Arch Public Health
2006, 64, 199-214

Mental and Pain Comorbidity of Chronic Somatic Disorders in the General Population in Belgium

by

Bertrem C, MD[1], Bruffaerts R, PhD[1],
Bonnewyn A, MA[1], Van Oyen H, MD PhD[2],
Demarest S, MA[2], Demyttenaere K, MD PhD[1]

Abstract

Objective: *Gaining knowledge on (a) the mental and pain comorbidity patterns of somatic disorders in the Belgian general population, and (b) associated short-time work loss days.*

Method: *A representative random sample of non-institutionalised inhabitants from Belgium aged 18 or older (n=2419) were interviewed between April 2001 and June 2002. DSM-IV mental disorders were assessed with the 3rd version of the Composite International Diagnostic Interview (CIDI 3.0). The presence of chronic somatic disorders and chronic pain conditions was based on self-report.*

Results: *Chronic somatic disorders were systematically associated with either chronic pain conditions (adjusted odds ratios [adjusted for*

[1] Department of Neurosciences and Psychiatry, Psychiatry Section, University Hospital Gasthuisberg, Leuven, Belgium
[2] Scientific Institute of Public Health, Unit of Epidemiology, Brussels, Belgium

Correspondence address: Prof. Dr. K. Demyttenaere, Dienst Psychiatrie, Herestraat 49, 3000 Leuven, Belgium. E-mail: koen.demyttenaere@med.kuleuven.ac.be

age, gender, and mental disorders] ranging between 2.3 and 2.7, p<.05) and mental disorders (adjusted odds ratios [adjusted for age, gender, and chronic pain conditions] ranging between 1.4 and 2.6, p<.05). Somatic disorders tended to be more chronic when they were comorbid with either mental disorders or pain conditions. Persons with a somatic disorder had, per month, 2.5 more work loss days than persons without a somatic disorder. Moreover, one third of this decrease in work loss was due to comorbid chronic pain or mental disorders.

Conclusions: *These are the first epidemiological data on comorbidity of somatic conditions and mental disorders in the general population in Belgium. The results highlight that, after adjustment for the potential influence of other variables, there is a consistent association between somatic disorders on the one hand, and mental disorders and pain conditions on the other. Mental and pain comorbidity also play a significant role in work loss in persons with chronic somatic disorders.*

Introduction

Psychiatric epidemiology traditionally lags behind epidemiology of somatic disorders, among others, because of difficulties with conceptualizing and measuring mental disorders. The development of comprehensive, fully structured diagnostic interviews for the assessment of mental disorders, strongly contributed to an unprecedented period of growth of psychiatric epidemiology in the past 10 years (1). Epidemiological data on the comorbidity of mental and somatic disorders is rather scarce.

Meanwhile, the traditional distinction between mental and somatic disorders is increasingly abandoned in medical sciences and psychiatry. It is increasingly recognised that somatic and mental disorders frequently co-occur, thus suggesting a bidirectional association between “soma” and “psyche” (2). A number of mediating mechanisms for these interactions between body and brain have been proposed. Impaired reactivity of the sympathetic-adrenomedullary and hypothalamic-pituitary-adrenocortical systems, which place persons under stress, through a variety of metabolic, immunological and endocrinological mechanisms, is one of the proposed pathways underlying proneness to behavioural risk behaviour (e.g. smoking or alcohol consumption) somatic and mental disorders (3). Epidemiological data on comorbidity of both mental and somatic disorders begin to emerge, but are often limited to the co-occurrence of specific somatic disorders (e.g. cardiovascular disease or migraine) with specific mental disorders (e.g. mood or anxiety disorders), and/or to primary, secondary or tertiary health care settings (4-14).

There are only few epidemiological data investigating the global picture of prevalence and co-occurrence of any mental and any somatic disorder in the general population. This is particularly interesting as common underlying factors may predispose to both somatic and mental disorders, simultaneously leading to true comorbidity. A population-based study in the Netherlands (NEMESIS) showed that adults with a mental disorder had higher rates of somatic disorders than adults without a mental disorder. Conversely, adults with a somatic disorder had higher rates of mental disorders than adults without a somatic disorder. The results of this study also revealed that somatic and mental disorders seem to be concentrated in a socio-economically and temperamentally disadvantaged minority of the general population (15). Moreover, it was also shown that persons with mental disorders have a higher probability to report functional limitations and activity restrictions (16).

To our knowledge, no epidemiological data have been published on the comorbidity of mental and somatic disorders in general in the Belgian population. The ESEMeD (European Study of the Epidemiology of Mental Disorders) project is an epidemiological study that is part of the World Mental Health Surveys (17). Apart from investigating the prevalence of mental disorders, data were also gathered on prevalence of somatic disorders, chronic pain conditions, and work loss (18). This provided an opportunity to investigate the comorbidity of mental and somatic disorders in the Belgian adult general population. This paper describes (a) the mental and pain comorbidity of selected chronic somatic disorders in the Belgian general population, and (b) associated short-time work loss.

Methods

Participants

This study uses data from a cross-sectional face-to-face household interview survey, based on probability samples representative of the adult population of Belgium. The target population is the non-institutionalized adult population in Belgium (aged 18 years or older), residing in private households. The sample frame was the National register of residents in Belgium. A stratified multistage random sample was drawn by Statistics Belgium, formerly National Institute of Statistics. In total, 2419 respondents were interviewed between April 2001 and June 2002 by lay interviewers that were trained by the Scientific Institute of Public Health, using a computer-assisted personal interview (CAPI). The overall response rate was 50.6%. This study is part of the European Study of the Epidemiology of Mental Disorders (ESEMeD), as a part of the World Mental Health Survey Initiative (WMH – see http://www.hcp.med.harvard.edu/wmh).

The central WMH staff trained bilingual supervisors in Belgium. Consistent interviewer training documents and procedures were used. The WHO translation protocol was used to translate instruments and training materials. The Belgian survey was carried out in bilingual form (Dutch and French). Persons who could not speak these languages were excluded. Standardized descriptions of the goals and procedures of the study, data uses and protection, and the rights of respondents were provided in both written and verbal form to all potentially eligible respondents before obtaining verbal informed consent for participation in the survey. Quality control protocols, described in more detail elsewhere (19), were standardized across the WMH countries where this study took place, in order to check on interviewer accuracy and to specify data cleaning and coding procedures. The institutional review board of the organization that coordinated the survey in Belgium approved and monitored compliance with procedures for obtaining informed consent and protecting human subjects.

Internal sub-sampling was used to reduce respondent burden by dividing the interview into two parts. Part 1 included the core diagnostic assessment of mental disorders. Part 2 included additional information relevant to a wide range of survey aims, including assessment of chronic physical conditions. Details of the sub-sampling are described elsewhere (20). All respondents completed part 1. All part-1 respondents (N=2419) who met criteria for any mental disorder and a probability sample of other respondents were administered part 2. Part 2 (N=1043) respondents were weighted by the inverse of their probability of selection for part 2 of the interview to adjust for differential sampling. Analyses in this article were based on the weighted part 2 sample. Additional weights were used to adjust for differential probabilities of selection within households and for post-stratification (i.e. to match the samples to population socio-demographic distributions).

Procedures

Lifetime and 12-month prevalence of mental disorders

The prevalence of mental disorders was determined by means of a Dutch and French version of the *Composite International Diagnostic Interview*, version 3.0 (CIDI 3.0) which was adapted for the World Mental Health Surveys by the Coordinating Committee of the WHO-World Mental Health Initiative. A mental disorder was defined by the presence of the diagnostic criteria of a specific mental disorder as determined by DSM-IV (21). This paper presents the 12-month prevalence of mood disorders (i.e. major depressive episode, dysthymia), anxiety

disorders (generalized anxiety disorder, social phobia, specific phobia, post-traumatic stress disorder, agoraphobia, panic disorder) and alcohol disorders (alcohol abuse and alcohol dependence).

Methodological evidence collected in the CIDI 3.0 Field Trials showed that all the disorders considered were assessed with acceptable reliability and validity both in the original CIDI (22) and in the CIDI 3.0 used in this survey (23). The recent clinical reappraisal studies carried out in four WMH countries (i.e. United States, Spain, France, and Italy, with total N=468) indicated a good concordance between diagnoses based on the CIDI 3.0 and diagnoses based on blinded clinical re-interviews. Area under receiver operator curves were found in the .73-.93 range for lifetime, and in the .83-.88 range for 12-month anxiety/mood disorders (24).

Lifetime and 12-month somatic disorders and chronic pain

Respondents were asked whether they ever, and in the past 12 months had been diagnosed with or treated for one of the following chronic somatic conditions: arthritis or rheumatism, allergies, heart disease, hypertension, asthma, tuberculosis or any other chronic lung diseases, malaria or some parasitic disease, diabetes, stomach or intestine ulcer, thyroid disease, a neurological problem like multiple sclerosis or Parkinson's disease or seizures, HIV infection, AIDS or cancer. Chronic pain was assessed by self-report: back or neck pain, frequent and/or serious headache or other non-specified chronic pain symptoms. Determining presence of chronic somatic disorders and chronic pain symptoms by self-report is a reliable method resulting in a moderate to high match with medical reports (25-26).

Furthermore, a rough measure of the chronic nature of the somatic disorder (hereafter referred to as "chronicity index") was calculated by determining the ratio between the 12-month prevalence and the lifetime prevalence. This index gives an idea of the proportion of respondents (in percentages) for which the particular disorder has a chronic nature or for whom there is recurrence of symptoms (27). Chronicity indices range from 0 to 100; with higher values indicating more chronic conditions.

Work Loss

The CIDI 3.0 used in the ESEMeD survey also included a series of questions about decrease in work productivity, as assessed by means of the 'Work Loss Day' (WLD) subscale of the WHO Disablement Assessment Scale version 2 (WHO-DAS-2). The time frame of the WHO-DAS-2 is the 30 days prior to performing the assessment. The WLD

questions are presented in Appendix 1. The responses were combined to create the WLD index: WLD=[sum(1.0*Q1)+ (0.5*Q2)+ (0.5*Q3)] / 30 (24). In other words, the days that subjects were totally unable to work (Q1) were given a higher weight in comparison to the 'cut-down'(Q2) and the 'cut-back' (Q3) days. The WLD score have to be interpreted as the percentage decrease in productivity per month (28). For reasons of interpretability, we opted to provide the mean number of monthly work loss (in number of days) instead of the mean WLD scores (in percentages work loss). The mean number of monthly work loss days were calculated from the original WLD scores.

Analysis

Prevalence estimates are provided and expressed as percentages (%) with 95% standard errors (SE). Correlates of chronic somatic disorders were obtained by binary logistic regression analyses. Correlates were expressed in odds ratios (OR) and 95% confidence intervals (95%CI). ORs were adjusted for the influence of age, gender, and either chronic pain (when the associations between somatic and mental disorders were assessed) or mental disorders (when the associations between somatic disorders and pain conditions were assessed). The ORs and 95%CI were produced using STATA software, which is designed for analysing complex sample surveys and weighted data. Prevalence estimates were weighted to account for the known probability of selection as well as to restore the distribution of the general Belgian population. The impact of either mental or pain comorbidity on the monthly work loss days was assessed using linear regression analysis. We calculated adjusted mean differences for the contribution of somatic disorders to monthly work loss, systematically adjusting for sociodemographic variables, the presence of mental disorders, and chronic pain conditions.

Results

Sample

The characteristics of the study sample are shown in Table 1. Mean age was 47 years, with the majority of the respondents (29%) being between 35 and 49 years old. Males represented 48% of the sample. Approximately 57% was married or living with someone, and 77% lived in midsized urban areas. The majority (53%) was in paid employment at the time of the interview. Details of the sample are described in previous communications from the ESEMeD/World Mental Health Surveys (29).

TABLE 1
Description of the study sample (raw numbers and weighted percentages), ESEMeD study, Belgium 2001-2002.

	Total Sample N=2419	**% (SE)**
Age		
18-24	167	10.9 (1.0)
25-34	406	17.9 (7.6)
35-49	775	28.6 (7.9)
50-64	570	21.3 (11.5)
65+	501	21.3 (9.2)
Gender		
male	1190	48.4 (1.1)
female	1229	51.6 (1.1)
Living Arrangements		
Not living with someone	672	21.0 (2.6)
Living with someone	1747	79.0 (2.6)
Urbanicity		
Rural (<10.000)	346	13.2 (5.1)
Midsize Urban (10.000-100.000)	1814	77.3 (4.4)
Large Urban (>100.000)	259	9.6 (3.1)
Employment		
Paid Employment	1298	52.8 (1.3)
Unemployed	95	3.5 (0.5)
Retired	529	21.2 (0.8)
Homemaker	119	4.5 (0.6)
Student	9	0.5 (0.2)
Other	369	5.7 (0.9)

Comorbidity patterns between chronic somatic disorders, mental disorders, and pain conditions

From our investigations concerning the comorbidity patterns between somatic disorders on the one hand, and mental disorders and pain conditions on the other, three main findings emerge. First, 54.4% of the population had a chronic somatic disorder in the past, of which 35.2% still had it in the past 12 months. Lifetime estimates of chronic somatic disorders ranged between 49 and 73% of the respondents; 12-month estimates were all in the range of 28 and 58% (Table 2). We also found that both lifetime and 12-month somatic disorders were more common in persons who also had 12-month mental disorders or a 12-month pain condition: the increase in somatic disorders seemed more common among persons with alcohol or anxiety disorders, or those with back or neck pain.

Second, for about 65% of the persons with a somatic disorder, this disorder has a chronic character. In persons without a mental disorder,

approximately one in two (i.e. 52.9%) reported a lifetime presence of a somatic disorder, with one in three (33.7%) experiencing a somatic disorder in the past 12 months, yielding a chronicity index of 63% (Table 2). We could also see that somatic disorders tend to be more chronic when they are comorbid with either mental disorders or chronic pain conditions. Indeed, whereas 63% of the somatic disorders are chronic in persons without any mental disorder, this index increases up to 70% in persons with a mental disorder (and even up to 79% in persons with an alcohol disorder). Similarly, somatic disorders were more chronic when comorbid with pain conditions: the somatic disorder was chronic for about 57% of the persons with a somatic disorder (without pain), this percentage increased up to 78% in persons who also had chronic pain.

Third, mental disorders and pain conditions were more common among persons with than among persons without somatic disorders of comparable age and gender (Table 3). The association between somatic disorders is stronger for pain conditions (ranging between 2.3 and 2.7) than for mental disorders (ranging between 1.4 and 2.6). In more detail, persons with somatic disorders were more likely to present back or neck pain as well (OR=2.7, 95%CI=1.4-3.8) or alcohol disorders (OR=2.6, 95%CI=1.3-5.1) than comparable persons without somatic disorders.

The impact of chronic somatic disorders on the number of monthly work loss days

Table 4 shows that persons with a somatic disorder are impaired in exercising their social role. Persons with a somatic disorder reported 6.3 (SE=0.6) days out of role per month compared to 3.8 (SE=0.8) in persons without somatic disorder. This implies that those with a somatic disorder had 2.5 days (SE=1.0) more out of role than persons without a somatic disorder. When controlling the influence of a somatic disorder for other factors, the mean difference between persons with somatic and those without somatic disorders is 2.0 days (SE=1.0) after controlling for sociodemographic variables, 1.8 days (SE=1.0) after controlling for sociodemographic variables and mental disorders, 1.3 days (SE=1.0) after controlling for sociodemographic variables and pain conditions, and 1.2 days (SE=1.0) after controlling for sociodemographic variables, pain conditions, and mental disorders. This implies that somatic disorders have a direct impact of about one work loss day per month (i.e. 1.2 days), compared to an impact of comorbid chronic pain or mental disorders of 0.8 days (2.0-1.2=0.8). In other words, approximately one third (i.e. 0.8 days out of 2.5=32%) of the decrease in work loss in persons with a somatic disorder is due to the comorbid chronic pain or mental disorders.

TABLE 2.
Twelve-month and lifetime somatic disorders in persons with 12-month mental disorders and 12-month chronic pain conditions, ESEMeD study, Belgium, 2001-2002.

		Lifetime prevalence of somatic disorders (SE)	12-month prevalence of somatic disorders (SE)	Chronicity index
Mental disorder condition	No mental disorder	52.9 (2.4)	33.7 (2.3)	63%
	Any mental disorder	66.8 (0.8)	46.9 (4.0)	70%
	Alcohol disorder	73.4 (10.7)	57.7 (4.5)	79%
	Anxiety disorder	69.6 (0.8)	51.3 (4.2)	73%
	Mood disorder	60.6 (6.2)	38.2 (6.6)	63%
	One mental disorder	66.1 (2.3)	48.6 (6.8)	74%
	Two or more mental disorders	68.4 (8.4)	42.8 (11.8)	63%
Pain condition	No chronic pain condition	49.3 (0.5)	28.0 (2.3)	57%
	One or more chronic pain conditions	66.8 (7.9)	52.6 (5.7)	78%
	Back- or neck pain	71.1 (5.3)	57.8 (5.9)	81%
	Headache	67.6 (10.2)	52.7 (3.3)	78%
	Other chronic pain condition	54.2 (14.4)	47.6 (10.4)	88%

TABLE 3. Prevalence estimates of 12-month mental disorders and chronic pain, by 12-month chronic somatic disorders, ESEMeD study, Belgium, 2001-2002.

		No somatic disorder (SE)	Somatic disorder (SE)	OR (95% CI)
Mental disorder condition	Any mental disorder	9.5 (0.8)	15.3 (1.4)	1.9 (1.4-2.6) [1]
	Alcohol-related disorder	0.9 (0.1)	2.1 (0.7)	2.6 (1.3-5.1) [1]
	Anxiety disorder	5.3 (0.1)	10.3 (1.5)	1.8 (1.2-2.7) [1]
	Mood disorder	5.6 (1.9)	6.4 (0.0)	1.5 (1.0-2.2) [1]
	One mental disorder	6.4 (0.1)	11.3 (2.2)	1.4 (1.4-2.9) [1]
	Two or more mental disorders	3.0 (0.9)	4.1 (0.7)	1.4 (0.9-2.3) [1]
Pain condition	One or more pain conditions	21.6 (1.8)	44.0 (5.2)	9.8 (7.3-13.2) [2]
	Back- or neck pain	13.2 (1.4)	32.9 (4.9)	2.7 (2.0-3.8) [2]
	Headache	8.9 (0.8)	17.9 (0.8)	2.5 (1.7-3.7) [2]
	Other chronic pain condition	4.3 (0.9)	7.1 (3.2)	2.3 (1.4-3.8) [2]

[1] ORs were adjusted for the influence of age, gender, and the presence of a pain condition.
[2] ORs were adjusted for the influence of age, gender, and the presence of a mental disorder.

TABLE 4. Decrease of role performance for persons with a somatic disorder, controlled for sociodemographic variables, mental disorders and pain conditions, ESEMeD study, Belgium, 2001-2002.

Covariate	Controlled for	Change in monthly work loss (in mean number of monthly work loss days) (SE)	p-value
Somatic disorder	—	-2.5 (1.0)	0.03
	Sociodemographic variables	-2.0 (1.0)	0.13
	Sociodemographic variables and mental disorders	-1.8 (1.0)	0.11
	Sociodemographic variables and chronic pain conditions	-1.3 (1.0)	0.01
	Sociodemographic variables, mental disorders, and chronic pain conditions	-1.2 (1.0)	0.04

Discussion

In this study, our aims were to investigate to which extent chronic somatic disorders were comorbid with either mental disorders and chronic pain conditions. The key findings are that (a) persons with a somatic disorder are almost three times more likely to have a pain condition or two times more likely to have a mental disorder than comparable subjects without, (b) somatic disorders tend to be more chronic when a mental disorder or a chronic pain condition co-occurs compared to pure (i.e. non-comorbid) somatic disorders, and (c) mental disorder or chronic pain comorbidity contributes significantly (about one third) to the decrease in work loss in persons with a somatic disorder.

These results are in line with epidemiological data from the NEMESIS study in the Dutch population, where individuals with psychiatric conditions had higher rates of somatic disorders and vice versa (15). The fact that comorbidity of mental and somatic disorders in the population is very common, has several important implications. First, our findings have considerable implications for daily clinical practice. Somatic health care professionals may be more aware of the fact that persons with a current or past history of a mental disorder are more likely to have a somatic disorder than comparable persons without such a history. The presence of mental disorders may deter somatic health care professionals to adequately managing medical illness (30). Moreover, our data suggest that the course of the somatic disorder seems to be more chronic when a mental disorder is present. It is known that the presence of a mental disorder has a negative impact on the quality of life and functioning of patients with a somatic disorder (31-33). Second, mental health care professionals need to be aware that persons with mental disorders are more likely to have somatic disorders than persons without mental disorders. These findings stress the need for a greater emphasis on detection, investigation, and treatment of somatic problems in patients with a comorbid mental disorder, especially as there is evidence that presence of a somatic disorder negatively influences the outcome of the mental disorder (11,34-36).

Persons with somatic disorders report about 6.3 work loss days per month. By comparison, persons without somatic disorders report almost 4 work loss days per month. We also found that pain and mental comorbidity accounted for one third of the decrease in work loss in persons with versus persons without somatic disorder. The findings on the decrease of role performance emphasize the social and economic impact of mental disorder and chronic pain comorbidity in individuals with chronic somatic disorders. If one wants to optimally reduce the impair-

ment in role performance in people with chronic somatic conditions, screening for the presence and appropriate management of comorbid mental disorders and chronic pain conditions should be part of the overall management of the somatic disorder (37). It is known that increased costs are associated with comorbid medical-psychiatric illness. Screening for mental disorders in patients with medical conditions can reduce these costs (38,39).

The high level of mental-somatic comorbidity also has implications for the organisation of health care services. In many countries national policies stipulate that mental health services have to be managed separately from other health services, with physical estrangement from medical colleagues and investigative support services. Health care services organised to provide adequate treatment for both physical and mental problems might improve health outcomes, patient satisfaction and also decrease stigmatization of people with mental disorders (40).

The high level of mental-somatic comorbidity also has implications at basic science level. Our epidemiological data underline the importance of continued basic research into the mechanisms of possible common underlying factors leading to both somatic and mental disorders and in revealing the bidirectional interactions between body and brain. Basic research in the fields of neuro-endocrinology, neuro-immunology and genetics continue to provide us with exciting data that are likely to lead to new options for treatment as well as to designing or adapting preventive strategies, ultimately decreasing the burden of both somatic and mental disease in the population (41,42).

Undergraduate medical education, postgraduate programmes, and continuing medical education of general practitioners, specialists, and other health care workers should reflect the high comorbidity of mental and somatic disorders. Training models for somatic health-care workers should address the mental health training needs and vice versa, the training models for mental health-care workers should address the somatic health training needs, using a multidisciplinary, problem-based approach (43).

Our data should be interpreted in the light of the following limitations. First, it has been reported that non-respondents might have higher rates of mental disorders than respondents (44,45). However, the ESEMeD study found higher prevalence estimates of mental disorders in countries with lower participation rates. Therefore, non-response did not seem to explain the differences in prevalence between countries. Second, the assessment of chronic pain and chronic somatic disorders was based on

a limited number of questions, so severity and persistence were not investigated. In addition, we investigated only comorbidities of those somatic disorders which were included in the CIDI 3.0. We could therefore only rule out comorbidity patterns with respect to somatic disorders included in this questionnaire. Third, since this study was cross-sectional in nature, findings have no meaningful implications for causal relationships between somatic disorders, mental disorders, and chronic pain conditions. In this regard, future research is needed to consider the diagnostic boundaries between somatic and mental disorders, and pain conditions. A last limitation is that the self-reported work disability could also be biased by overtly negative cognitive appraisals by persons with mood disorders (46).

In conclusion, this is the first study that analyses comorbidity patterns between chronic somatic disorders, chronic pain conditions, and mental disorders in the general population in Belgium. There are two main conclusions: (a) persons with somatic disorders are significantly more likely to have comorbid chronic pain conditions or mental disorders than persons without somatic disorders, and (b) persons with somatic disorders have about 76 work loss days per year, compared to 45 work loss days in persons without somatic disorders; one third of this difference in work loss days is explained by cormorbid pain conditions or comorbid mental disorders.

Acknowledgements

The ESEMeD survey was carried out in conjunction with the World Health Organization World Mental Health (WMH) Survey Initiative. We thank the WMH staff for assistance with instrumentation, fieldwork, and data analysis. These activities were supported by the United States National Institute of Mental Health (R01MH070884), the John D. and Catherine T. MacArthur Foundation, the Pfizer Foundation, the US Public Health Service (R13-MH066849, R01-MH069864, and R01 DA016558), the Fogarty International Center (FIRCA R01-TW006481), the Pan American Health Organization, Eli Lilly and Company, Ortho-McNeil Pharmaceutical, Inc., GlaxoSmithKline, and Bristol-Myers Squibb. A complete list of WMH publications can be found at:

http://www.hcp.med.harvard.edu/wmh. The ESEMeD project is funded by the European Commission (Contracts QLG5-1999-01042; SANCO 2004123), the Piedmont Region (Italy), Fondo de Investigación Sanitaria, Instituto de Salud Carlos III, Spain (FIS 00/0028), Ministerio de Ciencia y Tecnología, Spain (SAF 2000-158-CE), Departament de Salut, Generalitat de Catalunya, Spain, and other local agencies and by an

unrestricted educational grant from GlaxoSmithKline (GSK). Between 2000 and 2005, the study in Belgium was entirely sponsored by an unrestricted educational grant from GSK, whereas from 2005 onwards the study was sponsored by both GSK and the European Union (contract SANCO 2004123).

References

1. Kessler R. Psychiatric epidemiology: selected recent advances and future directions. Bull World Health Organ 2000; 78: 464-74.
2. Leue C, Van Os J, Neeleman J, de Graaf R, Volledbergh W, Stockbrugger RW. Bidirectional associations between depression/anxiety and bowel disease in a population based cohort. J Epidemiol Community Health, 2005;59: 434-35.
3. Brunner E. Socioeconomic determinants of health: stress and the biology of inequality. BMJ 1997; 314: 1472-6.
4. Guillem E, Pelissolo A, Lepine JP. Troubles mentaux et migraine: données epidemiologiques. Encephale 1999 ; 25 : 436-42.
5. Breslau N, Stewart WF, Lipton RB, Lucia VC, Welch KM. Headache and major depression : is the association specific to migraine ? Neurology, 2000; 308-13
6. Strudsholm U, Jahennessen L, Foldager L, Munk-Jorgensen P. Increased risk for pulmonary embolism in patients with bipolar disorder. Bipolar Disord 2005; 7:77-81.
7. Musselman DL, Evans DL, Nemeroff CB. The relationship of depression to cardiovascular disease: epidemiology, biology, and treatment. Arch Gen Psych 1998; 55: 580-92.
8. Ford DE, Mead LA, Chang PP, Cooper-Patrick L, Wang NY, Klag MJ. Depression is a risk factor for coronary artery disease in men: the precursors study. Arch Int Med 1998; 158: 1422-6.
9. Frasure-Smith N, Lesperance F, Talajic M. Depression following myocardial infarction. Impact on 6-month survival. JAMA 1993; 270: 1819-25.
10. Consoli SM. Dépression et maladies organiques associées, une comorbidité encore sous-estimée. Presse Med 2003; 32: 10-21.
11. Kisely SR, Goldberg DB. Physical and psychiatric comorbidity in general practice. BMJ 1996; 169: 236-42.
12. Wells KB, Golding JM, Burnam MA. Mental disorder in a sample of the general population with and without chronic medical conditions. Am J Psychiatry 1988; 145: 976-81.
13. Neeleman J, Systema S, Wadsworth M. Propensity to psychiatric and somatic ill-health: evidence from a birth cohort. Psychol Med 2002; 32: 793-803.
14. Murphy JM, Monson RR, Olivier DC, Zahner GE, Sobol AM, Leighton AH. Relations over time between psychiatric and somatic disorders: The Stirling County Study. Am J Epidemiology 1992; 136: 95-105.
15. Neeleman J, Ormel J, Bijl R. The distribution of psychiatric and somatic ill health: associations with personality and socioeconomic status. Psychosom Med 2001; 63: 239-47.
16. Van Oyen H., Van der Heyden J., Perenboom R., Jagger C. Monitoring population disability: evaluation of a new Global Activity Limitation Indicator (GALI). Soc.-Präventivmed, Soc.-Präventivmed, 51, 153-161, 2006.
17. Demyttenaere K, Bruffaerts R, Posada-Villa J, Gasquet I, Kovess V, Lepine JP. Prevalence, severity and unmet need for treatment of mental disorders in the World Health Organization World Mental Health Surveys. JAMA 2004; 291: 2581-90.

18. Alonso J, Angermeyer M, Bernert S, Bruffaerts R, Brugha TS, Bryson H et al. Disability and quality of life impact of mental disorders in Europe: results from the European Study of Epidemiology of Mental Disorders (ESEMeD) project. Acta Psychiatr Scand 2004; 109 (suppl.420): 38-46.
19. Alonso J, Angermeyer M, Bernert S, Bruffaerts R, Brugha TS, Bryson H et al. The ESEMeD/MHEDEA 2000 investigators. Sampling and methods of the European Study of the Epidemiology of Mental Disorders (ESEMeD) project. Acta Psychiatr Scand 2004; 109 (suppl.420): 8-20.
20. Kessler RC, Ustun TB. The World Mental Health (WMH) Survey Initiative Version of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI). Int J Methods Psychiatr Res 2004; 13: 93-121.
21. American Psychiatric Association. Diagnostic and Statistical Manual – IV. Washington DC: American Psychiatric Association, 1994.
22. Wittchen HU. Reliability and validity studies of the WHO Composite International Diagnostic Interview (CIDI): a critical review. J Psychiatr Res 1994; 28: 57-84.
23. Kessler RC, Abelson J, Demler O, Escobar JI, Gibbon M, Guyer ME et al. Calibration of DSM-IV Diagnoses in the World Mental Health (WMH) Version of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI). Int J Methods Psychiatr Res 2004; 13: 122-39.
24. Haro JM, Arbabzadeh-Bouchez S, Brugha TS, de Girolamo G, Guyer ME, Jin R et al. Concordance of the Composite International Diagnostic Interview Version 3.0 (CIDI 3.0) with standardized clinical assessments in the WHO World Mental Health Surveys. Int J Methods Psychiatr Res 2006; 15: 167-180.
25. National Center for Health Statistics. Evaluation of National Health Interview Survey diagnostic reporting. Vital Health Stat 1994; 120: 1-116.
26. Fabricant SJ, Harpham T. Assessing response reliability of health interview surveys using reinterviews. Bull World Health Organ 1993; 71: 341-8.
27. WHO International Consortium in Psychiatric Epidemiology. Cross-national comparisons of the prevalences and correlates of mental disorders. Bull World Health Org 2000; 78: 413-426.
28. Bonnewyn A, Bruffaerts R, Van Oyen H, Demarest S, Demyttenaere K: L'impact des troubles mentaux sur le fonctionnement quotidien de la population belge. Revue Med Liège 2005; 60: 849-854.
29. Bruffaerts R, Bonnewyn A, Demarets S, Van Oyen H, Demyttenaere K: Prévalence des troubles mentaux dans la population belge. Revue Med Liège 2003; 58: 741-750.
30. Bunce DF, Jones LR, Badger LW, Jones SE. Medical illness in psychiatric patients: barriers to diagnosis and treatment. South Med J 1982; 75: 941-4.
31. Baumeister H, Balke K, Härter M. Psychiatric and somatic comorbidities are negatively associated with quality of life in physically ill patients. J Clin Epidemiol 2005; 58: 1090-1100.
32. Lesperance F, Frasure-Smith N, Talajic M. Major depression before and after myocardial infarction: its nature and consequences. Psychosom Med 1996; 58: 99-110.
33. Wells KB, Stewart RD, Hays MA, Burnam W, Rogers M, Daniels S et al. The functioning and well-being of depressed patients: results from the Medical Outcomes Study. JAMA 1995; 262: 914-19.
34. Kisely S, Simon G. An international study of the effect of physical ill health on psychiatric recovery in primary care. Psychosom Med 2005; 67: 116-22.
35. Iosifescu DV, Nierenberg A, Alpert J, Papakostas GI, Perlis R, Sonawalla S et al. Comorbid medical illness and relapse of major depressive disorder in the continuation phase of treatment. Psychosomatics 2004; 45: 419-25.

36. Thompson WK, Kupfer DJ, Fagiolini A, Scott JA, Frank E. Prevalence and clinical correlates of medical comorbidities in patients with bipolar I disorder: analysis of acute-phase data from a randomized controlled trial. J Clin Psychiatry 2006; 67: 783-88.
37. Rupp I, Boshuizen HC, Roorda LD, Dinant HD, Jacobi CE, van den Bos G. Poor and good health outcomes in rheumatoid arthritis: the role of comorbidity. J Rheumatol 2006; 33: 1488-95.
38. Wells KB, Stewart A, Hays RD, Burnam MA, Rogers W, Daniels M, Berry S, Greenfield S, Ware J. The functioning and well-being of depressed patients: results from the Medical Outcomes Study. JAMA 1989; 262: 914-9.
39. Levitan SJ, Kornfeld DS. Clinical and cost benefits of liaison psychiatry. Am J Psychiatry 1981; 138: 790-793.
40. Eytan A, Bovet L, Gex-Fabry M, Alberque C, Ferrero F. Patients' satisfaction with hospitalization in a mixed psychiatric and somatic care unit. Eur Psychiatry 2004; 19(8): 499-501.
41. Vanitallie TB. Stress: a risk factor for serious illness. Metabolism 2002; 51: 40-45.
42. Baghai TC, Binder EB, Schule C, Salyakina D, Eser D, Lucae S et al. Polymorphisms in the angiotensin-converting enzyme gene are associated with unipolar depression, ACE activity and hypercortisolism. Mol Psychiatry 2006; 11: 1000-13.
43. Tarren-Weeney M, Carr V. Principles for development of multi-disciplinary, mental health learning modules for undergraduate, postgraduate and continuing education. Educ Health (Abingdon) 2004;17:204-12.
44. Eaton WW, Anthony JC, Tepper S, Dryman A. Psychopathology and attrition in the epidemiologic catchment area surveys. Am J Epidemiol 1992 135: 1051-9.
45. De Graaf R, Bijl R, Smit F, Ravelli A, Vollebergh WA. Psychiatric and sociodemographic predictors of attrition in a longitudinal study: The Netherlands Mental Health Survey and Incidence Study (NEMESIS). Am J Epidemiol 2000; 152:1039-47.
46. Ormel J. Synchrony of change in depression and disability. What next? Arch Gen Psychiatry 2000; 57: 381-2