Cognitive reserve and symptom experience in multiple sclerosis: A buffer to disability progression over time?

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Abstract

Objective: Research in MS has documented that enhanced cognitive reserve (CR) is associated with better health and well-being. Passive and active CR reflect past and current enrichment activities, respectively. This study investigated the relationship between CR and current and longitudinal symptom experience; and course of disease.

Methods: Secondary analysis of longitudinal data (n=860) from the North American Research Committee on MS registry (NARCOMS). **Measures:** Passive CR: Sole-Padulles Childhood Enrichment Measure. Active CR: Stern Leisure Activities Measure of cultural, social, and physical enrichment activities. Outcomes: Symptom Inventory (SI) and Performance Scales (PS) measures collected bi-annually over 1 and 5 years, respectively. **Analyses:** T-tests compared current SI means by CR median-split groupings. Linear regression compared PS trajectory scores by CR. Classification and Regression Tree (CART) modeling compared Stern item endorsement for mild, moderate and

severe disability groups to address potential confounding between disability and active CR. Chi-squared analysis evaluated the association between CR and course of disease (Relapsing-Remitting (RRMS), Primary Progressive (PPMS), and Secondary Progressive (SPMS)).

Results: High-Active CR patients had lower levels of current symptoms than Low-Active and high- or low-passive CR patients ($p<0.001$). Among patients whose PS trajectories changed over time, active CR was associated with less deterioration ($p<0.05$) and passive CR was unrelated. CART analysis revealed that active CR scores across disability groups had a similar range but was comprised of different items for mild, moderate and severe disability groups, suggesting that patients maintain active CR with different activities as the disease progresses. CR grouping was associated with course of disease ($X^2=16.4$, $p<0.02$), such that High Active (regardless of passive CR level) patients were over-represented among RRMS patients, and under-represented among SPMS patients. In contrast, Low Active Low Passive patients were under-represented among RRMS patients, but over-represented among PPMS and SPMS patients.

Conclusions: Our findings suggest that active CR is a buffer for functional limitation across disability groupings. This preliminary evidence generates hypotheses that high active CR provides a longer "runway" until disability accrual through cortical remodeling. CR may provide an alternative lens for thinking about MS course of disease.