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Last updated: February 9th, 2024

Research Summary – Physical Activity Recall Assessment for People with Spinal Cord Injury (PARA-SCI) – Community Reintegration

Author Year Research Design Setting (country)	**Demographics and Injury Characteristics of Sample**	**Validity**	**Reliability**	**Responsiveness Interpretability**
Lyons and Ginis. 2024 Secondary analysis of baseline data from the study of Martin Ginis et al. 2008 to test internal-consistency reliability and dimensionality of the PARA-SCI measure of leisure-time physical activity (LTPA) Canada	Adults with an SCI (n = 703)	Together, the following data demonstrate the **multidimensionality** of LTPA and the PARA-SCI is not unidimensional. Internal consistency should not be a criterion for evaluating LTPA questionnaires for use in studies of people with SCI. - Principal components analysis showed two components/dimensions ('Moderate and Heavy Intensity LTPA' and 'Mild Intensity LTPA') explained 73% of the variance.	**Internal consistency:** Cronbach's α was 0.227.	

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		- Binary logic crosstabulation produced no discernible patterns of behavioural interrelatedness across LTPA intensities.		
Zbogar et al. 2016 Observational study Two inpatient spinal cord injury rehabilitation centers in Canada	N=106 Non-ambulatory patients: (n=70) 49M, 21F Mean age (SD): 48.9 (18.3) 67% Traumatic, 33% Non-traumatic 49% Paraplegic, 51% Tetraplegic AIS: 33%A, 14%B, 21%C, 29%D Ambulatory patients: (n=36) 26M, 9F	Convergent Validity: Spearman correlations for PARA-SCI with: (Spearman correlation (95%CI)) Wrist accelerometry = -0.04 (-0.27-0.20) SCIM III mobility score = -0.14 (-0.37-0.11) Step counts = 0.35 (0.01-0.61)	**Test-retest, Inter-rater, Intra-rater:** Test-retest: p≤0.01 Non-ambulatory participants: Spearman's rho (95%CI) = 0.68 (0.53-0.79) Ambulatory participants: Spearman's rho (95%CI) = 0.53 (0.24-0.73)	**Interpretability:** MDC = 179.4 min

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	Mean age (SD): 51.8 (15.4) 69% Traumatic, 31% Non-traumatic 63% Paraplegic, 37% Tetraplegic AIS: 3%A, 6%B, 0%C, 91%D			
Martin-Ginis et al. 2012 Survey with a 1-week follow-up General community	Validity Study: N=103 (75% male, 25% female) Mean age: 48.10±12.70y Mean years postinjury: 17.9±11.9y 54% tetraplegic 46% paraplegic 40% complete 60% incomplete Test-Retest Reliability Study: N=35 (77% male, 23% female)	With the exception of mild intensity activity, there were moderate to strong correlations between Leisure Time Physical Activity Questionnaire for People with Spinal Cord Injury (LTPAQ-SCI) & PARA-SCI measures of Leisure Time Physical Activity (LTPA). All correlations between the PARA-SCI and LTPAQ-SCI measures of LTPA were positive and		**Interpretability:** Mean (SD) PARA-SCI leisure time physical activity (LTPA) subscore (min/day): mild: 6.58 (14.59) moderate: 12.69 (27.30) heavy: 5.37 (15.21) total: 24.64 (37.43)

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	Mean age: 48.51±13.24y Mean years postinjury: 14.20±12.42y 60% tetraplegic 40% paraplegic 25% complete 75% incomplete Patients with SCI who used a wheelchair as the primary mode of mobility	statistically significant (P<.01). The strongest correlation was between the measures of heavy LTPA (P=.54), followed by the measures of total (P=.46) and moderate LTPA (P=.43). The weakest correlation was between the measures of mild intensity LTPA (P=.27).		
Latimer et al. 2006 Construct and convergent validity test Not specified	Convergent validity study: 73 participants; 52M, 21F, avg. age =39 37 tetraplegic, 36 paraplegic Construct validity study: 158 participants; 110M, 48F, avg. age= 38.5	**Correlations with muscle strength:** • Biceps muscle strength assessed by maximal load that could be lifted in one repetition (1RM) in unilateral bicep curl correlated positively with total, moderate and heavy intensity		

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	81 tetraplegic, 77 paraplegic.	PARA-SCI leisure time physical activity (LTPA) subscore ($r \geq 0.21$, $P<.05$). • Bicep strength also correlated with heavy intensity lifestyle and cumulative activity ($r \geq 0.23$, $P<.05$). • Left Pectoral strength assessed by maximal load in one repetition (1RM) in unilateral chest press correlated only with moderately intensity LTPA subscore ($r=0.23$, $P=.03$). **Correlations with aerobic fitness:** • Oxygen consumption (VO2) correlated with ○ Heavy intensity Leisure Time Physical Activity		

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		(LTPA) (r=0.35 P<.01) o Moderate intensity cumulative activity (r=0.26 P<.05) o Heavy intensity cumulative activity (r=0.33 P<.01) • Workload sig. correlated with moderate, heavy and total LTPA subscore as well as heavy intensity cumulative activity (r≥0.28, P<.02). Extreme Groups analysis **Leisure time physical activity** ANOVA Total leisure time physical activity (LTPA) subscore		

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		indicated main effects for: • age (F(1,108)=11.18, P=.001, d=0.64) • gender (F(1,1456)=4.51, P=.04, d=0.36) Men and younger participants reported more total LTPA compared with women and older participants. MANOVA Effects on leisure time physical activity (LTPA) subscore for mild, moderate and heavy intensity were significant by: • Age (F(3,106)=3.94, Pillai's trace=0.10, P=.01); younger respondents engaged in more moderate intensity		

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		LTPA than older participants. • Having a gym/sports team membership (F(3,129)=7.01, Pillai's trace=0.14, P<.001); those who did belong to a gym or sports team reported more moderate and heavy intensity LTPA. • Participation frequency (low vs. high) (F(3,80)=3.65, Pillai's trace=, P<.001); those with high participation frequency reported more mild, moderate, and heavy intensity LTPA. **Lifestyle activity** Lifestyle scores were significant for: • Work status		

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		(F(3,151)=3.21, Pillai's trace=0.12, P=.02) **Cumulative activity** Cumulative scores were significant for: • Gym or sports team membership (F(3,129)=3.14, Pillai's trace=0.07, P=.03)		
Martin Ginis et al. 2005 Development and preliminary assessment of test-retest reliability and criterion validity Community dwelling - Telephone interviews	Reliability Study: 102 SCI patients Validity Study: 14 patients Age range: 27-53, 72% men Inclusion criteria: Neurological impairments secondary to SCI, wheelchair use and no cognitive deficit Reliability study participants:	Pearson correlations for indirect calorimetry measurement and levels of cumulative activity (using subset of validity sample; N = 9): • Mild: (r=0.27, n.s.) • Moderate: (r=0.63, P<.05) • Heavy: (r=0.88, P<.01) • Total: (r=0.79, P<.01)	**Test-retest, Inter-rater, Intra-rater:** All 3 PARA-SCI measures of total physical activity had an ICC >0.70 (there were no significant differences between any pairs of PARA-SCI scores from T1 to T2, meaning scores were stable across the test-retest period) • Cumulative activity	**Floor/ceiling effect:** Minimum between-subject variability may have caused floor effects in heavy intensity lifestyle activity for reliability scores. **Interpretability:** **Chronic SCI**: (*n* = 102, combination of: paraplegia and tetraplegia, complete and incomplete SCI) See table 1.

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<table>
<tr><th>Author Year Research Design Setting (country)</th><th>Demographics and Injury Characteristics of Sample</th><th>Validity</th><th>Reliability</th><th>Responsiveness Interpretability</th></tr>
<tr><td></td><td>50 paraplegic
Mean (SD) age = 41.1 (12.2) years
Mean (SD) time since injury = 12.5 (11.2) years
50% incomplete, 50% complete
64 % male

52 tetraplegic
Mean (SD) age = 36.9 (10.2) years
Mean (SD) time since injury = 11.2 (8.5) years
49% incomplete, 51% complete
79 % male</td><td></td><td>ICC =0.79 (0.7-0.85)
• Leisure time physical activity
ICC =0.72 (0.6-0.8)
• Lifestyle Activity
ICC =0.78 (0.68-0.84)

<table><tr><th>PARA-SCI measure and Intensity Level</th><th>ICC</th></tr><tr><td>Cumulative - Total</td><td>0.79</td></tr><tr><td>Cumulative - Mild</td><td>0.65</td></tr><tr><td>Cumulative - Moderate</td><td>0.75</td></tr><tr><td>Cumulative - Heavy</td><td>0.80</td></tr><tr><td>Leisure Time Activity - Total</td><td>0.72</td></tr><tr><td>Leisure Time Activity -</td><td>0.63</td></tr></table></td><td>SEM and MDC (calculated by the SCIRE team from data in Martin-Ginis et al. 2005):
See table 2.</td></tr>
</table>

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<tr><td></td><td></td><td></td><td>
<table>
<tr><td>Mild</td><td></td></tr>
<tr><td>Leisure Time Activity - Moderate</td><td>0.45</td></tr>
<tr><td>Leisure Time Activity - Heavy</td><td>0.91</td></tr>
<tr><td>Lifestyle Activity - Total</td><td>0.78</td></tr>
<tr><td>Lifestyle Activity - Mild</td><td>0.66</td></tr>
<tr><td>Lifestyle Activity - Moderate</td><td>0.80</td></tr>
<tr><td>Lifestyle Activity - Heavy</td><td>0.56</td></tr>
</table>
</td><td></td></tr>
<tr><td></td><td colspan="3">Table 1.
<table>
<tr><th>PARA-SCI measure and Intensity Level</th><th>Mean (SD) in minutes of PARA-SCI results at Time 1</th><th>Mean (SD) in minutes of PARA-SCI results at Time 2 (one week after Time 1)</th></tr>
<tr><td>Cumulative - Total</td><td>184.1 (141.2)</td><td>189.3 (138.3)</td></tr>
<tr><td>Cumulative - Mild</td><td>113.3 (107.4)</td><td>103.3 (95.2)</td></tr>
</table>
</td><td></td></tr>
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Cumulative - Moderate	66.1 (72.6)	63.9 (61.4)	
Cumulative - Heavy	19 (30.5)	21.5 (36.4)	
Leisure Time Activity - Total	45.3 (59.9)	51.2 (68.6)	
Leisure Time Activity - Mild	13.5 (25.1)	16.2 (37.0)	
Leisure Time Activity - Moderate	20.2 (33.4)	20.2 (30.6)	
Leisure Time Activity - Heavy	11.7 (28.3)	14.8 (34.4)	
Lifestyle Activity - Total	138.8 (138.5)	138.1 (127.4)	
Lifestyle Activity - Mild	85.6 (93.2)	87.6 (89.5)	
Lifestyle Activity - Moderate	45.9 (65.9)	43.8 (58.1)	
Lifestyle Activity - Heavy	7.3 (14.8)	6.7 (16.0)	

Table 2.

PARA-SCI measure and Intensity Level	SEM (min of activity/day)	MDC (min of activity/day)
Cumulative - Total	64.7	179.4
Cumulative - Mild	63.5	176.1
Cumulative - Moderate	36.3	100.6
Cumulative - Heavy	13.6	37.8
Leisure Time Activity - Total	31.7	87.9
Leisure Time Activity - Mild	15.3	42.3
Leisure Time Activity - Moderate	24.8	68.7
Leisure Time Activity - Heavy	8.5	23.5
Lifestyle Activity - Total	65.0	180.1

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	Lifestyle Activity - Mild	54.3	150.6	
	Lifestyle Activity - Moderate	29.5	81.7	
	Lifestyle Activity - Heavy	9.8	27.2	

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Research Summary – Physical Activity Recall Assessment for People with Spinal Cord Injury (PARA-SCI) – Community Reintegration - Cross-cultural Validation Studies

Author Year Research Design Setting (country)	**Demographics and Injury Characteristics of Sample**	**Validity**	**Reliability**	**Responsiveness Interpretability**
Eitivipart et al. 2022 Psychometric study to translate and culturally adapt the PARA-SCI Thai-version and to assess its inter- and intra-rater reliability. University of Sydney, and in a community of convenience in Bangkok, Thailand.	Participants with SCI (n = 38) Mean (± SD) age 37.4 ± 10.4 years Sex: 27M, 11W Tetraplegia (n = 13) and paraplegia (n =25) Mean (± SD) time since injury 12.7 ± 9.3 years		An excellent degree of **inter-rater reliability** (assessed by comparing the assessment by 2 researchers 1 hour apart on the same day) was found in all types of physical activity intensity. The average ICC for inter-rater reliability for all types of activity and intensities was 0.99 (95% CI range from 0.95 to 0.99, F (1,37) = 0.07–1.06, p>0.05). **Intra-rater reliability** (assessed by comparing the results of the interviews one week apart) was poor (ICC	

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			score r<0.5) for moderate intensity ADL, LTPA and cumulative physical activity as well as heavy intensity of LTPA and cumulative physical activity; and moderate reliability (ICC score between r=0.5–0.75) for mild intensity ADL, LTPA, and cumulative physical activity as well as the heavy intensity ADL.	