Soc Psychiat Epidemiol (2010) 45:253–258
DOI 10.1007/s00127-009-0062-0

ORIGINAL PAPER

Determinants of mental well-being in medical students

Éva Bíró · Ilona Balajti · Róza Ádány · Karolina Kósa

Received: 16 September 2008 / Accepted: 14 April 2009 / Published online: 28 April 2009

Abstract
Introduction Mental disorders constitute an increasingly important public health problem in the general population. Therefore, investigation of the determinants and state of mental health of those who will be treating patients, that is, future medical doctors, is justified. The paper gives an account of a mental health survey of medical students at a university in Hungary.
Methods A representative sample of year I–V students ($N = 100$) filled an anonymous standardized self-administered questionnaire that included demographic and socioeconomic items, mental well-being characterized by a sense of coherence (SOC) and psychological distress, as well as health behaviour. SOC was measured by the 13-item Antonovsky questionnaire and psychological distress was measured by the 12-item general health questionnaire (GHQ). Models for estimating mental well-being in relation to various determinants were built by backward stepwise regression.
Results Almost one-fifth of the students scored above the strict threshold on the GHQ indicating notable psychological distress. SOC showed significant positive correlation with perceived health and significant negative correlation with psychological distress. SOC and psychological distress were determined by different sets of explanatory variables in the regression models. Psychological distress and the use of sedative without medical prescription are inversely related to SOC; whereas social support and female gender show positive correlation to SOC according to our estimation. SOC, as expected, was a strong explanatory variable for psychological distress, forecasting an improvement in the GHQ score.
Conclusion Psychological distress was significantly greater in our sample of Hungarian medical students than in the same age group of the general population. Psychological distress is strongly related to SOC and can be estimated by our proposed models. Both SOC and psychological distress can be used to characterize the mental health of future medical doctors, the improvement of which needs attention even during their training.

Keywords Medical students · Mental well-being · Psychological distress · Sense of coherence

É. Bíró · K. Kósa (✉)
Division of Health Promotion, Faculty of Public Health, Medical and Health Science Centre, University of Debrecen, Postal address: POB 2, 4012 Debrecen, Hungary
e-mail: k.kosa@sph.dote.hu

I. Balajti
Faculty of Health Care, Medical and Health Science Centre, University of Debrecen, Debrecen, Hungary

R. Ádány
Department of Preventive Medicine, Faculty of Public Health, Medical and Health Science Centre, University of Debrecen, Debrecen, Hungary

Introduction

Mental disorders constitute an increasingly important public health issue [23], even among medical doctors, attested by untreated mood disorders, especially depression, increased burden of suicide and avoidance of care [5, 17, 27, 29]. Regarding physician suicide, a meta-analysis found for medically qualified men modestly high and for women highly elevated suicide rates compared to the general population [25]. A more recent US study examining data in 26 US states between 1984 and 1992 found increased suicide

risk for white female physicians and older white male physicians and dentists [22]. Mental disorders might appear early on, even during the years of medical training [2]. A Swedish study of medical students found the prevalence of depressive symptoms to be 12.9%, which was significantly higher than that in the general population [7]. Prevalence of psychiatric morbidity was 26% in Australian final year medical students, which increased significantly during internship [32]. Similarly, an increase in the prevalence of mental health problems requiring treatment was noted in Norwegian students from postgraduate years 1 to 4, but there was no increase in help-seeking [28]. Avoidance of care or seeking outside/private care is mostly explained by a fear of stigmatization related to mental illnesses [8] and their perceived impact on their future careers [6].

There are different constructs by which mental health is characterized. One of them is sense of coherence (SOC), a salutogenic concept defined by A. Antonovsky as a global orientation expressing a pervasive, enduring and dynamic feeling of confidence [1]. SOC reflects a person's view of life and capacity to respond to stressful situations (strain resistance resources), and how these resources are used to maintain and develop health. SOC consists of three elements: comprehensibility, manageability and meaningfulness measured by a long (29 items) or a short (13 items) questionnaire [1]. Both instruments are valid, reliable, and cross-culturally applicable [9]. SOC was found to correlate with subjective (perceived) health in several studies [10]. However, only one study on SOC was undertaken among graduated physicians in Finland that found an increase in SOC scores measured by the 13-item tool during follow-up, which correlated with decreased psychological distress as measured by the widely used 12-item general health questionnaire (GHQ) [30].

Our aim was to assess the mental well-being of medical students by the abbreviated SOC questionnaire, and the 12-item GHQ, an established tool for assessing psychological distress [12, 13]. Regression models for predicting SOC and distress were built using demographic, socioeconomic and behavioural determinants as explanatory variables.

Methods

The cross-sectional study was carried out among medical students at 1–5 years, at the Faculty of Medicine of the University of Debrecen, Hungary in 2007. The sampling frame consisted of medical students studying in Hungarian, divided into nine groups for each year ($n = 976$). Information on the number of students, gender distribution and study schedule of groups was provided by the Department of Education. One study group from each study year was randomly selected, providing a total of 100 students in the sample (10.3% of the sampling frame). Each group included 22 students on average. Interns completing their 6th year were excluded from the study as they follow individual rotations in various hospitals and could not be randomly sampled. Ethical permission for the study (DEOEC RKEB/IKEB: 2506–2006) was issued by the Commission on Research Ethics of the Medical and Health Science Centre of the University of Debrecen, Hungary.

Data collection

Each student of the selected study groups was personally invited after class by one of the junior authors to fill the paper-based, self-administered, anonymous questionnaire. The students were informed in writing and in person that participation was voluntary.

Questionnaire domains

The questionnaire included domains on mental health (see below), perceived health, demographic (age, gender, residence) and socioeconomic (parents' educational level) data, social support, as well as health behaviour: physical activity, diet, body weight and height, sexual behaviour, smoking, and alcohol and drug use. Items on substance use including sedative use without a prescription were adapted from the questionnaire of the European School Survey Project on Alcohol and Other Drugs (ESPAD) [11, 21]. Items not referred to separately were taken from the tool of the Hungarian National Health Interview Survey (HNHIS) of 2003 [20]. Social support was measured in the HNHIS and in our survey by the Hungarian version of the Health and Lifestyle Survey and Health Survey for England [16].

Mental health

Sense of coherence

The abbreviated form (SOC-13) was used in the present survey that had earlier been validated in Hungarian [3]. This version of the scale includes 13 items answerable on a Likert scale from 1 to 7. The confirmed correlated three-factor structured scale includes highly interrelated latent factors of meaningfulness (four items), comprehensibility (five items) and manageability (four items) [14]. However, subscales were not used during our analysis, only total scores varying between 13 and 91. A higher score indicates a stronger level of SOC.

Psychological distress: general health questionnaire

The GHQ is used to assess the respondent's current state and whether that differs from his/her usual state, helping to

detect psychiatric disorders in the general population. The 12-item version of the GHQ with a Likert scale from 1 to 4 as a case detector scored in the simplest manner is as useful as the longer versions and other established methods [13]. Scoring in the present survey was done according to the usual (0-0-1-1) method; therefore, scores ranged between 0 and 12. The threshold indicating notable psychological distress (score above 4) in medical students was identical to that used in the Hungarian National Health Interview Survey of 2003 [19] to make the comparison of the two data sets possible.

Statistical methods

Questionnaires were coded by study years. Data were recorded electronically in an Internet-based questionnaire that loaded the data in an MS Access 2002 database. Intercooled Stata 9.0 for Windows was used for data analysis.

For sense of coherence, psychological distress (GHQ), and social support a total score was calculated and used for analysis. Scores for SOC and psychological distress (GHQ) were stratified by gender, and the means were compared by the two-sample unpaired *t* test.

Correlation between SOC and perceived health was characterized by Spearman's rank correlation coefficient, whereas correlation between SOC and GHQ score was characterized by pairwise correlation. Models for SOC and distress (GHQ) were built by performing backward stepwise linear regression including those explanatory variables in the model that showed significant correlation with these two outcome variables in a previous correlation analysis. Categorical explanatory variables were turned into dummy variables in the model. Tests for normality and homoscedasticity justified the use of linear regression. Considering the relatively small sample size, significance level was set at 0.01.

We compared our results with those of the Hungarian National Health Interview Survey of 2003. We used the two-sample unpaired *t* test to compare the means, and the two-sample test of proportion to compare proportions.

Results

Basic demographics

Of the 100 students in the five study groups, 89 were present at the after-class time of data collection. Of them, 81 students completed the questionnaires (response rate 81%). All questionnaires were eligible for evaluation, but not all answers were completed in each questionnaire. Therefore, response rates are given separately for each question.

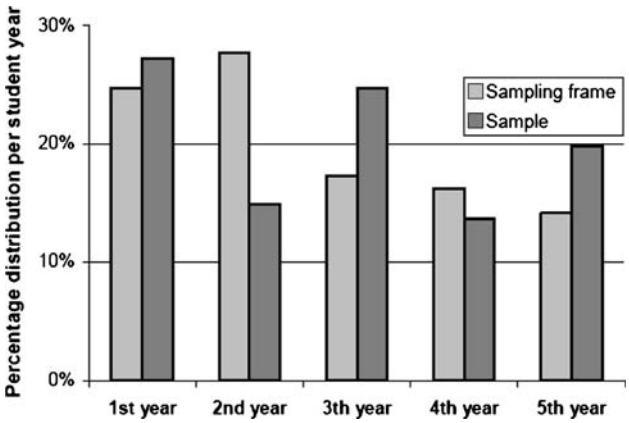

Fig. 1 Distribution of the sample and sampling frame by study year

Of the students, 43% were male and 57% were female, constituting a representative sample by gender of medical students (40% male, 60% female, $P = 0.570$). Representation based on the study year is shown in Fig. 1.

Mean age in the sample was 22 years (19–27 years), with 57% of them between 20 and 22 years of age (response rate: 97.5%). The mean age of the sampling frame could not be calculated due to data protection issues. Of the respondents, 65% had mothers with their highest education being a college degree, 28% of the students had high school graduate mothers, and 6% of had mothers with vocational training. As much as 53% of the students had college-educated fathers, and in equal proportion (23.5–23.5%) high school graduate fathers and fathers with vocational training, respectively.

Mental health status

The mean score for SOC was 62.5 (standard deviation (SD): 9.95, minimum 27, maximum 81). The mean score of males was 5.6 points lower than that of females ($P = 0.012$).

The mean score of psychological distress (GHQ) was 2.15 (SD: 2.69) ranging between 0 and 11, without significant difference between males and females. Of the students, 18.5% scored above the threshold (4 points) indicating notable mental problems.

As much as 75% of the students reported no lack of social support, 17.5% lacked somewhat and 7.5% severely lacked social support (99% response rate). Male students scored on average 0.87 points lower on the scale measuring social support than females ($P = 0.016$).

Correlation analysis

Correlation analysis revealed significant correlation between SOC and perceived health (Spearman's rho:

0.345, P: 0.002) as well as between SOC and distress measured by the GHQ (correlation coefficient: −0.522, $P < 0.001$). The negative correlation between SOC and GHQ is explained by the fact that a high SOC score is related to a strong sense of coherence, whereas a low GHQ score points to good mental health.

Pairwise correlation was carried out for all variables. Those showing a significant correlation ($P < 0.05$) with SOC or distress (GHQ) were selected for inclusion in the model described below.

Models for predicting sense of coherence and psychological distress

Regression models for estimating SOC and distress measured by GHQ were performed including those health determinants that were selected in the above-described correlation analysis.

Backward stepwise estimation for SOC resulted in the model shown in Table 1. According to our estimation, psychological distress and the use of sedative without medical prescription are inversely related to the SOC score, one unit increase of these leading to a decreased score of SOC by the value B. On the other hand, social support and female gender are positively correlated with SOC. Other explanatory variables included in the original model, such as perceived health, sedative use with medical prescription, population size of permanent residence and body mass index were dropped from the final model. Considering the gender difference in SOC and social support, interaction between gender and social support was tested but not found.

Table 1 Model for the estimation of sense of coherence

Explanatory variable	B (coeff)	P value	Confidence interval
Psychological distress (GHQ)	−1.67	<0.001	−2.26; −1.07
Sedative w/o prescription in the past month	−21.72	<0.001	−31.59; −11.86
Social support	1.73	0.001	0.73; 2.73
Gender (female compared to male)	4.48	0.008	1.21; 7.75

Table 2 Model for the estimation of psychological distress scored by GHQ

Explanatory variable	B (coeff)	P value	Confidence interval
Sense of coherence	−0.12	<0.001	−0.17; −0.06
Population size of permanent residence	−0.69	0.006	−1.18; −0.21

Backward stepwise estimation for distress measured by GHQ resulted in the model shown in Table 2. According to our estimation, sense of coherence, as expected, was a strong explanatory variable for psychological distress: one unit increase of SOC forecasting a decrease in the GHQ score by 0.12 points. Increasing population size of permanent residence results in a 0.69 point improvement in distress (lower GHQ revealing lower distress). Other explanatory variables included in the original model, namely age and gender were dropped from the final model.

Conclusion

Nearly one-fifth of the students scored above threshold on the scale measuring psychological distress (GHQ), indicating notable mental problems. According to our model, psychological distress and the use of sedative without medical prescription are negatively related to SOC, whereas social support and female gender are in positive correlation with SOC. A mean score for SOC of 62.5 was found in our study, which was significantly lower in males compared to females. Moreover, SOC was a strong explanatory variable for psychological distress and was also related to perceived health.

Mental health of medical students

Various versions of the GHQ were used to assess mental health of medical students. According to a case control study at Edinburgh University, a total of 17% of first-year medical students had symptoms of psychological morbidity, similar to that found in first-year non-medical students using the 60-item General Health Questionnaire [4]. Prevalence of psychiatric morbidity assessed by the 28-item General Health Questionnaire was 26% in final year medical students in Australia, which was higher than that in the general population [32].

The overall prevalence of psychological morbidity was 20.9% among undergraduate medical students in Nepal using the GHQ-12 [26]. All these studies found similar or higher prevalence of notable psychological distress among medical students than in our study (18.5%), although a direct comparison with studies that used different versions of the GHQ require caution. A study among medical and dental students in Nigeria using GHQ-12 found a mean score of 1.66 (SD: 2.22) [18] that was not significantly different from the mean of GHQ-12 in our study (2.15, SD:2.69; P:0.061).

SOC can also be used for characterizing mental health status though it has not been as widely used as GHQ. Only one study was published on Finnish students of medicine according to which the mean score for SOC was

Table 3 Comparison of some health measures of the present survey and the same age group (19–27 years) of the Hungarian National Health Interview Survey 2003

	Present survey (19–27 years)	National Health Interview Survey 2003 (19–27 years)	*P* value
Perceived health is very good or good (% of respondents)	74	77	0.502
Mean score of GHQ	2.15	1.36	0.009
Above the threshold on GHQ (% of respondents)	18.5	10.5	0.028
No lack of social support (% of respondents)	75	68	0.198

62.6 at graduation [30], remarkably close to the mean score found in our study. SOC could be a potential tool for assessing the risk of psychological morbidity among medical professionals, since poor SOC (low score) was found to be associated with a wide range of psychiatric disorders in young Finnish males [24]. It as also shown to correlate strongly with distress as measured by GHQ-12 [15], similarly to our finding. SOC also strongly correlated with perceived health in our sample, in agreement with other studies [10, 31].

Mental health of medical students compared to peer groups

Comparison of medical students with other groups of similar age revealed that medical students had a higher level of stress and depression than other, non-medical undergraduates [33] or peers not in higher education [32]. In order to check how the mental health of medical students in Hungary compares with their non-student peers, we collated our data with data of the same age non-student group (19–27 years) of the National Health Interview Survey 2003, in which identical tools were used for the variables shown in Table 3. The mean score for psychological distress in our sample of medical students was found to be significantly higher, indicating worse mental status compared to that in the similar age group of the general population. Correspondingly, the proportion of students with above-threshold (>4 points) scores was higher than that of the similar age group in the National Health Interview Survey 2003 as shown in Table 3.

A potential source of bias might be attributed to the fact that our data were collected in the first week of the spring semester, subsequent to the 6-week-long winter exam period. Questions of the GHQ related to the preceding weeks potentially overestimated the mean GHQ score. However, the fact that 76% more medical students scored above threshold in terms of psychological distress compared to their peers warrants further attention.

We present the first models, to our best knowledge, for estimating SOC and psychological distress in medical students. The robustness of our conclusions is supported by strong significance levels in our relatively small, but representative, sample of medical students of a Hungarian university. Our models might be helpful for the estimation of mental well-being among medical personnel. Further research should answer additional questions such as the role of personality versus workload in the development of mental health problems of physicians. Identification of those with mental problems prior to matriculation, early and at later time points in training would facilitate development and targeting of interventions at those at highest risk.

Acknowledgments The authors express their gratitude to Zsuzsanna Kéky, statistician of the National Centre for Healthcare Audit and Inspection for providing the age-specific data of the National Health Interview Survey of 2003; to Ágota Örkényi of the National Institute of Child Health for information on the analysis of the General Health Questionnaire domain in the National Health Interview Survey of 2003; and to András Keszei for advice on statistical analysis. Funding was provided by the NKFP1-00003/2005 project of the Ministry of Education, Hungary.

Ethical permission Ethical permission for the study (DEOEC RKEB/IKEB: 2506-2006) was issued by the Commission on Research Ethics of the Medical and Health Science Centre of the University of Debrecen, Hungary.

References

1. Antonovsky A (1987) Unraveling the mystery of health: how people manage stress and stay well, 1st edn. Jossey-Bass, San Francisco
2. Assadi SM, Nakhaei MR, Najafi F, Fazel S (2007) Mental health in three generations of Iranian medical students and doctors: a cross-sectional study. Soc Psychiatry Psychiatr Epidemiol 42:57–60
3. Balajti I, Vokó Z, Ádány R, Kósa K (2007) A rövidített koherencia-érzés és az általános egészség (GHQ) kérdőívek magyar nyelvű változatának validálása (Validation of the Hungarian versions of the abbreviated sense of coherence (SOC) scale and the general health questionnaire (GHQ)). Mentálhigiéné és Pszichoszomatika (J Ment Health Psychosom) 8:147–161
4. Carson AJ, Dias S, Johnston A, McLoughlin MA, O'Connor M, Robinson BL, Sellar RS, Trewavas JJ, Wojcik W (2000) Mental health in medical students: a case control study using the 60-item general health questionnaire. Scott Med J 45:115–116
5. Center C, Davis M, Detre T, Ford DE, Hansbrough W, Hendin H, Laszlo J, Litts DA, Mann J, Mansky PA, Michels R, Miles SH, Proujansky R, Reynolds CF 3rd, Silverman MM (2003) Confronting depression and suicide in physicians: a consensus statement. JAMA 289:3161–3166
6. Chew-Graham CA, Rogers A, Yassin N (2003) 'I wouldn't want it on my CV or their records': medical students' experiences of help-seeking for mental health problems. Med Educ 37:873–880

7. Dahlin M, Joneborg N, Runeson B (2005) Stress and depression among medical students: a cross-sectional study. Med Educ 39:594–604
8. Dunn LB, Moutier C, Green Hammond KA, Lehrmann J, Roberts LW (2008) Personal health care of residents: preferences for care outside of the training institution. Acad Psychiatry 32:20–30
9. Eriksson M, Lindström B (2005) Validity of Antonovsky's sense of coherence scale: a systematic review. J Epidemiol Community Health 59:460–466
10. Eriksson M, Lindström B (2006) Antonovsky's sense of coherence scale and the relation with health: a systematic review. J Epidemiol Community Health 60:376–381
11. European School Survey Project on Alcohol and Other Drugs (ESPAD) Student questionnaire (2003). Available from: http://www.espad.org/documents/Espad/Documents/ESPAD_Questionnaire_2003.pdf. Accessed 20 March 2009
12. Goldberg DP, Blackwell B (1970) Psychiatric illness in general practice: a detailed study using a new method of case identification. Br Med J 1:439–443
13. Goldberg DP, Gater R, Sartorius N, Ustun TB, Piccinelli M, Gureje O, Rutter C (1997) The validity of two versions of the GHQ in the WHO study of mental illness in general health care. Psychol Med 27:191–197
14. Hakanen JJ, Feldt T, Leskinen E (2007) Change and stability of sense of coherence in adulthood: longitudinal evidence from the healthy child study. J Res Pers 41:602–617
15. Matsuzaki I, Sagara T, Ohshita Y, Nagase H, Ogino K, Eboshida A, Sasahara S, Nakamura H (2007) Psychological factors including sense of coherence and some lifestyles are related to general health questionnaire-12 (GHQ-12) in elderly workers in Japan. Environ Health Prev Med 12:71–77
16. Meltzer H, Gill B, Petticrew M, Hinds K (1995) The prevalence of psychiatric morbidity among adults living in private households: OPCS Surveys of Psychiatric Morbidity in Great Britain. Report 1. HMSO, London
17. North CS, Ryall JE (1997) Psychiatric illness in female physicians: are high rates of depression an occupational hazard? Postgrad Med 101:233–236, 239–240, 242
18. Omigbodun OO, Odukogbe AT, Omigbodun AO, Yusuf OB, Bella TT, Olayemi O (2006) Stressors and psychological symptoms in students of medicine and allied health professions in Nigeria. Soc Psychiatry Psychiatr Epidemiol 41:415–421
19. Örkényi Á (2005) Lelki egészség (Mental health). Országos Lakossági Egészségfelmérés 2003 (Hungarian National Health Interview Survey 2003). Országos Epidemiológiai Központ
20. Országos Lakossági Egészségfelmérés 2003 (Hungarian National Health Interview Survey 2003) Önkitöltős kérdőív (Self-administered questionnaire). (2003) Országos Epidemiológiai Központ
21. Paksi B (2006) A budaörsi diákok alkohol- és drogfogyasztása, valamint dohányzása Kutatási jelentés. (Alcohol, drug use and smoking among students from Budaörs. Research report). Viselkedéskutató Társadalomtudományi és Szolgáltató Kft Available from: http://www.ndi-szip.hu/KefWeb/Controls/DownloadOrgAttach.aspx?attId=f6b9fa34-5f17-4810-9b7c-444b57cb26e2. Accessed 20 March 2009
22. Petersen MR, Burnett CA (2008) The suicide mortality of working physicians and dentists. Occup Med (Lond) 58:25–29
23. Prince M, Patel V, Saxena S, Maj M, Maselko J, Phillips MR, Rahman A (2007) No health without mental health. Lancet 370:859–877
24. Ristkari T, Sourander A, Ronning J, Helenius H (2006) Self-reported psychopathology, adaptive functioning and sense of coherence, and psychiatric diagnosis among young men: a population-based study. Soc Psychiatry Psychiatr Epidemiol 41:523–531
25. Schernhammer ES, Colditz GA (2004) Suicide rates among physicians: a quantitative and gender assessment (meta-analysis). Am J Psychiatry 161:2295–2302
26. Sreeramareddy CT, Shankar PR, Binu VS, Mukhopadhyay C, Ray B, Menezes RG (2007) Psychological morbidity, sources of stress and coping strategies among undergraduate medical students of Nepal. BMC Med Educ 7:26
27. Tyssen R (2007) Health problems and the use of health services among physicians: a review article with particular emphasis on Norwegian studies. Ind Health 45:599–610
28. Tyssen R, Rovik JO, Vaglum P, Gronvold NT, Ekeberg O (2004) Help-seeking for mental health problems among young physicians: is it the most ill that seeks help? A longitudinal and nationwide study. Soc Psychiatry Psychiatr Epidemiol 39:989–993
29. Tyssen R, Vaglum P (2002) Mental health problems among young doctors: an updated review of prospective studies. Harv Rev Psychiatry 10:154–165
30. Virtanen P, Koivisto AM (2001) Well-being of professionals at entry into the labour market: a follow-up survey of medicine and architecture students. J Epidemiol Community Health 55:831–835
31. von Bothmer MI, Fridlund B (2003) Self-rated health among university students in relation to sense of coherence and other personality traits. Scand J Caring Sci 17:347–357
32. Willcock SM, Daly MG, Tennant CC, Allard BJ (2004) Burnout and psychiatric morbidity in new medical graduates. Med J Aust 181:357–360
33. Yiu V (2005) Supporting the well-being of medical students. CMAJ 172:889–890