Supplementary Table 1. Assessments included in the PARS study(10,11,12)

Category	Area assessed	Assessments
Olfaction	**Odor identification**	40-item University of Pennsylvania Smell Identification Test(21). Subjects scoring ≤15th percentile based on age and sex (based on study-specific norms, as described(11)) were classified as hyposmic; all others were considered normosmic.
Imaging	**Dopamine transporter binding**	[^{123}I]β-CIT single photon emission computed tomography (SPECT) was performed as previously described(12,22). Baseline age-adjusted percent FP-CIT lowest putamen:cerebellum binding ratio was calculated. Scans were categorized as DAT reduction (≤80% age-expected lowest putamen [^{123}I]β-CIT uptake) or no DAT reduction (>80% age-expected lowest putamen [^{123}I]β-CIT uptake)(23). This cutoff was chosen in order to maximize detection of potentially at-risk individuals.
PD signs/symptoms	**Motor function**	Unified PD Rating Scale (UPDRS)
Cognition	**Memory**	(i) Hopkins Verbal Learning Test-Revised (immediate and delayed recall and recognition)(24) (ii) Repeatable Battery for Assessment of Neuropsychological Status (RBANS Battery A, immediate and delayed recall of the “fire story” and the “tidal wave story” and figure recall)(25) (iii) Wechsler Memory Scale (WMS-III) logical memory story A, immediate and delayed recall(26)
	Executive function/Working memory	(i) Controlled Oral Word Association Test (phonemic fluency: total word generation for letters F, A, and S and semantic fluency: total word generation for male names, animal, fruit, and vegetable categories)(27) (ii) Trail Making Test Part B (time to complete)(28) (iii) Wechsler Adult Intelligence Scale (WAIS)-III digit span backwards(26)
	Processing speed/Attention	(i) WAIS-III Digit Symbol Coding (raw score) (ii) WAIS-III symbol search (raw score) (iii) WAIS-III digit span forward(26) (iv) Trail Making Test Part A (time to complete)(28)
	Visuospatial function	(i) RBANS Battery A figure copying and line orientation(25) (ii) Clock Drawing Test (iii) Visual Object and Space Perception Battery (silhouettes animals and silhouettes objects)(29)
	Language	(i) Boston Naming Test (split half and split half even raw scores)(30)
Mood	**Depressive symptoms**	The Center for Epidemiological Studies Depression Scale (CES-D)(13). Subjects scoring ≥16 at baseline were classified as having clinically significant depression, consistent with previous PARS research(11).

Supplementary Table 2. Demographics and clinical features at first assessment for hyposmic participants (N=136)[a]

Variable	Value
Mean age (SD; range)	67.1 (7.0; 49.8 – 82.9)
Male sex (N, %)	84 (62%)
Mean education in years (SD; range)	15.9 (2.5; 9.0 – 20.0)
≥ 1 family member with PD (N, %)	47 (35%)
Smoking history, current or past (N, %)	69 (52%)
Mean Total UPDRS (SD; range)	2.5 (2.9; 0 – 16)
Mean % age-expected putamen (SD; range)	93.6 (22.6; 35.1 – 161.3)
Clinically significant depression (N, %)	16 (12%)

[a] This group includes PARS participants who had at least 1 cognitive assessment, with the baseline cognitive assessment occurring before the second imaging visit.

Supplementary Table 3. Association between baseline cognition and conversion to PD in hyposmics

Cognitive measure	Clinical outcome[a]		p-value[b]	Odds ratios (95% CI)[c]
	No conversion (N = 126)	Conversion (N = 8)		
Global cognition	-0.14 (1.03)	-0.78 (0.45)	0.07	2.55 (0.92, 7.09)
Executive function / Working memory	-0.14 (0.97)	-0.82 (0.37)	0.06	2.71 (0.97, 7.57)
Language	-0.07 (1.01)	0.21 (0.95)	0.63	0.78 (0.29, 2.10)
Memory	-0.08 (1.04)	-0.59 (0.62)	0.26	1.64 (0.70, 3.84)
Processing speed / Attention	-0.14 (1.05)	-0.61 (0.67)	0.25	1.69 (0.69, 4.16)
Visuospatial	-0.08 (1.07)	-0.36 (1.07)	0.35	1.42 (0.68, 2.96)

[a] Baseline mean (SD) cognitive z-scores by conversion status. Higher scores indicate better performance.

[b] Significance level for association between baseline cognitive performance and conversion from separate logistic regression models adjusted for age at baseline cognitive testing, sex, depression and education.

[c] Odds ratios are signed so that an odds ratio >1 implies a greater risk of conversion.

Supplementary Table 4. Association between baseline olfaction and annualized changes in cognitive measures

Cognitive measure[a]	Olfactory status		Entire sample (N=198) p-value[b]
	Normosmic (N=73)	Hyposmic (N=125)	
Global cognition	-0.02 (-0.08, 0.03)	-0.07 (-0.11, -0.03)	0.08
Executive function / Working memory	-0.03 (-0.09, 0.03)	-0.05 (-0.10, 0.00)	0.51
Language[c]	0.01 (-0.09, 0.11)	-0.13 (-0.22, -0.05)	0.005
Memory	-0.00 (-0.07, 0.07)	-0.09 (-0.15, -0.03)	0.01
Processing speed / Attention	-0.01 (-0.07, 0.04)	0.01 (-0.04, 0.06)	0.45
Visuospatial	0.01 (-0.07, 0.09)	-0.04 (-0.11, 0.03)	0.23

[a] Adjusted mean (95% CI) cognitive changes by baseline olfactory status.

[b] Significance of baseline olfactory status on change in cognition from separate multiple regression models adjusted for age at baseline cognitive testing, sex, depression, education, and baseline cognitive measure.

[c] One outlier omitted.