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The role of personality in comorbidity among anxiety and depressive disorders in primary care and specialty care: a cross-sectional analysis

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Abstract

Objective: Almost no cross-sectional studies directly compared the rate and pattern of comorbidity of affective disorders in relation to personality traits of patients seen in primary care versus specialty mental health care.
Method: Using data from the Netherlands Study of Depression and Anxiety, we compared 1086 primary care patients with 790 consecutive specialized mental health care patients. All participants had at least one lifetime *Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition*-based diagnosis of depression or anxiety. Personality was assessed with the NEO Five-Factor Inventory.
Results: In both settings it was common to have at least one lifetime comorbid affective disorder. Compared to primary care patients, specialty care patients showed elevated scores for Neuroticism and lower scores for Extraversion and Conscientiousness. The odds of having another disorder given any one disorder was no longer significant after accounting for personality dimensions. Only Neuroticism proved to be positively associated with comorbidity per se.
Conclusions: Prevalence of and comorbidity among anxiety and depressive disorders in primary care were very similar to those in specialty care. Neuroticism — but no other personality traits — may help to understand the comorbidity among anxiety and depressive disorders irrespective of recruitment setting.
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Keywords: Comorbidity; Care setting; Neuroticism; Anxiety; Depression

1. Introduction

The overall aim of the present cross-sectional study is to directly compare the rate of comorbidity among anxiety and depressive disorders and basic personality traits in primary care versus specialized mental health care patients and to assess whether the role of personality traits in these comorbidities differs between recruitment settings. Most persons with an anxiety or depressive disorder are more likely to see a primary care physician than a mental health care specialist for both diagnosis and treatment [1]. Primary care has become pivotal for the diagnosis and treatment of anxiety and depression disorders according to practice guidelines in various countries [2,3]. According to these guidelines, specialized mental health care is indicated for more severe, complex and chronic patients or patients with other characteristics indicative of a poor prognosis.

Strikingly, little empirical evidence exists about differences in characteristics between patients with affective disorders in these settings. Studies directly comparing primary care and specialty care patients within health care services are scarce and mostly directed to patients with major depressive disorder and seldom using comprehensive screening procedures in order to also include patients who were not recognized by their primary physician to suffer from an

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affective disorder [4–9]. In a recent large-scale study among representative patient populations from primary care versus specialty care [10], patients with a major depressive disorder in primary care did not differ markedly from psychiatric outpatients in their clinical characteristics as assessed with a semi-structured clinical interview. Based on the available studies in patients with major depression, it seems that depressive primary care patients tend to be older, more often female and less educated than specialists' patients.

Many community-based epidemiological studies [11,12] show a high degree of comorbidity among depressive and anxiety disorders. Because existing guidelines stress a rational allocation of resources and cooperation between primary care and specialized mental health care and state that specialized care is indicated for more severe, complex and chronic patients, a higher prevalence of comorbidity among anxiety and depressive disorders in specialized care is to be expected [2,3]. However, because the presence of affective disorders is often not recognized in primary care, general practitioners may fail to refer the indicated patient group with more severe and comorbid affective disorders to specialized mental health care attenuating differences in rate of comorbidity among these recruitment settings [5]. As far as we know, available studies give almost no information about differences in comorbid Axis I disorders between primary care and specialty care settings. A notable exception is a recent study based on the STAR*D study reporting that at least 1 comorbid psychiatric disorder is quite common in primary care patients with a depression detected by their general practitioner, although slightly less common than in specialty care patients [8].

Personality dimensions may be particularly relevant for the high comorbidity of depressive and anxiety disorders [13]. According to the reformulated integrative hierarchical model of depression and anxiety [14], a general factor is shared between the anxiety and depressive disorders, specific factors are linked to some disorders, but not others, and unique factors are not shared with any other disorder. Applying this model to personality psychopathology research, the comorbidity among depressive and anxiety disorders can be conceptualized to be the result of the influence of neuroticism or negative emotionality as a general factor and extraversion as a specific factor. Other personality traits (such as conscientiousness) could be unique for a specific disorder and consequently do not contribute to comorbidity because they are uncorrelated to different disorders by definition.

Numerous existing studies have established that neuroticism or negative emotionality is relevant for the full range of depressive and anxiety disorders. Extraversion or positive emotionality has shown more specific negative associations with depression and among the anxiety disorders with social phobia in particular [15–18]. Research using not only one or both of these personality characteristics, but using the more comprehensive Five-Factor conceptualization of personality in order to compare these five primary characteristics against each other using the same sample and measures is of a more recent date. These studies support the conclusions that in addition to high Neuroticism and low Extraversion, also low Conscientiousness and low Agreeableness are related to affective disorders [19]. Consistent with these findings several studies have reported that high neuroticism and low extraversion is more common in participants with two or more psychiatric disorders compared to those with one disorder [17,20–23]. As far as we know, there are no studies of differences in basic personality traits between patients with affective disorders from primary care versus from specialty care, nor studies investigating whether the role of personality traits in comorbidity among anxiety and depressive disorders differs between both recruitment settings.

The main purpose of the current study was twofold: to investigate possible differences in comorbidity of affective disorders and basic personality traits in primary care versus specialized mental health care patients and to assess the predictive value of personality traits for comorbidity across recruitment settings. The following key hypotheses were forwarded: (a) compared to primary care patients, specialty care patients will manifest a higher comorbidity of anxiety and depressive disorders and a higher level of neuroticism and a lower level of extraversion although the magnitude of these differences will be limited; (b) in both recruitment settings, high neuroticism as a general factor will predict the association among anxiety and depressive disorders (comorbidity), while the predictive value of extraversion as a specific factor will be confined to the association among specific depressive and anxiety disorders (in particular the comorbidity among dysthymia, major depressive disorder and social phobia). Given the preliminary nature of the empirical evidence on relationships of anxiety and depressive disorder with agreeableness, conscientiousness and openness to experience, no specific hypotheses regarding the role of these personality traits in comorbidity among anxiety and depressive disorders were formulated.

2. Methods

2.1. Participants and setting

The data for the present study were drawn from the Netherlands Study of Depression and Anxiety (NESDA), an ongoing 8-year longitudinal cohort study aimed at examining the long-term course of depressive and anxiety disorders in different health care settings and phases of illness. A total of 2981 respondents were recruited from primary care (n=1610), specialized mental health care (n=807) and the community (n=564), including healthy controls, respondents with subthreshold symptoms and those with an anxiety and/or depressive disorder. For the present study, only respondents recruited in primary care or specialized care settings were included. All respondents were administered a baseline assessment, which lasted on average four hours and included

assessment of psychopathology, demographic and personal characteristics, psychosocial functioning and biomarkers. Further details about NESDA are provided elsewhere [24]. A general inclusion criterion was an age of 18 through 65 years. Excluded were patients with a primary diagnosis of psychotic disorder, obsessive-compulsive disorder, bipolar disorder or severe addiction disorder (requiring care in specialized addiction clinics). A second exclusion criterion was not being fluent in Dutch. The study protocol was approved centrally by the Ethical Review Board of the VU Medical Centre Amsterdam and subsequently by local review boards of each participating centre/institute. After full verbal and written information about the study, written informed consent was obtained from all participants.

2.2. Measures

Detailed sociodemographic data were collected, including age, sex and years of education. The lifetime diagnoses of depressive (Dysthymia , Major Depressive Disorder) and anxiety disorders [Generalized Anxiety Disorder (GAD), Social Phobia, Panic disorder with or without Agoraphobia or Agoraphobia] were established with the Composite Interview Diagnostic Instrument (CIDI) psychiatric interview (World Health Organization life time version 2.1; Dutch version [25]), which classifies diagnoses according to the *Diagnostic and Statistical Manual for Mental Disorders, Fourth Edition* (*DSM-IV*) criteria [26]. The CIDI is used worldwide and WHO field research has found high interrater reliability [27], high test-retest reliability [28] and high validity for depressive and anxiety disorders [29,30]. Specially trained clinical research staff conducted the CIDI interview. *DSM-IV* exclusion rules with respect to somatic causes for the mental disorders were applied, but to allow research into co-occurrence of depressive and anxiety disorders hierarchy-free diagnoses were made. The present study assessed the co-occurrence of any depressive or anxiety disorder with another anxiety or depressive disorder.

Personality was operationalized using the 60-item NEO Five-Factor Inventory (NEO-FFI) [31]; Dutch version [32]. The NEO-FFI questionnaire measures the following five personality domains: Neuroticism, Extraversion, Agreeableness, Conscientiousness and Openness to Experience. Internal consistency values range from .74 to .89 [31]. Cronbach's alpha's of the NEO-FFI subscales in NESDA were: Neuroticism=.75; Extraversion=.78; Agreeableness=.83; Conscientiousness=.78; and Openness to Experience=.72.

2.3. Statistical analyses

Differences between recruitment settings in demographic and personality characteristics were analyzed with *t* tests for independent samples or chi-square analyses if appropriate. The magnitude of between-group differences was assessed by calculating Cohen's *d* with respect to continuous variables and φ for 2×2 chi-square tests for independence and Cramer's *V* when there was more than 1 *df* for the chi-square test.

The association of demographic and personality variables with comorbidity among anxiety and depressive disorders was analyzed with second-order generalized estimating equations (GEE2), a powerful method for modeling associations among disorders [33,34]. GEE2 allows analysis of the dependency of correlated binary variables (comorbidity) on additional factors (such as demographic characteristics and personality dimensions) through regression modeling. The association is expressed in an odds ratio (OR), which in the present study describes the odds of having one disorder given another (comorbidity). Because in contrast to logistic regression analysis with GEE2 more than one pair of disorders at a time can be analyzed, it is possible to calculate separate pairwise ORs, but also a summary OR (SOR), which describes the odds of having another disorder given any one disorder. To the extent that variables have similar effects on bivariate associations within a cluster (i.e., anxiety and depression clustering within individuals), using the SOR provides increased power to detect such relationships. GEE2 analyses were conducted in consecutive stages. Age, years of education and scores on personality dimensions were standardized to have a mean score of 0 and a standard deviation of 1. Gender was coded as a dummy variable ("0"=male; '1'=female). First, unadjusted (S)ORs among anxiety and depressive disorders were calculated. Secondly, (S)ORs for the association among anxiety and depressive disorders were calculated after controlling for the relationship of these disorders with demographic variables. In the third stage, (S)ORs were calculated after also controlling for personality predictor variables. Next, in order to investigate whether personality predictor variables differentially predict comorbidity, recruitment setting and five interaction terms expressing the interaction of recruitment setting with each of the personality dimensions were forced into the model. In the last stage GEE2 was used to check whether the SORs were moderated by the personality dimensions after controlling for relevant demographic and personality variables [17]. Since GEE2 is not able to do this with continuous explanatory variables, we categorized the personality dimensions into three categories (low, average and high). To this end, scores on the five NEO-FFI personality subscales were split into three categories using the (approximate) 33 and 66 percentile. With these last analyses, it is investigated whether personality dimensions affect the odds of having another disorder given that a person has one disorder, adjusting for the relationship of disorders with relevant demographic and personality predictor variables. Analyses were carried out by SAS (version 9.1) and SPSS (version 16.0). A relatively strict significance level of .01 was used for all comparisons. Although setting alpha smaller than the usual .05 level decreases our power to detect small effects, a stricter level is needed for controlling the family wise error rate when multiple comparisons are made. Given our large sample of participants, we had enough power for still detecting moderate to large effects, which are clinically more relevant. All tests were two-tailed.

3. Results

3.1. Demographic and clinical characteristics

One thousand nine hundred three Participants from primary care and specialty care organizations had at least one lifetime anxiety or depressive disorder. Complete data on personality traits were available for 1876 of these 1903 participants (98.6%). One thousand eighty-six Participants were recruited through primary care organizations and 790 participants through mental health care organizations. As can be derived from Table 1, primary care patients differed from specialty care patients with respect to several characteristics. Restricting ourselves to significant between-group differences with at least a medium effect size, it appears that specialty care patients are younger and obtained higher scores for Neuroticism and lower scores for Extraversion and Conscientiousness. Of note is that although the prevalence of anxiety and depressive disorders differed between recruitment settings and although specialty care patients manifested a significantly higher degree of comorbidity, these differences in type of disorder and prevalence of comorbidity all have a small effect size. Also after controlling for the number of lifetime disorders, the differences in Neuroticism [$F(1,2414)=4757.82$, $P<.001$], Extraversion [$F(1,2414)=3779.32$, $P<.001$] and Conscientiousness [$F(1,2414)=3836.11$, $P<.001$] between recruitment setting remained statistically significant.

3.2. Unadjusted lifetime comorbidity among anxiety and depressive disorders in primary care and specialty care patients

Unadjusted comorbidity among the six anxiety and depressive disorder is shown in Table 2. The summary OR (SOR) for both the primary care sample (SOR=1.11, 95% CI=1.03–1.20, $P<.01$) and specialty care sample (SOR=1.32, 95% CI=1.19–1.46, $P<.001$) was significantly greater than 1.0. The SOR for both samples combined was 1.22 (95% CI=1.15–1.30, $P<.001$). Dysthymia had a significant and positive association with Major Depressive Disorder, GAD and Social Phobia and Social Phobia with Agoraphobia both in primary care and specialty care patients. Major Depressive Disorder was only significantly and positively related to GAD in specialty care patients.

3.3. Lifetime comorbidity among anxiety and depressive disorders adjusted for demographic and personality characteristics

After controlling for demographic characteristics of the participants (i.e., age, gender and education), the SOR of

Table 1
Demographic, clinical and personality characteristics of primary care and specialty care patients

	Recruitment setting				t Test/χ^2	Effect size
	Primary care (n=1086)		Mental health care (n=790)			
	Mean/n	S.D./%	Mean/n	S.D./%		
Female gender (n)	779	71.7%	490	62.0%	χ^2=19.27**	φ=.10
Age (years)	45.6	12.0	38.2	11.3	t=13.68**	d=.63
Education (years)	12.1	3.4	11.8	3.2	t=1.99*	d=.09
Type of disorder:						
Dysthymia (n)	296	27.3%	251	31.9%	χ^2=4.77*	φ=.05
Depression (n)	863	79.5%	678	86.3%	χ^2=14.17**	φ=.09
GAD (n)	360	33.2%	291	37.0%	χ^2=2.97	φ=.04
Social phobia(n)	371	34.2%	368	46.8%	χ^2=30.41**	φ==.13
Panic disorder (n)	368	33.9%	387	49.2%	χ^2=44.44**	φ=.15
Agoraphobia (n)	140	12.9%	81	10.3%	χ^2=2.95	φ=.03
No. of disorders	2.2	1.1	2.6	1.2	t=7.37**	d=.18
Comorbidity:					χ^2=57.29**	V=.09
1 Disorder only (n)	370	34.1%	169	21.4%		
2 Disorders (n)	314	28.9%	226	28.6%		
3 Disorders (n)	239	22.0%	197	24.9%		
4 Disorders (n)	131	12.1%	139	17.6%		
5 Disorders (n)	32	2.9%	59	7.5%		
Personality factors:						
Neuroticism	38.2	7.9	42.1	7.0	t=11.43**	d=.64
Extraversion	36.1	6.7	33.2	7.0	t=9.19**	d=.42
Openness	31.3	5.4	31.0	5.6	t=1.06	d=.05
Agreeableness	43.4	5.2	42.8	6.0	t=2.08*	d=.10
Conscientiousness	37.3	5.9	34.7	6.7	t=8.41**	d=.44

* $P<.05$.
** $P<.001$.

Table 2
Unadjusted odds ratios and 95% confidence intervals for lifetime anxiety and depressive disorders in primary care (lower triangle) and specialty care patients (upper triangle)

	Dysthymia	Depression	GAD	Social phobia	Panic disorder	Agoraphobia
Dysthymia	–	3.05*** (1.75–5.31)	2.56*** (1.88–3.48)	1.54** (1.14–2.09)	1.10 (0.81–1.48)	1.21 (0.75–1.96)
Depression	4.00*** (2.54- 6.31)	–	1.63* (1.04–2.55)	0.98 (0.65–1.47)	0.81 (0.43–1.53)	0.69 (0.46–1.04)
GAD	2.67*** (2.02–3.52)	1.07 (0.78–1.47)	–	1.61*** (1.20–2.16)	1.06 (0.66–1.70)	1.37* (1.02- 1.83)
Social phobia	1.49** (1.13–1.96)	0.72* (0.53–0.98)	1.05 (0.81–1.38)	–	1.18 (0.75–1.88)	2.12*** (1.59–2.82)
Panic disorder	1.29 (0.98–1.71)	0.58** (0.39–0.86)	1.01 (0.69–1.47)	0.86 (0.58–1.25)	–	0.00 (0.00–0.00)
Agoraphobia	0.94 (0.63–1.41)	0.70* (0.51–0.94)	0.98 (0.75–1.28)	1.18*** (1.39–2.35)	0.00 (0.00–0.00)	–

* $P<.05$.
** $P<.01$.
*** $P<.001$.

having another disorder given any one disorder was marginally reduced to 1.21 (95% CI=1.14–1.29). When these analyses were repeated after also including the personality predictor variables into the model, however, the SOR was significantly lower (SOR=1.01, 95% CI=0.95–1.07) and no longer significant ($P=.75$). Table 3 shows the relationships of demographic (age, gender and education) and the five personality predictor variables with prevalence of life time anxiety or depressive disorder. As can be derived from Table 3, Neuroticism was significantly associated with the prevalence of each of the six anxiety and depressive disorders except Agoraphobia (all $P<.001$). Extraversion showed an inverse and significant relationship with the prevalence of Dysthymia, Major Depressive Disorder and Social Phobia (all $P<.001$). Openness showed a significant and positive relationship with Dysthymia only ($P<.01$) and Conscientiousness showed a significant and positive association with Panic Disorder only ($P<.01$). Agreeableness had only a borderline significant and inverse relationship with the prevalence of GAD ($P<.05$).

Next, we forced recruitment setting and the interaction of recruitment setting with each of the personality dimensions into the model (SOR=1.00, 95% CI=0.94 1.07, $P=.88$). Recruitment setting was only significantly related to the prevalence of Panic Disorder (OR=1.87, 95% CI=1.52–2.32; $P<.001$) with a higher prevalence of Panic Disorder in specialty care than in primary care. However, none of the interaction terms representing the interaction of recruitment setting with personality dimensions showed a significant relationship with the prevalence of anxiety and depressive disorders.

3.4. Adjusted lifetime comorbidity among anxiety and depressive disorders, stratified by personality scores

Controlling for demographic characteristics and the five personality dimensions as predictors of prevalence, the association between personality dimensions and comorbidity per se was analyzed (see Table 4). Analogous analyses with logistic regression would test for the interaction of a particular personality dimension and the likelihood of one disorder given another particular disorder. These analyses revealed that of the five personality dimensions, only Neuroticism moderated comorbidity among anxiety and depressive disorders as the confidence interval for the SORs of patients with high levels of Neuroticism (SOR=1.15, 95% CI=1.04–1.28) did not overlap with the confidence interval for the SOR of patients with low levels of Neuroticism (SOR=0.80; 95% CI=0.71–0.91), while patients with medium levels of Neuroticism scored in between (SOR=1.03; 95% CI=0.93–1.15).

4. Discussion

This study constitutes the first direct comparison of anxious and depressed primary care and specialty care

Table 3
Adjusted odds ratio's and 95% confidence intervals for demographic and personality predictors of lifetime anxiety and depressive disorders

	Dysthymia	Depression	GAD	Social phobia	Panic disorder	Agoraphobia
Gender	1.41 (0.91–1.47)	1.20 (0.92–1.58)	1.07 (0.86–1.33)	0.98 (0.79–1.22)	1.15 (0.93–1.42)	1.12 (0.81–1.55)
Age	1.34*** (1.20–1.52)	0.99 (0.86–1.13)	1.10 (0.99–1.22)	0.96 (0.86–1.06)	.90* (0.81–0.99)	1.29** (1.10–1.52)
Education	0.95 (0.84–1.07)	0.98 (0.85–1.13)	0.97 (0.87–1.08)	1.01 (0.90–1.13)	0.79*** (0.71–0.88)	.91 (0.79–1.05)
Neuroticism	1.58*** (1.38–1.83)	1.40*** (1.20–1.64)	1.64*** (1.44–1.86)	1.72*** (1.51–1.97)	1.36*** (1.20–1.54)	1.03 (0.85–1.23)
Extraversion	0.69*** (0.61–0.80)	0.70*** (0.60–0.82)	0.94 (0.83–1.06)	0.77*** (0.68–0.87)	1.03 (0.92–1.16)	.88 (0.74–1.06)
Openness	1.18** (1.06–1.33)	1.06 (0.92–1.21)	1.12* (1.01–1.25)	0.97 (0.87–1.08)	1.07 (0.96–1.18)	0.96 (0.82–1.12)
Agreeableness	0.93 (0.83–1.04)	1.06 (0.92–1.21)	0.89* (0.80–0.99)	1.04 (0.93–1.16)	1.04 (0.94–1.16)	0.95 (0.81–1.11)
Conscientiousness	1.00 (0.88–1.12)	1.06 (0.91–1.23)	1.06 (0.95–1.19)	1.00 (0.89–1.12)	1.17** (1.05–1.31)	1.05 (0.90–1.23)

* $P<.05$.
** $P<.01$.
*** $P<.001$.

Table 4
Adjusted summary odds ratios for lifetime comorbidity among anxiety and depressive disorders stratified by personality factors

	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
Low	0.80*** (0.71–0.91)	1.34*** (1.18–1.53)	1.38*** (1.19–1.60)	1.42*** (1.23–1.63)	1.24** (1.09–1.41)
Medium	1.03 (0.93–1.15)	1.33*** (1.16–1.54)	1.26** (1.09–1.45)	1.18* (1.04–1.35)	1.40*** (1.19–1.65)
High	1.15** (1.04–1.28)	1.16 (0.98–1.37)	1.24** (1.07–1.43)	1.27** (1.08–1.49)	1.24** (1.07–1.44)

Personality factors are split in three categories using the (approximate) 33 and 66 percentile separately for each sample.
* $P<.05$.
** $P<.01$.
*** $P<.001$.

patients with respect to comorbidity among anxiety and depressive disorders and basic personality traits. A major strength of the comparison is the large sample of patients who effectively represented primary and specialty care patients by screening eligible patients in both recruitment settings and consequently also detecting previously undiagnosed patients in primary care. The results replicate those of previous studies in patients with major depressive disorder and expand those to patients with various affective disorders. As has previously been reported with regard to depressed patients, primary care patients seem to be older and more often female than specialists' patients [8]. Prevalence of the various anxiety (GAD, Social Phobia and Agoraphobia) and depressive disorders (Dysthymia and Major Depressive Disorder) did not differ substantially between the two recruitment settings [6,8,10], although Panic disorder with or without Agoraphobia was significantly more prevalent in specialty care patients. Moreover, in both settings, it was common to have at least one comorbid affective disorder, although it was slightly less common in primary care (65.9%) than in specialty care settings (78.6%). Also, the specific lifetime comorbidities among anxiety and depressive disorder proved to be highly comparable [8]. In particular the co-occurrence of Dysthymia with Major Depressive Disorder, GAD and Social Phobia and the co-occurrence of Social Phobia with Agoraphobia was much more likely than one would expect simply by chance. These disorders are not only co-occurring but in some way significantly intercorrelated and this covariation of diagnoses may be called real comorbidity of diagnoses [3]. Because the psychiatric characteristics of primary care patients proved to be surprisingly similar to those of specialty care patients, also primary care physicians should assume that most patients with one affective disorder will have more that one diagnosis.

With regard to basic personality traits (i.e., Neuroticism, Extraversion, Agreeableness, Conscientiousness and Openness to Experience), some interesting differences between-recruitment settings emerged. Specialty care patients showed elevated scores on the traits of Neuroticism and lower scores on the traits of Extraversion and Conscientiousness of the Big Five personality factor model. Neuroticism and Extraversion constitute the "Big Two" dimensions of temperament. These differences on both temperamental dimensions may be related to the somewhat higher degree of (comorbid) affective disorders in specialty care patients. Alternatively, primary care doctors may be more inclined to refer patients with higher Neuroticism and lower Extraversion and Conscientiousness to more specialized mental health care. Additionally, in studies of determinants of service use for mental health problems, Neuroticism proved to be the only factor which, controlling for all other determinants in the model, showed the strongest association both with the occurrence of an affective disorder and with the utilization of specialized services for mental health problems in particular [35].

A second aim of the present study was to investigate whether the Big Five basic normal personality traits play a similar role in the comorbidity among anxiety and depressive disorders across both recruitment settings. Overall results were consistent with the basic assumption that high Neuroticism can be found across all anxiety and depressive disorders (except Agoraphobia which was only related to older age), while low Extraversion was positively related to Dysthymia, Major Depressive Disorder and Social Phobia. In contrast, the traits of Agreeableness, Conscientiousness and Openness to experience only proved to be related to one particular disorder (GAD, Panic Disorder and Dysthymia, respectively). Since these dimensions may constitute factors unique for a particular disorder they a fortiori cannot account for comorbidity among anxiety and depressive disorders because they are uncorrelated to different disorders. In line with these results, it was shown that the summary odds of having another disorder given any one disorder was greatly reduced and even no longer statistically significant after accounting for relationships of personality variables and disorder prevalence in both recruitment settings. These data suggest that the association among anxiety and depressive disorders relies to a large extent on the common association with Neuroticism [17,20,21,37] and to a lesser extent with Extraversion [17,20].

In addition, we found evidence that after controlling for demographic and personality variables, only Neuroticism showed a statistically significant relationship with comorbidity per se. Independent of prevalence, participants with high Neuroticism were more prone to develop comorbid affective disorders compared to participants with low Neuroticism, who were less likely to develop a comorbid disorder. Our findings are consistent with the notion that Neuroticism as a basic "temperamental core" [15] may

constitute a liability for developing comorbid affective disorders. Because Neuroticism may be heritable [36–38] and may account for the onset, overlap and course of depression and anxiety [22], the possibility of a common genetic liability between Neuroticism and comorbid internalized disorders seems a promising avenue for further research [39,40].

There are several reasons to think that the current data deserve serious considerations: (a) a direct comparison of primary care and specialty care patients within health care services using comprehensive screening procedures in order to also include patients who are not recognized by their primary physician to suffer from an affective disorder; (b) the detailed assessment of anxiety and depressive disorders and all personality traits of the Big Five factor model, using well-validated face-to-face semi-structured interview (CIDI) and self-report measures (NEO-FFI) and (c) a large sample size adequate for modeling multivariate associations among disorders.

The present study however has also important limitations. The first one is its cross-sectional nature. Although the most prominent theories favor predispositional and pathoplastic explanations for the effect of personality on psychopathology [41,42], the predominant use of cross-sectional designs preclude definitive directional conclusions about the relationship of personality dimensions and psychopathology. In a cross-sectional study, state-trait confounding may have resulted in over-adjustment in our adjusted estimates of comorbidity. Because anxiety and depression may elevate measures of personality traits, these traits may not perfectly reflect premorbid personality traits. A second important limitation is that the present study focused on only some of the anxiety disorders and that in order to study the full range of comorbidity among anxiety with depressive disorders a greater range of anxiety disorders would have been preferable (e.g., also including simple phobia, obsessive-compulsive disorder and posttraumatic stress disorder). Third, by using the NEO-FFI, only higher-order personality traits were investigated. Some previous studies using the longer NEO Personality Inventory have shown that lower-order personality traits may constitute factors specific for certain disorders [e.g., low trust (A) for social phobia and agoraphobia] or may be even unique for a specific disorder [e.g., low competence and achievement striving (C) for social phobia] [43].

In conclusion, the boundaries between primary care and psychiatric settings are less clear cut than conventional wisdom suggests and indicate that enhanced cooperation between settings, and a more sharply defined, more structured division of labor to promote effective treatment seems warranted [10]. Moreover, Neuroticism may constitute a common vulnerability and as an “ubiquitous” component of distress disorders may help to understand the comorbidity among anxiety and depressive disorders [13,14] irrespective of recruitment setting.

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