

# Long-term dementia prevalence in Parkinson Disease: Glass half-full?

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## 1 INTRODUCTION

- Cognitive impairment is a major non-motor symptom in Parkinson's disease (PD).
- Predictors of cognitive impairment include higher age and age at disease onset, greater disease severity, postural instability-gait disorder subtype, and sleep and psychiatric disorders.
- Recognition and treatment for PD cognitive impairment lags that of motor symptoms.
- **It has been reported that 80% of PD patients develop dementia long-term, but this statistic is based on limited research<sup>1,2</sup>.**

## 2 METHODS

- Parkinson's Progression Markers Initiative (PPMI) cohort: de novo PD patients completed a cognitive battery and MDS-UPDRS Part 1, and assigned an investigator cognitive diagnosis annually.
- University of Pennsylvania (Penn) cohort: Established PD patients given cognitive battery either annually or biennially, and given a consensus cognitive diagnosis.
- For both cohorts, a diagnosis of normal cognition, MCI or dementia was given at each visit.

## 3 RESULTS

### Clinical characteristics

- **PPMI: N = 417**; Mean (SD) age = 61.6 (9.8), education = 15.6 (3.0), disease duration = 0.6 (0.5); 65% Male; 92% White
- **Penn: N = 389**; Mean (SD) age = 69.3 (8.0), education = 16.0 (2.5), disease duration = 6.3 (5.3); 67% Male; 93% White.

### Overall probability of dementia and survival curve (Figure 1)

- **PPMI**: estimated probability of dementia diagnosis at year 5: 2.7%; year 8: 7.1%, year 10: 9.1% (Table 1)
- **Penn**: estimated probability of dementia at year 5: 11.8%, year 10: 26.5%, year 15: 49.7%, year 20: 74.4% (Table 2)

### Dementia diagnosis stratified by clinical characteristic (Penn cohort)

- The median time to dementia diagnosis, stratified by **age-at-disease-onset**, was 19.4 (95% CI: 19.4 – 23.7) years for <56 years old, 14.6 (95% CI: 13.4-15.2) years for 56-69 years old, and 9.2 (95% CI: 6.7 – 11.6) for 70+ years old (Figure 2)
- The median time to dementia diagnosis, stratified by **sex**, was 19.4 (95% CI: 16.1 – 19.4) years for females and 13.3 (95% CI: 13.3 – 14.6) years for males (Figure 3)
- The median time to dementia diagnosis, stratified by **education**, was 11.6 (95% CI: 6.7 – 18.0) for <13 years and 15.2 (95% CI: 14.6 – 16.1) for ≥13 years (Figure 4)
- Time to dementia was significantly less among those with older age at disease onset (p-value: < 0.001), male sex (p-value: 0.004), and education <13 years (p-value: 0.006), but did not differ by race (p-value: 0.32).

### Dementia in PD vs. Healthy Controls (HCs) (PPMI Cohort)

- The difference in time to dementia differed significantly between PD participants and HCs, being shorter in PD participants (p-value: 0.002) (Figure 5).

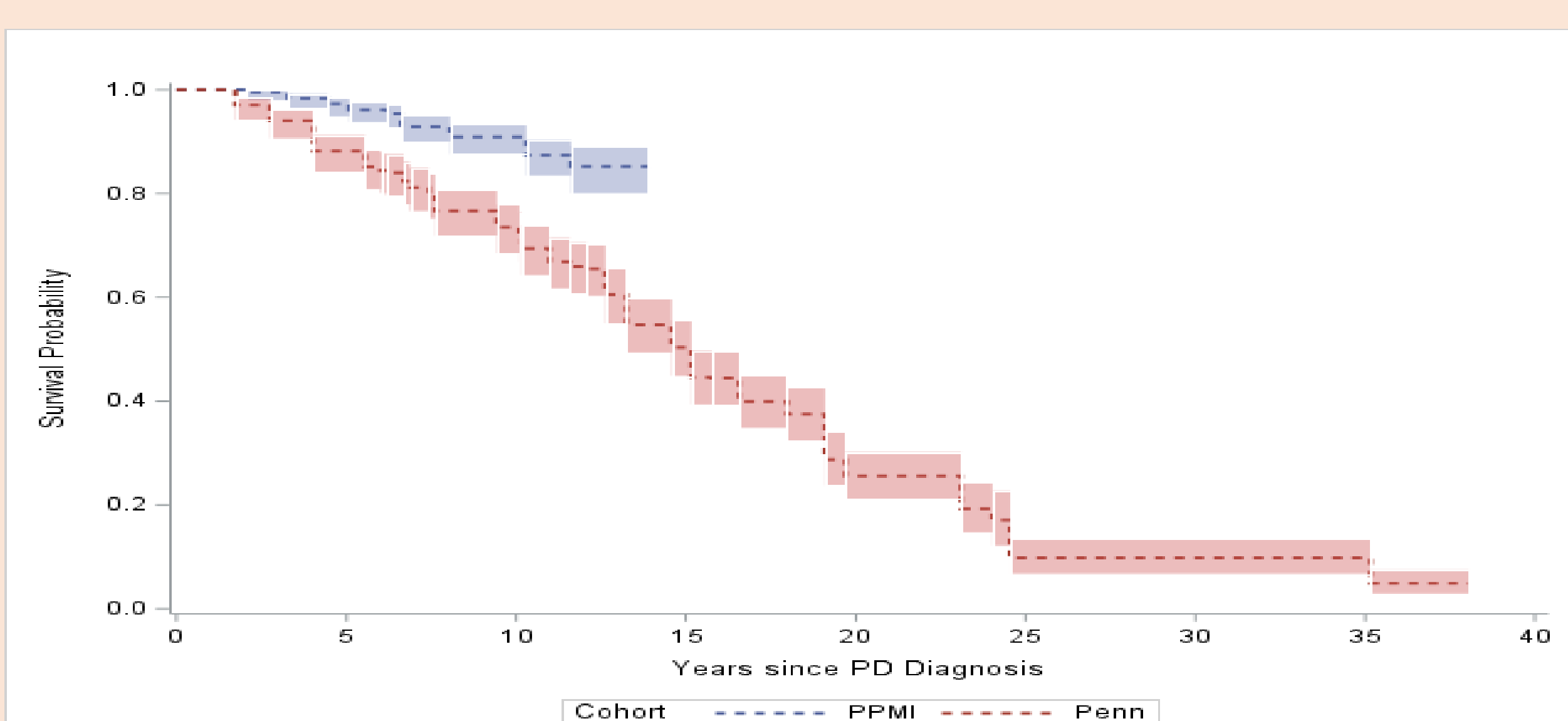
**Table 1: Estimated probability of dementia and cumulative number of diagnoses by PD duration in the PPMI cohort**

PD Duration	Dementia Dx Probability (95% CL)	Cumulative Dementia Diagnoses
Year 1	0	0
Year 2	0	0
Year 3	0.52% (0.13%, 2%)	2
Year 4	1.68% (0.78%, 3.6%)	5
Year 5	2.73% (1.44%, 5.12%)	7
Year 6	3.87% (2.37%, 6.29%)	13
Year 7	7.14% (4.99%, 10.17%)	17
Year 8	7.14% (4.99%, 10.17%)	23
Year 9	9.12% (6.66%, 12.43%)	27
Year 10	9.12% (6.66%, 12.43%)	28

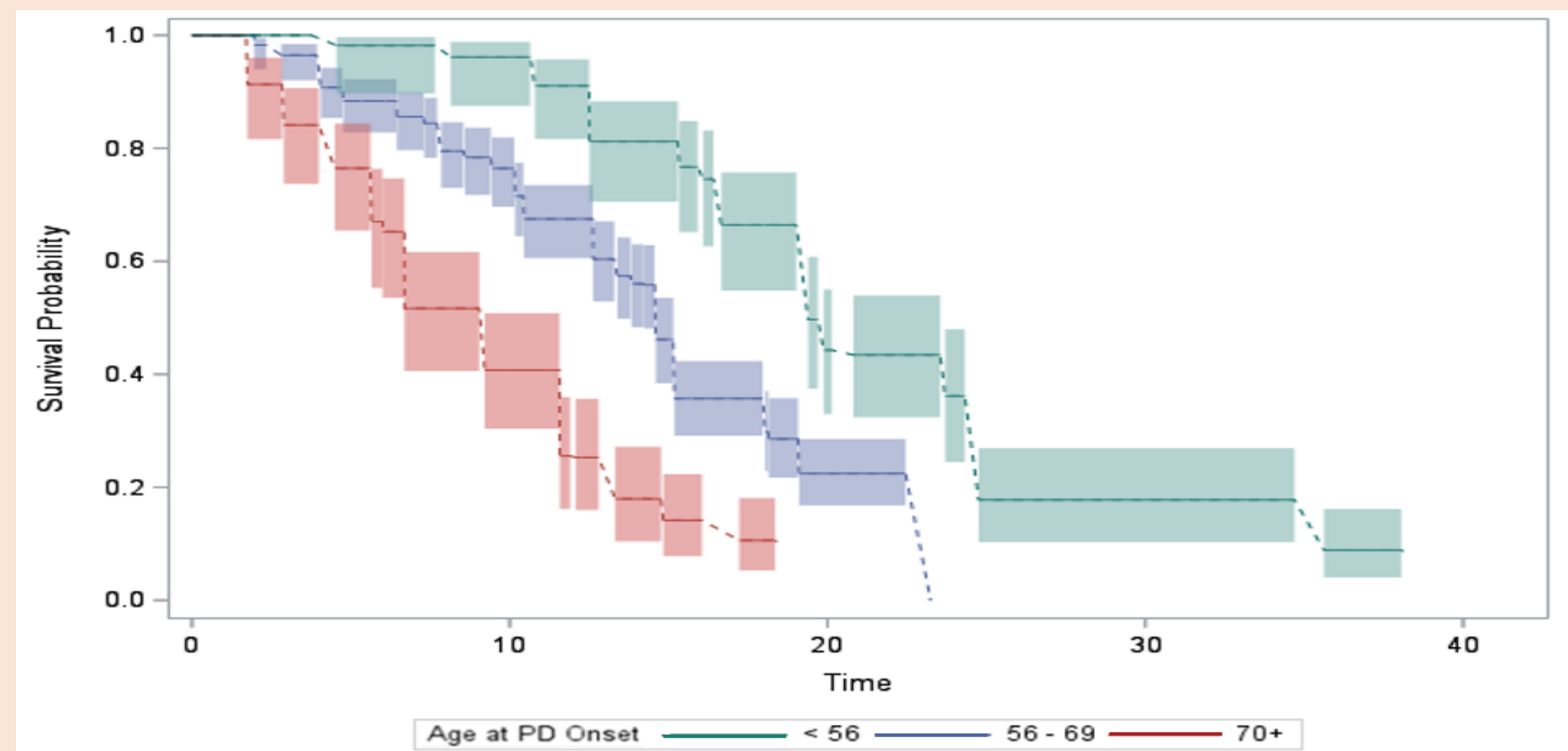
**Table 2: Estimated probability of dementia and cumulative number of diagnoses by PD duration in the Penn cohort**

PD Duration	Dementia Dx Probability (95% CL)	Cumulative Dementia Diagnoses
Year 5	11.82% (8.8%, 15.77%)	27
Year 10	26.5% (22.15%, 31.51%)	74
Year 15	49.66% (44.42%, 55.15%)	133
Year 20	74.39% (69.76%, 78.8%)	167
Year 25	90.23% (86.57%, 93.25%)	178
Year 30	90.23% (86.57%, 93.25%)	183
Year 35*		183
(24.756 - 34.693 years)	90.23% (86.57%, 93.25%)	
(35.622 - 38.052 years)	95.12% (92.47%, 97.05%)	

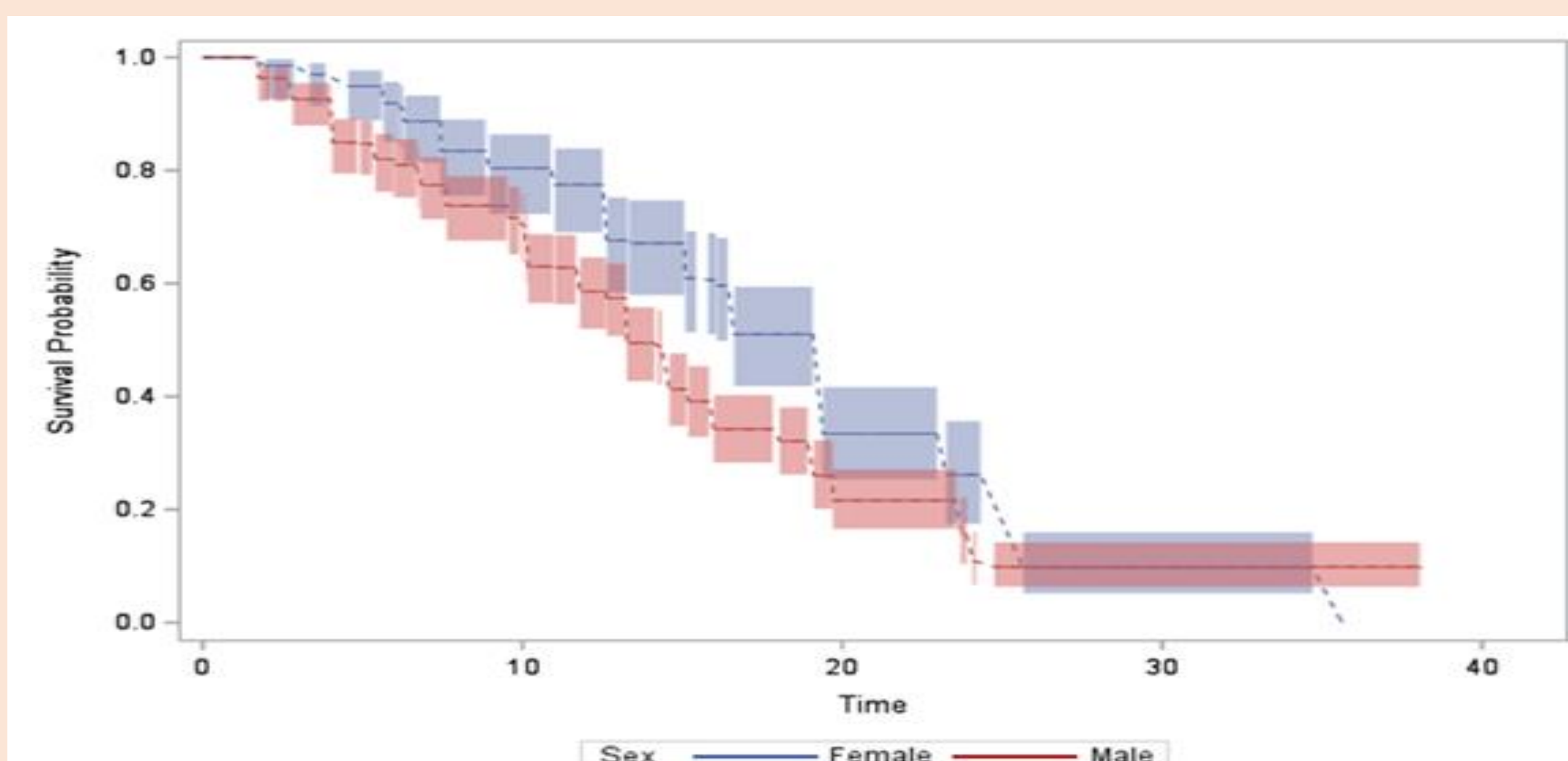
**Figure 1: Time to Dementia Diagnosis in the PPMI and Penn Cohorts**



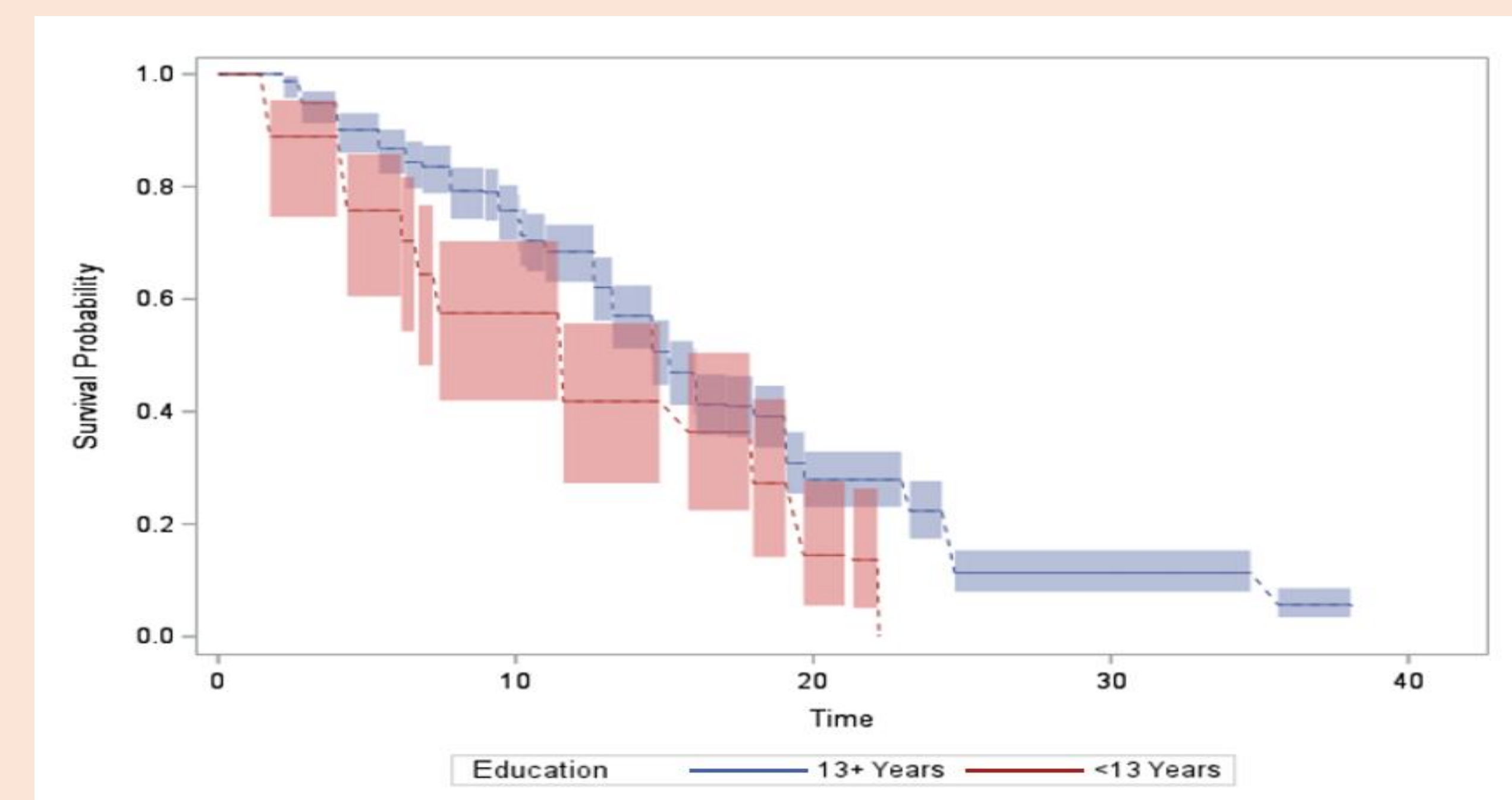
**Figure 2: Time to Dementia Diagnosis Stratified by Age at Onset in the Penn Cohort**



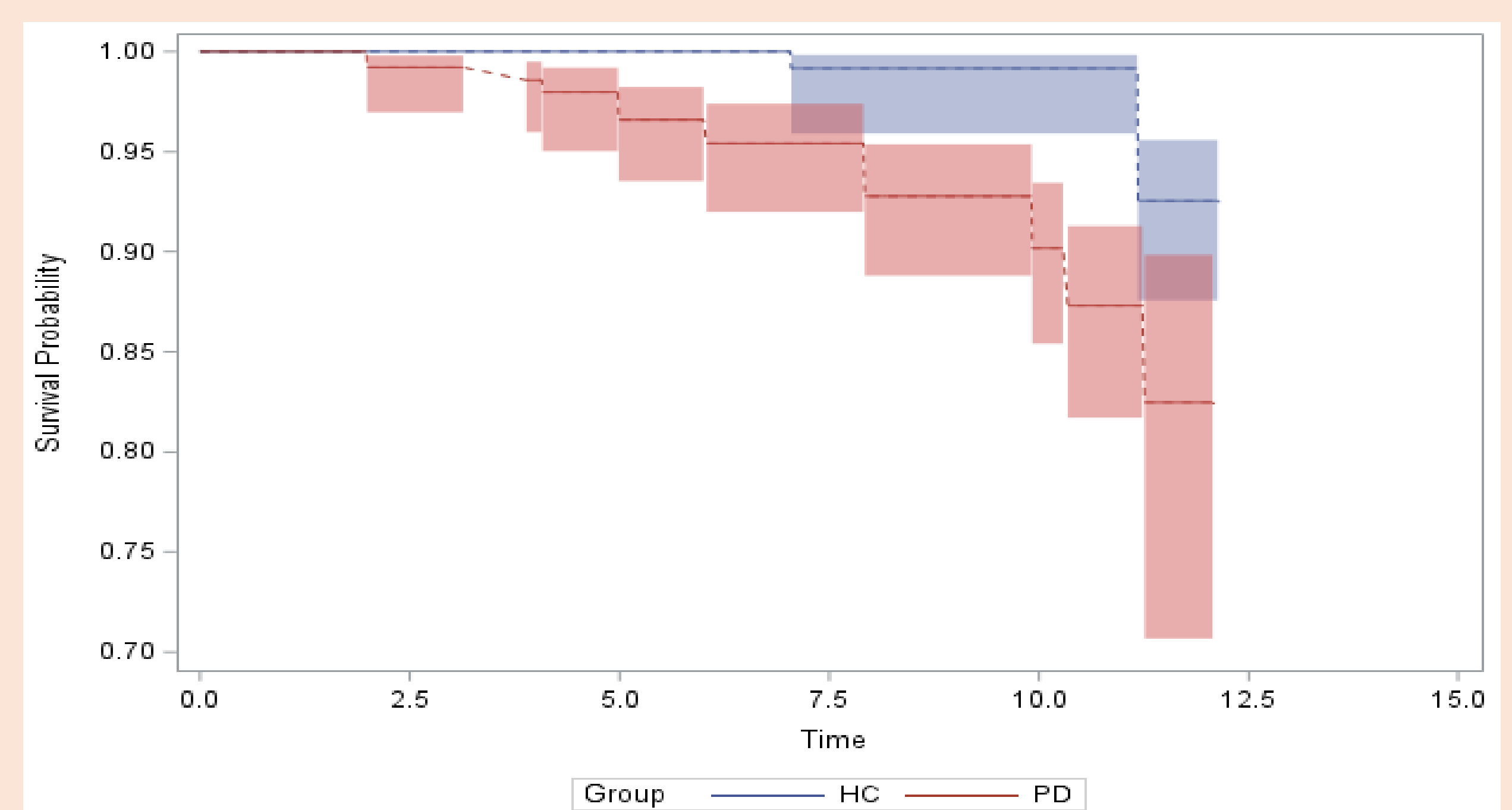
**Figure 3: Time to Dementia Diagnosis Stratified by Sex in the Penn Cohort**



**Figure 4: Time to Dementia Diagnosis Stratified by Education in the Penn Cohort**



**Figure 5: Time to Dementia Diagnosis in PD vs. Healthy Controls in the PPMI cohort**



## 4 CONCLUSIONS

- Although dementia occurs more commonly in PD than in comparable persons in the general population, it may occur less frequently, or later in the disease course, than previous oft-cited research suggests.
- If these results are confirmed, they have implications for patient education and clinical management.

## ACKNOWLEDGEMENTS

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