreign n (%)
Never	17 (18.7)	57 (23.5)	44 (23.9)	74 (34.4)
1-2x weekly	48 (52.7)	82 (33.7)	104 (56.5)	79 (36.7)
3-4x weekly	20 (22.0)	81 (33.3)	25 (13.6)	53 (24.7)
5-7x weekly	6 (6.6)	23 (9.5)	11 (6.0)	9 (4.2)
Total	91 (100)	243 (100)	184 (100)	215 (100)
	p=0.016		p<0.001	

Note: due to the rounding of percentage values to one decimal the total of a column is not necessarily 100%

At the period of our survey, 27.5% of Hungarian and 21.0% of foreign males admitted to be a smoker. The difference was non-significant like in case of females (domestic: 13%, foreign: 12.1%). There was also no difference among average scores of Fagerström-test among men (domestic: 2.87, SD: 0.87; foreign: 2.33, SD: 2.36) however females delivered significant difference (domestic: 2.89, SD: 1.1; foreign: 1.37, SD: 1.88; $t_{(38)}$=1.52, p=0.002).

Hungarian male students consume alcohol in 89, while foreign students in 81 per cent (a non-significant difference). Women, however indicated a considerable difference by domestic 74.1 per cent and foreign 65.4 per cent (OR: 1.71, CI 95%: 1.12 to 2.62, p=0.012). The difference of domestic and foreign female students proved to be also significant if related to the weekly alcohol consumption (Mann-Whitney U: 24344, p <0.001).

Hungarian males as well as females admitted to be more religious than the foreign subsample (OR for men: 2.05, CI 95%: 1.19 to 3.38, p=0.009, OR for women: 2.19, CI 95%: 1.42 to 3.39, p <0.001). Willingness of providing service overtime was nearly equally distributed among domestic and foreign female students, however there was a significant difference in the male s subsample (Table 4).

Table 4. Time related motivation to overtime service among domestic and foreign male students

Amount of overtime weekly	Domestic, n (%)	Foreign, n (%)
No overtime	27 (30.0)	68 (28.8)
1-2 hours weekly	8 (8.9)	15 (6.4)
3-5 hours weekly	28 (31.1)	40 (16.9)
6-10 hours weekly	15 (16.7)	51 (21.6)
More than 10 hours weekly	12 (13.3)	62 (26.3)
Total	90 (100)	236 (100)

p=0.014
Note: due to the rounding of percentage values to one decimal the total of a column is not necessarily 100%

We found no difference in the future professional service plans between the domestic and foreign male subsamples. Nevertheless, among females the foreigners are more likely (38.9%) to choose surgical specialisation than Hungarians (21.7%) (OR: 2.32, CI 95%: 1.47 to 3.66, p<0.001). According to the favoured type of service, domestic and foreign female students stick differently to their primary expectations (Table 5).

Table 5. Committed unemployment time in account to get the job originally planned

Committed unemployment time	Male		Female	
	Domestic n (%)	Foreigner n (%)	Domestic n (%)	Foreigner n (%)
Max. 1 year	49 (55.1)	165 (71.4)	101 (55.5)	151 (72.2)
1-2 years	14 (15.7)	33 (14.3)	32 (17.6)	34 (16.3)
2-3 years	7 (7.9)	6 (2.6)	6 (3.3)	5 (2.4)
More than 3 years	19 (21.3)	27 (11.7)	43 (23.6)	19 (9.1)
Total	89 (100)	231 (100)	182 (100)	209 (100)
	p=0.011		p=0.001	

Note: due to the rounding of percentage values to one decimal the total of a column is not necessarily 100%.

Social community engagement if related to the undergraduate status shows no difference in the domestic and foreign subsample. However, differences just appear when related to graduated medical doctors active in social services and organisations. Domestic students, men and women alike consider rather inappropriate to take over such engagements (males: 35.2%, females: 33.7%) compared to the foreign subsample (OR for men: 4.5, CI 95%: 2.43 to 8.34, p <0.001; OR for women: 4.98, CI95%: 2.8 to 8.85, p <0.001).

Regarding the self-rated health status, significant differences were also found between the domestic and the foreign subsample. Among males, there was a statistically significant difference in three of the eight components of self-rated health: physical capacities, limitations due to the emotional status and the emotional well-being. Results of statistical tests are demonstrated in Table 6.

Table 6. Comparison of components of self-rated health status between domestic and foreign male students

	Physical functioning	Role limitations due to emotional problems	Emotional well-being
N	331	331	323
Mann-Whitney U	9343.5	13782.5	13001
Wilcoxon W	38504.5	42702.5	40029
p-value	0.014	<0.001	0.001

If related to females, there was a significant difference in five entries of self-rated health status. Mean ranks and the outcomes of statistical tests are shown in Table 7.

Table 7. Comparison of components of self-rated health status between domestic and foreign female students

Categories	N		Average of ranks		Mann-Whitney U	Wilcoxon W	p
	Domestic	Foreigner	Domestic	Foreigner			
Physical functioning	182	215	211.98	188.1	17202	40422	0.013
Role limitations due to emotional problems	183	218	165.65	230.67	26415	50286.5	<0.001
Vitality	182	208	155.83	230.21	26148	47884	<0.001
Emotional well-being	182	215	163.33	229.2	26057.5	49277.5	<0.001
Social functioning	184	212	172.23	221.3	24337.5	46915	<0.001

The strategy of our multivariate analyses was directed by univariate analyses. Thus, we explored by countries of origin the impact of gender, age, diet, exercise, smoking and alcohol consumption on mental health status. Basic demographic data and characteristics of health and health risk behaviour of the subgroups (generated as it is put down in the Method chapter) are represented in Table 8.

Table 8. Basic demographic data and health behaviour by country distribution

Variables		Mediter-ranean	Scandina-vian	Israel	Iran	Hungary	Group differences
Gender n (%)	Males	37 (54.4)	54 (40.6)	65 (66.3)	23 (54.8)	88 (33.0)	$\chi^2_{(4)}$=38.639***
	Females	31 (45.6)	79 (59.4)	33 (33.7)	19 (45.2)	179 (67)	
Age (unit: years) Mean (SD)		22.9 (1.94)	24.8 (2.21)	26.3 (1.94)	26.1 (3.06)	22.8 (1.46)	$H_{(4)}$=231.556***
Diet n (%)	Unhealthy	24 (36.4)	39 (27.9)	35 (37.2)	11 (25.0)	91 (35.1)	$\chi^2_{(8)}$=9.417
	Average	33 (50.0)	71 (50.7)	45 (47.9)	28 (63.6)	134 (51.7)	
	Healthy	9 (13.6)	30 (21.4)	14 (14.9)	5 (11.4)	34 (13.1)	
Exercise n (%)	Inactive	16 (22.9)	13 (9.2)	10 (9.7)	9 (20.0)	26 (9.7)	$\chi^2_{(8)}$=22.725***
	Moderately active	15 (21.4)	13 (9.2)	16 (15.5)	5 (11.1)	34 (12.7)	
	Active	39 (55.7)	116 (81.7)	77 (74.8)	31 (68.9)	207 (77.5)	
Alcohol consumption (unit: standard drinks) Mean (SD)		6.7 (8.25)	8.1 (8.41)	4.6 (5.85)	3.9 (4.20)	3.3 (4.91)	$H_{(4)}$=71.628***
Overconsumption of alcohol n (%)		12 (18.5)	41 (31.8)	7 (7.4)	3 (8.6)	18 (6.8)	$\chi^2_{(4)}$=51.072***
Smoker n (%)		21 (30.4)	17 (12.3)	22 (21.4)	7 (16.7)	48 (18.0)	$\chi^2_{(4)}$=10.678*
Nicotine dependence mean (SD)		2.37 (1.86)	1.41 (2.26)	1.76 (1.78)	3.33 (3.45)	1.2 (1.24)	$H_{(4)}$=7.601

* p<0.05, ** p<0.01, *** p<0.001

Using the Mediterranean subsample as a reference, we analysed the predictors of healthy diet, vigorous exercise, tobacco smoking and overconsumption of alcohol by multivariate binary logistic regression. As related to the healthy lifestyle, the male versus female dichotomy proved to be a reliable predictor: females were more likely to follow healthier diet than males. It is true even if related to the vigorous exercise. In order to prove this, we also identified further useful predictors. Iranian students are less active if compared to the Mediterranean region like the female versus male comparison. Non-smokers and those following healthy diet were more likely to exercise than smokers and consumers of less healthy diet. Scandinavian students were less likely to be smokers than the Mediterranean sub-

sample, while our results indicate that those who are physically inactive and drink more alcohol are also more likely to smoke. Being Scandinavian turned out to be a predictor for alcohol overconsumption if related to the Mediterranean region while Hungarians consumed a reduced amount. Age was also significantly associated with consumption patterns of alcoholic beverages: younger participants seem more likely to drink excessively.

Analysis of mental health subscales of SF-36 was also performed in five groups of countries while obtaining significantly different outcomes. Pairwise comparisons for the subscale "Role limitations due to emotional problems" indicated that Hungarian students have significantly worse results ($p<0.001$) than any others, while no significant difference was detected among the remaining subsamples. Results were similar of the "Vitality" subscale ($p<0.05$), except for Iranian versus Hungarian students, who did not indicate any significant difference. Pairwise comparisons of the "Emotional well-being" subscale resulted in significant ($p<0.05$) differences between Hungarian and Scandinavian students, similar to Hungarians versus Israelis, while Iranians scored significantly lower than Scandinavians ($p=0.003$), and there was only a borderline significant difference if related to the Israeli students ($p=0.053$). The patterns of differences among subgroups were very similar in the "Social functioning" subscale: Iranians and Hungarians had significantly lower mean scores than Israelis and Scandinavians ($p<0.001$).

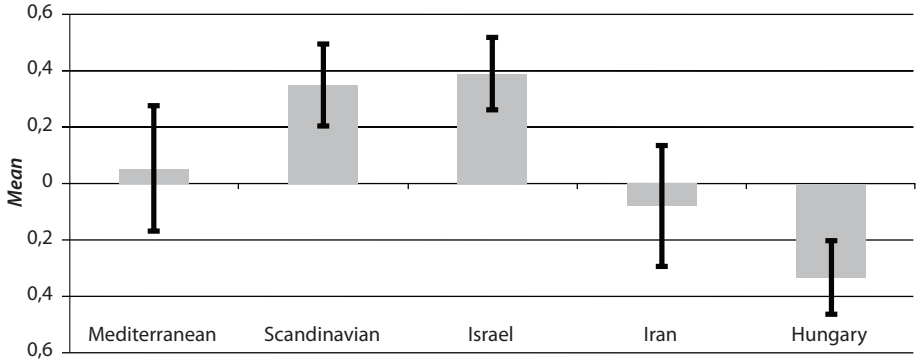
Table 9. Comparing of country groups along mental well-being

Scales of SF-36	Cronbach-α [CI_{95}] (No. of items)	Mediterranean	Scandinavian	Israel	Iran	Hungary	Group differences
		Mean (SD) [Median]					
Role limitations due to emotional problems	0.83 [0.80–0.85] (3)	75.6 (39.60) [100]	79.6 (35.47) [100]	85.7 (29.68) [100]	79.1 (34.14) [100]	57.1 (40.73) [66.67]	$H_{(4)}=$ 66.792***
Vitality	0.75 [0.72–0.78] (4)	59.0 (17.63) [60]	63.4 (17.87) [65]	63.6 (17.07) [65]	58.1 (17.42) [60]	53.7 (20.57) [55]	$F_{(4)}=$ 8.481***
Emotional well-being	0.83 [0.80–0.85] (5)	72.8 (15.99) [76]	78.7 (15.35) [84]	76.5 (13.75) [80]	69.1 (14.48) [68]	67.4 (19.92) [72]	$F_{(4)}=$ 12.25***
Social functioning	0.75 [0.70–0.78] (2)	76.5 (23.49) [87.5]	83.8 (21.15) [87.5]	85.8 (16.95) [87.5]	71.8 (20.61) [75]	72.1 (24.07) [75]	$H_{(4)}=$ 46.947***

*** *p<0,001*

We gained useful results by the principal component analysis of SF-36 mental health subscales. Component weights were identified in the range 0.76 - 0.89 with 65.9 % explanation of the total variance. Results of one-way ANOVA indicate that the country of origin is significantly related to the mental health ($F_{(4)}$=18.704, p<0.001, η^2=10.2%). Post hoc tests (Games-Howell Test) indicate that the mental well-being of Hungarian students is significantly lower than that of students from other countries, except the Iranians (Figure 1). Results of the multiway ANOVA indicate that the main effect of country of origin remained significant after adjusting for potential confounding variables ($F_{(4)}$=7.562, p<0.001, η^2=10,2%). The importance of exercise is also significant, while gender and diet showed narrow borderline significant values. The association between country and gender was also marginally significant (Table 10.).

Figure 1. Comparing students of different countries by principal component of mental health



Note: 95 % CI's of means are also demonstrated.

Table 10. Predictors of quality of life by multi-way ANOVA

Variables	F-value	p-value
Country	7.562	<0.001
Gender	3.046	0.082
Country * Gender	2.078	0.082
Age	0.020	0.887
Diet	2.917	0.088
Exercise	5.626	0.018
Alcohol	0.137	0.711
Nicotine dependence	0.135	0.713
Adjusted R^2 (%)	14,2	

Note: n=522. Grey shading indicates significant (p<0.05) associations.

Conclusions

Discussion

Among the sub-samples, there were more differences recorded. Our foreign students' average age is higher, explained clearly by the country-group analysis because of the Israeli and Iranian subsample. The reason behind is the mandatory military service in both countries (e.g. 3 years for men and 2 years for women in Israel). Another difference was observed in the gender distribution. In the Hungarian subsample, the rate of female students was about 20 per cent higher (a total of 67 per cent) than among foreigners. Gender difference was observed in the country-group analysis as well. The percentage of men exceeded generally fifty per cent margin, except the Scandinavian sub-sample, where it reached only 40 per cent. As far as our Hungarian sub-sample is concerned, it is almost certain that no sampling error occurred. The total sample contained only fourth year students and it was representative of the overall fourth year population according to the data of study administration of the Semmelweis University. Male / female rate was 37.4% – 63.6% in the Hungarian population in line with our previous observations. Among fourth year foreign students the overall male / female rate was 54.8% / 45.2% similar to our sample. Unfortunately, we had no access to the data of the student's nationality.

In line with previous studies, we also found that among medical students, females follow healthy diet in a higher proportion. Thus being a male is a risk factor of unhealthy diet even in a population with exceptionally broad knowledge of nutritional sciences. In addition to gender differences, it was observed that foreign students – as a consolidated group –, used healthier food than the Hungarians. However, we were not able to identify a distinct country-group members of which should have followed extremely healthy or unhealthy diet. There were considered several explanations. Let us assume that our observations sustain the phenomenon (as registered by many other researchers) that young people from Mediterranean countries do not necessarily follow the Mediterranean diet. Otherwise, it is almost certain that young people from other countries are aware of the importance of a healthy diet, and their vegetable and fruit consumption is as good as that of their Mediterranean peers.

Using multivariate analysis, we succeeded to demonstrate significant interrelations among healthy diet and females and frequent vigorous exercise. By the nature of the cross-sectional studies, there is no way to demonstrate cause-and-effect relationships, but some correlation turned out to be strong enough: if compared with inactive population physically active women were 3.2 times more likely to keep a healthy diet. The commonplace about the physically more active males was

not supported by the countries of origin. According to our dichotomous analysis, Hungarian male and female students are physically less active in vigorous exercises than those from abroad. However, collapsing moderate exercise with vigorous one for estimating total physical activity – as indicated in the Methodology section – this difference disappears. Based on the country specific analysis and referred to the Mediterranean region, Iranian students were the least inactive. Iranian researchers indicated the same experience about the obviously low sporting activity, in a domestic population. Thus, the country of origin might play a role in this regard. About Hungarian medical students, we can say with high certainty that they prefer more frequent but moderate forms of activity instead of less frequent but more strenuous exercises.

In case of tobacco smoking, we expected parallel outcomes with that of foreign studies. Self-admitted smokers represented more than 25 per cent of the domestic student population and 2 out of 10 among the foreigners. The same percentage was 12-13 among female students respectively. The country specific analysis showed that the highest proportion of smoking students was registered in the Mediterranean countries: without gender separation, their part surpassed the 30 per cent limit. The most obvious dependency by the Fagerström test (3.3 average score on the 10 units scale) was measured among them, however it did not prove to be significant if related to all other groups of countries. It may be considered as a positive phenomenon that the average degree of dependence was low or very low among Hungarian and foreign students as well. On the other hand, further reduction of smoking students' proportion should be more promoted because we cannot report any positive changes when referred to the former studies in our country.

Alcohol consumption was particularly high in our sample as 80-90 per cent of men and 75 per cent of women are involved. In the female subsample, there was a significant difference between Hungarian and foreign students: a smaller proportion of Hungarians drink alcoholic beverages. The country specific analysis revealed that there were Scandinavian students behind this difference. This astonishing outcome may explain an earlier Norwegian research having indicated that Norwegian students show different health behavioural patterns pre-eminently in the alcohol consumption in domestic environment versus abroad. Background factors may be versatile, e.g. the strict alcohol policy of all Scandinavian countries. Additionally, the Hungarian retail price of alcoholic beverages is much lower than in Sweden or Norway and not only in retailer business but in bars and other similar settings too. In addition, the Nordic countries are well known by their gender equality practice with consequences also in the risk behaviour of the population. Thus, there are no gender differences in alcohol consumption as well in this region.

Regarding the self-rated health status, Hungarian participants were matched not only with students in the English program but also with available average

normal values of the general domestic population. Thus, we can state it with high certainty that following the SF-36 methodology of evaluation there were the main gender scores of the four emotional components significantly lower than that of the general population. It indicates clearly that if compared to the average population aged 18–24 years the fourth-year medical students may have been influenced by several factors that affect negatively their mental status.

Significant differences were also recorded between Hungarian and foreign students in self-rated health status by collapsed variables and country specific settings too. Among males, the difference was rather moderate. In our overall analysis, domestic students considered themselves to be in a more favourable physical status, than the foreigners. Meanwhile, in emotional well-being and „limited activity because of emotional status" sections, foreigners recorded better results. Among females, we observed the same phenomenon. Hungarians considered their physical performance being better than did it the foreigners. On the other hand, they scored significantly lower in the four emotional components than the foreign students.

Practical consequences

Our cross-sectional study and the review of the relevant literature provided an opportunity to think generally over the health promotion practice in health professionals' education. Actually, we do not have sufficient knowledge about lifestyle and stamina of future medical doctors and all factors that may have a significant impact on. This is especially true when concerning mental health problems (e.g. depression, anxiety, burnout, suicidal thoughts), which require much more attention than they have actually. One of the reasons behind may be the low-key collaboration of universities in research activities promoting of which would result in „large scale" surveys similar to the former international programs. It would be the best option to arrange a nationwide study targeting the overall student population. Outcomes of this study could certainly be measured by similar databases published in the international literature.

Our foreign versus Hungarian and country-specific analyses revealed the Hungarian medical students' lower self-rated health status and less favourable lifestyle if contrasted to the general domestic sample and international settings. Lifestyle problems occur in less healthy diet and insufficient physical activity. In conclusion, similar to the primary schools with regular daily physical trainings and canteen-reforming dietary programs, the same health programs are needed in facilities of higher education as well. Given, that colleges and universities of health sciences provide full academic knowledge on health and diseases, future initiatives could certainly be started with extending the practical cure options (e.g. planning physical exercise programs in university settings or discussing dietary suggestions in practical trainings).

Medical students are in advance when realizing and weighting problems of tobacco smoking and alcohol overconsumption if compared with the general population. It might sound radical, but the idea of „totally smoke-free university campus" is a reasonable aim with zero tolerance toward all medical students and the whole staff as well. Alcohol consumption is a more complex issue, because the high level of knowledge about all harmful effects of overconsumption is not a protective tool in itself. Instead of repeating routinely the anti-alcohol commonplaces, the present situation underlines clearly the need for much more sophisticated prevention programs to achieve any positive changes.

Our research confirmed positively the statistical association between exercise and better mental status. This may have its place in medical lifestyle suggestions: doctors exercising regularly provide their patients with more practical advices about physical activity options. It would be worthwhile to consider teaching physical exercise as a therapy and as an „additional treatment for state-improving" during the medical training. Promoting university sport activities could be a part of this project too.

Weighting the results of our research, cultural diversity of universities must also be taken in account. Nowadays, national higher education programmes take up more and more students from very different parts of the world creating this way a multifaceted community. All this results in the globalization of education, shorter or longer visiting scholarships or even complete academic years spent abroad. Having all these in mind, health promotion programs targeting university students cannot ignore their country of origin, cultural background, and necessarily the limited skills of language. Taking all these in account, we shall be able to invent more effective prevention programs.

It is a great fortune that we can stop and even reverse negative trends looking over only a little more consciously the prevalent situation. This is probably true both in mental and physical health. As demonstrated, scientific evidence shows, we can go around the emerging burnout syndrome. The medical students' mental health status may improve only a single semester workshop substantially. The need is absolutely justified to spread this effect, considering even by mandatory participation for all medical students like providing vaccinations. Based on the relevant WHO definition, it is not hard to define supporting health as summarized in the following entries:

– Living in harmony with ourselves and our environment,
– Avoiding stress, and if present processing it properly,
– Exercising physically,
– Taking a balanced diet,
– Rejecting tobacco smoking and avoiding any harmful habits

However, raising the knowledge of preserving and promoting health, like other issues, is not of spontaneous nature. Beside the family providing the basic knowledge, there are other pre-eminent social platforms spreading credible and trustworthy information for the young population. It is useful, when educational facilities parallel to their basic commitments take also part in the health promotion even by involving external resources. Any familiar, well-known social environment gives the best opportunity not only to transfer knowledge of health promotion, but to couple it also with good practices.

List of publications

Thesis-related publications

1. Ferenc Horváth, András Terebessy, Vince Pongor, Péter Balázs
   Ethical norms of medical school students and the workforce migration
   NEW MEDICINE 19:(1) pp. 62–66. (2015)
2. Terebessy András, Horváth Ferenc, Balázs Péter
   Életmódbeli és önértékelt egészségiállapot-különbségek magyar és külföldi orvostanhallgatók körében
   LEGE ARTIS MEDICINAE 23:(1) pp. 53–60. (2013)
3. András Terebessy, Mária Hérincs, Ferenc Horváth, Péter Balázs
   University student's perception changed by permissive demonstration of alcohol consumption
   NEW MEDICINE 17:(2) pp. 62–66. (2013)
4. Horváth Ferenc, Terebessy András, Balázs Péter
   Nézetek az orvosi hivatásról negyedik évfolyamos orvostanhallgatók körében
   EGÉSZSÉGTUDOMÁNY 56:(1) pp. 28–40. (2012)
5. Terebessy András, Horváth Ferenc, Balázs Péter
   Impact of the mediterranean lifestyle on the health status of foreign medical students in Hungary
   MAGYAR EPIDEMIOLÓGIA 8:(3) pp. 167–173. (2011)
6. Horváth Ferenc, Terebessy András, Balázs Péter
   A hálapénzkérdés értékelése IV. éves orvostanhallgatók körében
   LEGE ARTIS MEDICINAE 21:(8-9) pp. 559–563. (2011)

Other publications

1. Voros Krisztian, Prohaszka Zoltan, Kaszas Edit, Alliquander Anna, Terebesy Andras, Horvath Ferenc, Janik Leonard, Sima Agnes, Forrai Judit, Cseh Karoly, Kalabay Laszlo
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   ARCHIVES OF MEDICAL RESEARCH 43:(7) pp. 548–554. (2012)