ORIGINAL RESEARCH

Trajectories of Life Satisfaction After Spinal Cord Injury

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Abstract

Objective: To describe individual-level temporal change in life satisfaction after spinal cord injury.

Design: Individual growth curve (IGC) analysis of prospectively collected data from the National Institute on Disability, Independent Living, and Rehabilitation Research National Spinal Cord Injury Database (NSCID).

Setting: Multicenter, longitudinal database study.

Participants: Participants (N=4846) in the NSCID.

Interventions: Not applicable.

Main Outcome Measure: Rasch-transformed Satisfaction With Life Scale scores.

Results: Individual-level trajectories reflecting life satisfaction vary extensively and are associated with demographic and injury-related characteristics. Demographic characteristics include race, sex, pre-employment and discharge marital status, and level of education; injury-related factors include days in rehabilitation, neurologic level, age at injury, and injury etiology. Results are displayed graphically by way of a computer-generated interactive tool and represent different trajectories of individual-level changes in life satisfaction.

Conclusions: IGC methodology allows researchers and clinicians to anticipate patient-specific trajectories through use of an automated interactive tool. Projected trajectories hold promise in facilitating planning for inpatient and outpatient services, which could enhance long-term outcomes.

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Satisfaction with life has long been considered an important outcome measure in medical rehabilitation[1] and extensively studied in the spinal cord injury (SCI) population using a cross-sectional approach.[2-5] This approach is satisfactory when snapshots of outcomes are desired or, when combined in series, can describe trends in outcomes. However, these approaches are not designed to describe the temporal progression at the individual

level. To our knowledge, there are only a few studies ever conducted to assess the within-subject change or trajectory of life satisfaction after SCI.[6-10] Unfortunately, each was limited by small case studies (17−278 participants) and a short length of follow-up (≤5y). One study[8] found that life satisfaction after the first year remains stable through the fifth year postinjury, while another[10] described distinct low, intermediate, high, improving, and deteriorating latent class trajectories for satisfaction with life.

Life satisfaction for people with SCI improves during inpatient rehabilitation and remains stable during the first year after discharge,[11] but is substantially lower than satisfaction in the general population.[2] While about 70% of inpatients report hope for recovery,[12] rehabilitation psychologists are challenged with motivating those who are newly injured and uncertain about their

future. Further, hope for recovery is predictive of life satisfaction, and rehabilitation psychologists are encouraged to assess SCI perceptions and hope for recovery to address life satisfaction.[12] If, as for many latent factors, the predictive relationship of hope for recovery and life satisfaction is bidirectional, clinicians could benefit from evidence-based tools to complement their clinical experience and judgment when addressing these issues.

This study leverages the extensive longitudinal data in the National Spinal Cord Injury Database (NSCID) and uses random-effects modeling, which is also known as individual growth curve (IGC) analysis, to better understand individual-level change in life satisfaction and to develop an interactive tool for clinicians. A detailed discussion of IGC analysis, including its many analytic advantages, is provided by Kozlowski et al,[13] where a number of recent studies[14-19] have adopted IGC analysis. In particular, IGC analysis is used as a comprehensive descriptive technique where the aim is to describe how change at the individual level is associated with demographic and injury characteristics within the study sample. Clinicians and researchers can benefit from this analytic approach because it provides a customized conceptualization of recovery for a person with SCI that has the potential to inform clinical planning and decision making. Thus, the study objective is to determine which factors are associated with changes in life satisfaction as measured by the Satisfaction With Life Scale (SWLS).[20] To facilitate the use of parametric statistics, we used Rasch-transformed Satisfaction With Life Scale (RTSWLS) scores, as transformed scores approach an interval level of measurement.[21] We augment IGC results by developing an interactive tool that provides a graphical display of individual-level change based on various demographic and injury characteristics.

Methods

Data source

The NSCID contains information on people in the United States with traumatic SCI who received initial rehabilitation at 1 of the 28 Spinal Cord Injury Model Systems centers since 1973. Data are collected during initial hospitalization and required at postinjury years 1, 5, and 10, and every 5 years thereafter. Data include demographic and SCI characteristics, physical functioning, and psychosocial outcomes. Details about this database, including data collection procedures, forms, instructions, and a complete data dictionary, are on the National Spinal Cord Injury Statistical Center website (www.uab.edu/nscisc). The authors of this article obtained local institutional review board and National Spinal Cord Injury Statistical Center approval.

Participants

The sample for the present analysis included NSCID participants who had 3 or more follow-up interviews conducted in

Table 1 SWLS by postinjury years for 16,930 follow-up records

Postinjury Years	Follow-up Records	SWLS
1	1994 (11.78)	18.3±7.8
2	1159 (6.85)	18.8±2.0
3	77 (0.45)	18.6±8.4
4	43 (0.25)	21.0±7.8
5	2499 (14.76)	20.8±7.9
6	28 (0.17)	18.6±7.9
7	38 (0.22)	21.4±8.4
8	27 (0.16)	19.0±7.5
9	31 (0.18)	21.1±9.3
10	2872 (16.96)	21.7±7.9
11	23 (0.14)	20.8±8.5
12	22 (0.13)	20.9±7.5
13	19 (0.11)	20.0±8.6
14	11 (0.06)	21.0±9.0
15	2595 (15.33)	22.2±7.6
16	15 (0.09)	17.8±7.3
17	9 (0.05)	18.4±8.3
18	6 (0.04)	21.3±9.2
19	4 (0.02)	16.7±10.6
20	2129 (12.58)	22.7±7.2
21	7 (0.04)	23.0±7.8
22	5 (0.03)	24.6±7.4
23	6 (0.04)	21.5±6.6
24	4 (0.02)	20.5±8.7
25	1670 (9.86)	23.1±7.2
26	6 (0.04)	19.0±9.6
27	2 (0.01)	32.5±4.9
28	5 (0.03)	22.6±7.7
29	5 (0.03)	21.0±9.9
30	1128 (6.66)	23.4±7.3
35	491 (2.90)	23.3±7.3

NOTE. Values are n (%) or mean ± SD.

1996 or later, the period during which the SWLS was documented. As of March 2015, 4846 individuals from 18 Spinal Cord Injury Model Systems were eligible for this study, contributing 16,930 SWLS observations beginning at postinjury year 1 through year 35 (table 1). The present analysis also included SWLS data obtained during off-years (beyond required anniversary years 1, 5, and every 5y). Table 1 displays the sample size broken down by postinjury year, which suggests there is ample information in the later follow-up points to conduct the proposed analysis.[22] Similarly, table 2 provides demographic and injury characteristics information for the original sample (ie, the model free of covariates; N=4846) as well as for the sample used in the final analysis (ie, the model that includes covariates; n=4604), which suggests the differences between the 2 samples are negligible.

Primary outcome measure

The SWLS is a global measure of life satisfaction consisting of 5 self-report items. Respondents rate items on a 7-point Likert scale as follows: 1, "strongly disagree"; 2, "disagree"; 3, "slightly disagree"; 4, "neither agree nor disagree"; 5, "slightly agree"; 6, "agree"; and 7, "strongly agree." Total scores range from 5 to 35.[20] The SWLS has shown convergent validity with other life satisfaction instruments in

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List of abbreviations:

AIS	American Spinal Injury Association Impairment Scale
IGC	individual growth curve
NSCID	National Spinal Cord Injury Database
RTSWLS	Rasch-transformed Satisfaction With Life Scale
SCI	spinal cord injury
SWLS	Satisfaction With Life Scale