Reviewer ID: Elsa Sun, Carlos L. Cano

Last updated: May 8th, 2024

Research Summary – Penn Spasm Frequency Scale (PSFS) and Spasm Severity Scale – Spasticity

Author Year Country Research Design Setting	**Demographics and Injury Characteristics of Sample**	**Validity**	**Reliability**	**Responsiveness Interpretability**
Mills et al. (2018) Psychometric study General Community	N=66 (17M, 49F) Mean age: 44.1±12.3 years Level of injury and AIS: C1-C4 AIS A/B/C = 15, C5-C8 AIS A/B/C = 22, T1-S1 AIS A/B/C 17 = 17, AIS D (any level) = 12		**Test-retest, Inter-rater, Intra-rater** The intra-rater reliability between 5 to 10 days and 4 to 6 weeks after baseline was 0.822 (0.709, 0.935) and 0.734 (0.586, 0.883), respectively, for PSFS Part 1. With the addition of Part 2, the intra-rater reliabilities were 0.812 (0.705, 0.919) and 0.729 (0.586, 0.872) for 5 to 10 days and 4 to 6 weeks, respectively. The PSFS inter-rater reliability within a 3-day time interval was 0.862 (0.759, 0.965) for Part 1 and 0.857 (0.762, 0.952) with the addition of Part 2.	

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			Part 1: spasm frequency Part 2: spasm frequency-severity combination	
Adams et al. (2007) Scale development and assessment General Community	N=61 community dwelling with chronic SCI and "stable" spasticity. 45 male, 16 female Mean age = 41.9 ±12.6 mean (SD) time since injury = 10.2 (8.6)	• Excellent: PSFS and SCI-SET correlations (*r* = -0.66) • Adequate: PSFS and Spasticity Severity correlations (*r* = 0.58*) • Excellent: PSFS and Spasticity Impact correlations (*r* = 0.67*) • Poor: PSFS and FIM Motor Score correlations (*r* = -0.05)		

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		• Adequate: PSFS and QLI Health and Functioning Sub scale correlations (*r* = -0.46*) *P<.001		
Boviatsis et al. (2005) Cohort Neurosurgical unit	N=22; MS=15, SCI=7 Population: MS, SCI C4-T11, Duration of symptoms: 1-5 years for total N, Avg disease duration SCI: 2.71y SCI Age: 27-49years, SCI M/F: 5/2			**Responsiveness:** Intrathecal Baclofen. From pre-tx to final post-tx, Ashworth decreased from 4.57 to 2.57 (P=.0134). Concomitant reduction in Penn from 3.71 to 1.28 (P=.00006). Calculated Cohen's d unavailable due to lack of reported SDs
Aydin et al. (2005) Cohort;	N=21 traumatic SCI Time postinjury was 11.48 ± 13.92 mos Traumatic SCI			**Responsiveness:** Baclofen Pre-post Spasm Frequency Scale (SFS) and Lower Limb Ashworth Score

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<table>
<tr><th>Author Year
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Research Design
Setting</th><th>Demographics and Injury Characteristics of Sample</th><th>Validity</th><th>Reliability</th><th>Responsiveness
Interpretability</th></tr>
<tr><td>uses a modified PSFS

Rehabilitation Centre</td><td>M/F: 6/15
C=5, 16=T
AIS A/B/C/D=10/3/7/1</td><td></td><td></td><td>(LLAS) was -28±30% and 22%, respectively. TENS pre-post SFS and LLAS was -16 ±16% and -17±17%, respectively. All other spasticity related measures progressed in the same direction also.

Calculated Cohen’s d: SFS = 1.11 (Score change divided by pretreatment SD)

Interpretability:
Mean (SD) score from modified version of PSFS: see table 1 below</td></tr>
<tr><td></td><td colspan="4">Table 1
<table>
<tr><td></td><td colspan="2">Baclofen treatment</td><td colspan="2">Transcutaneous electrical nerve stimulation treatment</td></tr>
<tr><td></td><td>Pre (n=10)</td><td>Post (n=10)</td><td>Pre (n=11)</td><td>Post (n=11)</td></tr>
</table></td></tr>
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	PSFS score 3.3 (0.9)	2.3 (0.3)	3.1 (0.7)	2.6 (0.6)
Benz et al. (2005) Outcome measure correlation Rehab institute: in/out-patient	N=17 No info on participant sex Age 22-63 (Mean 42.4; SD 11.6) C5-T10 AIS A-D Time since injury=24-372m	Spearman r Correlations between Ashworth (hip, knee, ankle) vs SCATS (clonus, flexion, extension) vs PSFS Hip knee ankle PSFS .43 .43. .51 SCATS Clonus Flex Ext PSFS .59* .41 .40 *P<.05		
Priebe et al. (1996) Outcome measure correlation VAMC-SCI service in/out-patient	N=85 Mean age=46y±13 (21-82) C3-T10 AIS A-D Duration of injury: 1m to 25y	Polychoric correlations SFS & Interference with Function Score = 0.407 SFS & Painful Spasm Score=0.312		
Penn et al. (1989)	N=20 Age 23-62			**Responsiveness:**

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Cohort Depts. of Neurosurgery, Physiology, PM&R, PE	M/F=11/9 MS/SCI=10/10 C5-T9 Population: SCI, MS			Intrathecal (IT) Baclofen, Ashworth was reduced from 4± 1 to 1.2 ±0.4, P=.0001, concomitant decrease in spasm frequency 3.3 ±1.2 to 0.4± 0.8, P<.0005. After mean follow-up of 19.2 months, Ashworth was 1.0± 0.1 and SFS was 0.3± 0.6. Calculated Cohen's d: SFS = 2.41 (Score change divided by pretreatment SD)