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Chapter 2

The role of somatic health problems in the recognition of depressive and anxiety disorders by general practitioners

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ABSTRACT

Background

Recognition of depression and anxiety by general practitioners (GPs) is suboptimal and there is uncertainty as to whether particular somatic health problems hinder or facilitate GP recognition. The objective of this study was to investigate the associations between somatic health problems and GP recognition of depression and anxiety.

Methods

We studied primary care patients with a DSM-IV based psychiatric diagnosis of depressive or anxiety disorder during a face-to-face interview (n=778). GPs' registrations of depression and anxiety diagnoses, based on medical file extractions, were compared with the DSM-IV based psychiatric diagnoses as reference standard. Somatic health problems were based on self-report of several chronic somatic diseases and pain symptoms, using the Chronic Pain Grade (CPG), during the interview.

Results

Depression and anxiety was recognized in sixty percent of the patients. None of the health problems were negatively associated with recognition. Greater severity of pain symptoms (OR=1.18, p=.02), and chest pain (OR=1.56, p=.02), in particular, were associated with more GP recognition of depression and anxiety. Mediation analyses showed that depression and anxiety in these patients were better recognized through the presence of more severe psychiatric symptoms.

Limitations

Some specific chronic diseases had low prevalence.

Conclusions

This study shows that the presence of particular chronic diseases does not influence GP recognition of depression and anxiety. GPs tend to recognize depression and anxiety better in patients with pain symptoms, partly due to more severe psychiatric symptoms among those with pain.

INTRODUCTION

Somatic health problems, such as chronic diseases or pain, may possibly influence the recognition of depressive and anxiety disorders by general practitioners (GPs). We need better insight into the role of somatic health problems on the diagnostic accuracy of GPs, since the number of patients with somatic and psychiatric co-morbidity is large and increasing, and unrecognized depression or anxiety could lead to suboptimal care for this group¹⁻³. In general, studies on GP recognition of depression and anxiety report low to reasonable sensitivity, ranging from 20% to 68%⁴⁻¹³.

The potential consequences of unrecognized depression and anxiety, particularly in patients with somatic health problems, include increased rates of disability, decreased work productivity, greater use of medical services and lower somatic treatment adherence¹⁴⁻¹⁶. In patients with somatic health problems the likelihood of a GP missing a diagnosis of depression or anxiety could well be increased as psychiatric symptoms may be overlooked or seen as being part of the somatic condition. Lack of time is also a frequently reported reason for missing a psychiatric diagnosis in general practice¹⁷. In patients with somatic health problems, dealing with the physical symptoms might have priority over assessing depressive or anxiety symptoms¹⁸⁻²⁰.

However, it could also be argued that GPs' recognition of depression and anxiety is better in the physically unhealthy. Somatically unhealthy patients, tend to contact their GP more often, which gives the GP more opportunity to recognize mental health problem^{13;17;21;22}. This increased frequency of contact in a continuity of care setting may make the GP more familiar with the patient's social environment and communication manner, and clues to mental health problems might be picked up more easily²³. Moreover, somatic health problems may be associated with more severe psychiatric symptomatology, which has been shown to be associated with increased recognition of depressive and anxiety disorders⁷.

The few studies that report on the association between somatic health problems and GP recognition of depression and anxiety have shown inconclusive results. Some studies found no associations^{5;7;10}, while other studies found either lower²⁴⁻²⁷ or higher GP recognition rates²⁸. In the above-mentioned studies on GP recognition, somatic health problems were determined predominantly by non-specific general measures of chronic disease. Specific chronic diseases and pain symptoms might have a different impact on GP recognition of depression and anxiety. For specific somatic diseases there is limited evidence from previous studies, that GPs are more likely to detect mental health problems in patients with hypertension, but no association was found for patients with cardiac disease^{6;29}. To the best of our knowledge no study has investigated the role of pain in the GP recognition of depressive and/or anxiety disorders.

The objective of this study was to estimate to what extent somatic health problems, including specific chronic diseases and pain, are associated with GP recognition of depressive and/or anxiety disorders.

MATERIALS AND METHODS

Design

The Netherlands Study of Depression and Anxiety (NESDA) is a longitudinal ongoing cohort study comprising 2,981 patients (18-65 years old). Patients, recruited from community, general practice and secondary mental health care, were examined to investigate depressive and anxiety disorders. Penninx et al³⁰ provide a detailed description of the NESDA study design and sampling procedures. The Ethics Committee of participating universities approved the research protocol and written informed consent was obtained from all patients. Specially trained research staff conducted the interviews between 2004 and 2007.

Sample

For the present study, we used data only from the general practice patients (n=1,610), who were not being treated for psychiatric conditions in a psychiatric mental health care setting and were included in the NESDA study. Patients were recruited from 21 general practices in the vicinity of the cities of Amsterdam, Groningen, and Leiden. For the selection of general practice respondents, a three-stage screening procedure was used as described in a study by Penninx et al.³⁰. Kessler-10 screening questionnaires (K-10)³¹, were sent to a random sample of 23,750 patients who had consulted their GP in the last four months irrespective of reason for consultation. A screen-positive score on the K-10 was defined as a validated K-10 score of ≥ 20 , or a positive score on any of the additional questions³¹⁻³³. Respondents (n=10,706, 45%) who returned the screener were more likely to be female (59.3% versus 50.0%, $p < .001$) and older (44.4 versus 39.0 years, $p < .001$). Of these responders, the screen-positives (43%) were approached for a telephone screen interview consisting of the CIDI-short form. When they screened positive for depression and/or anxiety and were not being treated for psychiatric conditions in a psychiatric mental health setting (n=1,162), they were invited for the baseline NESDA interview. Besides the phone-screen positive respondents a randomly selected sample of screen-negatives were also invited. During this interview, a total of 1,610 general practice patients were assessed for having a depressive and/or anxiety disorder using the full DSM-IV based CIDI, life-time version 2.1^{34,35}. The CIDI is a highly reliable and valid instrument for assessing depressive disorders (major depressive disorder, dysthymia) and anxiety disorders (social phobia, generalized anxiety disorder, panic disorder, agoraphobia) and was used as reference standard for the presence of a depressive and/or anxiety disorder in this study. The life-time version of the CIDI allowed us to determine the recency of the episode. Of the 1,610 general practice patients, we included only those with a CIDI-based diagnosis of depressive and/or anxiety disorder in the past year (n=798). GPs and patients were blinded to the CIDI diagnoses. In addition to the interview, we used data extracted from the electronic medical

records (EMR) to determine recognition by GPs. Twenty patients were excluded, because they did not give permission to use their EMR. Our study thus comprised 778 patients with a depressive and/or anxiety disorder according to the CIDI for the present study.

Measurements

Recognition of depression and anxiety as recorded by the GP

The EMR data of the 778 patients were searched for registered depression/anxiety diagnoses from one year before until one year after baseline interview, to create a fixed period of time in which the GP had the opportunity to recognize depressive or anxiety disorders. GPs often do not consistently use registration codes for all diagnoses made during the patient contacts, therefore, we decided to define GP recognition of depression and anxiety using the most reliable and sensitive definition based on previous NESDA studies^{4,36}. GP recognition meant that at least one of three criteria was fulfilled:

1. The GP recorded either a diagnosis of depression and/or anxiety in the EMR according to International Classification of Primary Care codes³⁷: depressive disorder (P76), depressive feelings (P03), anxiety disorder (P74), phobic disorder (P79) or feeling anxious, nervous or tense (P01) or other psychological diagnoses (P02/ P04/ P06/ P27/ P73/ P75/ P77/ P78/ P82/ P86).
2. The GP prescribed psychotropic medication according to the Anatomical Therapeutic Classification system (antidepressant (N06A) or anxiety medication (N05BA benzodiazepines, N05BB anxiolytics, N05BE buspiron).
3. The GP made a referral to a mental health specialist (psychologist, psychiatrist, psychotherapist or social worker in either primary or secondary mental health care).

Somatic health problems

Chronic somatic disease

First, patients were asked in the face to face interview whether they had been diagnosed with any of the cited specific chronic somatic diseases (Table 1). In order to assess the chronic diseases most 'objectively', we considered chronic disease only to be present if the participant stated that the disease was being treated by a healthcare professional or when medication was being used. As in a previous study³⁸, we assessed the presence of seven categories of chronic diseases; cardiometabolic, pulmonary, endocrine, neurological, musculoskeletal, digestive disorders or cancer³⁷. We calculated the number of chronic diseases as the number of disease categories a participant had.

Pain

To assess pain over the last 6 months, the interview contained four different measures : a) 7 specific pain locations (joints in the extremities, back, neck, abdomen, chest, head and orofacial area), b) the number of pain locations c) duration of pain and d) chronic pain severity determined by the Chronic Pain Grade³⁹(CPG). First, the participant was asked to choose the most painful of the specific pain locations. All subsequent questions applied to this location. Then, the number of pain locations (0-7) was assessed. Next, duration of pain in the last six months was dichotomized as ≥ 90 days versus < 90 days, since the definition of chronic pain is usually pain lasting three months or more⁴⁰. Last, chronic pain severity was graded by measuring the intensity of pain and disability caused by pain using the CPG scale developed by Von Korff et al.³⁹:

- grade 1: low intensity-low disability
- grade 2: high intensity-low disability
- grade 3: high disability-moderately limiting
- grade 4: high disability-severely limiting

To exclude the pain symptoms that occurred only sporadically in the past six months, only the pain locations with at least a grade 2 on the CPG were taken into account, so that the more severe locations of pain (high intensity of pain and/or high disability caused by pain) were measured.

Mediators

In addition to the analyses of the association between the independent variables (chronic diseases and pain) and the outcome - GP recognition - we wanted to perform mediation analyses to determine whether the associations were direct or indirect through certain mediators. A mediator is an intervening variable that may account (statistically) for the relationship between the independent variables - somatic health problems - and the dependent variable - GP recognition⁴¹. We considered the number of contacts with the GP and severity of the depressive and/or anxiety symptoms to be possible mediating variables in the relationship between somatic health problems and GP recognition, since the presence of somatic health problems increases the number of GP contacts¹⁶ and exacerbates the severity of depression and anxiety^{38;42-44}. Both these factors could in turn result in changes to GP recognition^{7;10;45}. The number of times a patient contacted the GP was extracted from the EMR over the course of two years (the year before until the year after the baseline interview). The severity of depressive symptoms over the past month at baseline was measured using the Quick Inventory of Depressive Symptomatology -self-report^{46;47}. Self-reported severity of anxiety symptoms over the past month at baseline was measured using the Beck Anxiety inventory, measuring the severity of mainly arousal-related symptoms of anxiety⁴⁸, and through the Fear Questionnaire, measuring phobic symptoms^{49;50}.

Statistical analysis

We used descriptive statistics to describe sample characteristics, somatic health problems and recognition outcome. Logistic regression analyses were used to assess the association between somatic health variables and GP recognition of depressive and anxiety disorders, before and after adjustment for covariates (age and gender).

Additionally, for associations with $p < 0.10$ between somatic health problems and GP recognition, we performed mediation analyses, using the approach by Preacher and Hayes⁵¹. This method estimates the path coefficients in a multiple mediator model and generates bootstrap confidence intervals for total and specific indirect effects of somatic health problems on GP recognition of depression and anxiety through the mediators, the severity of depression and anxiety and number of GP contacts. For all analyses, we considered $p < 0.05$ as a cut-off for significance.

RESULTS

Characteristics of the 778 patients with a depressive and/or anxiety disorder according to the CID-I are described in Table 1. The mean age was 44.8 years and 70.6% were female. The patients visited their GP sixteen times on average over a period of two years. Based on data extracted from the EMR, GPs had recognized 59.6% of depressed and anxious patients. Of the recognized participants, 64.9% were recognized on the basis of more than one of the criteria presented in Table 1.

Table 2 describes the results of unadjusted and adjusted logistic regression analyses of the association between somatic health variables and GP recognition. Recognition of depression and/or anxiety was significantly better in patients with musculoskeletal disease (OR=1.75; 95% CI=1.08-2.82), endocrine disease (OR=2.78; 95% CI=1.03-7.47), a higher number of chronic diseases (per disease increase: OR=1.23; 95% CI=1.04-1.45), chest pain (OR=1.61; 95% CI=1.13-2.29) and a higher CPG (per grade increase: OR=1.19; 95% CI=1.03-1.38). However, these associations turned out to be borderline insignificant in the adjusted analyses. We also conducted the analyses for specific diseases within the chronic disease categories (the diseases with ^{*} if $N > 20$, see Table 1), in order to check whether the different diseases within the disease categories had a different impact on GP recognition. No major differences in the associations between the corresponding disease categories and GP recognition were found.

We conducted separate subgroup analyses for patients with a depressive disorder diagnosis (n=488) or anxiety disorder diagnosis (n=608) (see Table 3). The results for the associations between the somatic health variables and GP recognition of either depression or anxiety were rather similar since the confidence intervals were largely overlapping, indicating the consistency of associations across depression and anxiety patients.

We performed additional mediation analyses to determine to what extent the number of GP contacts and the severity of the depression and/or anxiety mediated the (borderline) significant effects for somatic health problems on GP recognition found in our adjusted logistic regression analyses (Table 4). First, in the mediation analyses we found that an increasing number of chronic diseases and CPG led to an increasing number of GP contacts. We also found that somatic health problems led to greater depression and/or anxiety severity (a in Table 4) and consequently that an increasing number of GP contacts and higher depression and anxiety severity were significantly associated with GP recognition (b in Table 4). There were no direct paths (c' in Table 4) for musculoskeletal and endocrine disease, number of chronic diseases, chest pain and CPG. However, severity of depression (significant indirect a x b effects in Table 4) mediated the associations between number of chronic diseases, chest pain and CPG, and GP recognition. The total effects (c in Table 4) of chest pain and CPG leading to increasing GP recognition through depression severity remained significant.

Table 1: Baseline Sample Characteristics.

Characteristics	Population (n=778)
<i>Sample characteristics</i>	
Female gender, N (%)	549 (70.6)
Age in years, Mean (SD)	44.8 (12.1)
Education in years, Mean (SD)	11.8 (3.4)
CIDI diagnosis, N (%)	
Depressive disorder	170 (21.9)
Anxiety disorder	290 (37.3)
Comorbid disorder	318 (40.8)
QIDS score (0-27), Mean (SD)	10.3 (4.7)
FQ score (0-120), Mean (SD)	30.9 (19.5)
BAI score (0-63), Mean (SD)	15.8 (10.2)
Number of GP contacts, Mean (SD)	16.6 (16.2)
<i>Somatic health characteristics</i>	
Chronic disease category, N (%)	
<i>Cardiometabolic</i>	
hypertension*, angina pectoris, history of cardiac disease*, stroke, diabetes*	164 (21.1)
<i>Respiratory</i>	
asthma*, chronic bronchitis*, pulmonary emphysema	87 (11.2)
<i>Musculoskeletal</i>	
osteoarthritis*, rheumatoid arthritis, systemic lupus erythematoses, fibromyalgia	89 (11.4)

Table 1 continued.

<i>Digestive</i>	
ulcer*, irritable bowel syndrome*, Crohn's disease, colitis ulcerosa, diverticulitis, liver cirrhosis, hepatitis, constipation*	101 (13.0)
<i>Neurological</i>	
migraine, epilepsy, multiple sclerosis, peripheral neuropathy, hernia	33 (4.2)
<i>Endocrine</i>	
thyroid dysfunction	25 (3.2)
<i>Cancer</i>	
throat, thyroid, lymphoid, lung, esophagus, bowel, stomach, liver, uterus, cervix, ovary, bladder, testicle, prostate, skin, brain, blood	24 (3.1)
Number of chronic diseases, Mean (SD)	0.7 (0.9)
<i>Pain Location, N (%)¹</i>	
Neck	305 (39.2)
Back	322 (41.4)
Head	329 (42.3)
Orofacial	98 (12.6)
Abdominal	257 (33.0)
Joints	281 (36.1)
Chest	179 (23.0)
Number of pain locations, Mean (SD) ¹	2.3 (2.5)
Duration of Pain ≥ 90 days	337 (43.3)
Chronic Pain Grade, Mean (SD)	1.9 (1.1)
<i>Recognition of depression and anxiety, N (%)</i>	
Depression diagnosis (ICPC P76/ P03)	121 (15.6)
Anxiety diagnosis (ICPC P74/P79/P01)	95 (12.2)
Other psychiatric diagnosis ²	54 (6.9)
Psychiatric medication prescribed	330 (42.4)
Referral to mental health care	179 (23.0)
Total Recognized (Diagnosis or medication or referral)	464 (59.6)

Abbreviations: QIDS= Quick Inventory of Depressive Symptoms, FQ= Fear Questionnaire, BAI= Beck Anxiety Inventory

* with N>20

¹ Pain locations were only taken into account when CPG ≥ 2

²Diagnosis based on ICPC P02/P04/P06/P27/P73/P75/P77/P78/P82/P86

Table 2: Associations between somatic health problems and GP recognition^a.

Baseline variable	GP recognition of depressive and/or anxiety disorder		GP recognition of depressive and/or anxiety disorder	
	Unadjusted analyses		Adjusted analyses ^c	
	OR (95% CI)	p	OR (95% CI)	p
<i>Chronic disease category</i>				
Cardiometabolic	1.22 (0.86-1.75)	.268	1.00 (0.68-1.48)	.992
Respiratory	1.12 (0.71-1.78)	.624	1.10 (0.69-1.76)	.675
Musculoskeletal	1.75 (1.08-2.82)	.023	1.60 (0.98-2.61)	.060
Digestive	1.19 (0.77-1.84)	.423	1.17 (0.76-1.81)	.474
Neurological	1.59 (0.74-3.38)	.233	1.42 (0.66-3.05)	.366
Endocrine	2.78 (1.03-7.47)	.043	2.55 (0.95-6.91)	.066
Cancer	0.95 (0.42-2.16)	.895	0.86 (0.37-1.98)	.718
Number of chronic diseases	1.23 (1.04-1.45)	.015	1.16 (0.97-1.39)	.097
<i>Pain location^b</i>				
Neck	1.17 (0.87-1.58)	.288	1.15 (0.85-1.55)	.358
Back	1.28 (0.95-1.71)	.104	1.26 (0.94-1.69)	.125
Head	1.09 (0.81-1.45)	.576	1.11 (0.83-1.49)	.485
Orofacial	1.03 (0.67-1.58)	.903	1.00 (0.64-1.54)	.989
Chest	1.61 (1.13-2.29)	.008	1.56 (1.09-2.22)	.015
Abdominal	1.18 (0.87-1.60)	.296	1.25 (0.91-1.70)	.170
Joints	1.28 (0.94-1.72)	.114	1.21 (0.89-1.64)	.195
Number of pain locations ^b	1.05 (0.99-1.11)	.105	1.05 (0.99-1.11)	.124
Duration of pain ≥ 90 days	1.17 (0.87-1.56)	.301	1.07 (0.79-1.44)	.656
Chronic Pain Grade	1.19 (1.03-1.38)	.017	1.18 (1.02-1.37)	.024

a Using logistic regression analyses

b Pain locations were only taken into account when CPG ≥ 2

c Adjusted for age and gender

Table 3: Associations between somatic health problems and GP recognition^{a,c}.

Baseline variable	GP recognition of depressive disorder		GP recognition of anxiety disorder	
	OR (95% CI)	p	OR (95% CI)	p
<i>Chronic disease category</i>				
Cardiometabolic	1.09 (0.65-1.83)	.736	0.99 (0.64-1.53)	.967
Respiratory	1.44 (0.77-2.70)	.259	1.17 (0.69-1.99)	.568
Musculoskeletal	1.54 (0.87-2.88)	.180	1.51 (0.90-2.56)	.125
Digestive	1.17 (0.67-2.04)	.580	1.12 (0.69-1.83)	.644
Neurological	1.67 (0.60-4.66)	.328	1.47 (0.63-3.43)	.378
Endocrine	1.52 (0.55-4.28)	.433	3.93 (1.14-13.5)	.030
Cancer	0.61 (0.22-1.68)	.338	0.80 (0.32-2.10)	.638
Number of chronic diseases	1.19 (0.95-1.49)	.141	1.17 (0.96-1.42)	.118
<i>Pain location^b</i>				
Neck	1.03 (0.70-1.50)	.891	1.18 (0.85-1.65)	.327
Back	1.20 (0.82-1.74)	.355	1.22 (0.88-1.70)	.242
Head	0.98 (0.67-1.44)	.935	1.12 (0.81-1.57)	.492
Orofacial	1.21 (0.70-2.09)	.490	0.99 (0.61-1.59)	.955
Chest	1.56 (1.00-2.43)	.048	1.62 (1.09-2.41)	.017
Abdominal	1.30 (0.88-1.93)	.192	1.32 (0.93-1.88)	.122
Joints	1.28 (0.87-1.88)	.211	1.14 (0.81-1.61)	.458
Number of pain locations ^b	1.05 (0.97-1.13)	.255	1.05 (0.98-1.12)	.164
Duration of pain ≥ 90 days	0.99 (0.67-1.45)	.960	1.01 (0.72-1.41)	.975
Chronic Pain Grade	1.12 (0.94-1.34)	.228	1.18 (1.00-1.40)	.045

a Using logistic regression analyses

b Pain locations were only taken into account when CPG ≥ 2

c Adjusted for age and gender

Table 4: Summary of Preacher and Hayes mediator model analyses (5000 bootstraps) between somatic health problems (IV), and GP recognition (DV)².

Somatic health problem variables (IV)	Mediating variable (M)	Dependent variable (DV)	Effect of IV on M (a)		Effect of M on DV (b)	Direct effect (c ¹)		Indirect effect (a x b)	95% CI (ab)		Total effect (c)	
			Effect on M	SE		effect	p		effect	p	effect	p
Chronic disease	Number of GP contacts	GP recognition	1.88	.01*	.41	.108	.02	(-.01;.21)	.48	.057		
	Depression severity, QIDS		.75	.05*			.04	(-.01;.09)				
	Anxiety severity, BAI		3.31	.000			-.001	(-.05;.04)				
Musculoskeletal	Anxiety severity, BAI		2.38*	.015			.04	(-.01;.14)				
	Number of GP contacts	GP recognition	-5.00	.01*	.89	.084	-.05	(-.09;.004)	.94	.064		
	Depression severity, QIDS		1.38	.05*			.06	(-.02;.22)				
Endocrine	Anxiety severity, FQ		8.99*	-.001			-.006	(-.12;.08)				
	Anxiety severity, BAI		5.16*	.014			.073	(-.001;.26)				
	Number of GP contacts	GP recognition	1.47*	.01*	.10	.289	.01	(-.01;.05)	.14	.109		
Number of chronic diseases	Depression severity, QIDS		.42*	.05*			.02	(.01;.06)^				
	Anxiety severity, FQ		1.93*	-.001			.001	(-.02;.02)				
	Anxiety severity, BAI		1.42**	.014			.02	(-.01;.06)				
Pain	Number of GP contacts	GP recognition	1.60	.01*	.23	.247	.01	(-.01;.07)	.45	.014		
	Depression severity, QIDS		2.71**	.04*			.12	(.03;.23)^				
	Anxiety severity, FQ		7.38**	.001			-.001	(-.07;.07)				
Chest pain ¹	Anxiety severity, BAI		8.15**	.01			.10	(-.05;.27)				
	Number of GP contacts	GP recognition	1.10*	.01*	.06	.421	.01	(-.01;.07)	.16	.032		
	Depression severity, QIDS		1.31**	.04*			.06	(.02;.24)^				
CPG	Anxiety severity, FQ		3.62**	.001			-.001	(-.07;.07)				
	Anxiety severity, BAI		2.66**	.01*			.04	(-.05;.27)				

Abbreviations: CPG= Chronic Pain Grade, QIDS= Quick Inventory of Depressive Symptoms, FQ= Fear Questionnaire, BAI= Beck Anxiety Inventory

* p<.05, ** p<.001, ^ significant based on 95% confidence interval (CI)

1 Pain location was only taken into account when CPG ≥ 2

2 Adjusted for age and gender

DISCUSSION

In this study we investigated the relationship between somatic health problems and GP recognition of depressive and anxiety disorders. Our results show that GP recognition, based on our analysis of EMR data, was almost 60%, and somatic health problems tended to be positively associated with GP recognition. More specifically, severe chest pain and greater severity of pain symptoms were found to be positively associated with GP recognition of depression and anxiety. Equally important, none of the somatic health problems were negatively associated with recognition.

In our study, reports of chest pain led to an increase of the recognition rate. Chest pain can have a somatic origin, but may also be a symptom of depression or anxiety^{52;53}. Consequently, the presence of chest pain could prompt a GP to suspect underlying problems that have a psychiatric origin. With our interview data we cannot definitively determine the origin of chest pain.

Our results suggest a dose-response relationship in line with Robbins et al²⁸, as a higher number of chronic diseases showed a trend towards increased recognition, and more severe pain complaints increase the likelihood that the GP will establish a psychiatric diagnosis. Consistent with the literature, pain ratings in these depressed and anxious patients were high^{54;55}. Since pain was positively associated with GP recognition through severity of depressive symptoms, both the reporting of pain symptoms and the signalling of affective symptoms could have led to the GP recognition of depression and anxiety. GPs might be increasingly focused on diagnosing psychiatric conditions in somatically unhealthy patients due to more recent literature and guidelines on depressive and anxiety disorders, which have paid a lot of attention to their comorbidity with somatic health problems^{56;57}. Our findings may help to underline the unique and important role that GPs have in being able to diagnose both psychiatric and somatic health problems in the same patient in a continuity of care setting. Evaluating the EMR data over the course of two years may have contributed to ascertaining a recognition rate of almost 60%, which is rather high compared to previous studies^{11;12}. And even though GPs recognized the majority, in 40% of cases the depressive or anxiety disorder was not recognized. Not recognizing a depressive or anxiety disorder is only problematic if non-recognized patients have a worse outcome than recognized patients. So far, studies have found that GP recognition of depression did not affect outcome over the course of a few years, probably due to higher severity of baseline depressive symptoms in the recognized (and treated) patients^{58;59}. However, previous research has shown that course and treatment outcomes of depressive and anxiety disorders are negatively affected by somatic health problems even independent of psychiatric symptom severity^{1;38;42;60-62}. It would thus be interesting to know the difference in course of recognized and treated depressed or anxious somatically unhealthy patients compared to similar untreated patients. Our data are not suitable for answering this question.

This study has several strengths. To our knowledge, this large cohort study is the first to examine different indicators of somatic health problems in relation to GP recognition of depression and anxiety. Also, our definition of GP recognition - based on diagnosis, medication and referral - was investigated in previous studies, thus enabling us to construct the most reliable definition for these data^{4,36}. EMR data were evaluated over a 2-year period rather than using a single cross sectional assessment of recognition by the GP⁶³.

This study has a number of limitations. Some associations between specific chronic diseases and GP recognition may have gone undetected due to the low power of infrequently reported diseases. With our design we were only able to examine EMR data, but we could not interview the GPs about whether they believed patients suffered from a depression or anxiety in the period close to the baseline interview. Research has shown this latter method leads to higher recognition rates¹². We did not specifically assess the reason why antidepressants were prescribed by GPs. It might therefore be possible that antidepressants were prescribed for analgesic purposes, which could lead to an overestimation of GP recognition. However, Dutch GP guidelines do not recommend prescribing antidepressants for pain. Primary care studies have reported that less than 5% of all patients using antidepressants received these for pain^{64,65}. Patients could only be included if they had visited their GP in the past four months. Of the initially screened population, a small proportion was eventually studied for GP recognition of depression and anxiety. In the sampling procedure female and older patients (>40 years of age) were more willing to participate. Adjusting for gender and age in the analyses, however, hardly changed our associations. Psychopathology status was not found to be associated with willingness to respond in the general practice sample of NESDA⁶⁶, making it unlikely that we had a very biased sample of depressive and/or anxiety patients sample. In the Netherlands everyone has to be registered with a GP, and GPs, who have had uniform vocational training, serve as gatekeepers in the health care system, making it likely that findings are representative for other Dutch regions. Since health care systems vary considerably across countries, the findings on GP recognition could well differ in other nations. The last limitation is that the statistical mediation model assumes temporal direction of causal order (i.e. independent variable precedes mediator, and mediator precedes outcome variable). However, due to the study design, causality cannot definitively be attributed.

In conclusion, this study examined the influence of somatic health problems on GP recognition of depression and anxiety. Severe chest pain and greater severity of pain symptoms were found to be associated with better GP recognition. None of the somatic health problems were associated with poorer recognition. GPs tend to recognize depressive and anxiety disorders better in somatically unhealthy patients, who, in general are at higher risk for recurrent and chronic mental health problems.

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