

THESIS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (PHD)

**Studies on the mental health of students in
higher education**

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LIST OF ABBREVIATIONS

AGFI	Adjusted Goodness of Fit Index
ANOVA	Analysis of Variance
ANCOVA	Analysis of Covariance
BDI	Beck Depression Inventory
CB-SEM	Covariance-Based Structural Equation Model
CFI	Comparative Fit Index
DALY	Disability-Adjusted Life Years
EU	European Union
GFI	Goodness of Fit Index
GHQ	General Health Questionnaire
GRRs	General Resistance Resources
HBSC	Health Behaviour in School-aged Children
HNHIS	Hungarian National Health Interview Survey
IQR	Interquartile Range
LR+	Positive likelihood ratio
LR-	Negative likelihood ratio
MANOVA	Multivariate Analysis of Variance
MANCOVA	Multivariate Analysis of Covariance
MBSR	Mindfulness-based Stress Reduction
mhGAP	Mental Health Global Action Programme
NFI	Normed Fit Index
NT students	Future nursery school teachers
PCA	Principal Component Analysis
PD	Psychological Distress
PH students	Public health students
PSS	Perceived Stress Scale
PT students	Physiotherapy students
RMSEA	Root-Mean Square Error of Approximation
SD	Standard Deviation
SF-36	Short-Form-36 Health Survey
SoC	Sense of Coherence
YLD	Years Lived with Disability
WHO	World Health Organization

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“Health is not everything, but without health everything is nothing.”

Arthur Schopenhauer

INTRODUCTION

THE IMPORTANCE OF MENTAL HEALTH FOR PUBLIC HEALTH

World Health Organization 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’.[1]

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.[2] 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 were taken by the WHO. The World Health Day of 2001 was devoted to mental health in order to raise awareness on its importance, subsequent to which the highest level of decision makers, a forum of Ministers of Health from around the world issued a call for national actions during the World Health Assembly.[3] The need for action was demonstrated by the World Health Report of 2001 dedicated to mental health.[4] A few years later, a WHO-report was published detailing effective interventions and policy options to prevent mental disorders.[5] Despite effective treatment modalities, there has been a gap between the high prevalence of mental disorders and the low proportion of patients who receive proper treatment. The Mental Health Gap Action Programme (mhGAP) called for the closure of this gap in 2008 by providing a strategy for scaling up services for mental, neurological and substance use disorders especially in low and lower middle income countries, focusing on depression, schizophrenia, alcohol and drug dependence, dementia, epilepsy, and the risk of suicide.[6] The mhGAP issued a very practical intervention guide in 2010 to be used in non-specialized healthcare settings.[7]

A combination of well-targeted treatment and prevention programmes embedded into public health strategies could lead to the reduction of disability and deaths by effective treatment of patients minimizing the stigma and improving the social and economic environment. Even though disorders can be managed effectively with medication and/or psychosocial interventions, not every patient receives appropriate treatment. In order to improve population health and reduce the increasing burden of mental disorders, priority should be given to promotion of mental health at population level.[2]

BURDEN OF MENTAL DISORDERS IN THE GENERAL POPULATION

Mental health as a public priority is fully justified considering the increasing burden of mental disorders that have a large impact not only on the affected individuals but their families and communities as well. Many mental patients are unable to work or participate in social activities; in addition, their symptoms are often aggravated by discrimination. The burden on families is manifold: economic difficulties are caused by loss of income and treatment costs; giving physical and emotional support, coping with 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.[4]

The global cost of mental disorders in 2010 was estimated at US\$ 2.5 trillion, and estimated to increase US\$ 6.0 trillion by 2030.[8] The societal costs of mental illness are not only incurred from economic expenditure due to loss of productivity and the costs of care, but also to the indirect loss related to the increased risk of mental patients for other diseases and increased mortality.[9]

Mental and behavioural disorders affect more than 25% of all people at some time during their lives, and they are present at any point in time in about 10% of the adult population.[4] The suffering caused by various diseases is measured traditionally by incidence, prevalence and mortality. However, on one hand, the contribution of mental disorders to mortality is relatively low compared to other chronic diseases; on the other hand, classical measures of mortality and morbidity do not allow the comparison of the individual and social burden of suffering and loss of functionality due to various chronic and/or disabling diseases, such as mental disorders. Therefore, burden of disease using the disability-adjusted life year (DALY) was introduced as a complex time-based measure to enable the assessment of human suffering across diseases and geographical locations.[4] The number of DALYs for mental and behavioural disorders increased by 38% from 1990 to 2010, a tendency expected to continue in the future.[10] By 2010, mental and behavioural disorders accounted for 7.4% of the global burden of disease, similarly to that of neoplasms (7.6%). Mental and behavioural disorders, such as depression, anxiety, alcohol and drug use are the primary drivers of long-term disability and loss of independence worldwide. Depression is a major cause of disability across regions and is one of the top three causes of disability in almost every region. Additionally, schizophrenia and bipolar disorder are included in the top 20 causes of disability in many regions.[11] Mental and behavioural disorders accounted for 22.7% of all years lived with disability (YLDs), and increased by 37% from 1990-2010, being the leading cause of

YLDs in the age group 10-65 years.[12] The ranking of YLDs separately for the genders in high income countries can be seen in Table 1.

Table 1: Leading causes of burden of disease (YLDs), high income region, 2010

Rank	Males	Females
1	Low back pain	Low back pain
2	Major depressive disorders	Major depressive disorders
3	Neck pain	Other musculoskeletal
4	Falls	Neck pain
5	Drug use disorders	Anxiety disorders
6	Other musculoskeletal	Falls
7	Diabetes	Migraine
8	Chronic obstructive pulmonary disease	Osteoarthritis
9	Alcohol use disorders	Chronic obstructive pulmonary disease
10	Anxiety disorders	Alzheimer’s disease

Source: Institute for Health Metrics and Evaluation, The Global Burden of Disease, 2013 [13]

Depression ranked fourth as measured by DALYs in the European Union and the European Free Trade Association region in 2010.[14] Across Europe, 27% of the population are affected by a mental disorder during a year. The most prevalent conditions in the European Union are major depression, specific phobias, somatoform disorders and alcohol dependence.[15] Nevertheless, citizens in the EU experience positive emotions more often than negative emotions, but there have been significant discrepancies between countries, and a downward shift in feeling since 2006, with fewer respondents reporting experiencing the positive emotions and fewer saying that they had never or seldom experienced negative emotions during the last month. Those with the most negative experience are from low social groups, while persons with a more positive experience of life are at the higher end of the social scale or belong to the 15-24 age groups (mostly students).[16]

The top five leading causes of years lived with disability in Hungary were low back pain, major depressive disorder, falls, diabetes, and other musculoskeletal disorders in 2010.[14] Hungary is the only country which is above the EU average on both health and emotional problems.[16] According to the results of the Hungarian National Health Interview Survey (HNHIS) of 2000, 13% of the population was affected by psychological distress measured by the 12-item General Health Questionnaire (GHQ-12) [17], this proportion was nearly 10% in 2003.[18] The lifetime prevalence of the self-diagnosed depression was 13%, the proportion of the doctor-diagnosed depression was 9% in the population in 2003.[18] Using the Beck

Depression Inventory, the Hungarostudy survey series showed that the proportion of severe depression cases almost tripled between 1988 and 2002 (2.7% vs. 7.1%) [19], and one-tenth of the population was affected in 2013.[20] Six per cent of the respondents of the Hungarian population in the European Health Interview Survey “complained of chronic depression” in 2009, and the proportion of those receiving medicinal treatment because of some kind of mental diseases was around 10%.[21]

The above mentioned numbers on the burden of mental disorders probably reflect an underestimation due to the insufficient appreciation of the relationship between mental illness and non-mental conditions. Mental disorders increase risk for communicable (e.g. sexually transmitted diseases [HIV/AIDS], tuberculosis) and non-communicable diseases (e.g. cardiovascular diseases, diabetes), and contribute to injury, violence and suicide. In light of these connections was the slogan created: “no health without mental health”.[9]

BURDEN OF MENTAL DISORDERS IN YOUNG ADULTS

Mental and behavioural disorders are common in young people as well. 10-20% of all children have one or more mental or behavioural problems [4], one-fifth of adolescents [22] and at least one out of every four to five young people experience some kind of mental health problem.[23] These are the primary causes of disability in this age group with long-lasting effects (Figure 1).[23,24,25,26] Nearly half of all adult mental disorders have their onset in adolescence [27], and poor mental health in childhood is associated with a high prevalence of adult emotional, behavioural, and severe psychiatric problems.[25] The rates of depression increase for both genders between 15-18 years of age, and the female rate of depression becomes twice as high as in males.[28] Four per cent of the 12-17-year-olds, and 9 per cent of the 18-year-olds suffer from depression; and suicide is one of the leading causes of death among youth (15-35 years).[29] Poor mental health of youth is associated with lower educational achievements, substance abuse, suicide, violence, and reproductive and sexual health problems.[23] The economic impact of childhood mental disorders include the cost of medical expenses, special educational needs, burden to the criminal justice system, and social service expenses. 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.[30]

The mental health of European children in general is good, but a sizeable minority suffers from health complaints and perceive their health as fair or poor. These problems are more common among girls and older school-aged children. Eastern countries in the WHO European Region tend to have higher rates of poorer health and lower rates of life satisfaction.[29] An estimated 10 to 20% of children and adolescents have mental health problems, and suicide is one the leading causes of death in youth in Europe.[31]

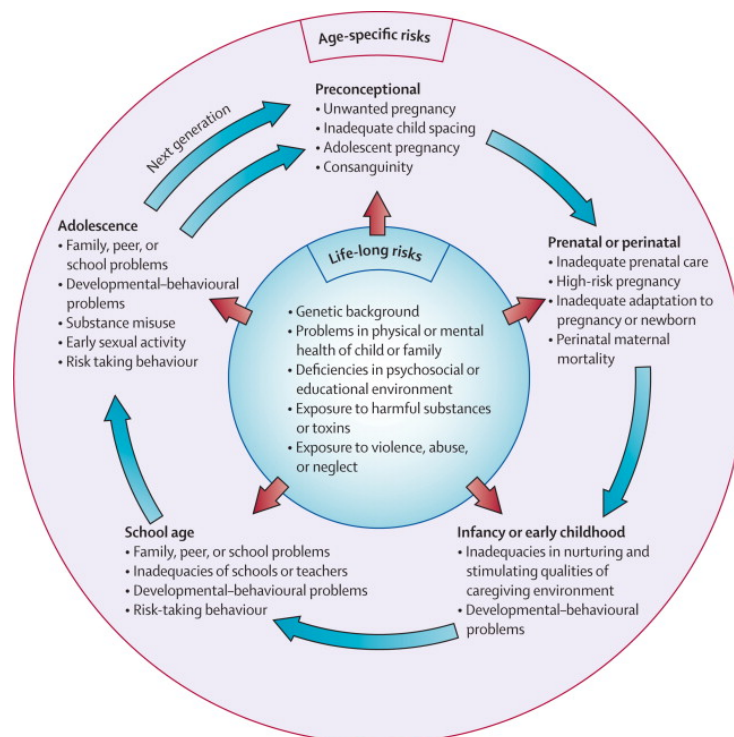


Figure 1: The lifecycle approach to risk factors for mental disorders
 Source: Kieling et al., *Lancet*, 378(9801):1515-1525, 2011. [24]

The impact of mental and behavioural disorders in terms of YLDs was the highest among youths in 2010 in Hungary (see Figure 2).[32]

Nearly one-fifth (17%) of young (19-29 age-group) Hungarian adults suffered from depressive symptoms in 2002. The proportion slightly decreased to 15% by 2006, but the prevalence of severe depression doubled (1.4% vs. 2.8%) between 2002 and 2006.[33] According to the results of the Health Behaviour in School-Aged Children (HBSC) Survey, nearly one fifth of the boys and one quarter of the girls felt depressed in 2010, which did not change significantly from 2002.[34]

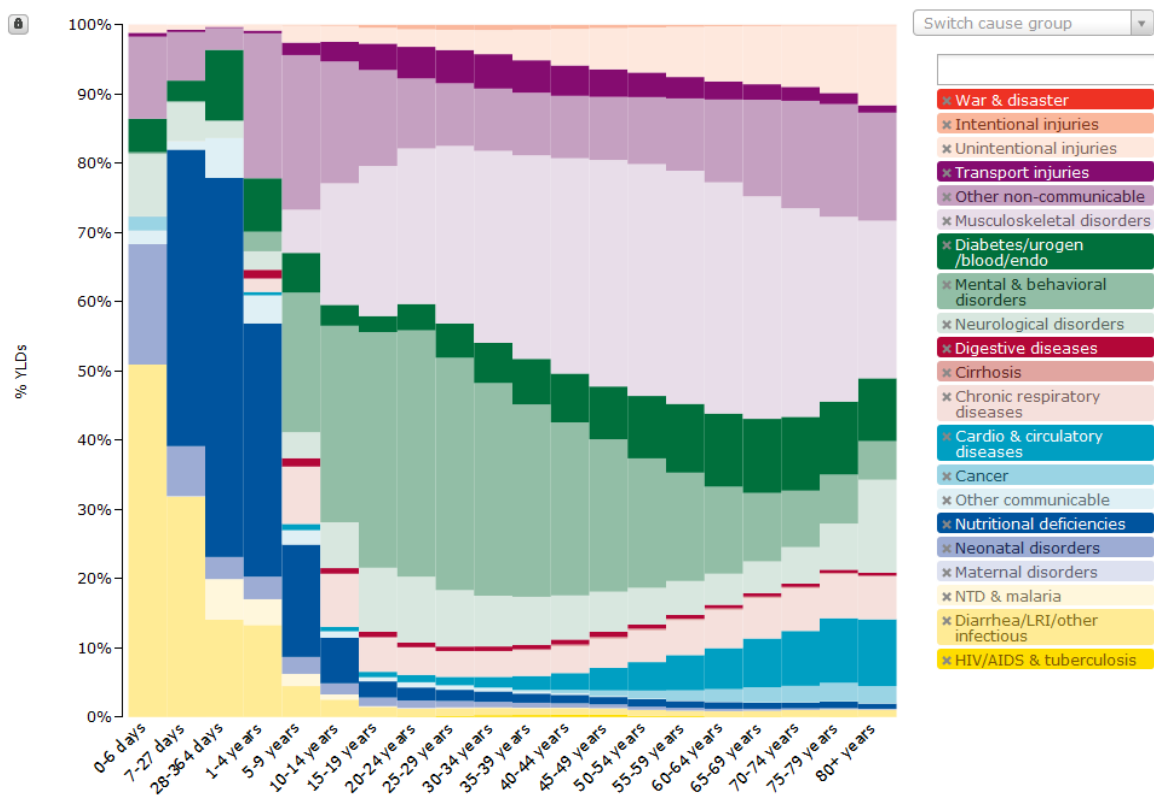


Figure 2: Major causes of years lived with disability in Hungary, both sexes, 2010
 Source: Global Burden of Diseases Cause Patterns, IHME, 2013 [32]

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, physical diseases, family and environmental factors (Table 2).[4]

Taking the holistic view of health proposed by the World Health Organization, the structural determinants and conditions of daily life constitute the social determinants of health: power, income, goods, and services, the circumstances of people’s lives – their access to health care, schools, and education, their conditions of work and leisure, their homes, communities, towns, or cities – and their chances of leading a flourishing life.[35]

Table 2: Selected risk and protective factors for mental health of children and adolescents

	Risk factors	Protective factors
Biological		
	Exposure to toxins (smoking, alcohol) in pregnancy	Age-appropriate physical development
	Genetic tendency to psychiatric disorder	Good physical health
	Head trauma	Good intellectual functioning
	Hypoxia at birth, birth complications	
	HIV infection	
	Malnutrition	
	Substance abuse	
	Other illnesses	
Psychological		
	Learning disorders	Ability to learn from experiences
	Maladaptive personality traits	Good self-esteem
	Abuse and neglect	High level of problem-solving ability
	Difficult temperament	Social skills
Social		
Family	Inconsistent care-giving	Family attachment
	Family conflict	Opportunities for positive involvement in family
	Poor family discipline	Rewards for involvement in family
	Poor family management	
	Death of a family member	
School	Academic failure	Opportunities for positive involvement in school life
	Failure of schools to provide appropriate environment to support attendance and learning	Positive reinforcement from academic achievement
	Inadequate/inappropriate provision of education	Identity with school or need for educational attainment
	Bullying	
Community	Transitions (e.g. urbanisation)	Connectedness to community
	Community disorganization	Opportunities for leisure
	Discrimination and marginalisation	Positive cultural experiences
	Exposure to violence	Positive role models
		Rewards for community involvement
		Connection with community organizations

Source: Patel et al., Lancet, 369(9569):1302-1313, 2007. [23]

Disorders are determined in a large part by the socioeconomic status (SES) of the individual. Low educational level, low income, insecure and poor quality employment or unemployment, psychosocial work environment and being at the bottom rungs of social gradient are all associated with increased risk of mental health problems.[36,37] For instance, the rates of depression are increased in low socioeconomic groups; there is evidence of an association between depression and low level of education, unemployment, underemployment, stressful working environments, income inequality, lack of housing, poor sanitation and built environment.[38,39] As a result of these connections, a vicious cycle of deprivation and depression can be established (Figure 3).

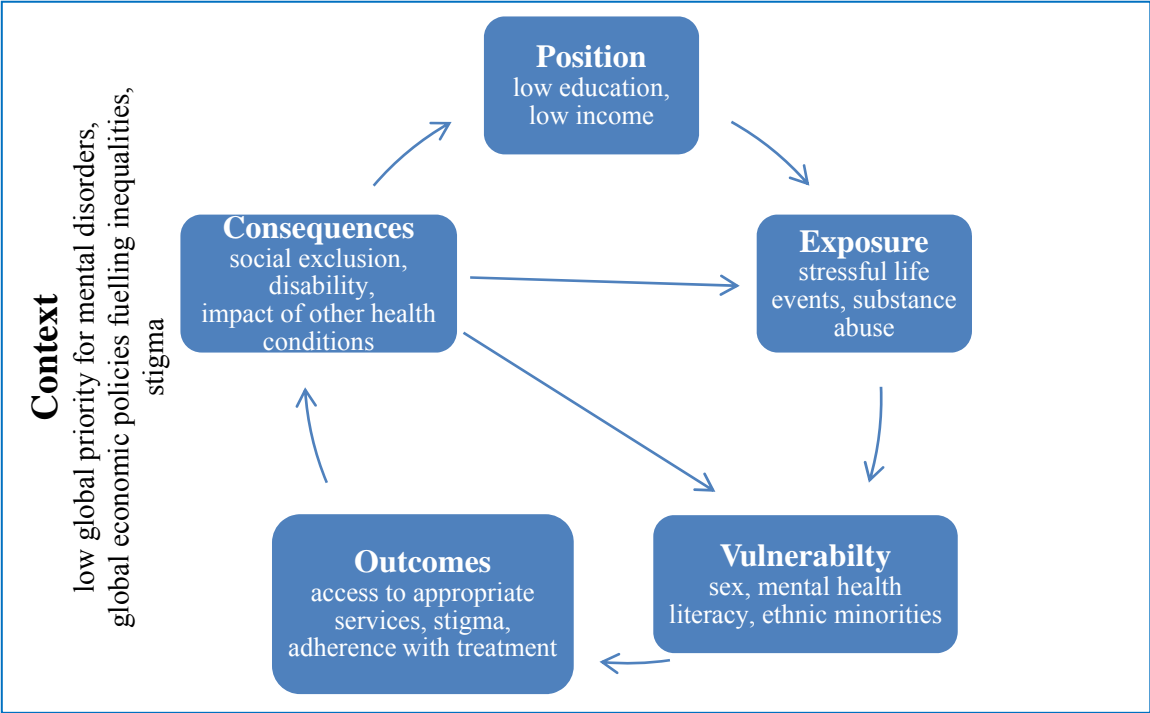


Figure 3: Vicious cycle of social determinants and mental disorders
 Source: Equity, social determinants and public health programmes WHO, 2010 [39]

There is also strong evidence that the health of young adults is affected by social factors of which the strongest determinants are national wealth, income inequality, and access to education, all associated with a wide range of health outcomes. Greater youth unemployment leads to poorer mental health outcomes, suicide, and violence-related mortality.[40] Disadvantage measured by poverty, receiving public assistance, and unemployment concentrating in particular neighbourhoods is connected with mental health problems among 5-11-year-olds.[41] Lower socioeconomic status is associated with lower levels of mental well-being among school-aged children.[29]

The multiple roles that women fulfil in society put them at greater risk of experiencing mental and behavioural disorders. However, the overall prevalence of these disorders does not seem to be different between men and women, but disease pattern varies between the genders: anxiety and depressive disorders are more common among women, while substance abuse and antisocial personality disorders are more frequent among men. The prevalence of some disorders, predominantly depression, tends to rise with age. The presence of major physical diseases affects not only the mental health of diseased persons but also the mental health of the whole family. Most of the disabling or life-threatening diseases, including cancers, have this impact.[4]

Mental disorders are deep-rooted in the social and emotional environment of the individual. People go through a series of significant – positive as well as negative – events in life and the accumulation of these events may contribute to the onset of mental disorder.[4] Safe and supportive families and schools, together with positive and supportive peers are fundamental in helping young people attain their best health. Adolescents had fewer behavioural and mental health problems in countries with tighter family connections.[40] Family can act as a protective health asset in many ways; one of this is parental communication which promotes prosocial values that help deal with stressful situations. Those who report easy communication with their parents are more likely to have higher self-rated health, higher life satisfaction and fewer physical and psychological complaints and less likely to participate in aggressive behaviours and substance use. 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. Students who get on well with their classmates, reported fewer subjective health complaints, better health status and higher life satisfaction, while low perceived classmate support seems to be related to psychological complaints.[29,42]

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. Depression and low self-esteem in young people are linked with smoking, binge drinking, eating disorders and unsafe sex; while in other age groups depression is linked with social isolation, alcohol and drug abuse as well as smoking.[43,44]

All in all, there are complex interactions between health determinants, behaviour and mental health at all stages of life.[44]

DOMAINS OF MENTAL HEALTH AND THEIR MEASUREMENTS

RESOURCE-ORIENTED APPROACHES OF MENTAL HEALTH

Sense of coherence (SoC)

Antonovsky proposed a salutogenic approach, namely, focused on peoples' resources and capacity that are conducive to health rather than risk factors that make people sick. He found that the key elements are the orientation towards problem solving and the capacity to use the available resources.[45] 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. If a person has these resources there is a better chance to deal with the challenges of life. The GRRs lead to life experiences that promote a strong SoC.[46] 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".[47] SoC has three components: the cognitive component (comprehensibility), the instrumental/behavioural component (manageability) and the motivational component (meaningfulness).[45] 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 expects that stimuli encountered in the future will be predictable, ordered, and explicit. Manageability is the extent to which a person perceives that resources are at their disposal that are adequate to meet the demands posed by the stimuli that bombards them. Meaningfulness refers to the extent to which a person feels that life makes sense emotionally, that problems and demands are worthy investing energy in, of commitment and engagement, seen as challenges rather than burdens.[47] SoC is applicable on the individual, group and societal level, and fluctuates dynamically through life. People develop their SoC through the whole life span but mainly in the first decades. Thereafter only major changes in life could impact SoC.[46]

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.[45] There is a strong positive relation between SoC and perceived good health as well as between SoC and mental health. Development of 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.[48] SoC can be measured with a reliable, valid, feasible, and cross culturally applicable instrument developed by Antonovsky, translated to more than 33 languages in two versions: the original (29 items, SoC-29) and the abbreviated version (13 items, SoC-13). It can be used as a measurement of the entire construct not examining its three sub-dimensions separately. Antonovsky never published a ‘normal’ value of SoC, he recommended examining SoC without dividing the sum of the item values into low or high. Regarding a systematic review the means of SoC-29 vary between 100.50 and 164.50 points from 124 studies, for SoC-13 from 35.39 to 77.60 points from 127 studies.[49]

Social capital, social support

One of the most confusing aspects of social capital has been the lack of 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.[50] 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.[51] There are two types of social support regarding the supportive functions; one of them is the *perceived support*, i.e. functions that are perceived to be available if needed; while another is the *received support*, functions that are reported to be recently provided.[52]

There are three main theories of how social relationships influence well-being (Table 3): the *stress and coping perspective* stated that support contributes to health by protecting from adverse effects of stress. The *social constructionist perspective* proposes that support promotes self-esteem and self-regulation, whereas the *relationship perspective* conceptualizes support as part of generic relationship processes and predicts that these processes (companionship, intimacy, low social conflict, and social skills) cannot be separated from social support.[52] There are two mechanisms by which social relationships can influence health outcomes: according to the *stress-buffering model* social ties are related to well-being only for persons under stress, whereas the *main effects model* proposes that social

relationships have a beneficial effect regardless of the presence of stress. Structural aspects of social relationships may operate via main effects, whereas functional aspects of social relationships operate through a stress-buffering mechanism.[52,53]

Social capital has been shown to be a major determinant of health, and its strengthening has salutogenic effects.[50] 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.[54] 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.[53] Social support can enhance self-efficacy, for instance in the case of (postpartum) depression. Social support also has an influence on emotion, mood and subjective well-being; however the perceived adequacy of support is more important than its availability.[55] Mention must be made about the negative aspects of social relationships: social negativity (criticism and/or unreasonable expectations from significant others) was found to be associated with anxiety and mood disorders.[56]

Table 3: Summary of theoretical perspectives on social support

Theoretical perspective		Aspect of support emphasized	Type of support measures emphasized	Support operates	Mechanism on health outcomes
Stress and coping	<i>supportive actions</i>	supportive behaviours	reports of supportive behaviours	promoting coping	stress buffering
	<i>appraisal</i>	perceived availability	perceptions of availability	promoting less negative appraisals of stress	
Social constructionist	<i>social cognition</i>	global evaluative representation of others	global evaluation of support availability	influencing evaluations of self and others	main effects
	<i>symbolic interactionism</i>	social roles	social roles	providing identity	
Relationship	<i>relationships</i>	companionship, undermining, intimacy	various	various mechanism	

Source: Cohen, Underwood, Gottlieb (Eds.): Social Support Measurement and Intervention: A Guide for Health and Social Scientists, 2000 [52]

Instruments to measure social capital ideally need extensive pre-testing to ensure their validity and reliability in the population being investigated.[50] Social support can be measured by many ways, and different measures reflect specific theoretical orientations.[52] Therefore the selection of measurement instruments should be directed by the specific research interest. One of the most important differences is whether the assessment of perceived vs. received support is the aim.[55] Perceived support for instance can be measured with a seven-item questionnaire used in the Health and Lifestyle Survey and Health Survey for England.[57] Received support can be assessed among others with the widely used Inventory of Social Supportive Behaviours, a 40-item questionnaire developed by Barrera et al, where the respondents have to indicate the extent to which the items were received during the last month.[52]

DEFICIENCY-ORIENTED APPROACHES OF MENTAL HEALTH

Stress

Stress is an important variable affecting health, but not all of its psychobiological relations are understood. Furthermore, there are different theoretical approaches regarding the connection between stress and health. The *response-based orientation* (developed by Hans Selye) defined stress as a nonspecific response to harmful stimulus (stressor). According to this theory, the defensive response (general adaptation syndrome, GAS) has three stages: the alarm reaction phase is triggered when there a noxious stimulus is experienced. In the stage of resistance physiologic forces are mobilized to resist damage. This stage can lead to adaptation (disappearance of symptoms) or to diseases of adaptation (e.g. hypertension, arthritis, cancer). Exhaustion, the third phase, can occur when the stressor is pro-longed or severe enough to lead to the depletion of adaptive energy. Selye maintained that stress has always been present, and without stress there would be no life. He attempted to distinguish 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 is an optimal level of stress. The *stimulus-based theory* treated life events as the stressors to which a person responds, and defined stress as the adaptation required by major life events. The *transactional theory* stated that stress is a result of a transaction between the person and the environment during which stress is experienced when the demands exceed the resources and some type of harm is expected. The behaviour that a person uses to respond in this situation is called coping, consisting of efforts to ameliorate the threat or to manage emotions.[58]

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.[59,60] An accumulation of events that compel behavioural changes may have negative physical health consequences, whereas stressors that implicate the self may primarily impact on mental health. The psychological impact of a stressor depends on its meaning for the individual, that is, the subjective appraisal of the stressor. The stressor may be perceived as potentially leading to loss, being a threat or a challenge, and can be thought of as controllable or uncontrollable. Furthermore, stressors can have direct harmful effects on self-conception and through these changes cause psychological symptoms (stress mediation). However, even cumulative stress experiences do not unavoidably lead to mental disorders, because there are psychosocial factors and coping resources which can moderate the effects of stressors, like social support, self-esteem and personal control.[56]

Psychological distress (PD) 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 is the following: “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”.[61] The most widely used definition regarding its symptoms is “a state of emotional suffering characterized by symptoms of depression and anxiety”.[62] The prevalence of PD ranges between 5% and 27% in the general population, being higher in women in most countries, and decreasing over the lifespan from late adolescence.[62]

Psychological distress is assessed with several scales. Since the length of the time window in which symptoms have to be recalled varies from 7 to 30 days, along with the threshold used to differentiate individuals with a lower vs. higher level of distress, estimations of the prevalence of psychological distress can be different. One of the validated and most widely used instrument to measure psychological distress is the General Health Questionnaire (GHQ) developed by Goldberg.[62] GHQ is an extensively used screening instrument that is appropriate for detecting non-psychotic psychological morbidity including anxiety and depression in the general population.[63] Its use above the age of 17 years has been well established.[64] The GHQ is used to assess the respondent’s current mental state and whether that differs from his/her usual state.[65] The GHQ has several versions that differ in the number of items (GHQ-12,-20,-28,-30,-60).[62] Various scoring methods can be used for evaluation, but all scales and methods yields an overall score; higher scores reflect more severe conditions. Thresholds are only relevant when the GHQ scale is used for screening,

and it is best defined by past clinical use or research evidence. The GHQ works both in the developing and developed countries.[66,67] Validated versions of the GHQ exist in more than 40 languages.[62]

Depression

Depression is a common mental disorder with a variety of symptoms, the core ones being negative affective state, loss of interest in normally pleasurable activities, and decreased energy. Other symptoms include changes in appetite, disturbance of sleep, feelings of worthlessness, diminished concentration, thoughts of death, suicide attempts or suicide; somatic symptoms may also be present. Depressive disorder is diagnosed when a specified number of core and additional symptoms are present lasting at least two weeks.[7] The severity of the symptoms can range from mild to severe, duration and appearance might be episodic, recurrent or chronic, and negative affective state can dominate the illness (unipolar depression) or, less frequently, it may be alternating with manic symptoms in case of bipolar disorder.[4,68] Depression can affect individuals at any stage of the life span, and there is an increasing prevalence during adolescence and young adulthood. The prevalence of depression is usually higher among adult women, but there is little or no differences in childhood and in the elderly.[4]

Depression is common in patients with chronic medical illness, such as coronary heart disease, cancer, diabetes. Depressive episodes can occur subsequent to the medical conditions, but many patients have depression before the medical illness. Depression can alter the course and outcome of the comorbidity.[9,55]

Many scales are in use to assess depression. Of those, the Beck Depression Inventory (BDI) is the most widely used tool that was developed in 1961 and revised in 1978 and 1996 (BDI-II). The BDI was designed to measure the presence and degree of depressive symptoms and has been used as a screening tool and research instrument as well. The questionnaire consists of 21 items, yielding a total score; higher scores represent more severe depression. 13 items of the BDI-II are included in the abbreviated version for use as a rapid screening tool.[69] A seven-item version has been used in primary care (BDI-PC) with an established threshold for identifying those who need specialist care.[70] The BDI can be used also for adolescents.[71,72] The BDI differentiates between psychiatric and nonpsychiatric patients, and subtypes of depression. The BDI symptoms discriminate medical patients, nonmedical patients, and normals; and distinguish between major depressive and generalized anxiety

disorders. The BDI has been translated into numerous languages and many of these translations have modified the original questionnaire.[73]

Other commonly used questionnaire is the Short-Form-36 (SF-36) Health Survey, designed to measure the general health status of the population above 14 years of age. It is applicable to assess a wide range of health conditions, among them mental health status. The SF-36 consists of a multi-item scale to evaluate eight health concepts (physical functioning, role limitations due to physical and emotional problems, bodily pain, social functioning, mental health, vitality, and general health perceptions).[69,74] Its mental health domains can be used to screen depression.[75,76,77]

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.[56]

School is not only a social and learning environment influencing the academic and vocational pathways, but also has an impact on present and future health. Connectedness to school is important to reach positive educational outcomes and lower rates of health-risk behaviours. Among adolescents who are not engaged with learning or who have poor relationships with peers and teachers, the prevalence of drug abuse, socially disruptive behaviours, anxiety and depressive symptoms are higher, and they also have poorer adult relationships, many of them failing to complete secondary school.[78] In elementary and high schools bullying is one of the biggest problems, which can have longitudinal effects on the mental health of the involved children (being bullied or being a bully). Bullying is related to psychological disturbance, increased prevalence of depression, suicidal ideation and a host of risk behaviour as well.[79,80]

Students in higher education are transitioning from dependence to independence that entails a host of changes in their lives. They have to cope with the stresses of moving from home, others live at home and have to commute every day. Students have to adjust to an educational institution that gives never-before experienced freedom but their performance has major implications for their employability. Underachievement or failure impacts not only on their 'market value' but on self-esteem and social relations as well. Due to the credit system, all

students have the freedom to progress according to their individual pace but this comes at the expense of not being in a strongly bonded peer group that could provide support and information. Transition to adult life also becomes obvious in financial terms for many whose families cannot fully cover costs related to studying. Many students have to take out student loans and/or take various jobs to support themselves financially which takes away their time and energy from studying. Previously unknown freedom combined with an increased drive to be in peer company may lead to the misuse of alcohol and drugs. 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. University students span an age range in which a wide spectrum of mental illness is seen: this is the high-risk period for onset of schizophrenia and bipolar disorder. Some students have already been affected by chronic conditions with adolescent onset, while others develop illnesses related to substance misuse. Students who have severe mental illnesses are at a considerable risk of academic failure and dropout.[81]

MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

Mental health problems are common among students in higher education all over the world. The critical importance of their mental health is reflected by an increasing number of university and college students seeking counselling services for psychological problems including learning disabilities, self-injuries, eating disorders, alcohol problems, illicit drug use, concerns of sexual assault on campus, and problems related to earlier sexual abuse in the USA during the last decade. Approximately one-fifth of counselling centre clients had severe psychological problems. Ninety-four percent of directors also noted an increase in the number of students seeking counselling who had already been taking psychiatric medication.[82] According to the Healthy Minds Study, a multicampus random sample of American college students, nearly half of college students screened positive for a mental disorder.[83] The prevalence of depression was 17.3% among them; nearly one-tenth suffered from anxiety disorder and 6.3% reported thoughts of suicide in the previous year. More than half of the students reported that mental health problems affected their academic performance at least 1 day in the past month. Nearly one quarter of the students had previous diagnosis of a mental disorder by a health professional (mainly depressive and anxiety disorders). Students under financial stress had higher likelihood of depression, anxiety, and suicidal ideation; however, students living in campus residences were at lower risk for anxiety disorders.[84] The major

health problems of Libyan university students were depression and anxiety.[85] The prevalence of psychological distress was 25.7% among French first year students [86] and 48% among tertiary students of medicine, law, psychology and mechanical engineering [87] in Australia. There is a gender difference between students because mental health problems generally are more common among women.[84,85,86] The prevalence of psychological distress was significantly higher among undergraduates in Sri Lanka [88], Great Britain [89] and Australia [87] than in the general population. However, the mental health of students in helping professions – aside from medical and nursing students – have received considerably less attention in the scientific literature.

REVIEW OF THE INTERNATIONAL LITERATURE

STUDENTS IN HEALTH-RELATED PROFESSIONS

Students of various professions of healthcare are of particular interest, because they will provide services in the future under increased workplace stress so well known in health care.[90] Therefore, it is of utmost importance that they are 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.[91,92] An ounce of prevention, as in so many other areas, in this respect also is worth a pound of cure. Identifying those who are at higher risk or identifying the mental health problems of students at an early stage allows the provision of help during the training, hereby hindering the development of mental health problems.[81]

The following search strategy was used to review the international literature on the mental health of students in health professions:

(1) Search in the PubMed by using the MeSH (Medical Subject Headings) Database:

"Mental Health"[Mesh] AND "Students, Health Occupations"*[Mesh]

"Physical Therapy Specialty"[Mesh] AND "Students"[Mesh] AND "Mental Health"[Mesh].

Medical students are overrepresented in research aimed at students of health profession in the international literature. This is revealed by the fact that a PubMed search with the phrase "Mental Health"[Mesh] AND "Students, Health Occupations"[Mesh] resulted in papers of

* Included: Dental, Medical, Nursing, Pharmacy, Premedical and Public Health Students

which 61% (out of 156 publications) focused on medical students. Therefore, the search was expanded by "Students"[Mesh] AND "Mental Health"[Mesh] which yielded 637 publications. (2) Search in Google and in Google Scholar using "mental health" AND university students AND health professionals as keywords.

Medical students

Nearly half of medical students at nine US medical schools had at least one mental health-related concern (mostly stress, fatigue, anxiety, depression) [93], similar to the findings among students at one Dutch medical university, where the most common mental disorders were depression, anxiety, stress and post-traumatic stress disorder; but the use of mental health services was only around 10%.[94]

The most widely measured dimension of mental health was psychological distress, approximated by the GHQ questionnaire. The proportion of those medical students who suffered from distress varied between 12-50% [95,96,97,98,99] (Table 4) and there was also a difference by study year. 36.6% of first year medical students at a university in the North of England scored above the threshold of the GHQ-12; nearly half of them had a stressful incident, mainly related to medical training.[100] Among these students, the prevalence of psychological distress decreased during their study, and the GHQ-12 score of the first year was the best predictor of psychological morbidity in the final year.[101] Nearly three-quarter of Indian medical students perceived stress, the main cause of which was related to academic matters.[102]

Only few publications were found about the presence of anxiety and emotional exhaustion. More than one-quarter of medical students of the Dubai Medical College for Girls showed the symptoms of anxiety.[103] High emotional exhaustion characterized 42.1% of medical students from seven medical schools in the US.[104]

Regarding depression, its prevalence in students fell between 10% - 52.5%, depending on the severity of the symptoms and the applied questionnaire (Table 4). The overall prevalence based on data from Sweden [105], Dubai [103] and USA [104] varied between 12.9% - 52.5%, whereas the prevalence of at least moderate depression was between 10% - 14.3% among US medical students.[106,107]

The lifetime prevalence of suicidal thoughts was 43.1% in Norwegian medical students at the end of their training, while its last year prevalence was 14.2%. [108] 17.4% of US medical students reported suicidal ideation. [104]

The mean score for sense of coherence was 62.6 points at graduation in Finnish students of medicine and increased to 67.5 points during the 4 years of follow up. [109]

Table 4: Mental health status of medical students in different countries

Indicator of mental health	Country and prevalence
Psychological distress (GHQ)	Iran: 50% UK: 36.6% Australia: 26% Nepal: 20.9% Nigeria: 12%
Perceived stress (PSS)	India: 73%
Anxiety	Dubai: 28.7%
Emotional exhaustion	USA: 42.1%
Depression	USA: clinically 10% at least moderate 14.3% overall: 52.5% Dubai: 28.6% Sweden: 12.9%
Suicidal thoughts	USA: 17.4% Norway: last year: 14.2% lifetime: 43.1%

Students in other health professionals

Studies in other health-related professionals found the prevalence of psychological distress to be around one-quarter to one-third (Table 5). [110,111,112] Baccalaureate students of nursing experienced high stress levels and were at risk for psychiatric illness according to a Canadian study. [113] 27% of Irish physiotherapy undergraduate students exhibited psychological distress measured by the GHQ-12; all students pinpointed to academic issues as the greatest sources of stress. Academic and personal sources of stress contributed to higher psychological morbidity scores in this study. [114] A study among medical and dental students in Nigeria

found that the mean score of psychological distress measured by GHQ-12 was significantly higher among them compared to students of physiotherapy and nursing. Excessive schoolwork, congested classrooms, strikes by faculty, lack of laboratory equipment, family problems, insecurity, financial and health problems as stressors were all associated with psychological distress.[115]

7.7-28.6% of Chinese nursing students had mental health problems, and there was a strong relationship between study-related stress and mental health among nursing students.[116] According to a multinational survey, the mean perceived stress score was 19.1 (16.2 in England, 21.7 in Malaysia) in first year dental undergraduates.[117] Comparing physiotherapy students from three countries, the lowest mean perceived stress score was 13.5 in students from Israel and the highest score was 19.0 in Swedish students.[118]

Furegato et al found that nearly one-fifth of Brazilian nursing students suffered from depression, of whom 6.7% presented with moderate or serious depression (Table 5).[119]

Table 5: Mental health status of students in other health related professionals

Indicator of mental health	Country, course and prevalence
Psychological distress	Europe, dental students: 36% USA, medical, dental, nursing and pharmacy students: 27.5% USA, 2 nd year pharmacy students: 25% Ireland, physiotherapy students: 27%
Emotional exhaustion	Europe, dental students: 22%
Depression	Brazilia, nursing students: overall: 19.2% at least moderate 6.7%

Gender differences

There is a marked gender difference in students of health professions: women tend to have more frequent mental health problems.[105,106,107,117,120,121,122,123,124,125] The proportion of those who suffer from some kind of mental health problems increases during the academic years.[97,107,124] A marked increase in the prevalence of mental health problems requiring treatment from postgraduate year one to four was noted in Norwegian medical students, but there was no increase in help-seeking.[126] Third-year dental students had the

highest total stress score at a Canadian dental school [127], stress is escalating over time among Australian dental students.[128]

Comparison with other groups of similar age

Comparison of medical students with other groups of similar age revealed that medical students tended to have a higher level of stress and depression than other, non-medical undergraduates [129] or peers not in higher education.[97,105] The mental health scores of a cohort of German medical students were lower than that of a sample of young adults.[124] Medical students studying in their early clinical years scored worse than the Australian generic population reference group in the domains of psychological health.[130] Similar results were found among nursing [116] and physiotherapy undergraduate students.[114] The existing literature supplies ample evidence that health profession students suffer from varying levels of stress during their training.[131]

STUDENTS IN TEACHER TRAINING

Teaching was found one of the top six most stressful occupations in the UK.[132] Therefore, the mental health status of (future) teachers deserves just as much attention as of those in the health professions since their health and mental well-being can influence their performance, teaching quality and capability as well as their relationship with pupils; and can have long-term effects on children's academic performance and well-being.[133,134,135,136] The large body of literature on student health pays relatively little attention to the mental health of those in teacher training though their academic tasks and practicum may also be highly stressful.[135]

The following search strategy was used to review the international literature on the mental health of future pedagogues (teachers and nursery school teachers):

(1) Search in the PubMed by using the MeSH Database:

"Mental Health"[Mesh] AND "Students"[Mesh].

(2) Search in Google and in Google Scholar with the following keywords:

"mental health" AND "future teachers"/"prospective teachers"/"student teachers"/"teacher candidates"/"Teacher Education Students"

"mental health" AND "kindergarten student teachers"/"early childhood educators"/"nursery school teachers".

Higher prevalence of anxiety and dysphoria was described in prospective teachers of Chinese nationality in Hong Kong.[137] Students in secondary-school teacher training in France exhibited high incidence of psychopathological instability that was increasing across four years of training.[138] Regarding the results of a longitudinal survey among students in teaching at the University of Applied Sciences in the Netherlands, 31% of students had more symptoms on the Symptom Check List-90 – which assesses psychosomatic well-being – in the 4th year compared to the 1st year.[139]

38% of secondary school student teachers were psychologically distressed by the GHQ-12 in the UK [140], similarly to trainee teachers in Nigeria.[141] 44% of German student teachers reported impaired mental health indicated by the GHQ-12, and this score was inversely correlated with the extent to which student teachers felt prepared for their work.[142] The same proportion of student teachers in Brunei had moderate to mild depression; nearly 80% were affected by some level of anxiety, and nearly one quarter suffered from stress.[143]

Most of the international publications on kindergarten student teachers focused on the relationship between teachers and the mental health of children rather than on the mental health of the present or future kindergarten teachers.

REVIEW OF THE HUNGARIAN LITERATURE

STUDENTS IN HEALTH-RELATED PROFESSIONS

The search strategy below was used to review the Hungarian literature related to the mental health of health professional students:

(1) Search in the Repository of Hungarian Scientific Works (Magyar Tudományos Művek Tára, MTMT)[†] with the keywords:

(lelki/mentális) egészség/(mental) health, hallgató/student, university student.

(2) Search in EHM (EPA-Humanus-Matarka) browser[‡] with the keywords:

(lelki/mentális) egészség/(mental) health, hallgató/egyetemi hallgató/főiskolai hallgató/egyetemista/főiskolás/student.

(3) Search in Google Scholar with the keywords:

lelki egészség/mentális egészség (mental health) AND hallgató (student).

[†] MTMT <https://www.mtmt.hu/>

[‡]EPA: Elektronikus Periodika Archivum és Adatbázis, Humanus: Humántudományi Tanulmányok és Cikkek, Matarka: Magyar folyóiratok tartalomjegyzékeinek kereshető adatbázisa közös kereső <http://ehm.ek.szte.hu/ehm?p=0>

The circle of identified articles overlapped in the 3 databases, and of those, only some were relevant, so the search was expanded back to 1990, and general terms (“egészség/health” and “hallgató/student”) were used. 171 Hungarian and 250 English publications were found in the MTMT by the combination of the keywords. If the two keywords were used separately, the number of results exceeded 1500. The EHM search engine produced 1260 publications with “egészség”, 632 with “health”, 400 with “hallgató”, and 255 with “student”. Of all of them, 20 were related to the thesis (3 written by our workteam), 16 investigated the mental health of students in health professions and 4 were about students in teacher training.

The most frequent psychosomatic symptoms were backache and sleeping disorders among medical students in Szeged according to Pikó et al. They reported more frequent stomach-ache and palpitation by men, and more stress-related headache and chronic fatigue by women.[144] More than one-third of medical, pharmacy, health visitor, nurse, physiotherapy and social worker students in Szeged suffered from mental health problems.[145] Three out of ten female nursing students perceived their personal health status rather negative, and almost everyone suffered from psychosomatic symptoms, the most frequent ones being nervousness, fatigue, discomfort.[146] Another study of the health status of nurses and nursing students in Csongrád County found that the most common psychosomatic symptom was fatigue.[147] Nearly ten years later the dominant symptom still was fatigue among nursing students [148] and the level of perceived stress was higher compared to nurses.[149] Female medical students from the four medical universities of Hungary reported more psychosomatic disorders, and complained about more stress factors than males; workload, sleeping disorders and emotional exhaustion are also significantly higher among them. Nearly one-tenth of the students suffered from depression and 1.6% attempted suicide.[150]

The prevalence of stress-based emotional complaints was 33% in medical, dentistry and pharmaceutical students in Budapest [151], 1.5 times higher than in an earlier research among medical students at the same university.[152] Nearly one-third of graduating medical students in Budapest reported high degree of burnout, one-quarter suffered from psychosomatic symptoms (fatigue, head- and backache) and depression, whereas anxiety was present in one-fifth of them.[153] A questionnaire survey was conducted in two different universities among 2nd-4th grade medical students in 2009 showing that nearly one fifth of the total sample qualified as high risk regarding burnout [154], a high prevalence of burnout (24.5-55.8%) was found in another sample of medical students.[155] Student burnout was shown to be an important explanatory factor for academic performance.[154]

The prevalence of stress related mental complaints was 15% among fourth year medical, dentistry and pharmacy students.[156] Health visitor students frequently noticed psychological symptoms, like nervousness and loss of interest.[157]

Our research group carried out a cross-sectional study among medical students at 1-5-years at the Faculty of Medicine of the University of Debrecen, Hungary in 2007. The mean score for sense of coherence was significantly lower in males compared to that of females. There was no significant gender difference in terms of psychological distress measured by GHQ-12 but close to one-fifth of the students scored above the threshold indicating notable mental problems. As to social support from family, one out of every 13 students severely lacked social support, and male students had been significantly less supported compared to females. The mean score for psychological distress in our sample of medical students was found to be significantly higher indicating worse mental status compared to the similar age group of the general population.[158,159]

STUDENTS IN TEACHER TRAINING

The next search strategy was used to review the Hungarian literature on the mental health of future pedagogues (teachers and nursery school teachers):

(1) Search in the Repository of Hungarian Scientific Works (Magyar Tudományos Művek Tára, MTMT)[†] using as keywords:

(lelki/mentális) egészség/(mental) health, hallgató/student, university student.

(2) Search in EHM (EPA-Humanus-Matarka) browser[‡] with the keywords:

(lelki/mentális) egészség/(mental) health, hallgató/egyetemi hallgató/főiskolai hallgató/egyetemista/főiskolás/student.

(3) Search in Google and in Google Scholar with the following keywords:

lelki egészség/mentális egészség (mental health) AND hallgató (university student).

The above search identified 2 studies that were not carried out by our research group. A study at a teacher training college (College of Nyíregyháza) revealed 43.3% prevalence of subclinical depression among students, with a higher proportion among females.[160] Four years later the authors repeated the study and obtained similar results. The most frequent complaints were feelings of worthlessness, discontentment, exhaustion and hopelessness.[161] Future teachers were also the focus of another study at the University of

Western Hungary, revealing that nearly one-quarter of them suffered from lack of social support, and 10% of them were clinically depressed.[162]

The other identified publications were authored by our research group at the Faculty of Public Health of the University of Debrecen of which I am member. Our group carried out a large-scale nationwide study on the mental health of students involving 27 faculties with teacher training courses at the six largest universities and colleges in Hungary in 2007. By randomly sampling 5% of the students we found that almost one-quarter of the respondents suffered from psychological distress and its mean value was significantly higher than in the same age group in the general population. The mean score of males was significantly more favourable reflecting lower distress compared to females. There was no significant difference between males and females in the mean of sense of coherence.[163,164]

The above results reveal important mental health problems, especially psychological distress, depression, and burnout in Hungarian students of some health professions, notably medical students and students in teacher training. Gender differences of some mental health measures are also of note. University students constitute a special sub-group within youth, representing an important part of national human capital and taking 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.[165] 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 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, recommend an assessment tool, and develop and test an intervention to increase their mental well-being.

The particular aims of our study were in line with the above mentioned goals:

1. Describe 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. Investigate the determinants of mental health of students in higher education

Subsequent to characterizing the mental health of selected students, contributing factors of 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. Build a model of mental health of students in higher education

In order to determine which factors have substantial impact on students' mental health, a hypothetical model of health was built and tested including measures of health behaviour, teenage activities, demographic and biological factors.

4. Improve 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

Building on our previous studies focused on medical students and students in teacher training described in detail in the introduction [158,159,163,164], 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

Public health students

A cross-sectional study was carried out among public health students at years 1-5 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 was launched before public health studies were split into bachelor and master degrees). 150 students studied for a bachelor degree in 4-year programme and 44 students were still in the 5 year programme. At the time of the study only our university in Hungary provided 5-year training in public health.

Prospective nursery school teachers

Students of the Faculty of Child and Adult Education of the University of Debrecen, Hungary were recruited. The study population consisted of all full-time students (N=168) registered at the course of nursery school teaching in the autumn semester of the 2009/2010 academic year.

Physiotherapy students

A cross-sectional study was carried out among physiotherapy students at years 1-3 at the Faculty of Public Health of the University of Debrecen, Hungary in 2010. Fourth-year students did not participate in the study because they spent their practices at different parts of the country at the time of data collection. Therefore, 77% of all physiotherapy students at the Faculty were invited to participate in the survey corresponding to one-fifth of all full-time physiotherapy students at study years 1, 2, and 3 in Hungary.

METHODS OF DATA COLLECTION

Each student was invited in person after class to fill a paper-based, self-administered, anonymous questionnaire. The research was carried out in accordance with the Helsinki

Declaration. Ethical permission (DEOEC RKEB/IKEB: 2506-2006) 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 students were informed in writing and in person that participation was voluntary and they had the right to refuse to participate. No personal data were collected so consent form was not requested to be signed. In order to avoid any pressure for participation, volunteer students at other courses were asked to distribute and re-collect the questionnaires. 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 [158,159] and future teachers [163,164], and included scales on mental health (sense of coherence, psychological distress, perceived stress, depression, social support)[§], perceived health, health locus of control (how much can do for own health), demographic (age, sex, residence) and 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.[166]

Perceived health was assessed by a standard question recommended by the World Health Organization [167] the Hungarian version of which was used in the Hungarian National Health Interview Survey.

Resource-oriented approaches of mental health

To measure *sense of coherence*, the abbreviated, 13-item-long scale (SoC-13) [47] was used that had earlier been validated in Hungarian.[168] 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 [169] of the Health and Lifestyle Survey and Health Survey for England.[57] 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

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

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.[17,18] Questions are answered on a 1-4-point Likert scale. Cases are detected by scoring in the simplest manner [66], which assigns to each symptom present a score of 1, while symptoms absent are scored 0. This is the so-called usual (0-0-1-1) method that 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 [18], the threshold indicating notable psychological distress was identical: a score above 4.

The 14-item Hungarian version [170] of the *Perceived Stress Scale* (PSS-14) developed by Cohen [171] was also used in our survey. The PSS 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.[171]

The *Beck Depression Inventory* (BDI) is one of the most widely used health inventories to assess depression. BDI was developed for measuring the presence and level of 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.[69] We used the 9-item Hungarian version of the BDI [172], 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: $\frac{\text{total score}-9}{9} \times 21$. [173] 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.[174]

STATISTICAL METHODS

In order to *prepare data for analysis*, a codebook was generated based on the items of the questionnaire. The paper-based questionnaires were coded by study years and data were entered electronically in a Microsoft Excel database. Subsequent to entering data, accuracy was checked and cleaned (for instance non-valid, inconsistent or missing answers). Intercooled Stata 9.0 and 10.0 for Windows was used for data transformations and analysis. 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 normal, 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. Only the significant differences were highlighted in the text. Subsequent to normality tests, variables with normal distribution were analysed with parametric tests; for distributed variables, non-parametric tests were used. The appropriate form of t-test or ANOVA was used to compare means, and the Wilcoxon-Mann-Whitney or the 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 those variables that were investigated by identical tools (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 the same age range (60.63 points among 18-26 year-olds; taken from the above mentioned representative survey of the Faculty and the Median Institute) was considered as a reference value. SoC scores below the reference value were classified as “low SoC”; equal or higher scores were considered as “normal level of SoC”. 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 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 LR+ reveals how much higher is the probability that positive result (that is, bad mental health) would occur in students who scored positive (that is, depressed) by the BDI as opposed to occurring in students without symptoms of depression. LR+ can be calculated by dividing the true positive rate with the false positive rate. Similarly, LR- describes how much higher is the probability that negative result would occur in students who scored depressed by the BDI as opposed to those without symptoms of depression. LR- can be calculated by taking the false negative rate and dividing it by the true negative rate. Accordingly, the larger the positive likelihood ratio, the greater the likelihood of bad mental health; the smaller the negative likelihood ratio, the lesser the likelihood of bad mental health as measured by our assessment tool.[175] LR was used to characterize the assessment tool because it does not require dichotomization, that is, students in all four categories of our composite indicator, including the two non-specific risk categories with conflicting SoC and GHQ results, were used to calculate the LR. All records with data for the Beck, SoC and GHQ scores (N=265) were used.

The posttest odds of mental health problem were calculated using the likelihood ratios as prescribed by Bayes' theorem, and converted to probability. According to this theory, the pretest odds of a particular disease or condition (in our case the prevalence of mental health problems estimated by BDI) should be multiplied by the likelihood ratio yielding the post-test odds.[175] The calculations were carried out by the following steps:

1. $\text{pretest odds} = \frac{\text{pretest probability}}{1-\text{pretest probability}} = \frac{\text{prevalence}}{1-\text{prevalence}}$
2. $\text{posttest odds} = \text{pretest odds} \times \text{LR}$

For the positive posttest odds, the LR+ was used, whereas the LR- was used for the negative posttest odds.

$$3. \text{ posttest probability} = \frac{\text{posttest odds}}{\text{posttest odds}+1}$$

Posttest odds were converted to posttest probability; the positive posttest probability is numerically equal to the positive predictive value, and the negative posttest probability is numerically equal to 1-negative predictive value.

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. One was composed of 4 students from year 1, and another with 3 participants from year 2, two sessions for the 3rd and 4th year students (3rd year: 32 and 7 persons; 4th year: 17 and 18 students, respectively), and 8 students from year 5. 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, her supervisor, or a bachelor student while another bachelor student took notes. Bachelor student facilitators worked as student researchers. 2 focus groups were conducted for physiotherapy students in the spring semester of the academic year of 2009/2010; one composed of 9 students from year 1, and another with 5 participants from year 2 (approximately 11% of those who participated in the questionnaire survey). 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 recordings were made. Hand-written notes were later subscribed and expanded by the facilitators. Sessions took one to two hour. 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.

MODEL OF MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

DATA USED FOR THE MODEL

In order to build a hypothetical model on mental health and its determinants, data of an earlier survey carried out by the Faculty of Public Health in six institutes of higher education were used. Data collection was described elsewhere in detail.[163,164,176] 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. 1010 records were used for the model. The questionnaire measured demographic (age, gender, population size of permanent residence), socio-economic indicators (parents' education, perceived financial status of family), health (subjective health, sense of coherence, psychological distress, social support, body weight & height), health locus of control, and health behaviour (physical activity, diet, sexual behaviour, smoking, alcohol & drug use) as published elsewhere.[158,159,163,164]

Data were analysed by Stata 10.0 and SPSS 22 software. Total score was calculated for sense of coherence (SoC), psychological distress (GHQ), and social support. Since the distribution of the values of psychological distress and sense of coherence were not normal, medians were used for point estimation and interquartile range (IQR) for interval estimation for these variables. Scores for SoC and psychological distress were stratified by gender, and medians were compared by the Kruskal-Wallis test. The χ^2 and the Fisher exact tests were used to investigate gender differences in terms of categorical variables.

CONSTRUCTION OF THE MODEL

A hypothetical model based on the biopsychosocial model of health [177] was constructed including 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 as shown on Figure 4. We tested this model using the methods described below on all data, and also separately for males and females.

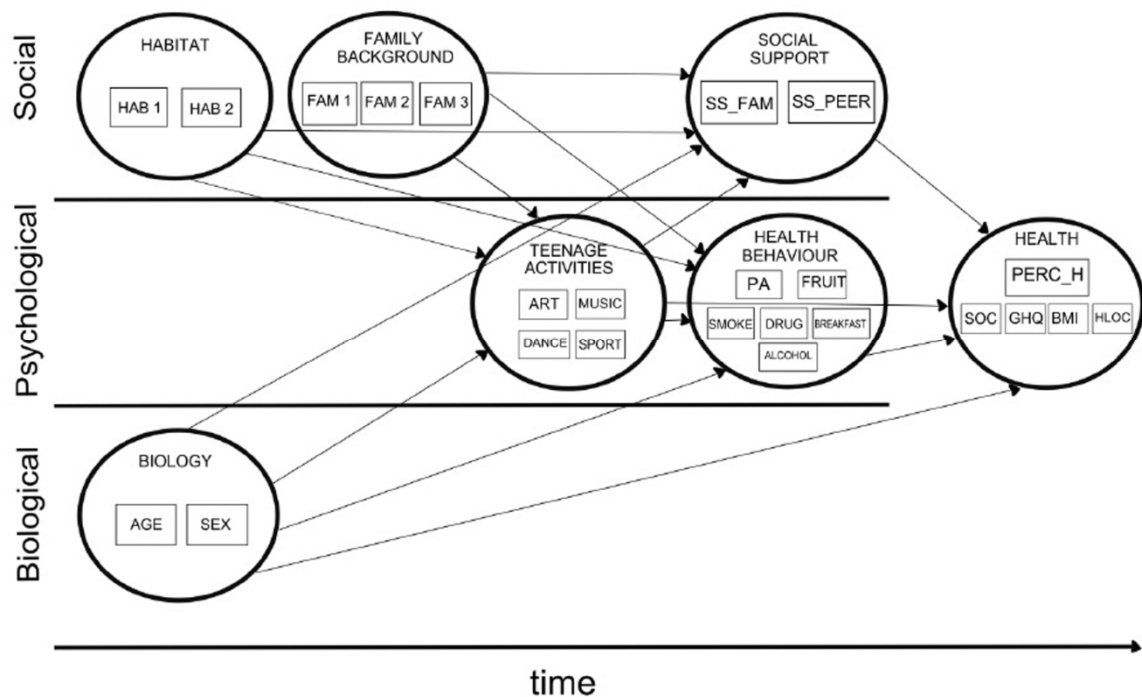


Figure 4: The hypothetical life-course model of health for students in higher education

Notes:

AGE: age
 SEX: gender
 HAB1: population size of permanent residence
 HAB2: type of co-habitation
 FAM1: perceived financial status of family
 FAM2: mother’s education level
 FAM3: father’s education level
 ART: engagement in arts before entering university
 MUSIC: engagement in music before entering university
 DANCE: engagement in dance before entering university
 SPORT: engagement in sport before entering university
 SS_FAM: social support from family
 SS_PEER: social support from peers

PA: physical activity
 FRUIT: fruit consumption
 SMOKE: smoking
 DRUG: drug consumption
 BREAKFAST: eating breakfast
 ALCOHOL: alcohol consumption
 PERC_H: perceived health
 SOC: Sense of Coherence
 GHQ: Psychological distress
 BMI: Body Mass Index
 HLOC: health locus of control

Model building and testing had 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. This was the most critical point because only some variables could be treated as continuous, and out of those not all were normally distributed. Data transformation was tried to eliminate this problem but it was not useful since the interpretation of the transformed variables was difficult, only a limited number of variables could be inserted into the model, and the fit of the model was also low. MANCOVA proved to be the best applicable method therefore this was performed as the last step, keeping in mind its limitation that it is not appropriate for establishing hierarchical relations. Steps of the modelling are described in detail below.

1. Step: Variable selection for modeling

There were 50 measured variables in our database so it was necessary to decide which ones could be included in the model. In order to answer this question, two methods were used.

Canonical correlation analysis

The latent outcome variable of health was approximated by five measured variables: body mass index, sense of coherence, psychological distress, health locus of control, perceived health. First, a canonical correlation analysis was performed involving all these 5 variables as a first set and the rest of the variables as a second set. The goal was to identify variables in the second set with a significant effect on the first set of variables (outcome) along with the strength of that relationship.

Principal component analysis with varimax rotation

In order to detect correlations among outcome and explanatory variables, a principal component analysis (PCA) with varimax rotation was also performed.

2. Step: Testing different methods for modeling

The most widely used method for hierarchical modeling is the Structural Equation Model for which strict conditions must be fulfilled.[178] A covariance-based Structural Equation Model (CB-SEM) was tested to fit to the data using AMOS 7.0 but the model demonstrated relatively low (below 0.90) fit indices for GFI (Goodness of Fit Index), CFI (Comparative Fit Index), NFI (Normed Fit Index) and for AGFI (Adjusted GFI, the value of the latter was

below 0.80). The RMSEA (Root-Mean Square Error of Approximation) was also above the acceptable value (0.08), therefore this model was discarded.

3. Step: Multivariate analysis of covariance (MANCOVA)

In the standard Multivariate Analysis Of Variance (MANOVA) analysis, several groups (or fixed factors) are compared on a linear composite of several outcome variables. The aim was to study the grouping effect on the linear composites. In order to remove the effect of some concomitant variables, a MANCOVA was conducted, that is, a MANOVA with „extra” covariate variables. The effect of covariates could reduce the error variance of the outcomes.

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 using the Missing Value Analysis procedure in SPSS 22. The box-plots of the outcomes on the seven grouping variables were also explored. Overall, 116 cases were removed as outliers so the final sample size was reduced to 894. Missing values were found for almost all variables in a low proportion (less than 5%) so they were replaced by the mean. Multivariate analysis of covariance (MANCOVA) rests on a number of assumptions such as independent observations, normally distributed outcome variables within groups, covariates that correlate with outcome variables but do not correlate with fixed factors. In addition, covariates must have low measurement errors and should not differ across the groups. These assumptions were tested by a series of univariate ANOVA. Not only the assumption homogeneity of variance must be fulfilled for outcome variables, but also the assumption of the homogeneity of covariances: that is, the correlation between outcome variables must be similar in each group. Outcomes should be in correlation with each other but not to the degree of multicollinearity. Levene’s test was used to check the equality of variance, and Box’s M test was used for the homogeneity of covariance assumption. In light of the rather large number of groups, multivariate normality could be assumed because of the central limit theorem. A reliability analysis yielded a reasonably high Cronbach alpha coefficient (0.768) so the assumption of the 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%.

Homogeneity of the covariances was also satisfied as the Box's M statistic was highly non-significant.

Different measures help to interpret the results of MANCOVA. F-ratio is the ratio of the explained and unexplained average variability in the data. Wilks's lambda is the product of the unexplained variance on each of the variates representing the ratio of error variance to total variance for each variate. Eta squared can be used as an effect size measure; it is calculated by dividing the effect of interest by the total amount of variance in the data, so it is the proportion of total variance explained by an effect. In case of more than one effect, eta squared must be calculated for each effect. However, another effect size measure called partial eta squared can also be used that shows the proportion of variance that a variable explains that is not explained by other variables in the analysis.[179]

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.[163,164] 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, accepting 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. 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 occasion was allowed to be missed from the rest of the training.

Intervention

The intervention was a multicomponent stress management training including improvement of knowledge on the harms of illegal 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, and response rate; 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 (the latter – irrespective of its result – was mandatory in order to receive credit for the course) at end of the course.

Determinants of mental health

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 collected.

Outcome measures

Perceived health, psychological distress and sense of coherence were measured by the above mentioned scales (Description of the mental health of students in higher education - 'Questionnaire domains').

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).[180] The latest issue of the Guide recommends the assessment of health risks with feedback for workplace action.[181] 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 [182]

The distribution of students and respondents by study year is shown in Table 6. All but 3 of the completed questionnaires were eligible for evaluation.

Table 6: Distribution of public health students and respondents by study year

Study year	No. of students	No. of respondents	Response rate (%)
1.	58	41	70.7
2.	55	39	70.9
3.	37	32	86.5
4.	36	29	80.6
5.	8	8	100
Total	194	149	76.8

Demographic and socioeconomic data

16.5% of the students were male and 83.5% were female, constituting a representative sample by sex** of public health students. Representation by study year is shown in Figure 5. Mean age in the sample was 20.6 years (min. 18, max. 25 years, standard deviation, SD: 1.53), not significantly different from the mean age†† of all students at the Faculty. Two-third of the students was between 19 and 21 years of age.

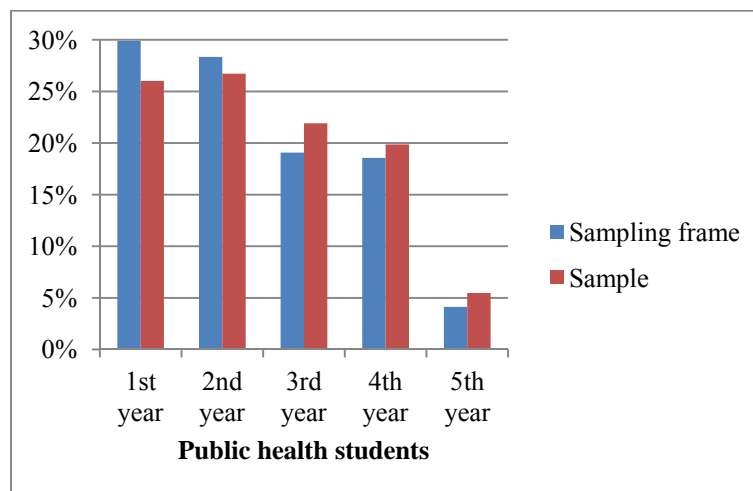


Figure 5: Distribution of public health students (sampling frame) and respondents (sample) by study year

** Sampling frame: 17.5% male, 82.5% female

†† Sampling frame: 20.6 years, SD: 1.33, min. 18, max. 26 years

The socioeconomic data of the respondents can be seen in Table 7 in detail. Briefly, almost one-third of the respondents had mothers with college degrees; almost one-fifth of fathers had college degrees. Nearly one-tenth of the students thought that the economic status of their family was bad or very bad.

Table 7: The socioeconomical characteristics of public health students

	Parents' educational level (%)		Economic status of the family (%)	
	Fathers	Mothers		
college	18.5	31.9	good or very good	41.1
high school	38.3	41.9		
vocational training	39.7	17.7	satisfactory	47.5
elementary school	1.4	8.5	bad or very bad	11.4
not known	2.1	-		

Health status

More than two-third of students rated their health as very good or good, and almost everyone thought that they could do much/very much for their health (health locus of control) (Table 8).

Table 8: Health status of public health students

Perceived health (%)	
very good or good	69.7
satisfactory	24.8
bad or very bad	5.5
Health locus of control (%)	
can do much/very much for own health	96.6
can do little/nothing for own health	2.7
did not answer the question	0.7

Mental health

Resource-oriented approaches of mental health

The mean score for sense of coherence was 60.1 (SD: 10.98, min. 31, max. 89) having shown an increasing trend during the academic years, from 54.5 to 62.3 point ($p=0.005$).

As to social support from family and friends, 59.5% of the students reported no lack of it, the proportion of those who severely lacked social support was significantly higher among men than women (37.5% vs. 12.7%; $p=0.003$); 70.6% were supported sufficiently by their student peers (Table 9).

Table 9: Social support of public health students

	Social support from family or friends (%)	Social support from student peers (%)
sufficient	59.4	70.6
moderately lacking	23.1	27.3
severely lacking	17.5	2.1

Deficiency-oriented approaches of mental health

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 it was almost 1/3 lower among last year students than among freshmen (12.5 vs. 35.3%).

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 (Table 10). 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 ($p=0.034$).

Table 10: Parametres of resilience (R) and deficiency (D) variables of mental health in public health (PH) students and their peers from the general population

Variables of mental health	Females (<26 years)		Males (<26 years)	
	PH students	General population	PH students	General population
R1 Mean score for sense of coherence	59.6	60.2	62.8	61.1
R2 Full social support from family (%)	61.9	65.5	50.0	68.8
R3 Full social support from peers (%)	70.3	n/a	70.8	n/a
D1 Above the threshold on GHQ (%)	19.8	6.4*	12.5	9.8

*Significant difference compared to female students ($p<0.05$)

FUTURE NURSERY SCHOOL TEACHERS [183]

Of the 168 students, 133 were present at the time of data collection. All of the completed questionnaires were eligible for evaluation. The overall response rate was 79.2% in the following distribution by study year: 1st year 88.2%, 2nd year 79.6%, 3rd year 65.2%. Some items in the questionnaires remained unanswered so if the proportion of the questions eligible for analysis was under 97% it is stated in the text.

Demographic and socioeconomic data

3% of the students were male and 97% were female, reflecting the female dominance of students (96.4%) at the Faculty. Representation by study year is shown in Figure 6. Mean age in the sample was 19.9 years (SD: 1.16; min. 18, max. 24 years).

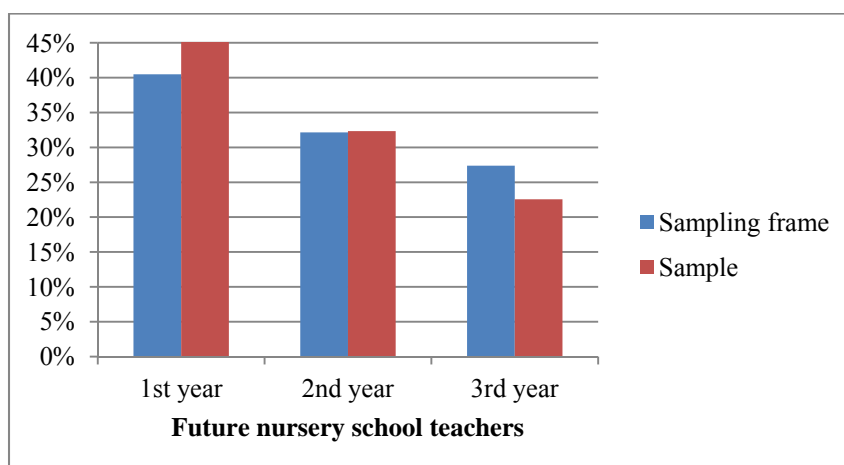


Figure 6: Distribution of future nursery school teachers (sampling frame) and respondents (sample) by study year

The socioeconomic data of students on the course of nursery school teaching can be seen in detail in Table 11. The proportion of parents with college degree was low among the students. 17.4% of them classified the economic status of their family as bad or very bad.

Table 11: The socioeconomical characteristics of nursery school teacher students

	Parents' educational level (%)		Economic status of the family (%)	
	Fathers	Mothers		
college	7.6	17.4	good or very good	33.4
high school	28.8	40.9		
vocational training	53	32.6	satisfactory	49.2
elementary school	8.3	8.3	bad or very bad	17.4
less than elementary or not known	2.3	0.8		

Health status

More than half of the respondents rated their health as very good or good, and the vast majority of them thought that could do much or very much for their health (Table 12).

Table 12: Health status of nursery school teacher students

Perceived health (%)	
very good or good	53.4
satisfactory	42.1
bad or very bad	3.8
did not answer the question	0.7
Health locus of control (%)	
can do much/very much for own health	89.5
can do little/nothing for own health	4.5
did not answer the question	6

Mental health

Resource-oriented approaches of mental health

The mean score for sense of coherence was 58.5 (SD: 9.72, min. 36, max. 83).

As to social support from family or friends, 56.5% of the students reported no lack of it, and nearly two-third feeled no lack of social support from their student peers (Table 13).

Table 13: Social support of nursery school teacher students

	Social support from family or friends (%)	Social support from student peers (%)
sufficient	56.5	68.7
moderately lacking	29.8	26.0
severely lacking	13.7	5.3

Deficiency-oriented approaches of mental health

One-third of the students scored above the threshold (4 points) on the GHQ-12 indicating notable psychological distress, and almost one-fifth suffered from moderate or severe depression according to the BDI scores (Table 14).

Table 14: Depression among the nursery school teacher students

Categories of depression (%)	
severe	6.1
moderate	12.1
mild	22.7
no depression	59.1

96.1% of the students provided answers eligible for evaluation for perceived stress (PSS), the mean score of which was 26.6 (SD: 6.07, min. 11, max. 40).

The results were compared to that obtained from 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 (Table 15). 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 ($p=0.003$).

Table 15: Parameters of resilience (R) and deficiency (D) variables of mental health of female future nursery school teachers (NT) and their peers from the general population

Variables of mental health	Females (<25 years)	
	NT students	General population
R1 Mean score for sense of coherence	58.3	60.2
R2 Full social support from family (%)	56.4	65.4
R3 Full social support from peers (%)	68.3	n/a
D1 Above the threshold on GHQ (%)	32.0	7.7*
D2 Mean score for PSS-14	26.8	n/a
D3 Moderate and severe depression (%)	18.1	n/a

*Significant difference compared to female students ($p<0.01$)

PHYSIOTHERAPY STUDENTS [184,185]

Of the 153 students from first to third year, 130 filled the questionnaire all of which were eligible for evaluation, yielding an overall response rate of 85%. The response rates by study year were the following: 1st year 86.8%, 2nd year 87.2%, 3rd year 82.4%.

Demographic and socioeconomic data

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 (SD: 2.56; min. 19, max. 41 years.), and the majority (95%) was under 26 years of age. Representation by study year is shown in Figure 7.

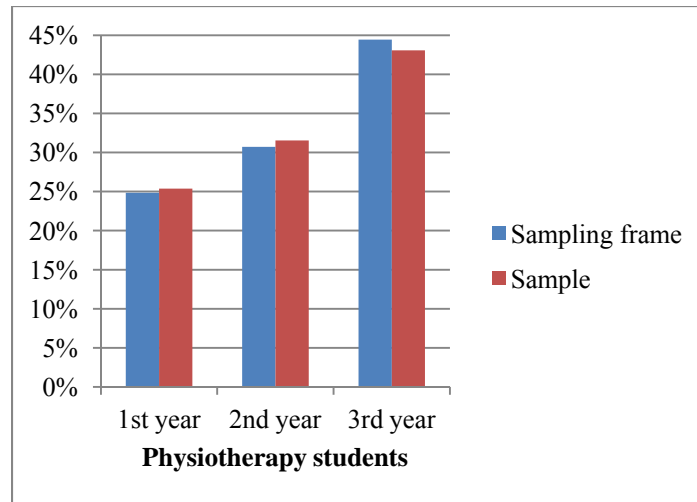


Figure 7: Distribution of physiotherapy students (sampling frame) and respondents (sample) by study year

The socioeconomic data of physiotherapy students is shown in Table 16 in detail. Nearly one-third of respondents had mothers with college degree, while this proportion was one-quarter among the fathers. Almost one-fifth of the students perceived the economic status of their families as bad or very bad.

Table 16: The socioeconomical characteristics of physiotherapy students

	Parents' educational level (%)		Economic status of the family (%)	
	Fathers	Mothers		
college	26.2	36.2	good or very good	30
high school	26.2	34.6		
vocational training	41.5	23.1	satisfactory	50.8
elementary school	3.8	3.9	bad or very bad	19.2
less than elementary or not known	2.3	2.2		

Health status

Two-third of students rated their health in the past year as very good or good, and virtually all of them thought that they could do much or very much for their health (Table 17).

Table 17: Health status of physiotherapy students

Perceived health (%)	
very good or good	65.1
satisfactory	31.0
bad or very bad	3.9
Health locus of control (%)	
can do much/very much for own health	98.4
can do little/nothing for own health	1.6

Mental health

In light of the students' wide age range (19-41 years), we supposed that their mental health status will vary. Therefore, mental health variables in the young (<26 years old) and mature (>25 years old) students were analysed separately, but no difference was found. For that reason, the mental health status of the entire group is reported.

Resource-oriented approaches of mental health

The mean score for sense of coherence based upon the answers of 128 students 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 obtained from a representative survey of the Hungarian adult population using the same scale and selected 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. The latter were no different from their peers in terms of sense of coherence, but male physiotherapy students scored almost 4 points higher than their peers ($p=0.297$) (Table 18).

Table 18: Parameters of resilience (R) and deficiency (D) variables of mental health of physiotherapy (PT) students and their peers from the general population

Variables of mental health	Females (<26 years)		Males (<26 years)	
	PT students	General population	PT students	General population
R1 Mean score for sense of coherence	60.0	60.2	64.9	61.1
R2 Full social support from family (%)	47.4	65.5*	50.0	68.8
R3 Full social support from peers (%)	62.6	n/a	37.5*	n/a
D1 Above the threshold on GHQ (%)	32.5	6.4*	0.0*	9.8
D2 Mean score for PSS-14	26.5	n/a	21.9	n/a
D3 Moderate and severe depression (%)	23.9	n/a	11.1	n/a

**Significant difference compared to female students*

Considering all years, half of the students reported no lack of social support (Table 19), the proportion of those students who received full social support was significantly lower compared to the general population, but that difference was only significant in female students ($p=0.001$ for females and $p=0.261$ for males). 60.5% 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 ($p=0.045$) (Table 18).

Table 19: Social support of physiotherapy students

	Social support from family or friends (%)	Social support from student peers (%)
sufficient	48.9	60.5
moderately lacking	36.4	36.4
severely lacking	14.7	3.1

Deficiency-oriented approaches of mental health

Nearly one-third (30%) of the students scored above the threshold on the GHQ-12 indicating notable psychological distress (2 students did not answer this part of the questionnaire). Female students experienced notable psychological distress in much higher proportions than male students ($p=0.027$), and the proportion of those in notable distress was also significantly, 5 times higher compared to females of similar age in the general population ($p=0.001$; Table 18).

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 ($p=0.051$; Table 18).

Nearly one-quarter of the students were screened as having moderate or severe depression (Table 20). In terms of gender difference, 2 times more females suffered from it compared to males ($p=0.344$), and there was not a single male student who was severely depressed (Table 18).

Table 20: Depression among physiotherapy students

Categories of depression (%)	
severe	8.5
moderate	14.6
mild	15.4
no depression	61.5

STUDENTS IN HELPING PROFESSIONS BY MERGING DATABASES [186]

The data from the above described 3 student group (public health – PH, physiotherapy – PT and nursery school teacher – NT) were also analysed together in a combined database (Table 21-26). The overall response rate was 79.4%.

Demographic and socioeconomic data

The mean age was significantly different among them; the highest was among PT students, while the lowest among NT students. The proportion of females was significantly lower among PH students compared to the 2 other groups. More NT students lived in hostel than PH or PT students, and less had permanent residence in larger cities (with a population of at least 10 thousand). The differences in basic demographics can be seen in Table 21.

Table 21: Demographic data

	No. of students	Average age in years (SD; min-max)	Proportion of females (%)	Permanent residence in city with at least 10,000 persons (%)	Live in hostel (%)
PH students	146	20.61* (1.53; 18-25)	83.5	46.1	33.8
NT students	133	19.98* (1.16; 18-24)	96.9**	31.6***	52.3***
PT students	130	21.86* (2.56; 19-41)	93.1**	55.4	38.5
All students	409	20.81 (1.99; 18-41)	90.9	44.3	41.3

*Significant difference among the 3 groups of students ($p < 0.001$)

** Significant difference compared to PH students ($p < 0.05$)

*** Significant difference compared to PH and PT students ($p < 0.05$)

Regarding the socioeconomic data (Table 22) the proportion of those NT students who have parents with college degrees was significantly lower compared to the 2 other groups of students, however, there was no difference in the subjective economic status of students' families.

Table 22: Socioeconomic data

	Fathers with college degree (%)	Mothers with college degree (%)	Economic status bad/very bad (%)
PH students	18.4	31.9	11.5
NT students	7.6*	17.4*	17.4
PT students	26.2	36.2	19
All students	17.4	28.5	15.9

*Significant difference compared to PH and PT students ($p < 0.01$)

Health status

In terms of perceived health, nursery school teacher students thought in the highest proportion that their health status was not good (satisfactory or worse): one and a half times more compared to public health students, and also the highest proportion thought that they can do only little for own health (Table 23).

Table 23: Health status

	Perceived health is satisfactory or worse (%)	Can do little for own health (%)
PH students	30.4	3.4
NT students	46.6*	10.5**
PT students	34.9	1.5
All students	37.1	5.1

* Significant difference compared to PH students ($p=0.005$)

** Significant difference compared to PH and PT students ($p<0.05$)

Mental health

Resource-oriented approaches of mental health

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 (63.63 point, SD: 10.24; min. 40, max. 79) than in females (59.45 point, SD: 10.76; min. 25, max. 89) ($p=0.037$). Nearly half of the students received full social support from their family, and two-third from their peers at the university (Table 24). Differences of positive mental health parameters between different students group were tested but not found.

Table 24: Positive aspects of mental health

	Mean score for sense of coherence (SD; min-max)	Full social support from family (%)	Full social support from peers (%)
PH students	60.06 (10.98; 31-89)	59.4	70.6
NT students	58.52 (9.72; 36-83)	56.5	68.7
PT students	60.76 (11.43; 25-85)	48.8	60.5
All students	59.78 (10.75; 25-89)	55.1	66.8

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 ($p=0.055$) (Table 25). 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 of females (35.1% vs. 13.2%, $p<0.001$).

Table 25: Changes in social support during study years

	Social support from family is severely or moderately lacking (%)	Social support from student peers is severely or moderately lacking (%)
1st year	47.7	28.1
2nd year	47.2	30.1
3rd year	41.7	41.7

Deficiency-oriented approaches of mental health

Nearly one-quarter of the students struggled with high psychological distress (Table 26), but their proportion was lower among the PH students and among 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 (Table 26), but the mean score was higher in females (26.48 vs. 22.62, $p=0.048$).

Table 26: Deficiency aspects of mental health

	Above the threshold on GHQ (%)	Mean score for PSS-14 (SD; min-max)	Moderate and severe depression (%)
PH students	19.2*	n/a	n/a
NT students	33.1	26.61 (6.07; 11-40)	18.2
PT students	29.7	25.95 (7.61; 2-42)	23.8
All students	27.1	26.28 (6.87; 2-42)	20.6

* Significant difference compared to NT and PT students ($p<0.05$)

One-fifth of the students suffered from moderate or severe depression without any significant difference among the NT and PT students or genders (Table 26).

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

Mental health data of the students were compared to that from representative surveys of the Hungarian adult population using the same mental health scales and restricting data for those under 26 years (Table 27) because 99% of the students belonged to that age group in our survey. The prevalence of worrisome psychological distress was twice as high among male students and four times as high among female students compared to their peers from the general population. The mean score for sense of coherence was non-significantly higher among male, and non-significantly lower among female students compared to their peers.

Table 27: Comparison of psychological distress and sense of coherence between students and their peers from the general population

		Combined sample	Medián 2010 (<26 years)
Above the threshold on GHQ (%)	males	18.9	9.8
	females	27.8	6.4*
Mean score for sense of coherence (SD; min-max)	males	63.3 (10.24; 40-79)	61.1 (10.54; 31-80)
	females	59.5 (10.76; 25-89)	60.2 (10.67; 39-83)

*Significant difference compared to the students ($p=0.001$)

The proportion of those who felt that their social support from family is completely lacking was significantly, nearly 3 times higher among male students, but with no difference among the females (Table 28).

Table 28: Comparison of severely lacking social support from family between students and their peers from the general population

		Combined sample	HNHIS 2003 (<26 years)
Social support from family is severely lacking (%)	males	35.1	9.9*
	females	13.2	12.3

*Significant difference compared to the students ($p<0.001$)

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 of measure mental health (Table 29). For SoC, the mean score of the same age group of the general population was set as the limit: students who scored below this value were considered as having low SoC. For GHQ-12, the limit value of 4 used in the 2003 National Health Behaviour Survey was applied: scores above this value were considered as reflecting notable psychological distress. Four groups were created as shown in Table 29. Two-fifth of students belonged to the category of good mental health with normal SoC and low GHQ. Mental health was considered worrisome 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%, $p=0.024$).

Table 29: Mental well-being of students

		Sense of coherence (%)	
		low	normal
Psychological distress (%)	high	23.1 (mental health problems)	4.3
	normal	33.3	39.3 (good mental health)

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 (Tables 29 and 30).

Table 30: Mental well-being of the general population, 2010

		Sense of coherence (%)	
		low	normal
Psychological distress (%)	high	5.7 (mental health problems)	2.3
	normal	44.3	47.7 (good mental health)

Regarding the proportion of mental health problems there was significant difference neither between genders (males: 7.3%, females 4.3%) in the general population, nor between male

students and their peers from the general population (7.3% vs. 10.8%). 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%, $p<0.001$) (Table 31). In terms of support from peers, the difference was somewhat lower (40.5% vs. 28%, $p=0.086$).

Table 31: The relationship between social support and mental well-being in students

		Mental well-being (%)	
		bad (low SoC, high distress)	good (high SoC, low distress)
Social support from family and friends (%)	severely lack	23.6	7.2
	moderately lack	40.5	24.8
	sufficient	35.9	68.0

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%.

Table 32: Categorization of the respondents by the assessment test (mental well-being) and the reference test (depression)

		Mental well-being			
		bad (+) (low SoC, high distress)	low SoC, low distress	high SoC, high distress	good (-) (high SoC, low distress)
Depression (BDI)	moderate or severe (+)	28	21	2	2
	no or mild (-)	39	56	13	95

DETERMINANTS OF MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

Based on the transcripts of the focus group sessions four common themes were identified.[185]

Theme 1: High demands 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.

“they expect much more from us here compared to high school, and I think it’s too much...”
“even if you were good in high school you may not be able to make it here”

Many students described the number and content of examinations as significant sources of stress. They have problems with scheduling and preparing for all exams. Most of the exams are written (as opposed to oral), and students are expected to “know everything”. Learning objectives and expected depth of knowledge are not clear for all subjects that increase stress especially during examination periods when there are less opportunities for consultation. Students agreed that they had too many subjects per semester, their schedule was overcrowded, certain days were full with lectures and seminars from 8 am to 8 pm including commuting between different locations.

“I don’t know how to study for all exams, now I have 18, I can get a recommended grade for 8 but it’s impossible to prepare for all”

“My last seminar was held at 8 pm, and it is difficult to get home because I do not live in Debreceen.”

“We didn’t know how to cram all exams into the examination period, should we start with the easier or more difficult subjects. At the end, we were all mental.”

Some introductory subjects are delivered together for students at various courses (medicine, pharmacy, public health), and public health students are expected to know as well as those studying medicine that they think is not justified. Regarding other subjects such as philosophy or sociology, students do not see the relevance of these for their future professions. Other subjects are considered too in-depth and difficult to learn due to the volume of the study material such as genetics and microbiology. The students could not tell what was the difference in the requirements compared to medical students, how much they were expected to know for the exams from these subjects.

“Neuroanatomy is very hard and I do not think that is important for us.”

“they expected a lot from some subjects, e.g. genetics, cell biology, microbiology, why we need so much as a physiotherapy student?”

“We were together with medical students at the lectures, but we did not get a topic list for the exam, so we did not know what we had to know for the exam.”

“At the exam the teacher asked about things what we never learned before, he thought that I was a medical student.”

Public health students felt that departments of other faculties were uninformed about their profession.

“He told us that mammography and in general prevention makes no sense.”

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. They thought it was cumbersome to get hold of administrative workers, many of whom were either not helpful, or too busy to help students, or did not provide all the necessary information.

“the Educational Office guys cannot answer questions, they are always busy, running here and there, they say will be back in a moment and you are just waiting”

“I arrived at office hours and she asked me: What are you doing here again?”

“I had to go back five times with the same form, because she did not know who had to fill it out and what attachments were required.”

Theme 2: Relations to peers

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

“I am feeling hostility in my group, for example if I miss a lecture, others would not tell me what was covered, don’t give me their notes and this makes me feel bad.”

“It would be nice to have more programs with the group, we should really stick together”

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.

“I have too little time for my friends and for myself”

“I would not have problems with exams if I had time to recharge”

Many students struggle financially. Their stipend is low, and their crowded timetable does not leave enough free time to work during semesters though they would need extra income. 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 what lead to exhaustion.

“if I get a bad mark, I have to think twice whether it is worth to re-sit the exam and try to get a better mark because the potential increase in stipend is not worth the extra cost”

Some students come from families and communities which are not aware of the difficulties of obtaining a degree in physiotherapy or public health, or their chosen profession is not thought of as highly as other health professions. They fondly mentioned a medical doctor lecturer who talked to them on why physiotherapy is important, and how much they could help both patients and doctors. However, many lay people do not appreciate their work.

“many people think we just do massage...”

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 also have similar problems could help increase support in study years. Others mentioned better time management skills and schedule as a potential tool to reduce stress.

“I could relax if I went to more parties”

“eating chocolate” (3 others are nodding)

“I would feel better if we did not have class until 8 pm and we had more info about stuff”

“I loved the class when we were exercising together, we could do this just for fun”

“I don’t think I could be less stressed because the lecturers pull the strings anyway”

“This is an equation without solution”

MODEL OF MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION [187]

BASIC CHARACTERISTICS

Demographic data and perceived health

1059 questionnaires were received yielding a response rate of 68.6%. Of those, 1010 questionnaires (65.4%) were eligible for analysis. Mean age of the students was 23.3 years (age range: 20-49, 97.2% below the age of 30); 67% of the respondents were female. 78% of them studied subjects related to pedagogy, and 71% of all respondents were potentially on track to become teachers.

Of those who responded, 65.2% rated their health as very good or good. There was no significant difference in terms of perceived health between males and females ($p=0.470$).

Measures of mental health

Psychological distress was measured by the total score of GHQ-12 and evaluated by the usual method.[66] Almost one-quarter (23.6%) of the respondents scored above the cut-off value of 4 that indicates unfavourable mental status; the proportion of females with high psychological distress was significantly higher compared to males (26.5% vs. 17.6%; $p=0.002$). The median score of males was significantly more favourable reflecting lower distress than that of females ($p<0.001$). The median for sense of coherence was 62 points (IQR: 16, min: 21, max: 87), with no significant difference between males and females ($p=0.862$). Since there was a marked gender difference in psychological distress, the model of health was analysed separately for male and female students.

MODEL OF HEALTH

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. Wilk's lambda statistic was 0.601, and the F-statistic also proved to be significant ($p<0.001$) of all canonical correlations ($r_1: 0.518$; $r_2: 0.282$).

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. The Kaiser-Meier-Oldkin measure was fairly large (0.690) and the Bartlett's test was also significant ($p < 0.001$), indicating the adequacy of the analysis. The first major component was mental health related to social support. Body mass index had a negative relationship with social support. Perceived health was mainly related to fruit consumption and physical activity. Sport was highly correlated with teenage activities in art. Use of sedatives with or without a prescription was separated from other types of drug use. Health locus of control and body mass index were separated from sense of coherence, psychological distress and perceived health in the correlation structure.

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 (Levene's test of equality of the between-group variances: $p < 0.001$; F statistics 1,679). 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. The grouping variables have different numbers of categories but overall satisfied the minimum sample requirements. 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. The assumption of homogeneity of the covariances was satisfied as attested to by Box's M (339,11) statistic ($F(234,6233)=1,064$; $p=0,243$).

Univariate and multivariate analyses for male students

As it can be seen from Figure 4 (see Methods), the hypothetical model treated the determinants of health as being situated at different time points. Living conditions, family background, age and sex were set as the most distal determinants, followed by teenage activities (activities before entering university); health behaviour and social support experienced while at university, all these impacting on the latent variable of health approximated by 3 measured variables. According to the result of the multivariate analysis of covariance, all of the most distant determinant variables, that is, age, family background (financial status of family, and parents' education) and habitat (population size of permanent residence and type of co-habitation) 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 (Table 33). Actual physical activity, smoking, dance during teenage years and social support from family had significant positive impact on health measured by sense of coherence, psychological distress, and perceived health (Figure 8).

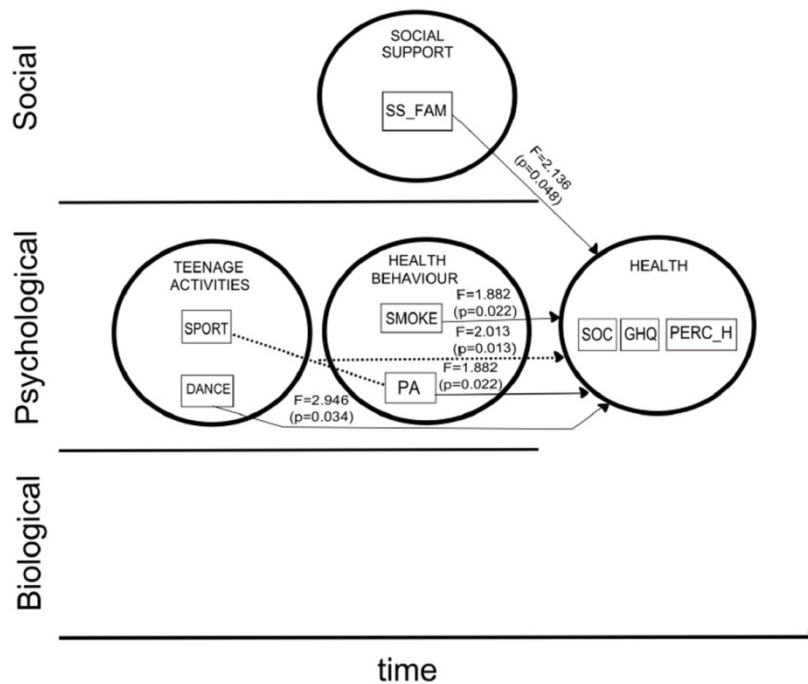


Figure 8: Best fit model for the relationship between health and its determinants in male students

Notes: The values on the arrows represent F ratio and the p value. Dotted line represents interaction.

DANCE: engagement in dance before entering university
 SPORT: engagement in sport before entering university
 SS_FAM: social support from family
 PA: physical activity

SMOKE: smoking
 PERC_H: perceived health
 SOC: Sense of Coherence
 GHQ: Psychological distress

Table 33: Effects of health determinants on indicators of health in male students

Variable	Sense of coherence ^a	Psychological distress ^b	Perceived health ^c	Overall effect to the multivariate outcome	Partial eta squared ^d
	F ratios from the tests of between subjects effects			p value	According to Wilks' lambda
Intercept	71.254**	62.273**	65.218**	< 0.001	0.558
Social support from peers at the university	0.702	0.234	0.328	0.855	0.005
Social support from family, friends	3.528*	0.757	0.258	0.048	0.031
Use of sedatives with prescription	0.199	0.367	0.919	0.937	0.005
Use of sedatives without prescription	0.160	0.770	0.725	0.957	0.007
Fruit consumption	2.058	1.666	1.150	0.378	0.021
Physical activity	1.506	1.143	2.262*	0.022	0.052
Smoking	0.693	1.167	2.490*	0.022	0.052
Arts	0.000	1.843	2.258	0.306	0.015
Dance	1.615	2.079	8.679**	0.034	0.035
Sport	0.317	0.442	0.034	0.724	0.005
Age	0.058	0.021	0.699	0.814	0.004
Social support from peers*sport	1.550	1.780	0.252	0.302	0.015
Smoking*sport	0.314	1.178	1.075	0.507	0.019
Physical activity*sport	1.492	2.625*	1.551	0.013	0.039
Social support from family, friends*age	2.024	0.845	0.193	0.341	0.014

Notes: * significant at $p < 0.05$; ** significant at $p < 0.01$

a: R squared for SoC =0.331; *b*: R squared for GHQ=0.227; *c*: R squared for perceived health=0.297; *d*: overall R squared=0.767

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, but family background and habitat disappeared from the model. 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 and fruit consumption had direct significant impact, whereas smoking, social support from family and peers alike had a somewhat weaker but still significant impact on health (Table 34).

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 (Figures 8 and 9).

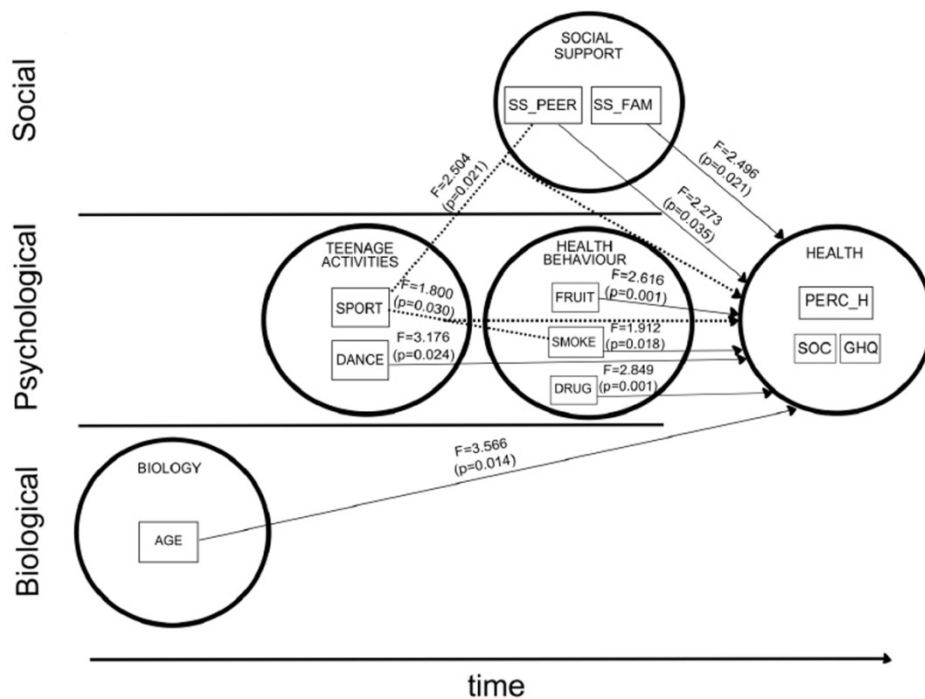


Figure 9: Best fit model for the relationship between health and its determinants in female students

Notes: The values on the arrows represent F ratios and the p value. Dotted line represents interaction.

AGE: age

DANCE: engagement in dance before entering university

SPORT: engagement in sport before entering university

SS_FAM: social support from family

SS_PEER: social support from peers

FRUIT: fruit consumption

SMOKE: smoking

DRUG: drug consumption

PERC_H: perceived health

SOC: Sense of Coherence

GHQ: Psychological distress

Table 34: Effects of health determinants on indicators of health in female students

Variable	Sense of coherence ^a	Psychological distress ^b	Perceived health ^c	Overall effect to the multivariate outcome	Partial eta squared ^d
	F ratios from the tests of between subjects effects			p value	According to Wilks' lambda
Intercept	82.360	130.549	42.212	<0.001	0.401
Social support from peers at the university	4.827**	0.183	0.764	0.035	0.012
Social support from family, friends	1.626	6.084**	2.011	0.021	0.013
Use of sedatives with prescription	1.294	0.999	2.791*	0.149	0.012
Use of sedatives without prescription	4.761**	2.545*	3.085*	0.001	0.020
Fruit consumption	2.094	3.658**	4.500**	0.001	0.023
Physical activity	2.698*	1.887	1.831	0.084	0.014
Smoking	1.819	1.320	2.830*	0.018	0.017
Arts	1.295	1.432	0.101	0.565	0.004
Dance	0.074	7.438**	0.078	0.024	0.017
Sport	0.078	0.882	2.119	0.364	0.006
Age	7.353**	1.377	5.580*	0.014	0.019
Social support from peers*sport	0.529	4.288*	1.754	0.021	0.013
Smoking*sport	1.783	1.007	3.579**	0.030	0.016
Physical activity*sport	2.211	1.289	0.405	0.378	0.010
Social support from family, friends*age	0.263	4.182*	1.241	0.135	0.009

Notes: * significant at $p < 0.05$; ** significant at $p < 0.01$

a: R squared for SoC =0.282; *b:* R squared for GHQ=0.213; *c:* R squared for perceived health=0.226; *d:* overall R squared=0.551

IMPROVEMENT OF MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

SOCIAL COGNITIVE INTERVENTION [188]

Description of the target group

Of all participants, 128 filled the questionnaire before and 148 after the course (response rate 62% and 72%, respectively). All questionnaires were eligible for evaluation. Among those who filled the questionnaire before the course 22% were male, after the course this proportion was 30%. The proportion of genders did not differ significantly before and after the course ($p=0.149$). The mean age of those who filled the questionnaire before and after the course did not vary significantly, as expected (23.21 years vs. 23.54 years; $p=0.320$).

Outcome measures

Health status

Perceived health was good or very good in 67% of the students before the course, and 58% after the course, not significantly different from that of before ($p=0.120$) (Table 35).

Mental health

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 ($p=0.017$) (Table 35). 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 students scored above threshold (4 points) on the GHQ-12 scale after the course compared to that before, indicating an improvement in mental problems, but the decrease did not reach significance ($p=0.226$). 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 ($p=0.688$) (Table 35).

Table 35: Comparison of the health status of participants before and after the course

	before the intervention	after the intervention	p-value
Perceived health is very good or good (%)	67.2	58.1	0.120
Median of psychological distress (IQR; min-max)	2 (5; 0-12)	1 (4; 0-11)	0.017
Mean score for sense of coherence (SD; min-max)	60.8 (12.99; 23-89)	61.4 (11.12; 25-89)	0.688

Evaluation of the course

Favourable narrative feedbacks were given by students on the evaluation questionnaire regarding the content, lecturers and overall organization of the course. The intervention was funded by an external source so all costs of the course could be accounted for (lecture fees, production of questionnaires, rental fees). Considering the overall cost of the course versus the number of students who completed the course, 1 point improvement in psychological distress was achieved costing 54 USD.

FEEDBACK FOR WORKPLACE ACTION [185]

In line with the recommendation of The Guide to Community Preventive Services [181], 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 results were also fed back to the highest decision making forum of the Faculty, the Council of the Faculty of Public Health in which students are represented. The Faculty subsequently launched various activities that were meant to increase social support and help students flourish.[189] For example, in every semester in which 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. Students have been invited to join the journal clubs of the Department of Physiotherapy at which those who are involved in extracurricular activities are scheduled to present their work.

DISCUSSION

FEATURES OF THE MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

The mean score for SoC was not significantly different among students at the investigated courses but the mean score in male students was higher than the mean score either in female students or in their peers from the general population.

Almost half of the students received full social support from their family and friends, but among males the proportion of those who severely lacked support from family was nearly 3 times higher than either in females or in their peers from the general population. Two-third was supported sufficiently by their student peers at the university, but there was a 1.5-fold increase in the proportion of those who did not receive satisfactory support among BSc students from year 1 to year 3.

Nearly one-quarter of the students bear the burden of high psychological distress, somewhat less of them being PH students and males (both one out of five students), but the prevalence of psychological distress among students was higher compared to their peers from the general population.

The mean score for perceived stress in the whole sample did not differ from the mean score of perceived stress measured during the validation of the Hungarian version of the PSS scale (under 25 years: 26.9; university students: 26.0).[170] No difference was found among student groups, but females perceived significantly higher stress than males.

One-fifth of the students suffered from moderate or severe depression with no significant difference either among NT and PT students or genders. The prevalence of depression was somewhat higher among students than their 15-29 years old non-student peers in 2006.[33]

All in all, mental health was unfavourable reflected by low SoC and high GHQ in almost one-quarter of the study population. The prevalence of unfavourable mental health was 2 times higher in female students compared to male students, and six times higher in female students compared to their peers from the general population.

Our results have been in line with other studies already mentioned in the introduction part that have drawn attention to the mental health problems of students in various health [131,145] and education [139] professions. 27% of physiotherapy students in Ireland scored above the GHQ-12 threshold, which was higher than in the general population [114] similarly to our finding. 36% of student teachers in Nigeria [141] and 38% in the UK [140] exhibited psychological distress, the prevalence was lower (23.6%) in future teachers in Hungary [163].

One study of Finnish students found the mean score for sense of coherence to be 62.6 [109], close to the mean score in our study. Mental health problems tend to be more frequent among female students [106,121,150] just like among females in the general population. Similarly, several studies found that the mental health status of students is worse than the mental well-being of their peers from the general population.[114,158,164]

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.[125,190,191,192]

Students who have lower than average sense of coherence and higher than average scores of mental distress can be considered as having higher risks for 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 have increased risk for mental health problems (using BDI as a reference test) with a 41.8% probability, from 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 to screening tests, the features of our assessment test are acceptable, especially if compared to the BDI: the positive predictive value of BDI was 54% and the negative predictive value was 99% in a study in which the prevalence of major depression was similar to that in our study.[193]

STRENGTHS AND LIMITATIONS

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. Though the respondents are not representative either for all Hungarian students in higher education or for students of University of Debrecen but given that the study aimed at 51% of all full-time public health students in Hungary, reasonably cautious conclusions can be drawn for all public health students in the country. The proportion of women among all public health students in the country was 86%, not significantly different from the proportion of women in our study. Our sample was comprised of one-fifth of all 1-3 year physiotherapy students and one-tenth of nursery school teacher students in Hungary. Neither the proportion of women among all physiotherapy students (89%) in the country nor the proportion of women among

all nursery school teacher students (98%) in the country was significantly different from the proportion of women in our samples.

Potential sources of bias in questionnaire surveys may arise from the respondents not answering honestly, or not remembering their status or feelings. This type of bias was probably not higher than in similar studies using standardized scales so our results are comparable with the results of other studies.

The timing of data collection about mental health is a critical point among university students because their stress level fluctuates during the academic year. A potential source of bias might be the timing of data collection, especially if it is close to the exam period. In order to reduce this type of bias, data were collected in the mid-term of the semester when stress related to the examination period is at the lowest. One-fourth of the students had unfavourable mental health status at this relatively quiet time of the study year that makes our finding even more worrisome, especially in light of the findings of the Eurobarometer mental health survey of 2010 [16] that found that 15-24 year-olds and students tend to experience the best mental health in the EU.

We developed an assessment tool with low negative posttest probability (high negative predictive value). However, validity calculations were based on data from a limited number of students (N=256) and the applied reference test (BDI) was a screening tool, not a diagnostic test. Therefore, our assessment tool needs to be validated against a diagnostic test, and the study population should be followed in order to also measure the test's reliability to predict high risk students.

MEANING OF THE STUDY AND FUTURE RESEARCH

In general, there were no major differences among the different student groups regarding their specialties. The mental health status of male students was more favourable than their female peers at the university. Psychological morbidity was significantly more frequent 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.

Students in higher education, especially females need help to increase their mental well-being. We agree with Huppert's opinion who stated that current mental health practice is misguided because it tends to focus only on those who have mental disorders whereas the majority of new cases arise from the general population.[189] Since mental health problems are common among those in helping professions, the best time to take action seems to be during studies to make students resilient for the major challenges they have to face upon entering the

profession. This approach seems to be taken by the World Health Organization that recommends “to implement strategies for promotion and prevention in mental health” in its Mental Health Action Plan for 2013-2020 [194], and the European Pact for Mental Health [195] which specifically calls for taking action “to implement mental health and well-being programmes with risk assessment and prevention programmes for situations that can cause adverse effects on the mental health of workers”. Giving heed to the international recommendations, we propose the assessment of mental health at the time when students begin their academic studies. Assessment should be carried out by a tool which focuses on mental health from the aspect of resilience, and reliably detects those who have low risk so all the rest of the students could be invited to take up preventive measures hereby avoiding stigmatization.

Our results highlight the importance of further, preferably longitudinal research on the mental health of students in helping professions in light of their status as future role models among their clients. Institutes of higher education should enhance training to improve coping skills for all students, increase social support, or both as potentially amenable determinants of mental health during higher education, and should provide more and better targeted services for those with highest risk not only in order to improve students’ mental health but also to increase their future credibility as professionals who not only talk the talk of their professions but also walk the walk of the paths of health.

MODEL OF MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

Health determinants are of major interest in various population groups, and a multitude of models for health has been published.[177,196,197] However, many of these models are built from cross-sectional data, though the life-course approach disentangling health exposures and determinants and their interrelatedness across the life span has been shown to better approximate adult health.[198]

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. In our analysis a multivariate model of student health was tested 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 [199,200], 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 MENTAL HEALTH OF STUDENTS IN HIGHER EDUCATION

STRATEGIES TO PROMOTE MENTAL HEALTH IN EDUCATIONAL SETTINGS

Schools are the most important settings for interventions targeting children and youth because they spend most of their time there, incorporating vast amounts of knowledge in formal and informal ways that shape their values, perspectives, social skills, emotional development and behaviour for the long run. Social and emotional skills are important to maintaining health and positive development, therefore school-based programmes often serve as both mental health promotion and substance abuse prevention programmes. School health promotion interventions can be effective in knowledge transmission, skills development, and supporting positive health choices. There is ample evidence that providing universal programmes to students have an impact on positive mental health, and multicomponent programmes are more effective than those that intervene only on one level. Evidence indicates greatest effectiveness where programmes are not only comprehensive and holistic but last several years.[44,201,202]

Special initiatives are aimed at universities such as the Health Promoting University initiative that aims to promote the health and well-being of staff, students and the wider community within the university's culture, structure and process by creating healthy working, learning and living conditions for students and staff.[203]

Institutions of higher education can have a direct influence on the mental health of students via support systems such as counselling, personal tutoring, financial advice, services for international students and for those with disabilities. A special aspect of services is the provision for struggling and/or mentally troubled students who may have strong disincentives

to come forward and seek health care services, especially if such services are hard to reach or non-existent.

Evidence based mental health promotion programmes among university students

While a number of mental health programmes demonstrated that properly designed interventions contribute significantly to the mental well-being of populations [204], there is less evidence regarding effective programs targeted to university students. Fortunately, five systematic reviews of mental health-promoting interventions among students had been published in the literature in the past decade so that provide a good overview of the field.

Shapiro et al. reviewed the literature from 1966 to 1999 on stress management programs in medical training and found – based on 24 studies – that these programs may result in decreased depression and anxiety, improved knowledge of the effects of stress, greater use of positive coping skills, and the ability to resolve role conflicts. A wide variety of interventions aimed at stress reduction, e.g. support groups, relaxation training, time-management and coping skills, mindfulness-based stress reduction, and mentoring programs. However, not one of these could be declared as a gold standard for interventions, so at that time they suggested more research to explore which components of the interventions in what duration and frequency would be most effective.[205]

A meta-analysis in which 83 studies of youth psychotherapy were examined in 2010 found that psychotherapy among students improved academically related outcomes.[206] However, its obvious limits in terms of human and financial resources as well as the help-avoiding attitudes of students [207] especially in health professions [208] make psychotherapy unfeasible as a means to help at-risk students and call for other, less stigmatizing and more accessible interventions.

A meta-analysis based on 19 relevant studies among college students from 1990 to 2010 showed relatively small but positive effect in stress reduction by psychoeducational interventions. Short-term interventions for women were found to be the most effective but their effectiveness was equivocal during longer follow-up.[209]

A review published in 2012 summarized findings of 16 clinical trials performed in the United States within the college student population from 1987 to 2011, and found a wide variety of depression-preventing interventions including cognitive-behavioural therapy, interpersonal process therapy, computer training, personal feedback through mailed intervention suggestions, as well as exercise and stress training. The authors concluded that there are no standardized interventions and evidence for effective outcomes in the current literature.[210]

The findings of a recently published meta-analysis and review provided strong support that cognitive, behavioural, and mindfulness-based interventions focused on stress reduction are effective in reducing the impact of stress on university students, including reduced levels of anxiety, depression, and cortisol response. However, the 24 studies in the meta-analysis underrepresented the total student population at universities and over-represented female students in Western countries.[211]

Another recent review of 83 programs in higher education also found that skills-oriented programs provide the highest benefit in mental health promotion. Mindfulness training and cognitive-behavioural techniques conducted as a course seem to be the most effective. To reach a broad audience, effective interventions need to be integrated into the routine structure and programming of higher education institutions and have support from students, staff and administrators. Another aim should be to develop courses or extracurricular programs for freshmen because the first year of college represents a critical transition of life.[212]

In summary, a rather wide variety of interventions had been tried and evaluated in students in higher education, but evidence is strongest for the beneficial impact of cognitive-behavioural and mindfulness-based interventions, though their impact has been shown among dominantly Western and female students. A wider variety of students from various cultural backgrounds should be involved in future studies to specify the best practices for implementation, including information on barriers and enablers, marketing, tailoring as well as staff and peer support.[213]

Mental health promotion at Hungarian universities

The majority of Hungarian initiatives are based on peer support.[214] The longest running service was established at the Eötvös Loránd University in Budapest in 1995 inviting psychology students as voluntary peer counsellors. The service has been operated by a civil organization ever since, and on top of individual counselling, self-knowledge courses ('Identity'), community development projects ('Filmklub') and special programs for foreign students ('Tandem') are also offered.[215]

A student service (Ariadne's thread) was established in 1997 at the University of Debrecen offering psychological consultation by clinical psychologists for students with emotional, learning or relationship problems.[216] Four years later in 2001 the University decided to establish an organizational entity – supervised by one of the vice-deans of the University – to improve the mental health of students (Mental Hygienic and Equal Opportunity Centre).[217] The Centre provides a wide variety of services such as peer support under the name of 'Hotel

Mental'[218]; groups for stress reduction, self-knowledge, sessions of physical activity, film club showing relevant movies followed by discussion, series of lectures on topics related to relationship and family, party service (transport from night events to home) and first aid for drug users.[219] However, no information could be found on the evaluation or impact of these services.

The HuMania Training Programme was launched in 2002 at Semmelweis University as a credit course for medical students run by volunteer peers. The course has also been offered by the University of Debrecen since 2008. The aim of the program is to help medical students prepare for their professional role, improve communication skills and social support, and prevent burnout. The credit course is led by students tutored by a senior lecturer of behavioural sciences, and use – among others – role play and junior Bálint group techniques. Participants having taken the course showed improved well-being while their risk for burnout decreased.[220,221]

The Mediwell Peer Counselling Program of the University of Szeged was established in 2009, and aimed at promoting medical students' mental health. Basic training takes one year, and includes sessions of team building, self-knowledge enhancement, and training on counselling. Medical students trained in the group keep regular office hours to receive their peers at the Hungarian and English language medical course for consultation, peer counsellors are supported by professional supervisors. Efficacy is proven by student feedback: 43% of the students would turn to a peer counsellor with their problems.[222,223,224]

OUR SOCIAL-COGNITIVE INTERVENTION

The intervention presented in the thesis was based on earlier research that pointed to sense of coherence and lack of social support as major determinants of students' stress.[158,163] 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, like relaxation and improving coping skills. The intervention was delivered as an optional course, and produced a modest but significant decrease in psychological distress in students as measured by the GHQ-12, an indicator of pathological levels of current stress. The significant though modest decrease in stress should be evaluated in light of the fact that overall change resulted from an intervention delivered by 4 different groups of faculty members at 4 institutes of higher education. The course provided further evidence that distress is amenable to change among students which is not true for

sense of coherence, a mental health indicator shown to change over longer periods of time.[225]

Assessment of incoming students' mental health by our tool followed by an invitation to take up an optional course for all those whose mental health is less than optimal would be a feasible, effective and non-stigmatizing way to help at-risk students to improve their mental resilience.

STRENGTHS AND LIMITATIONS

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. Another limitation of the study is that no environmental and social factors potentially impacting upon mental health problems were taken into consideration. However, social determinants of health are distal and impact upon health through intermediary determinants including psychosocial factors [226] so their contribution would show up in the varying mental health status of the students. The significant improvement of stress in the targeted student population at four 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 – supported by other findings.[227]

MEANING OF THE STUDY AND FUTURE RESEARCH

There are two potential avenues for improving the mental health of students. One is to reduce or limit stress they are exposed to; another one is to strengthen students' stress-coping skills by evidence-based interventions [194] (or a combination thereof).

In order to reduce the level 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. We are planning a follow-up survey in the future to study the overall impact of these changes on students' mental well-being.

Our social-cognitive intervention aimed at improving the coping resources of the students as individuals and as groups in the hope that this will also increase direct personal agency and proxy agency as expressed by the course's title "On the way to freedom". To our knowledge,

this is the first example of the translation of the social-cognitive theory into practice among students in higher education. Our intervention was very similar to that implemented by Van Daele et al who strengthened the resilience of participants by a stress control course.[227] Effective mental health promotion entails promoting the general mental well-being of students which can itself bring benefits to higher education institutions. Improved general mental well-being will impact on institutional reputation, staff and student recruitment, retention, study performance in general, and community relations. 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.[228] These all point in the direction of a structurally reorganized, healthy university towards which our intervention can be a first step. Students with improved communication skills and a deeper understanding of the individual and structural causes of student stress hopefully will help staff initiate a settings based movement towards creating a health promoting university.

CONCLUSION

Competent and credible helping professionals who are fit to practice [229] are essential for the provision of services.[133,230] Hidden and/or untreated health problems are but one of numerous reasons of impaired fitness for service [229] especially in an environment like health care or education where high levels of occupational stress are pervasive.[132,231] Stress, and especially chronic stress is an important health problem that has been linked, among others, to anxiety, depression, posttraumatic stress disorder [59,60], burnout, decreased job performance [59] and/or poorer academic outcomes [81].

However, even cumulative stress experiences do not inevitably lead to mental disorders if individual coping resources and psychosocial factors such as social support, self-esteem and personal control moderate the effects of stressors.[56] 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. Evidence from the past decades has shown that positive emotions and cognitive processes are mutually formative, both contributing to mental well-being.[189] Positive emotions may be the critical mediator underlying the relationship between happiness and success, that is, happiness may lead to successful outcomes rather than merely following from them.[232] 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.[233]

Academic sources of stress may be alleviated by planning modifications in the curriculum [234] and by interventions that provide psychological support. These interventions should be structured, inserted into the curriculum and offered preferably to all those who are in a less than optimal state, optimally 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.[235]

RECOMMENDATIONS

1. Incoming students should be offered an assessment of their mental health by an assessment questionnaire including our composite tool.
2. All except those in optimal mental health should be offered various mental services and interventions, including the uptake of optional courses aimed at improving the mental health of the students that are based on cognitive-behavioural and mindfulness approaches. Those at high risk should also be offered individual mentoring by peers or lecturers.
3. The mental health of all students should be monitored during their academic studies.
4. 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.

SUMMARY

ABSTRACT

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 school 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 peers from 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 would be recommended to detect those at higher risk in terms of mental resilience. Those at higher risk should be helped in various ways such as 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.

ÖSSZEFOGLALÁS

Az egészségügyi és pedagógus szakemberek saját egészségét betegeik, klienseik, tanítványaik naponta veszik hallgatólagosan górcső alá, szakmai tudásukkal összevetve azt. E megítélésen keresztül a szakemberek indirekt véleményformáló hatása, példakép-szerepe legalább olyan jelentős, mint szavaikkal közvetített tudásuk. Ezért kiemelten fontos e szakemberek egészségét már hallgató korukban megvizsgálni, hogy azt szükség esetén javítani lehessen.

Ennek érdekében elsőként felmérést végeztünk a népegészségügyi, gyógytornász és óvodapedagógus hallgatók egészségének megismerése céljából a Debreceni Egyetem hallgatói körében, elsősorban a lelki egészség kóros mértékű stresszel mért negatív, és koherencia-érzéssel mért pozitív aspektusára összpontosítva. Másodikként egy becslőskálát alakítottunk ki a jó és a kevésbé jó mentális állapotú hallgatók elkülönítésére. Harmadik lépésben a hallgatók mentális egészségének determinánsait határoztuk meg, egy többváltozós modellbe beépítve azokat; majd a hallgatók mentális egészségét javító intervenciót dolgoztunk ki és értékeltünk.

Felmérésünk szerint a vizsgált hallgatói populáció közel negyedére volt jellemző a kedvezőtlen mentális egészség, amelyet alacsony koherencia-érzés és magas pszichés stressz jellemez. A női hallgatók közt kétszer magasabb arányban voltak a kedvezőtlen mentális egészségűek a férfi hallgatókhoz képest, és hatszor többen voltak, mint a hasonló korú női átlagpopulációban. Az általunk kidolgozott becslőskála magas megbízhatósággal azonosítja a jó mentális állapotú hallgatókat, nem stigmatizálóan elkülönítve akik többlet-támogatást nem igényelnek, azoktól, akiknek erre szükségük van. A vizsgálatunk harmadik lépéseként épített modell tesztelése rávilágított arra, hogy a női és férfi hallgatók mentális egészségének háttér-tényezői jelentősen különböznek. Női hallgatók mentális egészségének kiemelten fontos védőfaktora a társas támogatás, míg férfi hallgatók mentális egészségére domináns hatással vannak a testmozgással kapcsolatos tevékenységek. A hallgatók mentális egészségének fejlesztésére kidolgozott és szabadon választható kurzusként megvalósított intervenció szignifikánsan csökkentette a kóros mértékű pszichés stresszt a résztvevők körében.

Eredményeink alapján javasoljuk az első éves hallgatók szűrését a lelki egészség szempontjából, hogy az optimálisnál kedvezőtlenebb állapotban lévőknek különféle támogató szolgáltatásokat lehessen kínálni szabadon választható kurzusok, kortársak vagy tanárok által vezetett segítő szolgáltatások formájában. Ugyancsak javasolt a hallgatók intézményi eredetű stresszorainak csökkentése annak érdekében, hogy az egyetemi környezet egészséget támogató jellege erősödjön. Követéses vizsgálatok tudják majd megválaszolni azt a kérdést, hogy az egyéni és intézményi változások hatására hogyan javul a hallgatók és végzettek mentális egészsége.

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LIST OF PUBLICATIONS



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PUBLICATIONS



Register number: DEENKÉTK/125/2014.
Item number:
Subject: Ph.D. List of Publications

Candidate: Éva Bíró
Neptun ID: E88CM1
Doctoral School: Doctoral School of Health Sciences
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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.
Health Promot. Int. Epub ahead of print (2014)
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Total IF of journals (all publications): 5.521

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The Candidate's publication data submitted to the Publication Database of the University of Debrecen have been validated by Kenezy Life Sciences Library on the basis of Web of Science, Scopus and Journal Citation Report (Impact Factor) databases.

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CONFERENCE PRESENTATIONS RELATED TO THE THESIS

Bíró É., Faludi E., Balajti I., Ádány R., Kósa K.: Egyetemi hallgatók mentális egészségének javítása. Oral presentation at the 3rd Conference of Népegészségügyi Képző- és Kutatóhelyek. Győr, 2009. September 24-26.

É. Bíró, I. Balajti, R. Ádány, K. Kósa: An effective method to improve the mental health of university students. Oral presentation at ASPHER Young Researchers Forum 2009. Lodz, 2009. November 25.

Bíró É., Jenei L., Siket A., Ádány R., Kósa K.: Népegészségügyi szakos hallgatók egészségmagatartása és egészségi állapota. Oral presentation at the 4th Conference of Népegészségügyi Képző- és Kutatóhelyek. Szombathely, 2010. September 2-4.

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I. Balajti, L. Daragó, É. Bíró, R. Ádány, K. Kósa: Response rate by various means of survey methods among students of higher education. Poster at the Conference of ASPHER 2007. 2007. October

I. Balajti, L. Daragó, É. Bíró, R. Ádány, K. Kósa: Response rate by various means of survey methods among students of higher education. Poster at the Debreceni Egyetem Orvos és Egészségtudományi Centrum és az MTA DAB Orvostudományi és Biológiai Szakbizottságának tudományos ülésén, 2008. Februar 25.

É. Bíró, I. Balajti, R. Ádány, K. Kósa: Health behaviour survey among medical students. Poster at the Debreceni Egyetem Orvos és Egészségtudományi Centrum és az MTA DAB Orvostudományi és Biológiai Szakbizottságának tudományos ülésén, 2008. Februar 25.

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KEYWORDS – TÁRGYSZAVAK

mental health	mentális egészség
sense of coherence	koherencia-érzés
psychological resilience	lelki reziliencia
psychological distress	pszichés distressz
social support	társas támogatás
mental well-being	mentális jól-lét
assessment tool	becslőskála
determinants of mental health	mentális egészség determinánsai
model of mental health	mentális egészség modellje
improvement of mental health	mentális egészség javítása
social-cognitive intervention	szociális megismerésen alapuló intervenció
university students	egyetemi hallgatók

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ANNEX: PUBLICATIONS RELATED TO THE THESIS