

Research Summary – Wheelchair Circuit (WC) – Wheeled Mobility

Author Year Research Design Setting (country)	Demographics and Injury Characteristics of Sample	Validity	Reliability	Responsiveness Interpretability
<p>Kilkens et al. 2004</p> <p>Longitudinal study, T1: start of rehab. T2: 3 months later T3: discharge (t=time)</p> <p>Eight rehabilitation centers in the Netherlands</p>	<p>N= 74 patients (51M, 23F) Avg. age: 40.5±14.5 years</p> <p>53 subjects were paraplegic; 18 subjects with a motor incomplete lesion. 21 subjects with tetraplegia; including 9 with motor incomplete lesions.</p>	<p>T1: start of rehabilitation T2: 3 months later T3: discharge (t=time)</p> <p>Groups: Paraplegia groups scored significantly higher than tetraplegia group at T1 (P<0.001) and T3 (P=0.004). Incomplete and complete groups no significant differences (ns).</p> <p>Age and Ability score: T1 r=-0.216 (ns), T3 r=-0.322 (P<0.0083) Age and Performance time score: T1 r=0.397</p>		<p>Responsiveness: Standardized response mean (SRM) Ability score for T1 and T3: SRM=0.6 (P<.001) Performance time score for T1 and T3: SRM=0.9 (P<.001) Physical strain score for T1 and T3: SRM=0.80 (P<.001)</p> <p>Interpretability: See table 1.</p>

Author Year Research Design Setting (country)	Demographics and Injury Characteristics of Sample	Validity	Reliability	Responsiveness Interpretability
		<p>($p < 0.0083$), T3 $r = 0.383$ ($P < 0.0083$)</p> <p>Age and Physical strain (%Heart Rate Reserve (%HRR)): T1 $r = 0.067$ (ns), T3 $r = 0.365$ (ns)</p> <p>Functional Independence Measure (FIM) mobility score and Ability score: T1 $r = 0.517$ ($P < 0.0083$), T3 $r = 0.519$ ($P < 0.0083$)</p> <p>FIM mobility score and Performance time score: T1 $r = -0.466$ ($P < 0.0083$), T3 $r = -0.396$ ($P < 0.0083$)</p> <p>FIM mobility score and %HRR: T1 $r = -0.398$ (ns), T3 $r = -0.139$ (ns)</p> <p>Peak power output and Ability score: T1</p>		

Author Year Research Design Setting (country)	Demographics and Injury Characteristics of Sample	Validity	Reliability	Responsiveness Interpretability	
		<p>r=0.824 (P<0.0083), T3 r=0.762 (P<0.0083)</p> <p>Peak power output and Performance time score: T1 r=0.628 (P<0.0083), T3 r=0.719 (P<0.0083)</p> <p>Peak power output and %HRR: T1 r=0.678 (P<0.0083), T3 r=0.692 (P<0.0083)</p> <p>VO₂peak and Ability score: T1 r=0.674 (P<0.0083), T3 r=0.572 (P<0.0083)</p> <p>VO₂peak and Performance time score: T1 r=0.425 (P<.0083), T3 r=0.563 (P<0.0083)</p> <p>VO₂peak and %HRR: T1 r=0.560 (P<0.0083), T3 r=-0.490 (P<0.0083)</p>			
	Table 1.				
			Ability score	Performance Time Score (s)	Physical strain score (%HRR)

Author Year Research Design Setting (country)	Demographics and Injury Characteristics of Sample	Validity	Reliability	Responsiveness Interpretability																																										
	<table border="1"> <tr> <td rowspan="5">T1</td> <td>Total group</td> <td>4.9 (2.4)</td> <td>30.6 (16.1)</td> <td>43.8 (17.8)</td> </tr> <tr> <td>Paraplegia</td> <td>5.7 (1.8)</td> <td>28.7 (15.4)</td> <td>41.3 (16.8)</td> </tr> <tr> <td>Tetraplegia</td> <td>2.7 (2.4)</td> <td>40.0 (17.3)</td> <td>56.0 (11.4)</td> </tr> <tr> <td>Incomplete</td> <td>5.0 (2.2)</td> <td>34.1 (20.5)</td> <td>44.2 (15.3)</td> </tr> <tr> <td>Complete</td> <td>4.8 (2.5)</td> <td>28.3 (12.2)</td> <td>43.5 (20.0)</td> </tr> <tr> <td rowspan="5">T3</td> <td>Total group</td> <td>6.2 (2.2)</td> <td>22.0 (10.6)</td> <td>35.4 (17.5)</td> </tr> <tr> <td>Paraplegia</td> <td>6.7 (2.0)</td> <td>19.4 (7.7)</td> <td>31.0 (14.4)</td> </tr> <tr> <td>Tetraplegia</td> <td>5.1 (2.6)</td> <td>29.5 (13.8)</td> <td>53.2 (18.6)</td> </tr> <tr> <td>Incomplete</td> <td>6.7 (1.6)</td> <td>23.2 (11.6)</td> <td>38.1 (18.1)</td> </tr> <tr> <td>Complete</td> <td>6.0 (2.5)</td> <td>21.3 (1.0)</td> <td>33.6 (17.3)</td> </tr> </table>	T1	Total group	4.9 (2.4)	30.6 (16.1)	43.8 (17.8)	Paraplegia	5.7 (1.8)	28.7 (15.4)	41.3 (16.8)	Tetraplegia	2.7 (2.4)	40.0 (17.3)	56.0 (11.4)	Incomplete	5.0 (2.2)	34.1 (20.5)	44.2 (15.3)	Complete	4.8 (2.5)	28.3 (12.2)	43.5 (20.0)	T3	Total group	6.2 (2.2)	22.0 (10.6)	35.4 (17.5)	Paraplegia	6.7 (2.0)	19.4 (7.7)	31.0 (14.4)	Tetraplegia	5.1 (2.6)	29.5 (13.8)	53.2 (18.6)	Incomplete	6.7 (1.6)	23.2 (11.6)	38.1 (18.1)	Complete	6.0 (2.5)	21.3 (1.0)	33.6 (17.3)			
T1	Total group		4.9 (2.4)	30.6 (16.1)	43.8 (17.8)																																									
	Paraplegia		5.7 (1.8)	28.7 (15.4)	41.3 (16.8)																																									
	Tetraplegia		2.7 (2.4)	40.0 (17.3)	56.0 (11.4)																																									
	Incomplete		5.0 (2.2)	34.1 (20.5)	44.2 (15.3)																																									
	Complete	4.8 (2.5)	28.3 (12.2)	43.5 (20.0)																																										
T3	Total group	6.2 (2.2)	22.0 (10.6)	35.4 (17.5)																																										
	Paraplegia	6.7 (2.0)	19.4 (7.7)	31.0 (14.4)																																										
	Tetraplegia	5.1 (2.6)	29.5 (13.8)	53.2 (18.6)																																										
	Incomplete	6.7 (1.6)	23.2 (11.6)	38.1 (18.1)																																										
	Complete	6.0 (2.5)	21.3 (1.0)	33.6 (17.3)																																										
<p>Kilkens et al. 2002</p> <p>Cross-sectional study, with 3 test trials/subject conducted by 2 raters.</p> <p>Eight rehabilitation centers in the Netherlands</p>	<p>N=27 patients Age: 18-65 years.</p> <p>All patients were in the final stage of their clinical rehabilitation program. They used a hand rim wheelchair.</p>		<p>Test-retest, Inter-rater, Intra-rater:</p> <p>Intra-rater: Task feasibility for Sum of tasks: ICC=0.98 (95% CI 0.96-0.99) Performance time ICCs:</p> <table border="1"> <thead> <tr> <th>Task</th> <th>ICC</th> </tr> </thead> <tbody> <tr> <td>Figure-of-8 shape</td> <td>0.97</td> </tr> </tbody> </table>	Task	ICC	Figure-of-8 shape	0.97	<p>Interpretability: See tables 1, 2, and 3.</p>																																						
Task	ICC																																													
Figure-of-8 shape	0.97																																													

Author Year Research Design Setting (country)	Demographics and Injury Characteristics of Sample	Validity	Reliability		Responsiveness Interpretability										
			Crossin g doorste p	0.71											
			Mounti ng platfor m	0.78											
			Sprint	0.99											
			Transfer	0.94											
			Peak heart rate ICCs:												
			<table border="1"> <thead> <tr> <th>Task</th> <th>ICC</th> </tr> </thead> <tbody> <tr> <td>Figure- of-8 shape</td> <td>0.85</td> </tr> <tr> <td>Crossin g doorste p</td> <td>0.90</td> </tr> <tr> <td>Mounti ng platfor m</td> <td>0.84</td> </tr> <tr> <td>Sprint</td> <td>0.83</td> </tr> </tbody> </table>		Task	ICC	Figure- of-8 shape	0.85	Crossin g doorste p	0.90	Mounti ng platfor m	0.84	Sprint	0.83	
Task	ICC														
Figure- of-8 shape	0.85														
Crossin g doorste p	0.90														
Mounti ng platfor m	0.84														
Sprint	0.83														

Author Year Research Design Setting (country)	Demographics and Injury Characteristics of Sample	Validity	Reliability		Responsiveness Interpretability
			Walkin g	0.96	
			3% slope	0.69	
			6% slope	0.85	
			Wheelc hair driving	0.84	
			Transfe r	0.68	
	Table 1. Performance time of the different tasks of the Wheelchair Circuit for the 3 test trials:				
	Task	Intrarater		Interrater	
		Trial 1	Trial 2	Trial 1	Trial 3
	Figure-of-8 shape	16.3 (8.6)	15.6 (8.1)	16.1 (8.7)	16.3 (9.6)

Author Year Research Design Setting (country)	Demographics and Injury Characteristics of Sample	Validity		Reliability		Responsiveness Interpretability																																																							
	Crossing doorstep	4.7 (4.1)	4.8 (3.6)	5.2 (4.7)	6.4 (7.5)																																																								
	Mounting platform	7.1 (4.8)	6.6 (9.5)	11.6 (12.4)	12.3 (14.1)																																																								
	Sprint	11.7 (5.5)	11.5 (6.0)	11.6 (5.6)	11.4 (6.0)																																																								
	Transfer	47.4 (49.8)	42.2 (38.3)	35.9 (34.7)	42.4 (45.7)																																																								
Table 2. Peak heart rates during the different tasks of the Wheelchair Circuit for the 3 test trials:																																																													
<table border="1"> <thead> <tr> <th rowspan="2">Task</th> <th colspan="2">Intrarater</th> <th colspan="2">Interrater</th> </tr> <tr> <th>Trial 1</th> <th>Trial 2</th> <th>Trial 1</th> <th>Trial 3</th> </tr> </thead> <tbody> <tr> <td>Figure-of-8 shape</td> <td>107.4 (17.6)</td> <td>103.8 (17.2)</td> <td>110.2 (16.2)</td> <td>107.1 (15.7)</td> </tr> <tr> <td>Crossing doorstep</td> <td>100.5 (20.2)</td> <td>95.9 (18.7)</td> <td>104.9 (16.9)</td> <td>106.1 (16.8)</td> </tr> <tr> <td>Mounting platform</td> <td>114.3 (19.2)</td> <td>106.3 (18.8)</td> <td>113.8 (18.7)</td> <td>107.9 (27.1)</td> </tr> <tr> <td>Sprint</td> <td>107.5 (18.3)</td> <td>107.2 (15.8)</td> <td>109.8 (16.9)</td> <td>109.2 (16.6)</td> </tr> <tr> <td>Walking</td> <td>130.4 (22.0)</td> <td>131.5 (23.9)</td> <td>130.4 (22.0)</td> <td>132.4 (22.9)</td> </tr> <tr> <td>3% slope</td> <td>99.4 (16.4)</td> <td>94.7 (15.6)</td> <td>102.1 (14.8)</td> <td>99.1 (13.0)</td> </tr> <tr> <td>6% slope</td> <td>108.3 (17.2)</td> <td>103.9 (17.6)</td> <td>111.7 (15.1)</td> <td>111.8 (15.6)</td> </tr> <tr> <td>Wheelchair driving</td> <td>103.1 (17.3)</td> <td>99.7 (16.5)</td> <td>105.1 (14.5)</td> <td>105.9 (13.3)</td> </tr> <tr> <td>Transfer</td> <td>112.7 (16.4)</td> <td>106.1 (13.4)</td> <td>115.7 (17.0)</td> <td>114.7 (17.7)</td> </tr> </tbody> </table>								Task	Intrarater		Interrater		Trial 1	Trial 2	Trial 1	Trial 3	Figure-of-8 shape	107.4 (17.6)	103.8 (17.2)	110.2 (16.2)	107.1 (15.7)	Crossing doorstep	100.5 (20.2)	95.9 (18.7)	104.9 (16.9)	106.1 (16.8)	Mounting platform	114.3 (19.2)	106.3 (18.8)	113.8 (18.7)	107.9 (27.1)	Sprint	107.5 (18.3)	107.2 (15.8)	109.8 (16.9)	109.2 (16.6)	Walking	130.4 (22.0)	131.5 (23.9)	130.4 (22.0)	132.4 (22.9)	3% slope	99.4 (16.4)	94.7 (15.6)	102.1 (14.8)	99.1 (13.0)	6% slope	108.3 (17.2)	103.9 (17.6)	111.7 (15.1)	111.8 (15.6)	Wheelchair driving	103.1 (17.3)	99.7 (16.5)	105.1 (14.5)	105.9 (13.3)	Transfer	112.7 (16.4)	106.1 (13.4)	115.7 (17.0)	114.7 (17.7)
Task	Intrarater		Interrater																																																										
	Trial 1	Trial 2	Trial 1	Trial 3																																																									
Figure-of-8 shape	107.4 (17.6)	103.8 (17.2)	110.2 (16.2)	107.1 (15.7)																																																									
Crossing doorstep	100.5 (20.2)	95.9 (18.7)	104.9 (16.9)	106.1 (16.8)																																																									
Mounting platform	114.3 (19.2)	106.3 (18.8)	113.8 (18.7)	107.9 (27.1)																																																									
Sprint	107.5 (18.3)	107.2 (15.8)	109.8 (16.9)	109.2 (16.6)																																																									
Walking	130.4 (22.0)	131.5 (23.9)	130.4 (22.0)	132.4 (22.9)																																																									
3% slope	99.4 (16.4)	94.7 (15.6)	102.1 (14.8)	99.1 (13.0)																																																									
6% slope	108.3 (17.2)	103.9 (17.6)	111.7 (15.1)	111.8 (15.6)																																																									
Wheelchair driving	103.1 (17.3)	99.7 (16.5)	105.1 (14.5)	105.9 (13.3)																																																									
Transfer	112.7 (16.4)	106.1 (13.4)	115.7 (17.0)	114.7 (17.7)																																																									
Table 3. SEM and MDC values (calculated from data) for performance time and peak heart rates during Wheelchair circuit tasks																																																													

Author Year Research Design Setting (country)	Demographics and Injury Characteristics of Sample	Validity		Reliability		Responsiveness Interpretability						
							Performance Time: Task		SEM	MDC		
							Figure-of-8 shape	1.5	4.1			
							Crossing doorstep	2.2	6.1			
							Mounting platform	2.3	6.2			
							Sprint	0.6	1.5			
							Transfer	12.2	33.8			
							Peak Heart Rate: Task					
							Figure-of-8 shape	6.8	18.9			
							Crossing doorstep	6.4	17.7			
							Mounting platform	7.7	21.3			
							Sprint	7.5	20.9			
							Walking	4.4	12.2			
							3% slope	9.1	25.3			
							6% slope	6.7	18.5			
							Wheelchair driving	6.9	19.2			
							Transfer	9.2	25.7			