A comparison of the CONOR Mental Health Index to the HSCL-10 and HADS

Measuring mental health status in The Oslo Health Study and the Nord-Trøndelag Health Study

Anne Johanne Søgaard[1], Ingvar Bjelland[2], Grethe S. Tell[2] and Espen Røysamb[1]

1) Norwegian Institute of Public Health, Oslo, Norway
2) Department of Public Health and Primary Health Care, University of Bergen, Norway

Correspondence: Anne Johanne Søgaard, Norwegian Institute of Public Health PO. Box 4404, NO-0403 Oslo, Norway
Telephone: +47 23 40 81 87   Telefax: +47 23 40 82 60   E-mail: ajso@fhi.no

ABSTRACT

Background: Cohort Norway (CONOR) containing blood samples and standardised health and exposure variables of about 170,000 subjects, is based on data from health surveys in different parts of Norway. In all participants mental distress is measured by seven questions modified after various mental health measurement instruments. The purpose of the present study was to examine the agreement between these questions – called the CONOR Mental Health Index (CONOR-MHI), and two previously validated instruments; namely the Hopkins Symptom Check List (HSCL-10) and the Hospital Anxiety and Depression Scale (HADS).
Methods: The CONOR populations used for these comparisons were the Oslo Health Study and the Nord-Trøndelag Health Study. In this paper all participants aged 30, 40, 45, 59-60 and 75-76 years were included – that is 18,770 and 7,014 for the two studies, respectively. Internal consistency was estimated for HADS, HSCL-10 and the CONOR-MHI and factor analysis was performed for the latter. Correlations, also corrected for attenuation, between CONOR-MHI and the two others, were calculated. Different cut-off values for the CONOR-MHI were computed, based on prevalence estimates for depression/ anxiety measured by HADS (cut-off ≥ 8) and mental distress measured by HSCL-10 (cut-off ≥ 1.85). AUC (Area Under Curve) from ROC analysis were also calculated, examining the efficiency of CONOR-MHI as a test for caseness of HADS-anxiety, HADS-depression and HSCL-10, respectively.
Results: The internal consistency of the CONOR Mental Health Index was high in both data sets (Cronbach alpha ≥ 0.8). The CONOR-MHI was highly correlated with scores on total HADS and HSCL-10 (r ≥ 0.7, corrected for attenuation r ≥ 0.8). A cut-off value of 2.15 for the CONOR-MHI was determined. This cut-off value corresponded to a prevalence of mental distress of 11.3% in Oslo and 7.2% in Nord-Trøndelag. The sensitivity was low to moderate, and the specificity was high for CONOR-MHI cut-off ≥ 2.15 when using mental distress (HSCL-10), anxiety (HADS-A) or depression (HADS-D) as gold standard. ROC-curves for CONOR-MHI versus HSCL-10 resulted in AUC at 0.902, whereas the corresponding AUC for CONOR-MHI versus HADS anxiety and depression resulted in AUC's at 0.909 and 0.840, respectively.
Conclusion: We suggest that the CONOR Mental Health Index composed of the seven questions on mental distress in CONOR, is a valuable and valid tool in epidemiological research.

Key words: Mental distress, Hopkins Symptom Check List, Hospital Anxiety and Depression Scale, Cohort Norway, CONOR-MHI, The Oslo Health Study, The Nord-Trøndelag Health Study

INTRODUCTION

A considerable number of questionnaires and instruments have been developed in order to measure mental distress in populations (1). The ideal instrument would be comprehensive, psychometrically sound, brief, easy to complete, valid and reliable in different population groups regardless of age, sex, socio-economic status, language and cultural background (2). Cohort Norway (CONOR) (3,4), containing blood samples, standardised health and exposure variables of about 170,000 subjects (as of August 2003), is based on data from health surveys in different parts of Norway. In all participants mental distress is measured by a seven

single item question, the CONOR Mental Health Index (CONOR-MHI), modified after various mental health measurement instruments. However, in order to justify use of this index as a measure of mental distress in epidemiological research, it should be compared to previously validated instruments.

Thus, the purpose of the present study was to examine the agreement between the CONOR-MHI and two previously validated instruments; namely the 10-item version of the Hopkins Symptom Check List (HSCL-10) and the Hospital Anxiety and Depression Scale (HADS). The CONOR populations used for these comparisons were the Oslo Health Study (HUBRO) and the Nord-Trøndelag Health Study (HUNT).

METHODS

Data materials

COhort NORway (CONOR)

CONOR is a collaboration between several population-based surveys in Norway (3,4). Data collection follows a standard procedure and is carried out as a collaboration between the National Health Screening Service, Oslo (now Norwegian Institute of Public Health) and the four universities in Norway. Both HUBRO and HUNT are part of CONOR, and both surveys contain the common set of 44 CONOR-questions (5) – including seven questions on mental health (CONOR-MHI).

The Oslo Health Study (HUBRO)

To compare mental distress measured by CONOR-MHI and HSCL-10 we used data from the Oslo Health Study (6,7), a population-based survey conducted in 2000/2001 inviting all inhabitants of Oslo aged 30, 40, 45, 59-60 and 75-76 years. A letter of invitation, containing an information brochure and the main questionnaire, was mailed two weeks prior to the appointment at the screening station. At the screening station a simple clinical examination was conducted. In addition, the main questionnaire was handed in and the participants were given two supplementary questionnaires, which they were requested to fill in at home and return by mail in pre-addressed stamped envelopes. (More details about HUBRO as well as the wording of the questionnaires can be found at HUBRO's web-site (6). Of the 40,888 persons invited, a total of 18,770 individuals (46%) participated. Through linkage to Statistics Norway there was found that the impact of self-selection had minor impact on prevalence estimates of selected risk factors and self-reported health/disease. Unhealthy persons, indicated by receiving disability benefit, attended to a lesser degree than healthy individuals. Social inequality in health by different sociodemographic variables seemed, however, unbiased (7).

The Nord-Trøndelag Health Study (HUNT)

Data from the Nord-Trøndelag Health Study (8) were used to compare anxiety and depression measured by the CONOR-MHI with HADS. All inhabitants aged 20 years and above in the 24 municipalities of Nord-Trøndelag were in 1995-97 invited to participate in the study. The procedures applied were very much the same as in HUBRO. Of 92,100 eligible subjects aged 20-89 years, 65,648 (71.3%) participated in the study. However, to make the results from the two studies more comparable, the same age groups as in HUBRO were selected for the analyses.

Mental health measurement instruments

CONOR Mental Health Index (CONOR-MHI)

The seven CONOR-questions on various aspects of mental distress, CONOR-MHI, are partly modified from the General Health Questionnaire-GHQ (9) and the Hopkins Symptom Check List – HSCL (10), and partly taken from other health surveys.

In HUNT the CONOR-MHI was included in the main questionnaire posted together with the letter of invitation, whereas in HUBRO it was included in the first supplementary questionnaire, handed out at the screening station. The CONOR-MHI is shown in frame 1. Each question has four answer categories, ranging from "no" to "very", which are given the values 1-4. Thus, the index based on all seven questions ranges from 7-28. The average CONOR-MHI score is calculated by dividing the total score on seven (number of items). Missing values are replaced with the sample mean value for each item. Records with two or more missing items are, however, excluded.

Frame 1. CONOR Mental Health Index (CONOR-MHI).

Have you, in the course of the last two weeks, felt:
(Cross off for each line)
(Categories: No, A little, Quite a bit, Very)

Nervous and unsettled?
Troubled by anxiety?
Secure and calm?
Irritable?
Happy and optimistic?
Sad/depressed?
Lonely?

Hopkins Symptom Check List

The Hopkins Symptom Check List (HSCL) (Frame 2) is a widely used, self-administered instrument designed to measure psychological distress in population surveys (10). This symptom rating scale has undergone several major revisions and minor alternations since 1954, when it was titled the Discomfort Scale. It was developed primarily to measure symptom changes in patients undergoing psychotherapy (11), but has also been utilised as a criterion measure in psychotropic drug trials (12). First of all the instrument has been used as a symptom measure with psychiatric outpatients, but inpatient studies have also shown it to be a sensitive measure of treatment response. Among outpatient conditions, a large proportion of cases falls in the category of anxiety states and depressive neuroses. Derogatis and co-authors (10) have presented psychometric properties and data from normative samples.

The basic HSCL instrument had 58 items, but has later been extended into a version with 90 items, and reduced into shorter versions with 35-, 25-, 10- and 5 items. Comparisons of different versions of the HSCL indicate that the shorter versions perform almost as well as the full version (2). The HSCL-10 consists of 10 items on a 4-point scale ranging from 'not at all' to 'extremely'. The average HSCL-10 score is calculated

by dividing the total score by ten (number of items). Missing values are replaced with the sample mean value for each item. Records with three or more missing items are, however, excluded. By this procedure the number of subjects with valid ratings was 17,392, of which 45.2% were males. In HUBRO the HSCL-10 was included in the main questionnaire. The first four items were used in a subscale HSCL-A (anxiety) and the six last items in a subscale HSCL-D (depression).

Frame 2. Hopkins Symptom Check List (HSCL-10)*.

Listed below are some symptoms or problems that people sometimes have. Please read each one carefully and decide how much the symptoms bothered or distressed you during the last week, including today? (*Place a check in the appropriate column*) (Categories: Not at all, A little, Quite a bit, Extremely)

Suddenly scared for no reason
Feeling fearful
Faintness, dizziness, or weakness
Feeling tense or keyed up
Blaming yourself for things
Difficulties falling asleep or staying asleep
Feeling blue
Feeling of worthlessness
Feeling everything is an effort
Feeling hopeless about the future

* This is the original wording. The English translation of the questionnaire in HUBRO, used by a few individuals, had a slightly other wording of some of the questions.

Hospital Anxiety and Depression Scale (HADS)

The Hospital Anxiety and Depression Scale is a self-administered questionnaire consisting of 14 items, seven for anxiety (HADS-A subscale) and seven for depression (HADS-D subscale), each scored from 0 to 3 on a Likert scale formulated in readily understandable language (13). The items are quoted in frame 3. In HUNT the HADS questions were included in the main questionnaire enclosed in the invitation letter.

To increase acceptability and to preclude that individuals feel tested for mental disorders, symptoms of severe psychopathology are not included. HADS-A contains items mainly concerned with restlessness and worry, as in generalised anxiety disorder, plus one item on panic attacks. HADS-D focuses mainly on the reduced pleasure response aspect (anhedonia) of depression, as well as psychomotor retardation and depressed mood. With a categorical approach, a cut-off value of ≥ 8 in both sub-scales has demonstrated optimal screening properties in identifying anxiety disorders and major depressive disorder, yielding sensitivities and specificities of approximately 0.80 (13). The two-dimensional nature of HADS has been demonstrated by several factor analytic studies (13), as well as in the HUNT population where the factors were identical with the sub-scales (14). In the selected

age groups a total of 7,014 individuals participated. Valid ratings of the anxiety and depression sub-scales were defined as at least five completed items on HADS-A and HADS-D, respectively. For those who filled in five or six items, the score was based on the sum of completed items multiplied with 7/5 or 7/6, respectively. By this procedure (15) the number of subjects with both valid HADS-A and HADS-D ratings were 6,574, of which 47.8% were males.

The results did not change when using HADS scores achieved by the same procedure concerning missing data as described for HSCL-10.

Frame 3. Hospital Anxiety and Depression Scale (HADS).

Here are some more questions regarding how you feel. For each question, please check one of the four answers that best describes your feelings during the last week. Don't take too long thinking about the answer, the more spontaneous answers are the best. (There are different sets of answers for each question)

HADS-A:
I feel tense or "wound up"
I get a sort of frightened feeling as if something awful is about to happen
Worrying thoughts go through my mind
I can sit and feel relaxed
I get a sort of frightened feeling like "butterflies" in the stomach
I feel restless as if I have to be on the move
I get sudden feelings of panic

HADS-D:
I still enjoy the things I used to enjoy
I can laugh and see the funny side of things
I feel cheerful
I feel as if I am slowed down
I have lost interest in my appearance
I look forward with enjoyment to things
I can enjoy a good book or radio or TV programme

Statistical analyses

Internal consistency was assessed for HADS, HSCL-10 and the CONOR questions by Cronbach alpha. In addition, possible latent factors of the CONOR questions were assessed by factor analysis (principal component extraction). Pearson correlation was calculated between the validated instruments and the corresponding subscales, and CONOR-MHI. In addition to the ordinary correlations between the indexes, we also calculated corresponding correlations corrected for attenuation. Because of measurement error, each item is imperfectly correlated with the underlying factor it is assumed to measure. Thus, the theoretical correlation between two indexes is greater than the observed raw correlation. To correct for this attenuation of the correlation we used the formula $r_{corrected} = r_{ordinary} / \sqrt{alpha_{index\ a} * alpha_{index\ b}}$ (16).

Finally, we wanted to examine whether a valid cut-off value for the CONOR-MHI could be determined. We chose cut-off points that resulted in approximately the same prevalence estimates for mental distress as did HADS and HSCL-10. Sensitivity and specificity were calculated for different cut-off values of CONOR-MHI for both HADS subscales and HSCL-10. We also calculated AUC (Area Under Curve) from a ROC analysis examining the efficiency of CONOR-MHI as a test for caseness of HADS-anxiety, HADS-depression and HSCL-10, respectively. AUC is independent of the chosen cut-off value.

RESULTS

The number of participants, the percentage answering the questions constituting HADS, HSCL-10 and CONOR-MHI and the percentage excluded because of missing answers, are presented in table 1.

Comparing HSCL-10 with the CONOR-MHI

The correlation between HSCL-10 and the CONOR-MHI was r=0.70. Calculating internal consistency resulted in Cronbach alpha=0.81 for CONOR-MHI (table 1), but the factor analyses with all the seven questions gave two factors with eigenvalues above 1. All the negative statements loaded on factor 1 with an eigenvalue=3.415, while the two positive statements "Secure and calm" and "Happy and optimistic" loaded on factor 2 (eigenvalue 1.009). Separate factor analyses for men and women gave two factors for men and one for women. Hence, due to the borderline eigenvalue of the second factor, the absence of a second

factor in women and in the HUNT-sample (presented later), and the high alpha-value of the seven items, we decided to use a seven-item mental health index. The correlation coefficients between the subscales HSCL-A and HSCL-D – and the CONOR-MHI were lower than for the total HSCL-10 (table 2). By correcting for attenuation, the correlations increased for all the calculated coefficients (table 2).

Given a cut-off of ≥ 1.85 for HSCL-10 (2) the prevalence of mental distress was 10.5%. To obtain comparable prevalence estimates of mental distress measured by the CONOR-MHI, the cut-offs were set to ≥ 2.10, ≥ 2.15 and ≥ 2.20, respectively (table 3). A cut-off of ≥ 2.15 for CONOR-MHI resulted in a prevalence of 11.3 for mental distress. ROC-curves for CONOR-MHI versus HSCL resulted in AUC at 0.902 (table 3).

Comparing HADS with the CONOR-MHI

All the CONOR mental health items loaded on the same factor, and the eigenvalue for CONOR-MHI was 3.492. As for the analyses in HUBRO, the Cronbach alpha value was high for CONOR-MHI (table 1). The correlations between the HADS-scores and the CONOR-MHI are shown in table 2. The results for the HADS-total score and HADS-A were at the same level as for HSCL-10 (r ≥ 0.7), while HADS-D was somewhat weaker correlated with CONOR-MHI. Correction for attenuation resulted in stronger correlations (table 2). Given a cut-off of ≥ 8 for both subscales (13), the prevalence of anxiety disorders were 15.0% and depression 11.6% (there is no convention for a cut-off of HADS-total score). A cut-off of ≥ 2.15 for

Table 1. Number of participants in the predefined age groups in the Nord-Trøndelag- and the Oslo Health Study, percentage of these who filled in at least one of the mental health items, the percentage excluded due to missing answers on single items and Cronbach alpha for each index.

	Nord-Trøndelag Health Study			Oslo Health Study			
	HADS-A[1]	HADS-D[1]	CONOR-MHI	HSCL-10	HSCL-A[1]	HSCL-D[1]	CONOR-MHI
Number of participants in the predefined age groups [2]	7014	7014	7014	18746[3]	18746[3]	18746[3]	15282[4]
Percentage of the participants answering at least one of the questions in the individual index	97.9	97.7	95.4	95.7	94.1	95.7	97.4
Percentage[5] excluded in the final analyses because of missing answers on some of the items in CONOR-MHI	4.0	2.1	13.0	3.0	0.6	3.0	2.3
Cronbach alpha	.81	.76	.82	.89	.75	.86	.81

[1] Subscales: HADS: anxiety - HADS-A, depression - HADS-D; HSCL-10: anxiety - HSCL-A, depression - HSCL-D

[2] 30, 40, 45, 59/60, 75/76 years old

[3] Include some individuals answering the main questionnaire without attending

[4] The CONOR-questions were included in the first supplementary questionnaire – handed out at the screening station, returned by mail and answered by 84.2% of those attending (18,152). The percentage in the second line is based on the number answering the supplementary questionnaire (15282).

[5] Of those answering at least one of the questions in the separate index

CONOR-MHI resulted in a prevalence of 7.2% for mental distress. The results for other cut-offs and corresponding sensitivity and specificity are presented in table 3. Similar to the results from HUBRO, the sensitivities were moderate and specificities high for the CONOR-MHI. ROC-curves for CONOR-MHI versus HADS anxiety and depression resulted in AUC's at 0.909 and 0.840, respectively (table 3).

INTERPRETATION AND CONCLUSION

The internal consistency of the CONOR Mental Health Index was high in both data sets (Cronbach alpha $\geq$ 0.8). The CONOR-MHI was highly correlated with scores on total HADS and HSCL-10 (r $\geq$ 0.7, corrected for attenuation r $\geq$ 0.8). The correlations between CONOR-MHI and the subscales are of the same magnitude and the differences are small.

There was a difference in rates of excluded because of missing data on the CONOR-MHI between HUBRO (2.3%) and HUNT (13.0%). Both in HUNT and in HUBRO the exclusion rates as well as the participation rates were increasing by age. Thus we have no reason to believe that the higher missing rate in HUNT should be of any importance for the results. The problem of selection bias was probably more decisive concerning the total participation rate, which in HUBRO was 46%. This selection had, however, minor impact on prevalence estimates of selected risk factors and self-reported health, and most of the associations tested were found to be unbiased (7).

Anxiety and depression can be conceived as continuous phenomena (17), and indexes of mental health can be used as continuous scales representing different degrees of the underlying dimension. However, for some purposes the dichotomising of mental health indexes may be useful. With regard to the CONOR-MHI we suggest a cut-off value of 2.15. This value corresponds to a slightly higher prevalence estimate than that calculated based on the HSCL-10 in HUBRO, and a somewhat lower prevalence than that calculated based on the HADS in HUNT. Findings from the non-response analyses in HUBRO support the assumption that our prevalence estimate of 10.5% with mental distress (HSCL-10 $\geq$ 1.85) is a little too low. When weighted for the distribution of several background factors in the total invited population, the prevalence estimate of mental distress increased with less than one percent (7).

Our chosen cut-off value corresponds to a prevalence of mental distress at 7.2% in Nord-Trøndelag. When mental distress was measured with HSCL-10

Table 2. Pearson correlation coefficients – uncorrected and corrected for attenuation, between HSCL-10, HADS-total, corresponding subscales for anxiety and depression – and the CONOR Mental Health Index (CONOR-MHI).

	HSCL-10	HSCL-A	HSCL-D	HADS-total	HADS-A	HADS-D
CONOR-MHI [1]	.70	.61	.67	.76	.74	.60
CONOR-MHI [2]	.82	.78	.81	.91	.91	.76

[1] Pearson correlation coefficient

[2] Pearson correlation coefficient, corrected for attenuation

Table 3. CONOR Mental Health Index (CONOR-MHI) used as a test[1] for caseness of HADS-anxiety, HADS-depression and HSCL-10, respectively.

	Prevalence of mental distress (%)	Sensitivity (%)	Specificity (%)	AUC[2]
HADS-A (cut-off $\geq$ 8) (HUNT)				.909
CONOR-MHI (cut-off $\geq$ 2.10)	9.2	48	97	
CONOR-MHI (cut-off $\geq$ 2.15)	7.2	41	98	
CONOR-MHI (cut-off $\geq$ 2.20)	7.1	41	98	
HADS-D (cut-off $\geq$ 8) (HUNT)				.840
CONOR-MHI (cut-off $\geq$ 2.10)	9.2	44	95	
CONOR-MHI (cut-off $\geq$ 2.15)	7.2	38	96	
CONOR-MHI (cut-off $\geq$ 2.20)	7.1	37	96	
HSCL-10 (cut-off $\geq$ 1.85) (HUBRO)				.902
CONOR-MHI (cut-off $\geq$ 2.10)	14.5	69	92	
CONOR-MHI (cut-off $\geq$ 2.15)	11.3	66	95	
CONOR-MHI (cut-off $\geq$ 2.20)	10.8	59	95	

[1] At cut-offs CONOR-MHI $\geq$ 2.10, $\geq$ 2.15 and $\geq$ 2.20.

[2] Area Under Curve in a ROC analysis demonstrating the efficiency of CONOR-MHI as a test for caseness of HADS-anxiety, HADS-depression and HSCL-10 mental distress, respectively. AUC is independent of the chosen cut-off value.

 (symptoms during *last 2* week) in a large sub-sample of about 50,000 in the same HUNT study, the prevalence (HSCL10 ≥1.85) was 6.5% in the same age groups as we have used in our analyses (K. Tambs, personal communication). Our finding of a different prevalence of mental distress in the city of Oslo (11.3%) than in the less densely populated Nord-Trøndelag (7.2%), is in accordance with other studies reporting a higher prevalence of mental distress in Oslo compared to other parts of Norway (18), and international studies reporting higher prevalence in urban compared to rural areas (19).

We suggest that the CONOR Mental Health Index composed of the seven questions on mental distress in CONOR, is a valuable and valid tool in epidemiological research comparing different groups, and analysing changes across time. The index can be used as a continuous scale representing different degrees of symptom severity or as a categorical measure for mental distress.

ACKNOWLEDGEMENT

REFERENCES

1. McDowell I, Newell C. Measuring health. A guide to rating scales and questionnaires, 2nd edn. New York: Oxford University Press, 1996.
2. Strand BH, Dalgard OS, Tambs K, Rognerud M. Measuring the mental health status of the Norwegian population: a comparison of the instruments SCL-25, SCL-10, SCL-5 and MHI-5 (SF-36). *Nordic J Pschychiatry* 2003; **57**: 113-8.
3. Engeland A, Søgaard AJ. CONOR (COhort NORway) – en oversikt over en unik forskningsdatabank. *Nor J Epidemiol* 2003; **13**: 73-7.
4. Magnus P, Arnesen E, Holmen J, Stoltenberg C, Søgaard AJ, Tell GS. CONOR (COhort NORway): historie, formål og potensiale. *Nor J Epidemiol* 2003; **13**: 79-82.
5. The Cohort of Norway (CONOR) [http://www.fhi.no/tema/conor/index.html].
6. The Oslo Health Study (HUBRO) [http://www.fhi.no/tema/helseundersokelse/oslo/index.html].
7. Søgaard AJ, Selmer R, Bjertness E, Thelle D. The Oslo Health Study. The impact of self-selection in a large, poulation-based survey (submitted).
8. The Nord-Trøndelag Health Study (HUNT) [http://www.hunt.folkehelsa.no/senter].
9. Goldberg DP. The detection of psychiatric illness by questionnaire. London: Oxford University Press, 1972 (Maudsley Monograph No. 21).
10. Derogatis LR, Lipman RS, Rickels K, Uhlenhuth EH, Covi L. The Hopkins Symptom Checklist (HSCL): a self-report symptom inventory. *Behav Sci* 1974; **19**: 1-15.
11. Parloff MB, Kelman HC, Frank JD. Comfort, effectiveness and self-awareness as criteria of improvement in psychotherapy. *Am J Psychiatry* 1954; **111**: 343-51.
12. Uhlenhuth EH, Rickels K, Fisher S, Park LC, Lipman RS, Mock J. Drug, doctor's verbal attitude and clinic setting in the symptomatic response to pharmacotherapy. *Psychopharmacologia* 1966; **9**: 392-418.
13. Bjelland I, Dahl AA, Haug T, Neckelmann D. The validity of the Hospital Anxiety and Depression Scale. An updated review. *J Psychosom Res* 2002; **52**: 69-77.
14. Mykletun A, Stordal E, Dahl AA. The Hospital Anxiety and Depression Scale (HADS): Factor structure, item analyses, and internal consistency in a large population. *Br J Psychiatry* 2001; **179**: 540-4.
15. Nunnaly J, Bernstein I. Psychometric Theory, 3 edn. New York: McGraw-Hill, 1994.
16. Zeller RA, Carmines EG. Measurement in the social sciences. The link between theory and data. London: Cambridge University Press, 1980.
17. Goldberg D. Plato versus Aristotle: categorical and dimensional models for common mental disorders. *Compr Psychiatry* 2000; **41**: 8-13.
18. Dalgard OS, Rognerud M, Strand BH. Mental health in Norway 1998. II. Geographical differences. *Nor J Epidemiol* 2002; **12**: 249-56. [In Norwegian: Psykisk helse i Helse-og levekårsundersøkelsen i 1998. II. Geografiske forskjeller].
19. Dohrenwend BP, Dohrenwend BS. Psychiatric disorders in urban settings. In: Caplan G, ed. *American Handbook of Psychiatry, Rev. Edn., Vol. 3*. New York: Basic Books, 1972.