

The Validity of The SF-36 Health Survey Among Chinese with Spinal Cord Injuries Living within The Community

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Introduction

Spinal Cord Injury (SCI) involves damage to the neural structures within the vertebral canal, including the spinal cord and nerve roots, caused by various factors. This damage results in functional impairments below the injury level, primarily manifesting as motor, sensory, and autonomic dysfunctions, which significantly impact patients' quality of life¹. The SF-36 Health Survey is a widely utilized Patient-Reported Outcomes Measure (PROM) used in assessing overall Health-Related Quality of Life (HRQoL) among people with SCI². However, its use has yet been validated in the Chinese language for use among Chinese with SCI.

Objective

This study aimed to evaluate the reliability and validity of the SF-36 Health Survey within the Chinese population with SCI, assessing its suitability for capturing patient-reported outcomes in both clinical and policy-making contexts.

Methods

A cross-sectional study was conducted in 2023 as part of the second National Quality of Life and Disease Survey Project for Individuals with SCI in China. Participants must have a confirmed SCI diagnosis, be able to complete the questionnaire independently or with assistance, and have no cognitive impairment. A total of 3,067 responses were collected electronically from respondents across seven geographical regions of mainland China. The study assesses the reliability, through internal consistency, and validity of the SF-36. Internal consistency was evaluated using Cronbach's alpha, Ceiling and floor effects were reported to determine the SF-36's sensitivity. while confirmatory factor analysis (CFA) was performed to examine the factor structure.

Results

A total of 3,059 valid response were analyze. Patient demographics are presented in Table 1.

Table 1. Patient Demographics			
Demographic Information	Category	Count	Percentage (%)
Age	<18	56	1.83
	18-35	474	15.50
	36-59	2,220	72.57
	>59	309	10.10
Gender	Male	2,107	68.88
Region	Northeast	199	6.51
	North China	491	16.05
	East China	740	24.19
	Central China	341	11.15
	South China	235	7.68
	Northwest	462	15.10
	Southwest	591	19.32

Data source & funding: Data was obtained from National Quality of Life and Disease Survey Project initiated by China Association of Persons with Physical Disabilities (CAPPD) and supported by Coloplast Access to Healthcare Partnership Program
Reference: 1. Jerome Bickenbach et al. International Perspective on Spinal Cord Injury. 13 Nov. 2013. 2. Ku JH. Health-related quality of life in patients with spinal cord injury: review of the short form 36-health questionnaire survey. Yonsei Med J. 2007 Jun 30;48(3):360-70. doi: 10.3349/ymj.2007.48.3.360. PMID: 17594142; PMCID: PMC2628081.
Regional categorization: Northeast (Liaoning Province, Jilin Province, Heilongjiang Province), East China (Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shandong), North China (Beijing, Tianjin, Hebei Province, Shanxi Province, Inner Mongolia Autonomous Region), Central China (Henan, Hubei, Hunan), South China (Guangdong Province, Guangxi Zhuang Autonomous Region, Hainan Province), Southwest (Sichuan Province, Guizhou Province, Yunnan Province, Tibet Autonomous Region, Chongqing), and Northwest (Shaanxi Province, Gansu Province, Qinghai Province, Ningxia Hui Autonomous Region, Xinjiang Uyghur Autonomous Region).

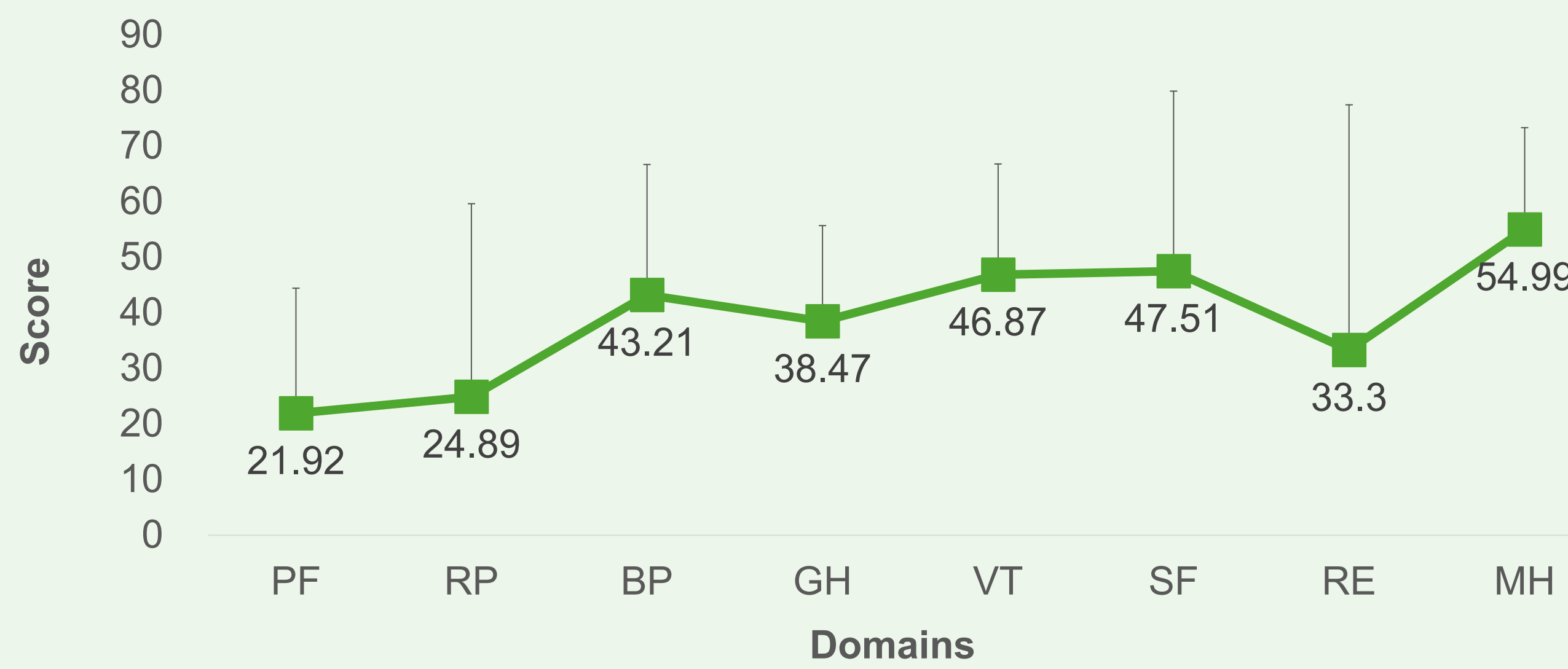
Demographic Information	Category	Count	Percentage (%)
Marital Status	Married	1,561	51.03
	Single	793	25.92
	Divorced	484	15.82
	Widowed	60	1.96
	Minor	91	2.97
Education	Remarried	70	2.29
	Illiterate	82	2.68
	Primary School or Equivalent	590	19.29
	Junior High School or Equivalent	1,243	40.63
	High School or Equivalent	618	20.20
Duration Since Injury	College Diploma or Equivalent	314	10.26
	Bachelor's Degree or Equivalent	194	6.34
	Master's or Doctoral Degree	18	0.59
	<5 Years	387	12.65
	5-10 Years	573	18.73
Injury Site	10-20 Years	1,015	33.18
	>20 Years	1,084	35.44
	Unknown	232	7.58
	Sacral	89	2.91
	Cervical	472	15.43
Annual Family Income (¥)	Cauda Equina	64	2.09
	Thoracic	1,367	44.69
	Lumbar	835	27.30
	<10,000	1,150	37.59
	10,000-20,000	681	22.26
Caregiver	20,000-30,000	95	3.11
	30,000-50,000	423	13.83
	50,000-100,000	388	12.68
	100,000-200,000	269	8.79
	>200,000	53	1.73
Caregiver	Yes	1,882	61.52

Figure 1 summarizes the mean and standard deviations of SF-36 scores. The high standard deviation indicates significant variability in scores across the domains among the people with SCI surveyed.

Conclusion

The SF-36 Health Survey exhibits satisfactory overall reliability in assessing HRQoL among Chinese with SCI, it demonstrated overall poor structural validity and inadequate internal consistency in the RP and RE subscales. Cultural factors and specific characteristics of the Chinese with SCI may influence these outcomes, indicating a need for further refinement or cultural adaptation of the SF-36 to enhance its validity and reliability. Future studies should explore tailored modifications and longitudinal assessments to better capture the nuanced quality of life experiences of Chinese with SCI.

Figure 1 Means ± Standard Deviations for SF-36 Scales



The SF-36 demonstrated good overall internal consistency (Cronbach's alpha = 0.87). Subscales for Physical Functioning (PF), Role-Physical (RP), and Role-Emotional (RE) showed high reliability ($\alpha > 0.70$). In contrast, Bodily Pain (BP), General Health (GH), Vitality (VT), Social Function (SF), and Mental Health (MH) subscales had lower internal consistency ($\alpha < 0.70$). These findings suggest that while the SF-36 is generally reliable for assessing quality of life in Chinese SCI patients, certain dimensions may need further refinement or validation to improve their internal consistency.

Table 2. Internal Consistency, Floor and Ceiling Effects for SF-36 Scales

Scales	Internal Consistency (Cronbach's alpha)	Ceiling Effect (%)	Floor Effect (%)
PF	0.90	1.57	18.93
RP	0.89	3.07	45.64
BP	0.63	5.39	4.74
GH	0.49	0.03	1.08
VT	0.61	2.32	0.56
SF	0.53	15.40	14.61
RE	0.93	27.26	60.41
MH	0.57	1.08	0.62

Finally, CFA suggested an inadequate fit of the SF-36's theoretical model to the data (*Comparative Fit Index* = 0.750; *Tucker-Lewis Index* = 0.682; *Root Mean Square Error of Approximation* = 0.104; *Root Mean Square residual* = 0.144). It revealed challenges in achieving adequate model fit and stable estimations for this sample of Chinese people with SCI, suggesting potential limitations in the direct applicability of these structures. This observation may be influenced by cultural factors affecting the perception and reporting of physical and mental health, thereby suggesting a need for the reevaluation of the SF-36's factor structure for use among Chinese with SCI.