# Association of early life cognitive enrichment with Alzheimer's disease pathologic changes and cognitive decline

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**Objective:** Indicators of early life cognitive enrichment have been associated with slower cognitive decline and less dementia in late life. However, the mechanisms underlying this association has not been elucidated. In this study, we examined the association of early life cognitive enrichment with late life Alzheimer's disease (AD) and other common dementia related pathologic changes.

**Methods:** We leveraged post mortem data from 813 subjects, participated in a longitudinal community-based study of older adults, the Rush Memory and Aging Project. Four indicators of early life cognitive enrichment were obtained by self-report at the study baseline, and a composite measure of early life cognitive enrichment was made from the 4 indicators. The main outcome was a continuous global AD pathology score derived from counts of diffuse plaques, neuritic plaques, and neurofibrillary tangles. Linear regression and path analysis were used for analyzing data.

**Results:** Participants were on average 90 (SD = 6) years old at the time of death, and 70% were women. In a linear regression model controlled for age at death, sex, and education, a higher level of early life cognitive enrichment was associated with a lower global AD pathology score (estimate = -0.069, S.E. 0.024, p = 0.004). However, it was not associated with any other dementia related pathologic changes. In addition, a higher level of early life cognitive enrichment was associated with less cognitive decline. An indirect effect through AD pathologic changes comprised 20% of the association between early life cognitive enrichment and late life cognitive decline rate, and 80% was a direct association.

**Conclusion:** Early life cognitive enrichment was associated with better late life cognitive health in part through an association with less AD pathologic changes.