Supplementary Online Content

**eFigure 1.** Flow Chart of Participant Inclusion Process

eFigure 2. Nocturnal Sleep Duration and Daytime Nap Duration Associations With Amyloid PET and Cognitive Function

eTable 1. Summary of Sleep Duration Associations With Amyloid PET and Cognitive Performance With Lifestyle Outcomes Included as Covariates

eTable 2. Summary of Associations Between the Interaction Term of Sleep Duration * Daytime Napping With Amyloid PET and Cognitive Performance

This supplementary material has been provided by the authors to give readers additional information about their work.

eFigure 1. Flow Chart of Participant Inclusion Process
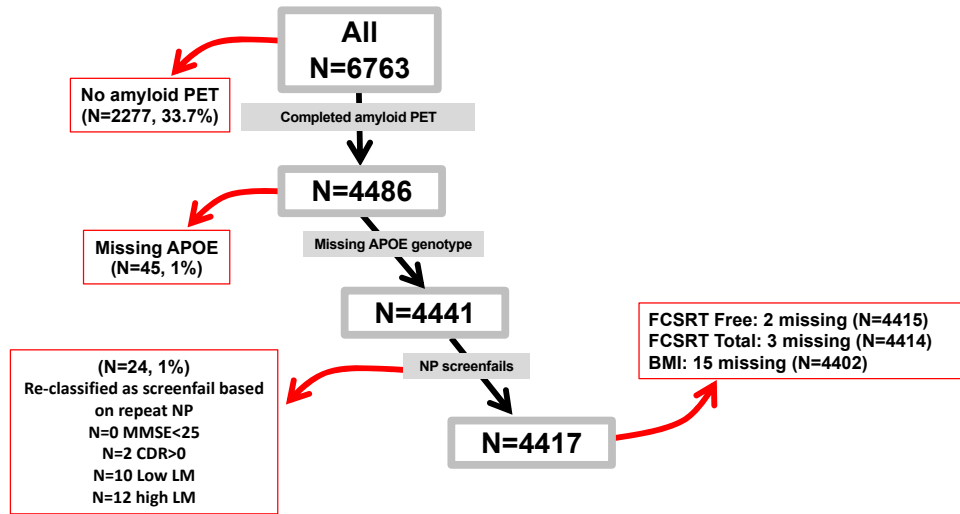
6763 individuals were screened, of which 4486 received amyloid PET with florbetapir. Participants with PET that were missing APOE genotype data were excluded from all PET analyses (N=45). Of the participants with PET and APOE genotype data, 24 had low cognitive scores upon repeated testing that would have precluded them from receiving a PET scan (0 with low MMSE, 10 with low Logical Memory Delayed Recall, 2 with CDR>0, and 12 with high Logical Memory Delayed Recall). We excluded these subjects from the analysis. This resulted in the analyses group of N=4417 individuals. Within this 4417, 2 were missing FSCRT free recall scores, 3 were missing FCSRT total recall scores, and 15 were missing BMI. All data otherwise were complete for the 4417 individuals.

eFigure 2. Nocturnal Sleep Duration and Daytime Nap Duration Associations With Amyloid PET and Cognitive Function
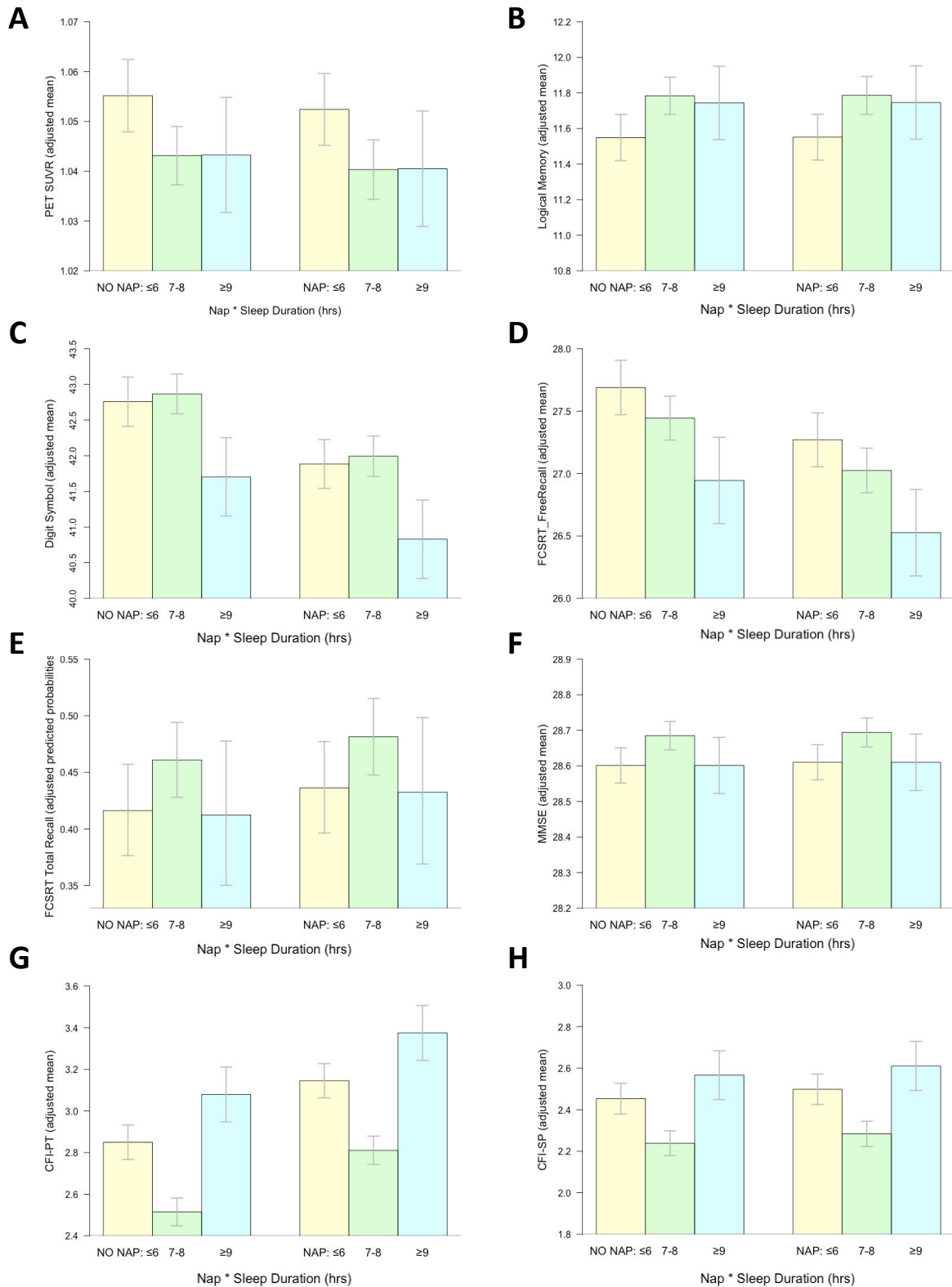
Bar plots comparing (A) florbetapir amyloid PET (B) logical memory delay, (C) digit symbol substitution, (D) Free and Cued Selective Reminding Test (FCSRT) free recall, (E) FCSRT total recall, (F) Mini-Mental State Exam (MMSE) performance, and Cognitive Function Index (G) self-assessment (CFI-PT) and (H) study partner assessment (CFI-SP) across self-reported sleep duration and self-reported daytime napping (0 minutes versus >0 minutes). Adjusted mean and standard error (y-axis) were derived using a linear mixed model that examined nap*sleep group as a factor (6 levels), with demographics included as additional predictors (age was mean centered at 71.3 years, education was mean centered at 16.6 years, non-Hispanic White was the reference for racial group, male for sex, with APOE ε33 genotype for APOE. A similar approach was taken for FCSRT total score, except in the context of a logistic regression (predicted probabilities of maximum score of 48 with 95% confidence intervals are plotted instead of adjusted means). This approach complements the statistical models exploring the interaction term between nocturnal sleep and napping (eTable 2) by estimating the value at each combination of nocturnal sleep and napping group (across 6 levels) rather than assuming a linear relationship. These patterns are consistent with the findings in eTable 2, suggesting a lack of interaction between nocturnal sleep and napping. For instance, the effects of shorter nocturnal sleep on elevated amyloid is independent of napping, and there is no additional effect of napping (A). For digit symbol, there are independent effects of both longer nocturnal sleep and napping on lower performance (C).

eTable 1. Summary of Sleep Duration Associations With Amyloid PET and Cognitive Performance With Lifestyle Outcomes Included as Covariates

Sleep duration continuous (β ± SE, p)				
Model Outcomes	Sleep duration	GDS	BMI	Daytime napping
PET SUVR	**-0.007 ± 0.053, 0.004**	0.003 ± 0.002, 0.17	0.000 ± 0.001, 0.84	0.000 ± 0.000, 0.31
MMSE	0.023 ± 0.363, 0.17	-0.018 ± 0.012, 0.15	-0.002 ± 0.004, 0.51	0.000 ± 0.001, 0.86
FCSRT Free	**-0.162 ± 0.074, 0.03**	-0.096 ± 0.054, 0.08	-0.001 ± 0.016, 0.94	**-0.013 ± 0.004, <0.001**
FCSRT Total	0.033 ± 0.029, 0.26	0.000 ± 0.021, 0.99	0.011 ± 0.006, 0.08	0.001 ± 0.001, 0.55
Logical Memory	0.060 ± 0.044, 0.18	-0.061 ± 0.032, 0.06	0.010 ± 0.009, 0.30	-0.003 ± 0.002, 0.11
Digit Symbol	-0.211 ± 0.117, 0.07	**-0.369 ± 0.086, <0.001**	**-0.118 ± 0.025, <0.001**	**-0.024 ± 0.006, <0.001**
CFI-self	-0.032 ± 0.027, 0.23	**0.473 ± 0.019, <0.001**	-0.008 ± 0.006, 0.16	**0.004 ± 0.001, <0.001**
CFI-study partner	-0.034 ± 0.025, 0.17	**0.208 ± 0.018, <0.001**	0.011 ± 0.005, 0.05	0.002 ± 0.001, 0.11

Sleep duration groups (β ± SE, p)					
Model Outcomes	Sleep duration (≤6 hr vs. 7-8 hr)	Sleep duration (≥9 hr vs. 7-8 hr)	GDS	BMI	Daytime napping
PET SUVR	**0.012 ± 0.006, 0.05**	-0.001 ± 0.011, 0.89	0.002 ± 0.002, 0.18	0.000 ± 0.000, 0.89	0.000 ± 0.000, 0.33
MMSE	-0.079 ± 0.042, 0.06	-0.077 ± 0.075, 0.30	-0.015 ± 0.012, 0.23	-0.002 ± 0.004, 0.54	0.000 ± 0.001, 0.89
FCSRT Free	0.279 ± 0.182, 0.13	-0.458 ± 0.327, 0.16	-0.094 ± 0.054, 0.08	-0.001 ± 0.016, 0.96	**-0.013 ± 0.004, <0.001**
FCSRT Total	**-0.187 ± 0.071, 0.01**	-0.227 ± 0.128, 0.08	0.005 ± 0.021, 0.82	0.012 ± 0.006, 0.06	0.001 ± 0.001, 0.48
Logical Memory	**-0.219 ± 0.109, 0.04**	-0.023 ± 0.195, 0.91	-0.057 ± 0.032, 0.08	0.010 ± 0.009, 0.28	-0.003 ± 0.002, 0.12
Digit Symbol	0.100 ± 0.288, 0.73	-0.824 ± 0.516, 0.11	**-0.359 ± 0.086, <0.001**	**-0.116 ± 0.025, <0.001**	**-0.023 ± 0.006, <0.001**
CFI-self	**0.190 ± 0.065, 0.004**	**0.367 ± 0.117, 0.001**	**0.467 ± 0.20, <0.001**	-0.009 ± 0.006, 0.11	**0.004 ± 0.001, 0.001**
CFI-study partner	**0.148 ± 0.061, 0.02**	**0.239 ± 0.109, 0.03**	**0.203 ± 0.018, <0.001**	0.010 ± 0.005, 0.06	0.002 ± 0.001, 0.13

Each table row summarizes a different model, and each column lists the predictors within each model (sleep, GDS, BMI, and napping). Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); CFI, Cognitive Function Index; FCSRT, Free and Cued Selective Reminding Test; GDS, Geriatric Depression Scale; MMSE, Mini-Mental State Examination; PET, positron emission tomography; SE, standard error; SUVR, standard uptake value ratio. Linear regressions included age, sex, self-identified race/ethnicity group, years of education, number of APOE ε2 alleles, and number of APOE ε4 alleles as covariates. Cells are bolded to indicate p<0.05.

eTable 2. Summary of Associations Between the Interaction Term of Sleep Duration * Daytime Napping With Amyloid PET and Cognitive Performance

	Sleep duration (continuous) * napping (β ± SE, p)	Sleep duration (<6 hr vs. 7-8 hr) * napping (β ± SE, p)	Sleep duration (>9 hr vs. 7-8 hr) * napping (β ± SE, p)
PET SUVR	0.000 ± 0.000, 0.32	0.000 ± 0.000, 0.29	0.000 ± 0.000, 0.75
MMSE	0.000 ± 0.001, 0.65	-0.001 ± 0.002, 0.65	0.004 ± 0.003, 0.21
FCSRT Free	-0.003 ± 0.003, 0.28	0.000 ± 0.007, 0.97	-0.017 ± 0.012, 0.17
FCSRT Total	-0.002 ± 0.001, 0.06	0.000 ± 0.003, 0.91	**-0.011 ± 0.005, 0.03**
Logical Memory	0.000 ± 0.002, 0.74	0.001 ± 0.004, 0.78	0.001 ± 0.007, 0.90
Digit Symbol	0.001 ± 0.004, 0.73	-0.007 ± 0.012, 0.56	0.010 ± 0.020, 0.60
CFI-self	0.001 ± 0.001, 0.15	-0.003 ± 0.003, 0.23	0.003 ± 0.005, 0.54
CFI-study partner	0.001 ± 0.001, 0.14	-0.001 ± 0.003, 0.62	0.004 ± 0.004, 0.36

Abbreviations: CFI, Cognitive Function Index; FCSRT, Free and Cued Selective Reminding Test; Mini-Mental State Examination; PET, positron emission tomography; SE, standard error; SUVR, standard uptake value ratio. Linear regressions included age, sex, self-identified race/ethnicity group, years of education, number of APOE ε2 alleles, and number of APOE ε4 alleles as covariates. Cells are bolded to indicate p<0.05.