The Attribution of Somatization in Schizophrenia Patients: A Naturalistic Follow-Up Study

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Background: Knowledge is limited concerning somatic symptoms that cannot be accounted for by detectable somatic illness among schizophrenia patients. This study aimed to explore the prevalence, correlates, and predictors of somatization among schizophrenia patients.

Method: Initial data on all consecutively admitted adult patients with DSM-IV schizophrenia, schizoaffective disorder, major depressive disorder, or bipolar disorder were collected between August 1998 and August 2000. Standardized measures of psychopathology, somatization, emotional distress, adverse effects, insight, and stress process–related (psychosocial) variables were administered to 237 schizophrenia patients at admission and at least 12 months thereafter (N = 148). Partial correlation and multiple regression analyses were performed.

Results: The frequency of somatization, defined as the presentation of 5 or more medically unexplained somatic symptoms (Somatic Symptom Index-5), among the inpatient population (27%) did not change significantly after at least 12 months (30%; p = .61). Regression analysis showed that somatization scores were best predicted by the combination of scores for emotional distress attributed to psychopathology and side effects, expressed emotion, and insight. This combined model explains at least 40% of the variance in somatization scores. Self-esteem and social support showed negative association with somatization scores. Somatization scores were not associated with gender, age, education, age at onset, observed severity of psychopathology, subtype and duration of illness, number of admissions and treatment settings, or type and dose of antipsychotic agents.

Conclusions: Somatization is a prevalent problem among schizophrenia patients and is associated with emotional distress attributed to psychopathology, side effects of antipsychotic agents, and family members' attitudes toward schizophrenia patients. This study suggests that insight, self-esteem, and social support may protect against somatization in schizophrenia patients.

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The definition of somatization as the presentation of 5 or more somatic symptoms that cannot be accounted for by detectable somatic illness has shown good validity in various populations.[1–4] Somatization has often been viewed as a continuum on which increasing degrees of somatic symptoms indicate increasing distress, a defense against underlying unconscious conflict, disability, and maladaptive illness behavior.[5,6] Modern stress theories focused on cultural variations and individual characteristics[6] and emphasized the intermediate role of cognitive and behavioral processes in the determination of neuroendocrine and immune system responses to stressors.[7]

Somatization is more prevalent in primary care settings (9%–20%)[8,9] and in recent immigrants (14.9%–21.9%)[3] compared with the general population (1.8%–4.4%).[2,10] Comparisons are difficult since different diagnostic criteria and instruments have been used to measure somatization: Standardized Polyvalent Psychiatric Interview,[8] Somatic Symptom Index-4/6 (SSI-4/6: requires 4 somatic symptoms for male subjects and 6 such symptoms for female subjects) or SSI-5 (threshold set at 5 symptoms for subjects of both sexes),[1–3] SSI-6 (6 or more symptoms from at least 2 different body sites without an identifiable organic cause),[9] and Brief Symptom Inventory-Somatization (BSI-S) scale.[3] A comparison of different diagnostic criteria for somatization revealed a prevalence rate according to the BSI-S of 21.9% (95% CI 19.3% to 24.5%) for 966 recent immigrants; the corresponding rates for the SSIs were significantly lower: 14.9% according to the SSI-5 ($\chi^2 = 15.4$, df = 1, $p < .001$) and 13.8% according to the SSI-4/6 ($\chi^2 = 21.5$, df = 1, $p < .001$).[3]

Previous studies suggest that somatization is associated with elevated emotional distress,[3,10,11] severity of depressive symptoms,[12] anxiety,[13] personality disorders,[14]

Table 1. Sociodemographic and Illness Characteristics of the Initial and Follow-Up Samples of Patients With Schizophrenia

Characteristic	Initial Sample (N = 237)	Follow-Up Sample (N = 148)
Male, N (%)	188 (79.3)	121 (81.8)
Age at examination, mean ± SD, y	37.9 ± 9.9	38.2 ± 9.5
Marital status, N (%)		
Single	150 (63.3)	97 (65.5)
Married	44 (18.6)	25 (16.9)
Other[a]	43 (18.1)	26 (17.6)
Education, mean ± SD, y	10.2 ± 2.8	10.2 ± 2.7
Age at onset, mean ± SD, y[b]	23.4 ± 7.8	22.9 ± 7.1
Illness duration, mean ± SD, y	14.3 ± 9.4	15.0 ± 9.1
No. of hospitalizations, mean ± SD	7.6 ± 4.6	7.8 ± 4.5
Psychopathology, mean ± SD[c]		
Positive syndrome	17.5 ± 5.8[d]	15.6 ± 5.9[d]
Negative syndrome	24.8 ± 7.0	26.2 ± 7.1
General psychopathology	42.0 ± 10.5	40.6 ± 10.9
Paranoid subtype of illness	176 ± 73.4	104 ± 70.2

[a]Widowed or divorced.
[b]According to age at which patient initially sought mental health care.
[c]Positive and Negative Syndrome Scale.
[d]2-tailed t test = 3.1, df = 383, p = .002.

gender (women),[1] age (45 to 64 years), marital status (separated, widowed, or divorced), and/or low educational and economic levels.[2,15]

Schizophrenia patients have a higher risk for somatization than does the general population since (1) they experience significantly more emotional distress (associated with psychopathologic symptoms) when compared with healthy controls[16] and (2) the adverse effects of antipsychotic drug therapy are not restricted to motor symptoms but also affect cognition and emotion. On the other hand, patients with somatization disorder have increased psychotic, manic, depressive, and anxiety symptoms.[17] The prevalence of and factors influencing somatization in schizophrenia patients have not yet been explored.

The aim of this study was to examine (1) the frequency of somatization and its change in frequency and severity over time in the schizophrenia population and (2) the association of demographic, illness-related, and psychosocial factors with severity of somatization.

METHOD

Study Design

Data were collected as part of the Sha'ar Menashe Longitudinal Study of Quality of Life (SMLS-QOL), an ongoing, naturalistic, longitudinal investigation assessing satisfaction with life and treatment among patients with major psychoses.[18–21] Initial data concerning all adult patients with schizophrenia, schizoaffective disorder, major depressive disorder, or bipolar disorder consecutively admitted to acute and rehabilitation hospital settings of Sha'ar Menashe Mental Health Center were collected between August 1998 and August 2000. The inclusion criteria were DSM-IV diagnosis of schizophrenia,[22] age of 18 to 65 years, inpatient status, and ability to provide written informed consent. Patients with comorbid mental retardation, organic brain diseases, severe physical disorders, drug/alcohol abuse, and low comprehension skills were not enrolled. The Internal Review Board of Sha'ar Menashe Mental Health Center and the Israel Ministry of Health approved the study protocol. All participants signed informed consent for participation in the study after receiving a comprehensive explanation of study procedures.

Subjects

Information for the present study was drawn from the SMLS-QOL database and included data for schizophrenia patients collected at 2 time points: (1) at hospital admission (initial sample [N = 237]) and (2) at least 1 year later (mean ± SD = 16.7 ± 4.8 months) (follow-up sample [N = 148]). At the follow-up evaluation, 62.4% of the initial sample were available for examination. Two patients had died, 12 could not be evaluated because of a severe mental status, 47 withdrew consent, and for 28 patients, less than 12 months had elapsed since admission (these patients will be evaluated as the study progresses). There was no significant difference between the follow-up sample and patients who were not followed up in terms of sociodemographic and clinical characteristics (age, sex, diagnosis, age at onset, number of hospitalizations, and symptom severity).

Sociodemographic and illness characteristics of the initial and follow-up samples are presented in Table 1. Of a total of 237 patients with schizophrenia, 176 presented with paranoid type, 38 with residual type, 11 with disorganized type, 11 with undifferentiated type, and 1 with catatonic type. Overall, 128 (54%) patients received only typical antipsychotics, 75 (31.6%) received only atypical antipsychotics, and 28 (11.8%) received both types (6 or 2.5% of the patients did not receive antipsychotic agents). Patients received concomitant medications (36% benzodiazepines, 17% antidepressants, and 10% mood stabilizers) as clinically indicated. All patients were physically healthy, with recent, normal physical examinations, and had normal blood and urine laboratory test results.

Follow-up evaluations were performed when patients were stabilized in various settings; 59 patients were reassessed in a hospital-based rehabilitation framework, 48 at discharge from rehospitalization, and 41 in an outpatient clinic. The positive syndrome was the only parameter that revealed differences between the 2 time points of the study samples (Table 1).

Psychiatric Rating Scales

Psychopathologic symptom severity was assessed using the Positive and Negative Syndrome Scale (PANSS)[23] and the Montgomery-Asberg Depression Rating Scale (MADRS).[24] The overall level of functioning was assessed

with the Global Assessment of Functioning Scale (GAF).[22] Two instruments were used to assess insight for illness: the Insight and Treatment Attitudes Questionnaire (ITAQ)[25] and the self-report Insight Scale (IS).[26] Pharmacologic treatments were recorded for the month prior to each assessment.

The adverse effects of medication were measured with the Abnormal Involuntary Movement Scale (AIMS)[27] and Distress Scale for Adverse Symptoms (DSAS).[28] The DSAS is a clinician-administrated rating scale consisting of a checklist of the 22 most frequently observed side effects during treatment with antipsychotics. Each item is rated on a 5-point scoring scale ranging from 0 (no or questionable symptom) to 4 (extreme expression of the symptom). Eleven items of the scale cover adverse events of mental or neurologic nature and the remaining items cover somatic or autonomic dysfunctions.

After an adverse symptom was revealed by the clinician's standard techniques, the patients were asked whether the adverse symptom was bothersome or distressful. Four DSAS indices are computed: observer-rated severity of adverse symptoms (SAS), mental distress index (MDI), somatic distress index (SDI), and general distress index (GDI) (Cronbach $\alpha = 0.78$ for MDI, $\alpha = 0.72$ for SDI, and $\alpha = 0.89$ for GDI). The higher the DSAS indices scores (range, 0–4), the greater the number of observed adverse symptoms and distress attributed to them. The DSAS was used to measure patients' objective and subjective aspects of adverse events related to drug therapy and quality of life.[18,19]

Interrater reliability scores for these rating scales were established by calculating interclass correlation coefficients (ICCs) for 22 patients who were assessed by 2 raters. All ICCs for PANSS, MADRS, GAF, ITAQ, and the SAS index of the DSAS were significant ($p < .001$) and varied between 0.78 and 0.95.

Questionnaires

The BSI-S[29] reflects distress arising from perceptions of bodily dysfunction and includes 7 items that focus on faintness or dizziness, heart or chest pain, nausea or upset stomach, shortness of breath, hot or cold spells, numbness or tingling in part of the body, and a feeling of weakness in various parts of the body. Responses are scored on a scale of 0–4 points, with higher mean scores indicating greater level of somatization. We used the SSI-5 that was adapted from previous studies[1–3] as the diagnostic criterion for somatization. The SSI-5 is based on a simple count of the overall number of somatic symptoms independent of modality or organ-system specificity with the threshold at 5 symptoms for subjects of both sexes.

The Talbieh Brief Distress Inventory (TBDI),[30] a self-report questionnaire of 24 items, was used for measuring the degree of emotional distress experienced by patients. The TBDI shows good validity, reliability, and internal consistency as well as stability of test-retest ratings for psychiatric patients.[16] Distress symptom scores are the mean scores for the items of each of the 6 subscales: obsessiveness, hostility, anxiety, and paranoid ideation (each with 3 items), sensitivity (4 items), and depression (7 items). To avoid collinearity, 1 somatic item (pains in heart or chest) was excluded, and therefore, for this study, a general TBDI index (range, 0–4) was computed from 23 items. An elevated distress level was established as a TBDI index score of >1.0.[30]

Assessment of the stress process involved psychosocial factors and used the following standardized self-report questionnaires: the Coping Inventory for Stressful Situations (CISS),[31] the General Self-Efficacy Scale (GSES),[32] the Rosenberg Self-Esteem Scale (RSES),[33] the Multidimensional Scale of Perceived Social Support (MSPSS),[34] and the Level of Expressed Emotion (LEE) scale.[35] The LEE scale provides an index of the perceived emotional climate in a person's influential relationships. In addition to providing an overall score, the scale assesses the following 4 characteristic attitudes or response styles of significant others: intrusiveness, emotional response, attitude toward illness, and tolerance/expectations. For the present sample, self-report instruments demonstrated high reliability (Cronbach $\alpha = 0.72$ for IS, $\alpha = 0.62–0.92$ for TBDI, $\alpha = 0.58$ for paranoid ideation, $\alpha = 0.82$ for BSI-S, $\alpha = 0.75–0.88$ for CISS dimensions, $\alpha = 0.82$ for GSES, $\alpha = 0.77$ for RSES, $\alpha = 0.74$ for LEE, and $\alpha = 0.93$ for MSPSS).

Data Analysis

Mean values with standard deviations are presented as mean ± SD. Differences in continuous and frequency of categorical variables were examined with a 2-tailed t test or Wilcoxon Rank Sum test (since the data do not follow the normal probability distribution), chi-square analysis, or Fisher exact test, where appropriate. The Mantel-Haenszel test (χ^2 value) was used for comparison of the odds ratio. Pearson correlation coefficient between the BSI-S scores and obtained variables was computed before and after partialling out the effect of key variables from the correlation matrix. Two-way analysis of variance (ANOVA) was performed to assess the main effect of age and gender differences on the somatization level.

Finally, multivariate regression analysis was used for predicting the variability of somatization scores (dependent variable). Three sets of independent variables were used for testing the following regression models: (1) the isolated distress symptoms model was examined by entering ratings of 6 TBDI symptoms; (2) the isolated adverse symptoms model was tested with 3 DSAS index scores; and (3) the combined model was examined with scores of positive, negative, and general syndromes (PANSS); level of functioning (GAF); insight (ITAQ and IS); adverse events (AIMS and 3 DSAS indices); emotional distress

Table 2. Frequency of Somatic Symptoms: Schizophrenia Patients Versus Normative Nonpatient Sample

	Schizophrenia Patients (N = 237)		Nonpatient Sample[b] (N = 974)		Chi-Square Test, Yates corrected (df = 1)		
Symptom[a]	N	%	N	%	χ^2	p Value	OR (95% CI)
Faintness or dizziness	134	56.5	168	17.2	155.1	.001	6.2 (4.6 to 8.4)
Breath difficulty	89	37.6	135	13.9	69.4	.001	3.7 (2.7 to 5.1)
Pain in heart or chest	92	38.8	158	16.2	58.0	.001	3.3 (2.4 to 4.5)
Nausea	113	47.7	221	22.7	58.4	.001	3.1 (2.3 to 4.2)
Hot or cold spells	90	38.0	175	18.0	43.5	.001	2.8 (2.0 to 3.8)
Feeling weakness in parts of the body	88	37.1	215	22.1	22.2	.001	2.1 (1.5 to 2.8)
Numbness in part of the body	98	41.4	230	23.6	29.5	.001	2.3 (1.7 to 3.1)

[a]Brief Symptom Inventory.
[b]Normative nonpatient sample from Derogatis and Spencer.[29]
Abbreviations: CI = confidence interval, OR = odds ratio.

Table 3. Pearson Correlation Coefficients Between Somatization and Related Variables in 237 Patients With Schizophrenia Before and After Adjusting for Variables

	Somatization								
		After Adjusting for Variables[a]							
Variable	Before Adjusting for Variables	General Syndrome	Depression	Side Effects[d]	Emotional Distress	Expressed Emotion	Emotion Coping	Social Support	Self-Esteem
General psychopathology[b]	0.26†	N/A	0.23‡	0.10	0.08	0.26‡	0.22‡	0.23‡	0.20†
Depression[c]	0.17†	0.11	N/A	0.01	0.03	0.14*	0.14*	0.15*	0.09
Side effects[d]	0.51‡	0.46‡	0.48‡	N/A	0.36‡	0.50‡	0.45‡	0.48‡	0.45‡
Emotional distress[e]	0.62‡	0.58‡	0.60‡	0.52‡	N/A	0.61‡	0.52‡	0.58‡	0.54‡
Expressed emotion[f]	0.17†	0.16*	0.16*	0.12	0.13	N/A	0.14*	0.10	0.15*
Emotion coping[g]	0.39‡	0.36‡	0.38‡	0.30‡	0.09	0.38‡	N/A	0.40‡	–0.15*
Social support[h]	–0.26‡	–0.22‡	–0.24‡	–0.18†	–0.10	–0.22‡	–0.27‡	N/A	–0.15*
Self-esteem[i]	–0.36‡	–0.32‡	–0.33‡	–0.26‡	–0.04	–0.35‡	–0.28‡	–0.30‡	N/A

[a]Pearson correlation.
[b]Positive and Negative Syndrome Scale.
[c]Montgomery-Asberg Depression Rating Scale.
[d]Distress Scale for Adverse Symptoms, global distress index.
[e]Talbieh Brief Distress Inventory.
[f]Level of Expressed Emotion scale.
[g]Coping Inventory for Stressful Situations.
[h]Multidimensional Scale of Perceived Social Support.
[i]Rosenberg Self-Esteem Scale.
*p < .05.
†p < .01.
‡p < .001.
Abbreviation: N/A = not applicable.

(6 TBDI symptoms); task-oriented, emotion-oriented, and avoidance-oriented coping styles (CISS); self-esteem (GSES); self-efficacy (RSES); expressed emotion (LEE); and social support (MSPSS).

The first 2 models were tested using dependent and independent variables of the initial sample, whereas, for analysis of the combined model, variables of both the initial and follow-up samples were employed. In testing regression models, we used the stepwise backward selection procedure to reduce the number of independent variables to a smaller number of predictors. The NCSS-2000[36] program was used for all analyses.

RESULTS

Frequency of Somatization

Of 237 patients, 65 met SSI-5 criteria for somatization at admission, and 172 patients did not. Thus, the frequency of somatization among the inpatient population was 27.4%. The odds ratio of patients having somatic symptoms increases from 2.1 to 6.2 when compared with published normative data (Table 2). Faintness or dizziness (56%), nausea (48%), difficulty breathing (38%), and heart/chest pain (39%) were the most frequent somatic presentations in the schizophrenia sample. Distressed patients (TBDI index score > 1.0) scored 3.7 times higher on frequency of somatization (37.8% [N = 56 of 148]) than did nondistressed patients (10.1% [N = 9 of 89]; Fisher exact test, p < .001).

Correlation Analysis

Table 3 presents a summary of correlation analyses. As can be seen, the higher the ratings of emotional distress (r = 0.62), side effects (r = 0.51), coping with emotions (r = 0.39), general psychopathology (r = 0.26), depression (r = 0.17), and expressed emotion (r = 0.17), the greater the intensity of somatization. Self-esteem (r = –0.36) and social support (r = –0.26) showed negative association

with somatization ratings. However, the correlation coefficients for all variables (except side effects) lost significance after adjusting for emotional distress. Similarly, when side effects are controlled, correlation coefficients of general psychopathology, depression, and expressed emotion with somatization also lost significance. On the other hand, after partialling out the effect of each symptom or other psychosocial factors, correlation of both emotional distress and side effects with somatization ratings remained significant. Correlation between somatization and depression scores lost significance after adjusting for general psychopathology and self-esteem, and correlation between somatization and expressed emotion lost significance after adjusting for social support.

Correlation coefficients of somatization scores with positive and negative symptoms, other psychosocial factors, age at examination, age at onset, education, number of hospitalizations, duration of disorder, and dose of antipsychotics, adjunctive antidepressants, benzodiazepines, or mood stabilizers failed to reach significant levels.

Type of Illness and Antipsychotic Agent

Patients suffering from paranoid (N = 174) and nonparanoid (N = 63) subtypes of schizophrenia showed no differences in somatization scores (0.70 ± 0.7 vs. 0.90 ± 0.8, respectively; ANOVA: F = 3.1, df = 1,237; p = .078). Somatization raw scores did not differ between patients treated with typical (N = 128; 0.76 ± 0.74), atypical (N = 75; 0.74 ± 0.76), or combined (N = 28; 0.66 ± 0.77) antipsychotic agents (ANOVA: F = 1.02, df = 2,237; p = .39; post hoc comparisons with Wilcoxon rank sum test, p > .05).

Age and Gender

Given that somatization may be related to age and sex of the subjects, 2-way ANOVA was performed to assess the main effect of age and sex differences on the somatization level. The analyses were conducted for 3 groups of subjects in different age groups at examination: 30 years or less (N = 60), 31 to 45 years (N = 119), and 46 to 64 years (N = 58). All 3 ANOVAs for somatization were not significant for sex (F = 0.04, df = 1,236; p = .84), age (F = 0.11, df = 2,236; p = .89), or sex-by-age interaction (F = 24, df = 2,236; p = .79).

Changes Over Time

Though the frequency of somatization (N = 45 of 148 [30.4%]) did not change after the follow-up period compared with that of the initial assessment (27.4%, χ^2 = 0.26, df = 1, p = .61), mean somatization scores slightly decreased between initial (0.80 ± 0.8) and follow-up assessments (0.72 ± 0.8; Wilcoxon rank sum test: z = 2.4, df = 148, p = .017).

Correlation coefficients for changes in somatization and changes in related factors scores between 2 assessments are computed (N = 148). Changes in somatization scores were significantly correlated with changes in the following factors scores: emotional distress (TBDI; r = 0.38, p < .001), severity of adverse symptoms (SAS; r = 0.22, p = .012), and attributed distress (GDI; r = 0.20, p = .022). Changes over time in somatization scores were not significantly associated with changes in ratings of psychopathologic symptoms and other psychosocial factors.

In addition, no significant differences were found in somatization mean scores between patients who were reassessed in rehabilitation settings (N = 59), patients at discharge from rehospitalization (N = 48), and outpatients (N = 41); (F = 0.81, df = 2,148; p = .44 [follow-up sample]).

Multivariate Regression Analysis

A series of stepwise regression analyses was conducted to estimate the association of various factors with the somatization severity (dependent variable) (Table 4).

The first model tested whether symptoms of emotional distress are associated with the severity of somatization. In the isolated emotional distress model, sensitivity, anxiety, and paranoid ideation accounted for 37% of the total variance in somatization scores in the initial sample (sensitivity and depression accounted for 36% of the total variance in somatization scores in the follow-up sample).

The second model assumes that 3 adverse symptom indices underlie somatization intensity scores. In the isolated adverse symptom model, mental and somatic distress indices explained 26% of the total variance in somatization scores in the initial sample (mental distress index accounted for 23% of the total variance in somatization scores in the follow-up sample).

Finally, the combined model, which best fit the data, explained 48% of the variability in somatization scores at the initial assessments. In this model, 14% of the somatization variance was explained with emotional distress symptoms (sensitivity, anxiety, paranoid ideation), 13.6% was explained with the somatic distress index (side effects), and 3.9% was explained with self-reported insight. When data at follow-up assessments were used for regression analysis, the combined model explained 40% of the variability in somatization scores: 12.3% of somatization variance was explained with emotional distress (depression), 7.2% was explained with the mental distress index (side effects), and 7.3% was explained with expressed emotion scores. All predictors, except insight, demonstrated a positive association with somatization, while self-reported insight showed an inverse association (β = –0.16) with somatization scores. Thus, regression analysis showed that somatization scores were best predicted by the combination of scores for emotional distress attributed to psychopathology and side effects, expressed emotion, and insight.

Table 4. Summary of Multiple Regression Analysis to Predict Severity of Somatization Among Schizophrenia Patients

Independent Variable	β[a]	t test	R^2, %[b]	R^2 Value	Adjusted R^2 Value[c]	F	df	p Value
Initial Sample								
Emotional distress model[d]				0.37	0.36	45.6	3,236	< .0001
Sensitivity	0.31	4.3‡	7.4					
Anxiety	0.22	3.6‡	5.1					
Paranoid ideation	0.19	2.6†	2.8					
Adverse symptoms model[e]				0.26	0.25	27.4	2,236	< .0001
Mental distress index	0.28	3.0†	3.6					
Somatic distress index	0.34	3.7‡	5.5					
Combined model				0.48	0.47	70.8	3,236	< .0001
Sensitivity[d]	0.26	3.8‡	6.0					
Anxiety[d]	0.20	3.5‡	5.1					
Paranoid ideation [d]	0.18	2.6†	2.9					
Somatic distress index [e]	0.31	6.0‡	13.6					
Insight, total[f]	–0.16	3.1†	3.9					
Follow-Up Sample								
Emotional distress model[d]				0.36	0.34	13.4	2,147	< .0001
Sensitivity	0.24	2.2*	3.3					
Depression	0.42	2.9†	5.8					
Adverse symptoms model[e]				0.23	0.21	140	1,147	< .0001
Mental distress index	0.45	3.9‡	9.7					
Combined model				0.40	0.38	30.0	3,147	< .0001
Depression[d]	0.34	4.4‡	12.3					
Mental distress index[e]	0.25	3.2‡	7.2					
Expressed emotion[g]	0.23	3.3‡	7.3					

[a]β is a standardized regression coefficient.
[b]Partial R^2 reflects the percentage of variation in the somatization explained by each independent variable adjusted to the effects of all other independent variables.
[c]Adjusted for sample size.
[d]Talbieh Brief Distress Inventory.
[e]Distress Scale for Adverse Symptoms.
[f]Self-report Insight Scale, total score.
[g]Level of Expressed Emotion scale, total score.
*p < .05.
†p < .01.
‡p < .001.

DISCUSSION

This article addresses the prevalence, correlates, and predictors of somatization, defined as the presentation of 5 or more medically unexplained somatic symptoms, in a large number of patients with schizophrenia. The main conclusions from this study are (1) somatization reported by persistently ill schizophrenia patients is a prevalent problem; and (2) there is a positive association between somatic complaints and emotional distress attributed to the psychopathology and side effects of medicine, insight, or expressed emotion.

The frequency of abridged somatization (SSI-5 criterion for somatization) among schizophrenia inpatients at the initial assessment was 27.4% and after at least 1 year (mean follow-up period 16.7 months) was 30.4%. These rates are higher than those previously reported for both consumers of primary care (19.7%; SSI-6 criterion for somatization)[9] and immigrant populations (14.9%; SSI-5 criterion for somatization).[3] Odds ratios for specific somatic symptoms increase from 2.1 to 6.2 when schizophrenia patients are compared with normative data. Faintness or dizziness (56%) was the most common somatic presentation in this study (17.2% among nonpatients; Table 2). Additional frequent somatic presentations such as nausea (48%) and heart/chest pain (38%) were also previously observed among recent immigrants (37.5% and 48%, respectively).[3]

Elevated frequency of somatization among schizophrenia patients may be explained by higher exhibited emotional distress rates in schizophrenia patients[16] and side effects of antipsychotic agents. In order to test these assumptions, correlation and regression analyses were applied.

We first tested 3 regression models in which it was assumed that somatization could be associated with emotional distress, side effects, and combined factors. Regression analysis revealed that the initial contribution of emotional distress and antipsychotic adverse events to the severity of somatization was 37% and 26%, respectively. The contribution of these factors remained prominent when other variables were added to the combined model, which explained at least 40% of the variability in somatization scores. This model also suggests that additional factors should be sought.

Generally, our findings that somatization of schizophrenia patients is highly associated with emotional distress confirm previous reports of studies involving men-

tally healthy subjects.[3,10,11] Particularly, (1) the frequency of somatization is 3.7 times higher among emotionally distressed schizophrenia patients than among nondistressed patients, (2) correlation between emotional distress and somatization scores ($r = 0.62$, $p < .001$) remained significant after partialling out the effect of other symptoms and psychosocial factors, and (3) changes over time in both somatization and emotional distress scores were correlated significantly ($r = 0.38$, $p < .001$). Our findings support Fink's conclusion[37] that somatization is associated with a broad spectrum of distress symptoms. Indeed, somatization scores were significantly associated with a combination of perceived sensitivity, anxiety, and paranoid ideation scores.

Next, reports indicated subjective discomfort or patients' perceptions of the burden of medication side effects.[19,38,39] The relationship between increased levels of somatization and side effects of medicine is established in the present study on the basis of findings that (1) partial correlation between side effects and somatization scores remained significant after partialling out the effect of psychopathologic symptoms, emotional distress, or stress process–related (psychosocial) factors, (2) changes over time in ratings of both side effects and somatization were correlated significantly ($r = 0.22$, $p = .012$), and (3) mental or somatic distress was attributed to adverse symptoms and accounted for 7% to 14% of variability in somatization after adjusting for the effects of the remaining factors. According to previous studies,[40,41] fewer side effects is an important benefit of atypical antipsychotics compared with typical agents. Therefore, it may be expected that patients treated with atypical antipsychotic agents would have lower scores on the somatization scale than those treated with typical agents; however, this was not the case.

Moreover, no significant correlation was revealed between somatization scores and dosages of antipsychotic agents. This contradiction may be explained by results of regression analysis, which showed that only distress attributed to side effects, but not the severity of adverse symptoms, significantly contributed to the somatization prediction when these variables were simultaneously entered into the model. Thus, the patient's subjective response to adverse symptoms, and not the symptoms themselves, appears to be more closely associated with somatization. An alternative explanation could be the possible association of emotional distress, expressed emotion, insight, and other factors with somatization (the combined model accounted for only 40% to 48% of the variance in somatization scores). A careful analysis of somatic presentation attributed to antipsychotic agents requires more specific investigation.

Expressed emotion refers to the affective attitudes and behaviors (i.e., criticism, hostility, and emotional overinvolvement) of relatives toward a family member with a psychiatric illness. Expressed emotion is a well-established, important predictor of the relapse rate of patients suffering from schizophrenia.[42,43] Regression analysis revealed that expressed emotion accounted for 7.3% of the total variance in somatization scores for the follow-up sample.

Considering this finding, the following points should be taken into account. First, 89 of the 148 patients in the follow-up sample were outpatients, and their home environment may therefore be characterized by higher levels of expressed emotion, which could explain why expressed emotion accounted for the variability of somatization scores in the follow-up sample. Second, the construct of expressed emotion is essentially cultural in nature, and therefore represents culturally dependent features of family response to an ill relative.[44,45] Taking into account this cultural aspect of the construct, the contribution of expressed emotion (7.3%) to variability of somatization scores should be replicated in other populations. Third, although the expressed emotion phenomenon can be contained in the vulnerability-stress model, the manner in which it mediates somatization has not yet been clarified.

The role of protective factors in relation to somatization has not received attention in the literature. Findings from this study provide strong evidence for a negative relationship of some factors with somatization. Specifically, somatization showed negative association with self-esteem ($r = –0.36$, $p < .001$) and social support ($r = –0.26$, $p < .001$) ratings. Likewise, self-reported insight is inversely related to the level of somatization in schizophrenia inpatients and explained 3.9% of the total variance in somatization scores in the initial sample ($\beta = –0.16$; Table 4). Testing these associations in further investigations is warranted.

The role of rater-observed depressive symptoms in the occurrence of somatization was evaluated differently in previous studies. While many authors related somatization to depressive complaints,[1,8] others did not find a specific association between them.[11] Since a relationship between emotional distress and psychopathologic symptoms was previously revealed,[12,16] we evaluated the association between these symptoms and somatization with partial correlation coefficients. First, we found that somatization had a slight correlation with general psychopathology (PANSS) including a depression factor ($r = 0.26$) and MADRS depression ($r = 0.17$), whereas its correlations with positive and negative syndromes were negligible. Second, after adjusting for the emotional distress index, side effects, and self-esteem scores, even these positive correlations lost significance. These findings provide evidence for a probable mediating role of emotional distress in the somatization/depression relationship among schizophrenia patients. We also suggest that somatization of schizophrenia patients primarily reflects somatized distress but not severity of depression. This assumption is supported by a recent study[46] reporting that 33% of the

genetic variance in somatic distress was due to specific gene action unrelated to depression or phobic anxiety. In addition, 74% of the individual environmental influence on somatic distress was also unrelated to depression or phobic anxiety. Authors concluded that somatic symptoms are relatively etiologically distinct both genetically and environmentally from symptoms of anxiety and depression.

Further analyses demonstrated that subtype and duration of schizophrenia, number of admissions and treatment settings, education, and age at onset are not associated with severity of somatization. Inconsistent with most previous studies of mentally healthy subjects,[2,3,47] we did not find gender and age differences in somatization rates among schizophrenia patients. These incongruous findings may be explained by substantive differences in sources of somatization among schizophrenia patients and mentally healthy subjects.

The limitations of our study are few and obvious. First, since baseline data were received from inpatients, our findings may not generalize well to less persistently ill schizophrenia patients during the more stable outpatient phase. Second, the effects of specific stressful life events and daily stressors were not analyzed. Data from psychotic patients who were unable or refused to participate in the study are lacking. Finally, frequency of specific somatic complaints among schizophrenia patients was compared with published normative data, instead of data collected from a control group. However, the primary strength of our study is that data were collected from a systematically ascertained sample with repeated multidimensional measures in a naturalistic follow-up. Increasing the subject's ability to cope with stress and focusing intervention on somatic complaints can be beneficial in promoting better outcomes. It would be interesting to replicate these findings in earlier phases of illness. Future investigations should focus on personal characteristics and inner resources that underlie somatization and the adjustment of patients to the stressors that accompany schizophrenia disorders.

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