Research Article

What determines low satisfaction with life in individuals with spinal cord injury?

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Objective: To examine variables associated with satisfaction with life (SWL) in individuals with a spinal cord injury (SCI).

Design: Cross-sectional, national survey to assess SWL, demographic and injury characteristics, health care utilization, chronic conditions (obesity, diabetes, heart problems, lung problems, hypertension, high cholesterol), symptoms (poor sleep, pain, depression), social support, grief/loss, and independence.

Setting/Participants: Community-dwelling Veterans with SCI.

Outcome Measures/Analyses: Bivariate analyses were conducted to assess differences in demographics, injury characteristics, chronic conditions, symptoms, social support, grief/loss, and independence in individuals who reported low SWL (≤ 20) vs. average/high SWL (21-35). Multivariate logistic regression assessed factors independently associated with low SWL.

Results: 896 Veterans with SCI (62%) responded. Average age was 62 years, the majority were male (94%), Caucasian (77%), and had paraplegia (61%). Odds of low SWL were 2.4 times greater for individuals experiencing pain (OR = 2.43, CI95: 1.47-4.02, $P = 0.0005$). Odds of low SWL were increased for individuals reporting greater grief/loss due to their SCI (OR = 1.14, CI95: 1.10-1.18, $P < 0.0001$). Lesser odds of low SWL were seen for individuals reporting greater emotional social support (OR = 0.97, CI95: 0.96-0.99, $P < 0.0001$) and independence (OR = 0.94, CI95: 0.90-0.97, $P < 0.0001$).

Conclusions: Pain and feelings of grief/loss due to injury were associated with low SWL. Self-perceived independence and good social support were associated with better SWL. Along with addressing pain and facilitating independence and social support, these findings suggest that interventions to improve SWL should focus on helping individuals deal with grief/loss due to injury.

Keywords: Satisfaction with life, Grief/loss, Spinal cord injuries, Veterans, Social support, Independence, Pain

Introduction

Decreased satisfaction with life (SWL) after sustaining a spinal cord injury (SCI) is relatively common and is a focus of rehabilitation and lifelong care.¹ Compared with the general population, individuals with SCI report lower SWL.² In general, sustaining a more recent injury, of non-traumatic etiology, older age at injury onset, older chronological age, and having more psychological service needs are associated with lower SWL in the SCI population,^{3,4} whereas lower age at injury onset,⁵ lower levels of pain⁶ and pain interference,⁷

active lifestyle,⁸ and white race³ are associated with higher SWL. Furthermore, more active participation in self-care practices and better access to care and care coordination with health care providers are associated with higher SWL in individuals with SCI.⁹

SWL is intended to evaluate an individual's global judgment of life satisfaction based on the theory that SWL is predicted based on a comparison of life circumstances to one's standards.¹⁰ In addition to demographic and health-related factors, impactful factors that are likely to influence how an individual with SCI assesses their 'standards' and therefore determines their SWL, include supportive social relationships, reactions to loss or grief due to injury, and independent performance in roles and goals.

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A classic definition of social support is the exchange of resources between an individual in need and an individual who intends to enhance the well-being of the recipient by providing support.¹¹ Social support is an important resource to meet the challenges encountered by individuals with SCI including functional limitations, complications and secondary conditions, and decreased SWL.¹² Informal care and social support are associated with better health, functioning, and quality of life (qol) in individuals living with SCI.¹³

Grief is a natural reaction to a loss or a change of any kind.¹⁴ Pathological or complicated grief occurs in a significant minority of individuals who experience loss of various types, e.g. loss of a loved one, from traumatic experiences, loss due to an inability to adapt to unexpected life change, to a degree in which it is distinct from 'normal' grief.¹⁵ In rehabilitation populations, including SCI, traumatic brain injury, and other neurological disorders and disabilities, feelings of grief following functional losses due to disability are similar to those reported by individuals who have experienced loss due to death of a loved one.¹⁶ Feelings of grief and loss due to injury may be highly salient to individuals with SCI. Grief after injury may facilitate adjustment to SCI. However, research is mixed on how to define grief, specify what is 'healthy' or 'unhealthy' regarding the grieving process, or how long it 'should' last.¹⁷

Independence includes a perceived ability to communicate needs and feelings of a sense of control over one's life.¹⁸ Abilities related to physical functioning and independence are highly related to SWL across several cohorts.¹⁹ Specifically low functional independence is highly related to poor SWL, but SWL often improves over time following SCI.⁶

Taken collectively, SWL may be a factor of demographic traits, injury-level characteristics, chronic conditions and symptoms, lack of social support, unresolved grief or loss after injury, and limitations in independence; several may be simultaneously influential. The study objective was to examine variables independently associated with SWL in persons with SCI. We hypothesized that, upon controlling for demographic, injury, and health characteristics, factors independently associated with low SWL would include: low levels of tangible and emotional social support; more feelings of grief/loss due to SCI; and less self-perceived independence.

Methods

Design/Setting/Sample. A cross-sectional, national survey was conducted with a random sample of community-dwelling Veterans who had used VA health care in the prior year. Our survey sample was derived from a

sampling frame of 8930 individuals with traumatic and non-traumatic SCI, identified using VA administrative databases, and may include those diagnosed with nonmalignant neoplasms resulting in neurologic deficit; vascular insults of a thromboembolic, hemorrhagic, or ischemic nature; cauda equina syndrome producing neurologic deficit; inflammatory disease of the spine, spinal cord or cauda equina resulting in non-progressive neurologic deficit; and demyelinating disease of the spinal cord. We used SAS 9.3 Proc SurveySelect to conduct systematic random sampling; this method selects units at a fixed interval throughout the sampling frame after a random start. We chose a 20% random sample from the sampling frame for our survey sample. Surveys were mailed in late 2014-early 2015, including a follow-up mailing to non-respondents to facilitate response.

Survey Instruments and Variables. Survey items assessed the dependent variable, *SWL*, using the Diener (1985) SWL scale,²⁰ along with *demographics*, *injury characteristics*, *health care utilization*, *general health status*, *chronic conditions*, *symptoms*, *social support*, *grief/loss due to injury*, and *independence*.

SWL. The Satisfaction with Life Scale (SWLS) measures cognitive judgments of SWL.²⁰ It is a commonly used measure of SWL²¹ and has been adopted by the SCI Model Systems. It contains 5-items with response options on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree) that are added for a summary score [ranging from 5–35], with higher scores indicating greater SWL. For this study, SWL was dichotomized as: low SWL (≤ 20) and average/high SWL (21–35), as described by Diener.²² Our rationale for dichotomizing the SWL scores was to provide an easily understandable interpretation of a global measure based on individual's judgments of ideal standards. Our approach to dichotomizing SWL is not unique in the rehabilitation literature; for example, Whiteneck *et al.*²³ used the same cutoff of 20 to dichotomize Diener's SWLS. Further, Fugl-Meyer and colleagues²⁴ used a similar SWL scale, dichotomized life satisfaction scores into high and low categories, and found that dichotomized SWL was a significant classifier of gross level of SWL as a whole.

Demographic characteristics included: age, sex; race/ethnicity, highest level of education, and marital status. **Injury characteristics** included: level (paraplegia, tetraplegia); completeness (complete, incomplete); age at injury onset (continuous, in years), and duration (continuous, in years). **Health care use** included: utilization in prior 12 months (VA use, non-VA use); distance from (continuous, in miles) and travel time to (continuous, in minutes) VA health care facility where the majority of care is received.

Health characteristics included: *general health status* (excellent to poor); *chronic conditions* (obesity diabetes, heart problems, breathing/respiratory problems, high blood pressure, and high cholesterol); and *symptoms* (problems sleeping, pain, and depression) in the prior 12 months. Prevalence proportions and average number of conditions and symptoms were reported.

Patient-reported social support, grief/loss, and independence

Social support. We used the Modified Medical Outcomes Study Social Support Survey (mMOS-SS), which contains 8 items measuring 2 domains (emotional/informational support and tangible/instrumental support) and has excellent psychometric properties.²⁵ Items within each domain are averaged and then transformed to a 0-100 scale, with higher scores indicating better support.

Grief/loss and Independence. The Spinal Cord Injury-Quality of Life (SCI-QoL), a patient-reported outcomes measure assessing qol in the SCI population, contains measures linked with the PROMIS® measurement system,²⁶ but adapted to the needs of individual with SCI.²⁷ The SCI-QoL item banks and short forms are standardized, valid measurement systems¹⁸ which assess constructs related to concerns of individuals with SCI, including 'grief/loss' and 'independence.'

Grief/loss. The SCI-QOL grief/loss item bank evaluates emotional reactions (e.g. anger, guilt, and despair) of grief that occur in response to sustaining a SCI. The grief/loss short form includes 9-items asking about ones' injury taking away from future, feeling lost due to injury, and having acceptance difficulty. Response options are on a 5-point rating scale (never to always). Response values for all questions are summed and converted to a standardized t-score using conversion tables provided by the scale's developers.²⁷ The grief/loss scale is standardized such that a mean of 50 and SD of 10 are indicative of normative values. Higher scores indicate higher feelings of grief or loss due to injury.

Independence. The SCI-QOL Independence short form²⁷ includes 9-items that evaluate perceptions of personal independence, ability to communicate needs, and a sense of control over one's life. For example, items ask about having informal caregiver assistance, being in control of daily activities, ability to do things without help, being limited in activities due to dependence on others, depending upon people to get places, and having feelings of being a burden to others. Response options are on a 5-point rating scale (never to always). The independence scores are calculated using the same technique as the grief/loss scoring described above, and

similarly a mean of 50 and SD of 10 indicate normative values. Higher scores indicate higher levels of self-reported independence among persons with SCI.

Analyses

Chi-square and t tests were used to assess unadjusted associations between variables of interest and SWL. Multivariate regression was used to identify variables associated with the dependent variable, controlling for confounders. The sample for analyses included participants who had available data for all variables. To determine if our final sample differed from those who were excluded due to missing data (assess self-selection bias), we conducted bivariate comparisons of individuals included in the final analyses (n = 564) to those with missing data (n = 275)

The dependent variable, SWL, was examined descriptively. Bivariate analyses to assess differences in demographics, injury characteristics, chronic conditions, symptoms, social support, grief/loss, and independence in individuals who reported low SWL (≤ 20) vs. average/high SWL (21-35) were conducted. A multivariate logistic regression model was used to assess factors independently associated with low SWL [reference: average/high SWL].

Multivariate analyses. The multivariate logistic regression model was used to generate odds ratios (ORs) and 95% confidence intervals (CIs) to identify variables independently associated with low SWL. Variables (demographic traits, injury characteristics, health conditions, symptoms, social support, grief/loss, and independence) were considered for inclusion in the model based on statistically significant bivariate associations (comparing low and average/high SWL scores), and variables commonly identified in the literature as meaningfully associated with SWL. The log likelihood ratio was used to determine the best fitting model. Covariates included in the final model were: white race, male sex, some college/college graduate education, married, injury duration, injury level (paraplegia), chronic conditions, symptoms, 'emotional' and 'tangible' social support (continuous), grief/loss (continuous), and independence (continuous).

An alpha level of 0.05 was used to determine statistical significance. Statistical analyses were performed with SAS 9.3 (SAS Institute Inc., Cary, NC). This study was approved by the Institutional Review Board at Edward Hines Jr., VA Hospital (PROMISE #0019).

Results

Sample/Response. Surveys were sent to 1,786 Veterans with SCI; 271 surveys were returned as undeliverable,

50 individuals had passed away, and 13 individuals did not feel the survey was applicable to them. Accordingly, the denominator was adjusted to 1,452. A total of 896 Veterans with SCI responded (62% response rate). Most participants ($n = 839$) provided responses for the dependent variable, SWL, by completing the full Diener SWLS, of whom 564 had complete data available on all variables for inclusion in the final multivariate regression.

Self-selection bias. Some differences in persons included in the regression model ($n = 564$) vs. those not in the model ($n = 275$) existed, these included: *general health* [69% in the model indicated excellent, very good, or good general health status vs. 53% not in the model, $P < 0.0001$]; *race/ethnicity* [23% in model were black, Hispanic, or other vs. 33% not in model, $P = 0.02$]; *marital status* [59% in the model were married vs. 51% not in model, $P = 0.03$], duration of injury [in the model (mean = 23.5) vs. not in the model (mean = 19.5), $P = 0.001$], and age [in the model (mean = 62 years) vs. not in model (66 years), $P < 0.0001$]. No differences in the sample vs. excluded existed on the basis of *injury level or completeness*; *sex*; *education* (graduated high school); *health care utilization*, *distance or travel time to VA*, presence of *chronic conditions* or *symptoms* (pain, sleep dysfunction, depression).

Univariate and bivariate analyses

Satisfaction with life. Individuals with low SWL ($n = 313$), had an average Diener SWL score of 13.2 (s.d. 4.6, range: 5-20) and for those with average or higher SWL ($n = 251$) the mean score was 26.7 (s.d., 3.9, range 21-35), $P < 0.0001$.

Participant characteristics. A lesser proportion of individuals with low SWL were white (73.8% vs. 81.3%, $P = 0.04$), educated beyond high school (71.9% vs 80.9, $P = 0.01$), and married (54.0% vs. 65.3%, $P = 0.007$) than those with average/high SWL. Those reporting low SWL had a shorter duration of injury (22.2 vs 25.2 years, $P = 0.02$) and average age at injury was higher (41.0 vs. 37.5 years, $P = 0.01$) than those with average/high SWL. A greater proportion with of participants with low SWL reported using non-VA health care in the prior year than those with average/high SWL (27.8% vs. 19.5%, $P = 0.02$).

Health characteristics. A smaller proportion of those with low SWL reported high ratings of general health (55.8% vs. 86.2%). Having breathing/lung problems was significantly higher in participants with low vs. average/high SWL (22.7% vs. 15.5%, $P = 0.03$). All three symptoms including: sleeping problems (56.2% vs. 29.0%, $P < 0.0001$), pain (78.0% vs. 57.0%, $P <$

0.0001), and depression (42.4% vs. 15.1%, $P < 0.0001$) were reported by a greater proportion of persons with low SWL (vs. average/high SWL) (Table 1).

Social support, grief/loss, independence. Bivariate comparisons of social support, grief/loss, and independence scores for low versus average/high SWL scores revealed lower overall social support scores (65.0 vs. 72.9, $P < 0.0001$), in particular lower emotional support (58.4 vs. 73.1, $P < 0.0001$). In addition, persons with low SWL reported worse grief/loss (57.8 vs 46.7, $P < 0.0001$) and less independence (46.6 vs. 52.7, $P < 0.0001$) than those who reported average/high SWL (Table 2).

Multivariate logistic regression analyses

The logistic regression analysis controlled for demographic and injury characteristics, chronic conditions, symptoms, independence, social support, and feelings of grief/loss due to injury. The odds of experiencing low SWL were 2.4 times greater for individuals experiencing pain (OR = 2.43, CI95: 1.47-4.02, $P = 0.0005$) than those not reporting pain. Odds for low SWL were increased for individuals reporting greater grief/loss due to their injury (OR = 1.14, CI95: 1.10-1.18, $P < 0.0001$). Lesser odds of low SWL were observed for individuals who reported higher levels of emotional social support (OR = 0.97, CI95: 0.96-0.99, $P < 0.0001$) and greater independence (OR = 0.94, CI95: 0.90-0.97, $P < 0.0001$), than for those with low emotional support and independence, respectively (Table 3).

Discussion

Our unadjusted analyses showed lower SWL reported by a smaller proportion of individuals with SCI who were white, educated beyond high school, and married. Our findings are similar to those published by Krause and colleagues reporting lower subjective well-being (as a measure of SWL) in persons with SCI who were non-white⁴ and Post *et al.* who found that less education was associated with lower SWL.⁵ Our finding that individuals who are not-married report lower SWL is consistent with literature describing this finding in the general population.²⁴ In addition, in individuals with a traumatically acquired disability, being married predicted greater SWL²⁷ and overall SWL has been found to be higher for individuals with SCI who are married.²⁸

We found that SWL did not differ by level of injury, but that low SWL was reported by individuals with shorter injury duration (but notably, in our Veteran cohort, duration of injury averaged 22 years) and those who were, on average, older at injury onset (41

Table 1. Demographic, injury, utilization, and health characteristics by low vs. average/high satisfaction with life.

% provided, unless otherwise indicated	Overall (n = 564)	Low SWL (≤ 20) (n = 313)	Average or higher SWL (21-35) (n = 251)	P value (low vs. average/ high SWL)
Demographic/Injury Characteristics				
Age (n = 455) [years] Mean, s.d. (range)	61.9, 10.6 (25-91)	62.2 10.3 (32-91)	61.4 11.0 (25-85)	0.43
Male (n = 564)	94.2	93.9	94.4	0.80
White ^a (n = 564)	77.1	73.8	81.3	0.04
Education ^b beyond high school (any college/college graduate) (n = 564)	75.9	71.9	80.9	0.01
Married (n = 564) (vs. not-married)	59.0	54.0	65.3	0.007
Paraplegia (n = 564) (vs. tetraplegia)	61.2	61.3	61.0	0.93
Duration of injury (n = 564) [years]	23.5, 15.0 (2-61)	22.2 14.8 (2-60)	25.2 15.1 (2-61)	0.02
Age at injury (n = 455) [years]	39.5, 15.1 (18-82)	41.0 15.2 (18-82)	37.5 14.7 (18-76)	0.01
Health care Utilization				
VA hospital/doctor in prior 12 months (n = 564)	88.5	87.5	89.6	0.44
Non-VA doctor/non-VA hospital in prior 12 months (n = 564)	24.1	27.8	19.5	0.02
Distance to VA (n = 539) [miles]	57.7, 128.3 (1- 2650)	60.9 162.1 (1- 2650)	53.9 68.8 (1-600)	0.50
Travel time to VA (n = 550) [minutes]	76.9, 141.2 (2- 3000)	80.5 178.3 (2- 3000)	72.5 73.1 (8-600)	0.48
General health:				
Excellent/very good/good (vs. fair/poor) (n = 557)	69.3	55.8	86.2	<0.0001
Chronic conditions (n = 564)				
Obesity	29.1	30.0	27.9	0.58
Diabetes	18.4	21.1	15.1	0.07
Heart problems	9.9	10.9	8.8	0.41
Breathing/lung problems	19.5	22.7	15.5	0.03
Hypertension	36.8	39.0	34.3	0.25
High cholesterol	23.1	24.6	21.1	0.33
# of chronic conditions ^c (mean, sd, range)	1.4, 1.3 (0-6)	1.5, 1.3 (0-6)	1.2, 1.3 (0-6)	0.02
Symptoms (n = 564)				
Sleeping problems	44.5	56.2	29.0	<0.0001
Pain	68.6	78.0	57.0	<0.0001
Depression	30.1	42.2	15.1	<0.0001
# of symptoms ^d (mean, sd, range)	1.4, 1.0 (0-3)	1.8 1.0 (0-3)	1.0 0.9 (0-3)	<0.0001

^aRace/ethnicity categories included: white, black/African American, Hispanic/Latino, Asian, Native Hawaiian/Other Pacific Islander, American Indian or Alaska Native.

^bEducation was examined as highest level of education attained, categories included: did not complete elementary school, elementary (grades 1-8), some high school (grades 9-11), high school graduate (grade 12 or GED), some college or technical school, college graduate (4 years or more).

^cChronic conditions considered: obesity, diabetes, heart problems, lung problems, hypertension, high cholesterol.

^dSymptoms considered: poor sleep, pain, depression.

years). Similarly, other studies have reported that a longer duration of injury was associated with higher SWL.^{4,6} Geyh *et al.* also noted that sustaining a SCI more recently was associated with lower SWL,⁴ although van Leeuwen *et al.* found no significant changes in SWL during the first 2 years post-injury.⁶ Our result that low SWL was more likely in persons with SCI who were injured at an older age is congruent with research that reported lower age at onset (before 50 years of age) as an independent determinant of higher SWL.⁵

Although individuals with SCI may experience a higher rate of chronic conditions compared with normative population,³¹ most of the chronic conditions, with the exception of breathing/lung problems, in the current study were not associated with SWL, although bivariate comparisons showed a higher mean number of chronic conditions associated with low SWL. Yet, controlling for other variables, none of the chronic conditions, nor the symptoms of poor sleep and depression in the regression model were independently associated with low SWL. This finding is consistent with beliefs

Table 2. Social support, grief/loss, and independence by low vs. average/high satisfaction with life.

	Overall (n = 564)	Low SWL (≤ 20) (n = 313)	Average or higher SWL (21-35) (n = 251)	P value (comparison low vs. average/high SWL)
Social support ^a (n = 564)	68.5 24.8 (0-100)	65.0 24.9 (0-100)	72.9 24.0 (3.1-100)	0.0001
Tangible Subscale (n = 564)	72.1 29.4 (0-100)	71.6 29.5 (0-100)	72.7 29.4 (0-100)	0.66
Emotional Subscale (n = 564)	64.9, 26.9 (0-100)	58.4 26.7 (0-100)	73.1 25.1 (0-100)	<0.0001
Grief/loss ^b (n = 564)	52.8 10.1 (30.9-76.1)	57.8 8.8 (30.9-76.1)	46.7 8.0 (30.9-76.1)	<0.0001
Independence ^c	49.3 8.5 (24.6-68.9)	46.6 8.2 (24.6-68.9)	52.7 7.7 (27.9-68.9)	<0.0001

^aModified Medical Outcomes Study Social Support Survey (mMOS-SS) contains 8 items measuring 2 domains (emotional/informational support and tangible/instrumental support). To obtain scores for subscales, the averages of scores for items in the subscales are averaged. Scale scores are transformed to a 0-100 scale.

^bSCI-QOL v1.0 Grief/Loss SF9a –Scores are calculated by summing responses and converting the sum to a standardized t-score using conversion tables provided by the scale's developers. Scores are standardized such that a mean of 50 and SD of 10 are indicative of normative values.

^cSCI-QOL Independence Short Form 8a. Scores are calculated by summing responses and converting the sum to a standardized t-score using conversion tables provided by the scale's developers. Scores are standardized such that a mean of 50 and SD of 10 are indicative of normative values.

that adjustment following SCI is a challenge that goes well beyond biological or physiological factors³³ and requires a focus on psychosocial-personal factors, social factors (including support), and positive thinking.^{4,32,33}

Low pain frequency may be associated with higher SWL in persons with SCI.⁶ Overall, nearly 70% of individuals with SCI in our study reported experiencing pain during the prior year. Chronic neuropathic pain develops in about 40% of persons after SCI;³⁴ pain is associated with complex mechanisms and symptoms and often presents as more than one type of pain, making it difficult to treat.³⁴

This is particularly problematic given that, in SCI cohorts, pain has been associated with decreased qol.^{35,36} Our finding of 2.4 times higher odds of low SWL for individuals experiencing pain is congruent with this existing literature. Increased perceptions of pain interference with daily life are associated with poor mental health and SWL in persons with SCI.³⁷ It is possible that pain limits participation in life activities, which may lead to less enjoyment and life satisfaction, in this cohort.

Chase *et al.* found that perceived control was the single largest predictor of SWL, independent of communication skills, satisfaction with personal assistance, marital status, role fulfillment, duration of injury, and health (indicated by self-rated physical health and number of annual hospitalizations).³⁸ It is plausible to develop interventions to improve SWL that are focused on improving feelings of control while addressing symptoms (such as pain). In one study, participation in an interdisciplinary pain program did not

reduce pain severity, but it helped individuals with SCI to cope with their chronic pain, lessen pain interference, and improve their overall sense of control.³⁹

Individuals with SCI may experience loss and grief related to their injury.¹⁷ In the present study, odds for low SWL were increased for those reporting greater grief/loss due to their injury. Although odds for low SWL were associated with grief/loss, depression was not associated with SWL. This finding aligns with other reports that indicate grief and loss are a distinct, measurable concept in SCI.⁴⁰ Several issues should be considered in measuring grief/loss, including: difficulty accepting SCI; missing pre-injury life, abilities, and activities; longing for one's pre-injury life; and feeling that SCI has taken away from one's future.¹⁷ Efforts to help people participate in some of their pre-injury activities, including potential adaptations to make it possible, may be accomplished through recreational therapy efforts and greater levels of recreation therapy received by individuals with SCI has been linked to increased SWL.⁴¹

Interventions that facilitate telling the story of one's life and constructing a personal narrative may be especially useful in helping mourn perceived losses, cope with grief due to injury, and put their new lives in perspective.⁴² Such interventions may include grief therapy strategies using autoethnographic narratives and story-telling, and/or participatory methods such as photovoice using photographs with narratives to capture individuals' perspectives around grief and loss allowing them to reflect and cope with the present situation.^{43,44} Efforts to emphasize disability in a positive

Table 3. Multivariate logistic regression: Variables independently associated with low SWL (<20) [reference: average/high SWL 21-35] (n = 564).

Covariates	OR	CI ₉₅	P-value
Race: white [ref: all other race/ethnicity categories]	0.745	0.429-1.292	0.2948
Sex: Male [ref: female]	1.790	0.708-4.528	0.2189
Education: some college/college graduate [ref: less than some college/college graduate]	0.632	0.367-1.088	0.0977
Married [ref: not married, e.g. never married, separated/ divorced, widowed]	0.638	0.383-1.062	0.0841
Duration of injury (continuous)	1.004	0.989-1.019	0.5939
Level of injury: Paraplegia [ref: tetraplegia]	0.991	0.610-1.609	0.9707
Obesity ^a	0.717	0.436-1.180	0.1903
Diabetes	0.887	0.479-1.640	0.7013
Heart problems	0.873	0.403-1.893	0.7317
Breathing/lung problems	0.891	0.492-1.612	0.7020
Hypertension	1.020	0.623-1.670	0.9379
High cholesterol	1.151	0.650-2.038	0.6298
Symptoms ^a			
Sleeping problems	1.422	0.877-2.304	0.1534
Pain	2.429	1.469-4.016	0.0005
Depression	1.064	0.605-1.873	0.8296
Social support ^b /Tangible Subscale (n = 564)	1.009	0.999-1.019	0.0875
Social support ^b /Emotional Subscale (n = 564)	0.974	0.963-0.985	<0.0001
Grief/loss ^c (n = 564)	1.138	1.100-1.176	<0.0001
Independence ^d	0.935	0.903-0.968	0.0001

^aConditions and symptoms: reference group: 'did not have in past year'.

^bModified Medical Outcomes Study Social Support Survey (mMOS-SS).

^cSCI-QOL v1.0 Grief/Loss SF9a.

^dSCI-QOL Independence Short Form 8a.

manner have focused on adding meaning and meaningful purpose to one's life by accepting one's own injury/disability and also by helping peers through encouragement and interaction; aspects which may help with coping and provide inner strength to lead a highly satisfied life with injury/disability.⁴⁵

Lesser odds of low SWL were seen for individuals who reported having emotional social support and independence. Our results are consistent with findings that "everyday social support" (companionship and daily

emotional support) and "support in problem situations" (instrumental, informational support, and emotional support during difficult times) are associated with SWL at admission to and discharge from rehabilitation,⁴⁶ one year later,⁴⁶ and up to 5 years post-SCI rehabilitation.⁶ The association between social support and SWL was stronger in persons who were functionally dependent than in those who had greater independence.^{6,46} Across all levels of injury and severity, perceived social support can provide hope following SCI;⁴⁷ hope has large implications on SWL in that it can enrich life and enable individuals to see beyond their current situation and grief.⁴⁸ Adversely a limited sense of hope following SCI is associated with identity conflicts and feelings of vulnerability.⁴⁹ Hope is associated with better ability to cope with injury and greater tolerance of pain,⁵⁰ both of which could be beneficial in persons with SCI. Moreover, peer support is positively related to SWL and can play an important role in adjustment following SCI. Peer support strategies can help meet needs for emotional support and help individuals with SCI learn ways to become more independent or adjust to their current level of independence; research showing that SCI peer support plays an important role in promoting SWL and may positively influence the rehabilitation process⁵¹ supports this possibility.

Limitations. These findings are based on self-report data, which may be subject to response and recall bias, and social desirability effects. Several participants were excluded from analyses due to missing data. Although we presented the differences among groups across study variables to disclose limitations on the generalizability of our results, variables that were significantly different in the sample vs. missing (general health, race, marital status, duration of injury and age), may have had an impact on findings. Veterans may be more likely to be male and to sustain incomplete injuries and have non-traumatic etiologies than civilians followed by the SCI Model Systems.⁵² Finally, Veterans with SCI tend to be older and have been injured, on average, for longer than civilian cohorts, and may have greater access to health services which may also limit generalizability.

Conclusions. There may be some common agreements about what components contribute to being 'satisfied with life,' such as youth and good health, however; individuals judge components differently by making comparisons to their personal standards of what constitutes good SWL¹⁰ and their expectations across a variety of variables.

In this study, we hypothesized that low levels of social support, greater feelings of grief/loss due to injury, and less independence would result in low SWL when

demographic, injury, and health characteristics were controlled for. When examined alone, several of the demographic, injury, and health characteristics were statistically significantly associated with low SWL, as were each of the symptoms assessed (dysfunctional sleep, pain, depression), and our hypothesized factors (social support, grief/loss due to injury, and independence). More importantly, when we controlled for co-variables, many of the individual associations were no longer significant. These findings suggest that many of the demographic factors and chronic conditions that are discussed widely in the literature as attributing to SWL are less impactful in the SCI population. As hypothesized, low social support, injury-related grief, and low independence were, in fact, independent predictors of low SWL when confounding was removed. We did not hypothesize that upon controlling for everything else, the finding that pain would be independently associated with low SWL. Collectively, this suggests that the important components individuals with SCI consider in their global judgments of life satisfaction are pain, social support, grief/loss, and independence. As theorized by Pavot and Diener (1993),¹⁰ these components are based on comparisons of an individuals' ideal 'standard; it is possible that individuals with SCI are making comparisons of these components to individuals without SCI or themselves before their SCI (e.g. independence before/after injury).

Life satisfaction has been linked to multiple positive health outcomes. Recent findings showed a reduction in mortality risk in adults aged 50 and older who report greater SWL.⁵³ Weist *et al.* found that SWL and feelings of control interact to predict mortality risk, though the effect of feelings of control was stronger than the effect of SWL on mortality risk.⁵⁴

Interestingly, in our sample, chronic conditions were not related to SWL, but pain and grief/loss due to injury were associated with low SWL. Self-perceived independence and good social support were also associated with better SWL. Many of factors associated with SWL may be addressable, for example helping individuals learn to manage and cope with difficult-to-treat pain; providing therapy to address feelings of grief and loss related to their SCI; and enhancing feelings of and opportunities for independence. The losses experienced from a chronic SCI are forever; however, in people who ultimately find ways to cope with and adapt to the loss, the process of grief changes over time and is met with a reduction in the intensity of feelings of grief/loss and resumption (or renewal) of a meaningful and satisfying life. This concept of grief/loss specifically due to injury is understudied and

warrants future research in SCI cohorts. Our work showed that along with addressing symptoms, such as pain, and facilitating independence and social support, interventions (such as peer support programs) to improve SWL should help individuals deal with feelings of loss due to injury and improving sense of control over their symptoms and lives.

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