The health status and
health behaviour of university students

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Introduction

1. Health and Education

Health promotion strategies can be implemented in several settings of which are of particular importance the educational institutions where the teaching and education of future generations take place. The classical method of education directly transfers knowledge and skills to the pupils or students by the teacher. However, besides this direct transfer of knowledge, the educational institutions have a profound influence on the personality development, attitudes, and self-esteem of students as well as their health literacy and health behaviour through their processes, environment and atmosphere – the so called hidden curriculum.. The health literacy and health attitudes of each and every teacher influences the students in a positive or negative manner in shaping their own health behaviour since teachers serve as role models also regarding health behaviour. In spite of this fact, rather few information is provided by the national and international literature about the health conditions and health behaviour of teachers and teacher trainee students. Such studies are warranted, given the fact that according to available data, the health behaviour of the young Hungarian population is rather poor: 44% of young males and 32% of young females (of the 18-34 age group) are smokers; almost one-fourth of the 14-16 age olds have already tried drugs, and approximately one-fifth of the teenagers are obese or overweight.

2. Health Status of Teachers and Teacher Trainee Students

Information on Hungarian teachers and educators of other nationalities is insufficient. The Hungarian Population Health Survey (Országos Lakossági Egészségfelmérés, OLEF) provides reliable data on issues related to health behaviour, but neither the last population survey of 2003 nor the former survey collected data concerning the lifestyle of this particularly important social group.

A few surveys in this topic have been published in the international literature though these focussed only on specific fields of health behaviour such as smoking, alcohol consumption, exercise or mental health, respectively. During the last fifteen years, out of all these issues, mental health has gained particular importance.

It is essential to conduct studies on the health status and behaviour of educators and teacher trainee students who have a profound role in shaping the health behaviour of the future generations so as to plan interventions if necessary. Due to their status and age, teacher trainee students can be more easily involved and positively influenced than older teachers with mature personality. Upon surveying the health behaviour of teacher trainee students, health behaviour problems may be identified that need to be addressed, and subsequently, interventions to efficiently change them can be developed. Studies on their mental health are also important since teaching is accompanied by serious and permanent mental stress for the management of which teachers should be prepared.

3. Mental Health as the Priority of Public Health

The global importance of mental health had been highlighted by the Global Burden of Disease Project in which a complex morbidity indicator, the disability-adjusted life year (DALY) – an indicator enabling comparisons between morbidity associated with different illnesses - was developed in the early 1990s. Thereafter, studies for the quantification of the global burden of disease indicated that mental diseases are the among the leading causes of the global burden of disease.

According to the definition by the World Health Organization, mental health is a „state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community". The cognitive, emotional, social and spiritual dimensions of mental health can be measured by numerous methods and instruments of which questionnaires are the most widely applied.

Depression, a profoundly frequent mental disorder reflecting mood impairment is a significant health risk factor. This disorder is strongly correlated with the most important self-destructive behaviours (smoking, excessive alcohol consumption), and it is a significant risk factor of cardiovascular diseases as well. Its assessment is based on a commonly used questionnaire compiled by Aaron T. Beck. The shortened version of Beck's scale is not suitable for establishing the clinical diagnosis, but can be reliably utilised to identify individuals with likely depression who need further clinical examination.

Aaron Antonovsky, an American medical sociologist developed his 'Salutogenesis Model' to describe the genesis (development) of health as related to personality and resistance resources.

This even nowadays is a unique model dealing with the reasons of being healthy instead of being ill, and based on the so-called sense of coherence which can be determined for each individual. The sense of coherence is a global orientation that expresses the extent to which a person has a pervasive, enduring as well as dynamic feeling of confidence. This complex self-esteem consists of three components: 'comprehensibility' according to which one perceives stimuli deriving from one's internal and external environments as structured, predictable and explicable; 'manageability', meaning available resources to cope with the aforementioned stimuli; and 'meaningfulness' so that stimuli are worthy of investment and engagement for the individual. Sense of coherence is related to health, and it correlates with the ability of the individual to overcome the challenges of life. It can be measured by a validated 29 item 'Orientation to Life' questionnaire, or with its abbreviated 13 item version which has been translated to 33 languages and widely applied nowadays.

The General Health Questionnaire, has been a commonly used instrument to assess mental health and has also been applied in the Hungarian Population Health Survey,. It detects the magnitude of psychological stress, and although not suitable to establish an exact clinical diagnosis, it has been widely used to screen mental disorders in the general population. It has been translated to more than 35 languages and utilised in population studies as well as among those receiving primary care. Items of the questionnaire reflect the prevalence of various symptoms which have to be assessed by the respondent for the past several weeks. The higher the score value obtained, the higher the probability of the impairment of mental functioning and thus pathological mental distress.

Aims

Our survey aimed to elucidate the health status and behaviour of Hungarian teacher trainee students, i.e. future teachers, and to identify those possible problems which should be addressed.
Application of a methodology that enables us to compare the parameters characteristic of the target population with that of the general population as measured in the former Hungarian national surveys, namely the Hungarian Population Health Survey of 2003 (OLEF 2003) was a guiding principle of our study.

A major aim of the study was to assess – for the first time in Hungary – sense of coherence as defined by Aaron Antonovsky using his abbreviated 13-item questionnaire. Since this had not been available in Hungarian, translation and validation of this questionnaire also had to be carried out. For this reason, comparison of the information obtained on sense of coherence with national data was not possible.

We intended to survey students enrolled in institutions of higher education at different locations in Hungary. For financial and logistical reasons, it was important to apply a data collection method which is suitable for assessment and provide data in a cost-effective manner from this geographically distributed population. Web-based data collection would have been an obvious method, but we could not find a methodological guide for its implementation in the national literature; while international publications underlined rather the difficulties of web-based data collection methods and low response rates. Therefore,a pilot study had to be conducted to determine which one of several data collection methods can provide the highest possible response rate, or at least an acceptable rate of 60% enabling assessment at the smallest expense within the shortest time frame.

Keeping all these considerations in mind, the aims of our studies can be summarised as follows:

1. Development and validation of a survey tool suitable for assessment of the university students' health status and health behaviour.
2. Identification of a cost-effective data collection method providing high response rates within geographically scattered populations.
3. Surveying the health state and health behaviour of students.

Methodology

1. Development and Validation of the Instrument

Development and Testing of the Questionnaire
Concerning the questionnaire, it was a basic requirement that the instrument should consist of validated questions on each survey topic. Since such a questionnaire was not available, it had to be developed taking the self-administered questionnaire of the Hungarian Population Health Survey of 2003 as a starting point. The Beck depression questionnaire and the

abbreviated version of Antonovsky's Orientation to Life questionnaire were also used for the development of our survey instrument.

The introductory page of the questionnaire contained general information followed by several unnumbered demographic questions (age, gender, field and year of academic studies, occupation). Questions No. 1-30 were selected from the personal and self-administered questions of the OLEF 2003 instrument for the assessment of health status, exercise, body mass index, smoking, alcohol consumption and mental stress. The second section contained the shortened 13 item scale (SOC-13) for the assessment of sense of coherence which was translated and validated by us. The third section involved the abbreviated Beck depression scale for the assessment of anxiety and depression, suitable for screening purposes. The questionnaire of the pilot study consisted of altogether 53 questions grouped into 9 domains corresponding to the survey topics. The questionnaire was field-tested by involving respondents of diverse age groups and of educational backgrounds in order to identify any possible difficulties in understanding of or responding to our questions. Data were recorded in MS Access 2000 by manual entry; and Stata 8.2 was used for statistical analysis.

Revision and Web-Adaptation of the Questionnaire

The instrument was modified on the basis of the results obtained in the pilot study. Beck's depression scale was omitted and replaced by the full version of the 12 item-long General Health Questionnaire (GHQ-12) scale for the assessment of psychological stress as in the Hungarian Population Health Survey of 2003. Questions for the assessment of health behaviour, physical exercise, smoking and alcohol consumption were simplified and the number of questions reduced. A 7 item-long scale was included for the assessment of social support, taken from the self-administered version of the OLEF of 2003 which was supplemented by one new question of ours concerning support received at the university or college.

Ten questions on drug consumption were also included in the questionnaire as taken from the instrument of the European School Survey Project on Alcohol and Other Drugs (ESPAD). New questions were designed including two questions on sexual activity and use of contraception, questions on student status, two questions about the intention to become a teacher and having studied pedagogy, and one question concerning the person(s) whom the respondent lives together during the academic term.

A web-based version of the questionnaire identical in terms of content, question sequence and response options with the paper-based one was also developed. This questionnaire was hosted

on the standard Linux server of the Faculty of Public Health with PHP and MySQL support, and run without client-side srcipts or cookies. Items followed a short introduction (112 words). There was one text-only scrolling page containing 80 questions viewable on all platforms with an 800×600 pixel screen. Data were automatically loaded into a MS Access database. Respondents were requested to log in by entering a 10-character long self-invented user ID; their Internet protocol (IP) numbers were not logged. Alpha testing of the modified questionnaire was conducted by employees, while beta testing was carried out by voluntary students of the Faculty of Public Health. Both the paper-based and Internet questionnaires were easy to complete within less than 20 minutes. In each survey described hereafter, the modified, extended questionnaire was applied.

2. Testing of Data Collection Methods for Response Rate

Establishing the methodology of data collection was a rather challenging task due the nationwide nature of the survey, the requirement of cost-effectiveness and the transition of the Hungarian higher education to the Bologna system. For a nationwide survey, defining a uniform data collection method applicable in each institution without excessive administrative and travel expenses and fitting within a certain time frame of data collection was crucial. The stratified sampling of academic years and study groups was not possible due to the transition process to the Bologna system, since these categories became irrelevant upon implementation of the credit system and the BSc-MSc-PhD levels of higher education; as a consequence, the earlier homogeneous groups of students following a uniform schedule disappeared. However, implementation of the electronic study administration system in all institutions of higher education – in which all students are enrolled and registered under a specific registration code – enabled us to use this system in surveying. According to the literature, however, Internet surveys generally and even among students yield low response rates. Therefore, following the validation of the questionnaire we had to identify a data collection method which not only produced an acceptable response rate but also met the above-mentioned requirements of cost-effectiveness. Four data collection modes were tested in February of 2007 among those students of the University of Debrecen who were not targeted in the main survey later on. Data collection was conducted during the enrolment period for the 2nd semester, therefore all students had to use the Electronic Studies Administration System.

Method 1 collected data face-to-face data by directly approaching study groups. It was only applicable to Faculties where student groups were still existent, that is, at the Faculty of Medicine. Altogether 976 students were enrolled in the 1st – 5th year at the Faculty of Medicine of the Medical and Health Science Centre of the University of Debrecen divided into nine study groups per academic year. By random sampling one study group of each academic year, altogether 100 students had been selected. Following preliminary agreement with instructors, the survey was conducted by approaching the students in person after seminars.

In Method 2, 1406 students of the Faculty of Health at the University of Debrecen were invited through the electronic messaging system of the University to attend a given location within a specified time interval to complete the questionnaire. Location was a selected public space in a Faculty building visited by the all the students on a daily basis; altogether three occasions were provided for the completion of the questionnaire. Students were informed one week prior to the first data collection via email which was repeated one day prior to each occasion of data collection.

Method 3 was almost identical to Method 2, except that a pedometer was promised to those who would come to the survey venue and complete the questionnaire. This method was tested among all 415 students of the Faculty of Dentistry at the University of Debrecen.

Method 4 collected data through the Internet inviting all 1764 students of the Faculty of Economics at the University of Debrecen. Students were, as in Methods 2 and 3, informed of the data collection through the electronic messaging system of the University. The email message contained a hyperlink which transferred them to the web-based questionnaire to be completed on-line. Information delivery was secured by sending the message through the Electronic Studies Administration System three times separated by one-week intervals.

Altogether 3685 students were approached at the University of Debrecen.

3. Instrument and Methodology of Data Collection among Teacher Trainee Students

Instrument of the Main Study (Questionnaire)

The questionnaire altogether had 80 questions divided into three main themes (health behaviour, health status and demographic characteristics). A description of the questionnaire can be found in the subsection 'Revision and Web-Adaptation of the Questionnaire'.

Sampling

A three-phase stratified sampling was applied. At first, six institutions of higher education: the University of Debrecen (Debreceni Egyetem: DE), Eötvös Loránd University (Eötvös Loránd Tudományegyetem: ELTE), University of Szeged (Szegedi Tudományegyetem: SZTE), University of Pécs (Pécsi Tudományegyetem: PTE); and two colleges, the state-owned Berzsenyi Dániel Teacher Training College of Szombathely at Western Hungary (Berzsenyi Dániel Tanárképző Főiskola: BDF) and the church-affiliated Kölcsey Ferenc Teacher Training College of the Reformed Church (Kölcsey Ferenc Református Tanítóképző Főiskola: KFRTKF) were selected on the basis of the institutional register of 2005-06 of the Ministry of Education and Culture. The sum total of the students enrolled in these institutions was 136 004 in the academic year 2005-06. Thereafter we identified and selected altogether 27 faculties within the selected institutions which offered teacher training study programs for the academic year 2006-07. Third, we determined the population of students (sample frame) to be involved in the study: 1) students conducting BSc/BA or MSc studies at university or college level; 2) full-time students involved in the credit system based or traditional education in Hungarian language; 3) students enrolled between academic years 2001-02 and 2006-07 (not first year students); 4) registered active students for the first semester of academic year 2006/07 at the selected faculties.

First-year students were excluded since the path to teacher training cannot be chosen during the first year within the Bologna system. According to the figures provided by the institutions, the sampling frame consisted of 30901 persons. Determination of the sample number was performed by the StatCalc program of Epi-Info version 3.3.2. Upon the assumption of a population of 30680 persons, calculating with a minimum frequency of 8% at 0.99 confidence level the random sample shall consist of at least 1423 persons. Accordingly, a sampling of 5% was determined, and the sample was calculated to be 1545 students. The Registrar's Departments at each University sorted all students of the selected 27 Faculties eligible for the survey by their personal registration code in the electronic administration system, then the residential address and email account of every twentieth student were saved into a separate file. Personal information of the students selected for the survey were not released to the researchers by the institutions.

Data Collection

Students selected by sampling received a letter of information about the surveys mailed by the universities to their residential address which included the URL of the web site of the internet questionnaire, a printed version of the questionnaire along with a stamped envelope for return, and a pedometer as a gift. The letter of information was also sent through the electronic administration system. Thereafter, students received one mailed and one electronic reminder for completion of the questionnaire. For those completing the questionnaire, the chance for winning two kind of presents of greater value (20 InterRail tickets and 20 entrance tickets for the Sziget Festival) were also offered; names were drawn among those who sent their contact details to a given email address.

Data Processing, Entry and Analysis

Data entered in the internet questionnaires were directly loaded into an electronic database, while those in the paper-based questionnaires were entered manually into the same electronic database (645 web-based and 414 paper-based questionnaires of the altogether 1059 questionnaires). Following inspection and data cleansing, 1009 questionnaires were subjected to analysis by the Stata program version 9.0.

Results

1. Development and Validation of the Instrument

Demographic Characteristics:

120 completed questionnaires were received in the pilot; 81.6% of respondents (98 persons) were female, male respondents represented 18.3% (22 persons); the mean age of the group was 28 years. The youngest respondent was 18, while the oldest one 63 years old. In accordance with the target population of the main study, students of higher education were overrepresented within the sample, comprising 55% of the sample. The importance of this is underlined by the fact that they served as the target group of the main study, and our principal aim was to obtain a reliable answer to whether in this respect the questionnaire would be suitable for the survey. We also assessed the distribution of the students by discipline: 9.2% were specialised in teacher training, 16.7% in physiotherapy, 16.7% were studying to become

health visitors, while 11.7% studied other specialties. The sample involved 33.3% college, 20.8% university students and 17.3% secondary school students in the final year. The remaining 28.87% were employees in various occupations.

Characterization and Inner Consistence of Health Related Scales

Sense of coherence by the Orientation to Life questionnaire

In respect of sense of coherence, 119 out of 120 questionnaires (99.1%) were found suitable for analysis. The mean score of sense of coherence 59.24, with a standard deviation of 13.75. A recently published meta-analysis reviewing 127 studies reported SOC-13 score means falling into the range 35.39 (Standard Deviation (SD): 0.10) – 77.60 (SD: 13.80). The mean value we have determined fell into that range. The lowest score was 23, the highest 86 (the minimum and maximum values of the score are 13 and 91). The inner consistency of the individual questions of the scale was determined by Cronbach's alpha with a value of 0.88. This value falls into the Cronbach's alpha range of 0.70-0.92 reported in the above-mentioned meta-analysis of the 127 surveys where SOC-13 was applied.

Depression by the Beck depression scale

118 of the 120 questionnaires (98.3%) proved to be suitable for analysis. The mean score was 14.68, with a standard deviation of 4.58 for the analysed sample. The lowest score of responses was 9, the highest 28 (minimum and maximum values are 9 and 36). The Cronbach's alpha value reflecting the inner consistency of the questions within the domain was 0.79.

Psychological stress by the General Health Questionnaire-12

The mean score was calculated upon the summation of the absolute values of the responses for questions 27, 29, 30 and the reverse response values for questions 26, 28. Altogether 119 questionnaires were suitable for analysis. The mean was 12.73 with a standard deviation of 2.89 and a Cronbach's alpha value of 0.76. The lowest score was 6, the highest 20 (the minimum and maximum values for the responses were 5 and 20).

On the basis of the pilot testing we concluded that questions of those two scales with the highest error rates ('Eating Habits' and 'Exercise') should be adjusted. The inner consistency of the Hungarian version of the SOC-13 coherence questionnaire was high, and suitable for the assessment of the sense of coherence of those involved in the survey, and exhibited a

strong correlation with other indicators of health status. Although the Beck scale is a reliable instrument for the assessment of depression but we decided to drop it since detection of the extent to which the population is disposed to depression was not in the focus of this survey. Besides that, questions of the 'psychological stress' scale related to sleep disorders and depression strongly correlated with the Beck scale. Concerning the questions on smoking and alcohol consumption, indicators of health behaviour, we concluded to keep them but narrowing the items of these domains. The final version of the questionnaire was developed by the modifications described in the 'Revision and Web-Adaptation of the Questionnaire' subsection.

2. Comparison of Data Collection Methods for Response Rates

Of the 89 questionnaires distributed during face-to-face contact, 81 was completed representing a 91.01% response rate (Method 1). However, only 45 students of the 1406 receiving preliminary electronic notification have come in person to fill the questionnaires in the frame of Method 2 (3.20% response rate). The promise of a gift upon filling the questionnaire was received by 415 students of whom 1.93% participated (Method 3). 1764 students were requested to fill the web-based questionnaire (Method 4) of whom 7.60% complied.

In the course of a mail questionnaire survey conducted by Feith et al. among female medical students of the University of Debrecen, 46.2% of the approached 253 students gave responses suitable for analysis (i.e. responses for at least 90% of the questions).

The most efficient data collection method was achieved by direct contact; the second most successful being mail surveys. The other methods resulted in such low response rates that the data would not be eligible for further analysis.

Personal approach can be a successful method for data collection, although not in all cases. It can be suitable if a group is assembled in a certain place; responses can be facilitated by the fact that those surveyed may address questions to the colleagues present, and face-to-face, responses are presumably less frequently refused. On the other hand, this method is not cost-effective for surveying a greater population scattered in several distant locations.

Mail survey is the second most effective method by which many people at widespread locations can be reached in a cost-effective manner. The participants are able to complete the questionnaire when they have enough time; however there is a risk that they may forget about it or may not send it back due to their not being motivated.

Relying on the experience obtained during the pilot study, we decided to combine the mail survey (paper-based questionnaire) with the internet-survey taking into account the computer literacy and internet accessibility of our target population. In addition, we provided non-conditional and conditional gifts to increase participation in the survey.

3. Mental Health of Medical Students

The personal data collection method applied among the students of the Faculty of Medicine of the Medical Health Centre of the University of Debrecen resulted in a dataset that was suitable for statistical analysis. One randomly selected study group of each academic year were involved in the survey, as it was described in the second chapter 'Methodology'.

Demographic Factors

Males represented 43 (confidence interval: 29.5-58.1), whereas females 57% (confidence interval: 41.9-70.8) of the surveyed population. The mean age of respondents was 22 years (minimum: 19; maximum: 27 years), more than half of the students falling into the 20-22 year age group. Distribution according to the population size of the settlement of permanent residence was as follows: 11% lived in settlements of less than 3 000 persons, 18,5% lived in settlements of 3 000 – 10 000 persons, 22% lived in cities of more than 10 000 inhabitants, 46% was permanent resident of county seats, while 2.5% were residents of the capital, Budapest. 4% of the students were living alone, 18% were lodging with non-relatives, 32% was living with relatives, and 46% was staying in student hostels during the study period. Considering the parents' highest qualifications, 65% of the mothers possessed college or university degrees, this rate being 53% for fathers.

Mental Health

Surveying was conducted right after the exams of the semester, and GHQ-12 questions address the presence of symptoms during the preceding several weeks. The mean value of psychological stress (GHQ) was 24.47 points (SD: ±4.7; minimum: 14; maximum: 39), significant differences between males and females were not observed. However, the mean score exceeded the threshold value referring to the impairment of mental health in 18.5% of the students. This finding is of concern in light of the fact that according to the OLEF study of 2003, a significantly lower proportion, 10.5% of young Hungarian adults of the 19-27 age group scored above this threshold value compared to medical students ($p=0.028$).

The mean score of sense of coherence measured by the SOC-13 scale was 62.5 (SD: 9.95; minimum: 27; maximum: 81) among medical students. The mean value obtained for males was significantly, by 5.6 score points lower than females' scores (p=0.012).

75% of the students did not perceive lack of social support, 17.5% were not completely satisfied by the support received from those living in his or her environment, 7.5% did not receive at all the social support from his or her family or fellows requested to overcome problems. The mean score of social support was significantly, by 0.87 score point lower for males than for females.

Health Behaviour

89% of the students more or less frequently performed exercise lasting for at least ten minutes and inducing sweating or quick pulse. Such exercise was performed on a daily basis, several times a week, once a week or once a month by 20%, 52%, 27% and 1% of them, respectively. Having breakfast was a daily habit for 55% of the students; fresh vegetables and fruits were consumed every second or third day by 33%; on a daily basis by 36%; and several times a day by 17% of them. 7% of the students used only oil for cooking and frying at home, while 22% used both oil and fat. 63% of the students never tried smoking, 8% had already quit smoking, but 15% were daily smokers. By their own admission, 83% of students consumed alcohol, but only one of them on a daily basis. On the basis of the responses suitable for analysis (95%) 73% of students had not used any kind of drug until the survey, 14% tried marijuana first, while 8% took sedatives or narcotics without medical prescription. The motivation for trying drugs was curiosity for 62%, sleep disorders for 4% of respondents. Concerning sexual behaviour at 96% response rate, almost one-third (31%) of the students admitted that they had not yet had sexual intercourse. Among those who already had sex, 50% used condom, 41% birth control pill for contraception, 7% applied other means, and only one respondent admitted sex without contraception.

Of medical students involved in the survey, 74% assessed his or her health status as good or very good, and 96% thought that he or she could do much or very much for maintaining or improving his or her health. According to the survey, medical students in Debrecen seemed to have a good overall health status. Although 18% of the respondents were obese or overweight, almost 90% did exercise more or less regularly. More than half of the students had breakfast and consumed fresh vegetables or fruits on a daily basis, while 63% had never tried smoking and consumed alcohol rather occasionally only.

4. The Health Status and behaviour of Teacher Trainee Students in Hungary

Demographic characteristics

The mean age of the sample was 23.25 years (minimum: 20; maximum: 49 years). Concerning gender distribution of respondents, males represented 33%, females 67%. The majority of students were enrolled in Humanities (43%), Social Sciences (31%) or Pedagogy (15%). Almost one-forth of them were second year students, 27% were of third year, 24% were of fourth year, 14% were fifth year students, the rest having been enrolled in the institution for the sixth or seventh academic year.

Approximately 80% of the respondents have already taken up courses in Pedagogy, and almost half of the students expressed his or her intention to work as a teacher following the completion of studies, while 30% had not yet decided whether he or she would become a teacher.

Socio-Economic Factors

Residence of students was evenly – by proportions of 20% – distributed between settlements populated by less than 3 000, by 3 000 to 10 000, by more than 10 000 inhabitants, county seats or the capital, respectively. 40% of the students were living together with relatives, 31% with nonrelatives, almost one fourth were living in student hostels, and only 5.56% were living alone during the study term.

Concerning the distribution of the parents' qualification, we found that more than four-fifth of the mothers and more than half of the fathers possessed a secondary school leaving certificate or a degree.

Three-fourth of the students perceived their financial situation good or at least satisfactory, while 20% as bad or very bad.

Heath Status and Health Awareness

Self-perceived health status during the last 12 months was reported as bad by 5%, as satisfactory by 28.9%, as good by 51.7% and as very good by 13.6% of the students. Upon surveying psychological stress, its mean score was 24.97 (SD: 5.9; minimum: 12; maximum: 46). The mean score for the SOC-13 measuring sense of coherence was 61.52 (SD: 11.5; minimum: 21; maximum: 87).

The mean Body Mass Index (BMI) of the students was 22.11 kg/square metre (SD: 3.6; minimum: 13.87; maximum: 40.09). On the basis of the calculated results, 71% of the respondents had normal weight, 10% were thin, 15% overweight, and 4% obese. Concerning health awareness, more than 90% of respondents were aware of the fact that much can be done for maintaining or improving their health by themselves. Only six students thought that they could do nothing to preserve health.

Health Behaviour

Slightly more than half of the students never tried smoking, 9% had already quit smoking, and 17.4% were daily smokers. Approximately one-fifth of the respondents smoked only a few times a month, 65% consumed less than a pack of cigarettes daily, one-fifth used approximately one pack per day, and 12 students responded that they smoked other than cigarette. Recently one-third smoked less, while one-third smoked more than two years before, and 19% smoked the same amount. 60% of smokers tried to quit smoking during the last 12 months. Mean age at the start of smoking was 17 years (SD: 2.3; minimum: 11; maximum: 26). By their own admission, 87% of students consumed alcohol, 19 persons (2%) on a daily basis, others only a few times a month or even less frequently.

Based on 97% of the responders, 63% of students had not used any kind of drug until the survey. The most frequently tried drugs were marijuana and hashish (30%), followed by the use of non-prescription sedatives or narcotics (5%). The motivation for trying drugs was predominantly (70%) curiosity. As to sexual behaviour, 15% of students claimed that they had not yet had sexual intercourse. Responses concerning the applied contraception methods were rather varying. Almost all available methods were mentioned by the respondents (96%). The most frequently used contraceptives were condom (37%) and birth control pills (37%), while only 0.2% used post-coital pill. According to their own admission, 35 persons (4%) did not apply contraception to prevent unintended pregnancy during the last sexual intercourse.

Having breakfast was a daily habit for 44% of the students. Fresh vegetables and fruits were consumed several times a day by more than half, two or three times a week by almost one-third of the respondents. According to the responses on physical activity, exercise lasting for at least ten minutes and inducing sweating or quick pulse were performed by 90% of the students.

Mental Health

We have encountered strikingly unfavourable results relating to indicators of mental health upon assessment of health and health behaviour related parameters. The magnitude of psychological stress exceeded the value which can be deemed as average in 24.1% of the respondents.

5. The Health Status of Teacher Trainee Students' by Institution of Higher Education

The institution-specific response rates obtained at ELTE (67%) and PTE (71%) exceeded the national average value (65%). Lower response rates were obtained at DE and BDF (63% and 51%, respectively). One-sample t-test analysis of these rates did not demonstrate significant differences between response rates obtained by institution compared to the national response rate. Gender distribution indicated 33% of males among respondents in the main study, whereas at BDF and PTE significantly higher rates for male respondents were observed (43% and 51%, respectively). According to the chi-square test, gender distribution was significantly different between institutions (p<0.000). The mean age of the national sample was 23.26 years (SD: 2.88; minimum: 20; maximum: 49). Significant difference between the mean age of the students of DE and PTE and the mean age of the national sample was demonstrated by the one-sample t-test at 99% response rate.

No significant differences were detected from the national average in respects of parents' qualification and the families' financial conditions. Self-perceived health status for the past 12 months among students of each institution were distributed closely to that of the national pattern. The national mean score for psychological stress was 24.97±5.91 (minimum: 12; maximum: 46), higher values indicating a greater extent of mental burden. The highest institutional mean score was obtained among students of the University of Debrecen, although, similarly to the other institutional mean scores, no significant difference from the national average was found. Compared to the national score, the highest mean score for sense of coherence was obtained among students of BDF, however neither this value nor those calculated for the other institutions differed significantly from the national mean score for sense of coherence.

Regarding the main parameters of students' health behaviour such as smoking habits, eating habits, exercise and sexual behaviour, none differed significantly among the surveyed institutions.

6. Correlation between Indicators of Mental Health and Health Determinants

In addition to the assessment of students' mental health and lifestyle, we also intended to determine the relationship between these two phenomena, and establish the determinants which give the best prediction for changes in psychological stress and sense of coherence defined as outcome variables.

In this attempt first we applied correlation study which was followed by simple linear regression and multivariate multiple regression analysis.

Correlation between continuous variables was tested by pairs; Spearman's rank correlation was applied when one of the variables was categorical. Variables correlated with health status-related outcome variables (subjective health, sense of coherence, psychological stress) at the 0.05 significance level were involved in those simple linear regression models by which we intended to predict the changes in sense of coherence and psychological stress. Categorical variables were transformed to dummy variables. Assumptions for normality and homogenity of variance were met that justified the application of linear regression analysis for both outcome variables.

Correlation Study between Health and Health Behaviour Indicators

The correlation study demonstrated significant correlation between subjective health and sense of coherence (Spearman's rho: 0.363; $p < 0.001$), likewise between subjective health and psychological stress (Spearman's rho: -0.377; $p < 0.001$). The negative correlation can be explained by the fact that higher scores of sense of coherence and lower scores of psychological stress refer to better mental health.

In concert with our expectations, a strong negative correlation was demonstrated between sense of coherence and psychological stress (correlation coefficient: -0.527, $p < 0.001$), since higher scores reflect stronger sense of coherence, while low scores for stress are indicative of low levels of stress. All three outcome variables independently exhibited strong correlation

(p<0.001) with the attitude of respondents as to how much they thought they could do to maintain or improve their health.

Simple Linear Regression Analysis

According to the linear regression analysis of the variables related to mental health, a 1 point increase of mental stress as measured by GHQ resulted in a reduction of the sense of coherence by 1.76 points (95% CI: CI -1.97, -1.55).

The two variables were analysed separately and regressed with other explanatory variables. The explanatory variables were selected in the course of the above mentioned correlation analysis. Both continuous and categorical variables were checked for normal distribution, then a backward stepwise regression analysis was conducted first for sense of coherence as an outcome variable.

We concluded that higher levels of psychological stress as well as the use of non-prescription sedatives or marijuana, and poor financial situation of the family reduced sense of coherence by the point value indicated in the bar 'B' representing the slope (since the family's poor financial situation was represented by higher scores, negative correlation was demonstrated). Higher extent of social support, older age, and good subjective health during the past year showed positive correlation, i.e. they predicted an increased sense of coherence by the point value indicated in bar 'B'. Other explanatory variables initially involved in the model (gender, use of prescription drugs, use of non-prescription drugs, population size of permanent residence, body mass index) were omitted from the final version of the model.

Psychological stress as outcome variable was also estimated by backward stepwise regression analysis, and consequently, social support, age, gender, financial situation, use of prescription drugs, use of non-prescription drugs or marijuana, fruit consumption and a sense of no control over health (thinking that almost nothing can be done by himself or herself to maintain or improve health) comprised the explanatory variables left in the model. Sense of coherence was an important explanatory variable of stress; one point increase in sense of coherence predicted a 0.11 point decrease of mental stress as expected. Improvement of subjective health by one category predicted 0.61 point decrease of the GHQ score meaning lower stress. According to the model, the mean stress level was 0.61 point higher for females than for males. Other variables involved in the initial model, namely age and population size of permanent residence were omitted from the final version.

Multivariate Multiple Regression Analysis

Multivariate multiple regression analysis was conducted for the joint prediction of sense of coherence and psychological stress considering the correlation between explanatory variables as well. A correlation analysis was performed first with all variables of health status and health behaviour after which those variables were selected that exhibited correlation at the $p<0.01$ level with the two outcome variables mentioned above. Subsequently, a multivariate analysis was conducted and those variables which possessed significant predictive value for one or another of the two outcome variables were tested for the hypothesis that the predictive value of these explanatory variables was zero in the equation for the prediction of both outcome variables. We built a model upon introduction of only those explanatory variables for which the precedingly tested zero hypothesis could be rejected. Those four variables were included in Model 1 that showed the strongest correlations; then the model was extended by introducing other explanatory variables in decreasing order of correlation strength.

According to the results, social support was a strong significant positive predictor of both sense of coherence and psychological stress: one point increment in social support increased sense of coherence by 2.16 points, and improved (decreased) psychological stress scoreby 0.31 points. Age also exhibited positive influence, one year increase in age increased sense of coherence by 0.45 points, and improved (decreased) psychological stress by 0.314 points (although this latter effect was much less significant than the previous one). As it was found by the simple regression analysis, gender was correlated with stress, and that was confirmed by the multivariate analysis. However, impaired financial conditions of the family, use of sedatives with or without medical prescription, use of marijuana, and low perceived control over health (not much can be done by the respondent to maintain or improve health) decreased the score of sense of coherence, but showed no correlation with mental stress. Decreasing fruit consumption predicted increasing stress..

Discussion

1. Addressing Methodologic Difficulties in Questionnaire Surveying of Diverse Populations

The precise definition of constructs to be investigated and careful selection of validated instruments for measurement are essential requirements of scientific studies. This is particularly important for testing concepts which have multiple definitions and a variety of measuring instruments. For example, Antonovsky developed two questionnaires for the assessment of the sense of coherence; initially a 29-item scale, and its abbreviated, 13-item version which we applied. The validity of the shortened version of the questionnaire was proven by numerous publications, but at the time we commenced our study, a Hungarian version of this questionnaire was not available. Mária Kopp et al. applied the 'Purpose and connection' scale of the 'Coping' block from the Brief Stress and Coping Inventory of Richard Rahe in the Hungarostudy of 2002 as an instrument for measuring sense of coherence, but consulting the literature has not provided any evidence for the equivalency of the 8-item 'Purpose and Connection' scale of Rahe's questionnaire and any of the two versions of Antonovsky's questionnaire.

The measurement of 'mental health' generates even more problems than that of sense of coherence since it has multiple definitions and several available measuring instruments even in Hungarian. The 12-item version of the GHQ was selected for our survey as a widely used tool to assess mental stress in the general population.,Since it was used in the Hungarian Population Health Survey of 2003, population data on mental stress were available for comparison.

To identify a data collection method by which each member of the selected and geographically scattered population can be reached and response rate can be maximised in a cost-effective manner proved to be a particularly challenging task during the planning phase. A well-known though costly method of data collection is mail survey. Cost-effectiveness considerations would have led us to use an internet based survey had lower response rates known from the literature and our pilot study not been cautionary. In order to achieve a satisfyingly high response rate while containing costs a combination of mail and internet survey was implemented in which several other measures were applied to increase response rate, later on justified by the results. Of these, the most important ones were creative

motivational gifts recommended by a focus group of students, as well as the paper-based and electronic reminders.

2. Health Status of Medical Students

Summing up our data and comparing them with results of former studies, it can be concluded that self-perceived health status did not change significantly among Hungarian medical students. No marked increase was observed in smoking, alcohol consumption or drug use in recent years. However, our findings reflecting an impaired mental health among medical students compared to the general population of the same age could not be compared with results of earlier studies conducted among medical students due to methodological differences. Therefore, it is not possible to describe how mental health changed in this population during the past several years. Our data clearly demonstrate the need to improve their mental health and stress management skills This might be achieved by remodelling existing subjects or introducing new ones which can teach medical students how to manage their own mental health, during the course of their studies. This is of particular importance if the credibility of future doctors for their patients is of any importance.

3. Health Status of Teacher Trainee Students

As already mentioned in the 'Aims' section, a guiding principle of our study was to be able to compare our results with data of the Hungarian Population Health Survey. As more than 96% of our sample belonged to the 19-27 age group, their data were comparable to data of the general population of the same age range. On the basis of this comparison, many more students currently specialised in teacher training, that is, many more future teachers are significantly more burdened by mental stress than the general population of the same age group. 8.7% of students exhibited strikingly low mean scores (less than 45 points) for sense of coherence. However, since it was not surveyed in the OLEF study, no comparison with the general population was possible. Low sense of coherence and high levels of stress indicate that many students are overburdened by stress, and hardly have the resources required to cope with the mental burden in their lives. On one hand, this merits further investigation; on the other hand, development of interventions at higher education institutions to prepare students to manage stress more efficiently is of vital importance.

4. Correlation between Mental Health and Health Determinants

Close correlation between sense of coherence and psychological stress was observed, as well as strong correlation of those with subjective health. Sense of coherence and psychological stress are suitable and reliable indicators of mental health. Multivariate multiple regression analysis for the prediction of these parameters demonstrated first by us that social support and age proved to be significant explanatory variables for both indicators of mental health. Taking sedatives with or without medical prescription or using marijuana are inversely related only to sense of coherence. Our model contributes to a better design of targeted interventions aiming to improve the health university students.

5. Proposals for the Improvement of Students' Health Status

Regarding the health status and health behaviour of future teachers, strikingly unfavourable results were obtained for psychological stress. The magnitude of stress exceeded the limit defined as average in 24.1% of respondents that was more than twice as high as that of the general population of the same age group. 8.7% of the students had strikingly low scores of sense of coherence (less than 45 points) indicating that these students could hardly cope with their problems and did not have sufficient resources for that purpose. Almost 20% of the students were not satisfied with the support they received from their close social environment; neither their friends nor their university fellows supported them to the extent they expected in managing their problems.

Young adults upon entering university have to leave their families in most cases which provided them safety. They must cope with new challenges among new people often in another city far away from their residence. Implementation of the Bologna system made the university environment less friendly that it had been before since study groups in their traditional meaning disappeared along with the social support they provided; other changes also made conditions unfavourable for group formation and development of solidarity among students. The increasing number of students enrolling in higher education increases the burden on lecturers: they have a higher teaching load and have less time for individual students. In case the students encounter difficulties in learning or in their private life, there is nobody available to talk to or ask advice from. Students practically have to cope with all arising problems by themselves in a mass of people surrounding them.

In view of our results, on one hand, institutes of higher education need to provide more help and support for students to prepare them for life at the university; help them learn skills which enable them to cope better with the increased demands (e.g. learning study and exam skills, time management). These skills, particularly time management skills would help students to live a healthier lifestyle, since in many cases it is lack of time that prevents them from implementing the principles of healthy nutrition and exercise in their everydays. An obvious point to intervene is to improve social support by various means, eg. teaching in small groups and credit courses, followed by the accurate assessment of their effects. Universities should also consider a careful selection of those who are admitted to universities, with particular emphasis on the identification of those at high risk experiencing above average psychological stress.

In light of our results, and taking into account the social and economic conditions of the surveyed population, a complex and targeted intervention program should be developed to solve or reduce problems related to student life, and to provide students with adequate information and knowledge by which their health status and behaviour can be positively influenced. Improvement of teacher trainee students' health and health behaviour would also contribute to the improvement of the health behaviour of the whole population and in the long run to the reduction of the prevalence of health risk factors.

Main Conclusions and New Findings

1. We have translated and validated the Hungarian version of the abbreviated 13-item instrument for the measurement of the sense of coherence defined by Antonovsky.

2. A methodology yielding high response rate has been developed for data collection in a geographically diverse sample.

3. We found that the prevalence of psychological stress was significantly higher among medical students and teacher trainee students (i.e. future teachers) compared to that in the same age group of the general population.

4. We developed a multivariate model for the identification of determinants of psychological stress and sense of coherence according to which:

   a. Sense of coherence and psychological stress as indicators of mental health show a strongly significant correlation, and both correlate with subjective health;

   b. Social support and age were found to be major determinants of mental health;

   c. A significant correlation between the use of psychoactive drugs – in particular, the use of non-prescription sedatives or marijuana – and both parameters of mental health (sense of coherence, psychological stress).

List of Publications

Publications based on the thesis

1. **Balajti I.,** Vokó Z., Ádány R., Kósa K.: A koherencia-érzés mérésére szolgáló rövidített kérdőív és a lelki egészség (GHQ-12) kérdőív magyar nyelvű változatainak validálása. *Mentálhigiéné és Pszichoszomatika* 2007; **2**:147-161.

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The cumulative impact factor of the publications based on the thesis: 4,278

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2. **I. Balajti**, L. Daragó, É. Bíró, R. Ádány, K. Kósa: Response rate by various means of survey methods among students of higher education. – DEOEC NK Megelőző Orvostani Intézet bemutatkozása DAB, 2008. február 25. Debrecen

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