

Sex Differences, Mild Cognitive Impairment and Event Related Potentials Elicited During Cognitive Tasks

Dr. Frank Knoefel, Principal Investigator

A. MacCosham, F. Knoefel, R. López Zunini, M. Breau, L. Sweet, C. Lord, R. Goubran, B. Wallace, V. Taler

BACKGROUND

- Alzheimer's Disease (AD) and related disorders affect 15% of Canadians > 65 - double by 2031.¹
- Women = 70% of Canadians with AD.²
- Research suggests females with Mild Cognitive Impairment (MCI) progress to dementia faster than males with MCI.³
- ERPs are derived from an electroencephalogram (EEG) which measures the brain's response to cognitive events.
- Previous studies: ERPs can identify people at risk of conversion to MCI and AD.⁴

Study Question: If ERPs are to be used as a potential electrophysiological marker for early cognitive change, are there sex differences we should be aware of?

METHODS

- Participants: 15 MCI participants from the Bruyère Memory Program and 17 Healthy Controls (HC) recruited from the community.
- Classifications of MCI and HC confirmed by a clinical committee.
- Participants performed the n-back cognitive task with EEG recording.
- EEGs: NeuroScan NuAmps 4.3 Brain Analyzer 2.1.
- Analyzed reaction time as well as P2, P3, and N2 for Fz, FCz, Cz, CPz, and Pz electrodes.

Participants

	Males			Females		
	MCI (n=7)	HC (n=6)	P	MCI (n=8)	HC (n=10)	P
Age	77.4 (6.2)	72.2 (3.3)	.092	74.1 (5.9)	73.0 (7.2)	.726
Education	15.7 (2.9)	15.7 (3.0)	.977	13.8 (2.5)	15.9 (3.1)	.135

Cognitive Tests

Test	Males			Females		
	MCI (n=7)	HC (n=6)	P	MCI (n=8)	HC (n=10)	P
MoCA	23.1 (3.1)	26.8 (1.5)	.022	22.1 (2.2)	27.9 (1.5)	<.001
RBANS Total	75.1 (10.3)	109.2 (7.5)	<.001	83.9 (6.9)	117.6 (9.2)	<.001
Trails A (sec)	63.6 (25.9)	35.5 (10.9)	.032	47.5 (25.9)	36.8 (13.8)	.276
Trails B (sec)	177.0 (79.7)	79.3 (21.5)	.015	153.4 (87.0)	80.5 (25.7)	.022

RESULTS

- Behavioural: MCI males had slower reaction times on n-back than HC males ($p < .01$), but MCI females were not slower than HC females ($p = .19$).

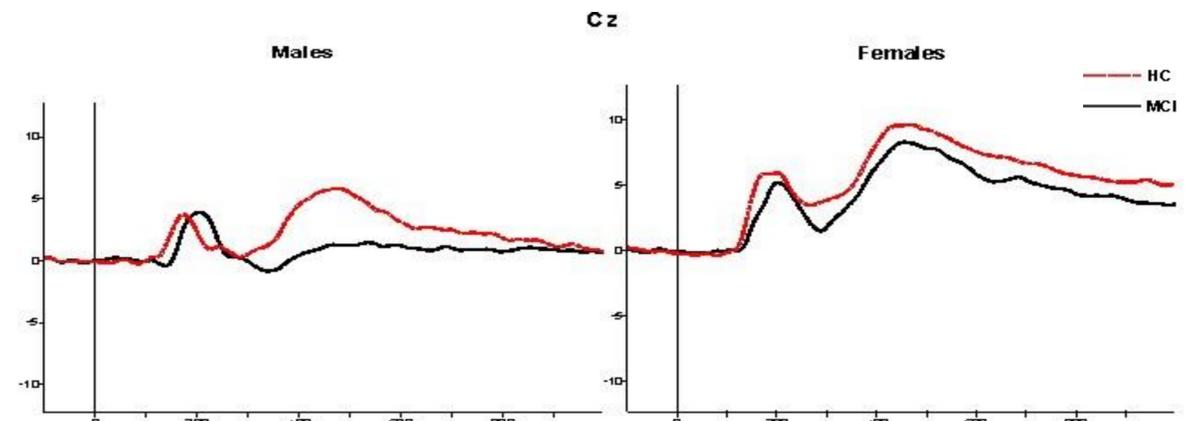


Figure 1. Male and Female ERP for MCI and HC participants at the Cz electrode across all n-back conditions.

- Main Effect of Group ($F(1,27)=6.01$, $p=.02$ as the MCI group had smaller P300 amplitudes than the HC group)
- Significant interaction of Group & Sex, ($F(1,27)=4.30$, $p=.05$, as only male MCI exhibited delayed P2 latencies relative to healthy males ($p=.006$). Females ($p=.758$)
- Significant interaction of Group & Sex, ($F(1,27)=5.39$, $p=.03$, as only male MCI exhibited delayed N2 latencies relative to healthy males ($p=.004$). Females ($p=.880$).

DISCUSSION

- Overall, male and female MCI were different from HC in most cognitive tests and behavioural results. However, in this group, females with MCI did not show differences from HC in Trails A, reaction time, and P2 and N2 latency.
- Limitation: small sample size.
- The differences between cognitive decline by sex should be further explored.
- The relationship between Trails A, reaction time, as well as N2 and P2 latencies should be further explored.

REFERENCES

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