Somatization Increases Disability Independent of Comorbidity

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BACKGROUND: Somatoform disorders are an important factor in functional disability and role impairment, though their independent contribution to disability has been unclear because of prevalent medical and psychiatric comorbidity.

OBJECTIVES: To assess the extent of the overlap of somatization with other psychiatric disorders and medical problems, to compare the functional disability and role impairment of somatizing and non-somatizing patients, and to determine the independent contribution of somatization to functional disability and role impairment.

DESIGN: Patients were surveyed with self-report questionnaires assessing somatization, psychiatric disorder, and role impairment. Medical morbidity was indexed with a computerized medical record audit.

PARTICIPANTS: Consecutive adults making scheduled visits to their primary care physicians at two hospital-affiliated primary care practices on randomly chosen days.

MEASUREMENTS: Intermediate activities of daily living, social activities, and occupational disability.

RESULTS: Patients with somatization, as well as those with serious medical and psychiatric illnesses, had significantly more impairment of activities of daily life and social activities. When these predictors were considered simultaneously in a multivariable regression, the association with somatization remained highly significant and was comparable to or greater than many major medical conditions.

CONCLUSIONS: Patients with somatization had substantially greater functional disability and role impairment than non-somatizing patients. The degree of disability was equal to or greater than that associated with many major, chronic medical disorders. Adjusting the results for psychiatric and medical co-morbidity had little effect on these findings.

BACKGROUND

The substantial disability and role impairment resulting from chronic medical and psychiatric disorders have been well established[1,2]. For instance, patients with COPD are more likely to have activity limitations, increased number of bed days, decreased rates of employment, and diminished social functioning[3]. Those with diabetes likewise have increased number of bed days, more lost work time, decreased rates of employment, and increased rates of disability[4]. Similar data have been seen in many studies of depression[2]. It is less well known, however, that somatization and somatoform disorders are also associated with substantial impairment of function in several domains. One specific sub-group of severely somatizing patients, those with somatization disorder, spend more days in bed[5], have higher rates of disability[6], more occupational and social role impairment[7], more unemployment[8], and require more sick leave[9].

The rates of disability that accompany medically unexplained symptoms appear to be generally comparable to or greater than those seen with many chronic medical conditions[2] as well as those resulting from mood and anxiety disorders[5,6,8]. In primary care populations, patients with five or more medically unexplained symptoms have greater social role impairment than patients whose symptoms have a medical explanation[10], and the total number of medically unexplained symptoms has a linear association with the severity of disability[11]. Although these patients' medically unexplained symptoms may be attributable to underlying mood and anxiety disorders, studies have suggested that as many as a third of somatizing patients do not have a co-morbid psychiatric disorder[12]. Thus, while it is clear that somatization is associated with disability, it remains unclear to what degree this relationship is mediated by co-morbid depressive and anxiety disorders and to what degree it is confounded by medical co-morbidity. Given that treatments have been shown to be effective for somatization disorder[13–15], and that these treatments differ in important respects from those for depressive and anxiety disorders, it is important to determine the unique contribution of somatization to disability and role impairment.

This study had the following specific objectives: to determine the extent of overlap or independence between somatization and medical and psychiatric morbidity, to compare the

functional disability and role impairment of somatizing patients with that of non-somatizers, and to estimate the unique contribution made by somatization to functional disability and role impairment.

METHODS

Design and Procedures

Consecutive patients attending primary care practices at the Brigham and Women's Hospital on randomly chosen days completed self-report questionnaires assessing somatization, health-related anxiety, and psychiatric disorder. One-third of them also completed a measure of role impairment. Utilization within our hospital system for 12 months prior to the index visit was obtained from the automated medical record, which was also used to extract a global rating of each patient's aggregate medical morbidity. The study was conducted between July 31, 2000 and June 1, 2002. It was approved by the Brigham and Women's Hospital (BWH) Human Research Committee, and all patients gave their signed informed consent. They received $10 for participating.

Setting and Subjects

The study was conducted in two primary care practices. One is located within the BWH, is staffed by both house officers and faculty, and serves a predominantly inner city population. The other is a suburban, outpatient satellite staffed primarily by attending physicians and serves a predominately middle–class population.

All English-speaking patients who were over 18 and had been a patient in that same practice for at least 1 year were eligible. Patients were excluded if they were intoxicated or cognitively unable to complete the questionnaires.

Variables and Their Measurement

Somatization. Somatization was assessed with the somatoform disorder module of the Patient Health Questionnaire (PHQ). This module is a self-report instrument composed of 15 somatic symptoms, including ten of the diagnostic symptoms of DSM-IV somatization disorder[16]. PHQ-15 somatic symptoms are rated 0 ("not bothered"), 1 ("bothered a little"), or 2 ("bothered a lot"), and are scored using a diagnostic algorithm. Patients who reported that they were "bothered a lot" by three or more symptoms were classified as somatizers for this study. The PHQ-15 has high internal reliability and convergent and discriminate validity, primarily in Caucasian, non-Hispanic samples[16,17]. In order to make a definitive diagnosis of a somatoform disorder, a medical evaluation must be performed to determine whether an adequate medical explanation exists for every symptom the patient endorses[18]. Since we omitted this medical evaluation, we are not able to distinguish definitively between medically explained symptoms and somatoform (medically unexplained) symptoms. However, self-reported PHQ somatic symptom counts have been shown to be highly associated with clinician-rated somatoform disorder symptom counts and

with the likelihood of the diagnosis of somatization disorder[10,16]. Therefore, the PHQ symptom count in this study can only be characterized as indicative of a provisional diagnosis of a somatoform disorder, and the patients referred to as somatizers are those with a high likelihood of receiving a formal diagnosis of a somatoform disorder.

Anxiety and Depressive Disorder. Anxiety and depressive disorder were assessed with the PHQ, which contains self-report modules covering the eight DSM-IV disorders most commonly encountered in primary care practice. In this study we assessed major depression, sub-threshold depressive disorder, panic disorder, and other anxiety disorders. The PHQ provides provisional diagnoses only since it is entirely self-administered, and definitive diagnosis requires a patient interview. However, the validity of these provisional diagnoses is comparable to that of the clinician-administered PRIME-MD interview[18], and the PHQ has been shown to have acceptable criterion and construct validity[18].

Role Impairment and Disability. The Functional Status Questionnaire (FSQ) is a self-report questionnaire developed to assess disability and role impairment in ambulatory medical populations[19]. It has been shown to be valid and reliable[19]. We used the nine items comprising the social activities subscale (e.g., visiting with relatives and friends, participating in community activities) and intermediate activities of daily living subscale (e.g., doing work around the house, doing errands, driving a car or using public transportation). We have used this scale extensively in prior work[20–23].

Medical Morbidity. The 18-item Charlson Comorbidity Index was used to assess serious medical comorbidity[24]. This valid and reliable measure was developed empirically to index medical conditions that singly or in combination increase the short-term risk of mortality[25]. Using ICD 10 diagnostic codes, a Charlson weight (from 1 to 6) is assigned to each of 18 serious medical diagnoses in the patient's medical record, and these are then summed to derive a total score reflecting aggregate medical morbidity.

Data Analysis

Our analyses focused on two primary outcomes. First, we calculated the total score for the nine FSQ items, where 100 corresponds to maximal function and 0 corresponds to total disability. Subjects who left three or more items unanswered, or who responded non-applicable to four or more items, were removed from the analyses. The remaining subjects with limited missing data had their sum scores re-scaled to account for the missing data and still span the entire possible range of 0 to 100. Similar scoring rules were applied to the three FSQ items related to social function in order to create a social activities summary score and to the remaining six FSQ items related to physical function in order to create an intermediate activities of daily living score. Each of these sub-scores was analyzed using the same linear regression model described below and showed essentially the same results as did the overall score (except for a stronger influence of depression on

social function). Therefore, only the results for the overall scale are presented in this manuscript.

Second, we dichotomized patients into two groups: those who had work limitations for health reasons (n=48) versus those who did not (n=178). The majority of subjects in our cohort had to be dropped from these analyses because of missing responses, inconsistent responses, and non-applicable responses (i.e., retired for reasons other than health). Of the subjects who could be reliably classified, the group with work limitations included subjects under age 65 who reported that they were unemployed (n=26) or retired (n=20) because of their health, plus two part-time workers who reported: (1) that they did as much work as others none or only some of the time, (2) that they worked their regular number of hours none or only some of the time, and (3) that they took rests because of health, most or all of the time. The remaining group of "healthy" workers included 162 full-time workers who reported: (1) that they did as much work as others all or most of the time, (2) that they worked their regular number of hours all or most of the time, and (3) that they took rests because of health, none or at most some of the time. This "healthy-worker" group also included 16 part-time workers who reported that they did as much work as others and worked their regular hours all of the time, and took rests for health reasons none of the time.

Somatizing and non-somatizing patients were then compared using a Fisher exact test for binary characteristics and a Wilcoxon rank sum test for continuous measures.

Finally, the impact of somatization on overall physical function, alone and in combination with all other psychiatric, demographic, and clinical covariates, was assessed with linear regression. While the model residuals did show a mild left skew, we relied on the large sample size (460) and the central limit theorem to assure the validity of the p-values. Likewise, logistic regression was used to evaluate the impact of somatoform disorder, alone and in tandem with psychiatric, demographic, and clinical covariates, on work limitations. However, because of the small number of subjects with work limitations (48), we had to group some of our predictors and use forward selection to reduce the number of predictors in the final model and avoid over-fitting. We retained an indicator for depression in the final model, even though it was not statistically significant because we wanted assurance that it did not confound the effect of somatoform disorder. P-values less than 0.05 were considered to be statistically significant.

RESULTS

A total of 2,668 questionnaires was distributed, and 1,914 (71.7%) were returned. Of these, 1,546 (80.8%) provided complete data, and 368 (19.2%) were from ineligible patients, were incomplete, or duplicates. A random one-third of these questionnaires contained the Functional Status Questionnaire. Thus, 628 questionnaires with the FSQ were returned, of which 523 were from eligible patients. Of these 523 patients, 483 (92%) provided analyzable FSQ data, but 16 additional patients (3%) were dropped because of missing data on somatization and/or psychiatric comorbidities, leading to a final sample size of 467. These 467 patients did not differ significantly in demographic, psychiatric, or medical characteristics from the 978 who did not receive the FSQ question-

naire. To assess possible sampling bias, we compared the study population with a random sample of 205 patients drawn from among all other patients attending the same practices on the same days. The study sample did not differ significantly from this random sample of non-participants in sociodemographic characteristics, medical morbidity, utilization, or costs, except that the study sample contained fewer Hispanics (14% vs. 22%; p=.02) and had fewer primary care visits in the preceding year [3.8 (SD=4.4) vs. 4.3 (SD=4.1); p=.02].

In the following analyses, somatization was defined categorically as the presence or absence of a provisional diagnosis of somatoform disorder using the PHQ. Table 1 presents the sociodemographic, psychiatric, and medical characteristics of these patients and of the remaining (non-somatizing) patients in the sample. The two groups differed significantly only in terms of education and race, with somatizing patients having generally lower levels of education and more commonly being Black. Table 1 also shows that for our outcome variables, somatizing patients had significantly lower physical function scores, both overall and on the physical and social subscales, as well a significantly higher percentage of patients with work limitations.

There was substantial overlap among somatization, depressive and anxiety disorders, and medical morbidity, as can be seen in Table 2. Sixty percent of somatizing patients had at least one psychiatric disorder compared to only 14% of non-somatizers (p<.001). This difference was present for all four of the psychiatric disorders measured in the study. However, although a higher percentage of somatizing patients had comorbid medical conditions (39% versus 30%), the difference was smaller and did not reach statistical significance (p=.12).

Table 3 presents the predictors of role impairment and disability. When considered in univariate analyses, it can be seen

Table 1. Characteristics of Somatizing and Non-somatizing Patients

	Somatization n=82 (18%)	No somatization n=385 (82%)	P – Value
Age, years, mean (SD)	46 (16)	45 (15)	.66
Gender			
% Female	83%	73%	.07
Marital status % married	34%	43%	.18
Race			.03
% White	39%	39%	
% Black	32%	20%	
% Hispanic	12%	10%	
% Other/unknown	17%	31%	
Education			
Less than high school	15%	7%	.01
High school graduate	27%	22%	
Some college	23%	20%	
College graduate	22%	20%	
Graduate school	13%	30%	
Medical morbidity			
No serious medical morbidity (Charlson Comorbidity Index score=0)	61%	70%	.12
Charlson Comorbidity Index score, mean (SD)	.88 (1.7)	.52 (1.0)	.08
Role impairment			
Total score (0–100)	65 (27)	88 (21)	<.001
Intermediate activities of daily life (0–100)	62 (28)	86 (23)	<.001
Social activities (0–100)	73 (32)	93 (18)	<.001
Work limitations	55%	14%	<.001

Table 2. Psychiatric Comorbidity

	Somatoform disorder (n=82)	No somatoform disorder (n=385)	P Value
Any medical comorbidity	39%	30%	.12
Any medical or psychiatric comorbidity	73%	38%	<.001
Any comorbid psychiatric disorder	60%	14%	<.001
Major depressive disorder	33%	5%	<.001
Other depressive disorder	18%	6%	<.001
Panic disorder	22%	3%	<.001
Other anxiety disorder	23%	3%	<.001

that the presence of any of the psychiatric disorders was associated with a highly significant increment in role impairment and disability. A lower level of function was also associated with being unmarried, older, having less education, and being of Hispanic ethnicity. Many medical conditions were associated with lower function, most notably congestive heart failure and peripheral vascular disease. Dementia and solid tumors

were also powerful causes of disability, but because they were so rare, these co-morbidities could not be carried forward into the multivariable model. The magnitude of the effect of the psychiatric disorders was comparable to, or exceeded that of, many medical conditions, including coronary artery disease, chronic obstructive pulmonary disease, connective tissue disease, diabetes, and cancer. When these variables were considered simultaneously in a multivariable regression, somatization and depression remained highly significant, along with congestive heart failure and peripheral vascular disease, which were both powerful predictors of disability. Lower education and advanced age were also significant.

Table 4 presents the predictors of work limitations. Again, somatization, depression, and anxiety were all significantly associated with work limitations when considered alone. However, when the other sociodemographic and medical variables were taken into account, only somatization remained statistically significant, with an odds ratio of 3.2. In the multivariable regression, being unmarried, having less education, being older, and having any serious medical comorbidity were also significant predictors of work limitations, with odds ratios ranging from 3.9 to 42.

Table 3. Patient Characteristics and Predictors of Role Impairment

Predictors	Prevalence	Univariate results[a]	Multivariate results[a]*
Somatization	82 (18%)	-23 (2.7) p<.001	-11 (2.7) p<.001
Major depression	48 (10%)	-23 (3.4) p<.001	-10 (3.6) p=.005
Other depression	37 (8%)	-20 (3.8) p<.001	-11 (3.6) p=.002
Panic disorder	30 (6%)	-22 (4.4) p<.001	-7 (4.0) p=.10
Other anxiety disorder	32 (7%)	-14 (4.3) p<.001	-6 (4.0) p=.15
Race:			
White	182 (39%)	Reference	Reference
Black	103 (22%)	-5 (2.8) p=.06	-1 (2.6) p=.73
Hispanic	49 (10%)	-9 (3.6) p=.01	-5 (3.4) p=.11
Other/unknown	133 (28%)	+11 (2.6) p<.001	+5 (2.3) p=.03
Married	191 (41%)	+6 (2.2) p=.006	+4 (2.1) p=.03
Female	348 (75%)	-4 (2.5) p=.11	-0.3 (2.1) p=.89
Education (high school)	45 (31%)	-18 (2.2) p<.001	-8 (2.2) p<.001
Age<32	115 (25%)	Reference	Reference
32<Age<44	112 (24%)	-4 (3.1) p=.11	-5 (2.6) p=.07
44<Age<55	119 (26%)	-8 (3.0) p=.012	-9 (2.7) p=.001
Age > 55	120 (26%)	-12 (3.0) p<.001	-10 (2.9) p<.001
MI	8 (1.7%)	-8 (8.4) p=.35	+9 (7.3) p=.21
CHF	15 (3.2%)	-29 (6.1) p<.001	-16 (5.8) p=.005
PVD	4 (0.9%)	-45 (12) p<.001	-35 (10) p<.001
CVD	16 (3.4%)	-9 (6.0) p=.16	+5 (5.3) p=.36
Dementia	1 (0.2%)	-75 (23) p=.002	*
COPD	52 (11.1%)	-8 (3.5) p=.016	-1 (2.9) p=.66
Connective tissue disease	14 (3.0%)	-16 (6.4) p=.013	- 9 (5.3) p=.09
Ulcer disease	2 (0.4%)	+14 (17) p=.40	*
Mild liver disease	3 (0.6%)	-30 (14) p=.026	-11 (11) p=.31
Diabetes	42 (9.0%)	-14 (3.8) p<.001	-5 (3.4) p=.16
Diabetes w/complications	0		
Hemiplegia	0		
Moderate/severe renal disease	9 (1.9%)	+1 (8.0) p=.88	+9 (6.8) p=.18
Cancer	27 (5.8%)	-0.5 (4.7) p=.92	+2 (4.0) p=.50
Severe liver disease	0		
Metastatic solid tumor	2 (0.4%)	-49 (17) p=.003	*
AIDS	2 (0.4%)	+16 (17) p=.34	*
HIV	0		

[a]*Results shown are effect estimates, measured as points on the 0–100 functional status scale, along with standard errors and p-values. For example, the first row demonstrates that having somatization disorder decreases your functional status, as measured by the PHQ, by 23 points, when compared to non-somatizers*

Seven patients were removed from the multivariate model because there were not enough patients with dementia (1), metastatic tumors (2), ulcers (2), or AIDS (2) to adjust the model for these co-morbidities in a stable way.

Table 4. Patient Characteristics and Predictors of Work Limitations

Predictors	Prevalence	Univariate Odds ratios	Multivariate Odds ratios
Somatization	40 (18%)	7.5 [3.6, 16] p<.001	3.2 [1.01, 10] p=.047
Any depressive disorder	35 (15%)	9.1 [4.1, 20] p<.001	3.1 [.85, 11] p=.09
Any anxiety disorder	32 (14%)	5.2 [2.3, 12] p<.001	
Race:			
White	91 (40%)	Reference	
Black or Hispanic	58 (26%)	3.1 [1.5, 6.3] p=.002	
Other/unknown	77 (34%)	0.2 [.04,.54] p=.004	
Not married	130 (58%)	3.0 [1.5, 6.3] p=.006	5.6 [1.9, 17] p=.002
Female	158 (70%)	1.4 [0.7, 2.8] p=.39	
Education (high school	52 (23%)	16 [7.4, 34] p<.001	8.9 [3.4, 23] p<.001
Age >32	168 (75%)	22 [2.9, 167] p=.003	42 [3.8, 500] p=.002
Any medical comorbidity	64 (28%)	4.9 [2.5, 9.6] p<.001	3.9 [1.4, 11] p=.008
CVD	6 (3%)	1.9 [.34, 11] p=.47	
COPD	26 (12%)	3.2 [1.4, 7.6] p=.001	
Connective tissue disease	8 (4%)	6.8 [1.6, 29] p=.011	
Diabetes	18 (8%)	7.3 [2.6, 20] p<.001	
Cancer	10 (4%)	0.9 [.19, 4.5] p=.92	

Sample size: 226 patients of whom 48 (21%) have work limitations
n=467* patients
Note 1: If the final model is adjusted for COPD, connective tissue disease, and diabetes instead of "any comorbidity," then the results above are essentially unchanged. In particular, somatization remains a significant predictor (p=.048) with an odds ratio of 3.2 [1.01, 10].
Note 2: The c-statistic for the model shown is .924

DISCUSSION

These findings suggest that somatization, *in and of itself*, makes a substantial contribution to impairment in activities of daily living, social function, and work function among primary care patients. Most important, this relationship persists even after the effects of medical and psychiatric comorbidity are taken into account. While this impairment has been noted in prior studies, to our knowledge this is the first study to assess functional impairment associated with somatization, while simultaneously controlling for both medical and psychiatric comorbidity. This work thus adds to a growing body of evidence that medically unexplained symptoms, *in and of themselves*, take a significant toll on functional status, and importantly demonstrates that the magnitude of somatization's effect on disability is greater than or comparable to that of several common chronic, medical conditions.

The study has a number of limitations. First, there are questions of sampling bias and generalizability. A substantial fraction of the patients who were approached did not return completed questionnaires. We did find, however, that the study sample was quite comparable in sociodemographic characteristics to a random sample of all the other clinic attendees who did not participate in the study. In addition, we only obtained functional status data on a random one-third of the participants. This does not limit generalizability, since we found no significant differences in the demographic, psychiatric, or medical characteristics of the patients who completed functional status questionnaires versus those who did not. However, it does limit our power, particularly for the subset of patients analyzed for work limitations.

Second, as mentioned earlier, somatization was assessed with a self-report questionnaire and not with an individual medical evaluation to rule out a medical basis for each somatic symptom. We did index each patient's aggregate medical morbidity with the Charlson Comorbidity Index, but this only partially addresses the problem since it emphasizes severe,

life-threatening diseases more then chronic and less serious (yet very symptomatic) diseases. Thus, the possibility always remains that some of the somatic symptoms attributed to somatization could in fact have had a medical basis and that this partially explains our findings. The relationship between somatization and medical illness is especially complex because the two may co-occur, and medical illness not infrequently precipitates somatoform disorder.

Third, the cross-sectional design does not permit any conclusions about cause-and-effect relationships. Thus, it is possible that role impairment and disability lead one to somatize, and this is an alternative (though unlikely to be a complete) explanation for our findings.

Finally, we did not assess etiologic factors that can predispose to the development of somatization. These include childhood physical and sexual abuse, and personality traits. However, controlling for all possible etiologic factors was beyond the scope of our study, and we thus assessed only those current psychiatric diagnoses that are most commonly associated with somatization, depression, and anxiety.

Our findings demonstrate that the degree of impairment accompanying somatization rivals that of several, common chronic medical conditions, including CHF, PVD, DM, and COPD. This is compatible with an emerging literature comparing the role impairment of patients with functional somatic syndromes to that of patients with a single, comparable medical illness. These include comparisons of patients complaining of chronic fatigue with severely fatigued, disease-free, breast cancer patients[26], irritable bowel syndrome and inflammatory bowel disease patients[27], the pain of fibromyalgia and that of rheumatoid arthritis[28], and dizziness with psychiatric and otologic causes[29]. These studies reveal that those with medically unexplained symptoms report greater functional impairment, more severe and intense symptoms, and poorer health status than those whose symptoms have a medical explanation.

Additionally, there is a growing body of literature indicating that medically unexplained symptoms are as, or even more,

chronic and refractory to treatment than medically explained symptoms. Studies have shown that somatoform disorder symptoms are chronic and persistent[30,31], and may often be even *more* persistent and intractable than the symptoms of major medical illnesses[31] and less likely to resolve[30]. Some medically unexplained symptoms have a remarkably poor prognosis: Three-quarters of atypical chest pain patients, for example, are still symptomatic and disabled at 10-year follow-up[32].

The unique contribution of somatization to disability has important clinical implications since its treatment often differs from that of the anxiety or depressive disorder. While some somatization responds well to treatment with SSRIs, as do depression and anxiety, cognitive behavior therapies specifically targeting the unique aspects of somatization have been developed, tested, and shown to be efficacious[23–25,33]. One such protocol aims to restructure beliefs and expectations about health, disease, and medical treatment. It also addresses those beliefs that contribute to the initiation, amplification, and maintenance of distorted cognitions about symptoms, including the effects of attention, beliefs, circumstances, expectations, behavior, and mood on somatic sensations[34].

In sum, severe somatization is an entity distinct from depression, which may be as distressing, persistent, refractory, and disabling as the somatic symptoms resulting from several major medical conditions. They are therefore by no means trivial or "benign" and are deserving of more intensive study and clinical attention than they tend to receive. Our results are consistent with a worldwide growing body of literature that demonstrates that the burden of disability from psychiatric disorders rivals, or exceeds, that associated with medical problems.

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