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Research report

Functioning after a major depressive episode: complete or incomplete recovery?

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Abstract

Background: Numerous studies have shown improved functioning after a depression, but often substantial limitations at follow-up remained. The goal of this study is to examine (1) whether functioning returns to pre-morbid levels after a major depressive episode (MDE), (2) predictors of incomplete functional recovery, and (3) how these functional levels relate to those in a non-depressed sample. *Methods*: Data were derived from the Netherlands Mental Health Survey and Incidence Study, a prospective general population study with three waves. Psychopathology was measured with the Composite International Diagnostic Interview (CIDI) and functioning with the Short-Form-36 Health Survey (SF-36). One hundred and sixty-five individuals who met criteria for MDE between baseline and third wave, but not in the 12 months preceding baseline and third wave were selected. *Results*: Mean post-morbid levels of functioning did not differ from pre-morbid levels although this level still differed significantly from the non-depressed sample. Sixty to eighty-five percent of the respondents did better or showed no change on different scales after recovery from MDE. Co-morbid substance use disorder and anxiety disorder, presence of somatic illness, external mastery, low social support and high baseline functioning were predictors of worsened functioning. *Limitations*: Lay interviewers used fully structured diagnostic interviews to determine MDE and functioning was measured using self-report. *Conclusions*: In general, people who recover from a MDE will also recover from functional impairments. The most important predictors of incomplete functional recovery are clinical and social in nature whereas personality and demographic characteristics are less important.

Keywords: Depression; Functional limitations; General population

1. Introduction

Depression is a common disorder, with a lifetime prevalence of 15% (Bijl et al., 1997) and a burden greater than that of various common chronic medical conditions, such as arthritis (Wells et al., 1989), hypertension (Hays et al., 1995) and diabetes (Hays

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et al., 1995; Wells et al., 1989). The World Health Organization predicts that by the year 2020, major depression will be the second most disabling condition worldwide, measured in disability-adjusted life years (Murray and Lopez, 1997). Numerous studies have stressed the relation between depression and functional limitations, suggesting a causal relation or at least a synchrony of change. Judd et al. (2000) found significant increases in functional limitations with each stepwise increment in the severity of depressive symptoms during the long-term course of major depressive disorder. Although functioning after recovery from a major depressive episode (MDE) has been an important topic in many studies, the results are inconsistent and the issue remains controversial. Some authors reported that mean functional levels returned to normal levels among patients who had recovered from a MDE (Ormel et al., 1993; Von Korff et al., 1992), while others found substantial and persistent functional limitations at follow-up (Coryell et al., 1990, 1993; Hirschfeld et al., 2002; Judd et al., 2000; Wells et al., 1989).

The extent to which functional limitations will persist after MDE might be altered by the presence of social support. The importance of social support for health related quality of life, in particular mental health and emotional well-being has been supported elsewhere (Kessler et al., 1985; Sherbourne et al., 1992).

In the above-mentioned studies, patients were selected after onset of the MDE and, therefore, pre-morbid levels of functioning are unknown. Given this limitation, no comparison between worsened and unchanged functional status can be made.

To overcome this limitation, the present study draws on data from the longitudinal Netherlands Mental Health Survey and Incidence Study (NEMESIS), a general population study among the Dutch population aged 18–64. The major strength of this study is that functional status was measured pre-episode, post-episode as well as during the MDE which, to our knowledge, has never been done before. The goal of this study is to examine (1) whether functioning returns to pre-morbid levels after MDE, (2) demographic, personality, social and clinical predictors of incomplete functional recovery, and (3) how these functional levels relate to those in a non-depressed sample.

2. Method

2.1. Sampling and procedure

Data were derived from the Netherlands Mental Health Survey and Incidence Study (NEMESIS). Methods are describes elsewhere (Bijl et al., 1997).

Briefly, NEMESIS is a prospective epidemiologic survey in the Dutch general population (aged 18–64) with three waves. It was based on a multistage, stratified, random sampling procedure. These procedures were approved by the ethics committee of the Netherlands Institute of Mental Health and Addiction and informed consent was obtained according to the prevailing Dutch law of 1996 (Bijl et al., 1998).

In the initial data collection phase, 7076 persons were interviewed. The response rate was 69.7%. Of the 7076 persons who had taken part in 1996 (T_0), 5618 were re-interviewed in 1997 (T_1) (response: 79.4%) and 4796 in 1999 (T_2) (response of T_1 subjects: 85.4%). After adjustment for demographic variables, a 12-month disorder at T_0 only slightly increased the probability of loss to follow-up between T_0 and T_1 as well as between T_0 and T_2 (OR=1.20, CI=1.04–1.38; OR=1.29, CI=1.15–1.46) (De Graaf et al., 2000).

2.2. Definition of cohort

As Fig. 1 shows, individuals who met DSM-III-R criteria for MDE between T_0 and T_2, but not in the 12 months preceding T_0 and T_2 were selected to form a cohort (n=165). This group was compared to a control group (Fig. 2) of respondents without a MDE during that period (n=4178).

2.3. Assessment of psychopathology

The Composite International Diagnostic Interview (CIDI), version 1.1 (computerized version), was used to determine which individuals met the DSM-III-R criteria (American Psychiatric Association, 1987) for MDE in the 12 (T_0, T_1 and T_2) months or 24 months (T_2) preceding the time of measurement. The CIDI is a structured interview, developed by the World Health Organization (Robins et al., 1988; Smeets and Dingemans, 1990), designed for use by trained interviewers

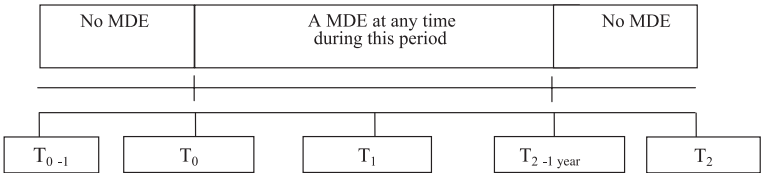

Fig. 1. Definition of cohort (n=165).

who are not clinicians. The WHO field trials have documented acceptable inter-rater reliability, acceptable test–retest reliability and high validity for depression (Wittchen et al., 1991; Wittchen, 1994). Depression was diagnosed using the hierarchical rules of DSM-III-R, thus excluding MDEs occurring in the course of psychotic or bipolar disorders.

2.4. Assessment of functional status

Functional disability was assessed at T_0, T_1 and T_2 using the Short-Form-36 Health Survey (SF-36) (Ware and Sherbourne, 1992), a questionnaire containing 36 items, forming eight scales. Good reliability and validity of this instrument was demonstrated (Aaronson et al., 1998; Burke et al., 1995; McHorney et al., 1993; McHorney et al., 1994). Scoring was performed in accordance with the guidelines of Ware and Sherbourne (1992) on a 0–100 scale, with 100 defined as maximum functioning. In the present study, all eight scales were used:

1. '*Physical functioning*' (10 items, Cronbach's α=0.90 for all T_0 respondents), which assesses health related limitations on daily activities such as bathing, getting dressed and lifting shopping bags.
2. '*Physical role functioning*' (four items, Cronbach's α=0.88), which records problems with work and other daily activities due to physical health problems.
3. '*Vitality*' (four items, Cronbach's α=0.77), which records perception of energy and fatigue.
4. '*Pain*' (two items, Cronbach's α=0.86), which records the amount of bodily pain and any limitations resulting from it.
5. '*Psychological health*' (five items, Cronbach's α=0.83), which assesses feelings of depression or nervousness.
6. '*Psychological role functioning*' (three items, Cronbach's α=0.79), which records problems with work and other daily activities as a consequence of emotional problems.
7. '*Social functioning*' (two items, Cronbach's α=0.71), which assesses limitations on social activities such as visiting friends and relatives.
8. '*General health*' (five items, Cronbach's α=0.75), which records the individual's subjective assessment of his or her general health.

Worsened individual functioning on any of the eight scales was defined as a lower score at T_2 than at T_0. People with improved and unchanged functional levels were compared to worsened individuals.

2.5. Predictors of functional change after a depressive episode

2.5.1. Demographic variables

Gender, age and educational attainment (T_0).

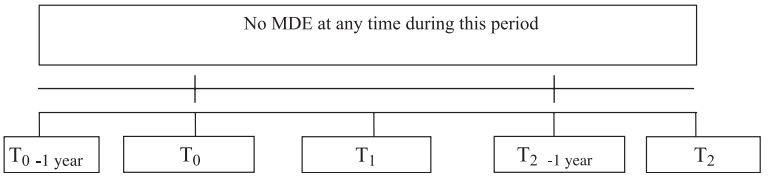

Fig. 2. Definition of control group (n=4178).

2.5.2. Personality variables

Neuroticism (T_0) was assessed using the Groningen Neuroticism Questionnaire (14 items, Cronbach's α=0.72). A low score reflects instability, vulnerability to stress or anxiety proneness (Horwood and Fergusson, 1986; Ormel et al., 1989).

Mastery (T_0) was assessed using a mastery questionnaire (five items, Cronbach's α=0.81) measuring the extent to which one regards one's life-chances as being under one's own control (internal mastery) in contrast to being fatalistically ruled (external mastery) (Pearlin and Schooler, 1978). A low score on mastery reflects external mastery.

Self-esteem (T_0) was assessed using the Rosenberg Self-Esteem (10 items, Cronbach's α=0.86). A high score indicates the subjective feelings of self-worth or self-acceptance (Rosenberg, 1965).

2.5.3. Social variable

Social support (T_1) was assessed using the Social Support Questionnaire for Transactions (23 items, Cronbach's α=0.91) (Suurmeijer et al., 1995). A high score indicates high levels of perceived social support.

2.5.4. Clinical variables

Severity of major depression (T_1), categorized as mild, moderate and severe according to DSM-III-R. In case of multiple depressive episodes, the most severe one was selected.

Nature of the depressive episode (T_1), categorized as single or recurrent.

Co-morbidity with anxiety and substance use disorder (T_1), categorized in two variables; co-morbid anxiety disorder and co-morbid substance use disorder. In order not to exclude any disorder, we calculated psychiatric co-morbidity using the 12-month prevalence without applying the hierarchical DSM-III-R rules.

Somatic illness (T_0 and T_2) was assessed by means of a questionnaire listing 31 chronic somatic conditions for which respondents had received treatment in the preceding 12 months (T_0) or 24 months (T_2), categorized as yes or no. If data was missing somatic illness was coded 0: not suffering from a somatic illness to our knowledge.

Treatment (T_1 and T_2). Respondents were asked whether they had received help for mental health problems within the past 12 months. Two groups were distinguished:

1. Respondents who received no care or exclusively informal care or by non-drug-prescribing professionals.
2. Respondents who received primary care, specialized mental health care or residential mental health care.

If respondents received both informal and formal mental health care, they were placed in the second group.

2.6. Statistical analyses

To check for all possible confounding, multivariate logistic regression analysis was used with forced entry of all variables. We obtained the odds ratios and their 95% confidence interval that reflected the associations between predictors and functional recovery. People with worsened functioning were compared to people with unchanged or improved functioning, controlled for baseline functional level.

3. Results

3.1. Subjects

A cohort of people who met criteria for MDE between T_0 and T_2, but not in the 12 months preceding T_0 and T_2 was selected (n=165). This group was compared to a control group of people without MDE from the year preceding T_0 until T_2. The selected cohort consisted of more women (69% versus 51%, p<0.0001) and were younger than the control group at T_0 (mean age: 38.7 versus 41.5, p<0.0001). Educational attainment did not differ between the groups.

3.2. Functioning of cohort versus control group

Before onset of MDE, the cohort scored significantly lower on all SF-36 scales than the control group. Differences ranged from 4.5 points on physical functioning to 10.1 points on vitality.

3.3. Cohort

Table 1 shows a large and significant drop in psychological role functioning, vitality, psychological health, and social functioning during the MDE. Physical role functioning and general health exhibited a large drop in scores as well, but failed to reach significance level. In contrast, pain scores were constant and physical functioning deteriorated over time.

After recovery from MDE, mean scores on all SF-36 scales returned to pre-morbid levels. Contrary to expectations, scores on some of the functional scales improved significantly between T_0 and T_2 in the cohort.

However, like on T_0, mean scores on SF-36 scales were significantly lower in the cohort compared to the control group on all but psychological role functioning (2.6 points, p=0.13). Significant differences ranged from 3.5 points (p=0.02) on general health to 6.3 points (p<0.001) on physical functioning.

3.4. Worsened functioning in the cohort

Although mean levels of functioning returned to pre-morbid levels or above, some individuals worsened after a MDE. This deterioration was most prominent in the general health, vitality, and physical functioning categories in which about 40% of the subjects scored worse on T_2 compared to T_0.

3.5. Determinants of worsened functioning in the cohort

Table 2 presents the results of the multivariate logistic regression analyses, comparing a group of individuals whose performance was worse to a group of individuals who performed the same or better at T_2 as compared to T_0. Four groups of determinants were analyzed:

Demographic characteristics: Gender reached significance on psychological health and age on physical functioning, but a general trend and consistency could not be found. Educational attainment did not reach significance on any of the SF-36 scales.

Personality characteristics: Of the three personality characteristics, mastery predicted worsened functioning best, reaching significance on psychological health and social functioning. Neuroticism reached significance on one scale and self-esteem was not a significant predictor of worsened functioning on any of the SF-36 scales.

Social characteristic: Low social support predicted decreased physical functioning and psychological health.

Clinical characteristics: Co-morbid substance use disorder predicts decreased physical role-functioning and general health and co-morbid anxiety

Table 1
Mean score of SF-36 scales on different waves in a cohort with MDE between T_0 and T_2, but not in the years preceding T_0 and T_2 and a control group without depression during that period and comparison between mean SF-36 scores on different waves within the cohort

	T_0				T_1				T_2				Comparison within cohort		
	Cohort (n=165)		Control (n=4178)		Cohort (n=165)		Control (n=4178)		Cohort (n=165)		Control (n=4178)		T_0-T_1	T_1-T_2	T_0-T_2
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	p	p	p
Physical functioning	88.0	17.0	92.5	15.1	87.7	18.5	92.2	15.5	85.7	20.2	91.1	16.2	0.76	0.14	0.09
Physical role functioning	78.2	35.2	87.2	28.5	72.0	39.5	87.8	28.4	80.8	33.9	87.1	28.7	0.08	0.01	0.48
Vitality	63.3	18.1	73.4	17.0	54.9	20.1	71.1	15.6	65.4	16.2	71.6	15.6	0.00	0.00	0.17
Pain	80.1	23.5	86.1	20.6	80.1	24.1	86.3	20.4	80.2	23.4	85.9	20.5	0.98	0.92	0.95
Psychological health	73.9	16.5	83.9	12.7	64.7	18.7	81.4	12.1	76.5	13.6	82.3	11.8	0.00	0.00	0.03
Psychological role functioning	85.7	30.4	94.9	18.7	73.3	37.0	95.2	18.2	93.3	21.2	95.9	16.9	0.00	0.00	0.01
Social functioning	82.8	19.7	91.3	16.2	76.2	23.0	91.2	15.2	86.4	17.5	91.1	15.4	0.00	0.00	0.05
General health	68.3	18.9	75.5	16.8	66.1	17.1	73.8	16.3	70.1	18.4	73.6	16.5	0.09	0.00	0.15

Table 2
Multivariate logistic regression analyses within the group of people with a MDE between T_0 and T_2, but not in the years preceding T_0 and T_2

	Physical functioning		Physical role functioning		Vitality		Pain		Psychological health		Psychological role functioning		Social functioning		General health	
	OR [CI]	*p*	OR [CI]	*p*	OR [CI]	*p*	OR [CI]	*p*	OR [CI]	*p*	OR [CI]	*p*	OR [CI]	*p*	OR [CI]	*p*
Demographic																
Gender	0.7 [0.3–1.7]	0.37	2.9 [0.7–11.5]	0.14	1.2 [0.4–3.2]	0.77	0.9 [0.4–2.2]	0.81	3.7 [1.1–12.7]	**0.04**	0.3 [0.1–1.5]	0.13	1.7 [0.5–5.1]	0.37	0.6 [0.2–1.6]	0.28
Age	1.1 [1.0–1.1]	**0.00**	1.0 [1.0–1.1]	0.12	1.0 [1.0–1.0]	0.99	1.0 [1.0–1.1]	0.15	1.0 [0.9–1.0]	0.71	1.0 [1.0–1.1]	0.50	1.0 [1.0–1.1]	0.46	1.0 [1.0–1.0]	0.97
Education	1.1 [0.8–1.7]	0.54	0.8 [0.5–1.4]	0.47	1.3 [0.9–1.9]	0.19	1.4 [1.0–2.1]	0.08	1.1 [0.7–1.7]	0.70	1.7 [0.8–3.3]	0.14	1.5 [0.9–2.4]	0.13	0.8 [0.5–1.2]	0.22
Personality																
Neuroticism	0.9 [0.8–1.0]	**0.03**	1.1 [1.0–1.3]	0.21	1.0 [0.9–1.2]	0.61	1.0 [0.9–1.1]	0.78	0.9 [0.8–1.1]	0.29	0.9 [0.8–1.2]	0.60	1.0 [0.8–1.1]	0.54	1.1 [0.9–1.2]	0.30
Self-esteem	1.0 [0.9–1.2]	0.72	0.9 [0.8–1.1]	0.34	1.0 [0.9–1.1]	0.94	1.0 [0.9–1.1]	0.50	1.1 [0.9–1.2]	0.43	1.0 [0.8–1.2]	0.82	1.0 [0.9–1.2]	0.82	0.9 [0.8–1.1]	0.23
Mastery	1.0 [0.8–1.1]	0.54	0.9 [0.7–1.1]	0.38	0.9 [0.8–1.1]	0.54	0.9 [0.8–1.0]	0.13	0.7 [0.6–0.9]	**0.01**	1.0 [0.8–1.4]	0.92	0.8 [0.7–1.0]	**0.03**	0.9 [0.8–1.1]	0.39
Social																
Social support	0.9 [0.9–1.0]	**0.03**	1.0 [0.9–1.1]	0.89	0.9 [0.9–1.0]	0.11	1.0 [0.9–1.0]	0.57	0.9 [0.8–1.0]	**0.02**	0.9 [0.9–1.0]	0.29	0.9 [0.9–1.0]	0.13	0.9 [0.9–1.0]	0.14
Clinical																
Severity of depression	0.8 [0.5–1.3]	0.28	1.3 [0.6–2.6]	0.50	0.9 [0.5–1.6]	0.70	0.7 [0.4–1.2]	0.17	0.4 [0.2–0.9]	**0.01**	1.3 [0.6–3.1]	0.49	0.8 [0.4–1.4]	0.41	1.0 [0.6–1.6]	0.89
Episode (single/ recurrent)	0.6 [0.2–1.3]	0.19	1.5 [0.5–4.8]	0.46	1.0 [0.4–2.5]	0.99	0.9 [0.4–2.2]	0.88	0.4 [0.1–1.1]	0.07	0.8 [0.2–3.3]	0.74	0.8 [0.3–2.3]	0.74	0.6 [0.2–1.6]	0.31
Co-morbid anxiety	1.1 [0.4–3.2]	0.80	4.8 [1.3–18.1]	**0.02**	2.2 [0.7–6.4]	0.16	1.9 [0.7–5.0]	0.22	3.9 [1.2–12.9]	**0.03**	2.5 [0.6–12.3]	0.24	2.4 [0.7–7.9]	0.12	1.5 [0.5–4.4]	0.45
Co-morbid substance use	1.4 [0.4–5.9]	0.61	5.6 [1.0–30.8]	**0.05**	2.6 [0.6–11.6]	0.23	2.3 [0.6–9.2]	0.22	4.9 [0.7–34.5]	0.11	4.9 [0.6–39.1]	0.13	2.6 [0.5–12.8]	0.26	5.7 [1.1–28.5]	**0.04**
Somatic illness T_0	0.6 [0.3–1.6]	0.33	0.6 [0.2–2.0]	0.39	1.0 [0.4–2.5]	0.97	1.1 [0.5–2.7]	0.81	1.0 [0.4–2.6]	0.97	2.5 [0.5–9.8]	0.29	1.0 [0.3–2.8]	0.97	1.8 [0.7–4.4]	0.23
Somatic illness T_2	2.0 [0.8–5.0]	0.13	0.8 [0.2–2.8]	0.76	2.4 [0.9–6.3]	0.09	1.0 [0.4–2.4]	0.96	1.5 [0.5–4.2]	0.48	4.7 [0.8–26.6]	0.08	5.1 [1.6–15.6]	**0.01**	3.3 [1.3–8.8]	**0.02**
Treatment	2.0 [0.5–2.8]	0.71	0.9 [0.3–3.0]	0.84	2.2 [0.9–5.7]	0.10	1.3 [0.5–3.0]	0.57	2.4 [0.8–6.7]	0.10	1.1 [0.2–5.7]	0.93	0.8 [0.3–2.2]	0.70	1.4 [0.6–3.5]	0.47
SF–36 T_0	1.0 [1.0–1.1]	0.12	0.9 [0.8–0.9]	**0.00**	1.1 [1.0–1.1]	**0.00**	1.0 [1.0–1.0]	0.41	1.2 [1.1–1.3]	**0.00**	1.0 [1.0–1.1]	0.27	1.1 [1.1–1.2]	**0.00**	1.1 [1.1–1.1]	**0.00**

A comparison between worsened and unchanged or better functioning (reference group).
Bold: $p<0.05$.

disorder predicts worsened physical role-functioning and psychological health. In addition, somatic illness on T_2 determined worsened social functioning and general health. Surprisingly, severity of depression, treatment and whether the episode was single or recurrent are not significant predictors of functional decline. Neither was somatic illness on T_0.

3.5.1. Baseline SF-36 score

As expected, high baseline SF-36 score predicted a lower score on T_2 on five scales. This finding indicates that regression to the mean was present in this study and had to be controlled for.

In summary, controlling for regression to the mean, somatic illness at T_2, co-morbid substance use disorder, co-morbid anxiety disorder, low mastery and low social support are the most important predictors of worsened functioning after MDE in this study. Demographic characteristics are not very important predictors of decreased levels of functioning.

4. Discussion

4.1. Strength and weaknesses

The findings in this study should be interpreted in the light of the following strength and weaknesses. The major strength of this study is that functional status was measured pre-episode, post-episode as well as during the MDE which, to our knowledge, has never been done. A weakness is that diagnoses were made by lay interviewers using fully structured diagnostic interviews. Although diagnoses made with the CIDI have shown acceptable reliability and validity, they do not match the accuracy of diagnoses by clinicians. Second, the present study relied on self-report measures of all variables. Therefore, concern about report bias in which depressed subjects may systematically report more negatively about their functioning, is warranted. Finally, no data was available on people who were lost to follow-up. People with the most severe and incapacitating forms of depression could have selectively discontinued the study. However, De Graaf et al. (2000) found that overall psychopathology has only weak-to-moderate effects on attrition and was not related to refusal.

4.2. Key findings and implications

The main finding is that mean levels of functioning return to pre-morbid levels, although both pre-episode and post-episode levels of functioning are lower in the cohort than the control group. Not withstanding the lack of residual dysfunction at the group level, 15–40% of the subjects function worse after MDE. The three main findings of this study will be separately compared to the literature. First, a significant functional improvement after recovery from a MDE was found in this study. This finding is consistent with findings of Von Korff et al. (1992), Coryell et al. (1993), Ormel et al. (1993), Judd et al. (2000), and Hirschfeld et al. (2002). They all found a large and statistically significant reduction in the functional level among people who suffer from a depression.

Second, support was found for the hypothesis that MDE leaves no additional functional limitations compared to pre-morbid levels in this study. This is, to our knowledge, the first study in which functional levels were assessed before onset of a MDE. Therefore, the findings on this matter cannot be compared to the results of other studies.

Third, after recovery from MDE, mean functional levels of the cohort were still significantly worse than those in the control group. Inconsistent findings regarding this issue were reported in previous studies. Hirschfeld et al. (2002) and Coryell et al. (1993) found that upon remission of a MDE the functional level, although greatly improved, was still not in the normal range, which is consistent with the findings in the current study. In contrast, Ormel et al. (1993), Von Korff et al. (1992) and Judd et al. (2000) found that disability among patients with improved depressive symptoms returned to levels found among normal subjects. These inconsistent findings might be caused by difference in definition of recovery and presence of co-morbidity.

Judd et al. (2000) found a return to normal levels only in patients who were asymptomatical at the time of measurement. In addition, depression levels in the study of Von Korff et al. (1992) improved to mean level in the population. In contrast, in the current study DSM-III-R criteria for MDE were used dichotomously. Statistical analyses did not control for the presence of depressive symptoms below the diagnostic threshold of DSM-III-R MDE. Ormel et al. (1993)

analysed both measures of anxiety and mood disorder together. A drop of 50% in the combined score was defined as recovery. In contrast, in the current study subjects recovered from MDE, but not necessarily from anxiety disorder, which might explain differences in functional levels between the studies. Furthermore, it may be that subjects recruited in a population study have less severe expressions of MDE than those in psychiatric facilities. Further research is needed to clarify these contradictions.

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