

Enriched, task-specific therapy in the chronic phase after stroke

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademien, Göteborgs universitet kommer att offentligen försvaras i hörsal Arvid Carlsson, Academicum, Medicinargatan 3, Göteborg, torsdagen den 6 maj, klockan 09.00.

av Sara Vive, Leg. Fysioterapeut

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Avhandlingen baseras på följande delarbeten

- I. Vive S, Af Geijerstam JL, Kuhn HG, Bunketorp-Käll L. Enriched, Task-Specific Therapy in the Chronic Phase After Stroke: An Exploratory Study. *J Neurol Phys Ther.* 2020 Apr;44(2):145-155. doi: 10.1097/NPT.0000000000000309. PMID: 32118616; PMCID: PMC7077970
- II. Vive S, Bunketorp-Käll L, Carlsson G. Experience of enriched rehabilitation in the chronic phase of stroke. *Disabil Rehabil.* 2020 Jun 1:1-8. doi: 10.1080/09638288.2020.1768598. Epub ahead of print. PMID: 32478573.
- III. Vive S, Zügner R, Tranberg R, Bunketorp-Käll L. Gait Kinematics and Spatiotemporal Variables after Enriched, Task-Specific Therapy in the Chronic Phase after Stroke. A Single-Subject Experimental Design Study. *Archives of Clinical and Medical Case Reports* 5 (2021): 325-338.
- IV. Vive S, Elam C, Bunketorp-Käll L. Comfortable and maximum gait speed in individuals with chronic stroke and community-dwelling controls. 2021 Submitted.

**SAHLGRENKA AKADEMIN
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Enriched, task-specific therapy in the chronic phase after stroke

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Abstract

Recovery and improvement of motor functions and abilities after stroke depend on the spontaneous recovery process but also on the reorganization of neural mechanisms. In animal studies, an Enriched Environment (EE) has proved to be an effective intervention for boosting brain plasticity and recovery after stroke. Until recently, an EE has been a laboratory phenomenon with few attempts of translation to the clinical setting. The overall aim of this thesis was to study whether enriched task-specific therapy (ETT) contributed to any changes with respect to function, activity, participation and different aspects of health in individuals with chronic stroke. This thesis includes four papers.

In **study I**, a longitudinal uncontrolled observational study, with a within-subject, repeated-measures design, we studied whether ETT contributed to any motor or health-related changes, in individuals with chronic stroke. The ETT-interventions was a 3-week, high intensity, task specific training program in an EE in Spain, where also social and sensory components was included. The 39 participants who completed the ETT program did improve their functional motor ability, balance, gait speed and walking endurance, and were shown to achieve gains in multiple dimensions of health. The improvements were sustained at the 6-month follow-up. In **study II**, we explored the experiences of individuals who participated in the ETT program using focus group interviews. The analyses, which was performed using qualitative content analysis, showed that ETT may lead to perceived improvements in function, knowledge, new insights and perceptions of rehabilitation needs and can have enriching emotional impacts. In **study III**, a longitudinal observational study with a single-subject experimental design, we studied the gait and movement pattern in a three dimensional gait lab. Four participants were studied, of whom two had significant improvements in gait kinematics, symmetry, and spatiotemporal variables after the intervention. In **study IV**, a cross-sectional observational controlled study, we studied the relationship between comfortable and maximum gait speed in individuals with chronic stroke, and in a community dwelling elderly control group. We found that the maximum gait speed in the stroke individuals can be predicted by the comfortable gait speed, with a coefficient at 1.41, which differed from the control group, which uncorrected coefficient was found to be 1.20.

In conclusion, this thesis shows that, ETT applied to individuals in a chronic phase after stroke, had impacts on functional motor ability, gait speed, balance, multiple dimensions of health and led to different emotional impacts. Further, ETT might affect the kinematic gait pattern, but in order to understand the underlying mechanisms of recovery and improvement, further research is needed.

Keywords: *stroke; rehabilitation; function; activity; participation; health; enriched environment; intense training; qualitative research; gait analysis; gait speed.*