

Association of Pain Severity and Pain Interference with Cognitive Outcomes in Older Adults

Table 1 – Estimated association between pain and pain interference indexes and cognition (cross-sectional analyses)				
	Pain index		Pain interference index	
	Estimate (95% CI)	P	Estimate (95% CI)	P
Global	-0.010 (-0.033, 0.013)	0.396	-0.013 (-0.038, 0.012)	0.302
Memory	-0.033 (-0.063, -0.003)	0.029	-0.038 (-0.071, -0.006)	0.021
Language	-0.017 (-0.048, 0.014)	0.275	-0.018 (-0.052, 0.016)	0.301
Attention	0.013 (-0.015, 0.040)	0.366	-0.008 (-0.038, 0.021)	0.574
Visual-spatial	0.003 (-0.026, 0.032)	0.827	0.012 (-0.020, 0.043)	0.465
Estimates are reported for cognitive scale z-score per 1-unit increase in the given pain measure. For example, a 1-unit higher pain interference score is associated with 0.038 standard deviations lower memory subscale z-score.				

Table 2 – Estimated association between pain and pain interference indexes and change in cognition (longitudinal analysis)				
	Pain index		Pain interference index	
	Estimate (95% CI)	P	Estimate (95% CI)	P
Global	-0.023 (-0.058, 0.012)	0.207	-0.028 (-0.066, 0.011)	0.155
Memory	-0.020 (-0.066, 0.026)	0.399	-0.007 (-0.058, 0.044)	0.789
Language	-0.021 (-0.066, 0.024)	0.362	-0.016 (-0.067, 0.034)	0.526
Attention	-0.021 (-0.068, 0.026)	0.378	-0.051 (-0.103, 0.001)	0.053
Visual-spatial	-0.034 (-0.082, 0.014)	0.163	-0.040 (-0.093, 0.014)	0.146
Estimates are for difference in longitudinal change in the given cognitive scale z-score per 1-unit increase in the given pain measure. For example, we estimate that each 1-unit increase in pain interference is associated with a 0.051 standard deviations greater between-visit reduction on the attention subscale.				

Investigating the Role of Pain in Cognitive Aging: A Prospective Longitudinal Cohort Study

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BACKGROUND

- Chronic pain is a common consequence of aging experienced by >50% of older adults (≥65 years).¹
- Chronic pain is associated with cognitive impairment.² Yet, most studies rely on pain diagnosis codes at a static baseline timepoint rather than evaluating pain measures over time, with incomplete adjustment for analgesic use and other important covariates.
- Prescription opioid use is common in older adults, with approximately 70% receiving opioid prescriptions over a median follow-up of 7.5 years. Like pain, these opioid exposures are associated with multidimensional cognitive decline and incident mild cognitive impairment.³
- Studies have been unable to disentangle potential adverse cognitive effects of chronic pain from those of medications used to treat pain, such as prescription opioids.

OBJECTIVES

To evaluate the associations of pain **severity** and **interference** with cognition in older adults employing both cross-sectional and longitudinal analyses, with adjustment for opioid analgesics and other factors associated with cognitive impairment.

We hypothesized that higher pain severity and interference scores will be associated with lower cognitive scores, especially in the domains of **memory** and **attention**, and accelerated cognitive decline.

METHODS

Design: Prospective observational cohort employing a subset of participants in the Mayo Clinic Study of Aging (MCSA), a longitudinal, population-based study evaluating the mechanisms of cognitive aging.

Participants: Adults ≥65 years were invited to participate in this substudy, which included administration of the Brief Pain Inventory-Short Form (BPI-SF) and cognitive testing at two consecutive MCSA visits (~15 months apart). Analgesic medications were ascertained longitudinally.

- Exposures:** Pain severity (0-10) and interference (0-10) scores
- Outcomes:** Domain-specific and global cognitive z-scores derived from standardized neuropsychological testing

Analyses: Multivariable longitudinal and cross-sectional analyses assessed association between pain severity/interference and cognition. All models were adjusted for age, sex, cardiovascular and metabolic conditions, education, marital status, smoking status, MCSA visit number, Beck depression and anxiety indexes, number of opioid prescriptions in the prior year, and prior cognitive z-score. Missing data was accounted for using multiple imputation with 200 imputed data sets.

RESULTS

- Among 209 participants (mean age 76 years old, 57% male), 140 (67%) completed both cognitive and pain assessments at baseline and follow-up.
- Analgesics were used in 46% (97/209), most prominently acetaminophen (51/209, 24%), opioids (37/209, 18%), and NSAIDs (31/209, 14%).
- Cross-sectionally, higher pain severity and interference were associated with reduced memory (Table 1). There were no significant associations with global cognition or other cognitive domains.
- In longitudinal analyses (Table 2), increased pain and pain interference were not associated with changes in global cognition. There was some evidence to suggest a relationship between pain interference and decreased attention scores, but results were not statistically significant.

DISCUSSION

- Greater pain severity and interference were associated with lower memory scores cross-sectionally.
- Longitudinal effect estimates consistently suggest relationships between pain burden and cognitive function, however, results were not statistically significant for comparisons.
- These results highlight pain severity and pain interference as potentially modifiable risk factors for cognitive decline in aging populations, especially regarding memory and attention.
- Comprehensive pain assessment and management may represent important strategies to promote healthy cognitive aging.
- Future work should include longer follow-up, mechanistic biomarkers, and randomized trials comparing pain treatment modalities to clarify causal pathways.

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DISCLOSURES

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