

# Comparing spatiotemporal gait parameters between overground walking and self-paced treadmill walking in persons after stroke.

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A cross-sectional study was conducted to evaluate if a self-paced treadmill in a virtual environment could serve as a valuable alternative for overground gait assessment in persons after stroke. The results indicate that a self-paced treadmill can be used for clinical gait analysis, taking into account the difference in preferred walking speed.

## References

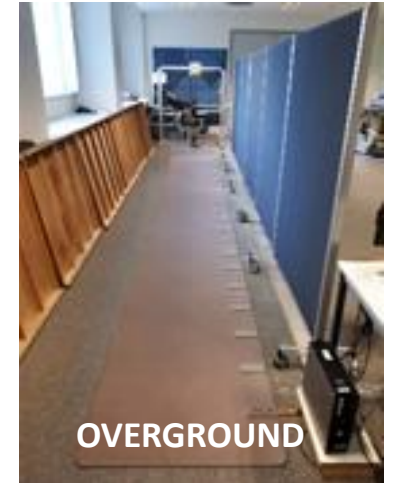
1. Sinitski et al. (2015) <http://doi.org/10.1016/j.gaitpost.2014.12.016>
2. Sloot et al. (2014) <https://doi.org/10.1016/j.gaitpost.2013.08.022>

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## Introduction

Overground gait analysis requires quite some space and equipment. Recent developments allow the use of a **self-paced treadmill** for clinical gait analysis, potentially enabling **more natural gait patterns** compared to fixed-speed treadmills and space sparing settings<sup>1, 2</sup>.

As self-paced versus overground walking was not evaluated extensively in persons after stroke we examined the use of a self-paced treadmill as a **valuable alternative for overground analysis**.



## Research hypothesis

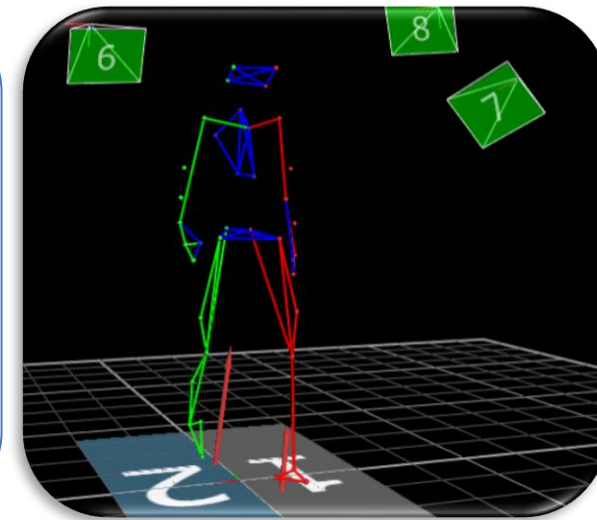
- Spatiotemporal parameters of walking on the self-paced treadmill would be closely related to overground walking.
- Symmetry of the spatiotemporal parameters will increase when walking on the treadmill.

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## Methods

- 25 persons after stroke who could walk independently for at least 6 minutes
- Walking at self-selected speed overground (GAITRite, CIR Systems) and on a self-paced treadmill (GRAIL, Motek) in randomized order

- Mean age of 53 ( $\pm 12.1$ ) years; 10 females – 15 males
- 40.72  $\pm$  42.94 months post stroke
- Fugl-Meyer lower limb 28.12 ( $\pm 5.0$ ) /34
- Fugl-Meyer upper limb 47.48 ( $\pm 17.4$ ) /66
- Short FES-I 10.32 ( $\pm 3.6$ ) /28
- Six persons used an AFO during the assessment



## Outcome parameters

- Eight spatiotemporal parameters (velocity, cadence, step width and length, stance/swing phase duration, double/single limb support duration)
- Coefficient of variation for step width and step length
- Spatial (step length) and temporal (stance and swing) symmetry

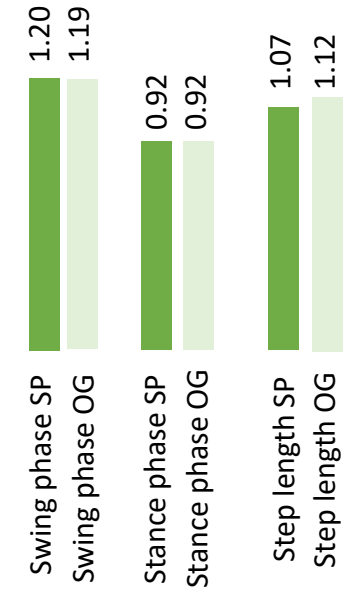
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# Results

	GAITrite_OG		GRAIL_SP		OG vs. SP	PAIRED SAMPLE T-TEST			
	Mean	SD	Mean	SD	ICC (95% CI)	MD (95% CI)	P	Bias (%)	LoA (%)
Velocity (m/s)	1.10	0.3	0.93	0.3	.73 (.17 to .89)	0.17 (0.08 to 0.25)	<0.001	-14.1	-51.0 to 22.8
Cadence (steps/min)	105.95	15.0	103.04	15.6	.90 (.77 to .96)	2.90 (-0.85 to 6.70)	0.123	-2.5	-19.5 to 14.4
Step width (m)	0.25	0.1	0.21	0.04	.57 (.03 to .81)	0.04 (0.02 to 0.07)	0.003	-10.8	-64.3 to 42.7
Step length P (m)	0.64	0.1	0.55	0.1	.64 (.11 to .87)	0.09 (0.05 to 0.13)	<0.001	-14.0	-40.2 to 12.1
Step length NP (m)	0.59	0.1	0.52	0.1	.72 (.20 to .89)	0.07 (0.03 to 0.11)	0.001	-10.1	-41.5 to 21.3
Stance phase P (%)	60.56	2.1	63.40	2.4	.55 (-.24 to .84)	-2.83 (-3.57 to -2.10)	<0.001	4.7	-1.1 to 10.5
Stance phase NP (%)	66.25	4.0	69.38	3.1	.76 (-.19 to .93)	-3.08 (-3.89 to -2.26)	<0.001	4.8	-1.3 to 10.9
Swing phase P (%)	39.43	2.1	36.60	2.4	.54 (-.24 to .84)	2.83 (2.09 to 3.57)	<0.001	-7.1	-16.0 to 1.7
Swing phase NP (%)	33.74	4.0	30.67	3.1	.77 (-.19 to .94)	3.07 (2.26 to 3.87)	<0.001	-8.8	-19.5 to 2.1
DLS (%)	26.84	3.8	32.76	3.5	.43 (-.20 to .78)	-5.92 (-7.23 to -4.62)	<0.001	23.3	-2.4 to 48.9
SLS P (%)	33.73	3.9	30.68	3.0	.77 (-.19 to .94)	3.05 (2.25 to 3.85)	<0.001	-8.7	-19.4 to 2.1
SLS NP (%)	39.46	2.1	36.59	2.3	.73 (.17 to .89)	2.87 (2.13 to 3.61)	<0.001	-7.2	-16.0 to 1.6

OG = overground; SP = self-paced; ICC = intraclass correlation coefficient; MD = mean difference; CI = confidence interval; LoA = limits of agreement; P = paretic; NP = non-paretic; DLS = double limb support; SLS = single limb support

**Table 1: Comparing the spatiotemporal parameters between the overground (GAITrite\_OG) and treadmill (GRAIL\_SP) condition.**



**Fig 1: Temporal and spatial symmetry in both conditons**

## Conclusion

- SP treadmills provide opportunities for gait assessments/training after stroke.
- The slower velocity and accompanying changed spatiotemporal parameters need to be taken into account.
- Symmetry of walking does not change.

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