

Letters to the Editor

Development and validation of a Stress-related Vulnerability Scale

Dear Editor:

In the last decades, an impressive body of literature has documented the noxious effects of emotional stress on mental and physical health (Lovallo, 2004). Also, evidence is accumulating that social relationships can have a positive impact on health (Cohen *et al.*, 2000). Further, stress and support might interact, and an influential theoretical perspective hypothesizes that the belief that support is available reduces the noxious effects of stress on health. This is commonly referred to as the 'stress buffering hypothesis' and is supported by many studies (Lakey & Cohen, 2000).

In stress research, there is an influential tradition which focuses on individuals' subjective evaluations of their abilities to cope with the demands posed by specific events or experiences, with an emphasis on perceived stressfulness of such events (Cohen *et al.*, 1995). The literature on social support also suggests that the subjective perception of support has particular importance, as perceived support rather than objective support is associated with lower levels of autonomic activity, better immunosurveillance, and lower basal levels of stress hormones (Uchino *et al.*, 1996).

Several validated measures of perceived stress and perceived social support are available. However, there is a scarcity of instruments assessing both perceived stress and support that are short enough to be used in busy clinical routines. In this paper, we report about the development and validation of a short self-completed questionnaire, named Stress-related Vulnerability Scale (SVS), which enquires about both perceived stress and social support.

METHODS

Participants

The study was performed on two independent samples. The first sample (A) was recruited among friends

and relatives of a group of students and graduate students attending the Department of Psychiatric Sciences at the 'Sapienza' University of Rome, Italy. The second sample (B) was composed of white-collar workers. All subjects gave their written informed consent to take part in the study and met the following criteria:

- 1) age 18-65 years;
- 2) absence of severe medical or psychiatric illness;
- 3) absence of cognitive impairment.

Assessment instruments

The SVS is a self-completed questionnaire consisting of 9 items, scored on a 4-point scale (not at all, a little, quite a bit, a lot). A pilot version of the instrument was developed 10 years ago through a careful examination of the relevant literature on perceived stress and social support. Then, this pilot version was subsequently tested on a nonclinical sample of about 100 university students and administrative employees, and it was refined based on participants' feedback. This earlier version, which consisted of 15 items and was named Rapid Stress Assessment Scale, proved fruitful both in clinical (Tarsitani & Biondi, 1999) and non-clinical samples (Tomei *et al.*, 2006a, b; Pancheri *et al.*, 2002). The SVS was developed from this earlier instrument through a careful item selection procedure based on psychometric performance (internal consistency, factorial structure). Compared with other established questionnaires on perceived stress, this instrument puts more explicit emphasis on emotional aspects (e.g., feeling discouraged, irritable, worried, etc.) and also enquires on perceived social support (isolation, social activities and support). The reference period of the SVS is the last month and it yields scores on three subscales of 3 item each, named 'Tension', 'Demoralization', and 'Reduced Social Support', respectively. Subscale scores are added to give

a total score. Higher scores indicate greater stress-related vulnerability.

The *Perceived Stress Scale* (PSS) (Cohen *et al.*, 1983) is a well-known self-report questionnaire to measure the amount of stress perceived by an individual. This instrument has been thoroughly validated and widely used. The items are scored on a 5-point scale, and they are summed to yield a total score. Higher total scores correspond to greater perceived stress. We used the 10-item version of the instrument.

The *Multidimensional Scale of Perceived Social Support* (MSPSS) (Zimet *et al.*, 1988) is a validated self-report questionnaire measuring the subject's perception of the adequacy of support from family, friends, and significant others. It consists of 12 items, each scored on a 7-point scale, and it gives three subscale scores named Family Support, Friends Support, and Others Support. Higher scores indicate greater perceived support.

The life event checklist is based on Paykel's list of stressful life events (Paykel, 1983) and it includes 60 specific and clearly defined events, as well as a final open question asking for any additional relevant event not included elsewhere in the list. We followed several recommended steps (Turner & Wheaton, 1995; Kessler & Wethington, 1991) to facilitate recall of life events and maximize the reliability of the checklist, such as careful question wording, grouping of events in sections according to the area of life (e.g., work, home, friends and close relationships, family, health, financial issues, legal troubles, death of someone dear), inclusion of a life event calendar to be used to record each event, and the suggestion to use some periods of the year that the subject remembers well (e.g., Christmas, Easter or other religious holidays, Halloween, Labor Day, Thanksgiving, summer vacations, birthday, wedding anniversary, etc.) as reference points that may help dating stressful events.

Procedure

At baseline, all participants completed the SVS, the PSS, and the MSPSS. Participants in sample B also completed the life event checklist. After about 10 days, participants in sample A were asked to complete the SVS for a second time. After 6 months, participants in sample B were asked to complete again the SVS and the life event checklist.

Statistical analysis

The internal consistency of the SVS was measured with Cronbach's alpha in all subjects. To assess test-retest

reliability, the intraclass correlation coefficient between SVS scores at first and second administration and the linear weighted kappa coefficient were calculated in sample A. The linear form of the kappa coefficient has some advantages over the quadratic version, that is equivalent to the intraclass correlation coefficient (Fleiss & Cohen, 1973), as it is less sensitive to the number of categories and should therefore be preferred when the number of categories of the ordinal scale is large (Brenner & Kliebsch, 1996). Convergent validity was assessed in all subjects by examining Pearson's correlation coefficients between SVS scores and MSPSS and PSS scores. We hypothesized that scores on the SVS 'Reduced Social Support' subscale would negatively correlate with MSPSS total score, and that scores on the SVS 'Tension' and 'Demoralization' subscales would correlate with PSS score. As an additional test of convergent validity, Spearman's correlation coefficient was used to assess the relationship between the number of life events experienced over the preceding 3 months and the SVS total score both on the first and second assessment in sample B. To assess sensitivity to change, this sample was divided in groups according to the number of life events experienced in the 6 months that elapsed between the first and the second administration, and one-way ANOVA was used to compare mean change in SVS scores between the two administrations in these groups. Principal component analysis was used to study the factor structure of the SVS in all participants. The number of factors to be extracted was determined according to the Kaiser-Guttman rule. Orthogonal rotation was performed using the Varimax method. Weighted Kappa was calculated using Intercooled STATA 7.0 for Windows, while all other analyses were performed with SPSS 16.0 for Windows.

RESULTS

Of 210 subjects who were enrolled in sample A, 202 completed all SVS items and were included in the analyses. One hundred thirty four (66%) were females, their mean age was 36.0 ± 12.7 years, and most were well educated (primary school, 1%; junior high school, 4%; senior high school, 56%; graduate degree, 39%). One hundred and fourteen (56%) were single, 80 (40%) were married or cohabiting, while 8 (4%) were divorced or widowed. One participant (0%) did not complete the PSS, and six (3%) the MSPSS.

Ninety-six subjects completed all the instruments in sample B and 71 of them were assessed after 6 months, with no significant differences in sex, age, marital status,

education, and baseline MSPSS, PSS and SVS scores between the subjects who completed and those who did not complete the SVS at the 6-month follow-up. Seventy (73%) were females, their mean age was 36.5 ± 7.4 years, and most had a high school education (junior high school, 30%; senior high school, 68%; graduate degree, 2%). Thirty (31%) were single, 64 (67%) were married or cohabiting, 2 (2%) were divorced. The internal consistency of the SVS was tested separately on samples A and B and was found to be satisfactory, with Cronbach's alpha coefficients of 0.86 and 0.81, 0.72 and 0.73, 0.83 and 0.73, 0.63 and 0.64 for the total score and the 'Tension', 'Demoralization', and 'Reduced Social Support' scales among sample A and B, respectively. Also, test-retest reliability (sample A) was high, with intraclass correlation coefficients of 0.88, 0.85, 0.83, 0.84 for the total score and the 'Tension', 'Demoralization', and 'Reduced Social Support' scales, respectively. The linear weighted kappa coefficient for the total score and the 'Tension', 'Demoralization', and 'Reduced Social Support' scales was 0.72, 0.68, 0.68, 0.69, respectively. Internal consistency and test-retest reliability remained satisfactory also when the analyses were repeated separately for gender, age (≤ 35 vs. > 35 years), and educational level (primary or junior high school vs. senior high school vs., university degree). The profile of correlations between the SVS and the PSS and MSPSS in all subjects was as expected and corroborated the validity of the SVS. The correlation between the 'Reduced Social Support'

SVS subscale and MSPSS total score was -0.58 ($p \leq 0.001$), while the correlation between the PSS and the 'Tension' and 'Demoralization' SVS subscales was 0.67 and 0.75, respectively (both $p \leq 0.001$). The correlation between the SVS total score and the PSS was 0.75 ($p \leq 0.001$), and there was a moderate negative correlation between the SVS total score and the MSPSS ($r = -0.52$, $p \leq 0.001$). These results were consistent across gender and age subgroups.

In sample B, the correlation between the number of life events experienced during the preceding 3 months and the SVS total score on the first assessment was 0.32 ($p = 0.002$). The correlation between the number of events occurring in the 6 months that elapsed between the first and the second administration and the SVS total score on the second administration was 0.52 ($p < 0.001$).

Sensitivity to change was corroborated by the finding that the mean difference in SVS total score between the second and the first administration was 0.7 in the group with one or more intervening life events ($N = 57$) and -2.1 in the group with no intervening events ($N = 14$) ($t = 2.38$, $df = 69$, $p = 0.02$).

As regards principal component analysis, there were three components with an eigenvalue over 1. Hence, according to the Kaiser-Guttman rule, we extracted three factors. Communality values were acceptable, ranging from 0.51 to 0.77, indicating that the variables were well defined by this factor solution. The three factors accounted for 67.0% of total variance.

Table I – Factor structure of the SVS.

SVS item	Mean \pm SD	Factor I	Factor II	Factor III	SVS subscale
I often feel irritable	1.43 \pm 0.87	.81			Tension
I feel restless	1.34 \pm 0.86	.73	.36		
I experience physical complaints (headache, muscle pains, something pressing on my chest, palpitations) that I think are caused by nervous tension	1.08 \pm 0.97	.68			Demoralization
I'm worried because I can't manage things that are important in my life	0.98 \pm 0.85		.82		
I feel discouraged because I can't overcome difficulties	0.96 \pm 0.86	.38	.79		
I feel down	1.15 \pm 0.90	.55	.59		Reduced social support
I have people I can talk to who understand my difficulties	1.07 \pm 0.88			-.86	
I live somewhat isolated from others	0.67 \pm 0.87		.44	.66	
I enjoy my free time	1.33 \pm 0.90	-.35		-.57	
Variance explained (after rotation)		25.4%	23.1%	18.5%	
Interpretation		'Tension'	'Demoralization/ difficulties in coping'	'Social contacts'	

Factor loadings > 0.55 are highlighted in bold.

A fairly simple pattern of factor loadings emerged, as illustrated in Table I, where loadings under 0.32 (i.e., 10% of shared variance between a variable and a factor) are replaced by blank spaces. Factor I included items relating to restlessness, irritability, and physical ailments subjectively ascribed to tension. It was interpreted as a 'tension/irritability' factor and it mainly corresponded to the 'Tension' subscale. Factor II loaded on items relating to discouragement, demoralization, worry, sense of losing control and not being able to cope with difficulties. It was interpreted as a 'demoralization/difficulties in coping' factor, and it corresponded to the 'Demoralization' subscale. Factor III included items covering social isolation, social support and social activities. It was interpreted as 'social contacts' and it corresponded to the 'Reduced Social Support' subscale.

DISCUSSION

Given the growing evidence that loneliness can adversely affect health (Cacioppo *et al.*, 2002) and that supportive interactions among people are protective against the health consequences of stress (Lakey & Cohen, 2000), the combination of high perceived stress and low social support should substantially increase vulnerability to disease. The SVS was designed as a single, very short instrument to measure stress-related risk of somatic and mental illness. It yields three subscale scores (i.e., 'Tension', 'Demoralization', 'Reduced Social Support'), and a total score which might represent a measure of stress-related vulnerability state.

This study showed that the SVS factor structure is consistent with the conceptual framework that guided the construction of the instrument. Also, the internal consistency of the SVS was satisfactory and test-retest reliability was high. Further, the pattern of correlation between SVS subscale scores and PSS and MSPSS scores as well as the correlation between the number of recent stressful life events and SVS total score provided evidence of convergent validity. Finally, the relationship between changes in SVS total score over a 6-month period and the number of life events experienced during the same period corroborated sensitivity to change.

A note of caution about the generalizability of our findings is warranted. First, the representativeness of sample A, which consisted of relatives and friends of a group of students, was likely limited. Also, as we studied non-clinical subjects, our findings might not generalize to clinical populations and this issue needs to be addressed in future investigations. While the generalizability of our

findings needs to be further investigated, the satisfactory psychometric properties exhibited by the SVS, as well as its brevity and easiness of completion and scoring, suggest that it is a potentially useful tool for clinicians and researchers as a measure of stress-related vulnerability even in studies carried out on large samples or in busy clinical routines. Only a couple of minutes are needed for its completion and scoring, and it is usually well accepted by patients and research participants as a means of assessing their perception of current life experiences and situations. The instrument may turn out to be useful in the routine clinical assessment of working populations to identify individuals at risk for stress-related diseases, as well as in studies of the relationship between stress and health. Clearly, further investigations should be performed to better elucidate the relation between SVS scores and health outcomes.

The Italian and English versions of the SVS are available upon request.

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