



The association between somatization and disability in primary care patients



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ABSTRACT

Background: Patient encounters for medically unexplained physical symptoms are common in primary health care. Somatization ('experiencing and reporting unexplained somatic symptoms') may indicate concurrent or future disability but this may also partly be caused by psychiatric disorders. The aim of this study was to examine the cross-sectional and longitudinal association between somatization and disability in primary care patients with and without anxiety or depressive disorder.

Methods: Data were obtained from 1545 primary care patients, participating in the longitudinal Netherlands Study of Depression and Anxiety (NESDA). Somatization was assessed using the somatization scale of the Four-Dimensional Symptom Questionnaire (4DSQ). Disability was determined by the WHO Disability Assessment Schedule 2.0 (WHO-DAS II). The relationships between somatization and both the total and subdomain scores of the WHO-DAS II were measured cross-sectionally and longitudinally after one year of follow-up using linear regression analysis. We examined whether anxiety or depressive disorder exerted a modifying effect on the somatization-disability association.

Results: Cross-sectionally and longitudinally, somatization was significantly associated with disability. Somatization accounted cross-sectionally for 41.8% of the variance in WHO-DAS disability and, longitudinally, for 31.7% of the variance in disability after one year of follow-up. The unique contribution of somatization to disability decreased to 16.7% cross-sectionally and 15.7% longitudinally, when anxiety and/or depressive disorder was added to the model.

Conclusion: Somatization contributes to the presence of disability in primary care patients, even when the effects of baseline demographic and health characteristics and anxiety or depressive disorder are taken into account.

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Introduction

In primary care patients, somatization is a common problem. A substantial amount of patient encounters in primary care concern medically unexplained physical symptoms, leading to frequent consultations and high overall health care costs [1]. Part of the patients with MUS

fulfill the criteria for somatization, or a somatoform disorder. Several definitions and operationalizations of somatization have been proposed, frequently including 'the expression of psychological illness through physical symptoms' [2] as well as 'repeated medical help-seeking for multiple medical symptoms without organic disease' [3]. The presence of medically unexplained physical symptoms is a key feature of somatoform disorders [4]. In a systematic review about the prevalence and disability burden of mental and neurological disorders in the European Union, a 12-month prevalence of somatoform disorders of 6.3% was found [5]. Other studies reported a prevalence of undifferentiated somatoform disorders varying from 8.6% up to 25.6% in primary care patients [6–9]. Somatoform disorders include somatization disorder and undifferentiated somatoform disorders [4].

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Somatization has been found to be related to disability in several cross-sectional studies [10–12]. The World Health Organization describes disability as ‘any restriction or lack of capacity to perform an activity in a manner or within a range considered normal for a human being’ [13]. The presence of five or more medically unexplained symptoms is associated with greater social disability compared to five symptoms with a medical explanation [14]. Patients with long-lasting somatization have more disability and higher sick leave than non-somatizers [12]. Up to 30% do not recover or even get worse, indicating a poor prognosis for a substantial group [15]. High levels of somatic symptom severity contribute to reduced health-related functioning [16,17], even after adjustment for psychiatric and medical co-morbidity [1,18].

The link with anxiety and depression has been mentioned often and the term cosyndromality has been suggested for the concurrent occurrence of somatic, anxiety and depressive symptoms [19]. In primary care, somatizing patients often have comorbid anxiety or depressive disorders [20]. Three quarters of somatizing patients for whom psychiatric consultation was requested by a general practitioner (GP) in a consultation trial, turned out to have undetected depression or anxiety disorder [21]. De Waal and colleagues found that 50% of the primary care patients with an anxiety and/or depressive disorder also had a comorbid somatoform disorder [22]. This suggests that this combination of symptoms and syndromes poses a clinical challenge for the GP.

However, most of this research was cross-sectional and it has rarely been explored if somatization in itself leads to long-term disability, or whether concurrent ill mental health, especially anxiety and depressive disorder, is responsible for the somatization–disability connection. Previous studies that investigated the association between somatization and disability in primary care patients identified psychiatric morbidity as a potential confounder of this relationship [18], but no studies were performed with a longitudinal design. However, if such an association would exist, this could have far-reaching clinical consequences. Perhaps patients who are somatizing with comorbid psychiatric disorders show more disability compared to people with only somatization or psychiatric disorder. That would indicate that they should at least receive treatment both for the psychiatric problems and for the somatic symptoms.

The aim of our study was, therefore, to investigate the effect of somatization on disability in primary care patients, both cross-sectionally, and during longer follow-up. We addressed the following research questions: 1) Is somatization cross-sectionally and/or longitudinally associated with disability over the course of a year in primary care patients?; and 2) if that is the case, is this association the same in patients with and without depressive or anxiety disorder (i.e., is the association modified by depressive or anxiety disorder)?

Methods

Design

We carried out an observational study with both cross-sectional and longitudinal analyses after one year of follow-up in primary care patients.

Participants and procedure

Data were obtained from the Netherlands Study of Depression and Anxiety (NESDA), a multicenter cohort study including a representative sample of participants aged 18 through 65 years old. Participants were recruited from the general population, primary care and secondary mental health care. Multidimensional information was collected through interviews, self-report questionnaires and various tests. A detailed description of the objectives and methods of the NESDA study has been published elsewhere [23].

For the current study, we selected the subsample of primary care patients being a stratified sample of consecutive primary care

attendees. Participants who did not complete the questionnaires used in this study or who had too many missing values (see below) were excluded.

For the longitudinal analyses, the same sample was used as for the cross-sectional analyses with the exclusion of the participants who had too many missing values, and therefore could not be imputed, on the WHODAS at one year of follow-up.

Measures

Somatization

Somatization was measured with the 16-item Somatization scale of the Four-Dimensional Symptom Questionnaire (4DSQ), as it is a valid questionnaire to measure somatization in the primary care setting [24]. The questionnaire is designed to assess common psychological symptoms in primary care. It contains a continuous scale with a range from 0 to 32. Experiencing many symptoms from different organ systems (e.g. dizziness and upset stomach and palpitations and muscular aches) implies somatization [25]. In patients presenting with (medically unexplained) physical symptoms, scores on the 4DSQ-somatization scale are significantly associated with general practitioners' suspicions of psychosocial factors playing a role in the presentation of these symptoms. [24] The 4DSQ-somatization questionnaire was used as a continuous scale (range 0–32).

Disability

Disability was measured using the self-report World Health Organization Disability Assessment Schedule 2.0 (WHO-DAS II) [26]. This instrument was created in 1998 and can be used as a common, international, and interdisciplinary instrument to measure disability. The scale contains 36 items on functioning and disability, covering six domains of functioning during the last 30 days: 1. Understanding and communicating with the world (cognition); 2. Moving and getting around (mobility); 3. Hygiene, dressing, eating, and staying alone (self-care); 4. Getting along with people (interpersonal interactions); 5. Work, leisure, domestic responsibilities (life activities); 6. Joining in community activities (participation in society) [26]. There is a fair correlation between the domains of the WHO-DAS scales and similar domains in other equivalent instruments, such as the SF-12, SF-36, the WHO Quality of life scale and the London Handicap Scale [27].

Scores were calculated for the separate domains and all domains combined. Subsequently, the scores were transformed into scores on a scale from 0 to 100, where higher scores reflect greater disability.

Depressive and anxiety disorder

Baseline diagnoses of anxiety and depressive disorder were based on the Composite International Diagnostic Interview (CIDI, version 2.1), according to the DSM-IV criteria. The CIDI is a robust diagnostic tool with good reliability and validity [28]. We used current disorders (i.e., occurring within the past month). Depressive disorders included Major Depressive Disorder and Dysthymia, and anxiety disorders included Generalized Anxiety Disorder, Panic Disorder with Agoraphobia, Panic Disorder without Agoraphobia, Social Phobia and/or Agoraphobia. For the analyses we defined depression–anxiety status as a nominal variable with 4 categories: no anxiety or depressive disorder, anxiety disorder only, depressive disorder only, and comorbid anxiety with depressive disorder.

Background variables

Based on the literature, the following independent variables were considered as potential confounders of the relationship between somatization and disability: gender, age, marital status, education level, the number of chronic somatic diseases and depressive and anxiety disorders.

These variables have all been linked to both somatization and disability to some extent.

Gender, marital status, education level and number of chronic disease were obtained from the baseline interview. Marital status divided the participants into two groups: those who were married or had a partner and those without a partner. Level of education was represented by three categories (basic, intermediate and high) derived from the SOI (standard classification of education) of the CBS (Statistics Netherlands). Chronic somatic diseases were measured by counting the number of diseases (for instance heart diseases, asthma, diabetes or arthritis) that participants reported for which they were getting medical treatment.

Continuous variables were split into categories (displayed in the baseline table) to avoid problems with non-linear relationships and to make results easier to interpret.

Statistical analysis

The analyses were conducted using data from primary care patients with or without anxiety and depressive disorder. Because of the stratified sampling, we weighted back the study sample to the composition of the source population using appropriate weights (see Donker et al. [29]).

Respondents with two or more missing item scores on each of the subscales of the WHO-DAS (three or more on subscale 6: participation in society) or with 7 or more missing item scores on the somatization scale were excluded. In the remaining respondents, missing item scores were replaced with the participant's mean item score of the corresponding scale.

As we focussed on the association between somatization and disability, we followed an explanation model approach [30]. We created two linear regression models for both the cross-sectional and the longitudinal analysis. The first model explored the relationship between somatization as the independent variable and the WHO-DAS II (total score and separate domain scores) as the dependent variables. The second model examined how much of this association remained, after the addition of depression–anxiety status to the first model. To study the effect modification, we added an interaction term between somatization and depression–anxiety status. If the 'causal' effect of somatization on disability differs within strata of another exposure, it is known as effect modification [31]. A significant interaction term ($p \leq 0.01$) was taken as a sign of effect modification. The p -value was based on Bonferroni correction for testing six WHO-DAS domains.

In both models, we tested background variables for being confounders in the relationship between somatization and disability by including them as covariates in the regression models. Significant confounding was defined by a change of 10% or more in the beta coefficient of the somatization score. Significant confounders were included in the models to obtain unbiased estimates of the contribution of somatization to disability [32]. Non-significant confounders were not included in the regression models.

We used the R-square statistic as a measure of effect size. In the first models without confounders, the model R-square represented the amount of variance in the dependent variable (disability) explained by the independent variable (somatization). In the second models (with depression–anxiety status), and also in the first models that included one or more confounders, the model R-square represented the amount of variance in disability jointly explained by somatization and all covariates. However, since we were only interested in the specific contribution of somatization to disability, we calculated R-square differences (delta R-square) between the R-square of the full model and the R-square of the covariate-only model (i.e., after removing somatization). Delta R-square thus represented the amount of variance in disability explained by somatization after adjusting for significant confounders. The delta R square is linked to the regression coefficient. Those two measures are statistically

equivalent. The association between somatization and disability is significant, when the regression coefficient is significant. Delta R square was used as a measure of effect size.

All analyses were performed with SPSS 21.0.

Results

Characteristics of the study sample

Primary care patients were included ($N = 1610$). Participants with too many missing values on the WHO-DAS questionnaire or the 4DSQ somatization scale were excluded ($N = 32$). This resulted in a total sample size of 1578 for the present analyses. After weighting back to the composition of the source population, 1545 participants remained. This overall sample had a mean age of 46.39 years old ($SD = 11.94$) with 67.2% women and 32.8% men. The baseline characteristics of the participants are presented in Table 1. Depressive and anxiety disorders were established in 22.9% of the weighted sample.

Cross-sectional association between somatization and disability

Table 2 summarizes the associations between somatization and disability in the various domains. The relationship between somatization and disability was linear, and thus we chose to analyze somatization as a continuous variable. The size of the effect of somatization on disability is expressed in unstandardized regression coefficients (B). For every unit increase in the predictor, the somatization score, the mean WHO-DAS score increased by the amount of the regression coefficient B. For instance, one point increase in the somatization score was associated with a mean increase of 1.47 (95% CI 1.38; 1.55) in the WHO-DAS total score (Table 2, first line). The amount of variance in total WHO-DAS II score explained by somatization was 41.8%. Background variables turned out to be no confounders of the relationship between somatization and disability, except for chronic diseases in the relationship between somatization and mobility. Depression–anxiety status was no effect modifier of the relationship between somatization and disability total score. However, after adjusting for anxiety and depressive disorder, the amount of WHO-DAS II total score variance explained by somatization decreased from 41.8% to 16.7%. Thus, depression and anxiety disorder accounted for 60% of the association between somatization and the total disability score.

For the specific domains, the contribution of somatization to disability had a maximum explained variance of 37.5% in the first model and 15.2% in the second model on the sixth domain 'Participation in society'. Anxiety and depressive disorder were effect modifiers of the relationship between somatization and mobility, self-care, interpersonal interactions, household activities and work activities. Because the effect of somatization

Table 1

Characteristics of the study population (weighted, $N = 1545$)

Characteristics	Mean (SD)
WHO-DAS 32 items (0–100)	13.30 (14.26)
4DSQ (0–32)	7.16 (6.29)
	Percentage %
<i>Personal characteristics</i>	
Age (in years)	
<47	48.6
≥47	51.4
Gender (female)	67.2
Nationality (Dutch)	98.1
Married/partner	76.2
# Chronic diseases (0–8)	
0	56.7
1	29.7
≥2	13.6
Education level	
Basic	4.8
Intermediate	47.6
High	47.6
<i>Illness characteristics</i>	
Anxiety disorder (past month)	
Social phobia	8.1
Panic with agoraphobia	4.6
Panic without agoraphobia	2.3
Agoraphobia	3.1
GAD	5.8
Depressive disorder (past month)	
Dysthymia	3.6
MDD	11.1
No anxiety/depressive disorder	77.1
Anxiety disorder only	11.0
Depressive disorder only	5.2
Comorbid anxiety–depressive disorder	6.7

Table 2
Regression coefficients of the cross-sectional linear regression analysis modeling the association between somatization and disability (weighted, $N = 1545$)

WHODAS domains (N)	Model 1 [†]		Model 2 [‡]	
	B (CI) [*]	(Δ) R ² #	B (CI) [*]	Δ R ² #
Total score (N = 1545)	1.47 (1.38; 1.55)**	.418	1.08 (0.98; 1.17)**	.167
1. Cognition	1.48 (1.37; 1.59)**	.312	1.06 (0.94; 1.18)**	.118
2. Mobility***	1.15 (1.03; 1.27)**	.170	No anx/dep: 0.83 (0.67; 0.99)** Anxiety: 0.73 (0.36; 1.09)** Depression: 1.09 (0.59; 1.58)** Comorbid: 1.66 (1.25; 2.06)**	.088
3. Self-care	0.84 (0.75; 0.92)**	.201	No anx/dep: 0.57 (0.45; 0.68)** Anxiety: 0.73 (0.46; 1.00)** Depression: 0.73 (0.37; 1.09)** Comorbid: 1.08 (0.78; 1.37)**	.096
4. Interpersonal interactions	1.45 (1.31; 1.58)**	.225	No anx/dep: 1.02 (0.84; 1.19)** Anxiety: 1.30 (0.89; 1.71)** Depression: 0.16 (−0.40; 0.71) Comorbid: 0.29 (−0.17; 0.74)	.076
5h. House-hold activities	2.05 (1.89; 2.21)**	.288	No anx/dep: 1.64 (1.42; 1.85)** Anxiety: 1.44 (0.94; 1.94)** Depression: 1.35 (0.67; 2.03)** Comorbid: 0.78 (0.22; 1.33)**	.117
5w. Work activities [§] (N = 1116)	1.91 (1.71; 2.12)**	.237	No anx/dep: 1.61 (1.35; 1.88)** Anxiety: 1.57 (0.95; 2.20)** Depression: 0.33 (−0.47; 1.13) Comorbid: 0.73 (−0.05; 1.51)	.108
6. Participation in society	1.69 (1.58; 1.80)**	.375	1.25 (1.13; 1.37)**	.152

No anx/dep = no anxiety and/or depressive disorder; comorbid = comorbid anxiety and depressive disorder.

* Unstandardized regression coefficients of somatization (with 95% confidence intervals).

** P-value $\leq .001$.

*** Model adjusted for chronic diseases.

† Model adjusted for confounding background variables (if any).

‡ Model adjusted for background variables and anxiety and depressive disorder.

Delta R square, indicating the contribution of somatization to disability.

§ This domain was only applicable if participant was employed or attended school.

on disability in these domains differed with depression–anxiety status (which is the essence of effect modification), we report separate regression coefficients for the subgroups depression only, anxiety only, comorbid depression and anxiety, and no anxiety or depression. The relationship between somatization and the subdomains of disability was strongest for people with comorbid disorder on domain 2 and 3. The effect of somatization on interpersonal interactions was greatest for people with anxiety disorders. Lastly, the correlation between somatization and household and work activities was strongest for people without anxiety or depressive disorder.

Longitudinal association between somatization and disability

For the longitudinal analyses, the sample was reduced to 1361 participants (88.1%) due to non-response at one year follow-up. The non-responders were not significantly different from the study population regarding gender and age.

Table 3 presents the regression coefficients (B) expressing the association between somatization at baseline and disability after one year. Somatization was found to be significantly associated with disability after one year of follow-up (B: 1.35, CI: 1.24–1.45).

Table 3
Regression coefficients of the longitudinal linear regression analysis modeling the association between somatization and disability (weighted, $N = 1361$)

WHODAS domains (N)	Model 1 [†]		Model 2 [‡]	
	B (CI) [*]	(Δ) R ² #	B (CI) [*]	Δ R ² #
Total score (N = 1361)	1.35 (1.24; 1.45)**	.317	1.09 (0.97; 1.20)**	.157
1. Cognition	1.11 (1.00; 1.21)**	.228	0.87 (0.75; 1.00)**	.107
2. Mobility***	0.84 (0.73; 0.95)**	.121	0.75 (0.62; 0.87)**	.073
3. Self-care	0.44 (0.37; 0.50)**	.122	0.35 (0.28; 0.42)**	.061
4. Interpersonal interactions	0.85 (0.74; 0.96)**	.146	No anx/dep: 0.67 (0.53; 0.81)** Anxiety: 0.60 (0.26; 0.94)** Depression: 0.13 (−0.44; 0.70) Comorbid: 0.08 (−0.31; 0.47)	.057
5h. House-hold activities	1.14 (1.01; 1.27)**	.183	0.90 (0.76; 1.05)**	.086
5w. Work activities [§] (N = 1016)	0.92 (0.76; 1.08)**	.120	No anx/dep: 0.96 (0.75; 1.16)** Anxiety: 0.84 (0.33; 1.35)** Depression: −0.25 (−1.04; 0.55) Comorbid: −0.02 (−0.59; 0.55)	.082
6. Participation in society	1.10 (1.00; 1.20)**	.317	0.91 (0.80; 1.03)**	.136

No anx/dep = no anxiety and/or depressive disorder; comorbid = comorbid anxiety and depressive disorder.

* Unstandardized regression coefficients of somatization (with 95% confidence intervals).

** P-value $\leq .001$.

*** Model adjusted for chronic diseases.

† Model adjusted for background variables (if any).

‡ Model adjusted for background variables and anxiety and depressive disorder.

Delta R square, indicating the contribution of somatization to disability.

§ This domain was only applicable if participant was employed or attended school.

Concerning the WHO-DAS total score, in the first model, somatization accounted for 31.7% of the variance in disability after one year. There were no confounders identified in the first model and depression–anxiety status was no effect modifier in the second model. When depression–anxiety status was added to the model, the unique contribution of somatization to disability after one year was reduced to 15.7%.

The explained variance for the domains ranged from 12.0% in the domain of Work activities to 31.8% in the domain 'Participation in Society'. The number of chronic diseases was again the only confounder and was identified in the relationship between somatization and mobility. The unique contribution of somatization to disability ranged from 5.7% in domain 4 (Interpersonal interactions) to 13.6% in domain 6 (Participating in society). Depression–anxiety status was identified as an effect modifier for the relationship between somatization and disability on domain 4 and 5 (interpersonal interactions and work activities), where the effect was largest for people without anxiety or depressive disorder.

Tables 2 and 3 suggest that the power of the study was sufficient to detect a significant contribution of somatization of 6–10% to the variance of disability.

Discussion

The present study shows that somatization is associated with disability in primary care patients. Cross-sectionally, the contribution of somatization is substantial, explaining 41.8% of its variance. However, this relationship between somatization and disability was partly accounted for by anxiety and depressive disorders. Interestingly, after adjustment for the effect of anxiety and depressive disorder, somatization was still associated with disability. In addition, somatization was also associated with disability after one year.

Consistent with previous findings, the association between somatization and disability was substantial, also when the effect of depressive and anxiety disorder was taken into account. Our results are in line with the previous study of Hoedeman and colleagues, who found a strong relationship between high levels of somatic symptom severity and functional limitations, sickness absence duration and discharge in sick-listed employees [33]. However, they found that psychiatric comorbidity (depressive, anxiety and panic disorder) did not contribute to a longer duration of sickness absence. Barsky and colleagues have seen a correlation between somatization and higher medical utilization and costs, but independent of anxiety and depression and medical comorbidity [1]. However, Barsky et al. used a cross-sectional design allowing no conclusions about cause-and-effect relationships.

In contrast to most of the other studies, we used a longitudinal design. In this primary care population, we found in the adjusted models a moderate association between somatization and (long-term) disability. Adjustment for anxiety and depressive disorder took away part of the effect of somatization on disability, possibly because of the association between somatization and anxiety and depressive disorder on the one hand, and the effect of anxiety and depressive disorder on disability on the other hand. Those results are in line with previous studies that found a higher impairment of every day functioning when patients have depression and/or anxiety in addition to physical symptoms [7,34,35].

This study has several strengths, including the large sample size and the longitudinal design. While the decreased functioning was noted in prior cross-sectional studies, to our knowledge this is the first study to assess disability associated with somatization longitudinally among primary care patients.

Besides strengths, the study also has some potential limitations. Firstly, the disability measures were based on self-report questionnaires. This may result in more missing data than interview-administered versions. However, by using missing value analysis, we tried to minimize the effects of missing values. Another potential limitation is that we used the 4DSQ somatization scale to measure somatization, which is measured as the presence of multiple physical symptoms. Somatization is often operationalized by a lack of organic causality, defined as 'the expression of psychological illness through physical symptoms' [2] or 'repeated medical help-seeking for multiple medical symptoms without organic disease' [3]. Such operationalizations are difficult to assess in large-scale studies, as a panel of experts is needed, or the patient's treating physician. Some somatic symptoms may have had a medical basis, since we could not distinguish with certainty between explained and unexplained symptoms because

no medical evaluation was performed. The somatization scale measures the presence of physical symptoms which remain often unexplained, for example dizziness, painful muscles, back pain or palpitations. It is common to experience one or a few unexplained symptoms under stressful circumstances [36,37]. However, if someone is experiencing many of these symptoms, it implies somatization. In addition, it should be noticed that we used continuous scores for somatization and disability, but categorical measures for anxiety and depressive disorders. Therefore, the adjusted association between somatization and disability could have been overestimated.

Since somatization is a common problem in primary care patients, it may be important to improve identification of these patients. We would advice GPs to pay more attention to medical unexplained physical symptoms. The 4DSQ can be a helpful tool to detect patients who are somatizing.

It may also be important to estimate the distinct roles of somatization and anxiety or depressive disorder on disability, because the treatment of somatization often differs to some extent from the treatment of anxiety and depressive disorder. A greater emphasis on explanation, relaxation, motivation, activation and countering avoidance behavior may be needed. Perhaps an implementation of better communication strategies might be helpful to improve health care. A multidisciplinary guideline and a GP guideline are available in the Netherlands for 'somatically insufficiently explained physical symptoms' [38,39].

As the unique contribution of somatization to disability is substantial, treatment of somatization might be useful to decrease disability in this population. In patients with co-morbid anxiety and depressive disorder who show signs of somatization, additional treatment focussing on anxiety and depressive disorder may also be effective in reducing disability.

In conclusion, somatization contributed to disability in primary care patients over and above anxiety and depressive disorder.

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Competing interest statement

The authors have no competing interests to report.

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