Studies on the mental health of students in higher education

by Éva Bíró MD

Supervisor: Karolina Kósa MD, PhD

DOCTORAL SCHOOL OF HEALTH SCIENCES

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The Examination takes place at the School of Public Health, Faculty of Public Health, University of Debrecen, on the 12th September 2014 at 11 am.

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The PhD Defense takes place at the Lecture Hall of Bldg. A of the Department of Internal Medicine, Faculty of Medicine, University of Debrecen on 12th September 2014 at 1 pm.

INTRODUCTION

THE IMPORTANCE OF MENTAL HEALTH FOR PUBLIC HEALTH

World Health Organization (WHO) defines mental health as 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. Though all dimensions of health are vital for all individuals, mental health is of crucial importance to the overall well-being of individuals, societies and countries. This is signified by the fact that mental health has become a major international public health concern in relation to which a number of actions have been taken by the WHO.

Mental health as a public priority is fully justified considering the increasing burden of mental disorders which can be estimated by complex measures combining information on the impact of both premature death and disability. Many mental patients are unable to work or participate in social activities; in addition, their symptoms are often aggravated by discrimination. The consequent burden on families is manifold: economic difficulties are caused by loss of income and treatment costs; increased need for physical and emotional support, disturbed behaviour, disruption of household routine, stigmatization from others and lost opportunities of work, social relationships and leisure stretch the coping reserves of family and friends. Mental disorders increase the risk of communicable (e.g. sexually transmitted diseases, tuberculosis) and non-communicable diseases (e.g. cardiovascular diseases, diabetes), as well as external trauma such as injury, violence and suicide.

Promoting mental health by focusing on its positive aspects could not only reduce the incidence and prevalence of mental illness but increase well-being. A combination of well-targeted treatment and prevention programmes embedded into public health strategies could lead to the reduction of disability and deaths. Effective treatment of patients should be combined with minimizing the stigma and improving the social and economic environment. In order to improve population health and reduce the increasing burden of mental disorders, priority should be given to the promotion of mental health at population level.

BURDEN OF MENTAL DISORDERS IN YOUNG ADULTS

Mental and behavioural disorders are common in young people. 10-20% of all children have one or more mental or behavioural problems; one-fifth of adolescents and at least one out of every four to five young people experience some kind of mental health problem. These are the

primary causes of disability in this age group with long-lasting effects. Nearly half of all mental disorders experienced by adults have their onset in adolescence, and poor mental health in childhood is associated with a high prevalence of adult emotional, behavioural, and severe psychiatric problems. Poor mental health of youth is associated with lower educational achievements, substance abuse, suicide, violence, and reproductive and sexual health problems. Despite the magnitude and serious consequences of mental disorders in youth, fewer than half of them with current mental disorders receive specialized mental health treatment.

Suicide, a major risk outcome of mental problems is one of the leading causes of death in youth in Europe. According to the results of the Hungarostudy, nearly one-fifth of young Hungarian adults suffered from depressive symptoms in 2002. The proportion slightly decreased to 15% by 2006, but the prevalence of severe depression doubled between 2002 and 2006.

DETERMINANTS OF MENTAL HEALTH

A number of risk and protective factors determine the prevalence, onset and course of mental and behavioural disorders. These include – among others – genetic predisposition, social and economic factors, demographic factors, somatic diseases, family and environmental factors. The socioeconomic status (SES) of individuals also contributes to the risk of mental disorders. Low educational level, low income, insecure and poor quality employment or unemployment, psychosocial work environment; overall, being at the bottom rung of the social ladder are all associated with increased risk of mental health problems. As a result of these connections, a vicious cycle of deprivation and depression might be established. In the case of the young adults, the strongest social determinants of health are income inequality and access to education.

The pattern of mental diseases vary between the genders: anxiety and depressive disorders are more common among women, while substance abuse and antisocial personality disorders are more frequent among men. It seems that the multiple roles women fulfil in society put them at greater risk of experiencing mental and behavioural disorders.

Mental disorders are deep-rooted in the social and emotional environment of the individual. Safe and supportive families and schools, together with positive and supportive peers are fundamental in helping young people attain their best health. Perceived peer support from friends is a protective factor against feelings of depression and isolation, and interactions with friends strengthen the ability to cope with stressful events.

Mental well-being is also influenced by behaviour. Alcohol, tobacco and drug use are all risk factors to mental ill-health; maintaining a healthy diet and regular physical exercise are protective factors.

DOMAINS OF MENTAL HEALTH AND THEIR MEASUREMENTS

RESOURCE-ORIENTED APPROACHES OF MENTAL HEALTH

Sense of coherence (SoC)

Antonovsky proposed a salutogenic, that is, health-generating approach in order to uncover resources and capacities that are conducive to health rather than focusing on risk factors that make people sick. He found that the key is the orientation towards problems and the capacity to find meaning and use available resources. General Resistance Resources (GRRs) are biological, material and psychosocial factors such as money, knowledge, experience, self-esteem, healthy behaviour, commitment, social support, cultural capital, intelligence, traditions and view of life that help the person to deal with challenges of life. GRRs lead to life experiences that promote a strong sense of coherence. SoC according to the original definition is "a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that the stimuli from one's internal and external environments in the course of living are structured, predictable, and explicable; the resources are available to one to meet the demands posed by these stimuli; and these demands are challenges, worthy of investment and engagement". SoC has three components: the cognitive component (comprehensibility), the instrumental/behavioural component (manageability) and the motivational component (meaningfulness). According to Antonovsky, comprehensibility refers to the extent to which a person perceives the stimuli that confront her/him as making cognitive sense as information that is ordered, consistent, structured, and clear. High sense of comprehensibility predicts that stimuli encountered in the future will be predictable, ordered, and explicit. Manageability is the extent to which a person perceives that adequate resources are at their disposal to meet the demands posed by the regular stimuli bombarding them. Meaningfulness refers to the extent to which a person feels that everyday problems and demands are worthy of investing energy in, life is seen as a series of challenges rather than burdens.

Sense of coherence is a major explanatory construct of health; it reflects a person's view of life and capacity to respond to stressful situations. There is a strong positive relation between SoC and perceived good health as well as between SoC and mental health. High SoC reflects

resilience and a positive state of physical and mental health, quality of life and well-being. It is a mediator between stress and mental health so people with high SoC seem to be more resilient under stress: the stronger the SoC the lower the range of symptoms and distress.

Social capital, social support

Social capital has been a term of increasing use in the health sciences but there is no consensus regarding its definition. According to the *social cohesion theory,* social capital consists of the resources available to members of social groups, and from it follows that social capital, being a group attribute, can be measured at the group level. The *network theory* defines it in terms of the resources that are embedded within an individual's social network that makes social capital measurable at the individual and group levels as well. According to the network theory, social support is an individually measurable dimension of social capital defined by Cobb as information leading the subject to believe that he is cared for and loved (emotional support), esteemed and valued (esteem support), and a member of a network of communication and mutual obligations. Social support may be *perceived support*, i.e. functions that are perceived to be available if needed; or *received support*, functions that are reported to be actually obtained.

Social capital has been shown to be a major determinant of health, and its strengthening has salutogenic effects. There is an inverse relationship between individual social capital and mental disorders: higher level of social capital is associated with lower risk of mental illness. The effects of social ties on mental health also differ by gender. Women tend to maintain more emotionally intimate relationships, mobilize more social supports during periods of stress, and provide more frequent and more effective social support to others.

DEFICIENCY-ORIENTED APPROACHES OF MENTAL HEALTH

Stress

Stress is an important variable affecting health, but not all of its psycho-biological pathways are understood. Selye maintained that stress has always been present, and without stress there would be no life. He distinguished between two types of stress: good named eustress and pathogenic named distress. The latter occurs when demands exceed the capacity of the body, while eustress leads to increasing performance. Stress has a major impact on mental health; it may mediate, promote or cause mental disorders. Stress, and especially chronic stress, has been linked, among others, to anxiety, depression and posttraumatic stress disorder. The psychological impact of a stressor depends on its meaning for the individual, that is, the

subjective appraisal of the stressor. However, even cumulative stress experiences do not unavoidably lead to mental disorders, because there are ameliorating factors like social support, self-esteem and personal control.

Psychological distress is commonly used as an indicator of the mental health of the population. There are different definitions in the literature; one of the most general specifies stress as "a discomforting emotional state experienced by an individual in response to a specific stressor or demand that results in harm, either temporary or permanent, to the person".

THE LIFE-COURSE PERSPECTIVE OF MENTAL HEALTH

Childhood and early adulthood are critical periods in building the foundations of mental health. Traumas experienced at early ages create vulnerabilities that increase the risk of mental illness for the rest of life. Compensatory mechanisms, however, can erase much of that vulnerability. Life-course research suggests that efforts should be made both to prevent the onset of mental illness and to nurture appropriate psychosocial resources. The most appropriate settings for the prevention of mental disorders are schools that represent not only social and learning environment influencing the academic and vocational pathways, but also have a direct impact on present and future health. Connectedness to school is important to reach positive educational outcomes and lower rates of health-risk behaviours.

Students in higher education are in transition from dependence to independence that entails a host of often stressful changes in their lives. Leaving the family, increased responsibility for performance, educational and financial demands, greater autonomy may be challenges or burdens draining coping resources. On the positive side, there are new opportunities for developing friendships and pursuing social, recreational and sporting interests; the higher education environment offers easily accessible student support services. These factors can help students be more resilient but have been investigated much less than sources of distress.

MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

Mental health problems are common among students in higher education, especially among medical students, the most frequent target group of relevant research. However, the mental health of students in other helping professions received considerably less attention in the scientific literature though they will provide complex services in the future under increased workplace stress so widespread in healthcare.

The mental health of future teachers has also not received much attention though teaching was found one of the top six most stressful occupations in the UK. Therefore, the mental health status of present and future teachers deserves just as much attention as of those in the health professions: their mental well-being influences not only their capacities and work performance but the overall quality of teaching in the school as well as teachers relationship with pupils All these factors have an impact in the long run on children's academic performance and well-being.

It is of utmost importance that future professionals preparing to interact with large numbers of children and adults in their daily work be well prepared not only to practise safely and competently but in a status of mental well-being that improves the quality of services rendered and reduces the risk of burnout. An ounce of prevention, as in so many other areas, in this respect also is worth a pound of cure. Besides identifying those who are at higher risk of mental health problems at an early stage, mental resilience – a hitherto rather neglected dimension – also needs to be assessed.

The validity of these statements was supported by our results obtained from a cross-sectional study among medical students at 1-5-years at the Faculty of Medicine of the University of Debrecen and students involving 27 faculties with teacher training courses at the six largest universities and colleges in Hungary in 2007. The mean score for psychological distress in our sample of students was found to be significantly higher indicating worse mental status compared to the similar age group of the general population. Close to one-fifth of the medical and one-quarter of the teacher students scored above the threshold indicating notable distress.

University students represent an important part of the national human capital whose education takes up a considerable part of social investments for the future. This justifies attention to their mental health in order to ensure the best present and future use of financial investment that their education requires. It is of particular importance to answer the question whether these trends can be observed only in some groups of students or they are generalizable to students in higher education; and if so, by what means could the mental health of students be substantially improved.

AIMS OF RESEARCH

Our aim was to describe the mental health of university students at various courses, determine its risk factors, and develop and test interventions to increase their mental well-being.

The objectives of our study were the following:

1. **Description of the mental health of students in higher education**

   The mental health of some groups of students preparing for helping professions have not received sufficient attention compared to medical students. Therefore, we wanted to gather information on public health, physiotherapy and nursery school teacher students to fill this gap in knowledge and be able to decide whether their mental health is similar to other students and their peers or there are differences by study courses.

2. **Investigation of the determinants of mental health of students in higher education**

   Subsequent to characterizing the mental health of selected students, factors contributing to their mental status were identified with a view to those that are potentially amenable to change. Focus groups were organized by inviting students to discuss and uncover these background factors.

3. **Building a model of mental health of students in higher education**

   In order to determine which factors have substantial impact on students' mental health, the bio-psycho-social model of health was taken according to which variables were arranged and tested.

4. **Improvement of the mental health of students in higher education**

   a. **social cognitive intervention**

   Based on the results of the qualitative and quantitative studies among university students, a group intervention to improve the capacities of the human as well as collective agency of students in higher education was developed, delivered and evaluated.

   b. **feedback for workplace action**

   A simple but efficient means of improving community health and well-being is the assessment of health risks with feedback for workplace action. Based on this recommendation, a brief written summary describing the results of the descriptive and qualitative studies was sent to the educational office and the dean of each faculty from which students were surveyed in order to initiate and facilitate institutional changes to make the university environment more conducive to health.

METHODS

DESCRIPTION OF THE MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

Continuing our previous studies among medical students and students in teacher training, cross-sectional studies were carried out surveying the mental health of university students at courses which had been hitherto underresearched. Students of public health, kindergarten teaching and physiotherapy were recruited to participate in this survey.

STUDY POPULATIONS

Cross-sectional studies were carried out among public health (PH), nursery school teacher (NT) and physiotherapy (PT) students. PH students studied at years 1-5 (N=194) at the Faculty of Public Health of the University of Debrecen, Hungary in 2008 (students at year 4 and 5 studied in the 5-year programme that had been launched before public health studies were split into bachelor and master degrees). The study population also consisted of all full-time students of the Faculty of Child and Adult Education of the University of Debrecen, Hungary (N=168) registered at the course of nursery school teaching in the autumn semester of the 2009/2010 academic year. Physiotherapy students at years 1-3 (N=153) at the Faculty of Public Health of the University of Debrecen, Hungary were also involved in 2010.

METHODS OF DATA COLLECTION

Each student was invited in person after class to fill a paper-based, self-administered, anonymous questionnaire. Ethical permission was issued by the Regional and Institutional Commission on Research Ethics of the Medical and Health Science Centre of the University of Debrecen, Hungary. The timing of data collection on mental health is critical in case of university students because their stress level fluctuates during the academic year. A potential source of bias is the excess stress close to the exam period. In order to reduce this type of bias, data were collected in mid-semester.

Questionnaire domains

The questionnaire was similar to those used in previous surveys among medical students and future teachers, and included scales on mental health (sense of coherence, psychological distress, social support, perceived stress, depression)[a], perceived health, health locus of control (how much can do for his/her health), demographic (age, sex, residence) and

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[a] The scales for perceived stress and depression were not included in the questionnaire for public health students.

socioeconomic (parents' educational level, family's economic status) data. Items not referred separately were taken from the tool of the Hungarian National Health Interview Survey (HNHIS) of 2003.

Resource-oriented approaches of mental health

To measure *sense of coherence,* the abbreviated, 13-item-long scale (SoC-13) was used that had earlier been validated in Hungarian. Items are answered on a 7-point Likert scale, and the total score varies between 13 and 91. Higher score indicates a stronger level of sense of coherence.

Social support was measured by the Hungarian version of the Health and Lifestyle Survey and Health Survey for England. Briefly, respondents answered seven questions, each on a 1-3 scale. Overall scores ranged from 7 to 21. The maximum score of 21 indicated no lack of social support, scores of 18 to 20 indicated a moderate lack of social support and scores of 17 showed that individuals perceived a severe lack of social support. One more question addressed perceived support from peers at the university.

Deficiency-oriented approaches of mental health

The 12-item version of the General Health Questionnaire (GHQ-12) was used to detect *psychological distress*. The Hungarian version had been used in two waves of the Hungarian National Health Interview Survey. Questions are answered on a 1-4-point Likert scale. Cases are detected by scoring in the simplest manner, which assigns a score of 1 to each symptom present, while symptoms absent are scored 0. This yields a score ranging between 0 and 12. In order to compare our data with data of the Hungarian National Health Interview Survey of 2003, the threshold indicating notable psychological distress was identical: a score above 4.

The 14-item Hungarian version of the *Perceived Stress Scale* (PSS-14) developed by Cohen measures the degree to which situations are appraised as stressful. Items are answerable on a 5-point Likert scale (0 to 4), total scores range between 0 and 56. A higher score indicates higher levels of perceived stress.

The *Beck Depression Inventory* (BDI) is one of the most widely used health inventories to measure depression, and is used as a screening tool as well as a research instrument. The items of the questionnaire are rated on a four-point scale and scores are added up to yield a total score; higher scores represent more severe depression. We used the 9-item Hungarian version of the BDI, thus, scores ranged between 9 and 36. The BDI-9 score can be

transformed to estimate the score of the 21-item BDI in the following way: $\frac{\text{total score-9}}{9} \times$ 21. Scores less than 9 indicate no depression; 10 to 18 indicate mild; 19 to 25 moderate, and scores of 26 or higher reflect severe depression.

STATISTICAL METHODS

For sense of coherence (SoC), psychological distress (GHQ), perceived stress (PSS), depression, and social support, total scores were calculated and used for analysis as it was described under "Questionnaire domains". Social support was categorized as severely, or moderately lacking, or sufficient. BDI score was categorized as none, mild, moderate or severe depression.

In terms of *descriptive statistics,* the mean, minimum, maximum and standard deviation were used for normally distributed data; and median, minimum, maximum and interquartile range for non-normally distributed data. The frequency distribution of categorical data was also provided. *Inferential statistics* were applied to examine the differences between genders and courses. The appropriate form of t-test or ANOVA was used to compare means, and the Wilcoxon-Mann-Whitney or Kruskal-Wallis test was used to compare medians. Categorical variables were analysed by the chi-square test and Fisher's exact test.

Our results were compared with results of the general population of the same age revealed in the Hungarian National Health Interview Survey of 2003 regarding social support from family. Psychological distress and sense of coherence were also compared to that of a representative survey of the Hungarian adult population carried out by the Faculty of Public Health and the Median Public Opinion and Market Research Institute in 2010. The two-sample unpaired t test was used to compare means, and the two-sample test of proportion to compare proportions for which the level of significance was set at 0.05.

A *composite indicator* of 'mental well-being' was created from sense of coherence and psychological distress to assess mental health. For SoC, there is no threshold below which it could be considered 'subnormal', therefore the overall mean of SoC in the general population of 18-26 year-olds was considered as a reference value (60.63 points obtained from the already mentioned representative survey of the Faculty and the Median Institute). SoC scores below the reference value were classified as low; equal or higher scores were considered normal. As to psychological distress, the cut-off value used in the HNHIS was used (normal score: <5 points). Based on the categories of SoC and GHQ, four groups were created: good

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mental health (normal SoC, low GHQ), bad mental health (low SoC, high GHQ), and two categories were classified with non-specific risk: normal SoC and high GHQ, and low SoC with low GHQ.

In order to check the validity of our *assessment tool of mental well-being*, the positive (LR+) and negative likelihood ratios (LR-) were calculated taking the BDI scores as reference. For this calculation, BDI scores over 18 points identified bad mental health, BDI scores below 19 points identified those in good mental health. Mental well-being, as stated above, was defined as having normal SoC and low GHQ, bad mental health was characterized by a combination of low SoC and high GHQ. The posttest odds of mental health problem were calculated using the likelihood ratios as prescribed by Bayes' theorem, and converted to probability. All records with data for the Beck, SoC and GHQ scores (N=265) were used.

DETERMINANTS OF MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

All students who were involved in the quantitative survey at the Faculty of Public Health were also invited to participate in focus groups, organized during the semester at times when it was convenient for the students. Open-ended questions were formulated regarding causes of stress at the university; personal and private problems encountered during studies; and possible ways of reducing stress.

8 focus groups were conducted with public health students in the autumn semester of the academic year of 2008/2009. Altogether one-third of those who participated in the questionnaire survey were also participants of the qualitative survey. The facilitator of the focus group was the author or her supervisor, helped by 2 bachelor students who also took notes. 2 focus groups were conducted for physiotherapy students in the spring semester of the academic year of 2009/2010; approximately 11% of those who participated in the questionnaire survey were involved in this part. One master student of health promotion led the focus group as facilitator while another master student took notes.

Complying with the request of the participants, no audio recording was made. The hand-written notes were later subscribed and annotated by the facilitators. Sessions took one to two hours. The transcripts were read several times to identify keywords for coding. After coding, major topics were identified, and relevant narratives were divided into these topics.

DATA USED FOR THE MODEL

In order to build a hypothetical model on mental health and its determinants, data of an earlier, above described survey carried out by the Faculty of Public Health in six institutes of higher education were used. Briefly, the sampling frame included students of 27 faculties of the six largest universities and colleges in Hungary (N=30,901 students) of whom 5% were sampled. The questionnaire measured demographic, socio-economic indicators, health, health locus of control, and health behaviour.

CONSTRUCTION OF THE MODEL

A hypothetical model based on the biopsychosocial model of health was constructed regarding the determinants of health. Health as a latent outcome variable was defined by five measured variables of which three related to mental health: sense of coherence as a measure of mental resilience, GHQ approximating psychological distress, and health locus of control. Body mass index was used as a measure of physical health, and perceived health as a summary measure. Explanatory variables were grouped into the following latent variables: behaviour (current physical activity, alcohol, drug and fruit consumption, smoking, eating breakfast); social support (from family and from peers); teenage activities (engagement in sport, arts, dance or music *before* entering higher education); family background (father's and mother's education, economic status of family); habitat (population size of permanent residence, type of co-habitation meaning whom the respondent lived with); and biological factors including age and gender. Latent variables were arranged on a time axis on which habitat, family background and biological factors were defined as the most distal determinants. Teenage activities – influenced by biological factors, habitat, and family background – expected to impact upon current health behaviour and social support, whereas all these together thought to impact upon current health status. We tested this model using the methods described below separately for males and females.

Model building and testing was carried out in three major steps. First, canonical correlation analysis and principal component analysis were carried out to select variables to be used in the model. The next step was to decide about the most appropriate statistical method for modelling that would comply with both the assumptions of the method and the characteristics of our data. MANCOVA proved to be the best applicable method therefore this was performed as the last step, keeping in mind its inability to establish hierarchical relations.

Based on the results of the previous analyses, the multivariate analysis of covariance was carried out using the full dataset with 1010 subjects and only those outcome and grouping variables as well as covariates that remained significant in the previous analyses. As a first step, the data matrix was examined for missing data and outliers on the outcomes. Overall, 116 cases were removed as outliers so the final sample size was reduced to 894. MANCOVA rests on a number of assumptions which were tested and multivariate normality was assumed because of the central limit theorem. A reliability analysis yielded a reasonably high Cronbach alpha coefficient (0.768) so the assumption of low measurement error of the covariates was satisfied. Interaction terms between covariates and groups were also checked by performing univariate covariance analyses (ANCOVA). MANCOVA employs a type of General Linear Model so significant interactions can be built into the model. Interaction terms were considered significant at 5%.

IMPROVEMENT OF MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

SOCIAL COGNITIVE INTERVENTION

Target group

The intervention was targeted at those students who participated in a previous health survey showing notable mental distress among prospective teachers in Hungary.**Hiba! A könyvjelző nem létezik.** All students of 27 faculties providing teacher training at the six largest universities and colleges in Hungary who created the sampling frame of the previous health survey were potentially eligible to join the intervention delivered in the form of a 30-hour credit course. The same course was planned to be offered at each of the six institutes of higher education delivered by local staff, planning a minimum of 10 and a maximum of 50 students in the order of signing up for the course through the educational administration systems of the universities. Of the six institutes, one university could not offer the programme due to staff shortage; at another institute, the number of students signed up for the course did not reach the minimum of 10, so altogether four universities delivered the programme in the 2nd semester of the academic year of 2007/2008. Participants were split into two smaller groups at each university for developing communication skills. In order to maximize benefits, no absence was allowed for the group meetings and only one was allowed in the rest of the training.

Intervention

The intervention was a multicomponent stress management training including improvement of knowledge on the harms of illegal substances, and the benefits of legal psychoactive

substances used for stress reduction, teaching relaxation techniques (2-hour blocks at 6 occasions), enhancing communication skills by role play in a group setting (3-hour blocks at 6 occasions) but without addressing contextual sources of stress. The structure and methods of the training were uniform but were delivered at each institute of higher education by local faculty members in the form of a 30-hour elective credit course during 14 weeks. Courses were approved by the relevant Faculties.

Data collection

Students anonymously filled a questionnaire assessing their mental status at the 2nd, and at the last meeting. No personal identification on the questionnaire was required to increase the trust of the students, therefore only a group-level comparison was possible before and after the course. Besides the questionnaire, participants filled an evaluation sheet about the organization of the optional course, and their knowledge of taught methods of stress reduction was also assessed at end of the course (the latter was mandatory in order to receive credit for the course, irrespective of its result).

Perceived health, psychological distress and sense of coherence measured by the above mentioned scales (Description of the mental health of students in higher education - 'Questionnaire domains') were used as outcome indicators. Demographic data and information related to the participants' field of study (studied discipline, number of years of attendance, whether the respondent wants to become a teacher, and he/she studied courses on pedagogy) were also collected.

Statistical methods

Questionnaires were coded by university and date (before or after the course). Paper-based data were entered into a Microsoft Excel database. Intercooled Stata 9.0 for Windows was used for data analysis. A total score calculated for sense of coherence and another for psychological distress were used for analysis. Means were calculated for normally distributed variables and compared by the two-sample t test. Median was calculated for psychological distress, being a non-normally distributed variable, and the Wilcoxon rank sum test was used to measure the difference between its pre- and post-course values. The two-sample test of proportion was applied to compare proportions. The level of significance was set at 0.05.

FEEDBACK FOR WORKPLACE ACTION

The Community Preventive Services Task Force of the Centers for Disease Control and Prevention of the USA conducts systematic reviews of interventions aiming at community

health and well-being, and publishes its results online (The Guide to Community Preventive Services). The latest issue of the Guide recommends the assessment of health risks with feedback for workplace action. Based on this recommendation, we sent a feedback describing the results of the descriptive and qualitative studies to each Faculty in order to facilitate those institutional changes which can help reduce the perceived level of stress and/or the influence of the stressors.

RESULTS

DESCRIPTION OF THE MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

PUBLIC HEALTH STUDENTS

The overall response rate was 75%. 83.5% of the students were female, constituting a representative sample by sex of public health students. Mean age in the sample was 20.6 years (min. 18, max. 25 years), not significantly different from the mean age of all students at the Faculty.

The mean score for sense of coherence (SoC) was 60.1 (SD: 10.98, min. 31, max. 89), and showed an increasing trend from the 1st to 4th academic years from 54.5 to 62.3 point (p=0.005). As to social support, 59.5% of the students reported no lack of it, 23% lacked somewhat, and 17.5% severely lacked social support. The proportion of those who severely lacked social support was significantly higher among men than women (37.5% vs. 12.7%; p=0.003); 29% lacked social support from their student peers. Nearly one-fifth of the students scored above the threshold (4 points) on the GHQ-12 scale indicating notable psychological distress. The proportion of those who suffered from psychological distress decreased during the study years and was almost 1/3 lower among senior (last-year) students than among freshmen.

Gender differences were tested and not found for any of the mental health indicators except for the category of severely lacking social support from family. The results were compared to that obtained from a representative survey of the Hungarian adult population using the same scale and restricted for the same age group (under 26 years). Since the proportion of females was much greater in our sample than in the national one, data were analysed separately for males and females. There was no significant difference regarding the mean score for sense of coherence. The proportion of those who received sufficient support was lower among male

students than in the general population (p=0.059), and the proportion of those who can be characterized with higher psychological distress was 3 times higher among female students (p=0.034).

FUTURE NURSERY SCHOOL TEACHERS

The overall response rate was 79.2%. 97% of the students were women reflecting the female dominance of students (96.4%) at the Faculty. Mean age in the sample was 19.9 years (SD: 1.16; min. 18, max. 24 years).

The mean score for sense of coherence (SoC) was 58.5 (SD: 9.72, min. 36, max. 83). As to social support, 56.5% of the students reported no lack of it, 29.8% lacked somewhat, and 13.7% severely lacked social support. 31.3% lacked social support from their student peers. One-third of the students scored above the threshold (4 points) on the GHQ-12 indicating notable psychological distress. For perceived stress (PSS), the mean score was 26.6 (SD: 6.07, min. 11, max. 40). According to the BDI scores, nearly one quarter (22.7%) of the students suffered from mild, 12.1% from moderate and 6.1% from severe depression.

The results were compared to that of a representative survey of the Hungarian adult population using the same scale and selected for the age group (under 25 years). Since the proportion of males was very low in our sample compared to the national one, data were analysed only for females. The mean score of SoC was 2 points lower among NT students (p=0.302), while the proportion of those who received full support from family was also lower by 9% (p=0.088). One-third of the female students suffered from psychological distress, significantly, four times higher than in the general population (p=0.003).

PHYSIOTHERAPY STUDENTS

The overall response rate was 85%. The majority of the students in our sample were females (93%) in the same proportion like at the Faculty (94.6%). The mean age was 21.9 years (min. 19, max. 41 years,), and the majority (95%) was under 26 years of age. In light of the students' wide age range, we supposed that their mental health status would vary. Therefore, mental health variables in the young (<26 years) and mature (>25 years) students were analysed separately, but no difference was found. For that reason, the mental health status of the entire group is reported.

The mean score for sense of coherence was 60.7 (SD: 11.4, min. 25, max. 85), and non-significantly, 5 points higher in males compared to females. This score was compared to that

of a representative survey of the Hungarian adult population of the same age (under 26 years) studied with the same scale. Since the proportion of females was much greater in our sample than in the national one, data were analysed separately for males and females. Female students were no different from their peers in terms of sense of coherence, but male physiotherapy students scored almost 4 points higher than their peers (p=0.297). Considering all years, half of the students (49%) reported no lack of social support, 36% lacked somewhat, and 15% severely lacked social support. The proportion of those students who received full social support was significantly lower compared to the general population, but that difference was significant only in female students (p=0.001 for females and p=0.261 for males). 39% of students lacked social support from their student peers. In terms of gender difference, 2 times more females had satisfactory support from their student peers compared to males (p=0.045).

Nearly one-third (30%) of the students scored above the threshold on the GHQ-12 indicating notable psychological distress. Much more female than male students experienced notable psychological distress (p=0.027), and the proportion of female students in notable distress was also significantly, 5 times higher compared to females of similar age in the general population (p=0.001). Of the 129 students who provided answers for perceived stress (PSS-14), the mean score was 25.95 (SD: 7.61, min. 2, max. 42). Females scored 4.5 points higher in terms of perceived stress compared to male students (p=0.051). 15.4% of the students suffered from mild, 14.6% from moderate and 8.5% from severe depression. There was no significant gender difference in the prevalence of depression (p=0.344). However, there was not a single male student who was severely depressed.

STUDENTS IN HELPING PROFESSIONS BY MERGING DATABASES

The data from the above described 3 students group (public health - PH, physiotherapy - PT and nursery school teacher - NT) were also analysed together in a merged database. The overall response rate was 79.4%. The average age was significantly different among them; the highest was among the PT students, while the lowest among the NT students (p<0.001). The proportion of females was significantly lower among PH students compared to the 2 other groups (NT p<0.001; PT p=0.014).

The mean score for sense of coherence was 59.78 (SD: 10.75; min. 25, max. 89) for the whole sample. The mean score was significantly higher in males than in females (p=0.037). Nearly half of the students received full social support from their family, and two-third from their peers at the university. Differences of positive mental health parameters between different

students group were tested but not found. However, stratifying by study years, a 1.5-fold increase was found in the proportion of those who did not receive satisfactory support from their peers from year 1 to year 3 among BSc students (p=0.055). Difference in social support between the two genders was also revealed: the proportion of those males who severely lacked support from family was nearly 3 times higher than that of females (35.1% vs. 13.2%, p<0.001).

Nearly one-quarter of the students struggled with high psychological distress, but their proportion was lower among PH students (NT p=0.009; PT p=0.044) and males (18.9% vs. 27.8%, p=0.245). The mean score for perceived stress was 26.28 (SD: 6.87; min. 2, max.42) for the whole sample without any difference among student groups, but the mean score was higher in females (26.48 vs. 22.62, p=0.048). One-fifth of the students suffered from moderate or severe depression without any significant difference between NT and PT students (p=0.264), or genders (p=0.628).

Comparison of the mental health status of students to their peers from the general population

Mental health data of the students were compared to the Hungarian adult population of the same age-group (those under 26 years because 99% of the students belonged to that age group in our survey) from representative surveys that used the same mental health scales. The prevalence of worrisome psychological distress was twice as high among male students (p=0.246) and four times as high among female students (p=0.001) compared to their peers from the general population. The mean score for sense of coherence was non-significantly higher among male (p=0.343), and non-significantly lower among female students (p=0.639) compared to their peers. The proportion of those who felt a complete lack of social support from family was significantly, nearly 3 times higher among male students (p<0.001), but with no difference in females (p=0.665).

Mental well-being: a composite indicator

A composite indicator was created from sense of coherence and psychological distress to test the assessment capacity of these questionnaires to measure mental health. For SoC, the mean score of the same age group of the general population was set as the threshold: students who scored below this value were considered as having low SoC. For GHQ-12, the threshold value of 4 used in the 2003 National Health Behaviour Survey was applied: scores above this value were considered as reflecting notable psychological distress. Two-fifth of students belonged to the category of good mental health with normal SoC and low GHQ. Mental health was

considered worrysome for those who had low SoC and high GHQ. This category captured almost one-quarter of the study population. One-third of the students can be described with low SoC and normal GHQ; and only 4.3% have normal SoC combined with high GHQ. The prevalence of mental well-being (high SoC, low GHQ) was significantly lower in female students compared to males (37.8% vs. 56.8%, p=0.024).

The proportion of those students whose mental health should be cause for concern (low SoC and high GHQ) was 4 times higher (p<0.001) than in the same age group of the general population. Regarding the proportion of mental health problems, there was significant difference neither between genders (males: 7.3%, females 4.3%; p=0.536) in the general population, nor between male students and their peers from the general population (7.3% vs. 10.8%, p=0.590). However, the proportion of female students in bad mental health was nearly six times higher than among their peers from the general population (24.2% vs. 4.3%; p=0.002).

We investigated the relationship between mental well-being and social support. Results revealed that the proportion of those who had insufficient social support from family and friends was higher among those whose mental health was bad. Insufficient support from family and friends was twice as prevalent among students who suffered from mental health problems according to the composite measure (64.1% vs. 32%, p<0.001). In terms of support from peers, the difference was somewhat lower (40.5% vs. 28%, p=0.086).

Students in worrying mental health (high GHQ and low SoC) have higher risk of developing mental health problems therefore it is important to detect them. In order to identify all high risk students, a short questionnaire survey could be used applying the scales of sense of coherence and psychological distress (GHQ-12). The validity of this assessment tool was calculated using data of those 256 students whose mental well-being and BDI scores were available (Table 32). The LR+ came to be 2.75, yielding a positive posttest probability of 0.418, whereas the LR- was 0.081 producing a negative posttest probability of 0.021. The more widely known and used positive predictive value calculated with the above data came to be 41.8%, whereas the negative predictive value proved to be 97.9%.

DETERMINANTS OF MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

Based on the transcripts of the focus group sessions, four common themes were identified.

Theme 1: High demand and low support at university

The transition from high school to the first undergraduate year was described as stressful by most students. Nearly all of them experienced increased stress during their first study year compared to that in high school. They identified cumulative and excessive demands as main reasons. Many students described the number and content of examinations as significant sources of stress. Students complained about administrative support. Many students described a perceived lack of guidance on academic requirements as a significant source of stress. They felt that the educational office was slow to answer questions, and had problems with deadlines, opening hours and employees.

Theme 2: Relations to peers

There are conflicts within study groups. These are centered around the unhelpfulness towards group mates. Some students did not share their notes or would not give it to those who missed class.

Theme 3: Leisure time and family matters

Another source of stress is lack of free time due to the study schedule. Students have no time to take care of errands or relax and engage in leisure time activities. They voiced their desire to have more free time which would also make studying easier. They have to study even at weekends so they do not have enough time for friends and family.

Many students struggle financially. Their stipend is low, and their crowded timetable does not leave enough free time for working during semesters. Due to their limited budget, some of them have a precarious existence. Others have to work in order to be able finance their study, and they can do it only in the late afternoon or in the evening that leads to exhaustion.

Theme 4: Techniques and skills to cope with stress

Students did not have coherent ideas on how they can reduce or avoid stressful situations at the university. They listed a variety of individual means of coping with stress, such as relaxation at home, physical activity, eating chocolate, and listening to music. Some of them thought that group programs or conversation with peers who have similar problems could help increase support in study years. Others mentioned better time management skills and organized schedule as a potential tool to reduce stress.

MODEL OF MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

Variable selection for modeling

Based on the results of the **canonical correlation analysis**, two major dimensions were formulated. The first dimension may be called the dimension of mental health that was mainly correlated with drugs (except smoking), social support, and sport (in teenage years). The perceived financial status of the family and maternal education were also influential on mental health. The second dimension approximated physical health that showed a strong relationship with age, drugs (except marijuana) and dancing (in teenage years). Based on these results, other variables were omitted from further investigations.

Altogether 8 components were extracted from the total of 24 variables divided into one outcome and seven determinant groups by **principal component analysis with varimax rotation**. 51.71% of the total variance was explained by the components which extracted 60-80% of the variance from each and every variable.

Multivariate analysis of covariance (MANCOVA)

As described above, body mass index, sense of coherence, psychological distress, health locus of control, and perceived health were defined as outcome variables. When correlation among the outcome variables, as well as correlation between the outcome variables and covariates was checked, a reasonable but modest correlation was found among the outcome variables except body mass index so this was excluded from the final model. Health locus of control was also excluded from the outcome variables in the final model because that correlated less with the covariates and also violated the assumption of homogeneity of the error variances. Therefore, 3 (sense of coherence, psychological distress and perceived health) of the 5 proposed outcome variables were included in the final model.

In addition, 7 grouping variables (variables of health behaviour such as smoking, fruit consumption, social support from family and support from peers, use of sedatives with or without a prescription, and physical activity), and 4 covariates such as age, as well as teenage experience with dance, sport, and arts were defined. Use of marijuana had to be omitted because it violated the covariate independence test. After the inclusion of covariates, multivariate outcomes became much stronger in most cases, and some of the error variance was also reduced. Equality of the covariance matrices was tested by Box's test, and the assumption of homogeneity of the covariances was satisfied.

Univariate and multivariate analyses for male students

According to the result of the multivariate analysis of covariance (R^2=0.767), all of the most distant determinant variables, that is, age, family background and habitat disappeared from the model, leaving sport and dance as teenage activities as the most distant determinants, sport impacting indirectly (through interaction with actual physical activity), dance impacting directly on health. Actual physical activity, smoking, and social support from family also impacted on health.

Univariate and multivariate analyses for female students

The MANCOVA analysis yielded different result for females. Of the most distant determinant variables, only age had a significant direct impact on current health. Dance during teenage years had a significant direct impact, while teenage sport impacted only indirectly, through peer support and smoking, on current health. Current drug use, fruit consumption, smoking, social support from family and peers alike had direct impact on health (R^2=0.551). With the exception of current physical activity, all determinants found significant in male students were also significant in female students as well, but in addition age, social support from peers, fruit consumption and drug use also remained in the model. In contrast to male students, the health of female students seems to be more pronouncedly multi-factorial.

IMPROVEMENT OF MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

SOCIAL COGNITIVE INTERVENTION

Of all participants, the response rate was 62% before and 72% after the course. All questionnaires were eligible for evaluation. Among those who filled the questionnaire, the proportion of genders and the mean age did not differ significantly before and after the course.

The median of **psychological distress** was 2 (interquartile range, IQR: 5; min. 0, max. 12) before the course, and 1 (IQR: 4; min. 0, max. 11) after the course. Post-training values were significantly reduced compared to pre-training, reflecting improvement (p=0.017). There was no significant difference between males and females regarding psychological distress either before (p=0.099) or after (p=0.598) the course. 24% fewer of the students scored above threshold (4 points) on the GHQ-12 scale after the course compared to that before, indicating an improvement in mental problems (p=0.226). The pre-intervention median of psychological distress measured by GHQ did not differ significantly (p=0.778) from that of the median of GHQ in the previous health survey among future teachers but the post-intervention median

was significantly lower compared to that survey (p<0.001). The mean score for **sense of coherence** increased non-significantly from 60.8 (standard deviation, SD: 12.99; min. 23, max. 89) before to 61.4 (SD: 11.12; min. 25, max. 89) after the course (p=0.688).

Favourable narrative feedbacks were given by students on the evaluation questionnaire regarding the content, lecturers and overall organization of the course. Considering the overall cost of the course versus the number of students who completed the course, 1 point improvement in psychological distress was achieved at a cost of 54 USD.

FEEDBACK FOR WORKPLACE ACTION

The summary results of the descriptive studies were sent back to the Faculties, while the results of the focus groups were submitted in writing to the director of the Educational Office to facilitate organizational and administrative change. The Faculty subsequently launched various activities to increase social support and help students flourish. For example, in every semester, group activities are designed to increase bonding between students, and opportunities are created for students at different years to engage with each other. Credit courses are offered to help professional orientation, teach relaxation, yoga techniques, and self-management.

DISCUSSION

FEATURES OF THE MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

In general, there were no major differences among various student groups by specialties. **Mental health** was unfavourable as reflected by low SoC and high GHQ in almost one-quarter of the study population. The mental health status of male students was more favourable than their female peers at the university. Psychological morbidity occurred significantly more frequently in Hungarian female students compared to their peers, while the mental health of male students was very similar to their non-student peers except for the notably more frequent lack of social support. Our results have been in line with other studies that drew attention to the mental health problems of students in various health and education professions.

Students who have below-average sense of coherence and above-average scores of mental distress can be considered at higher risk to develop mental health problems. The identification of these students would enable them to receive timely support and help for their studies. A

potential method for **assessment** would be the application of a short questionnaire measuring sense of coherence and psychological distress upon commencing their studies which would distinguish those who are psychologically well prepared for the increased psychological burden of studying at an institute of higher education with a 97.9% probability. Compared to the validity of screening tests, the features of our assessment test are acceptable.

The main **causes of stress** for physiotherapy and public health students as revealed by the focus group sessions were high demand and low support at university, suboptimal relations to peers, lack of leisure time, and insufficient coping skills to deal with stress. These causes were similar to ones found in other qualitative studies of university students.

An advantage of the present survey is that the surveyed population, in spite of being relatively small, gave a high response rate, and represented students by study year in the Faculties. The timing of data collection about mental health is a critical point in case of university students because their stress level fluctuates during the academic year. A potential source of bias might be the timing of data close to the exam period. In order to reduce this type of bias, data were collected in the mid-term of the semester. The unfavourable mental health of university students is likely to deteriorate during the examination periods.

MODEL OF MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

In light of the result of our cross-sectional studies, it can be stated that the mental health of the students should be improved. However, first we have to know what factors in what arrangement determine health. A multitude of health models have been published, but many of these models are basedon cross-sectional data though the life-course approach disentagling health exposures and determinants and their interrelatedness across the life span has been shown to better approximate adult health.

As the number of determinants increases and their longitudinal influences are also taken into account, so does modelling become increasingly complex, requiring carefully constructed, precise hypotheses tested by appropriate statistical tools. We tested a multivariate model of student health in which determinants were arranged in a life-course approach that revealed substantial differences among the determinants of male and female health. Our proposition is that the health of male students is determined by less variables that are more proximal in time and more centered around physical activity, and lesser influenced by social relations. Female students' health, as opposed to that of males, is influenced by age; determinants are more grouped around ingestion (oral consumption of various substances), and social support. Our final models are in agreement with our hypothetical model and other findings that revealed

gender differences in health, and also add further information on specific gender differences. Our models not only help understanding gender differences in the creation of health but also identify potential points of intervention. Though MANCOVA is not appropriate for testing hierarchical relations (those should be tested by other statistical procedures using data from longitudinal surveys), the effect size measures were acceptable especially in light of the complexity of the latent outcome variable ("health") and the high number of explanatory variables.

IMPROVEMENT OF THE MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

There are two potential avenues for helping students. One is to reduce or limit the stress they are exposed to; another one is to strengthen students' stress-coping skills by evidence-based interventions (or a combination thereof).

In order to reduce the amount of stress students have to face, the summary results of the descriptive studies were fed back to the Educational Office of the University as well as to the involved Faculties to facilitate organizational and administrative change, and present opportunities to increase social support and help students flourish. Based on the published literature of mental health promoting programs among university students, we compiled those elements into a course for which most evidence was available but was not offered at the University. Therefore, the course was built upon the social-cognitive theory combined with stress reduction elements. The intervention was delivered as an optional course and produced a modest but significant decrease in psychological distress in students. The significant improvement of stress in the targeted student population at 4 universities provides evidence of the reliability and effectiveness of the content and structure of the course rather than the mode of delivery, the mix of students or some subjective features of the lecturers.

One limitation of our study is that the group effect that we found was not investigated at the individual level as students were deliberately not requested to be identified on the questionnaires so as to preserve trust related to the sensitive issues discussed during the intervention. Repeated interventions will be needed to evaluate reliability.

Effective mental health promotion entails promoting the general mental well-being of students which itself can bring benefits to higher education institutions. There is increasing awareness that mental well-being can be promoted by attention to organizational practices, general environment, availability of support, lifestyle, attitudes and social inclusion. These all point in the direction of a structurally reorganized, healthy university towards which our intervention can be a first step. An optional course in our opinion is a possible way of helping at-risk

students to improve their resilience. Its only drawback is that it cannot reach students who are not conscious of their suboptimal mental health condition or not willing to ask for help.

CONCLUSION

Competent and credible helping professionals who are fit to practice are essential for the provision of services. Hidden and/or untreated health problems are but one of numerous reasons of impaired fitness for service especially in an environment like health care or education where high levels of occupational stress are pervasive.

However, even cumulative stress experiences do not inevitably lead to mental disorders if individual coping resources and psychosocial factors moderate the effects of stressors. Improvement of the mental well-being of care providers increases job performance and the quality of patient care, and decreases absenteeism, turnover, job burnout, and retaliatory behaviours. Academic sources of stress may be alleviated by planning modifications in the curriculum and by interventions that provide psychological support.

Multi-modal cognitive-behavioural interventions can elicit significant changes in emotions, even turning a pessimist into an optimist by teaching him/her skills to decrease negative automatic thoughts and increase more constructive thoughts. These interventions should be structured, inserted into the curriculum and offered to all those who are in a less than optimal state, preferably at the beginning of their studies. By applying mental health-related knowledge and imparting skills to students (and staff) that lead to improved mental resilience, universities have a far greater potential to improve the health and quality of life of humankind that they have so far taken advantage of.

RECOMMENDATIONS

Incoming and/or female students have a higher risk to develop mental health problems therefore their mental health should be assessed by a questionnaire including our composite tool. Appropriate services should be recommended based on its evaluation.

Our results highlight the importance of longitudinal studies. Monitoring the mental health of all students during their academic studies should serve as a basis of interventions.

All except those in optimal mental health should be offered various mental services and interventions, including optional courses aimed at improving the mental health of students that are based on cognitive-behavioural or mindfulness approaches. Those at high risk should also be offered individual mentoring by peers or lecturers. Institutional changes (review of curriculum, schedules, quality of educational services, etc.) should be implemented to reduce

unnecessary stressors related to academic affairs thereby improving the quality of higher education.

Recognizing the critical importance of the mental health of students, the University of Michigan initiated a large-scale ongoing annual survey in 2007 (Healthy Minds Study) to examine the mental health and most frequent disorders of college students. According to its results, nearly half of college students screened positive for a mental disorder in the multicampus sample, and more than half of them reported that mental health problems affected their academic performance at least 1 day in the past month. Our research provides evidence to our assertion that the monitoring of the health status of Hungarian college students is also justified.

MAIN STATEMENTS

Psychological morbidity was significantly more frequent in Hungarian students compared to their peers. However there were no major differences among the various student groups by specialties. The high proportion of those students who suffered from psychological distress gives cause for concern.

Our assessment tool was shown to identify with high probability those who are in optimal mental health hereby distinguishing between those who need extra support and those who do not in a non-stigmatizing manner. Those at higher risk should be helped in various ways such as optional courses, peer-led and tutor-led mental health services.

One group of the causes of stress was related to the university such as high demand and low support, and suboptimal relations to peers. Other stressors were at least partially related to the family background, such as finanacial problems; or were personal, like no leisure time and insufficient coping skills to deal with stress. Institutional changes can reduce unnecessary stressors rooted in academic affairs, and coping skills can be improved by optional courses.

Our model of student health revealed substantial differences among the determinants of male and female health. Our proposition is that the health of male students is determined by less variables that are more centered around physical activity, whereas female students' health is more influenced by social support. The most effective points of intervention are different in the two genders. However, an optional course as the simplest intervention may produce a modest but significant decrease in psychological distress in students as proven by our multi-site intervention.

SUMMARY

Future health and education professionals are especially important among students because their credibility, that is, their own health and well-being in contrast to their relevant knowledge, will be tested daily by their clients and patients. Our goal was to better understand students' mental health from both negative (related to stress) and positive (related to resilience) aspects and its determinants in order to identify needs for improvement so that appropriate interventions could be developed.

First, a series of cross-sectional studies focusing on mental health was carried out among students of public health, physiotherapy and nursery teaching at the Faculty of Public Health and the Faculty of Child and Adult Education of the University of Debrecen, Hungary. Second, an assessment tool was created and tested to distinguish between those with high or low mental resilience. Third, relevant factors contributing to the mental health of students were identified, and a multivariate model of health was built and tested. Fourth, a social-cognitive intervention aimed the improvement of mental health of the students was implemented as an optional course and evaluated.

According to our results, almost one-quarter of the surveyed students exhibited unfavourable mental health that was characterized by low sense of coherence and high distress. Unfavourable mental health was twice as frequent among female as in male students, and six times higher than in their female peers in the general population. Our assessment tool was shown to identify with high probability those who are in optimal mental health hereby distinguishing between those who need extra support and those who do not in a non-stigmatizing manner. Our model of mental health revealed substantial gender differences in the determinants of mental health: social support for women, and physical activities for men were identified as of greatest importance. The social-cognitive intervention that was offered for students as an optional course significantly reduced abnormal psychological stress among those who completed it.

The assessment of incoming students is recommended to detect those at higher risk in terms of mental resilience. High–risk students should be helped in various ways by offering optional courses, peer-led and tutor-led mental health services. Institutional stressors should be reduced to create an environment for all that is conducive to health. Follow-up studies should be needed to assess the impact of individual and institutional changes on the mental health of university students and graduates.

LIST OF PUBLICATIONS

UNIVERSITY OF DEBRECEN
UNIVERSITY AND NATIONAL LIBRARY
**PUBLICATIONS**

Candidate: Éva Bíró

Neptun ID: E88CM1

Doctoral School: Doctoral School of Health Sciences

Mtmt ID: 10036724

List of publications related to the dissertation

1. **Bíró, É.**, Veres-Balajti, I., Ádány, R., Kósa, K.: Social cognitive intervention reduces stress in Hungarian university students.
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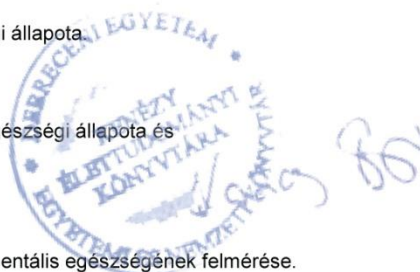
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Total IF of journals (all publications): 5.521

Total IF of journals (publications related to the dissertation): 3.374

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