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Regular Article

Depression and somatic symptoms scale: A new scale with both depression and somatic symptoms emphasized

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Abstract The authors' preliminary study selected 22 items for Depression and Somatic Symptoms Scale (DSSS), including depression subscale (DS) and somatic subscale (SS). The aim of the study was to test reliability and validity of the DSSS. The study enrolled 135 consecutive outpatients (34 male and 101 female) experiencing a major depressive episode (the MDE group), 95 of whom (25 male and 70 female) accepted 1 month of treatment (the treatment group). Diagnosis was confirmed by using the Structured Clinical Interview for 4th edition with text revision Diagnostic and Statistical Manual Axis I Disorders. The DSSS and Hamilton Depression Rating Scale (HAMD) were given and evaluated. Cronbach's alpha was used to assess internal consistency. The correlation between the improvement percentage (IP) for the HAMD and the IP for the DSSS was calculated for the treatment group. Factor analysis was performed by using the principal-axis factoring method with promax rotation. Cronbach's alpha values of the DSSS and its subscales ranged from 0.73 to 0.94. Pearson correlation coefficients for the relationship between the DSSS and HAMD ranged from 0.63 to 0.86. In the treatment group, DSSS and HAMD scores were significantly decreased after treatment and the IP for the HAMD and the DSSS were similar and correlated (correlation coefficient = 0.78). The results of the factor analysis demonstrated that most of the items in DS and SS appropriately loaded in Depression and Somatic factors, respectively. The discriminative ability of the DSSS for anxiety comorbidities was not inferior to that of the HAMD. Therefore, the DSSS is reliable and sensitive to the treatment and has acceptable convergent, factorial, and distinct-groups validities. Because it assesses both depression and somatic symptoms, DSSS may overcome the deficiency of other depression scales with few somatic items.

Key words anxiety, depression, psychometrics, questionnaire.

INTRODUCTION

Somatic symptoms among patients with depression are important for several reasons. First, somatic symptoms may confound or mask the diagnosis of depression.[1] Second, residual symptoms, which are often somatic symptoms, might increase the risk of relapse.[2–4] Patients with major affective disorder and somatization had more and longer depressive episodes as well as more depressive symptoms than patients without somatization.[5] Increased pain severity in patients with major depressive disorder (MDD) was associated with worse depression, poor health-related quality of life (HRQoL), and a negative impact on treatment response of depression.[6] Finally, pain or somatic symptoms in depression increase the economic burden of depression.[7] Therefore, somatic symptoms have a significantly negative impact on diagnosis, treatment, and prognosis of depression.[3]

Fava reported that the conventional scales for depression used in clinical trials rarely included significant data on somatic symptoms.[3,8] It had also failed to bring the somatic aspect of depression to a level of attention and assessment equal to that of

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the psychological symptoms.[3,8] For example, the Hamilton Depression Rating Scale (HAMD) and the Montgomery–Asberg Depression Rating Scale (MADRS) are the most common scales used to evaluate depression.[9–11] Although the 17-item HAMD scale contains eight items pertaining to somatic symptoms, six of the eight items are designed to identify vegetative symptoms, including insomnia, loss of appetite, loss of bodyweight, and decreased libido. Other somatic symptoms – for example, fatigue, chest tightness, palpitations, headache, muscle soreness, and other types of pain – are coded for by only two items, thereby accounting for only six points, or 11.5% of the total score.[3,8] The fact that the codes for several somatic symptoms are limited to two items makes it almost impossible to track specific somatic symptoms and dimension. Among the 10 items for the MADRS scale, there are only two items for the vegetative symptoms (decreased appetite and insomnia) and none for other somatic symptoms. However, scales for depression without relevant somatic symptoms are problematic for researchers in the field of depression. Studies of somatic issues in depression must use other tools to measure somatic severity, such as the visual analog scale, the 90-item Hopkins Symptom Checklist,[12] Patient Health Questionnaire,[13] or HRQoL scale.[14] However, these scales are not specifically designed for depression and the question remains as to whether the somatic symptoms in these scales can be used to accurately assess somatic severities in patients with depression.

The authors' previous studies investigated the impact of headache on HRQoL and three psychometric scales among patients with MDD.[15–17] The authors found that the difference in depressive severity between MDD patients with and without migraine was partially due to somatic severity. However, no depression scale emphasizing somatic symptoms was available to further explore this difference. One study reported that adding HRQoL subscales for physical and social activity could improve the accuracy of predicting acute treatment response.[18] Therefore, a depression scale that emphasizes somatic symptoms is worth developing. In fact, the demand for such a scale becomes more necessary and urgent because somatic symptoms have a great impact on the prognosis of depression[4–6] and new antidepressants also stress their effect in this area.[1]

Initially, 102 patients with MDD were enrolled to determine which items should be included in the Depression and Somatic Symptoms Scale (DSSS).[19] A total of 44 items were used in the preliminary DSSS, including 16 depression items and 28 somatic items, the latter included seven pain-related items. The preliminary items for depression subscale were modifications of the 4th edition Diagnostic and Statistical Manual (DSM-IV) criteria for MDE, HAMD or MADRS scale items.[9,10,20] The preliminary items for somatic subscale were selected from several sources, including the HAMD scale,[10] the 90-item Hopkins Symptom Checklist,[12] and the common somatic symptoms for MDD reported in the previous studies.[21–25] In selecting appropriate items for the DSSS, several principles were considered: (i) somatic items that could reflect the severity of depression or predict the occurrence of depression, or the ones with significant impact on clinical practice or HRQoL;[1,21–26] (ii) somatic symptoms that were common in the present study and previous studies for depression; and (iii) somatic symptoms that improve Cronbach's alpha value for DSSS. The final DSSS was composed of 22 items with two major subscales, the depression subscale (DS) and the somatic subscale (SS). The DS had 12 items, including three vegetative symptoms and fatigue, and the SS had 10 items, including five pain items, which comprised the pain subscale (PS). Three vegetative symptoms (insomnia, poor appetite, and loss of interest in sex) and fatigue were included in DS but not in SS because three of the four symptoms were criteria for MDE and the four symptoms were also included in the HAMD scale. This design made DS more compatible with MDE criteria, HAMD, and other scales for depression. The preliminary results showed that the DSSS and HAMD were significantly correlated, and the Cronbach's alpha of the DSSS and all subscales fell within an acceptable range. The form of the DSSS is shown in Appendix I. The DS items were even-numbered plus item 21 (fatigue) and the SS items were odd-numbered except for item 21. The purpose of this study was to describe the psychometric characteristics of the DSSS by assessing reliability (by evaluating the Cronbach's alpha and test–retest reliability) and validity (by testing the correlation between DSSS and HAMD scores, their sensitivity to treatment, and correlation of improvement percentages [IP] between the DSSS and HAMD, factorial validity, and distinct-groups validity).

SUBJECTS AND METHODS

Four groups (major depressive episode [MDE] group, non-MDE group, treatment group, and test–retest group) were studied. Patients in the MDE group came from the project entitled 'The impact of headache and somatic symptoms on MDD II', which was conducted from January 2004 to January 2005 in the psychiatric outpatient clinics of Chang Gung Memorial Hospital, Taoyuan, Taiwan. This project was approved by the institutional review board of the Chang Gung Memo-

rial Hospital. Study participants were recruited from consecutive outpatients, 18–65 years of age, who had not received antidepressant or other psychotropic drug treatment within the past 2 weeks. Screening included an interview with a board-certified psychiatrist using the Structured Clinical Interview for DSM-IV-text revision (TR) Axis I Disorders.[27] Patients who met the DSM-IV-TR criteria for MDD[20] and experienced a MDE were enrolled. Seven anxiety comorbidities were diagnosed by using the Structured Clinical Interview.[27] The course of depression was clarified. Chronic depression was defined as chronic major depression for more than 2 years, dysthymic disorder plus current MDE, or previous MDE without full remission plus current MDE with a total course of more than 2 years.[28]

To minimize confounding of somatic symptoms by other medical conditions, substance abuse, or psychotic symptoms, the following exclusion criteria were established: (i) a history of substance dependence or abuse without full remission in the previous month; (ii) psychotic symptoms, catatonic features, or severe psychomotor retardation with obvious difficulty being interviewed; and (iii) regular treatment with medications for medical diseases, such as hypertension or diabetes mellitus.

In enrolling the non-MDE group, the same exclusion and inclusion criteria, which were applied to the MDE group, were used except for fulfilling MDD in a MDE. Therefore, patients who were not in MDE were enrolled in the non-MDE group. The enrolment of consecutive subjects in the MDE and non-MDE groups started at the same time. Enrolment in the MDE group lasted 1 year and in the non-MDE group for 4 months. Written informed consent was obtained from all subjects prior to the study enrolment.

After subjects were enrolled, subjects were requested to finish the self-administrated DSSS. Psychiatrists, who were blind to the DSSS results and psychiatric diagnoses, evaluated the HAMD score. In calculating the DSSS score, 'Absent' was scored as 0 points, 'Mild' as 1 point, 'Moderate' as 2 points, and 'Severe' as 3 points. The total scores on the DSSS or its subscales were calculated by adding the appropriate item scores. The scores on the DSSS and its subscales and the HAMD between the MDE and non-MDE groups were also compared. Moreover, the correlation between the HAMD and the DSSS and its subscale scores were calculated for the different groups.

To understand the sensitivity of the DSSS to treatment and the correlation between degree of improvement in the DSSS and HAMD scores, the MDE patients were treated for 1 month by pharmacological therapy. At 1 month later, DSSS was given and HAMD was re-evaluated by the same psychiatrist. Those who accepted the 1 -month follow-up treatment were considered to be in the treatment group. Scores on the DSSS and its subscales before and after treatment were compared to determine the test's sensitivity to treatment. The IP for the DSSS and its subscales and the HAMD were also compared. The IP calculation was:

$$(\text{scores before treatment} - \text{scores after treatment}) \times 100\%/\text{scores before treatment}$$

Moreover, the correlation between IP for the DSSS and its subscales and the HAMD was calculated.

The internal consistency of the DSSS and its subscales in the MDE, non-MDE, and the treatment groups were assessed by Cronbach's alpha. To test the test–retest reliability of the DSSS, psychiatric outpatients were enrolled who met two criteria: (i) received treatment in the psychiatric clinic for depression for at least 3 months and were in a stable condition according to patients' self-report and chart review; and (ii) did not expect change in medications or treatment profile in the following week. Subjects were given the DSSS at the index visit and 1 week later. Then, the Pearson correlation was calculated for the correlation between scores on the DSSS in the index visit and scores obtained 1 week later.

The factor structure of DSSS was investigated in the MDE and non-MDE groups. The authors submitted the DSSS items to a principal-axis factor analysis with promax rotation. A two-factor solution appeared to be the best fit based on two considerations. First, in their initial hypothesis for designing DSSS, it was composed of two major subscales: DS and SS. Second, the scree test revealed the possibility of a two or three-factor solution.

To test the discriminative validity of DSSS, subjects in the MDE group were divided into the anxiety comorbidity subgroup and the nonanxiety comorbidity subgroup. The differences of scores between the two groups were compared. Authors selected to test the discriminative ability for anxiety comorbidities because the purpose of DSSS was to emphasize somatic symptoms, which were related to anxiety.

All statistical analyses were carried out using the Statistical Package for the Social Sciences for Windows 10.0 (SPSS Inc., Chicago, IL, USA). Pearson correlation was used in these situations: the correlation of the DSSS and its subscale scores with the HAMD scores, the correlation between the IP for the DSSS and its subscales and that for the HAMD, and test–retest reliability. Independent or paired *t*-test was used in appropriate situations. A *P*-value less than 0.05 was considered statistically significant in all of the tests.

Table 1. Age, gender, and the scores on the Hamilton Depression Rating Scale and Depression and Somatic Symptoms Scale for the different groups[†]

	MDE group	Non-MDE group	Test–retest group (at baseline)	Test–retest group (1 week later)
Sample size	135	139	46	46
Age (years)	30.2 ± 8.4	32.6 ± 8.1	38.1 ± 12.0	38.1 ± 12.0
Gender (M : F)	34:101	50:89	17:29	17:29
HAMD	23.4 ± 4.5	12.5 ± 5.5	–	–
DSSS	41.3 ± 10.3	23.2 ± 10.7	20.8 ± 14.7	19.3 ± 14.1
Depression subscale	25.3 ± 5.1	13.7 ± 6.0	11.7 ± 7.8	11.3 ± 8.1
Somatic subscale	16.0 ± 6.6	9.5 ± 6.3	9.2 ± 7.5	7.9 ± 7.0
Pain subscale	7.7 ± 3.7	4.4 ± 3.2	4.7 ± 4.1	4.1 ± 3.9

[†] Differences in the mean scores on the HAMD and DSSS and subscales between the MDE group and non-MDE group were significant ($P < 0.01$).

DSSS, Depression and Somatic Symptoms Scale; HAMD, Hamilton Depression Rating Scale; MDE group, subjects with major depressive disorder currently in a major depressive episode; non-MDE group, subjects not in a major depressive episode.

RESULTS

Sample characteristics and scores in different groups

The sample size, mean age, mean scores on the HAMD and the DSSS and its subscales among different groups are shown in Table 1. The MDE group's scores on the DSSS and its subscales and the HAMD were significantly different from the non-MDE group's scores ($P < 0.01$).

Among the 135 subjects in the MDE group, 95 (70.4%; 25 men and 70 women; mean age, 31.3 ± 8.2 years) completed the required 1-month follow-up visit and, therefore, were considered as the treatment group. The HAMD scores at baseline (23.8 ± 4.9) in 40 subjects (29.6%) who dropped out were not significantly different from those of the treatment group (23.3 ± 4.4). The coefficient of variance (standard deviation/mean) of the HAMD scores in the treatment group (at the 1 month follow-up point) was higher than in the MDE group (at baseline; 0.55 vs. 0.19). Therefore, the HAMD scores in the MDE group were more homogeneous, compared to those in the treatment group after the 1-month treatment.

Internal consistency reliability

The Cronbach's alpha values for the different groups are shown in Table 2. All Cronbach's alpha values of the DSSS and SS for the three groups were >0.8 and the Cronbach's alpha values of the DS and PS were in an acceptable range (>0.7). Of the groups, the treatment group had a higher Cronbach's alpha value.

Table 2. The Cronbach's alpha of the Depression and Somatic Symptoms Scale and its subscales[†]

	MDE group	Non-MDE group	Treatment group
DSSS	0.87	0.88	0.94
Depression subscale	0.73	0.79	0.90
Somatic subscale	0.88	0.88	0.90
Pain subscale	0.82	0.77	0.85

[†] The Cronbach's alpha values in the MDE and the non-MDE groups were obtained at baseline and the results in the treatment group were obtained at the 1-month follow-up point.

DSSS, Depression and Somatic Symptoms Scale; MDE group ($n = 135$), subjects with major depressive disorder currently in a major depressive episode; non-MDE group ($n = 139$), subjects not in a major depressive episode; Treatment group ($n = 95$), subjects in MDE group who accepted 1 month of treatment.

Test–retest reliability

The scores of DSSS at the index visit and 1 week later are shown in Table 1. The difference in DSSS scores between the two evaluations was not significant as indicated by the paired *t*-test. The Pearson correlation coefficients calculated between the DSSS scores at the index visit and 1 week later were as follows: DSSS, 0.92; DS, 0.88; SS, 0.90; and PS, 0.90 (all $P < 0.01$).

Convergent validity and sensitivity to treatment

The correlation between the scores on the HAMD and DSSS are shown in Table 3. The scores on the DSSS

and its subscales were significantly correlated with those on the HAMD. Among the three groups, the correlation between the scores on the HAMD and DSSS was higher for the treatment group than for the MDE or non-MDE groups. Among DSSS subscales, DS score was best correlated with HAMD score.

Table 3. The Pearson correlation coefficients of the Hamilton Depression Rating Scale and Depression and Somatic Symptoms Scale[†‡]

	MDE group	Non-MDE group	Treatment group
HAMD – DSSS	0.63	0.66	0.86
HAMD – DS	0.65	0.68	0.84
HAMD – SS	0.49	0.48	0.78
HAMD – PS	0.39	0.50	0.71
DSSS – DS	0.84	0.87	0.95
DSSS – SS	0.91	0.88	0.93
DSSS – PS	0.82	0.81	0.87
DS – SS	0.54	0.52	0.77
DS – PS	0.45	0.49	0.72
SS – PS	0.93	0.91	0.93

[†] The Pearson correlation coefficients in the MDE and the non-MDE groups were obtained at baseline and the results in the treatment group were obtained at the 1-month follow-up point.

[‡] All these correlations were statistically significant ($P < 0.01$).

DS, Depression Subscale; DSSS, Depression and Somatic Symptoms Scale; HAMD, Hamilton Depression Rating Scale; MDE group ($n = 135$), subjects with major depressive disorder currently in a major depressive episode; non-MDE group ($n = 139$), subjects not in a major depressive episode; PS, Pain Subscale; SS, Somatic Subscale; Treatment group ($n = 95$), subjects in MDE group who accepted one month of treatment.

The scores on the different scales before and after treatment are shown in Table 4. The scores on the HAMD and DSSS decreased significantly post treatment (all P-values <0.01). The IP of the HAMD, DSSS, and DS were similar. The difference in IP between the HAMD and DSSS ($P = 0.31$), the HAMD and DS ($P = 0.51$), the HAMD and SS ($P = 0.14$), the HAMD and PS ($P = 0.11$), the DS and SS ($P = 0.18$), and the DS and PS ($P = 0.16$) was not significant. Moreover, the IP of the DSSS and its subscales were significantly correlated with that of the HAMD. The IP of the DS was most correlated with that of the HAMD (correlation coefficient = 0.81).

Factorial validity

The results of factor analysis were presented in Table 5. Factors 1 and 2 appeared to be the Somatic factor and the Depression factor, respectively. In the MDE group, eight items in the SS loaded substantially on Factor 1. Although tightness in the chest and palpitation loaded on both factors, all items in the SS had a factor loading >0.35 on Factor 1. Nine items in the DS loaded on Factor 2 with a factor loading >0.3. Insomnia, loss of interest in sex, and irritable mood did not appropriately load on both factors.

In the non-MDE group, Factor 1 included all items in the SS with a factor loading >0.4. All items in the DS except for 'unable to concentrate', 'insomnia', and 'fatigue' had a factor loading >0.3 in Factor 2. Three items in the DS, 'anxious', 'unable to concentrate', and 'fatigue' tended to load on both factors.

The two factors were moderately correlated (correlation coefficient = 0.51 in the MDE group and 0.45 in the non-MDE group). The two-factor solution accounted for 34.1% of the variance in the MDE group and 35.5% of that in the non-MDE group.

Table 4. The improvement percentage for all scales and the Pearson correlation coefficients between improvement percentages for the Hamilton Depression Rating Scale and Depression and Somatic Symptoms Scale in the treatment group ($n = 95$)

	Scores before treatment	Scores post treatment[†]	IP (%)[‡]	Correlation coefficients[§]
HAMD	23.3 ± 4.4	12.8 ± 7.1	44.9 ± 29.3	–
DSSS	41.6 ± 10.1	23.5 ± 13.2	42.6 ± 35.9	0.78
Depression subscale	25.2 ± 5.2	13.9 ± 7.6	43.5 ± 34.6	0.81
Somatic subscale	16.4 ± 6.0	9.6 ± 6.4	39.3 ± 46.6	0.61
Pain subscale	7.9 ± 3.5	4.9 ± 3.5	37.2 ± 52.0	0.51

[†] Scores post treatment decreased significantly for all scales and subscales ($P < 0.01$).

[‡] The IP was calculated as follows: (scores before treatment – scores after treatment) × 100%/scores before treatment.

[§] The Pearson correlations between the IP for the HAMD and DSSS were significant ($P < 0.01$).

DSSS, Depression and Somatic Symptoms Scale; HAMD, Hamilton Depression Rating Scale; IP, improvement percentage.

Table 5. Factor analysis of Depression and Somatic Symptoms Scale by using the principal-axis factoring method with promax rotation

	MDE group		Non-MDE group	
	Factor 1	Factor 2	Factor 1	Factor 2
Somatic subscale				
1. Headache	0.58	–0.02	0.41	0.18
3. Tightness in the chest	0.36	0.41	0.58	0.13
5. Muscle tension	0.75	–0.17	0.77	–0.10
7. Back pain	0.70	–0.06	0.69	–0.08
9. Dizziness	0.47	0.24	0.64	–0.01
11. Chest pain	0.54	0.26	0.63	–0.06
13. Neck or shoulder pain	0.78	–0.12	0.54	0.08
15. Shortness of breath or difficulty breathing	0.46	0.28	0.67	–0.02
17. Soreness in more than half of the body's muscles	0.95	–0.25	0.78	–0.09
19. Palpitations or increased heart rate	0.36	0.43	0.69	0.05
Depression subscale				
2. Loss of interest in daily or leisure activities	–0.11	0.58	–0.25	0.85
4. Insomnia	0.14	0.16	0.13	0.05
6. Irritable mood	0.21	0.16	0.15	0.34
8. Unable to feel happy or decreased ability to feel happy	–0.20	0.66	–0.03	0.76
10. Depressed mood or tearful	–0.01	0.50	0.07	0.64
12. Feelings of self-reproach or guilt	–0.08	0.50	0.20	0.44
14. Loss of interest in sex	0.21	0.06	0.01	0.47
16. Anxious or nervous	0.14	0.51	0.38	0.31
18. Unable to concentrate	0.05	0.51	0.29	0.28
20. Thoughts of death or suicidal ideas	–0.12	0.64	0.03	0.39
21. Fatigue or loss of energy	0.25	0.42	0.31	0.29
22. Decreased appetite or loss of appetite	0.08	0.34	–0.02	0.48

MDE group ($n = 135$), subjects with major depressive disorder currently in a major depressive episode; non-MDE group ($n = 139$), subjects not in a major depressive episode.

Distinct-groups validity

The percentage and score of anxiety comorbidities and chronic depression are shown in Table 6. Chronic depression and all anxiety comorbidities except for generalized anxiety disorder (GAD) had higher scores on the HAMD and DSSS. Among seven anxiety comorbidities, significant differences of scores between anxiety comorbidity subgroup versus non-anxiety comorbidity subgroup were noted in five anxiety comorbidities by using the DSSS. However, the HAMD only could differentiate the severity of three anxiety comorbidities. Significant differences of scores in the DS and SS also were noted in four anxiety comorbidities.

DISCUSSION

The scores on the DSSS and its subscales were significantly correlated with those on the HAMD. This correlation was less for the MDE group than the treatment group. This might be partially attributed to more homogeneity in severity of depression in the MDE group (at baseline) than in the treatment group (at the 1 -month follow-up point) because subjects in the treatment group might have different degrees of improvement after the 1-month treatment. Among the DSSS subscales, DS was most correlated with the HAMD. This result was compatible with the design of the DSSS because the items in the DS were modified items from the HAMD and based on DSM-IV criteria for MDE.

The scores on the DSSS and its subscales significantly decreased after treatment. The IP for the HAMD and DSSS were similar and significantly correlated (Table 4). These results demonstrated that the DSSS was sensitive to treatment, and its validity as a tool to monitor the severity of depression during treatment was good.

The Cronbach's alpha values for the DSSS and SS were good (>0.8) and those for the DS and PS were acceptable (>0.7). The test–retest reliability of scores on the DSSS at baseline was also highly correlated with scores 1 week later, indicating that the reliability of the DSSS was acceptable.

Table 6. The scores (mean ± standard deviation) of the Hamilton Depression Rating Scale and the Depression and Somatic Symptoms Scale between the comorbid group versus the non-comorbid group among 135 subjects with major depressive disorder[†]

	HAMD	DSSS	DS	SS	PS
Chronic depression					
Yes ($n = 62$; 45.9%)	24.5 ± 4.5**	44.4 ± 9.3**	26.2 ± 4.7	18.2 ± 5.9**	8.8 ± 3.5**
No ($n = 73$)	22.5 ± 4.4	38.8 ± 10.5	24.6 ± 5.3	14.2 ± 6.6	6.8 ± 3.7
Panic disorder					
Yes ($n = 24$; 17.8%)	26.2 ± 4.2**	47.2 ± 10.0**	28.0 ± 4.5**	19.2 ± 6.4**	9.1 ± 3.9*
No ($n = 111$)	22.7 ± 4.3	40.1 ± 10.0	24.8 ± 5.1	15.3 ± 6.4	7.4 ± 3.7
Agoraphobia					
Yes ($n = 22$; 16.3%)	26.5 ± 3.9**	47.6 ± 7.7**	27.5 ± 4.1*	20.1 ± 4.9**	9.6 ± 3.3**
No ($n = 113$)	22.8 ± 4.4	40.1 ± 10.3	24.9 ± 5.2	15.2 ± 6.6	7.3 ± 3.7
Social phobia					
Yes ($n = 42$; 31.1%)	24.5 ± 4.3	44.1 ± 10.3*	26.5 ± 5.5	17.6 ± 6.0	8.6 ± 3.6
No ($n = 93$)	22.9 ± 4.6	40.1 ± 10.1	24.8 ± 4.8	15.3 ± 6.7	7.3 ± 3.7
Specific phobia					
Yes ($n = 36$; 26.7%)	24.8 ± 4.2*	46.1 ± 9.1**	27.3 ± 4.9**	18.8 ± 5.5**	9.1 ± 3.1**
No ($n = 99$)	22.9 ± 4.6	39.6 ± 10.2	24.6 ± 5.0	15.0 ± 6.7	7.2 ± 3.8
Post-traumatic stress disorder					
Yes ($n = 13$; 9.6%)	25.4 ± 3.5	46.2 ± 10.2	27.4 ± 4.1	18.8 ± 7.7	9.2 ± 4.3
No ($n = 122$)	23.2 ± 4.6	40.8 ± 10.2	25.1 ± 5.2	15.7 ± 6.4	7.5 ± 3.7
Obsessive–compulsive disorder					
Yes ($n = 17$; 12.6%)	25.0 ± 5.0	47.8 ± 9.8**	28.2 ± 4.2*	19.6 ± 6.8*	9.4 ± 4.2
No ($n = 118$)	23.2 ± 4.5	40.4 ± 10.1	24.9 ± 5.1	15.5 ± 6.4	7.4 ± 3.6
Generalized anxiety disorder					
Yes ($n = 5$; 3.7%)	22.6 ± 6.6	36.2 ± 16.2	21.4 ± 9.2	14.8 ± 7.2	8.0 ± 3.7
No ($n = 130$)	23.5 ± 4.5	41.5 ± 10.0	25.5 ± 4.9	16.1 ± 6.6	7.7 ± 3.8

[†] The difference between groups was compared by the independent *t*-test (* $P < 0.05$; ** $P < 0.01$).

DS, Depression Subscale; DSSS, Depression and Somatic Symptoms Scale; HAMD, Hamilton Depression Rating Scale; PS, Pain Subscale; SS, Somatic Subscale.

In the factor analysis, most of the items in the DS and SS loaded on the Depression factor and the Somatic factor, respectively. Insomnia, loss of interest in sex, and irritable mood in the MDE group did not appropriately load on both factors. However, the three symptoms were common depressive symptoms in MDE and also included in some scales for depression, such as the HAMD and Zung Depression scale.[10,29] Therefore, the Depression and Somatic factor reflected the common depressive and somatic symptoms among patients with a MDE, respectively.

The discriminative ability of the DSSS was not inferior to that of the HAMD. This might partially result from the fact that the DSSS had more somatic components. All anxiety comorbidities had higher scores of the HAMD or DSSS except for GAD. Subjects during MDE with the symptoms of GAD were not diagnosed as GAD according to the hierarchy rule of DSM-IV-TR.[20] Therefore, only patients with a short duration of MDE, which had less severity compared with chronic depression (Table 6), had an opportunity to fulfil a diagnosis of GAD in the present study. Moreover, near half of the present study's subjects (45.9%) had chronic depression. These two circumstances might partially explain the lower frequency of GAD (3.7%) and MDD with GAD having a less depressive severity in the present study.

Lack of somatic items in depressive scales might lead to underestimate the impact of somatic symptoms on depression and HRQoL and fail to monitor somatic dimension. The DSSS emphasized depression and somatic symptoms simultaneously and had several advantages. First, the design of the DSSS enables the researcher to observe and monitor different dimensions of depression during treatment. Second, each item of the DSSS deals with only one symptom. Therefore, the DSSS could be used as a symptom-checklist for depression. This design facilitates monitoring of individual somatic symptoms during treatment. Third, the discriminative ability of the DSSS for anxiety

comorbidities was not inferior to that of the HAMD. Finally, the DSSS is a simple and self-administrated scale with only 281 words in the Chinese version.

Some methodological issues or limitations should be addressed. First, the DSSS was compared with the HAMD because the HAMD is one of the most popular scales used in evaluating the severity of depression.[11] Second, the test–retest reliability of two scores 1 week apart, which is a short interval, was selected because the DSSS was sensitive to treatment and the severity of depression might change after a longer period. Third, this study focused on the HAMD to test the validity of the DSSS. Other methods to test validity of the DSSS were indicated, such as comparing the SS to other somatic scales and the correlation of the DSSS and scales for HRQoL. Moreover, interpretations, limitations, or cultural differences associated with the DSSS might need to be further studied.

In conclusion, the results of the present study demonstrate that the DSSS and its subscales are reliable and sensitive to the treatment and have acceptable convergent validity, factorial validity, and distinct-groups validity. The DSSS is able to assess both depression and somatic symptoms and may overcome the deficiency of other scales for depression that include few somatic symptoms. Therefore, DSSS could serve as an instrument to monitor the severity of depression and somatic symptoms.

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REFERENCES

1. Greden JF. Physical symptoms of depression: unmet needs. *J. Clin. Psychiatry* 2003; **64** (Suppl. 7): 5–11.
2. Bakish D. New standard of depression treatment: remission and full recovery. *J. Clin. Psychiatry* 2001; **62** (Suppl. 26): 5–9.
3. Fava M. Depression with physical symptoms: treating to remission. *J. Clin. Psychiatry* 2003; **64** (Suppl. 7): 24–28.
4. Paykel ES, Ramana R, Cooper Z, Hayhurst H, Kerr J, Barocka A. Residual symptoms after partial remission: an important outcome in depression. *Psychol. Med.* 1995; **25**: 1171–1180.
5. Lipowski ZJ. Somatization and depression. *Psychosomatics* 1990; **31**: 13–21.
6. Bair MJ, Robinson RL, Eckert GJ, Stang PE, Croghan TW, Kroenke K. Impact of pain on depression treatment response in primary care. *Psychosom. Med.* 2004; **66**: 17–22.
7. Greenberg PE, Leong SA, Birnbaum HG, Robinson RL. The economic burden of depression with painful symptoms. *J. Clin. Psychiatry* 2003; **64** (Suppl. 7): 17–23.
8. Fava M. Somatic symptoms, depression, and antidepressant treatment (commentary). *J. Clin. Psychiatry* 2002; **63**: 305–307.
9. Montgomery SA, Asberg M. A new scale designed to be sensitive to change. *Br. J. Psychiatry* 1979; **134**: 382–389.
10. Hamilton M. Development of a rating scale for primary depressive illness. *Br. J. Soc. Clin. Psychol.* 1967; **6**: 278–296.
11. Demyttenaere K, De Fruyt J. Getting what you ask for: on the selectivity of depression rating scales. *Psychother. Psychosom.* 2003; **72**: 61–70.
12. Derogatis LR, Lipman RS, Rickels K, Uhlenhuth EH, Covi L. The Hopkins symptom checklist (HSCL): a self-report symptom inventory. *Behav. Sci.* 1974; **19**: 1–15.
13. Kroenke K, Spitzer RL, Williams JB. The PHQ-15: validity of a new measure for evaluating the severity of somatic symptoms. *Psychosom. Med.* 2002; **64**: 258–266.
14. Ware JE, Snow KK, Kosinski M, Gandek B. *SF-36 Health Survey-Manual and Interpretation Guide.* The Health Institute, New England Medical Center, Boston, MA, 1993.
15. Hung CI, Wang SJ, Hsu KH, Juang YY, Liu CY. Risk factors associated with migraine or chronic daily headache in outpatients with major depressive disorder. *Acta Psychiatr. Scand.* 2005; **111**: 310–315.
16. Hung CI, Liu CY, Fuh JL, Juang YY, Wang SJ. Comorbid migraine is associated with a negative impact on quality of life in patients with major depression. *Cephalalgia* 2006; **26**: 26–32.
17. Hung CI, Liu CY, Juang YY, Wang SJ. The impact of migraine on patients with major depressive disorder. *Headache* 2006; **46**: 469–477.
18. Pyne JM, Bullock D, Kaplan RM *et al.* Health-related quality-of-life measure enhances acute treatment response prediction in depressed inpatients. *J. Clin. Psychiatry* 2001; **62**: 261–268.
19. Hung CI, Weng LJ, Su YJ, Liu CY. Preliminary study of a scale measuring depression and somatic symptoms. Psychological reports 2006; 99: 379–389.
20. *American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders*, 4th edn, Text Revision. American Psychiatric Association, Washington, DC, 2000.
21. Von Korff M, Resche LL, Dworkin SF. First onset of common pain symptoms: a prospective study of depression as a risk of factor. *Pain* 1993; **55**: 251–258.
22. Von Knorring L, Perris C, Eisemann M, Eriksson U, Perris H. Pain as a symptom in depressive disorder. I. Relationship to diagnostic subgroup and depressive symptomatology. *Pain* 1983; **15**: 19–26.
23. Mathew RJ, Weinman ML, Mirabi M. Physical symptoms of depression. *Br. J. Psychiatry* 1981; **139**: 293–296.
24. De Wester JN. Recognizing and treating the patient with somatic manifestations of depression. *J. Fam. Pract.* 1996; **43**: S3–S15.

25. Gerber PD, Barrett JE, Barrett JA *et al.* The relationship of presenting physical complaints to depressive symptoms in primary care patients. *J. Gen. Intern. Med.* 1992; **7**: 170–173.
26. Wang SJ, Fuh JL, Lu SR, Juang KD. Quality of life differs among headache diagnoses: analysis of SF-36 survey in 901 headache patients. *Pain* 2001; **89**: 285–292.
27. First MB, Spitzer RL, Gibbon M, Williams JBW. *Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version. Patient Edition (SCID-I/P)*. New York State Psychiatric Institute, Biometrics Research, New York, 2002.
28. Dunner DL. Acute and maintenance treatment of chronic depression. *J. Clin. Psychiatry* 2001; **62** (Suppl. 6): 10–16.
29. Zung WWK. A self-rating depression scale. *Arch. Gen. Psychiatry* 1965; **12**: 63–70.

APPENDIX I

Depression and somatic symptoms scale

Date: __/__/__

Please evaluate the severity of these symptoms you have experienced in the past week (7 days):
Absent: no symptoms.
Mild: symptoms caused **slight** discomfort or disturbance.
Moderate: symptoms caused **significant** discomfort or disturbance.
Severe: symptoms caused **very significant** discomfort or disturbance.

Please check one of absent, mild, moderate, or severe to indicate the severity of the following symptoms.

	Absent	Mild	Moderate	Severe
1. Headache				
2. Loss of interest in daily or leisure activities				
3. Tightness in the chest				
4. Insomnia				
5. Muscle tension				
6. Irritable mood				
7. Back pain				
8. Unable to feel happy or decreased ability to feel happy				
9. Dizziness				
10. Depressed mood or tearful				
11. Chest pain				
12. Feelings of self-reproach or guilt				
13. Neck or shoulder pain (or soreness)				
14. Loss of interest in sex				
15. Shortness of breath or difficulty breathing				
16. Anxious or nervous				
17. Soreness in more than half of the body's muscles				
18. Unable to concentrate				
19. Palpitations or increased heart rate				
20. Thoughts of death or suicidal ideas				
21. Fatigue or loss of energy				
22. Decreased appetite or loss of appetite				