

Learning with the NuDrive lever-propelled wheelchair: the effects of 1 day learning on mechanical efficiency and push frequency.

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Introduction Previous research has shown that lever-propelled wheelchairs are more efficient but also less practical than hand-rim propelled wheelchairs (van der Woude et al., 2001). The NuDrive lever-system tried to make lever propulsion more practical by designing the levers lightweight and detachable. Experience has shown that people need some time to get acquainted with the NuDrive.

Objective Investigate the effects of 1 day of learning with the NuDrive.

Methods

Participants:

15 Able-bodied participants

Mean age 24.1 (2.4)

Control (CON) n= 8

Experimental (EXP) n= 7

Design:

Pre- post test: 3 x 4 minutes blocks, 2 minutes rest

Intervention: 7 trials of 2 x 4 minutes blocks, 2 minutes rest

Treadmill: 1.11 m/s, 0.22 W/kg

Measurements:

- Gross mechanical efficiency (GME)
- Net mechanical efficiency (NME)
- Push frequency
- Local perceived discomfort (LPD) and RPE

Statistics:

Repeated measure ANOVA ($\alpha=0.05$)

Results

The RPE and LPD showed no significant effects

Table: mean gross and net mechanical efficiency and frequency of control group and experimental group, pre and post test (* significant interaction)

		EXP	CON
GME*	pre	4,00 (0,62)	4,25 (0,68)
	post	4,76 (0,60)	4,15 (0,60)
NME*	pre	5,23 (1,00)	5,45 (1,10)
	post	6,60 (1,01)	5,29 (0,92)
Frequency	pre	68,1 (25,6)	77,8 (13,2)
	post	55,7 (18,0)	70,3 (14,5)

Frequency EXP Individual

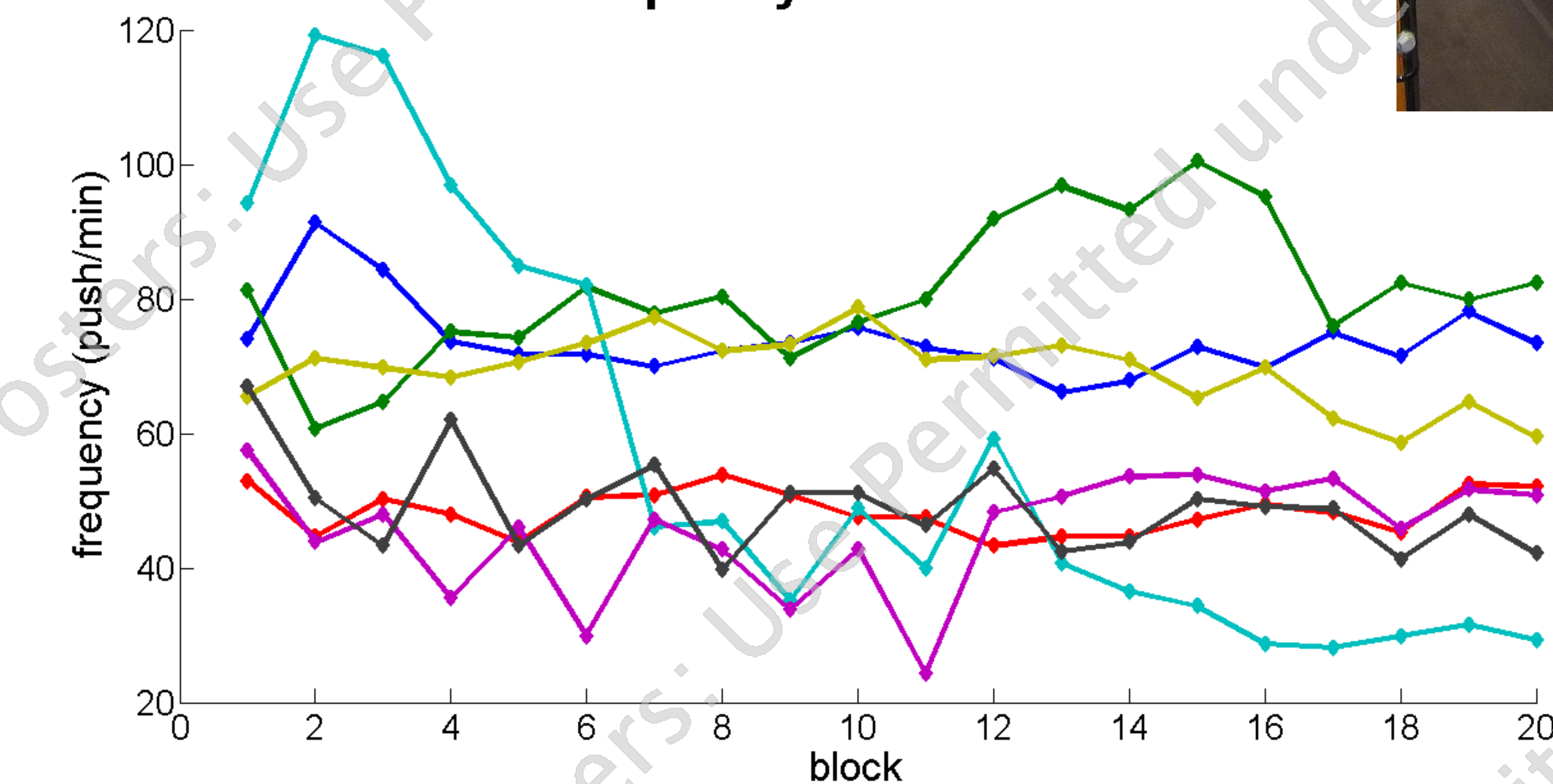


Figure 2: frequencies of the individual participants of the experimental group

Mean Frequency EXP and CON

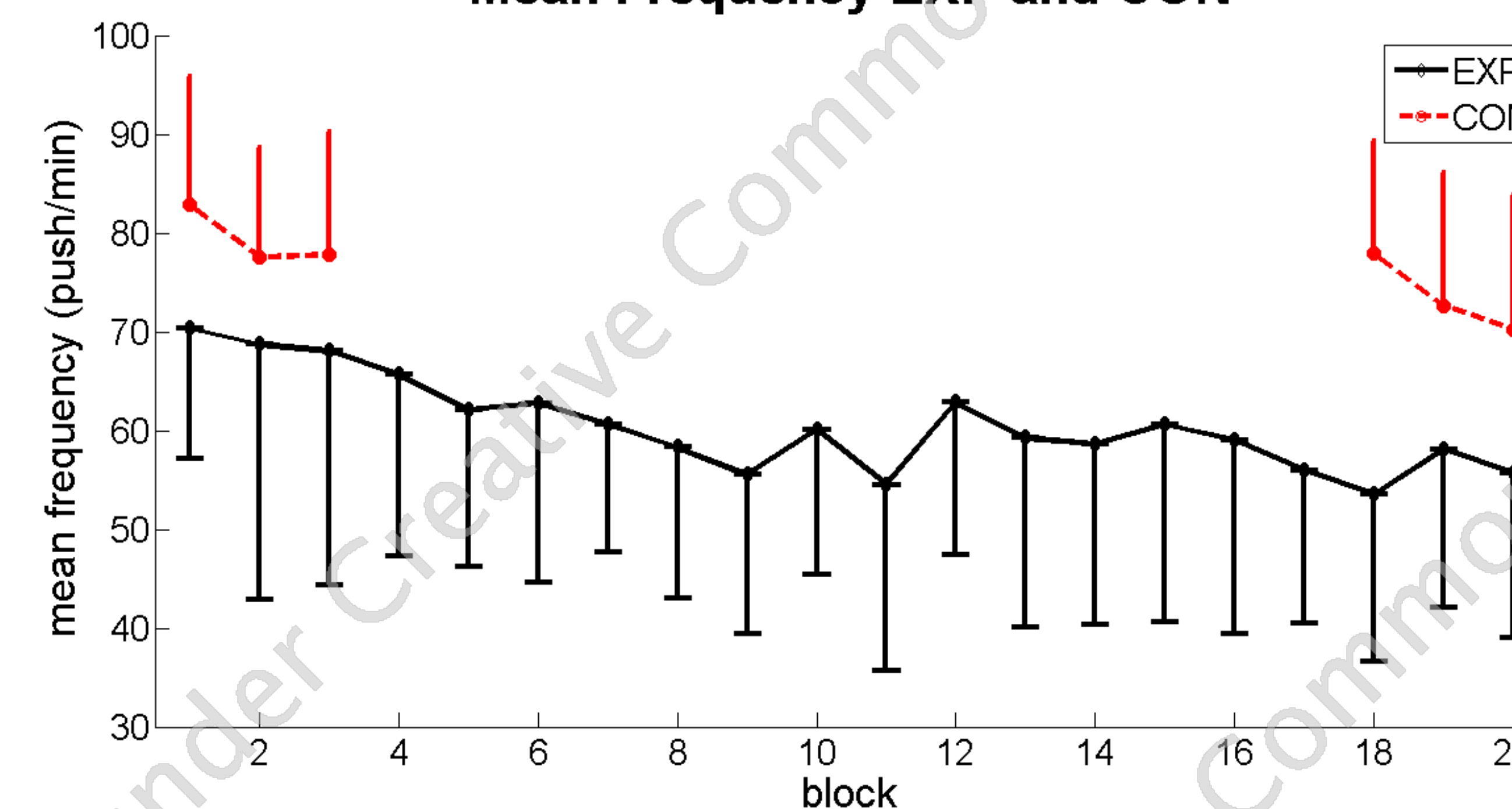


Figure 1: mean frequency with SD of the experimental group and control group

Conclusions The present study is the first that focuses on learning mechanisms in lever-propelled wheelchairs. Efficiency improves with practice, and a clear learning effect was present after 1 day of practice with the NuDrive. Decreasing push frequency might attribute to this learning mechanism. Based on the present results a proper learning period is advised before using or evaluating the NuDrive system as an alternative for hand-rim propulsion.

References

van der Woude LHV, Dallmeijer AJ, Janssen TW, Veeger D. (2001). American Journal of physical Medicine and Rehabilitation, 80(10), 765-777

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