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Onset of disability in depressed and non-depressed primary care patients

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ABSTRACT

Background. While cross-sectional and longitudinal studies have consistently found depressive illness and disability to be related, understanding whether depression leads to subsequent onset of disability is limited.

Methods. In the context of the multi-centre international WHO Collaborative Study on Psychological Problems in General Health Care, we followed prospectively consulting non-elderly primary care patients who were essentially disability free at baseline but who differed in baseline depression status, comprising 1051 patients free of physical disability at baseline including 14% depression; 914 free of social disability including 9% depression. Depression status was assessed with the CIDI; patient-reported physical disability with the MOS physical functioning scale and social disability with the BDQ role functioning and number of disability days measures; investigator-rated social disability with the Occupational section of Groningen Social Disability schedule; and the treating physicians rated the severity of physical illness.

Results. In patients essentially disability free at baseline, depressive illness resulted in a 1·5-fold (at 3 months) and a 1·8-fold (at 12 months) increase in risk of onset of physical disability, after controlling for physical disease severity. Depressive illness also resulted in a 2·2-fold (at 3 months) and a 2·3-fold (at 12 months) increase in risk of onset of social disability, after controlling for physical disease severity, physical disability and onset of physical disability.

Conclusions. Among non-elderly primary care patients, depressive illness is associated with onset of physical disability and shows an even stronger association with onset of social disability.

INTRODUCTION

Depressive illness is common and frequently runs a recurrent or chronic course. Cross-sectional studies have generally reported a positive linear relationship between severity of depression and level of disability (Blumenthal & Dielman, 1975; Berkman *et al.* 1986; Wells *et al.* 1989; Broadhead *et al.* 1990; VonKorff *et al.* 1992; Wohlfarth *et al.* 1993). We have previously reported that this cross-sectional relationship holds across major cultures (Ormel *et al.* 1994). Non-experimental longitudinal studies have reported that remission of depression is associated with reduction in social disability, whereas patients with unimproved depressive illness tend to remain chronically disabled (VonKorff *et al.* 1992; Ormel *et al.* 1993, 1994; Hays *et al.* 1995; Sturm & Wells, 1995). While this series of studies points to an association between depressive illness and disability, it remains unclear whether depression precedes onset of physical and/or social disability, or is simply a consequence or correlate (Turner & Beiser, 1990; Ormel *et al.* 1994). Bruce and colleagues (1994) recently found that high levels of depressive symptoms in community-dwelling,

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high-functioning elderly were associated with an increased risk of onset of disabilities in activities of daily living. Penninx *et al.* (1998) reported that older persons who report depressive symptoms are at a slightly higher risk of subsequent physical decline as measured with physical performance tests. But this association has rarely been studied in non-elderly subjects. To date, only Armenian *et al.* (1998) found that depression independently predicted inability to perform activities of daily living 11 years later. Furthermore, two (Mintz *et al.* 1992; Coulehan *et al.* 1995) out of three (Simon *et al.* 1999) randomized depression treatment studies in non-elderly primary care patients suggest that treatment of depression can produce offset of disability. But, these trials of depression treatments have not shed light on whether depressive illness, if left untreated, is associated with increased onset of disability.

Four problems hamper a causal interpretation that common depression causes disability: (1) disability, in particular disabilities in activities of daily living, is a well-established risk factor for depression (Aneshensel *et al.* 1984; Phifer & Murrell, 1986; Kennedy *et al.* 1990; Beekman *et al.* 1995; Prince *et al.* 1998); (2) the association of depression with physical disability (limitations in physical functioning such as locomotor disability) may be confounded by other factors, most notably physical disease (Berkman *et al.* 1986; Turner & Beiser, 1990; Ormel *et al.* 1994); (3) the association between depression and social disability (limitations in performance of more complex social and occupational activities) may be confounded by physical disability (Turner & Beiser, 1990; Ormel *et al.* 1994); and, (4) factors affecting onset *versus* offset of disability may or may not differ. In particular, in primary-care patients, onset of physical illness and associated disability could explain the observation that depression predicts onset of social disability if onset of physical disability induced social disability and depression. The present study addresses these limitations of prior research.

This report seeks to answer the following questions: (1) does the presence of depressive illness among patients who are essentially free of physical disability at baseline increase subsequent risk of onset of physical disability, after controlling for baseline physical disease severity; and (2) does the presence of depressive illness in patients who are essentially free of social disability at baseline increase subsequent risk of onset of social disability, after controlling for baseline physical disease severity, physical disability, and change in physical disability? By controlling for change of physical disability, we reduce the possibility that onset of social disability might be due to an increase of physical disability.

METHOD

The study questions were addressed using data from the multi-centre international WHO Collaborative Study on Psychological Problems in General Health Care (WHO-PPGHC). Each site enrolled patients from clinics selected as typical of local urban primary health care. The methods of this study are fully explained elsewhere (Ormel *et al.* 1994; VonKorff & Üstün 1995; VonKorff *et al.* 1996). Five out of the 15 sites had poor overall response rates ($< 60\%$) and were excluded from the analyses reported herein (Athens, Greece; Mainz, Germany; Nagasaki, Japan; Rio de Janeiro, Brazil; Santiago, Chile). The remaining sites were Ankara, Turkey; Bangalore, India; Berlin, Germany; Groningen, Netherlands; Ibadan, Nigeria; Manchester, UK; Paris, France; Seattle, USA; Shanghai, China; and Verona, Italy.

Patient selection

At each of the 11 sites 1300 to 2800 consecutive attenders, aged 15 to 65, were screened with the 12-item General Health Questionnaire (GHQ-12) (Goldberg & Williams, 1988). A total of 16043 screens were completed (response rate 96%). Respondents were selected for second-stage diagnostic assessment according to site-specific GHQ-12 thresholds (100% of those with GHQ scores above the 80th percentile, 35% of those scoring between the 60th and 80th percentiles, and 10% of those scoring below the 60th percentile). A total of 3839 patients of the eligible 5251 completed structured interview and self-report instruments in the second stage (response rate 73%). Eligible for 3- and 12-month follow-up were a 40% random sample and those with a definite or subthreshold ICD-10 psychiatric disorder. Out of the 2653 eligible

Table 1. *Patterns of onset of disability**

Nr	Absence (0) and presence (1) of disability			Prevalence pattern (%)		Included in analysis?	
	Baseline	3 month	12 month	Physical	Social	3 month	12 month
a	0	0	0	53·3	53·4	Yes	Yes
b	0	0	1	8·5	8·6	Yes	Yes
c	0	1	0	11·8	10·2	Yes	Yes
d	0	1	1	6·9	7·1	Yes	Yes
e	0	0	—†	11·4	11·3	Yes	No
f	0	1	—	3·3	4·1	Yes	No
g	0	—	0	4·0	3·7	No	Yes
h	0	—	1	0·7	1·6	No	Yes

* Few patients died; thus course patterns including death are not presented.
† Data missing.

subjects, 2310 took the 3-month (response 87%) and 2089 the 12-month follow-up (response 79%). At 3-month follow-up we re-administered the patient-reported disability measures and at 12-month follow-up the full baseline set.

The subgroup of patients who were essentially free of physical disability at baseline included 1051 patients of whom 152 (14%) were depressed while the subgroup of patients who were essentially free of social disability consisted of 914 patients of whom 79 (9%) were depressed.

Measures

Physical health status was rated by the physician examining the patient at index consult on the basis of all information available to the physician (completely healthy, some symptoms but subclinical, mildly ill, moderately ill, severely ill) (VonKorff & Üstün, 1995). The categories were extensively described and anchored by case vignettes.

Psychopathology, including depression, was assessed with the WHO primary care version of the Composite International Diagnostic Interview (CIDI) (WHO, 1989) yielding both ICD-10 and DSM-III-R psychiatric diagnoses.

Physical disability was measured with the 6-item Physical Functioning scale of the Medical Outcomes Survey (MOS-PF) short-form (Stewart *et al*. 1988) (mean 3·1 and S.D. 3·3 in the baseline sample, $N = 3839$; see Appendix for items).

Social disability was assessed with the 5-item Role Disability scale of WHO's Brief Disability Questionnaire (BDQ items 2–6; mean 2·7, S.D. 2·6) and a question on the number of days in the past month the subject had not been able to carry out his/her usual activities due to health problems (disability days; mean 5·2, S.D. 8·2) (see Appendix for items). In addition, we administered the Occupational Role section of the Social Disability Schedule (SDS) (Wiersma *et al*. 1988), a semi-structured interview on role functioning (no disability, 40·4%; mild disability, 32·0%; moderate disability, 20·4%; severe disability, 7·2%).

At baseline the three social disability indicators were strongly correlated (on average 0·54). Their correlations with physical disability (MOS-PF) was slightly weaker (on average 0·49), stressing the need to control for physical disability.

Definitions

We defined: (*i*) free of physical disability at baseline as MOS-PF score of 0 or 1; (*ii*) onset of physical disability during follow-up as a MOS-PF score or $\geqslant 2$ follow-up; (*iii*) free of social disability at baseline as $\leqslant 2$ disability days and no or minimal occupational role dysfunctioning (rating 0 or 1) and a BDQ Role Disability scale score of $\leqslant 2$; (*iv*) onset of social disability during follow-up as 3 or more disability days, and/or at least moderate occupational role dysfunctioning, and/or a BDQ Role Disability scale score of $\geqslant 3$, and, (*v*) depression at baseline as the presence of ICD-10 depressive disorder (F32/33).

Analysis

Two series of logistic regression analyses using SPSS logistic regression module were carried out to evaluate whether baseline depression status predicted onset of disability in those essentially free of disability at baseline. The first series targeted the onset of physical disability, and

controlled for severity of physical disease at baseline. The second series focused on social disability, and controlled for severity of physical disease, physical disability at baseline, and for change in physical disability. Both series were performed for the 3-month as well as the 12-month outcomes. Table 1 shows which patients were included in which analyses.

RESULTS

We first determined physical disability onset rates among patients who were essentially free of physical disability at baseline, contrasting those who met the ICD criteria for major depression with those who did not (see Table 2). Among those with depressive illness at baseline, 28·9% were found to have an onset of physical disability at 3-months compared to a 22·2% onset rate among those who were not depressed at baseline. Onset of physical disability at 3 months meant an increase of at least 2 points on the MOS-PF in 89% of patients, of at least 3 points in 62% and of at least 4 points in 44%. At the 12-month follow-up the corresponding onset rates were 27·3% and 17·8%. The 'size' of onset at 12 months was slightly larger compared to the 3-month onset. In the logistic regression analysis the adjusted odds ratio for onset of physical disability for depressed *v.* non-depressed patients was 1·47 ($P = 0{\cdot}05$; 95% CI, 0·99–2·17) at 3 month and 1·78 ($P = 0{\cdot}009$; 95% CI, 1·15–2·73) at 12-month follow-up.

Table 2. *Risk of onset of physical disability in subjects free of baseline physical disability, with and without baseline depression*

	Depression status at baseline	
Onset of physical disability	No depression *N* (%)	Depression *N* (%)
No onset at 3 months	699 (77·8)	108 (71·1)
Onset at 3 months	200 (22·2)	44 (28·9)
Total	899 (100)	152 (100)
No onset at 12 months	669 (82·2)	93 (72·7)
Onset at 12 months	145 (17·8)	35 (27·3)
Total	814 (100)	128 (100)

Table 3. *Risk of onset of social disability in subjects free of social disability at baseline, with and without baseline depression*

	Depression status at baseline	
Onset of social disability	No depression *N* (%)	Depression *N* (%)
No onset at 3 months	643 (78·7)	52 (65·8)
Onset at 3 months	174 (21·3)	27 (34·2)
Total	817 (100)	79 (100)
No onset at 12 months	600 (80·5)	35 (64·8)
Onset at 12 months	145 (19·5)	19 (35·2)
Total	745 (100)	54 (100)

Table 4. *Risk of onset of social disability in subjects free of both social and physical disability at baseline, with and without baseline depression*

	Depression status at baseline	
Onset of social disability	No depression *N* (%)	Depression *N* (%)
No onset at 3 months	466 (82·0)	26 (63·4)
Onset at 3 months	102 (18·0)	15 (36·6)
Total	568 (100)	41 (100)
No onset at 12 months	434 (84·1)	18 (69·2)
Onset at 12 months	82 (15·9)	8 (30·8)
Total	516 (100)	26 (100)

The corresponding results for onset of social disability in those free of social disability at baseline are provided in Table 3. At 3 months, 34·2% of depressed patients who were initially not affected by social disability had experienced onset of social disability, compared to an onset rate of 21·3% among the non-depressed patients. The 'size' of onset of social disability is difficult to indicate because of its compound nature. To give an impression: the mean difference in disability days between the essentially disability free patients at baseline and those of them with an onset of social disability was 6·9 days. At the 12-month follow-up, the onset rates were 35·2% among the depressed and 19·5% among the non-depressed. The 'size' of the 12-month onset was comparable to the 3-month onset. In logistic regression analyses controlling for physician-rated severity of physical disease, physical disability at baseline and change of physical disability, the adjusted odds ratios for onset of social disability for depressed *v.* non-depressed patients was 1·68 ($P = 0{\cdot}06$; CI, 0·97–2·92) at the 3-month follow-up and 2·16 ($P = 0{\cdot}02$; CI, 1·15–4·07) at the 12-month follow-up.

Table 4 gives the corresponding results for

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onset of social disability in those free of both physical and social disability at baseline. The OR at the 3-month follow-up was 2·20 ($P = 0·05$; 95% CI, 0·99–4·91) and at the 12-month follow-up 2·33 ($P = 0·08$; 95% CI, 0·90–6·07).

DISCUSSION

We believe our findings provide evidence that depression precedes increased risk of onset of physical, and more strongly, social disability. Our results are consistent with the findings of Bruce *et al*. (1994) and extend their results to a non-elderly population. Our findings also concur with Armenian's recent observation that depression predicted onset of limitations in activities of daily living 12 year later independently of chronic physical illnesses and other psychiatric disorders. Their population sample included both middle-aged and elderly persons (Armenian *et al*. 1998). We have shown that the explanation of the association between depression and onset of physical disability cannot be attributed to the confounding effects of physical disease, and that the association between depression and onset of social disability cannot be attributed to the confounding effects of physical disability. Despite the small number of depressed patients who were essentially free of disability at baseline, significant results were obtained.

Limitations

Some methodological qualifications are needed. The first is regression-to-the-mean-bias. Observations, which are selected for extreme values (patients essentially free of disability at baseline) will tend to return toward mean values by virtue of the random effects of error variance. However, if this bias has occurred, it will have affected depressed and non-depressed patients similarly. Thus, it is unlikely that regression to the mean can explain the differential effect on onset of disability between the depressed and non-depressed groups.

The second qualification is that the definition of onset of disability is essentially arbitrary. To examine the sensitivity of our results for different definitions, we also examined whether a more restrictive and a more lenient definition of onset made a difference (e.g. for onset of physical disability the lenient threshold was $\geqslant 1$ on the MOS-PF scale and the restrictive one $\geqslant 3$. The changes in threshold did not affect the ORs. They ranged from 1·6 to 2·5 for onset of physical disability and from 2·4 to 3·2 for onset of social disability. Notwithstanding, it should be stressed that onset of disability, as defined here, basically refers to a transition from none or minimal disability to some, moderate or marked disability.

The third qualification is the binary nature of our outcome which does not utilize the information on how much disability had developed, that is the 'size' of onset. For two reasons, we decided against the use of linear regression analysis: (*i*) we wanted to maintain the prospective approach of examining onset of disability in persons free of disability at baseline; and (*ii*) three of the four disability outcome measures are ordinal at best.

The observed ORs probably underestimate the true association of baseline depression with onset of disability. Measurement error will have resulted in misclassification of depression status, freedom of disability, and onset of disability, with subsequent weakening of the observed association. On the other hand, the imperfect adjustment for severity of physical illness, due to the coarse-grained measure of severity of physical illness, may have inflated the association of baseline depression with onset of disability.

The reader might be puzzled by the low proportion of patients who were free of disability at baseline (physical 44%; social 39%; $N = 3839$) and the high incidence of disability during follow-up in those free of disability (physical 244 out of 1051; social 201 out of 896). Both should be understood while realizing: (*i*) that the cut-off used for differentiating freedom of disability from onset of disability was very low indeed; (*ii*) that the sample consisted of a consulting population; and (*iii*) that high GHQ scores were strongly oversampled.

How might the presence of a depressive illness induce disability?

Depression, and other forms of psychological illness, affect the highest order capacities of the human organism, including motivation, energy, concentration and self-confidence. It is not surprising that depressive illness could initiate social disability, but strong evidence that depression precedes onset has been lacking. With mounting evidence that depressive illness induces

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physical and, in particular, social disability, and that treatment of depression induces offset of disability, it may now be productive to shift the focus of attention from whether depression causes disability to how this might occur. Various mechanisms may be involved, ranging from erosion of good health habits (exercise, nutrition) to loss of social support, from psychoneuro-immunological effects of depression to atrophy, and from loss of energy to loss of motivation. Our results also underscore the need for prevention and intervention in disability-free but depressed adults. The lack of disability in depressed primary care patients should not be used as a rationale for withholding or limiting active treatment of their depressive illness. They are at risks of physical as well as social disability.

APPENDIX 1

Brief Disability Questionnaire*†

During the last month:

1 Have your health problems limited you in any of the following activities?
   (*a*) The type or amount of vigorous activity you can do, e.g. lifting objects, running or sports
   (*b*) The type or amount of moderate activity you can do, e.g. moving a table, carrying groceries or goods
   (*c*) Climbing stairs or walking uphill
   (*d*) Bending, lifting or stooping
   (*e*) Walking long distances (i.e. 1–2 km)
   (*f*) Eating, dressing, bathing, or using the toilet

2 Have you had to cut down or stop any activity you used to do, such as hobbies, because of some illness or injury?

3 Have you not been able to do something that your family (or household) expected from you as a part of daily routine?

4 Have your personal problems decreased your motivation for work?

5 Have your personal problems decreased your personal efficiency at home, school or work?

6 Has there been a deterioration in your social relations with friends, workmates or other persons?

7 During the **last one month** how many days in total were you unable to carry out your usual daily activities fully?

8 During the **last one month** how many days in total did you stay in bed all or most of the day because of illness or injury?

* Response categories (except item 7 and 8): 0 = no, not at all; 1 = yes, sometimes or a little; 2 = yes, moderately or definitely.

† Items ((*a*)–1(*f*) constitute the Physical Functioning Scale of the Medical Outcomes Survey short-form (MOS-PF); items 2–6 the Role disability scale; and items 7 and 8 the Disability Days Measure.

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