

Subjective stress in male veterans with spinal cord injury

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Abstract—We undertook a telephone survey to examine perceived stress among 165 veterans with spinal cord injury (SCI) who received care from a Department of Veterans Affairs Medical Center. Measures included Perceived Stress Scale, Hassles Scale, Center for Epidemiologic Studies Depression Scale, Short-Form State-Trait Anxiety Inventory, Satisfaction with Life Scale, and Short-Form Interpersonal Support Evaluation List. The mean perceived stress score for our sample of veterans with SCI (17.3) was higher than the means for men from the general population (12.1) and nonveteran men with SCI (13.9). Physical abilities, health, and financial issues were frequently reported hassles. Stress was related positively to depressive symptomatology and anxiety and negatively to life satisfaction. The association of hassles with measures of psychological well-being was partially mediated by perceived stress. The association of perceived stress with depression and anxiety varied as a function of social support, suggesting that those with low social support are the most vulnerable to the negative impact of stress on their psychological well-being. Stress management programs designed specifically to meet the needs of veterans with SCI are needed.

Key words: anxiety, depression, hassles, life satisfaction, male, psychological stress, respirator, social support, spinal cord injuries, veterans.

INTRODUCTION

Psychological stress has long been found to be related to psychological and physical well-being. Stress has commonly been viewed as a noxious external event or stimuli that impinges on the individual [1–2]. Researchers have examined major life events as well as more minor everyday events or stressors, sometimes referred to as daily has-

sles or chronic strains [3]. Most researchers now agree that these everyday strains tend to have a greater negative effect on psychological well-being than do more acute stressful life events [4]. Pearlin and colleagues have argued that these daily hassles or life strains have such negative effects because they are so persistent and unrelenting [5].

Lazarus and Folkman have argued that describing a person's level of stress based solely as a function of external events (major or minor) is inadequate because it does not adequately consider the individual and the individual's appraisals [1]. Lazarus et al. have suggested that psychological stress reflects the person's appraisal that a situation or environment is taxing, exceeds his or her resources to cope, and endangers well-being [1,6]. Cohen and

Abbreviations: ANOVA = analysis of variance, ASIA = American Spinal Injury Association, CES-D = Center for Epidemiologic Studies Depression, MS = multiple sclerosis, PSS = Perceived Stress Scale, SCI = spinal cord injury, SD = standard deviation, SF-ISEL = Short-Form Interpersonal Support Evaluation List, SF-STAI = Short-Form State-Trait Anxiety Inventory, SWLS = Satisfaction with Life Scale, VA = Department of Veterans Affairs.

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colleagues argued that a global assessment of stress is more likely to predict the impact of stress on health and well-being than measures of specific major or minor life events [7]. Specific events and stressors are anticipated to contribute to the overall global assessment of stress; thus external stressors (major life events, minor life events, and daily hassles/strain) would all contribute to higher global perceived stress scores, which would, in turn, affect psychological and physical health.

Turner and Wood postulated that having a chronic physical disability is a chronic life strain [8]. They found that measures of chronic impairment-related strain were significantly related to depression. Consistent with Turner and Wood's hypothesis, Cohen and Williamson reported higher global perceived stress scores in persons who were disabled than in persons in the general population [9].

In the past two decades, psychological stress research has been extended to persons with spinal cord injury (SCI). Stress may have important clinical ramifications for persons with SCI, given the literature linking stress to immune function and wound healing [10] and given research suggesting that persons with SCI are more likely to have impaired immune systems than the general population [11–18]. Earliest efforts to examine stress in persons with SCI assessed stressful life events and their effect on psychological well-being [19–20]. Rintala et al. studied global perceived stress in community-residing persons with SCI and found that persons with SCI had greater perceived stress than their counterparts in the general population and that higher perceived stress was associated with more depressive symptomatology, less satisfaction with life, and poorer self-assessed health [21–22]. Gerhart et al. similarly found greater perceived stress to be related to more depressive symptoms, less life satisfaction, and poorer perceived well-being among British individuals who had lived with SCI for at least 20 years [23]. Although causality cannot be inferred from these cross-sectional studies, clearly perceived stress is correlated with poorer health and psychological well-being.

Rintala et al. also found that social support was related to overall perceived stress scores in persons with SCI [21–22]. Among men with SCI, those who were more socially integrated and more satisfied with their social support reported lower levels of stress. Social support also has been related to a number of health outcomes, including psychological health, physical health, and even mortality [24–26]. While some studies have suggested that social support has a strong and direct effect on

psychological and physical health outcomes, others have found support for the stress buffering model, which proposes that social support acts as a buffer against the negative consequences of high levels of stress [27].

In this study, we were interested in examining the effect of daily hassles and global perceived stress on psychological health outcomes. We also were interested in examining the direct and/or stress-buffering role of social support. Our population of interest was veterans with SCI who receive healthcare from Department of Veterans Affairs (VA) facilities. We were already aware from the literature that persons with SCI had higher average perceived stress scores than the general population. We further anticipated that veterans with SCI might even be at greater risk of experiencing more frequent daily hassles and higher levels of global perceived stress. Evidence suggests that veterans compared to nonveterans are more likely to have psychiatric disorders [28], to be homeless [29], to smoke [30–31], and to be heavy drinkers [32–34]. Furthermore, veterans who receive at least some of their healthcare from a VA facility have been found to be socioeconomically disadvantaged and to have poorer health status than veterans who receive all of their care elsewhere [35]. Many of these differences between veterans and nonveterans and between veterans who receive healthcare at VA facilities and those who do not are factors that have been shown to be related to psychological stress [9]. A large study compared elderly men treated for acute myocardial infarction at VA hospitals with men on Medicare treated at non-VA hospitals. Those treated in VA hospitals were more likely to have a number of coexisting conditions including hypertension, chronic obstructive pulmonary disease or asthma, and diabetes [36], all of which can be related to or exacerbated by stress [37–40]. Thus, one could argue that veterans, in general, particularly those who seek healthcare from VA facilities, may be at greater risk for high levels of stress and for the negative consequences of stress.

Given (1) the very serious health concerns of veterans with SCI, including secondary conditions such as urinary tract infections and pressure ulcers; (2) the literature demonstrating the negative effects of stress on health, including immune function and wound healing; (3) the poorer immune function of persons with SCI; and (4) the unique characteristics of veterans receiving care from VA facilities, a better understanding of the nature, sources, and experience of stress among veterans with SCI is warranted. To our knowledge, no studies of subjective stress

have been done in veterans with SCI. This study attempts to fill this gap in the literature by examining stress and its correlates in veterans with SCI.

Based on findings reported in the literature, the following hypotheses guided this study:

1. Veterans with SCI will perceive more stress than the general population and more stress than a sample of nonveterans with SCI.
2. Veterans reporting more daily hassles will have more subjective stress than those reporting fewer hassles, and the relation of hassles to psychological well-being will be mediated through perceived stress.
3. In addition to having a direct effect on psychological well-being, social support will moderate the effect of stress on psychological well-being. In other words, the relation between stress and psychological well-being will be greater among veterans with lower social support.

Our proposed model is displayed in **Figure 1** with the effect of specific sources of stress (daily hassles) on psychological well-being mediated by one's overall global perception of stress. The model also depicts both the direct influence of social support on psychological well-being as well as its moderating role on the impact of stress on psychological well-being.

METHODS

Participants

Within the 2 years before the beginning of the study, 495 veterans with SCI received healthcare services at the Michael E. DeBakey VA Medical Center in Houston, Texas. These individuals constituted our sampling frame. Potential participants were randomly selected from the sampling frame until 170 veterans with SCI (~34% of the total sampling frame) had participated. We made at least six attempts to contact potential participants by telephone at various times of day over several weeks, if we had a working telephone number. In some cases, no current telephone number was identified through VA records or Internet searches. Before abandoning the recruitment of persons who we were unable to reach by telephone and moving down the randomized list, we sent letters to the last known address asking the potential participant to call a member of the research staff using a toll-free number. If the person did not respond within 2 to 3 weeks, the next name was selected. To be included, participants had to be at least

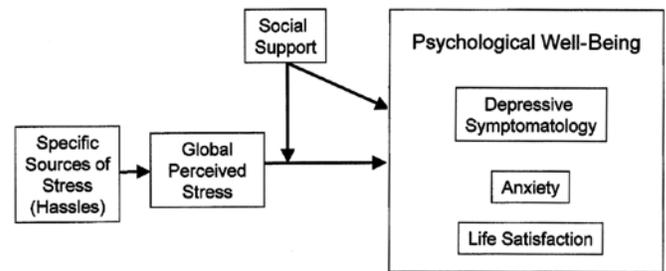


Figure 1.

Proposed model of relations among sources of stress, perceived global stress, social support, and psychological well-being.

18 years of age, have an SCI, have sustained the SCI for at least 6 months before study entry, be able to provide self-report information by telephone, be living in the community (i.e., not be hospitalized), and be willing to participate. We randomly selected 378 persons from the sampling frame to complete the desired number of surveys.

Of the 378 persons randomly selected from the sampling frame, 26 (6.9%) were deceased, 105 (27.8%) were unable to be contacted, 62 (16.4%) refused to participate, 6 (1.6%) asked to be called back later but did not consent before the end of the study, 4 (1.1%) were reported by family members to be mentally incapacitated, 1 (0.3%) stated he was too depressed to participate, 1 (0.3%) indicated he was unable to participate because he was ventilator-dependent, and 3 (0.8%) withdrew partway through the survey. Thus, the participation rate was 45 percent (170 of the 378 randomly selected). The 208 nonparticipants and the 170 participants did not significantly differ on variables available from the VA electronic medical record, including age, age at onset of SCI, time since onset of SCI, gender, race/ethnicity, and level and completeness of injury. To obtain a more homogeneous sample for all analyses reported here, we excluded the two women participants and the three participants who could not be categorized by level and completeness of injury, one who had cervical spondylosis, one who had central cord syndrome, and one who had multiple sclerosis (MS). Thus, the analyses included 165 male veterans with SCI. The characteristics of the respondents, including the level and completeness of injury, are described in **Table 1**.

Procedures

We sent potential participants a letter explaining the study and a set of cards with response options for particular questions. After approximately 2 weeks, they were

Table 1.

Characteristics of the sample, subjective stress, sources of stress, and psychological well-being.

Characteristics	Mean \pm SD	Median	Range
Chronological Variables			
Age (yr)	55.0 \pm 12.3	54.6	27–84
Age at Onset (yr)	37.1 \pm 13.7	34.2	19–71
Time Since Onset (yr)	17.9 \pm 11.7	16.5	1–58
Perceived Stress			
PSS	17.3 \pm 8.9	18.0	0–35
Sources of Stress			
Number of Hassles	14.7 \pm 9.1	15.0	0–43
Psychological and Social Well-Being			
CES-D	15.6 \pm 11.6	13.0	0–55
SF-STAI	11.4 \pm 4.9	11.0	6–24
SWLS	18.2 \pm 8.4	18.0	5–35
SF-ISEL	19.8 \pm 4.4	21.0	6–24
	Number	Percentage	Mean Stress Score
Race/Ethnicity (<i>F</i>-test = 0.62)			
Caucasian	105	63.6	17.1
African American	49	29.7	18.2
Other	11	6.7	15.1
Education (<i>F</i>-test = 1.21)			
Less Than High School	12	7.3	21.2
High School or GED	46	27.9	18.0
Some College or Trade School	77	46.7	16.9
Bachelor's Degree or Higher	30	18.2	15.7
Income (<i>F</i>-test = 0.66)			
Less Than \$15,000	44	26.7	16.6
\$15,000 to \$24,999	40	24.2	17.5
\$25,000 to \$49,999	20	12.1	19.9
\$50,000 or More	19	11.5	16.7
Not Reported*	42	25.5	17.1
Marital Status (<i>F</i>-test = 0.39)			
Never Married	28	17.0	16.1
Married	64	38.8	17.9
Separated, Divorced, or Widowed	73	44.2	17.3
Level and Completeness of Injury (<i>F</i>-test = 0.75)			
Tetraplegia (ASIA A, B, or C)	51	30.9	17.3
Paraplegia (ASIA A, B, or C)	74	44.8	16.6
All ASIA D	40	24.2	18.8
Uses a Respirator (<i>F</i>-test = 6.91[†])			
Yes	8	4.8	25.3
No	157	95.2	16.9

*Participants who did not report income were not included in the analysis of variance for stress by income.

[†]*p* < 0.01

SD = standard deviation

PSS = Perceived Stress Scale

CES-D = Center for Epidemiologic Studies Depression (Scale)

SF-STAI = Short-Form State-Trait Anxiety Inventory

SWLS = Satisfaction with Life Scale

SF-ISEL = Short-Form Interpersonal Support Evaluation List

GED = General Equivalency Diploma

ASIA A, B, C, D = American Spinal Injury Association Impairment Scale grades A, B, C, and D.

contacted by telephone and invited to participate. If we could not reach participants by telephone, we sent a second letter to the last known address asking them to contact the research staff. Once contacted by telephone, the veterans were given an explanation of the study and asked if they wished to participate. Those interested in participating gave oral consent on the telephone. The Baylor College of Medicine Institutional Review Board for Human Subjects Research approved this procedure for recruitment. After giving oral consent, participants either began the telephone survey or made an appointment to complete the survey at a later time. Veterans who agreed to participate were asked about subjective stress, sources of stress, and other factors potentially related to stress (e.g., social support, depression, anxiety, and life satisfaction). The survey took approximately 60 to 90 minutes to complete. We conducted the interview in more than one session if the veteran became fatigued or needed to end the interview before completing all measures. Veterans were paid \$25 for their participation in the survey.

Measures

Participant Demographic and Injury-Related Information

We obtained information related to the veteran's level and completeness of injury and time since injury from medical records. Basic demographic information (e.g., age, education, race, marital status, employment status, income level) was collected during the telephone interview.

Measures of Stress and Sources of Stress

The Perceived Stress Scale (PSS) [7] assesses the extent to which respondents have felt their life to be stressful (i.e., unpredictable, uncontrollable, and overloading) during the past month. They rate themselves on the 10-item measure using a 5-point scale (0 = never to 4 = very often) with possible scores ranging from 0 to 40. The scale has been reported to have good internal consistency and has demonstrated moderate correlations with other measures of appraised stress [9]. Gerhart and colleagues found that the 14-item version of the PSS administered to persons with SCI was negatively correlated with measures of life satisfaction and quality of life and positively related to depression and fatigue [23], thus supporting the validity of the measure for use in the SCI population. Similarly, Rintala et al. reported that the 10-item PSS was positively related to stressful life events and negatively related to social support in a sample of

men with SCI [21]. In the present study, Cronbach's alpha was 0.86.

The Hassles Scale is a 53-item measure that assesses relatively minor stressors encountered in daily life [3]. We asked respondents to indicate how much of a hassle, annoyance, or bother each item had been in the past month using a 4-point scale ranging from 0 to 3 (none or not applicable, somewhat, quite a bit, and a great deal). The Hassles Scale has been used with persons with SCI, fibrositis/fibromyalgia syndrome, rheumatoid arthritis, and chronic tension-type headaches [21,41–42]. One study reported good mean test-retest correlation coefficients for each monthly administration with the following month over a 6-month period [3]. In the present study, we were interested in using the Hassles Scale as a more objective measure to identify sources of stress among veterans with SCI in contrast to the PSS, which was used to assess global perceptions of the stressfulness of their current lives. Therefore, instead of using the sum of the ratings on the Hassles Scale, we chose to use the score reflecting the total number of hassles endorsed (i.e., any items rated at least somewhat of a hassle). In the present study, Cronbach's alpha was 0.90.

Measures of Psychological Well-Being

The Center for Epidemiologic Studies Depression (CES-D) Scale is a 20-item self-report measure of depression [43]. Each of the 20 items is rated on a scale ranging from 0 (rarely or none of the time) to 3 (most or all of the time) according to how often the person experienced certain feelings during the past week. Possible scores range from 0 to 60, with higher scores indicating more depressive symptomatology. The CES-D Scale has been used successfully in several studies of persons with SCI [44–48]. Strong evidence of convergent and discriminant validity and internal consistency has been reported for the CES-D Scale [43,49]. In the present study, Cronbach's alpha was 0.90.

The Short-Form State-Trait Anxiety Inventory (SF-STAI) [50], a six-item version of the Spielberger STAI [51], assesses state anxiety. Respondents indicate the extent to which they currently feel calm, tense, upset, relaxed, content, and worried, using a 4-point response scale ranging from 1 (not at all) to 4 (very much). The calm, relaxed, and content items are reverse-scored so that higher scores on all items reflect greater anxiety. Possible scores on the measure range from 6 to 24. The long form of the STAI has been administered to persons

with (1) musculoskeletal pain with or without fibromyalgia, (2) traumatic brain injury, and (3) serious orthopedic injuries [52–53]. The short form has been reported to be highly correlated with the total score on the STAI, and acceptable reliability and validity have been reported [50]. In the present study, Cronbach's alpha was 0.88.

The Satisfaction with Life Scale (SWLS) [54] is a five-item scale measuring global life satisfaction. It has seven response options ranging from "Strongly Disagree" to "Strongly Agree" to indicate agreement with each of five statements regarding satisfaction with life. The SWLS has been used in a number of studies of persons with SCI [55–57]. It has been found to have a moderately high correlation with the Life Satisfaction Index-A [58] and with other measures of well-being, lending support to the scale's convergent validity. Pavot et al. reported that the SWLS had good internal consistency [59]. In the present study, Cronbach's alpha was 0.81.

Measures of Social Support

The Short-Form Interpersonal Support Evaluation List (SF-ISEL) is a six-item instrument that measures perceived social support. Respondents use a 4-point response scale (Definitely True, Probably True, Probably False, and Definitely False) to indicate the extent to which people are available to provide support to them in a variety of areas. This brief scale includes two items each from the tangible, belonging, and appraisal support factors of the original 40-item ISEL measure [60]. The six-item scale has been used previously with middle-aged and older adults, including women with breast cancer [61–63], and has been reported to have acceptable internal consistency. The long form of the ISEL has been used with persons with SCI and ankylosing spondylitis [21,64]. In the present study, Cronbach's alpha was 0.77.

Data Analysis

Descriptive data were obtained for all study variables, including means, standard deviations [SDs], and ranges for continuous variables and number and percent for categorical variables. Scores for the scales were calculated, as was the total number of hassles. We assessed the relation between subjective stress, as measured by the PSS, and categorical variables using analyses of variance (ANOVAs) and assessed the intercorrelations of all continuous study variables using Pearson correlations.

To examine the first hypothesis, we compared the mean score for the PSS to mean scores on the scale for

(1) the general population [9] and (2) a community-based sample of nonveteran men with SCI [21] using an ANOVA, followed by post hoc pairwise comparisons (Bonferroni method) of our veteran sample with each of the other two samples. The second hypothesis proposed that the effect of daily hassles on psychological well-being will be mediated through global perceived stress. We conducted three separate series of multiple regression analyses (one for each measure of psychological well-being). As suggested by Baron and Kenny [65], for one to determine mediation (e.g., that global perceived stress mediates the relation between daily hassles and psychological well-being), several associations among the variables must exist. First, global perceived stress (the mediator) must show a significant association with psychological well-being. Second, daily hassles must show a significant association with global perceived stress. Finally, when both daily hassles and global perceived stress are placed in the same model predicting psychological well-being, the association between daily hassles and psychological well-being must be diminished (partial mediation) or eliminated (total mediation). We conducted multiple regression analyses to evaluate each step just outlined for each of the three measures of psychological well-being.

We conducted three additional multiple regression analyses to test the third hypothesis that social support may moderate the effect of stress on psychological well-being. Stress, social support, and their interaction term (social support \times perceived stress) were entered into each of these regression analyses. A significant interaction term would indicate that the relation of stress to well-being varied by the level of social support. To understand the nature and direction of this relation, we calculated the correlation between stress and each of the measures of psychological well-being separately for those reporting high and low levels of social support (those scoring in the top quarter compared to those scoring in the bottom quarter on the social support measure). We performed the χ^2 test for homogeneity of two or more correlations using Fisher's z' -transformation for each of the measures of psychological well-being.

RESULTS

Perceived Stress and Sources of Stress in Veterans with SCI

Rintala et al. reported a mean PSS score of 14.1 for a random sample of 89 men with SCI living in the

community [21]. Of those men, 20 percent were veterans ($n = 18$). The data were reanalyzed without the 18 veterans. An ANOVA performed to compare the means for our current veteran sample, the 71 nonveterans in the previous study, and Cohen and Williamson's [9] general population sample of men (mean age 42.8) found significant differences among the three groups ($F_{2, 1159} = 26.88, p < 0.001$) (Table 2). Post hoc pairwise comparisons of our veteran sample with each of the other two samples revealed that the veterans had a significantly higher mean PSS score than (1) the nonveteran SCI sample ($t = 2.83, p < 0.05$) and (2) the general population sample ($t = 7.27, p < 0.001$). These findings support our first hypothesis.

Veterans endorsed an average of 14.7 hassles (Table 1). Interestingly, although veterans with SCI reported higher levels of stress than the community sample of 71 nonveteran men with SCI, they, on average, reported significantly fewer hassles (14.7 [SD = 9.1] vs. 20.4 [SD = 10.9], $t = 4.73, p < 0.001$), which, in part, may be a function of some of the differences between the two samples. The veterans were significantly older than the nonveterans in the community sample (mean years = 55.0 [SD = 12.3] vs. 38.3 [SD = 11.0], $t = 9.87, p < 0.001$). They also were more likely to have motor-incomplete injuries (American Spinal Injury Association [ASIA] Impairment Scale grade D; 24.2% vs. 7.0%) and less likely to have motor-complete tetraplegia (ASIA Impairment Scale grades A, B, or C; 30.9% vs. 50.7%, $\chi^2 = 13.1, p < 0.001$). However, neither age nor level and completeness of injury was significantly related to perceived stress or the number of hassles in either the current sample of veterans or the nonveteran community sample.

The hassles endorsed most frequently by our sample of veterans with SCI included "Your physical abilities" (endorsed by 70%), "Your health" (62%), "Money for extras" (59%), "Money for emergencies" (57%), "Money for necessities" (56%), and "Your medical care" (56%).

Relation of Perceived Stress to Other Study Variables

Perceived stress was unrelated to the demographic categorical variables of race/ethnicity, education, income, and marital status (Table 1). Stress was also unrelated to the impairment-related variable of level and completeness of injury. However, the eight people who used a respirator had significantly higher stress scores than those who did not use a respirator (Table 1).

Table 2.

Comparison of mean Perceived Stress Scale scores with previous samples.

Sample	N	Mean* \pm SD
Veterans with SCI	165	17.3 \pm 5.9
Nonveterans with SCI	71	13.9 \pm 7.7
General Population	926	12.1 \pm 8.9

*F-test = 26.88, $p < 0.001$
 SCI = spinal cord injury
 SD = standard deviation

The intercorrelations among all continuous study variables are displayed in Table 3. Age, age at onset, and time since onset were all significantly correlated with each other ($r = 0.35$ – 0.60). However, these three chronological variables were unrelated to our three measures of psychological well-being (depressive symptomatology, anxiety, and life satisfaction). Age at onset was weakly ($r = -0.16$), but significantly ($p < 0.05$), related to stress, indicating that persons injured at a younger age were somewhat more likely to have higher stress. We found no other significant associations between the chronological variables and our predictors of psychological well-being (daily hassles, stress, and social support). The intercorrelations among the psychosocial variables varied widely from 0.29 to 0.80, all of which were significant at the 0.001 level.

To examine our second hypothesis that the effect of hassles was mediated through global perceived stress, we first examined our correlation matrix to determine if the preliminary conditions for establishing mediation were met. The number of daily hassles endorsed was significantly related to all three psychological health measures ($r = 0.51, 0.51, \text{ and } -0.44$ for depression, anxiety, and life satisfaction, respectively). Perceived stress was similarly significantly related to all three measures ($r = 0.68, 0.68, \text{ and } -0.57$ for depression, anxiety, and life satisfaction, respectively). The number of hassles was also significantly related to perceived stress ($r = 0.49$). Thus, we proceeded to examine whether including both hassles and stress in our regression model would diminish or eliminate the effect of hassles on psychological well-being measures. Displayed in Table 4 are the results of these analyses. In all three analyses, the strength of the association between the number of hassles and psychological well-being was reduced when perceived stress was added to the regression model. However, with all three measures of well-being, daily hassles continued to contribute

Table 3.

Pearson correlations among continuous study variables.

Variable	Age	Age at Onset	Time Since Onset	PSS	No. of Hassles	CES-D	SF-STAI	SWLS	SF-ISEL
Age (yr)	—	0.60*	0.35*	-0.14	-0.07	-0.06	-0.07	-0.01	-0.10
Age at Onset (yr)	0.60*	—	-0.54*	-0.16 [†]	-0.15	-0.12	-0.11	-0.05	-0.01
Time Since Onset (yr)	0.35*	-0.54*	—	0.04	0.10	0.07	0.05	0.04	-0.10
PSS	-0.14	-0.16 [†]	0.04	—	0.49*	0.68*	0.68*	-0.57*	-0.34*
No. of Hassles	-0.07	-0.15	0.10	0.49*	—	0.51*	0.51*	-0.44*	-0.29*
CES-D	-0.06	-0.12	0.07	0.68*	0.51*	—	0.80*	-0.65*	-0.51*
SF-STAI	-0.07	-0.11	0.05	0.68*	0.51*	0.80*	—	-0.60*	-0.53*
SWLS	0.01	-0.05	0.04	-0.57*	-0.44*	-0.65*	-0.60*	—	0.50*
SF-ISEL	-0.10	-0.01	-0.10	-0.34*	-0.29*	-0.51*	-0.53*	0.50*	—

* $p < 0.001$
[†] $p < 0.05$
PSS = Perceived Stress Scale
CES-D = Center for Epidemiologic Studies Depression (Scale)
SF-STAI = Short-Form State-Trait Anxiety Inventory
SWLS = Satisfaction with Life Scale
SF-ISEL = Short-Form Interpersonal Support Evaluation List

Table 4.

Regressing psychological well-being on number of hassles and perceived stress.

Variable	CES-D					SF-STAI					SWLS				
	B	SE B	β	R ²	R ² Δ	B	SE B	β	R ²	R ² Δ	B	SE B	β	R ²	R ² Δ
Step 1				0.257	0.257				0.257	0.257				0.189	0.189
No. of Hassles	0.649	0.087	0.507*			0.273	0.036	0.507*			-0.405	0.006	-0.435*		
Step 2				0.504	0.247				0.496	0.239				0.355	0.166
No. of Hassles	0.292	0.081	0.228*			0.120	0.035	0.222*			-0.193	0.067	-0.207 [†]		
PSS	0.742	0.083	0.569*			0.311	0.036	0.566*			-0.443	0.068	-0.468*		

* $p < 0.001$
[†] $p < 0.01$
CES-D = Center for Epidemiologic Studies Depression (Scale)
SF-STAI = Short-Form State-Trait Anxiety Inventory
SWLS = Satisfaction with Life Scale
B = unstandardized multiple regression coefficient
SE B = standard error of B
 β = standardized multiple regression coefficient
PSS = Perceived Stress Scale
R = multiple correlation
R² = proportion of variance accounted for
R² Δ = change in R² at each step

significantly and independently to the explained variance, suggesting that the effect of daily hassles on psychological well-being is only partially mediated by global perceived stress. Note that depression scores exceeding 16 on the CES-D Scale indicated that a large proportion (45%) of veterans with SCI were experiencing considerable depressive symptomatology.

To examine our third hypothesis that the effect of stress on psychological well-being is moderated by social support, we conducted a series of regression analyses in which we entered stress, social support, and the interaction of stress and social support (**Table 5**). In analyses of life satisfaction, only social support accounted for significant proportions of the variance in life satisfaction. The results suggest that social support had a significant direct effect

on life satisfaction. Stress did not contribute uniquely to life satisfaction, and life satisfaction was not a function of the interaction of stress and social support. In our analyses of depression and anxiety, both stress and the interaction of stress and social support explained significant variance. These data indicate that stress is not uniformly related to depression and anxiety, rather the strength of the relation varies as a function of social support.

To better understand the direction and nature of this finding, we split our sample into three groups (approximating the lowest quartile, the highest quartile, and the 50% in between) based on their scores on the social support measure (ISEL). The bottom group had scores ranging from 6 to 17 out of a possible 24 points and consisted of 42 participants (25.5%). The top group had the maximum number

Table 5.

Regressing psychological well-being on perceived stress, social support, and their interaction.

Variable	CES-D ($R^2 = 0.563$)			SF-STAI ($R^2 = 0.583$)			SWLS ($R^2 = 0.433$)		
	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β	<i>B</i>	SE <i>B</i>	β
PSS	1.432	0.317	1.099*	0.699	0.130	1.271*	-0.099	0.262	-0.104
SF-ISEL	-0.125	0.347	-0.048	0.028	0.142	0.025	0.992	0.287	0.518*
PSS \times SF-ISEL	-0.033	0.015	-0.513 [†]	-0.019	0.006	-0.693 [‡]	-0.016	0.013	-0.343

* $p < 0.001$
[†] $p < 0.05$
[‡] $p < 0.01$

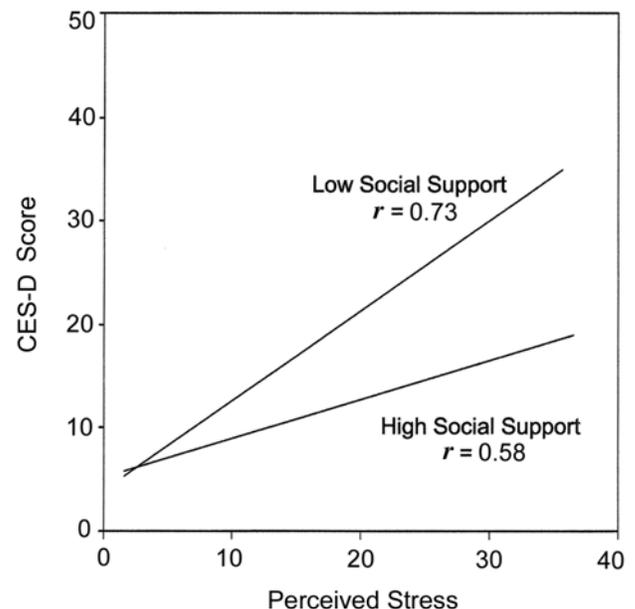
CES-D = Center for Epidemiologic Studies Depression (Scale)
SF-STAI = Short-Form State-Trait Anxiety Inventory
SWLS = Satisfaction with Life Scale

B = unstandardized multiple regression coefficient
SE *B* = standard error of *B*
 β = standardized multiple regression coefficient
PSS = Perceived Stress Scale
SF-ISEL = Short-Form Interpersonal Support Evaluation List

of points (i.e., 24) and consisted of 44 (26.7%) participants. The middle group included 79 people (47.8%) who had scores on the ISEL between 18 and 23. We then compared the correlation between stress and each measure of well-being for the group with the lowest social support scores to the correlations for the group who had the highest social support scores (Figures 2, 3, and 4). For both depression and anxiety, the correlation with stress was stronger for those with low social support ($r = 0.73$ and 0.76 , respectively) compared with those with high social support ($r = 0.58$ and 0.60 , respectively); however, given the relatively small size of these subsamples, the differences in the correlation coefficients between the high and low social support groups were not significant (depression: $\chi^2 = 1.42$, $p < 0.25$; anxiety: $\chi^2 = 1.84$, $p < 0.20$). The correlations for the low and high groups for satisfaction with life were more similar to each other than were the other two measures of psychological well-being (low: $r = -0.56$; high: $r = -0.46$, $\chi^2 = 0.37$, $p < 0.70$), confirming that life satisfaction was not a function of the interaction of stress and social support.

DISCUSSION

This is the first study to show that veterans with SCI who receive healthcare at a VA healthcare facility are at increased risk for psychological stress compared with nonveterans with SCI and with the general population. Although several studies of posttraumatic stress disorder (PTSD) among veterans with SCI have been conducted [66–70], we are aware of no studies that have examined global perceived stress and daily hassles experienced by veterans with SCI. We also found that a high percentage

**Figure 2.**

Relation of stress to depressive symptomatology in persons with high and low social support. CES-D = Center for Epidemiologic Studies Depression (Scale).

of the sample appeared to be experiencing significant depressive symptoms, with nearly half exceeding the established cutoff of 16 on the CES-D Scale. The veterans with SCI in our sample reported a wide array of daily hassles, but the most frequently reported hassles pertained to their SCI, health, and finances. The number of hassles was positively related to perceived stress, positively related to anxiety and depression, and negatively related to life satisfaction. The effect of hassles on psychological well-being was only partially mediated by global perceived stress, with daily hassles continuing to

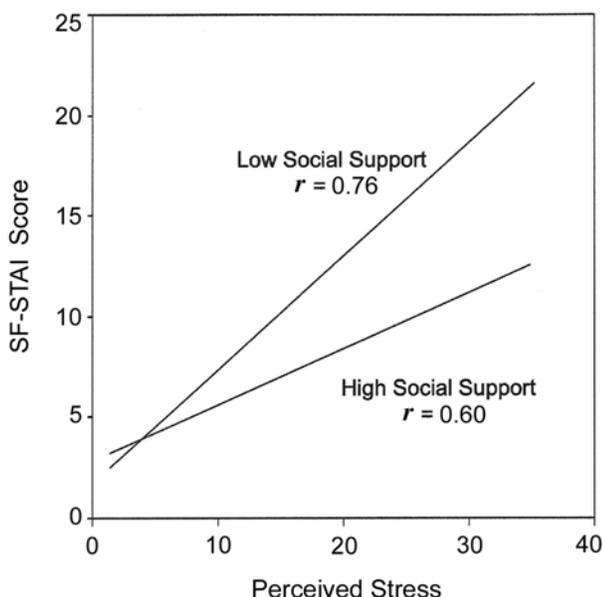


Figure 3. Relation of stress to anxiety in persons with high and low social support. SF-STAI = Short-Form State-Trait Anxiety Inventory.

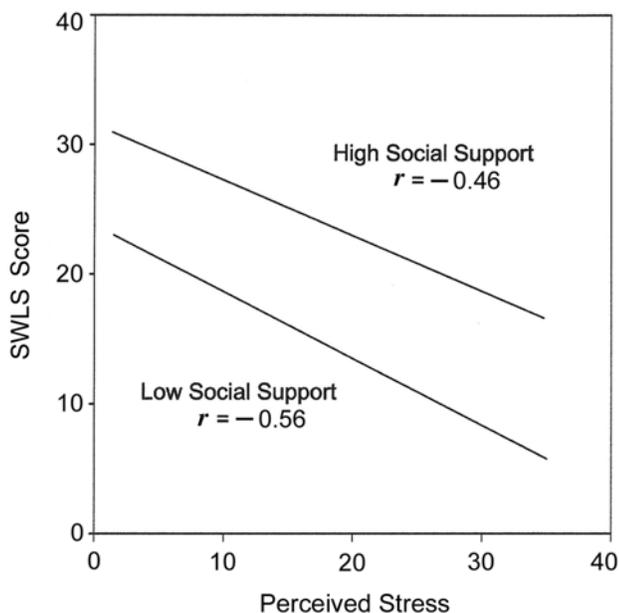


Figure 4. Relation of stress to satisfaction with life in persons with high and low social support. SWLS = Satisfaction with Life Scale.

contribute uniquely to the variance of depression, anxiety, and life satisfaction, supporting Pearlin and colleagues' assertion that chronic strain has a direct effect on psychological well-being [5].

Perceived stress was not significantly related to demographic and disability-related variables except for an association with use of a respirator; however, stress was strongly and significantly related to a number of important psychosocial variables. Stress was positively correlated with depressive symptomatology and anxiety and negatively correlated with satisfaction with life and perceived social support. Social support significantly moderated the associations between global stress and two of the psychological well-being variables—depressive symptomatology and anxiety, thus suggesting that stress may have more negative consequences for those with lower levels of social support. Social support did not have a significant direct effect on these psychological outcomes when incorporated in a model with stress. Results with life satisfaction, however, were quite different from those results with depression and anxiety. Social support had a significant direct effect, but not a stress-buffering effect, on life satisfaction. Thus, the effect of stress on life satisfaction did not appear to vary as a function of social support.

Although the stress and coping literature has generally found support for both the direct and stress-buffering role of social support, with results differing, in part, based on the type of social support measured [27], a recent study examining adjustment to a physically disabling chronic condition (MS), found little evidence of the role of social support in adjustment to MS. It found only limited support for a stress-buffering role of social support and no direct effect of social support [71]. In contrast to this finding, we found in our study of veterans with a physically disabling condition that social support is highly related to psychological well-being. Interestingly, the role that social support plays appeared to vary as a function of the outcome examined. Most striking is the strength of the relation between perceived social support and life satisfaction, which appears to be significantly more robust than the relation between perceived social support and measures of psychological distress. These findings highlight the need for further research studies to examine and contrast the role of stress and social support as they relate to positive outcomes (e.g., life satisfaction) as well as to negative outcomes (e.g., depression and anxiety) among persons with disabilities.

This study has several limitations. First, the two female participants were excluded from the analyses reported here. Although they represented 25 percent of the women in the sampling frame, the number was insufficient

to allow analyses of gender differences. This is a problem whenever veterans with SCI are the target population of a research study because of the small number of women veterans with SCI who receive care from VA healthcare facilities. Second, participants randomly selected had a 45 percent response rate. However, no significant difference was found in available demographic and injury-related variables between persons who were selected but did not participate and persons who did participate. Unfortunately, no other information that might affect stress was available about the nonparticipants. Third, the only available nonveteran sample with SCI with which our veteran data could be compared directly (i.e., used the same measures) was significantly different in terms of age and level and completeness of injury. Fourth, an interviewer previously unknown to the participants obtained all the self-report data via a telephone survey. The impact of this method of data collection on recruitment and on the results is unknown. Fifth, although our model (**Figure 1**) indicates the hypothesized direction of influence from one construct to another, because this study is cross-sectional in design, causality cannot be determined.

CONCLUSIONS

Veterans with SCI in this study perceived more stress than did the general population of men and a sample of nonveteran men with SCI. These data substantiate the need to identify and alleviate stress among veterans with SCI. Our data also suggest that a high percentage of veterans with SCI are experiencing significant depressive symptomatology. Given these findings, designing stress management programs and depression self-management programs and making them widely available for veterans with SCI may be beneficial.

Because some stress management strategies may be difficult or impossible for persons with SCI to practice, stress management programs need to be developed that meet their special needs. A wide range of strategies is available that one can use for effective stress management. Martin Ginis et al. [72] found that an exercise program developed for people with SCI improved perceived quality of life and depression. The effects of the exercise intervention on psychological outcomes were found to be mediated, in part, by reductions in perceived stress. Certain components of stress management programs, such as encouraging participants to better activate, interact with,

and enhance their support networks, are likely to be appropriate for all participants regardless of level of impairment. Our results suggest that social support may be an important component to include in such stress management programs. Veterans with SCI most frequently endorsed the hassles related to money, physical abilities, health, and healthcare. The Veterans Health Administration is positioned to help alleviate hassles related to health and healthcare. Issues related to financial concerns may be more difficult to address. Even if solutions to these hassles are challenging, healthcare personnel providing services to veterans with SCI need to be aware of the hassles and chronic strains affecting their everyday lives.

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