

The cognitive and brain reserve hypothesis in post-stroke cognition: Protocol for a prospective longitudinal study

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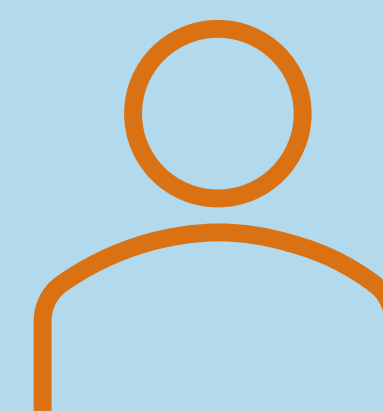
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Background

- **Cognitive impairment** is a common consequence of stroke, though its complexity is not yet well understood.
- The **cognitive and brain reserve hypothesis** captures the resilience of the brain in the occurrence of neuropathological damage, and may improve our understanding of post-stroke cognition.
- Nevertheless, comprehensive longitudinal studies in stroke remain scarce.

Aims

- To incorporate the cognitive and brain reserve hypothesis into a **predictive model** of chronic post-stroke cognition, with a particular focus on **executive dysfunction**.
- To assess if and how cognitive and brain reserve add **predictive value** over and above well-known predictors.



In Dutch-speaking stroke patients, over 18 years old, with no neurological disorders other than stroke.

Protocol

Subacute phase

< 90 days post-stroke

Planned sample: N = ± 150

Chronic phase

> 6 months post-stroke

Planned sample: N = ± 75

Test session 1



Cognition

Oxford Cognitive Screen

Cognitive reserve

Cognitive Reserve Index questionnaire (CRIq),
Cognitive Reserve Scale (CRS)



Brain reserve

Global Cortical Atrophy &
Fazekas score on clinical scan



Lesion load

Lesion volume based on lesion mask

Demographic and clinical information

Age, sex, education,
stroke etiology, previous stroke

Anticipated
attrition
50%, N = 75

Test session 2



Cognition

Oxford-Multiple Errands Test (OxMET),
OCS-Plus,
Behavior Rating Inventory of Executive
Function (BRIEF)

Planned analyses

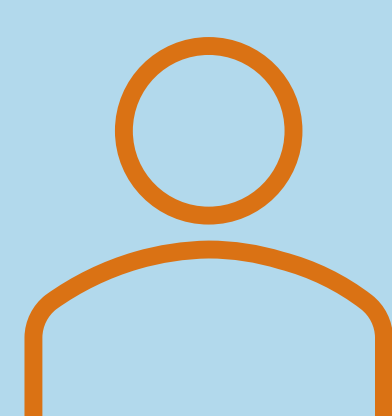
Linear mixed-effects models to predict OxMET, OCS-Plus and BRIEF outcomes, with participants as random effect.

Reduced model: age, sex, education, lesion load, time.

Full model: age, sex, education, lesion load, time, cognitive reserve, brain reserve, interaction terms with lesion load.

Preliminary data

- **N = 44**, 45% female, M age = 70 (SD = 11) with M = 13 years of education (SD = 3). 84% ischemic stroke, 52% left-sided stroke, 75% first-ever stroke.
- On average, patients were impaired on 22% of OCS tasks, most prevalently in the praxis domain.
- Proportion impaired OCS tasks **correlated negatively** with Dutch norm-corrected CRIq total score ($\rho = -0.40$, $p = 0.006$) and raw CRS total score ($\rho = -0.46$, $p = 0.001$).



Take-away

- This longitudinal study will help elucidate to what extent **cognitive and brain reserve** contribute to cognitive trajectories after stroke.
- This will illustrate the potential of considering these broad indicators of cognitive health in **supporting and optimizing cognitive recovery** after stroke.