The Learning Ratio in Early-Onset Alzheimer's Disease

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Background

The Learning Ratio (LR) is a novel marker of learning capacity. Unlike traditional raw learning scores (RLS), LR controls for the number of words learned by participants after the first trial, thus avoiding a common confound with learning slope research. While investigation has been conducted on the relationship between LR and late-onset Alzheimer's Disease, little to no information on LR in the context of early-onset Alzheimer's Disease (EOAD) exists. The goal of this study was to establish criterion validity for the LR by showing that it outperforms the traditional RLS in EOAD.

Methods

Rey Auditory Verbal Learning Test individual trial scores (Trials 1-5) were obtained from 314 participants (82 cognitively normal [CN], 168 EOAD, and 64 Early-Onset Non-Alzheimer's Disease [EOnonAD]) enrolled in the Longitudinal Early-Onset Alzheimer's Disease Study. RLS for each participant was calculated as follows: Highest Trial score (of Trials 2 through 5) – Trial One score. LR was calculated as follows: RLS / (Maximum trial score possible – Trial One score). In essence, LR is the proportion of available information learned after Trial 1.

Results

When controlling for age, education, sex, and ethnicity, significant differences were observed between groups for both LR (p<0.001, η=0.485) and RLS (p<0.001, η=0.325). For both LR and RLS, CN participants performed better than EOnonAD participants, who performed better than EOAD participants. Upon direct comparison, the magnitude of the effect for LR was stronger than for RLS.

Conclusion

Results support criterion validity for LR by establishing that LR values are consistently lower for more severe disease states to a greater extent than a traditional learning metric. Such a finding suggests that LR is useful for measuring learning for those with EOAD.