

Use of Actigraphy to measure physical activity in manual wheelchair users in the real world

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Rational

- Physical Activity (PA) has many health benefits (e.g., reduced risk of chronic disease, improved physical and psychological function, increased socialization)¹
- Few individuals who use a manual wheelchair (MWC) are active enough to accrue these health benefits²
- There is a need to promote PA within the MWC users population³
- Accurately promoting PA behavior requires a valid and reliable outcome measure⁴
- Actigraphy is a tri-axial accelerometer that measures bouts of movement⁵
- Actigraphy has been proven effective with MWC users in previous lab-setting studies⁶

Objectives

To validate the use of actigraphy to measure PA in MWC users in their natural environments and establish cut-points of PA intensity.

Methodology

Design. Cross-sectional study

Sample. Community-living MWC users for > 1 year, > 18 years of age, 2 hand propulsion for at least 5 minutes.

Intervention. 13 real-world PAs with Actigraphs on the arm and wheel:

Type a script, leaf through a magazine, put on a jacket and take it off, open a door go through it and close the door, wheel forward 20m (slow, normal, fast), wheelchair slalom 18m, wheelchair shuttle ride, slight incline (1:16), steep incline (1:8), wheel forward on gravel 2m, wheel forward outside 940m.

Outcomes. Heart Rate (HR) and Rate of Perceived Exertion (RPE) were collected at the end of each activity. Bouts of activity were collected with the Actigraphs during each of the 13 tasks.

Analysis. Graphical observation and comparison between 'activity bouts' with HR and RPE.

Preliminary Results

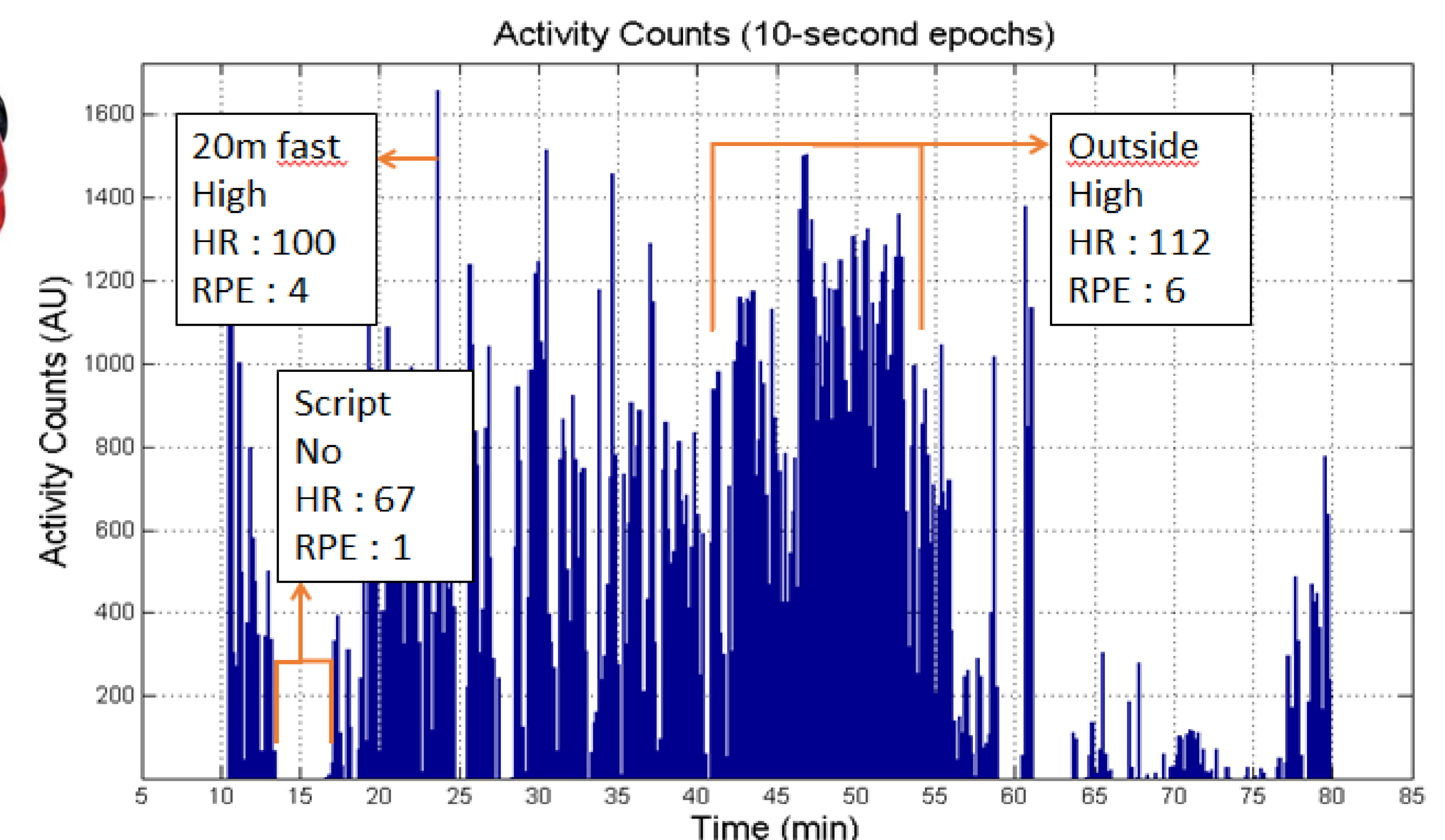
- N= 23
- Mean age = 54.7 ± 13.7 years
- Mean time using a MWC = 15.5 years
- 9 women, 14 men (52.2% SCI, 47.8% other)



References

[1] van der Scheer et al., J Rehabil Med 2016; 48:33–42; [2] Coulter et al., Spinal Cord 2011; 49 :445–450; [3] Garcia-Masso et al., Spinal Cord 2013;51:898-903; [4] Sallis et al., Res Q Exerc Sport 2000;71:1–14; [5] Warms et al., Nurs Res 2004;53(2):136-43; [6] Conger et al., J Phys Act Health 2015;12(11):1520-26.

Participant #3	Intensity	HR	RPE	Start time	End time
Type a script	No	67	1	13:25	16:43
Magazine	No	58	1	17:32	18:32
Jacket	Low	75	1	19:09	19:39
Door	Low	72	2	20:23	20:30
20m slow	Low	64	1	21:55	22:19
20m normal	Moderate	73	3	22:49	23:00
20m fast	High	100	4	23:29	23:37
Slalom	Moderate	81	3	26:33	26:53
Shuttle ride	High	115	6	---	---
Slight incline	Moderate	81	4	33:40	33:46
Steep incline	High	86	6	34:34	34:41
Gravel	High	92	6	36:53	37:03
Outside	High	112	6	41:59	52:55



Discussion & Conclusion

- HR and RPE increased with the intensity
- Peaks of activity increased within no, low and high intensity activities
- Actigraphy can discriminate between various PA intensities
- Useful tool providing objective measure of PA in the real world
- Useful tool for further projects to assess PA behaviors (SPPAC feasibility study)

Acknowledgements

