

Executive Symptoms in Older Adults with ADHD and CIND

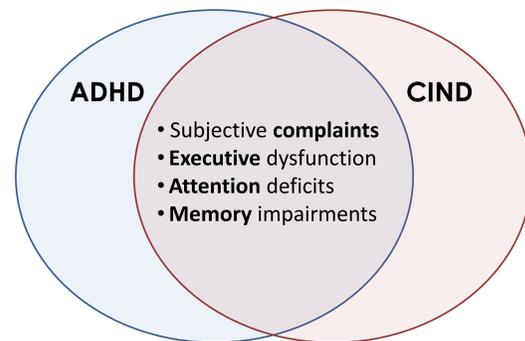
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Background

- **ADHD:** Attention-deficit/hyperactivity disorder
- **CIND:** Cognitive impairment, no dementia; assumed to be a prodrome of dementia



- Cognitive features of ADHD may be difficult to distinguish from those of CIND in older patients
- **We aimed to determine which neuropsychological measures differentiate ADHD from CIND, specifically with regard to executive functions.**

Participants

ADHD (n=20)

- Subjective concern
- Score ≥ 4 on the Adult ADHD Rating Scale (ASRS v1.1) Part A
- No stroke

CIND (n=19)

- From the Sunnybrook Dementia Study, selected to match ADHD group on age and education
- Subjective concern
- Objective deficit < -1.5 SD in any domain
- No stroke

Controls (n=48)

- From the Sunnybrook Dementia Study, selected to match ADHD group on age and education
- No complaints, normal cognition, no stroke

Results

Table 1. Mean (SD) baseline characteristics of participant groups.

	ADHD (n=20)	MCI (n=19)	Controls (n=48)	χ^2	p
Age (years)	62.95(8.79)	67.56(9.27)	64.81(6.40)	5.593	0.061
Sex (M/F)	11 / 9*	6 / 13	10 / 38	7.615	0.022
Education (years)	15.00(2.57)	15.47(2.87)	16.65(2.58)	5.070	0.079
Mini Mental State Examination	28.10(1.89)*	26.89(1.82)*§	29.13(1.12)	22.998	0.000
Depression (0=no, 1=mild, 2=severe)	0.50(0.69)*	0.26(0.56)*	0.02(0.14)	16.584	0.000
Semantic fluency					
Total score	17.85(6.38)	14.05(3.63)*§	21.58(5.53)	25.557	0.000
First 15 seconds	6.70(2.23)*	6.47(1.68)*	8.29(2.10)	12.124	0.002
Last 45 seconds	11.15(4.98)	7.58(3.29)*§	13.29(4.54)	20.417	0.000
Perseverations	0.65(0.81)	0.58(0.61)	0.96(1.65)	0.002	0.999
Intrusions	0.20(0.52)	0.11(0.46)	0.13(0.44)	1.082	0.582
Phonemic fluency					
Total score	38.65(12.38)	36.21(11.97)*	46.83(13.46)	8.760	0.013
First 15 seconds	13.90(4.00)*	15.05(4.21)	17.60(4.25)	9.578	0.008
Last 45 seconds	24.75(9.78)	21.16(8.69)*	29.23(9.99)	8.761	0.013
Perseverations	0.85(1.14)*	3.26(3.83)§	1.88(1.58)	8.589	0.014
Intrusions	0.45(0.83)	1.47(1.71)*	0.58(0.90)	6.013	0.049
Digit Span					
Forwards	7.80(2.80)	8.32(1.80)	8.63(1.77)	0.894	0.640
Backwards	6.50(2.28)	7.16(2.06)	7.23(2.23)	1.410	0.494
Wisconsin Card Sorting Task					
Total categories	3.75(1.68)	2.89(1.52)*	3.94(1.14)	6.999	0.030
Total correct	49.30(9.40)	46.37(6.72)*§	49.63(9.52)	6.295	0.043
Non-perseverative errors	7.15(10.12)	7.58(6.49)*	3.77(2.90)	6.197	0.045
Perseverations to previous category	7.30(4.70)	9.47(5.04)	8.92(4.75)	4.332	0.115
Early set-loss errors	0.45(1.00)	1.11(1.49)	0.48(0.82)	4.182	0.124
Late set-loss errors	0.20(0.41)	0.79(0.92)*§	0.27(0.49)	7.828	0.020
Trail-making test					
Trails A time	31.50(11.32)	43.47(14.85)*§	32.49(9.51)	9.461	0.009
Trails A errors	0.10(0.31)	0.05(0.23)	0.15(0.41)	0.793	0.673
Trails B/A ratio	3.16(1.83)	3.01(1.44)	2.46(1.10)	4.802	0.091
Trails B errors	0.35(0.75)	0.68(1.00)	0.35(0.98)	3.372	0.185
Victoria Stroop					
Color-naming time	15.55(5.77)	16.05(5.68)*	12.52(2.39)	7.412	0.025
Word-reading time	19.80(9.05)	20.37(6.74)*	15.88(2.94)	9.972	0.007
Interference time	35.80(18.59)	41.42(18.47)*	27.00(7.87)	13.343	0.001
Interference errors	0.50(1.28)	1.21(1.40)*§	0.42(0.85)	8.560	0.014

Notes. * $p < .05$ difference with Control group. § $p < .05$ difference with ADHD group.

BETWEEN-GROUP DIFFERENCES

1. Relative to Controls, ADHD participants performed similarly on most measures. In contrast, CIND participants performed significantly worse (indicated * in table).
2. Relative to CIND, ADHD participants performed better on measures of **verbal fluency**, Wisconsin Card Sorting Task (**WCST**), **Trails A**, and **Stroop** (indicated § in table).
3. After controlling for MMSE and depressive symptoms, only **semantic** and **phonemic fluency** differences remained significant between ADHD and CIND groups (framed cells in table).

CLUSTER ANALYSIS

MMSE, total and 45-sec semantic fluency, and phonemic fluency perseverations were used in two-step cluster analysis to determine if they could reliably distinguish ADHD from CIND.

		ADHD predicted		
		YES	NO	
Group	ADHD	13	7	Sensitivity 65.0%
	CIND	1	18	Specificity 94.7%
				Accuracy 79.5%

Conclusions & Implications

- Executive functions were relatively preserved in this small sample of older adults with ADHD, and appear more affected in CIND.
- **Verbal fluency may be a cost-effective screening measure to distinguish ADHD from CIND in older adults.** Semantic fluency is thought to rely relatively more on temporal-lobe than frontal-lobe functions, and may be most sensitive to the earliest stages of Alzheimer's disease (in which the hallmark feature is temporal-lobe degeneration). Increased perseverative errors also suggest worse monitoring abilities in CIND relative to ADHD.
- This preliminary study is the first to directly compare executive abilities between these syndromes, and is an important initial step towards characterizing the neuropsychological profile of ADHD in relation to CIND.



alzheimer's association



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