

BACKGROUND

Disability as assessed by activities of daily living (ADL) is a common feature of all dementias. White matter hyperintensities (WMH) and neuropsychiatric symptoms are prevalent in all neurodegenerative disorders (NDDs) and contribute to morbidity and dependence. However, it remains unexplored how these factors associate with various trajectories of functionality in persons with NDDs..

Objectives:

1.

To Create trajectories of activities of daily living, both basic (BADL) and instrumental, (IADL) using repeated ADL measures in persons with variable degree of cognitive impairment.
2.

To compare the following risk factors between trajectories at baseline to understand their influence of ADLs:

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cardiovascular risk factors (diabetes; hypertension; stroke prevalence),

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imaging (normal-appearing grey matter (NAGM) and WMH volume), and

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neuropsychiatric biomarkers (Neuropsychiatric inventory (NPI))

This study was embedded within the Sunnybrook Dementia Study (SDS) – a prospective observational cohort study of patients with neurodegenerative disorders (NDDs) being conducted at the Sunnybrook Health Sciences Center since 1995.

Patients are followed every year for comprehensive brain imaging, cognitive, behavioral and functional assessments.

470 patients with variable degrees of cognitive impairment (subjective cognitive complaints, mild cognitive impairment, Alzheimer’s Disease, Lewy body dementia, frontotemporal dementia, vascular dementia, and mixed disease) were included with ADL assessments for up to six visits (min visits: 2).

Using Group-based trajectory modelling, trajectories for BADL and IADL were calculated using sex, years of education, *APOE-ε4* dosage, and age and mini-mental state examination (MMSE) score at baseline as determinants.

METHODS

Diabetes; hypertension; stroke prevalence, NAGM and WMH volume, and Neuropsychiatric inventory scores at baseline were compared across trajectories using ANOVA and Kruskal-Wallis tests for continuous and Chi squared test for categorical variables.

Comparisons were also made across trajectories for the component scores of both BADL and IADL, that is:

- Initiation
- Planning
- Action

SUMMARY & CONCLUSIONS

Greater WMH burden and neuropsychiatric symptoms are associated with reduced functionality in patients with neurodegenerative disorders.

Strict control of cardiovascular risk factors and treatment of neuropsychiatric symptoms may help maintain independence for longer..

RESULTS

For BADL, following three trajectories were identified: high baseline functionality–slow decline”; “high baseline functionality–rapid decline”; “moderate baseline functionality–very rapid decline” **Figure 1**.

For IADL, trajectories were characterized by “high baseline functionality–slow decline”; “moderate baseline functionality–rapid decline”; “low baseline functionality–slow decline” **Figure 2**.

Figure 1: Trajectories of BADL

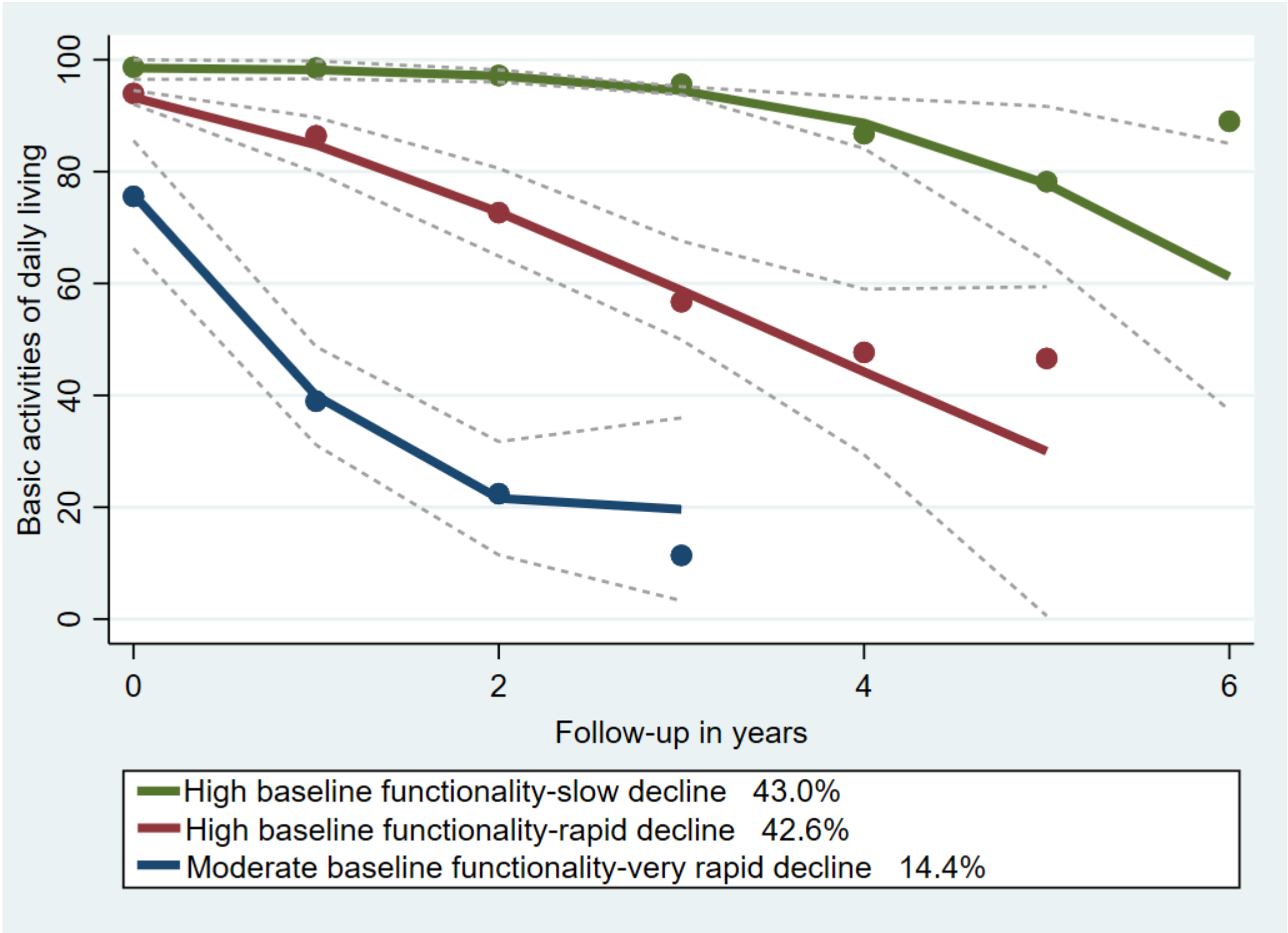
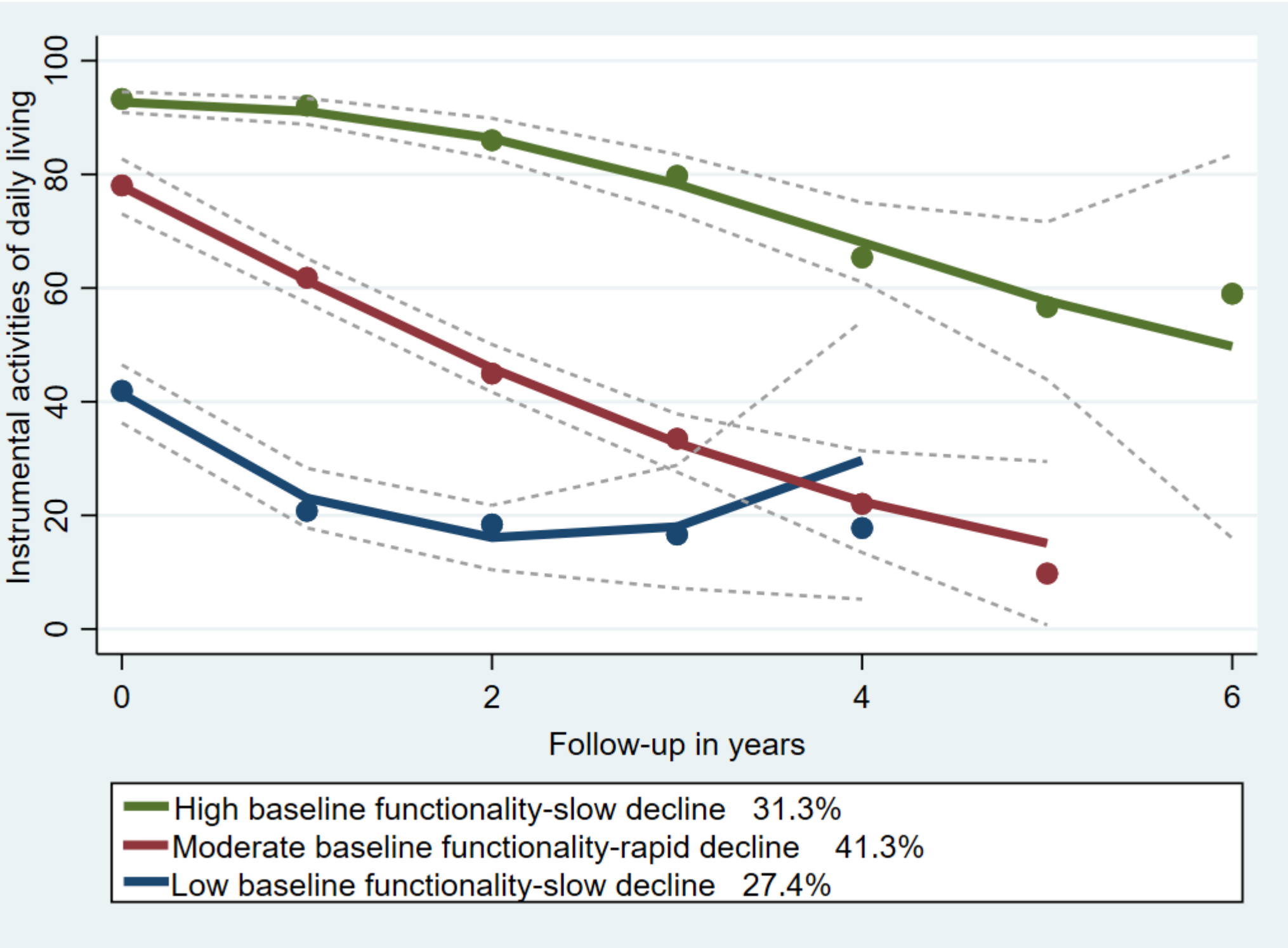


Figure 2: Trajectories of IADL



CV-risk factors did not significantly differ across BADL or IADL trajectories. BADL: persons within the “moderate baseline functionality–very rapid decline’ had less NAGM volume and higher neuropsychiatric inventory score than the other two groups. IADL: Persons within the “low baseline functionality–slow decline” had significantly less NAGM volume and more neuropsychiatric symptoms than the other two groups. For both B- and IADL, lowest functioning trajectories had greater WMH burden than the “high baseline functionality–slow decline group” **Table 2**

Table 1. Descriptive statistics for variables used in trajectory calculation by trajectories.

	Basic			Instrumental		
Characteristics	High–baseline–Slow decline	High baseline–rapid decline	Moderate baseline–Very rapid decline	High baseline–Slow decline	Moderate baseline–Rapid decline	Low baseline–Slow decline
	199 (42.3%)	203 (43.2%)	68 (14.5%)	149 (31.3%)	193 (41.3%)	128 (27.4%)
Age, years	68.7 (10)	71.9 (9.1)	67.6 (10.7)	67.73 (10.09)	72.07 (8.39)	69.25 (10.9)
Sex, female	97 (49)	89 (43.84)	33 (48.53)	77 (51.68)	76 (39.38)	66 (51.56)
Education, years	14.53 (3.7)	13.6 (3.4)	13.9 (3.8)	14.59 (3.81)	14 (3.56)	13.5 (3.4)
<i>APOE-ε4</i>						
0	89 (44.72)	108 (53.20)	37 (54.41)	76 (51.01)	88 (45.60)	70 (54.69)
1	92 (46.23)	76 (37.44)	27 (39.71)	61 (40.94)	86 (44.56)	48 (37.50)
2	18 (9.05)	19 (9.36)	4 (5.88)	12 (9.05)	19 (9.84)	10 (7.81)
MMSE score	26.3 (2.7)	23.2 (3.9)	20.2 (5.82)	26.73 (2.31)	24.25 (3.77)	20.8 (4.83)

Values are mean (standard deviation) or count (percentage)

- For basic activities of daily living, all three component scores namely initiation, planning and action were significantly lower in the moderate baseline–very rapid decline trajectory as compared to the high baseline trajectories.
- Similarly, for instrumental activities for daily living, all component scores were lowest for the Low baseline function–slow decline trajectory compared to the other two trajectories.

Table 2. NAGM, WMH and NPI scores across by trajectories.

	Trajectories of basic activities of daily living			
	High baseline–slow decline	High baseline–rapid decline	Moderate baseline–very rapid decline	
NAGM, mm ³	542406.9 (54859.2)	514042.7 (52231)	493345 (51445.8)	<0.001
Total WMH, mm ³	1854 [826.5–7354.5]	4279 [1346–10265]	3113 [768–8304]	0.03
NPI, total score	3 [0–9.5]	9 [2–18]	13 [4–23]	0.0002
	Trajectories of instrumental activities of daily living			
	High baseline–slow decline	Moderate baseline–rapid decline	Low baseline–slow decline	
NAGM, mm ³	542910.3 (52260.3)	523275.3 (53314.5)	501052.6 (56240.5)	<0.001
Total WMH, mm ³ ,	2005 [610–6737]	3216 [1030–10529]	3980 [1037–8532]	0.01
NPI, total score	3 [0–9]	7 [2–14]	14 [6–27]	<0.001

Values are mean (standard deviation), median [IQR] or count (percentage)

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