Distinct empathy trajectories in nonfluent and logopenic primary progressive aphasia: a longitudinal neuroimaging study

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TAKE-HOME Despite **similar baseline empathy** deficits, **trajectories diverge** over time: **lvPPA** shows progressive **decline** in cognitive and affective empathy, **linked to frontal cortical thinning**, while **nfvPPA** remains **stable**.

Background

Empathy loss reported in nonfluent (nfvPPA) and logopenic (lvPPA) variants of primary progressive aphasia [1]

KNOWLEDGE GAPS

- Limited longitudinal evidence on empathy changes in nfvPPA and lvPPA [2]
- Neural correlates of empathy decline unknown

Objectives

1. Characterize trajectories of cognitive & affective empathy in nfvPPA and lvPPA
2. Identify neural correlates of empathy changes

Method

PARTICIPANTS

	HC	nfvPPA	lvPPA	*p*
N	45	34	38	-
Age (y)	67.2	68.1	67.3	.888
Education (y)	14.2	11.8	12.9	**.005**
Disease dur. (y)	-	3.78	3.97	.304
CDR SoB	-	5.09	4.1	.494

LONGITUDINAL FOLLOW-UP

BL	Y2	Y3	Y4	Y5	Y6-9
34 nfv / 38 lv	9 / 14	4 / 9	3 / 4	2 / 2	1 / 2

TASKS & MEASURES

- **IRI-PT** — cognitive empathy (perspective-taking) · **IRI-EC** — affective empathy (empathic concern)
- Annual **structural MRI** in PPA participants

ANALYSES

Kruskal-Wallis + Dunn's post-hoc · linear mixed-effects models · ROI cortical thickness

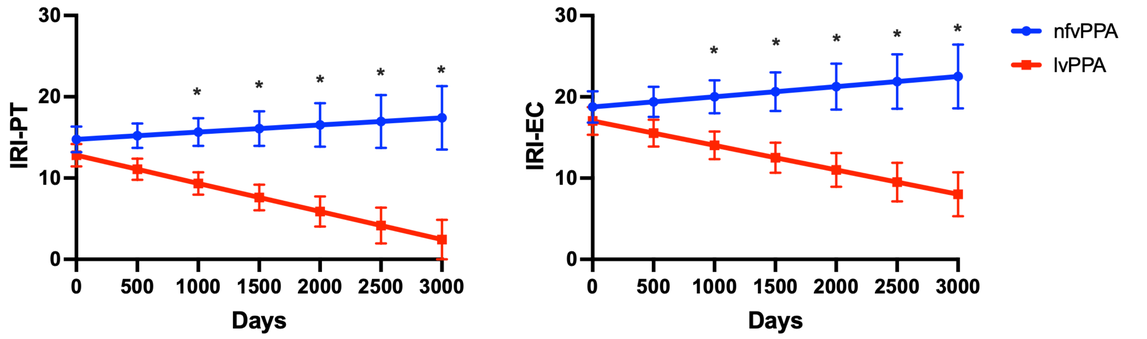
Results

EMPATHY AT BASELINE

Baseline empathy	nfvPPA	lvPPA
Cognitive empathy (IRI-PT)	↓ vs HC	↓ vs HC
Affective empathy (IRI-EC)	Preserved	Preserved

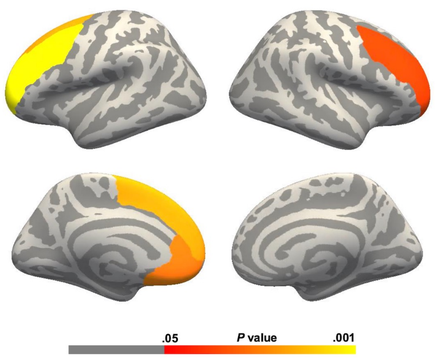
Reduced cognitive empathy but preserved affective empathy at baseline in both variants

EMPATHY TRAJECTORIES OVER TIME



Predicted cognitive (IRI-PT) and affective (IRI-EC) empathy over time in nfvPPA and lvPPA: progressive decline in both cognitive and affective empathy in lvPPA only

NEURAL CORRELATES OF EMPATHY CHANGES IN LVPPA



Cognitive empathy decline in lvPPA associated with thinning of:
Bilateral middle frontal gyrus · Left superior frontal gyrus · Left ventromedial prefrontal cortex

Discussion

- Similar baseline empathy deficits, but divergent empathy trajectories over time
  - **nfvPPA** — **Reduced cognitive empathy** at baseline, **stable** over time
  - **lvPPA** — **Reduced cognitive empathy** at baseline, **decline** of both components over time
- **Frontal cortical thinning** associated with cognitive empathy decline in lvPPA
  - ➢ Suggests a critical role of frontal networks in maintaining empathy [3]

Clinical implications

- Empathy may be a valuable non-language marker of disease progression [4]
- Longitudinal empathy assessment could support differential diagnosis
- Early identification of empathy loss may inform caregiver support [5]

References

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5. Hazelton, J. L., Irish, M., Hodges, J. R., Piguet, O., & Kumfor, F. (2017). Cognitive and affective empathy disruption in non-fluent primary progressive aphasia syndromes. *Brain Impairment, 18*(1), 117-129.

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Read the related article: Cordonier et al. (2026), Alzheimer's & Dementia