Utility of cognitive assessment tools in a non-research setting

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Introduction

- Most of the common and popular cognitive assessment tools have been extensively researched and validated, but almost invariably in a research environment. Their usefulness and validity in a 'non-research' setting has not been well studied.

"Non-research setting":

- A Memory Clinic in a busy general/teaching hospital, where doctors are often under pressure of time;
- Patients are seen by different doctors at different interviews;
- Doctors are at different levels of training and experience, with different inter-personal and language skills;
- There is no established normative data for the local patient population.

- Standard Cognitive Function Tests, for all new patients and suitable follow-ups:
  - CDT (Shulman Clock Drawing Test)
  - sMMSE (Standardized Mini-Mental State Examination)
  - ACE-R (Addenbrooke's Cognitive Examination – Revised)
  - FAB (Frontal Assessment Battery)
  - IQCODE (Informant Questionnaire on Cognitive Decline in the Elderly)
- Functional Assessment
  - LAWTON's IADL Scale*

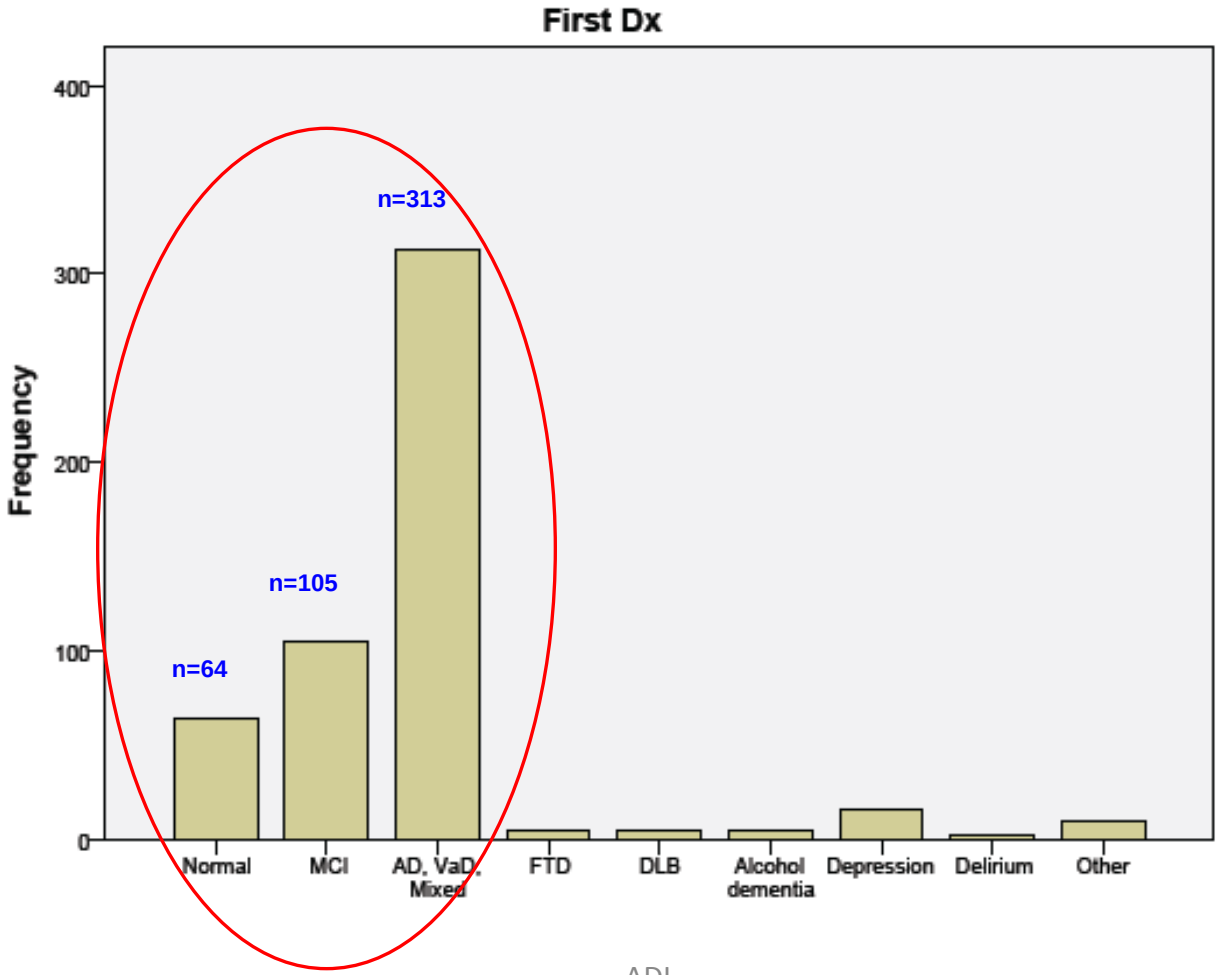
    *performed by Occupational Therapist, usually on a home visit before Clinic attendance and diagnosis.

- *AIM:*
  - *to evaluate the diagnostic and discriminatory values of the 6 popular cognitive assessment tools in a non-research clinic setting*
- *METHOD:*
  - *Study Period: Jan 2011 – April 2014 (40 months);*
  - *Study Population: 3 groups of patients, each with a new diagnosis of "Normal"; "MCI"; or "Dementia (AD, VaD, Mixed)";*
  - *Data: demographic data and cognitive function test scores for the 3 groups were retrieved from the Memory Service Database;*
  - *Statistical Analysis: Between-group differences of the test scores for the 3 groups were analyzed using Oneway ANOVA and Tukey post-hoc tests, on IBM SPSS Premium V.22*
- *RESULTS:*
  - *Presented visually as Box-plots and statistically on linear graphs and tables.*

- *"Diagnosis":*
  - Diagnosis is a clinical one, using, with some exceptions, DSMIV and Petersen's criteria, finalized by consensus at the weekly multi-disciplinary Case Conferences;

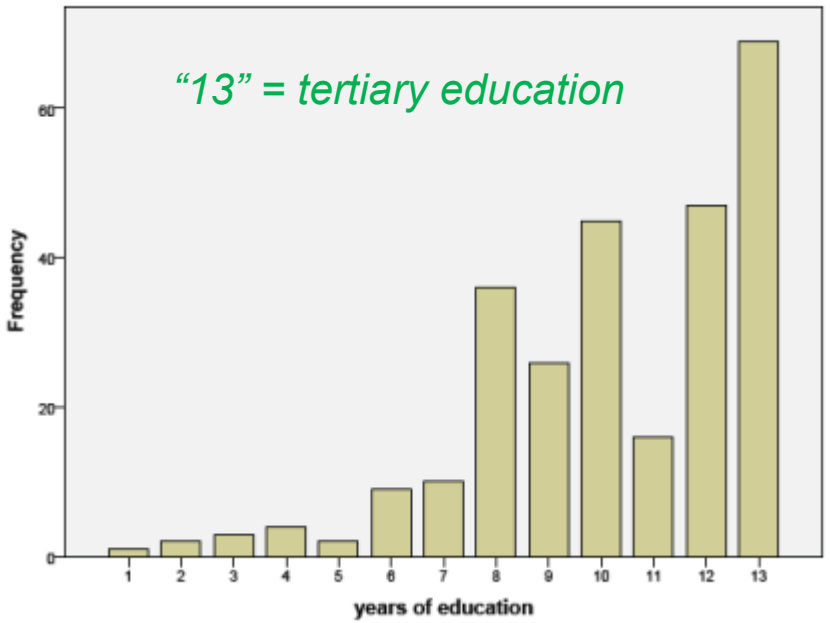
- *"Normal":*
  - Patients presenting to Memory Clinic and diagnosed as being cognitively normal, hence not a general population normal.

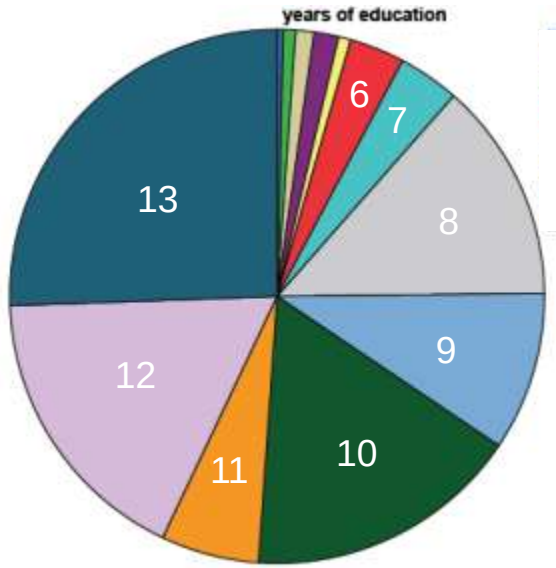
40 month data (Jan 2011 – April 2014) New Diagnoses

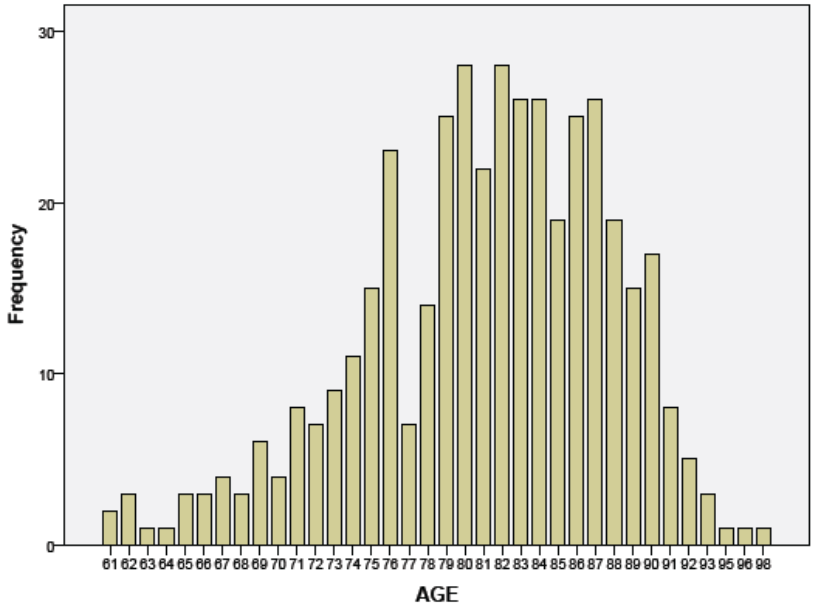


AGE AND YEARS OF EDUCATION LEVEL (NEW CASES)

N=581

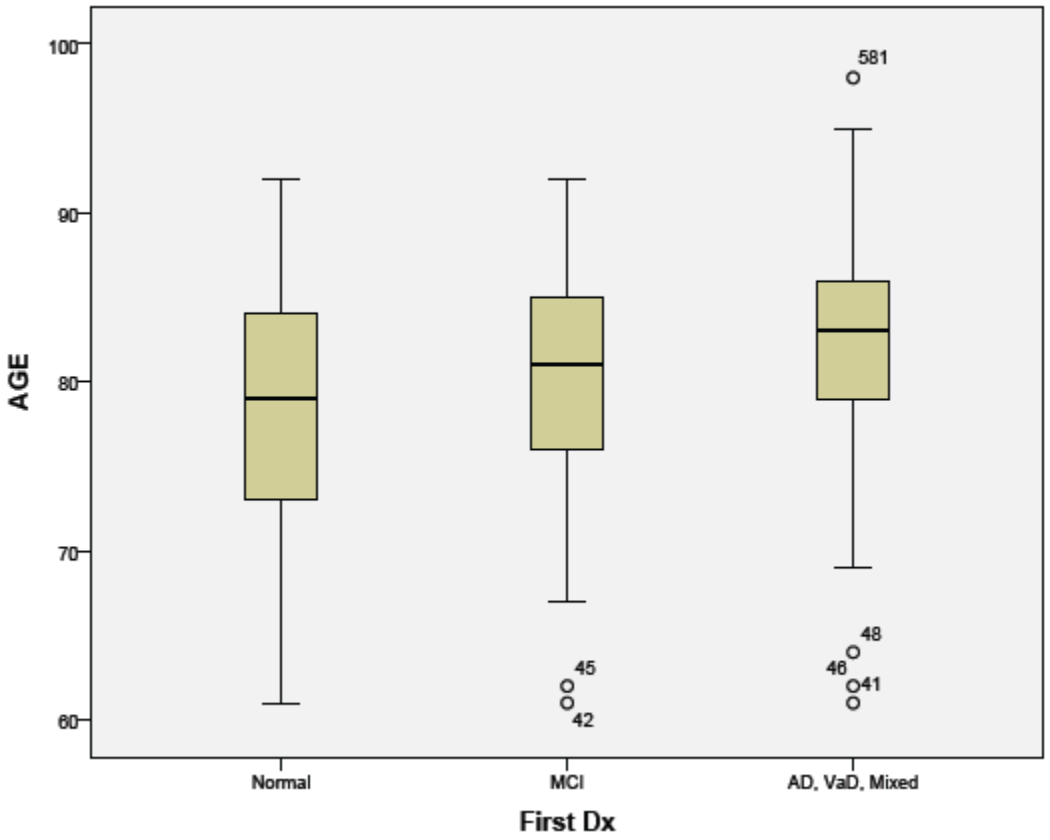


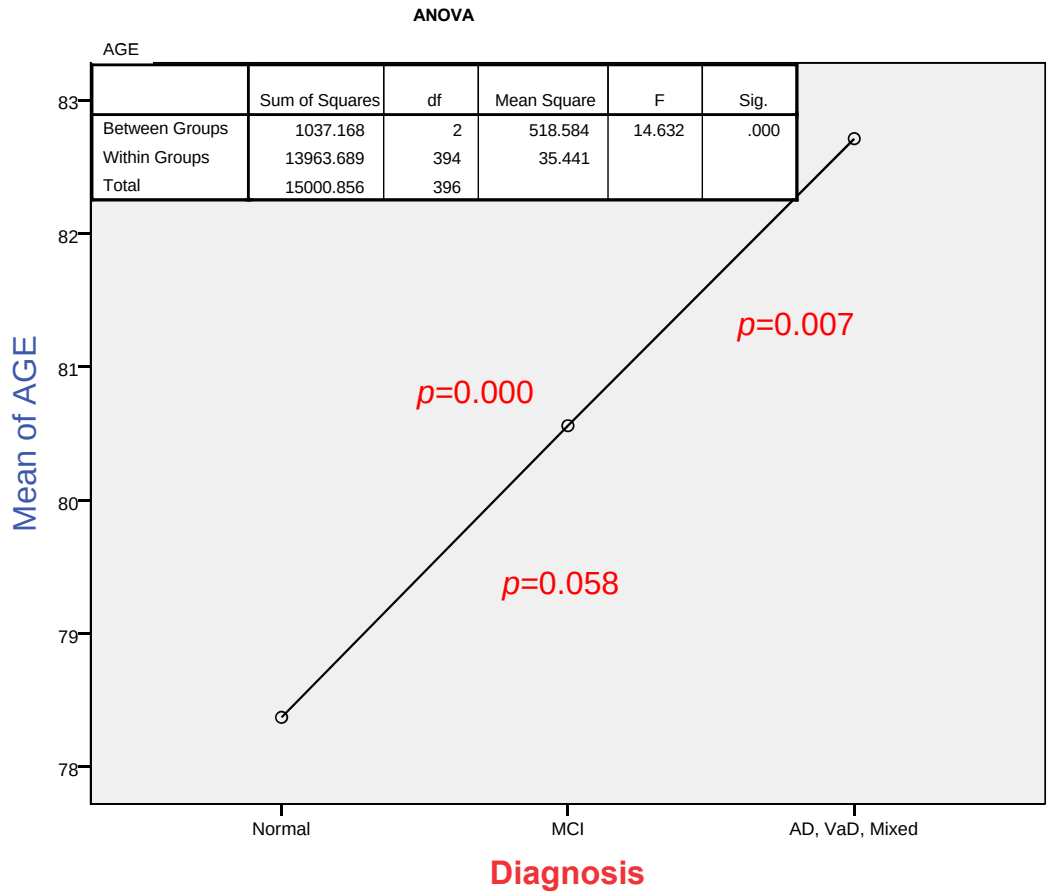




	AGE	years of education
Mean	81.14	10.27
Median	82.00	10.00
Mode	80	13
Std. Deviation	6.667	2.557

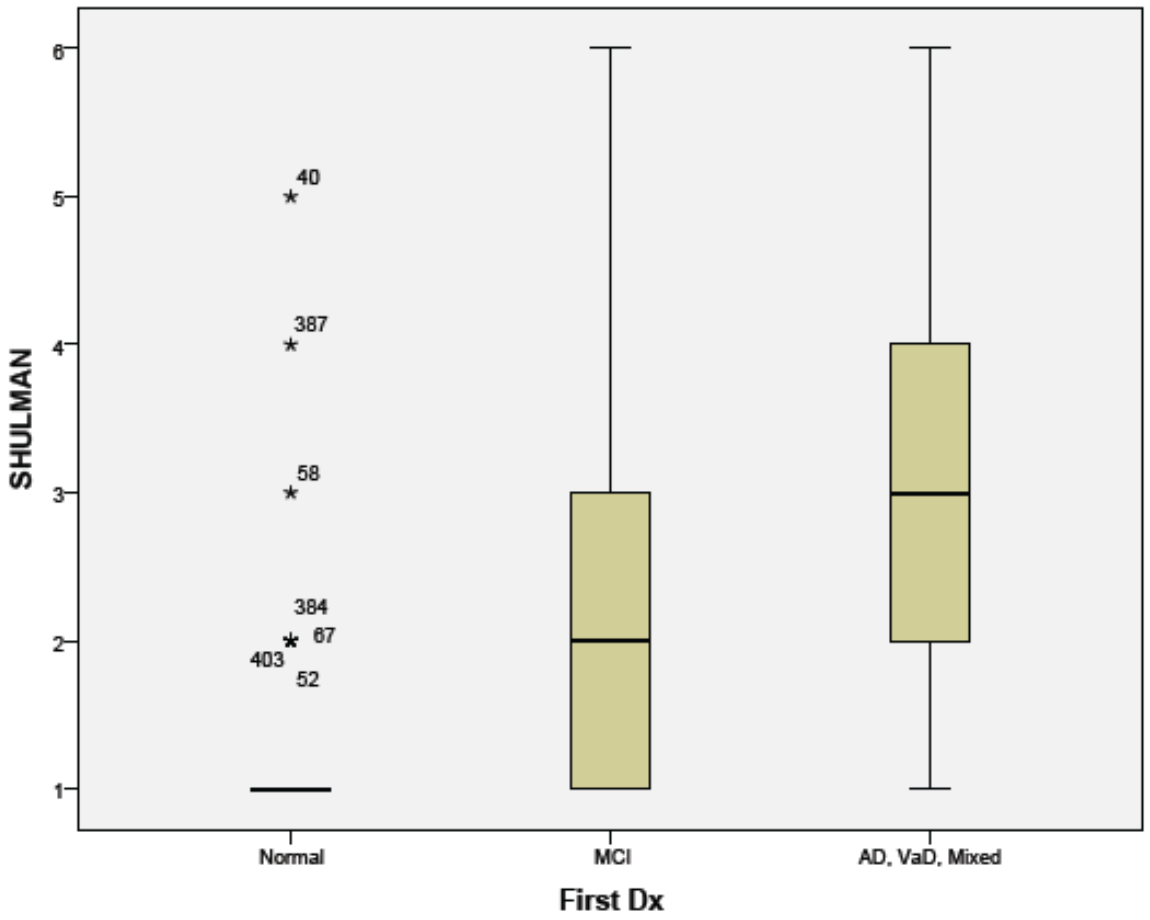
AGE AT TIME OF DIAGNOSIS





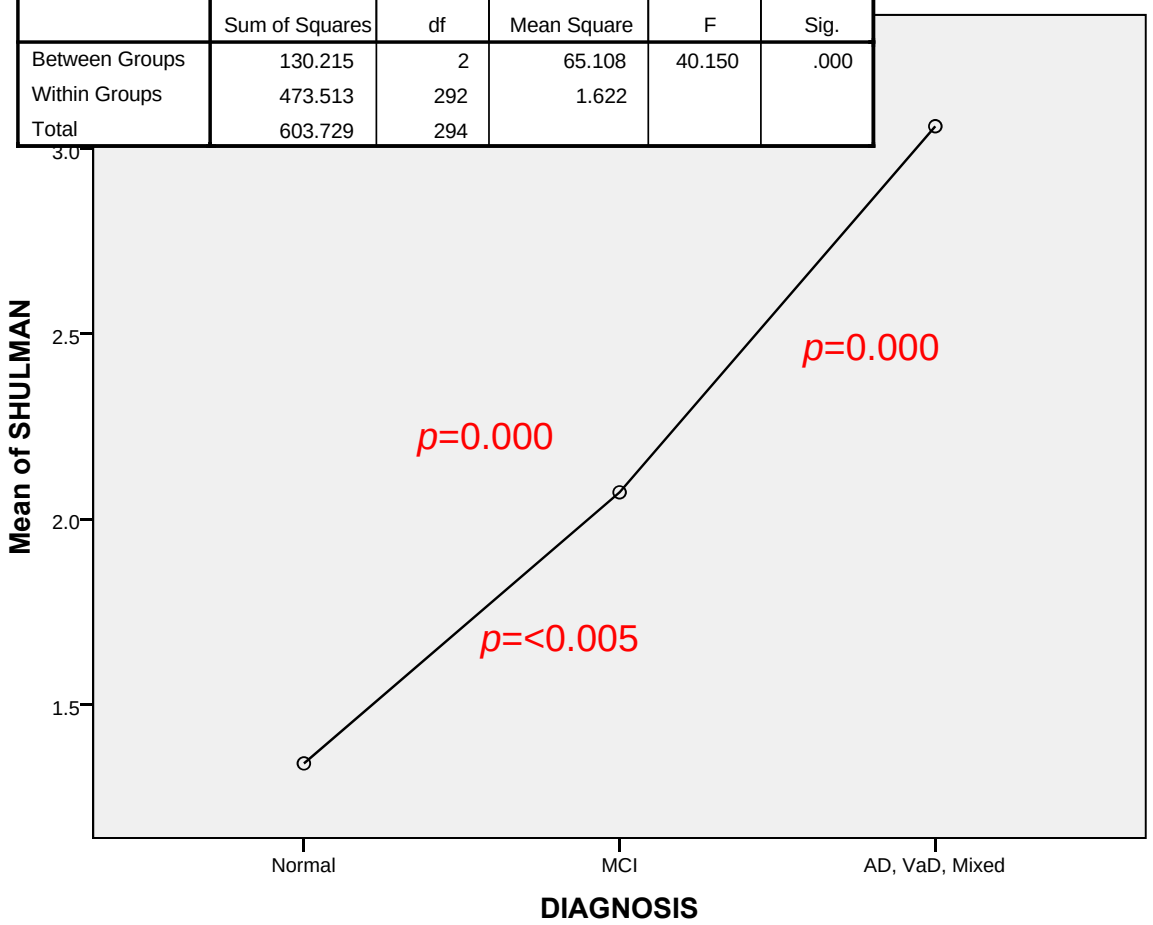
	NORMAL	MCI	DEMENTIA
Mean Age ± SD	78.37 ± 6.98	80.58 ± 6.26	82.49 ± 5.64

CDT – Shulman Method



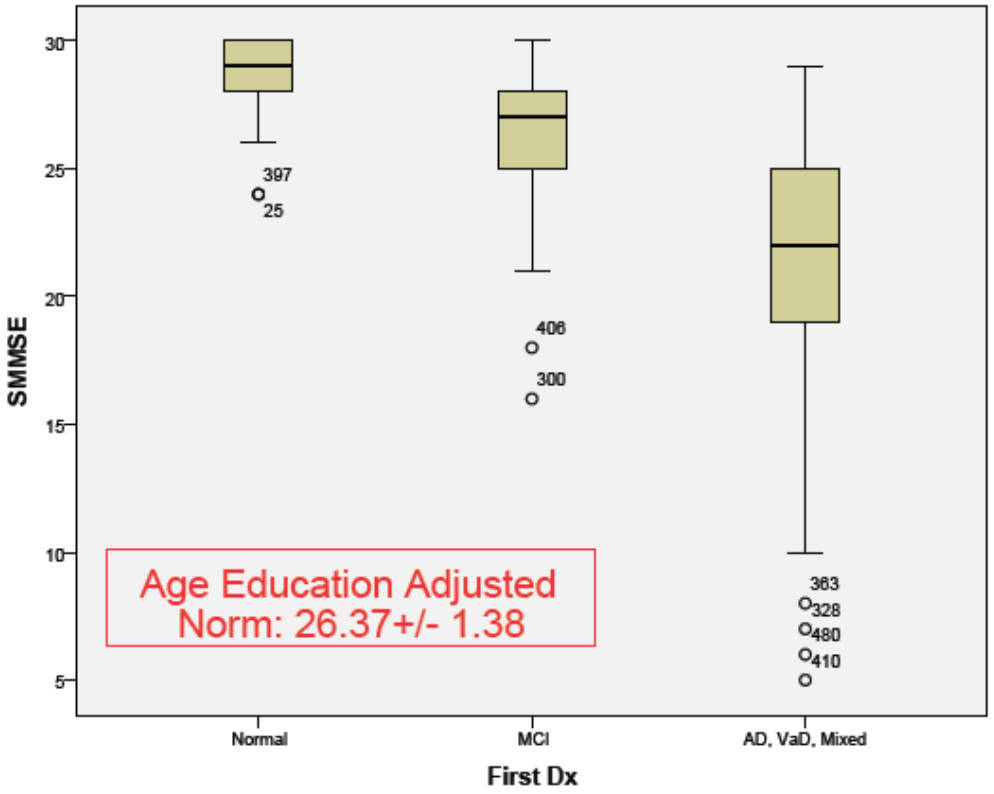
SHULMAN

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	130.215	2	65.108	40.150	.000
Within Groups	473.513	292	1.622		
Total	603.729	294			



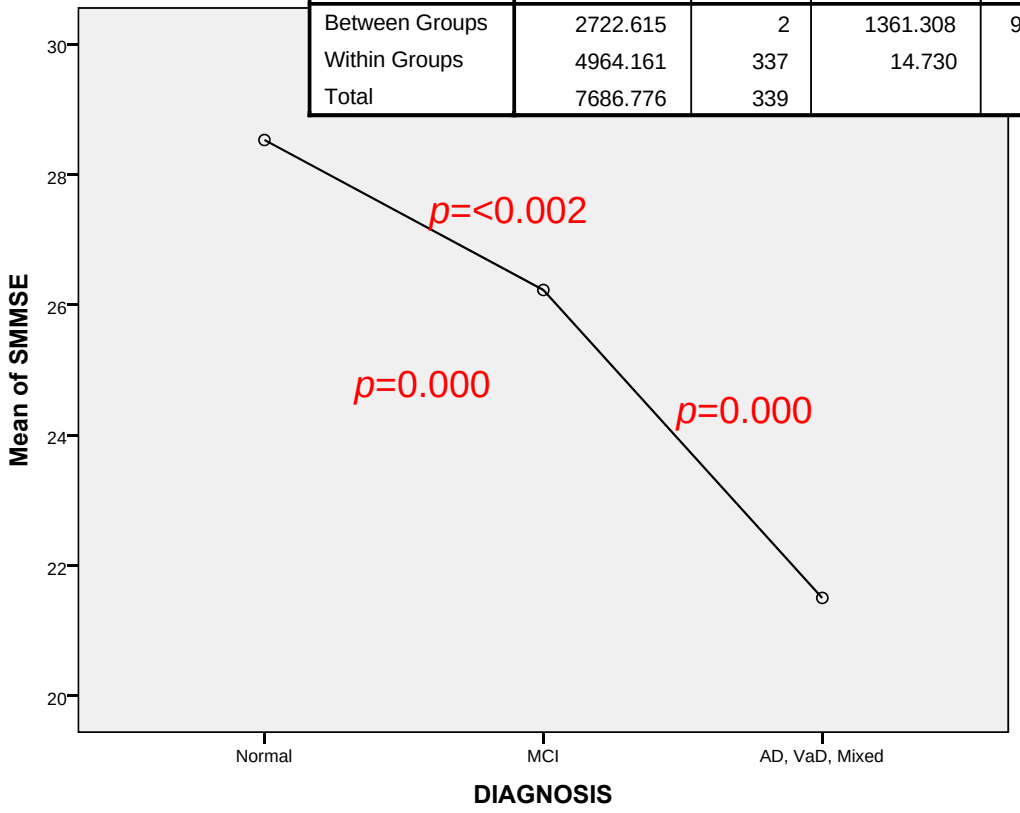
	NORMAL	MCI	DEMENTIA
SHULMAN CDT	1.3 ± 0.8	2.1 ± 1.2	3.0 ± 1.4

sMMSE



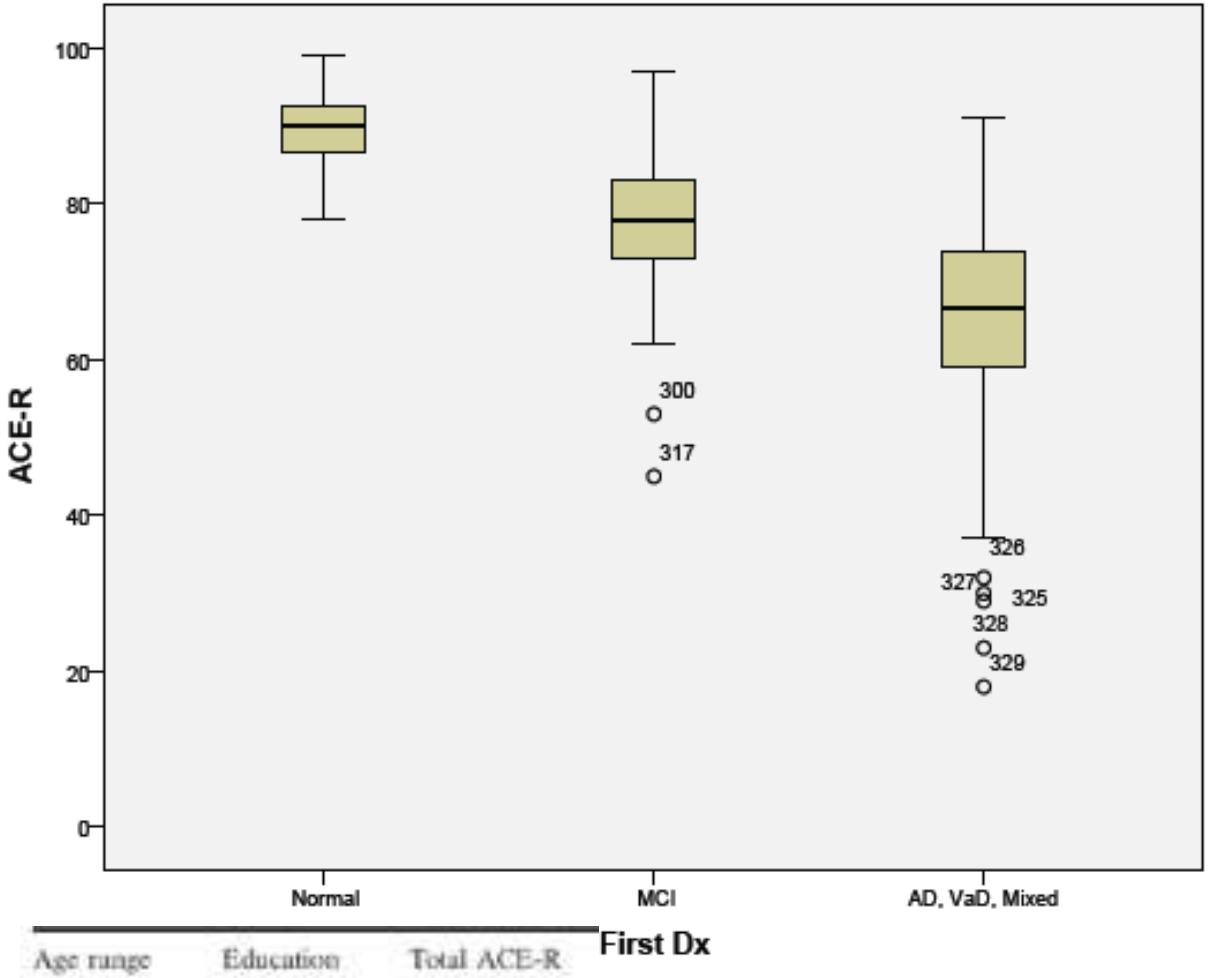
SMMSE

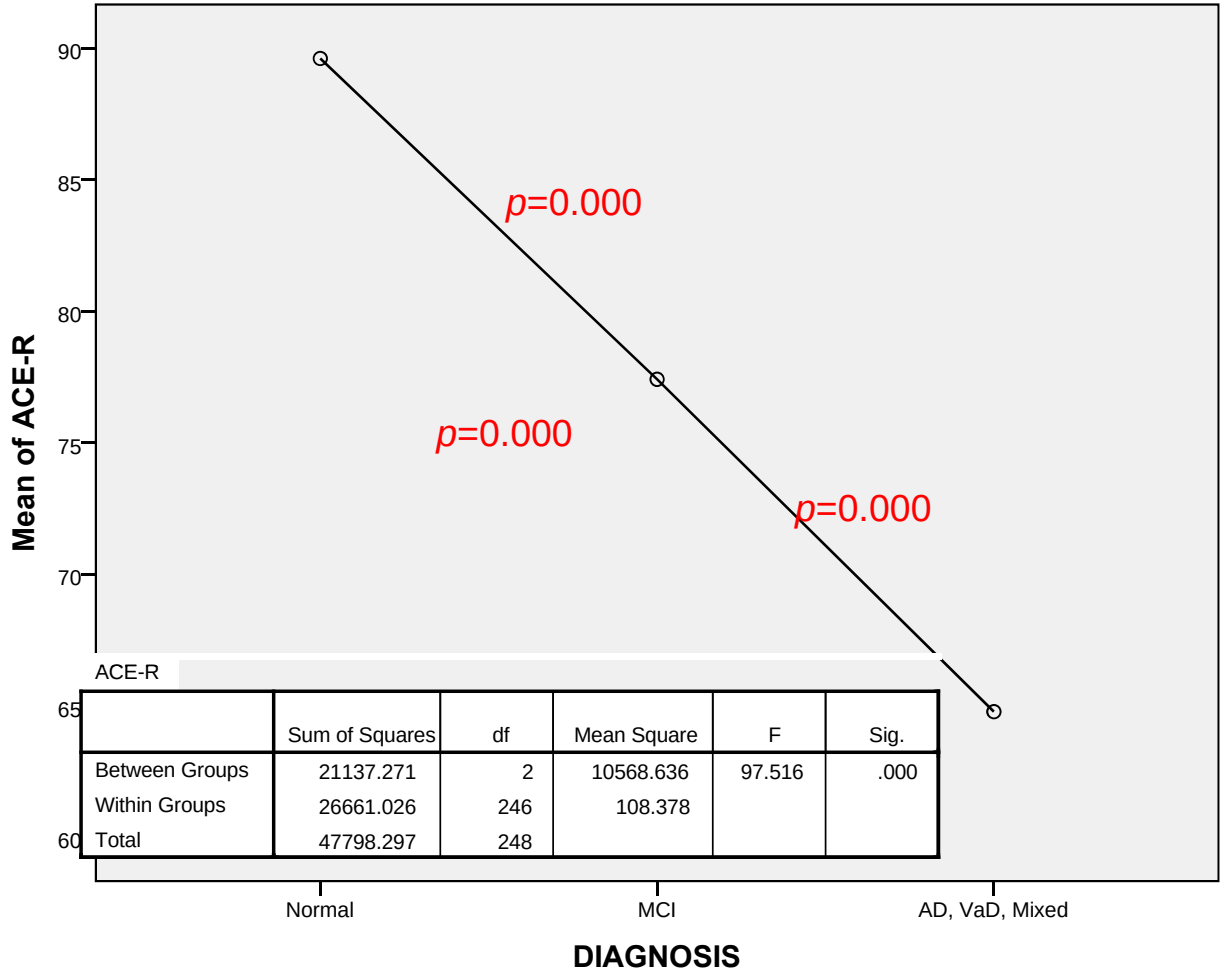
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2722.615	2	1361.308	92.415	.000
Within Groups	4964.161	337	14.730		
Total	7686.776	339			



	NORMAL	MCI	DEMENTIA
SMMSE	28.5 ± 1.6	26.2 ± 2.3	21.6 ± 4.5

Addenbrooke's Cognitive Examination of the Elderly - Revised





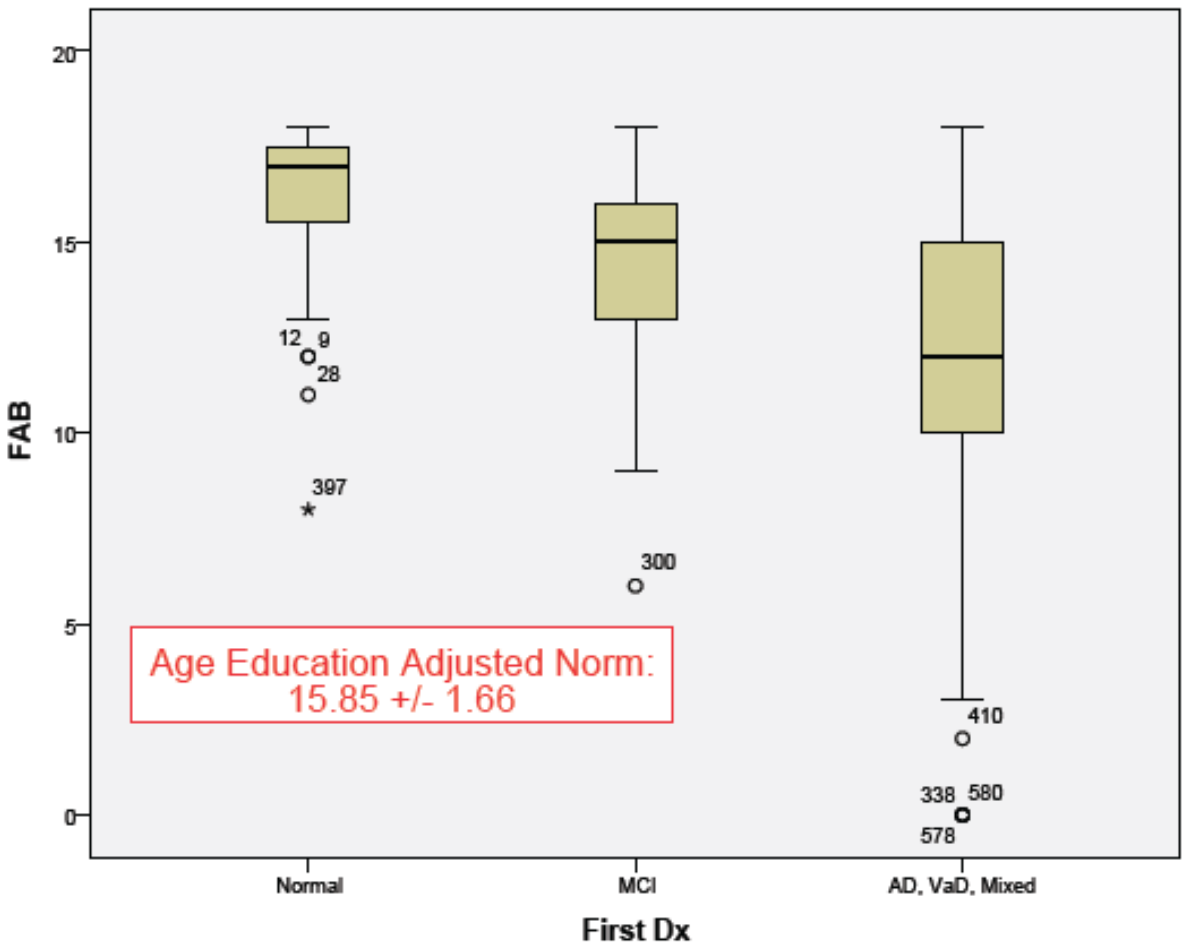
ACE-R

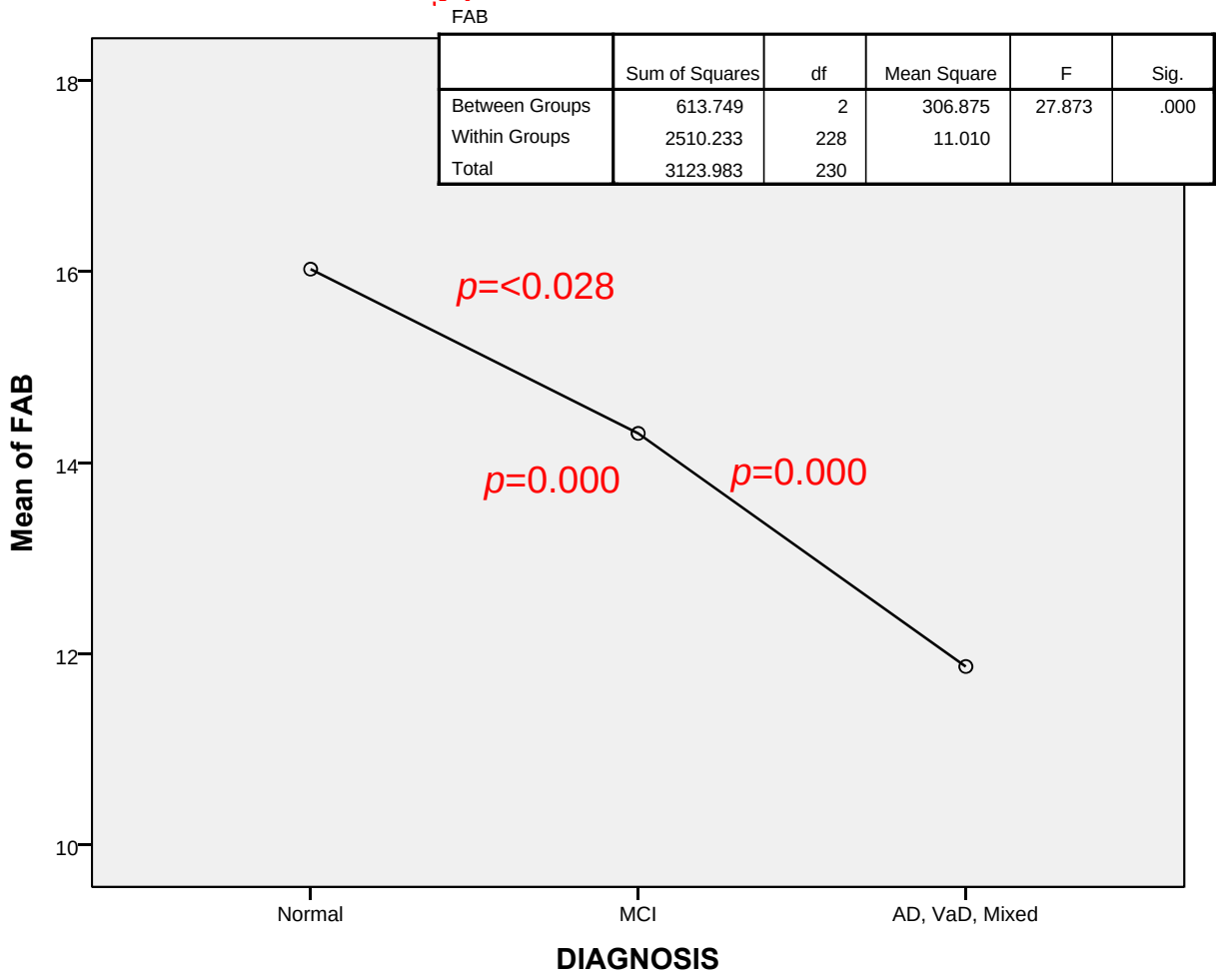
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	21137.271	2	10568.636	97.516	.000
Within Groups	26661.026	246	108.378		
Total	47798.297	248			

Age range	Education (years)	Total ACE-R score
50–59	12.7	86
60–69	12.9	85
70–75	12.1	84

	NORMAL	MCI	DEMENTIA
ACE-R	89.6 ± 4.8	77.4 ± 8.1	65.1 ± 12.6

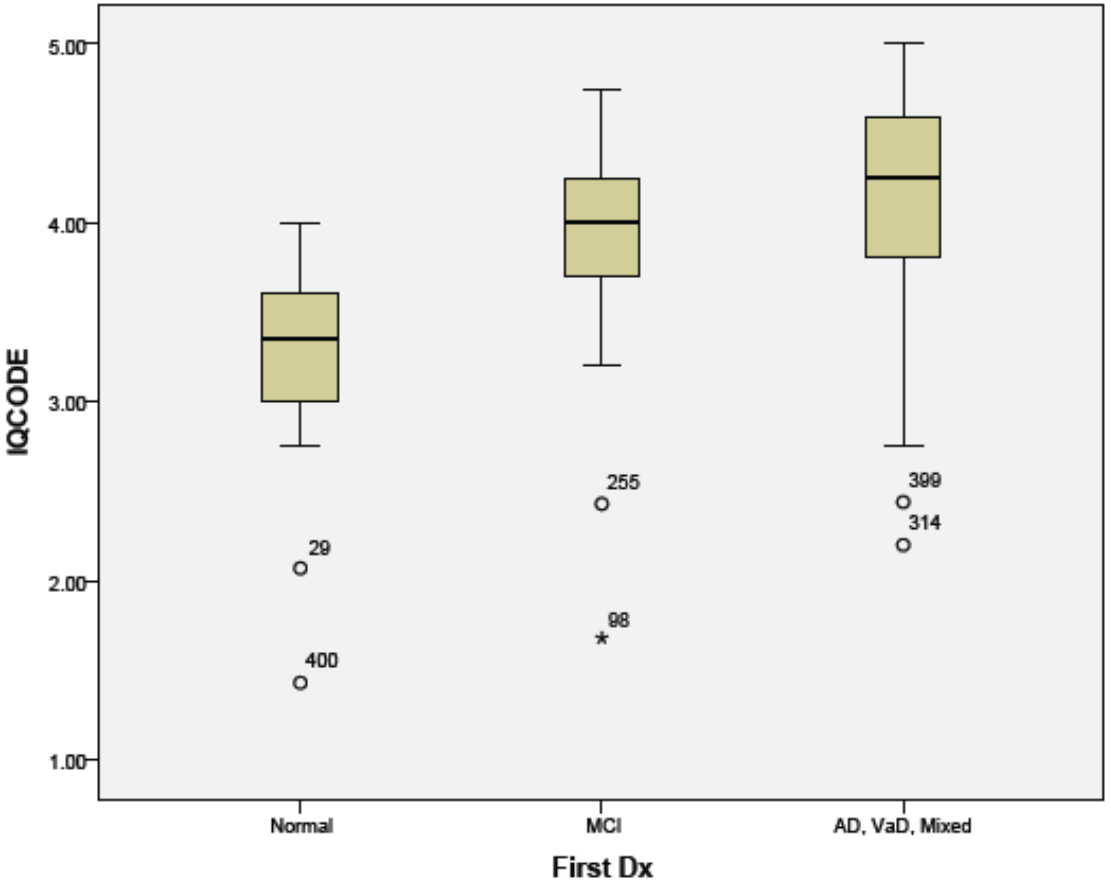
FAB (Frontal Assessment Battery)

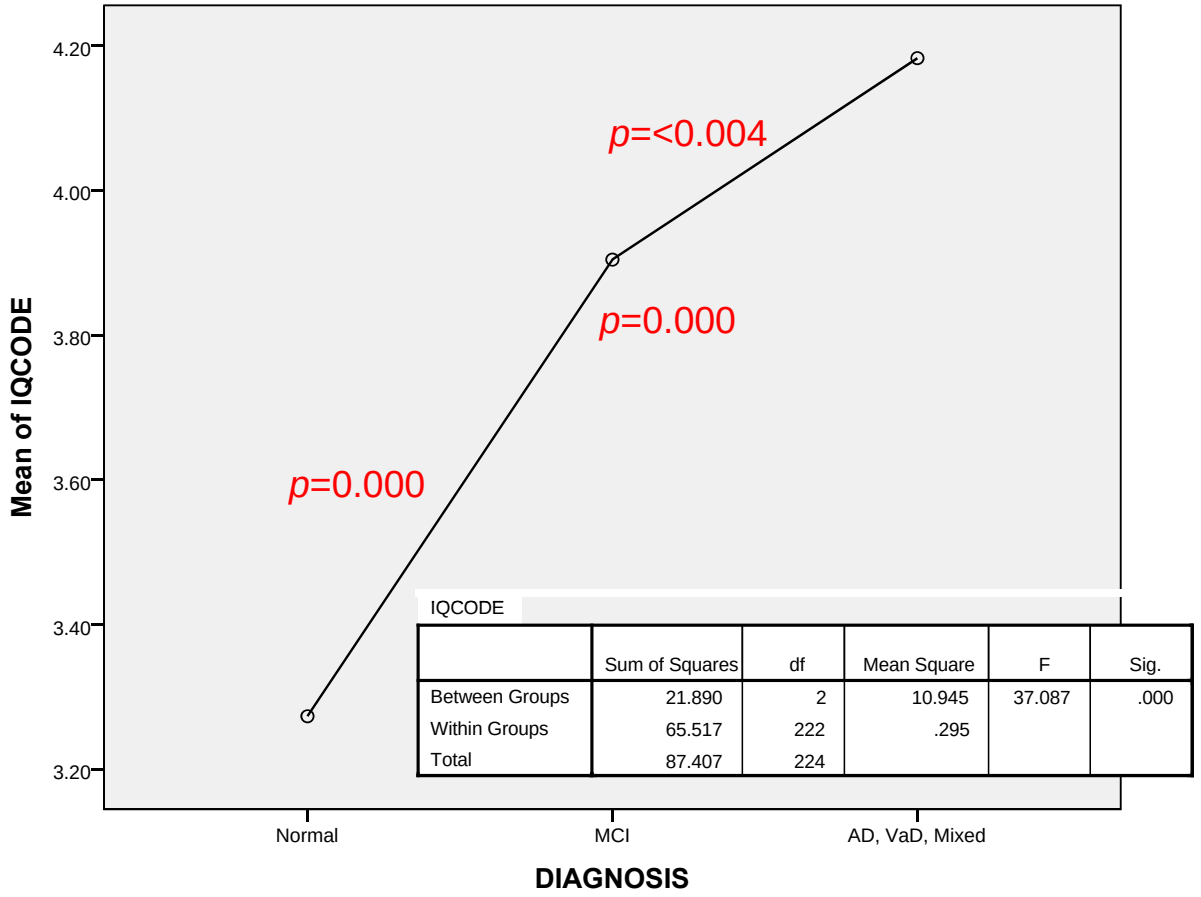




	NORMAL	MCI	DEMENTIA
FAB	16.0 ± 2.2	14.3 ± 2.8	11.7 ± 4.0

IQCODE (Informant Questionnaire on Cognitive Decline in the Elderly)





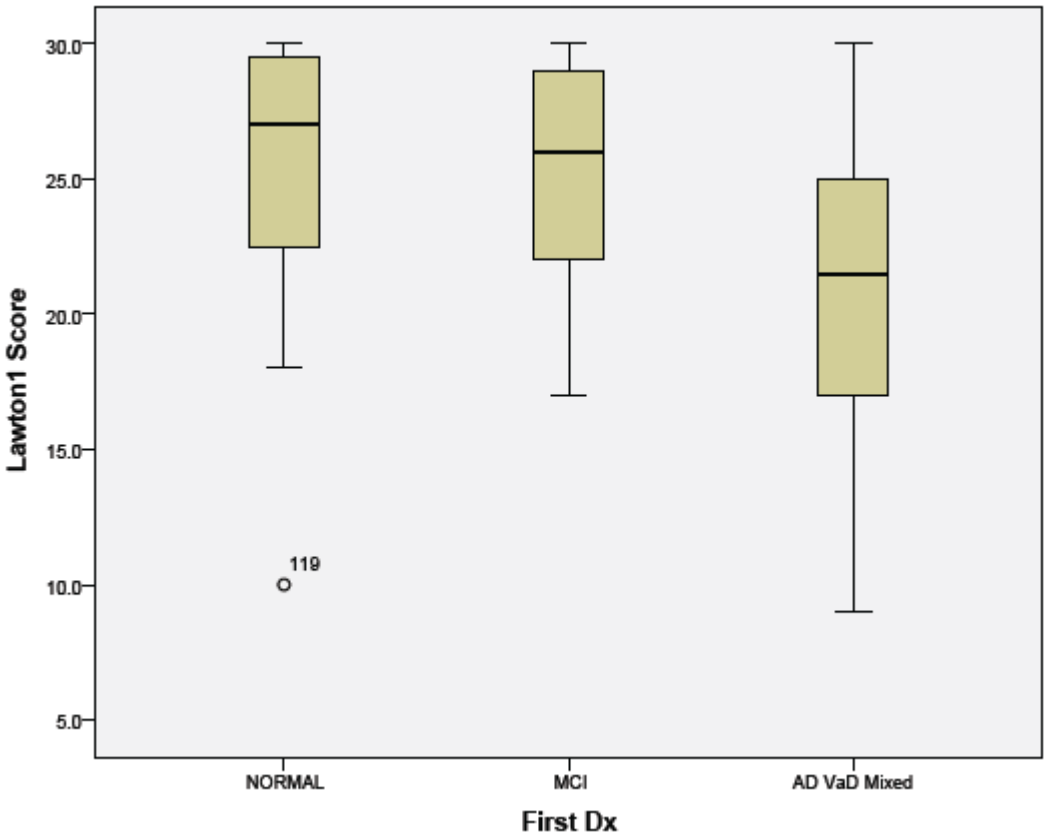
IQCODE

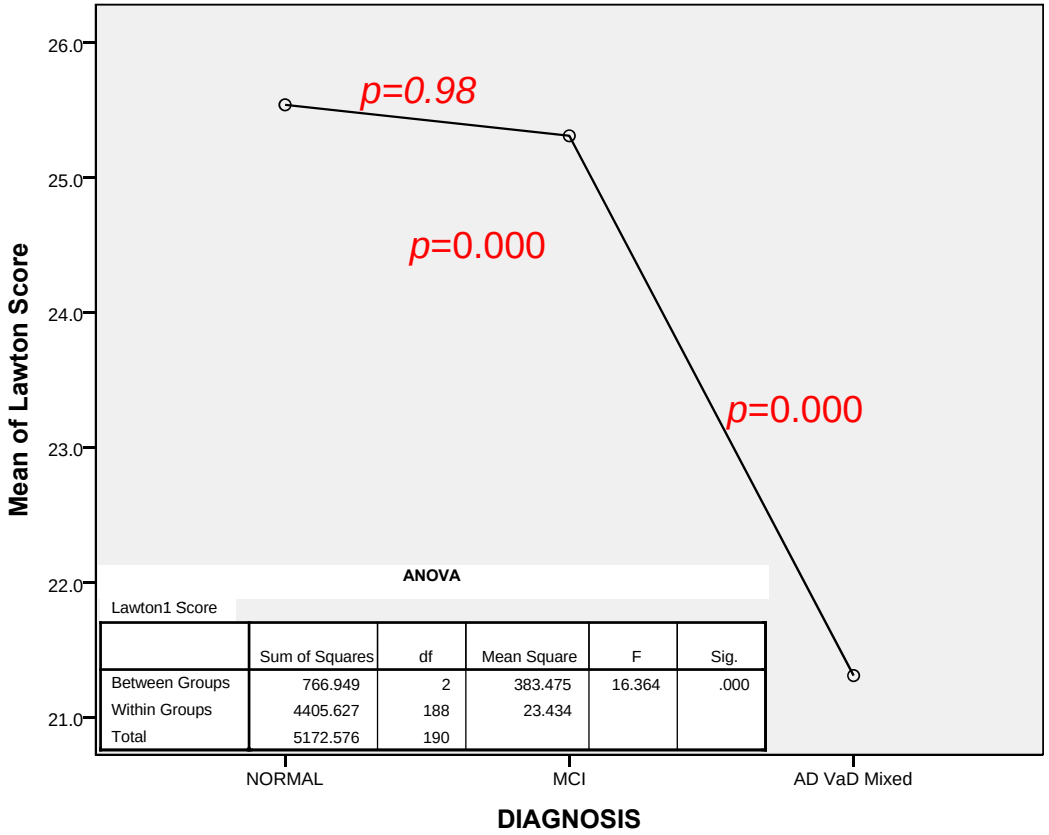
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	21.890	2	10.945	37.087	.000
Within Groups	65.517	222	.295		
Total	87.407	224			

	NORMAL	MCI	DEMENTIA
IQCODE	3.3 ± 0.5	3.9 ± 0.5	4.2 ± 0.6

LAWTON IADL – Revised version*

** These were performed by OT before Clinical Consultation and diagnosis*





ANOVA

Lawton1 Score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	766.949	2	383.475	16.364	.000
Within Groups	4405.627	188	23.434		
Total	5172.576	190			

	NORMAL	MCI	DEMENTIA
LAWTON'S IADL	25.54 ± 4.81	25.30 ± 4.03	21.30 ± 5.16

Conclusions

- *When applied in a non-research Memory Clinic:*
  - The 6 cognitive assessment tools in this study retain their diagnostic usefulness;
  - The tests remain highly discriminatory between the three diagnostic groups of Normal, MCI, and Dementia;
  - Functional assessment with Lawton's IADL Scale contributes reliably in differentiating Patients in the Dementia Group from those in the Normal and MCI Groups;
- *This study highlights also the importance of taking into consideration the patient's age and education level when interpreting test scores;*

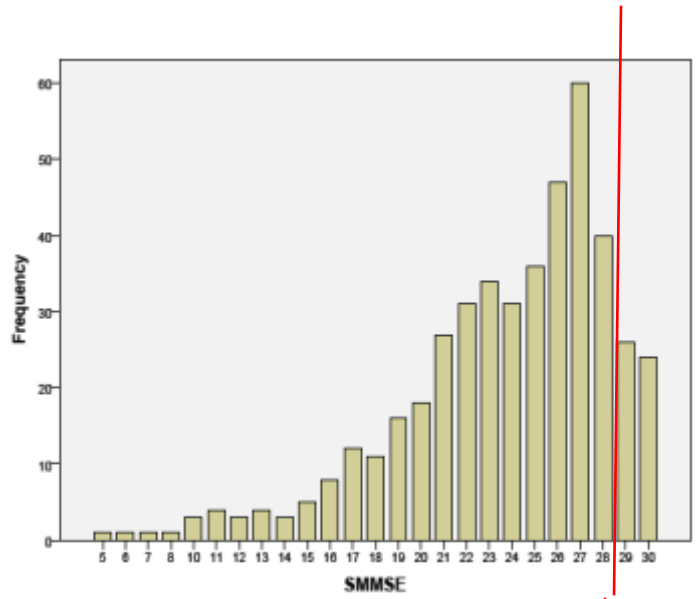
Limitations of the study

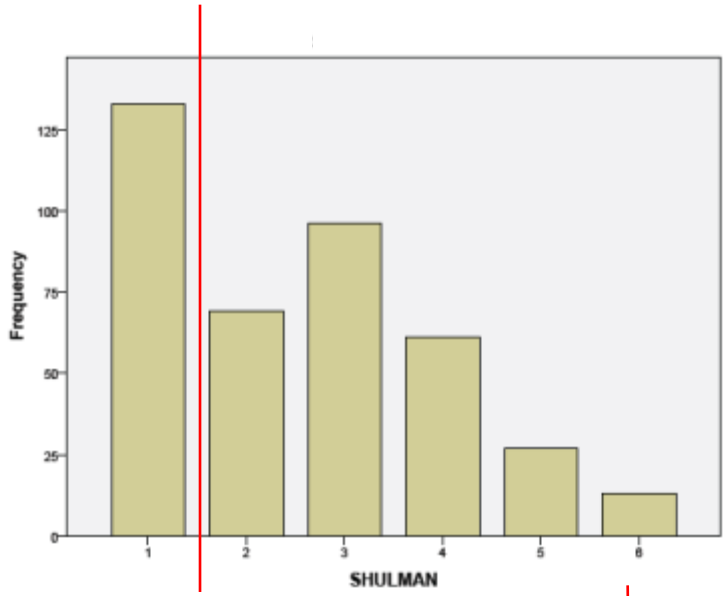
- Data were collected in the course of clinical management, not under research conditions;
- Though clinical diagnosis was made by consensus at the multidisciplinary meeting, there was no blinding to the test results;
- Our study population were largely from an English-speaking and/or European cultural background.

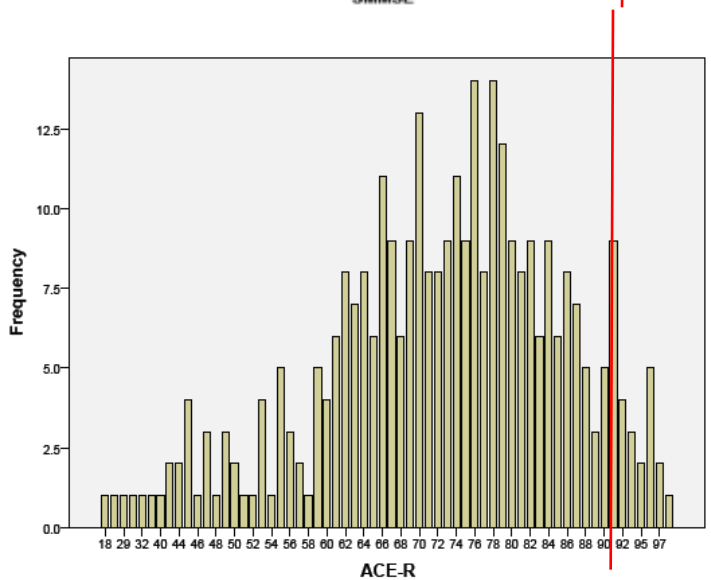
Reference:

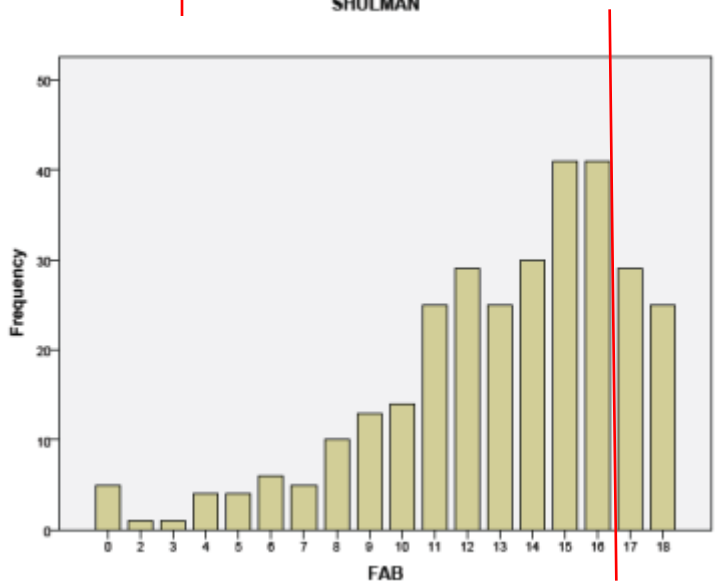
- Jorm A F: *Intern Psychogeria* 2004; 16:3, 1
- Shulman K: *Int. J. Geriat. Psychiatry* 2000; 15
- Mioshi E: *Int J Geriatr Psychiatry* 2006; 21:1078
- Dubois B et al*: Neurology* 2000; 55:1621
- Green J: *Aust J Primary Health*, 2006; 12:82
- Juva K*: Age Ageing* 1997; 26:393

Frequency Distribution of test scores at Diagnosis









Correlations of tests

ACE-R: Addenbrooke's Cognitive Examination – revised
FAB: Frontal Assessment Battery
Shulman: Shulman's Clock Drawing Test

Correlations

		SMMSE	ACE-R	FAB	SHULMAN	IQCODE
SMMSE	Pearson Correlation	1	.848**	.575**	-.589**	-.179**
	Sig. (2-tailed)		.000	.000	.000	.003
	N	447	324	296	373	267
ACE-R	Pearson Correlation	.848**	1	.582**	-.592**	-.214**
	Sig. (2-tailed)	.000		.000	.000	.001
	N	324	329	271	311	222
FAB	Pearson Correlation	.575**	.582**	1	-.448**	-.173*
	Sig. (2-tailed)	.000	.000		.000	.011
	N	296	271	308	295	213
SHULMAN	Pearson Correlation	-.589**	-.592**	-.448**	1	.106
	Sig. (2-tailed)	.000	.000	.000		.082
	N	373	311	295	399	271
IQCODE	Pearson Correlation	-.179**	-.214**	-.173*	.106	1
	Sig. (2-tailed)	.003	.001	.011	.082	
	N	267	222	213	271	294

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).