Predictive Factors of Chronic Pain After Spinal Cord Injury (SCI)

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Background

- A significant proportion of people with SCI experience chronic pain. A recent systematic review of 42 published studies on chronic pain after SCI identified prevalence rates between 26% and 96% (Dijkers et al, 2009).
- Research indicates that chronic pain after SCI is associated with decreased life satisfaction and quality of life, and interference with functional autonomy (Widerstrom-Noga et al, 2007; Khenioui et al, 2006).
- Psychological factors such as cognitions, i.e. attributions and coping styles, have been identified as significant predictors of pain adjustment (Molton et al. 2009; Raichle et al., 2007).
- Social integration and psychological functioning have been found associated with pain severity ratings (Jensen, Hoffman & Cardenas, 2005).
- While evidence in support of the biopsychosocial model of pain is considerable, few studies have examined demographic, health, functional and social integration factors together.

Aim

To identify significant predictors of self-reported chronic pain after SCI.

Methodology

- A nation-wide mail-in self-report survey was administered to adults with SCI (N=627).
- Participants were recruited through convenience sampling mechanisms in collaboration with the National Spinal Cord Injury Association (NSCIA), Independent Living Research Utilization (ILRU) and the Veterans Administration in Hines, IL.
- The MedStar IRB approved survey and consent documentation were mailed to participants with a pre-paid return envelope.
- Survey domains included are detailed in **Table 1**.

Table 1. Survey Domains

Domain	Measurement Detail
Incidence of secindary & chronic conditions	Diagnosis of 26 specific health conditions, including depression, diabetes, high blood pressure, incontinence, osteoporosis, pressure ulcers and UTIs
Functional capacity	Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) Scales
Health behaviors	Smoking and drinking habits measured through the Behavior Risk Factor Surveillance System (BRFSS)
Exercise status	Physical Activity and Disability Scale (PADS) measuring the type of exercise, intensity and frequency
Community integration	Measured frequency of engaging in social and community activities, and the level of dependence on others for engagement
Exercise self-efficacy	Measured through the SCI Exercise Self-Exercise Scale (ESES) (Kroll, 2007)
Employment	Working or not working
Injury	SCI level, completeness, duration, etiology, age at injury, wheelchair use
Demographics	Age, sex, race, education, marital status, household income

- Bi-variate analysis was used to identify factors associated with chronic pain
- Logistic regression was performed using chronic pain as the dependent variable (multicollinearity diagnostics were carried out)

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Results

Participants who completed the mail-in survey were all at least 18 years of age, living in the United States, and 1-year post SCI. **Table 2** provides descriptive statistics of the full sample (N=627).

Table 2. Characteristics of Survey Participants

Variable	% (N)
Sex	63.5 (398) Male 36.5 (229) Female
Age (mean)	48.6
Race	88.4 (550) White 4.5 (28) African American / Black 4.3 (27) Hispanic 2.7 (17) Other
Marital status	53.3 (332) Married 46.7 (291) Not married
Education (highest achieved)	1.3 (8) Grades 1 – 8 23.6 (147) Grades 9 – 12 52.2 (326) College/some college/technical 22.9 (143) Graduate/some graduate ed.
Employment	59.5 (372) Not working 40.5 (253) Working
Household income	28.5 (172) < $20k 34.8 (210) $20k - $60k 22.8 (138) $60k - $100k 13.9 (84) > $100k
Injury level	51.3 (300) Tetraplegia 48.7 (285) Paraplegia
Completeness of injury	58.1 (325) Incomplete 41.9 (234) Complete
Age at injury (mean)	32.9
Duration of injury (mean years)	15.9
Etiology	52.0 (272) Vehicular accident 17.4 (91) Fall 13.0 (68) Sport injury 10.9 (57) Medical / Surgical 6.7 (35) Violently acquired
Chronic pain reported in prior 12 months	56.8 (356) No reported chronic pain 43.2 (271) Reported chronic pain

43.2% of all participants reported having chronic pain. These individuals (N=271) were asked, using **Figure 1**, if pain had occurred on 10 specific parts of the body. The following are the incidence rates of reported chronic pain by body part (N):

- 86.3% (234) Lower back
- 76.0% (206) Shoulders
- 52.8% (143) Legs
- 51.6% (140) Upper back
- 47.9% (130) Feet
- 43.2% (117) Thighs
- 38.8% (105) Hands
- 33.2% (90) Upper arms
- 27.7% (75) Elbows
- 11.8% (32) Head

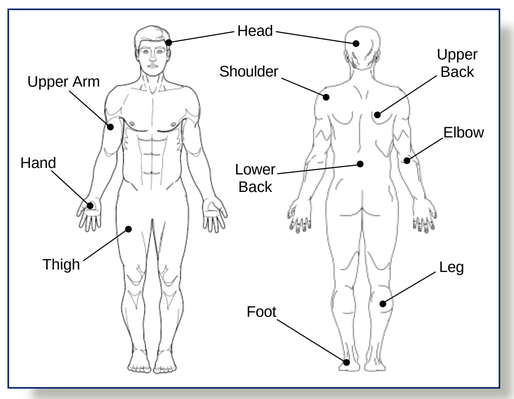

Figure 1. Location of Chronic Pain

Bi-variate analysis identified the factors or conditions listed in **Table 3** as significantly correlated (p=.05) with reported chronic pain.

Table 3. Correlates of Reporting Chronic Pain

Variable	Correlation	P-Value
Depression	.187	.000
Skin breakdown	.079	.049
Average ADL score	-.092	.023
Using a wheelchair	-.101	.011
Smoking	.124	.002
Community integration	-.132	.001
Employment	-.107	.008
Having a C-level injury	-.114	.004
Having a L-level injury	.167	.000
Household income	-.103	.011
Education	-.082	.042

Correlations between the variables were calculated so to identify any potential multicollinearity. The following variables were included in the regression:

1. Incidence of depression during the previous 12 months (yes, no)
2. Wheelchair use (use power or manual wheelchair, do not use wheelchair)
3. Smoking (yes, no)
4. Level of community integration (scale)
5. L-level of injury (yes, no)

Table 4 presents the results from the logistic regression. The dependent variable was the incidence of chronic pain during the past 12 months.

Table 4. Predictors of Chronic Pain

Variable	Coefficient	P-Value	Odds Ratio
Depression	.780	.000**	2.182
Wheelchair use	-.327	.195	.721
Smoking	.560	.045*	1.751
Community integration	-.544	.025*	.580
L-level of injury	.960	.017*	2.611

*$p \leq .05$ **$p \leq .01$

When controlling for the other factors, depression, smoking, community integration and level of injury were each found to be a significant predictor of the incidence of chronic pain. The odds of reporting chronic pain after SCI are 2.6 times greater among those who have an L-level injury, are 2.2 times greater among those who report a recent episode of depression and are 1.8 times greater among those who smoke. Additionally, individuals with low levels of community integration are much more likely to report chronic pain. When controlling for the other variables, wheelchair use was not a significant predictor of reporting chronic pain.

This regression model predicts with 62.8% accuracy and is found to be a good-fit using the Hosmer-Lemeshow test.

Conclusion

The findings provide further evidence for a biopsychosocial understanding of chronic pain after SCI (Raichle et al., 2007) and highlights the complex profile of injury characteristics, health risk behaviors and psychological factors as predictors. A multi-level approach is needed to reduce chronic pain in people with SCI.

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