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Research report

Determinants of (non-)recognition of depression by general practitioners: Results of the Netherlands study of depression and anxiety

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ABSTRACT

Background: Although most depressed patients are treated in primary care, not all are recognized as such. This study explores the determinants of (non-)recognition of depression by general practitioners (GPs), with a focus on specific depression symptoms as possible determinants.
Methods: Recognition of depression by GPs was investigated in 484 primary care participants of the Netherlands Study of Depression and Anxiety, with a DSM-IV diagnosis of depression in the past year. Recognition (yes/no) by GPs was based on medical file extractions (GP diagnosis of depressive symptoms/depressive disorder and/or use of antidepressants/referral to mental health care). Potential determinants of (non-)recognition (patient, depression, patient-GP interaction, and GP characteristics) were bivariately tested and variables with a p-value ≤0.2 entered into a multilevel multivariate model. Subgroup analysis was performed on 361 respondents with more reliable GP diagnosis data.
Results: 60.5% of patients were recognized by their GP. Patients who did not consult their GP for mental problems, and without comorbid anxiety disorder(s) were less often recognized. In the subgroup, where 68.7% was recognized, in addition to these, decreasing number of symptoms of depression and increased appetite were associated with decreased recognition. No GP characteristics were retained in the final model.
Limitations: Some data on recognition were collected retrospectively.
Conclusions: In addition to patients without a comorbid anxiety disorder or who did not consult their GP for mental problems, GPs less often recognized patients with fewer depression symptoms or with increased appetite. Recognition may be improved by informing/teaching GPs that also increased appetite can be a symptom of depression.

1. Introduction

Depression is a common condition, associated with a large burden for patients and society due to its chronic or recurrent nature (Murray and Lopez, 1997). Most patients with depression are treated in primary care, although often in a non-specific way (Kessler et al., 2003; Wilson et al., 2003). Adequate recognition and treatment can decrease the burden of disease (Claxton et al., 2000; Hirschfeld, 2001; Melfi et al., 1998). It is reported that general practitioners (GPs) recognize depression poorly, perhaps due to their more physical and demand-led orientation (Berardi et al., 2005; Simon and VonKorff, 1995; Wittchen et al., 2001). However, various

definitions of 'recognition' were used in these studies. Those that applied a cross-sectional design and relied solely on GP diagnosis at time of consultation found lower recognition rates compared to studies that used medical file extraction over extended time periods (Kessler et al., 2002; Mitchell et al., 2009).

Although recognition alone does not necessarily imply appropriate treatment (Dowrick and Buchan, 1995). It seems obvious that recognition of a patient as having depression or as 'a psychological case', or at least a discussion of the symptoms, is essential for adequate treatment. Documentation of an International Classification of Primary Care (ICPC) code of depression in the GP's records might not be required to ensure appropriate treatment, as GPs might decide not to diagnose depression because they (or the patient) might consider a diagnosis of depression as stigmatizing (Barley et al., 2011). Also, not all GPs code every consultation with an ICPC code. Finally, not every patient with depression needs (immediate) treatment. With a reasonable chance of spontaneous recovery within three months, several guidelines recommend 'watchful waiting' or a minimal intervention as an option during the first months, especially for patients with a first and mild depression (Meeuwissen et al., 2009; National Collaborating Centre for Mental Health, 2009; Spijker et al., 2002). On the other hand, many patients with depression do need treatment, and recognition alone might not be sufficient to ensure adequate follow-up and treatment in these patients (Claxton et al., 2000; Hirschfeld, 2001; Melfi et al., 1998). Therefore a definition of recognition measuring 'active recognition' i.e. receiving treatment such as antidepressants or a referral to mental health care might be more suitable.

When it is established which patients remain unrecognized, GPs can be advised to focus on these groups which, in turn, might improve recognition. Although some studies examined determinants of recognition of depression, the results were ambivalent and the sample sizes small. As possible determinants, mostly depression severity and demographics were investigated.

Some studies reported that depression severity predicts recognition (Klinkman et al., 1998; Simon and VonKorff, 1995; Tylee and Walters, 2007; Wittchen et al., 2001), or that patients presenting with mental problems were better recognized (Furedi et al., 2003; Menchetti et al., 2009; Wittchen et al., 2001). Patient characteristics such as age, gender, ethnicity and marital status have also been investigated, but with mixed results. Some found that women and older persons were identified more easily, whereas others found no differences (Fernandez et al., 2010; Gater et al., 1998; Rifel et al., 2008; Wittchen et al., 2001). An elderly primary care sample showed that clinical clues to better identify depression were female gender, the presentation of vague symptoms, and gastrointestinal symptoms (van Marwijk et al., 1996). Another study performed in the Netherlands found that not only patients with low severity of depression, but also those without chronic somatic comorbidity, with lower educational level and with fewer visits to the GP, were at higher risk for non-recognition (Nuyen et al., 2005).

Physician factors such as gender, experience, depression interest and courses on depression were also investigated, again with mixed results. Wittchen et al. found that physician experience of more than 5 years increased recognition. Tylee

and Walters found that interest in psychiatry and empathy increased recognition, while pre-occupation with organic disease decreased recognition (Tylee and Walters, 2007; Wittchen et al., 2001).

Only one study investigated the different symptoms of depression as possible determinants, and found that only 'loss of self-confidence' was associated with recognition (Wittchen et al., 2001).

It is unclear which determinants predict GP's recognition of depression when using a broader, longitudinal measured definition of recognition and examining a wide spectrum of potential predictors.

The main aim of the present study was to identify determinants of (non-)recognition of depression by GPs (longitudinally measured) in patients with DSM-IV diagnosed depression. Characteristics of the patient, depression, patient–GP interaction and GP were investigated. Of the depression characteristics, we focused on the influence of specific depression symptoms on recognition rate. We hypothesized that GPs would less often recognize less severe cases (including patients without suicidal tendency), those who did not present with mental problems, and/or patients with few(er) visits to their GP.

2. Methods

This study was conducted with data from the Netherlands Study of Depression and Anxiety (NESDA, www.nesda.nl), a large prospective cohort study (n = 2981) on the course of depression and anxiety disorders among respondents aged 18–65 years, recruited from the community, primary care and secondary mental health care. Detailed information on the objectives, study population and methods of NESDA has been published (Penninx et al., 2008).

2.1. Study sample and reference standard

The present study included only those respondents recruited from primary care with (at baseline) a major depressive disorder (MDD) or dysthymia in the past year (n = 503) according to the DSM-IV criteria and measured with the Composite International Diagnostic Interview (CIDI). In the Netherlands, access to secondary (mental) health care is not possible without referral by a GP. Moreover, all inhabitants are listed with a single GP (practice).

Details on the recruiting methods have been published (Penninx et al., 2008). Briefly, a screening questionnaire was sent to a random sample of 23,750 patients (registered with 65 GPs) who consulted their GP in the past four months irrespective of the reason for consultation. The screener was returned by 10,706 persons (45%). The non-responders showed no bias with regard to psychopathology (Van Der Veen et al., 2009).

Those screening positively were approached for a telephone interview consisting of the CIDI short-form (CIDI-SF), which has proven diagnostic quality for screening purposes (Patten et al., 2000; Sunderland et al., 2011). Respondents fulfilling criteria for a current disorder on the CIDI-SF were invited to participate, as were a random selection of screen negatives (both from the written screener and the CIDI-SF). In total 1610 persons were recruited who underwent an extensive baseline interview,

including the CIDI (Tacchini et al., 1994; Wittchen et al., 1991). The GP was not aware of the results of the screening or of the interview. Of these 1610 persons, we included only those with a MDD or dysthymia in the past year: i.e. 503 patients registered with 64 GPs.

In addition to the interview/questionnaire data, we also used data from the GP's electronic patient file (EPF) and from questionnaires filled in by the GPs (available for all 64 GPs). Excluded were 15 respondents who refused permission to use their EPF data (as we could not determine the GP's diagnosis in these cases), and four respondents with missing values on one or more of the determinants studied. Finally, 484 respondents were included in this study.

Fig. 1 displays the recruiting process of this study in detail.

2.2. Definition of recognition by GPs

We used a definition of recognition by GPs (hereafter called 'recognition') constructed from extraction from the EPF (extraction period: 1 year before until 1 year after the baseline interview). This method is similar to that of Joling et al. (2011), who used different indicators of recognition to construct the most reliable definition (best combination of sensitivity (0.693) and specificity (0.811)) of recognition of depression by GPs.

The CIDI diagnosis from the baseline interview was used as reference standard for the diagnosis of depression. The following indicators were used: 1) *Use of antidepressants* (measured by report in the EPF), 2) *Referral to mental health care* (psychologist, psychiatrist, psychotherapist, social worker or professional at an institute for mental health care; referral letter available in the EPF), 3) *presence of ICPC P03* (depressive symptoms) or *ICPC P76* (depressive disorder) or *other relevant P-code* (P indicating a psychological problem) in the EPF.

These three indicators were combined to construct the most sensitive definition of recognition; i.e. if any of these indicators were present, we considered this patient "recognized" (yes/no). Sensitivity of this definition was 0.605.

ICPC codes were missing in all GP contacts for 123 respondents (25.4%). Because of this, respondents that did not receive antidepressants or referral, i.e. in particular the less severe cases, might have been defined as not recognized. We performed subgroup analysis in a subsample with at least one contact with the GP with an ICPC code. Sensitivity of the definition in this subgroup was 0.687.

2.3. Determinants of recognition

A detailed description of the measures applied in NESDA has been published (Penninx et al., 2008).

Patient characteristics including demographic data (age, gender, education in years), number of chronic diseases and self-reported disability due to these diseases (yes or no) were assessed during the baseline interview.

Depression characteristics including current and lifetime diagnosis based on the DSM-IV, the number of and all separate symptoms, and number of previous episodes, were
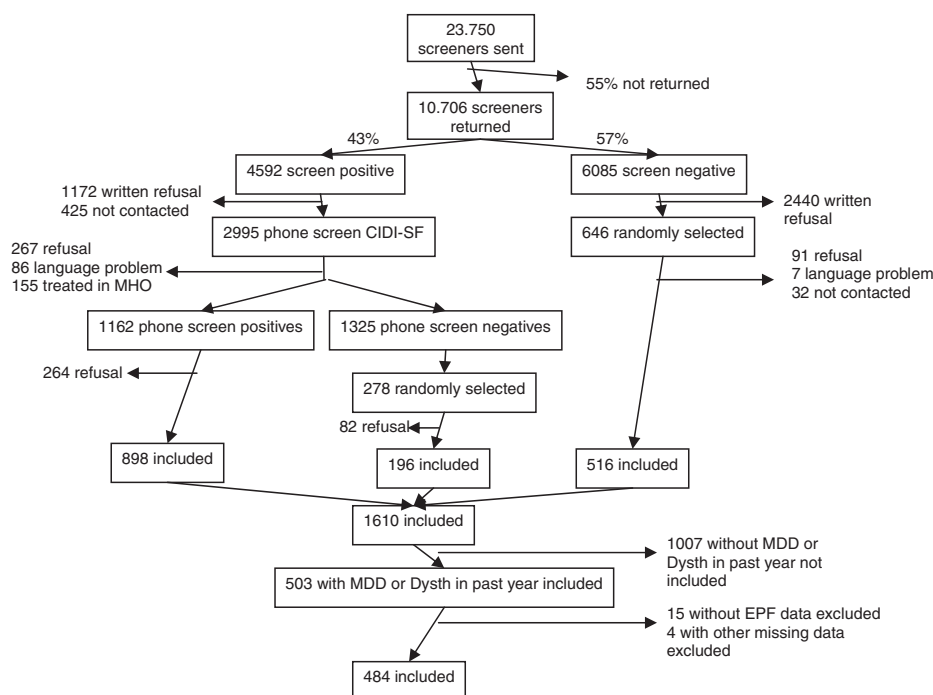

Fig. 1. Recruiting flow-chart. CIDI-SF = Composite International Diagnostic Interview—Short Form; MHO = Mental Health Organization; MDD = major depressive disorder; Dysth = dysthymia.
Flow-chart derived and adjusted from Penninx et al. (2008). The Netherlands Study of Depression and Anxiety (NESDA): rationale, objectives and methods. Int. J. Methods Psychiatr. Res. 17, 121–140.

assessed with the CIDI during the baseline interview. Severity was measured with the Inventory for Depressive Symptomatology (IDS), and suicidal tendency with the Beck Suicide Ideation Scale (Beck et al., 1979; Rush et al., 1986).

Patient–GP interaction characteristics were assessed at the baseline interview; the number of contacts with the GP and whether any contact about mental problems had taken place was based on self-report. The Perceived Need for Care Questionnaire (PNCQ) and the Trimbos/iMTA questionnaire for Costs associated with Psychiatric Illness (Tic-P) were administered to assess the need for care (e.g. perceived need for psychotherapy) and the care received (Meadows et al., 2000). Based on the answers to these questionnaires we constructed the variable 'perceived need for more or other care' (yes or no).

Finally, *GP characteristics* (years of experience as a GP, special interest in depression, training in psychiatry and/or depression/anxiety in the past year) were derived from the GPs' questionnaires.

2.4. Ethical considerations

The study protocol of NESDA was centrally approved by the Ethical Review Board of the VU University Medical Center and subsequently by the local review board of each participating center. After receiving full verbal/written information about the study, written informed consent was obtained from all participants before baseline assessment. A full ethics statement of NESDA has been published (Penninx et al., 2008).

2.5. Statistical methods

Descriptive statistics were used to describe the study population and the number of respondents recognized, with the Statistical Package for the Social Sciences version 16.0 (SPSS Inc., Chicago, USA). The definition of recognition (constructed with the 3 indicators described above) was used as the dependent variable 'Recognition' (yes/no) in the subsequent analyses. The prediction of all independent variables on our dependent variable 'Recognition' was analyzed with bivariate logistic regression. All variables with a bivariate correlation with a p-value <0.2 were then selected for the multivariate logistic regression. To prevent multicollinearity, we excluded from these one of each pair of continuous variables with a mutual correlation >0.7 and dichotomous variables with ≤5.0% of respondents in one of the categories.

To determine which variables independently predicted recognition, logistic multilevel analysis was conducted using MLwiN 2.23. Multilevel analysis was used because the patients in this study were nested within the GP practices. Multilevel models are hierarchical systems that estimate regression coefficients and their variance components while at the same time correct for the dependency of the measurements. The first level was defined as patient, the second level as GP. The outcome variable represented the logit of the probability (i.e. natural log of the odds) of recognition of depression by the GP. Regression coefficients were transformed into odds ratios by taking the EXP[regression coefficient]. The Wald test was used to obtain a p value for each regression coefficient. The Wald test was also used on the variance parameters to obtain

an indication of the necessity for allowing a random intercept or regression coefficient into the model (Twisk, 2006). Based on a stepwise backward selection procedure a final model was fitted consisting of only significant factors which constituted the predictors for recognition of depression by the GPs in the present study.

3. Results

3.1. Study sample

Table 1 lists the characteristics of the study sample. Compared with the total NESDA sample (mean age 41.9 years; 33.6% male), the present sample was slightly older (mean 44.7 years) and with fewer males (29.8%). As expected in a sample with depression in the past year, the average number of depression symptoms was high (7.7). Several symptoms were very common (depressed mood, loss of interest, fatigue and trouble concentrating; all >90%), whereas others were less so: e.g., change in appetite (more appetite 37.8%; less appetite 47.3%) or weight (weight gain 22.1%; weight loss 28.3%), psychomotor agitation (46.7%), psychomotor retardation (50.8%), feelings of worthlessness/guilt (82.9%), problems with sleep (trouble sleeping 79.3%; sleeping too much 37.6%; early awakening 42.8%) and thoughts of death (63.2%).

The average age of the 64 GPs was 48.7 (SD 8.4) years, 56% were male, and their average length of GP experience was 18 years. In the past year, 69% had followed a course on psychiatry and 48.3% on depression and/or anxiety; 36% had a special interest in depression.

3.2. Recognition

In 293 out of 484 respondents (60.5%) depression was recognized according to our definition in the total sample. In the subgroup of individuals with ICPC data in 248 out of 361 respondents (68.7%) depression was recognized. Based on a sensitivity analysis, this subgroup population generated a higher recognition rate. If ICPC data had been complete in all respondents, probably even more patients would have been recognized.

3.3. Determinants of recognition

3.3.1. Bivariate analysis

Using bivariate multilevel logistic regression (Table 2), seven variables were significantly (p<0.05) associated with recognition. Decreasing depression severity and decreasing number of depression symptoms were associated with poorer recognition, and dysthymia was less often recognized compared with MDD. Recognition became also less likely when patients had no contact or fewer contacts with the GP in the past 6 months, or no contacts about mental problems. Finally patients without comorbid anxiety disorders were recognized less often. None of the depression symptoms or GP characteristics was found to be significant.

3.3.2. Multivariate analysis

Next, multivariate multilevel logistic regression was performed (Table 3) including all significant characteristics

Table 1
Characteristics of primary care participants with major depression/dysthymia (n = 484) and GPs (n = 64).

Patient characteristics/comorbidity	
Age in years, mean (SD)	44.7 (11.8)
Gender (male)	144 (29.8%)
Education: no. of years	11.7 (3.4)
Comorbid anxiety	318 (65.7%)
No. of chronic somatic diseases, mean (SD)	1.2 (1.2)
Disability due to chronic somatic diseases	291 (60.1%)
Depression symptoms	
Feeling depressed/sad/empty	446 (92.1%)
Anhedonia/loss of interest	455 (94.0%)
Fatigue/loss of energy	453 (93.6%)
Trouble sleeping	384 (79.3%)
Sleeping too much	182 (37.6%)
Waking up 2 h early	207 (42.8%)
More appetite	183 (37.8%)
Weight gain	107 (22.1%)
Less appetite	229 (47.3%)
Weight loss	137 (28.3%)
Psychomotor retardation	246 (50.8%)
Psychomotor agitation	226 (46.7%)
Feelings of worthlessness/guilt	401 (82.9%)
Trouble concentrating/deciding	469 (96.9%)
Thoughts of death	306 (63.2%)
Other depression characteristics	
Depression severity (IDS), mean (SD)	29.9 (12.0)
No. of symptoms (CIDI), mean (SD)	7.7 (1.2)
Major depressive disorder/dysthymia (MDD)	469 (96.9%)
Chronic depression in past 5 years	99 (20.5%)
Suicide attempt in the past	96 (19.8%)
Suicidal thoughts in the past week	90 (18.6%)
Patient–GP interaction characteristics	
Contact with GP in past 6 months	440 (90.9%)
No. of contacts with GP in past 6 months, mean (SD)	3.5 (4.3)
Contact with GP about mental problems	243 (50.2%)
Perceived need for more or other treatment	308 (63.6%)
GP characteristics	
GP gender (male)	33 (55.9%)
GP age in years, mean (SD)	48.7 (8.4)
GP experience as GP (in years)	18.0 (9.8)
GP special depression interest (yes/no)	21 (35.6%)
GP training in psychiatry past year (yes/no)	42 (71.2%)
GP training depression/anxiety past year (yes/no)	31 (52.5%)

All numbers are number of participants with characteristic (percentage) unless otherwise specified.

Table 2
Results of bivariate multilevel logistic regression with dependent variable 'recognition' by the GP[a].

	Total sample (n = 484)		Subgroup with ICPC (n = 361)	
	Odds ratio (95% CI)	p-value	Odds ratio (95% CI)	p-value
Patient characteristics/comorbidity				
Age (years)	1.001	0.901	0.995	0.960
Gender (female)	0.869	0.501	0.985	0.953
Education (no. of years)	1.001	0.972	1.001	0.976
Comorbid anxiety disorder	*1.586*	*0.021*	*1.770*	*0.016*
No. of chronic somatic diseases	1.000	1.000	0.919	0.345
Disability due to chronic somatic diseases	1.069	0.728	1.090	0.710
Depression symptoms				
Feeling depressed/sad/empty	1.141	0.705	*1.660*	*0.186*
Anhedonia/loss of interest	*1.857*	*0.114*	*2.024*	*0.159*
Fatigue/loss of energy	1.586	0.229	1.564	0.274
Trouble sleeping	*1.317*	*0.177*	1.257	0.436
Sleeping too much	1.276	0.216	1.342	0.219
Waking up 2 h early	1.275	0.213	1.132	0.590
More appetite	*0.775*	*0.191*	*0.717*	*0.151*
Weight gain	0.887	0.597	0.755	0.276
Less appetite	0.905	0.597	1.017	0.941
Weight loss	0.992	0.970	1.139	0.610
Psychomotor retardation	*1.397*	*0.077*	*1.452*	*0.102*
Psychomotor agitation	1.025	0.896	1.117	0.626
Feelings of worthlessness/guilt	*1.553*	*0.076*	*1.608*	*0.111*
Trouble concentrating/deciding	1.234	0.696	1.931	0.247
Thoughts of death	0.966	0.859	1.182	0.474
Other depression characteristics				
Depression severity (IDS score)	*1.019*	*0.018*	*1.029*	*0.004*
No. of symptoms (0–9)	*1.177*	*0.047*	*1.294*	*0.008*
Major depressive disorder/dysthymia (MDD)	*2.241*	*0.184*	*6.488*	*0.076*
Chronic depression in past 5 years	1.297	0.279	1.344	0.316
Suicide attempt in the past	1.149	0.564	*1.608*	*0.128*
Suicidal thoughts in the past week	1.114	0.659	1.051	0.829
Patient–GP interaction characteristics				
Contact with GP in past 6 months	*2.705*	*0.003*	*2.757*	*0.008*
Number of contacts with GP in past 6 months	*1.096*	*0.002*	*1.077*	*0.040*
Contact with GP about mental problems	*3.547*	*0.000*	*3.607*	*0.000*
Perceived need for more or other treatment	0.906	0.619	0.976	0.916
GP characteristics				
GP age (years)	1.004	0.790	1.001	0.943
GP gender (male)	1.031	0.905	0.851	0.502
GP experience as GP (years)	1.007	0.590	1.008	0.467
GP training in psychiatry in the past year	*1.669*	*0.074*	*1.514*	*0.181*
GP training depression/anxiety in the past year	0.954	0.857	1.083	0.745
GP special depression interest	0.902	0.707	0.839	0.501

All variables are yes/no unless otherwise specified.
p-values < 0.2 are printed italic as these variables were selected for multivariate analysis.
[a] Definition of recognition: diagnosis of depression or depressive symptoms or other psychiatric ICPC code by GP/use of antidepressant and/or referral to mental health care.

from the bivariate analyses as well as characteristics with a p-value of 0.05 to 0.20. Two variables were retained in the final multivariate model. Discussing mental problems with the GP was a strong predictor of recognition: patients who did not discuss their mental problems with the GP were much less likely to be recognized as having a depression. In addition, patients without a comorbid anxiety disorder in the past year were less likely to be recognized. None of the depression symptoms or GP characteristics remained significant in the final model.

3.3.3. Ancillary (subgroup) analysis

We repeated the analysis on the subsample of 361 respondents with at least one ICPC coded GP-contact. In this subsample the same seven variables were significantly (p < 0.05) associated with recognition using bivariate analysis (Table 2).

Multivariate multilevel logistic regression was also performed for this subsample (Table 4). The final model in this analysis consisted of four variables. Again, patients not discussing their mental problems with the GP and patients without a comorbid anxiety disorder in the past year were

Table 3
Results of multilevel logistic regression analysis of all participants (n = 484) with dependent recognition[a].

	Odds ratio	95% CI for odds ratio	p-value
Comorbid anxiety disorder past year	1.565	1.043–2.348	0.030
Contact with GP about mental problems	3.532	2.378–5.248	0.000

[a] Definition of recognition: diagnosis of depression or depressive symptoms or other psychiatric ICPC code by GP/use of antidepressant and/or referral to mental health care.

less likely to be recognized. This subgroup also identified a decreasing number of depressive symptoms and increased appetite was found to be associated with poorer recognition.

4. Discussion

4.1. Summary of main findings

Several characteristics of the patient, depression and patient–GP interaction were found to be associated with (non-)recognition. Remarkably, no GP characteristics were retained in the final model. As expected, especially patients without contact with the GP about mental problems were less often recognized. Notably, those without a suicide attempt in the past or suicidal thoughts in the past week were not less well recognized. Therefore, our hypotheses were partially confirmed. The presence of a comorbid anxiety disorder led to better recognition.

It is likely be that our definition of recognition was not sensitive enough to detect all recognized cases in the total sample because of missing ICPC codes. The sensitivity analysis showed that in the subgroup of individuals with ICPC codes, in addition to the other predictors, increased appetite was associated with poorer recognition. As increased appetite is an atypical symptom of depression, this suggests that GPs are more attentive to patients with typical features of depression than to those without (or with atypical features). None of the other depression symptoms were significantly associated with recognition.

Moreover, all the GP characteristics were non-significant; for the GP demographics, this was not unexpected. However,

we (for example) expected that training in psychiatry, and especially depression, would lead to better recognition. It should be noted that probably many (if not all) GPs had received training in psychiatry in the past (although not all in the past year). As a consequence, training in psychiatry during the past year was confounded by previous trainings.

4.2. Strengths and limitations

The present study has several strong points. First, our reference standard for depression diagnosis was the CIDI and not a self-report questionnaire, making comparison with GP recognition more reliable. Second, recognition was not based on GP-coded diagnosis only but on a wider definition, thereby increasing sensitivity. Also, recognition was not measured cross-sectionally as in most studies (in which GPs filled in a questionnaire about each patient), but longitudinally by evaluating EPF data over a 2-year period. We believe information gathered during this period provides a more accurate estimation of the depressed population in primary care. Many patients do not seek help from the GP right at the start of an episode and may therefore go unrecognized in cross-sectional studies. Also, we expected many GPs not to code a depression at their first encounter with a patient. Since they may initiate a watchful observation period in the hopes symptoms subside without administering an active treatment and labeling the patient as depressed. These patients would also go unrecognized in a cross-sectional study. Fourth, the data collected within NESDA are extensive, enabling to examine many possible determinants of recognition. Finally, the GPs were unaware of the CIDI diagnoses; all had to rely on their own judgment for diagnosis and treatment, which prevents a GP assessment biased by the interviews.

Some limitations also need addressing. First, our outcome variable 'recognition' was constructed by our group; we did not ask GPs directly whether they had recognized their patients as being depressed. Although asking about recognition can lead to higher recognition, because of increased awareness. Next, we did not take into account whether the respondent had discussed (or had wanted to discuss) depression with their GP. Third, some data on recognition (e.g. referral to mental health care) were collected retrospectively. In addition, the ICPC codes were missing in about 30% of the GP contacts, making them less reliable for assessing recognition. We dealt with this limitation by performing a subgroup analysis on the group of patients with at least one contact with the GP with an ICPC code. Fourth, our definition of recognition was partially based on the use of antidepressants and referral to mental health care. As a consequence, we partially measured 'active recognition'. Not all patients need treatment and some do not want treatment (or even a diagnosis of depression) because they consider it as stigmatizing (Barley et al., 2011). We perhaps missed patients that were recognized by their GP as being depressed but who did not receive treatment (neither a prescription for an antidepressant nor a referral to mental health care) or were fitted with an ICPC diagnosis of depression, but on the other hand recognition alone might not be sufficient to ensure adequate follow-up and treatment (Claxton et al., 2000; Hirschfeld, 2001; Melfi et al., 1998).

Table 4
Results of multilevel logistic regression analysis of subgroup with ICPC code (n = 361) with dependent recognition[a].

	Odds ratio	95% CI for odds ratio	p-value
Comorbid anxiety disorder past year	1.837	1.106–3.052	0.019
Contact with GP about mental problems	3.564	2.205–5.762	0.000
Number of symptoms of depression	1.313	1.064–1.619	0.011
Increased appetite	0.553	0.331–0.922	0.023

[a] Definition of recognition: diagnosis of depression or depressive symptoms or other psychiatric ICPC code by GP/use of antidepressant and/or referral to mental health care.

4.3. Comparison with literature

As our definition of recognition differed from those used in other studies, our percentage of recognized cases (60.5%) did too: Mitchell et al. 33.6% and Klinkman et al. 35% (Klinkman et al., 1998; Mitchell et al., 2009; Simon and VonKorff, 1995). It was however comparable to that of Wittchen et al. (2001), who reported that 59% (ICD-10) to 75% (DSM-IV) of the patients in their study were recognized. The results of a later study on recognition of depression in primary care, Joling et al. (2011) indicated that the used definition of recognition influences the percentage of recognition found.

4.3.1. Patient characteristics

In the present study age did not affect recognition, in contrast to others who found that older patients were better recognized (Wittchen et al., 2001). This may have been the result of including only patients between 18 and 65 years of age in our study. We did not find any gender differences either, in line with the results of Rifel et al. (2008). Patients without comorbid anxiety disorders were less often recognized. Comorbid anxiety and depression are common and have a worse prognosis compared to depression or anxiety alone (Penninx et al., 2011). It could be that these patients are more symptomatic and are therefore easier to recognize for the GP. In the current study however, this could also be an artefact. Our definition included the ICPC codes for feelings of anxiety and anxiety disorder. This is justifiable, as a substantial proportion of our population had comorbid anxiety disorder and depression and a correct ICPC code might not be required to ensure appropriate treatment. This brings us to the other part of the definition, i.e. the use of antidepressants and referral to mental health care, both of which are accepted treatment modalities for anxiety disorder as well. This in turn could lead to the increased recognition of patients with comorbid anxiety disorder.

4.3.2. Depression characteristics

Although less severe depression was less recognized in many studies (Klinkman et al., 1998; Simon and VonKorff, 1995; Tylee and Walters, 2007; Wittchen et al., 2001) and less severe depression was also less often recognized in our bivariate analysis, we found no significant independent association in the multivariate model. This is interesting, as we had expected severity to predict recognition. Perhaps patients with more severe depression presented more often with mental problems or more often suffered from comorbid anxiety disorders, thereby minimizing or neutralizing the independent effect of severity in the multivariate model. In our subgroup a decreasing number of depression symptoms led to decreasing recognition.

In the present study, no specific depression symptoms were associated with (non-) recognition in the total sample, while in the subgroup increased appetite led to worse recognition. The effect of specific symptoms on recognition was also investigated by Wittchen et al. (2001). In their multivariate analysis only 'loss of confidence' remained significant; however, because this item is in the ICD-10 but not in the DSM-IV it was not investigated in our study. Wittchen et al. found no other associations between recognition and specific depression symptoms. Clearly this issue, with two different results, warrants further investigation.

4.3.3. Patient–GP-interaction characteristics

In line with studies by Menchetti et al. (2009), Wittchen et al. (2001) and Furedi et al. (2003), as expected, we found that patients presenting with mental problems were better recognized.

None of the *GP characteristics* was associated with recognition, whereas Wittchen et al. found that physician experience of more than 5 years increased recognition and Tylee et al. reported that interest in psychiatry also increased recognition (Tylee and Walters, 2007; Wittchen et al., 2001).

4.4. Implications for clinical practice and future research

In addition to the reason for the encounter, and comorbid anxiety disorder, the number of symptoms of depression and increased appetite were associated with (non-)recognition of depression in primary care. Mental problems as the reason for encounter experienced the strongest correlation with recognition. It would therefore seem logical to prompt patients to present their mental problem to the GP. However, the GP's routine workday may be more somatically oriented than they are aware of. In a ±10-minute consultation, GPs often assess/exclude several somatic illnesses and manage the care of frequently multi-morbid patients. Such a busy schedule may not be optimal for an open discussion of sensitive issues sometimes charged with guilt and/or shame. A separate directly accessible pathway to cognitive behavioral therapy (as implemented in the UK) might be a better option.

The fact that GPs less often recognized patients with atypical features such as increased appetite, suggests that recognition may be improved by emphasizing to GPs that depression may also have atypical features. More studies on the effect of specific depression symptoms on the recognition of depression are needed to confirm (or contradict) the current findings.

Conflict of interest
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