

# Personality, Lifestyle, and Cognitive Health in Old Age

Robert S. Wilson, Ph.D.  
Rush Alzheimer's Disease Center  
Rush University Medical Center

Alzheimer's Public Educational Forum  
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- **Collaborators:**

Lisa L. Barnes, PhD

David A. Bennett, MD

Patricia A. Boyle, PhD

Ana Capuano, PhD

Sukriti Nag, MD, PhD

Julie A. Schneider, MD

Raj Shah, MD

Eisuke Segawa, PhD

Joel Sytsma, BA

Lei Yu, PhD

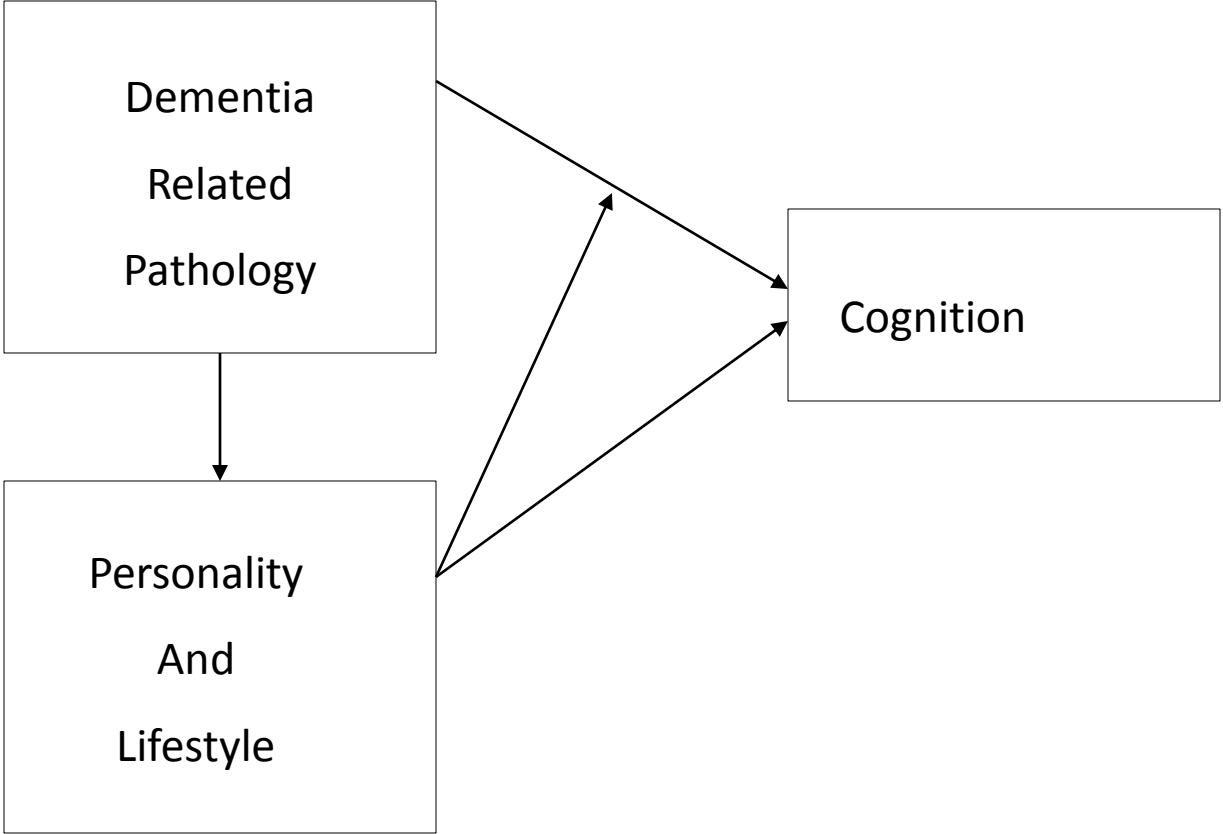
- **Disclosures:** None

# Objective

- Identify personality and lifestyle factors that influence late-life cognitive health

# Clinical-Pathologic Studies

- **Religious Orders Study, Rush Memory and Aging Project**
  - Began in 1990s
  - Annual evaluations
  - Neuropathologic examination to quantify dementia related pathologies



# Depression

## ► Predicts:

- Cognitive decline (Neurology 2002;59:364-370)  
(J Am Geriatr Soc 2010;58:873-879)
- MCI (Arch Gen Psychiatry 2006;63:273-279)  
(Arch Neurol 2006;63:435-440)
- Dementia (Neurology 2002;59:364-370)  
(Neurology 2010;75:35-41)

Table 1. The relation of incident mild cognitive impairment and dementia to change in depressive symptoms over time<sup>a</sup>

Model Term	Model A			Model B		
	Estimate	SE	P	Estimate	SE	p
Time	0.021	0.008	0.010	0.039	0.007	<0.001
Mild cognitive impairment	0.200	0.089	0.025			
Time x mild cognitive impairment	0.014	0.011	0.201			
Dementia				0.729	0.220	<0.001
Time x dementia				-0.059	0.024	0.013`

<sup>a</sup>Estimated from 2 proportional odds models adjusted for age at baseline, sex, and education. SE, standard error; CI, confidence interval.

Table 2. The relation of postmortem neuropathologic markers to change in depressive symptoms over time<sup>a</sup>

Model Term	Estimate	SE	p
Time	0.026	0.019	0.176
Amyloid plaques	0.013	0.022	0.565
Amyloid plaques x time	0.002	0.002	0.354
Tangle density	0.010	0.019	0.618
Tangle density x time	0.001	0.002	0.769
Gross infarcts	0.074	0.201	0.714
Gross infarcts x time	-0.007	0.023	0.754
Microinfarcts	0.315	0.200	0.115
Microinfarcts x time	0.015	0.023	0.495
Lewy bodies	0.428	0.279	0.125
Lewy bodies x time	0.040	0.029	0.167
Hippocampal sclerosis	-0.517	0.375	0.125
Hippocampal sclerosis x time	0.015	0.036	0.680

<sup>a</sup>Estimated from a proportional odds model adjusted for age at death, sex, and education. SE, standard error.



eFigure 1. Relation of mean level of depressive symptoms to rate of global cognitive decline after adjustment for dementia related pathology

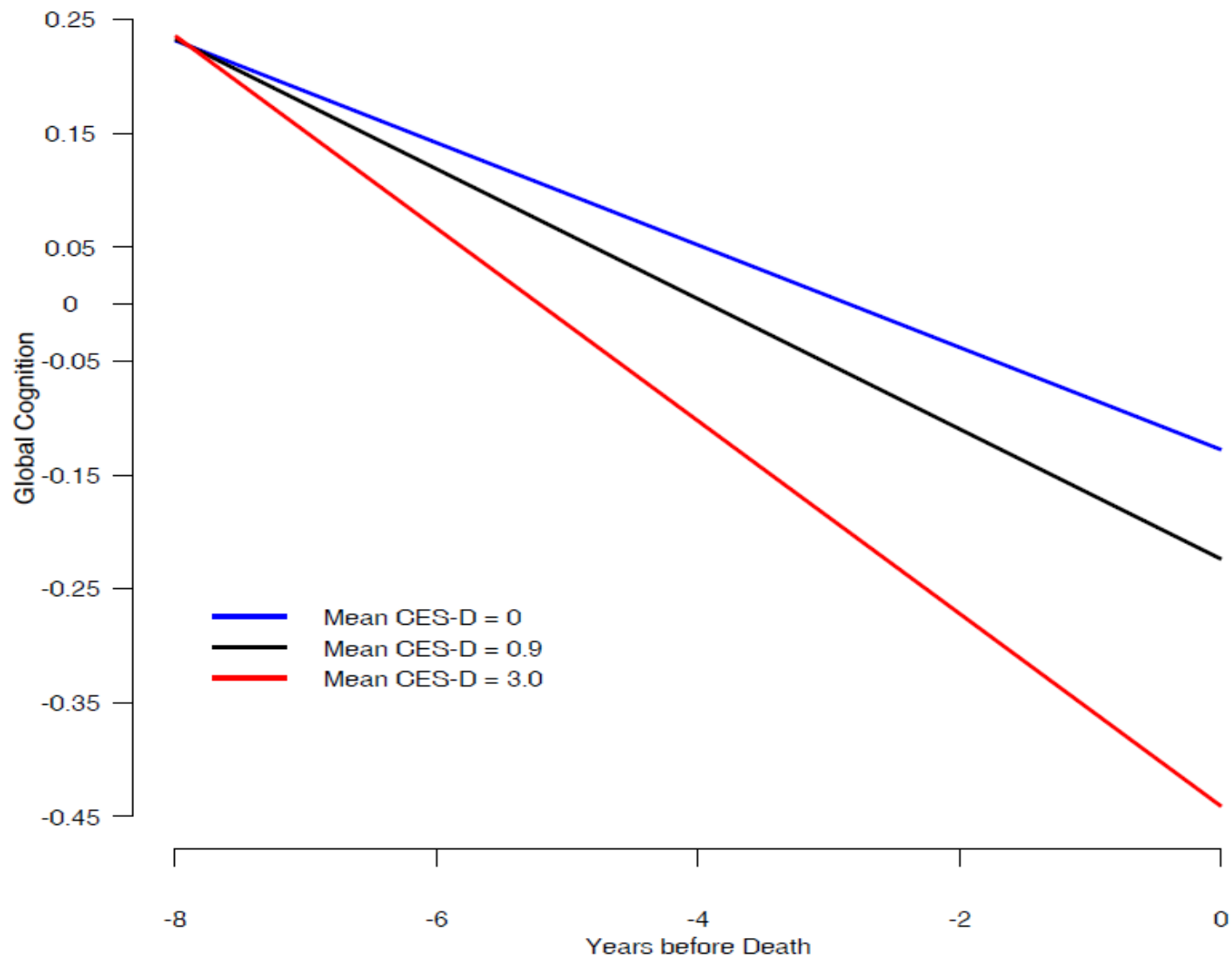
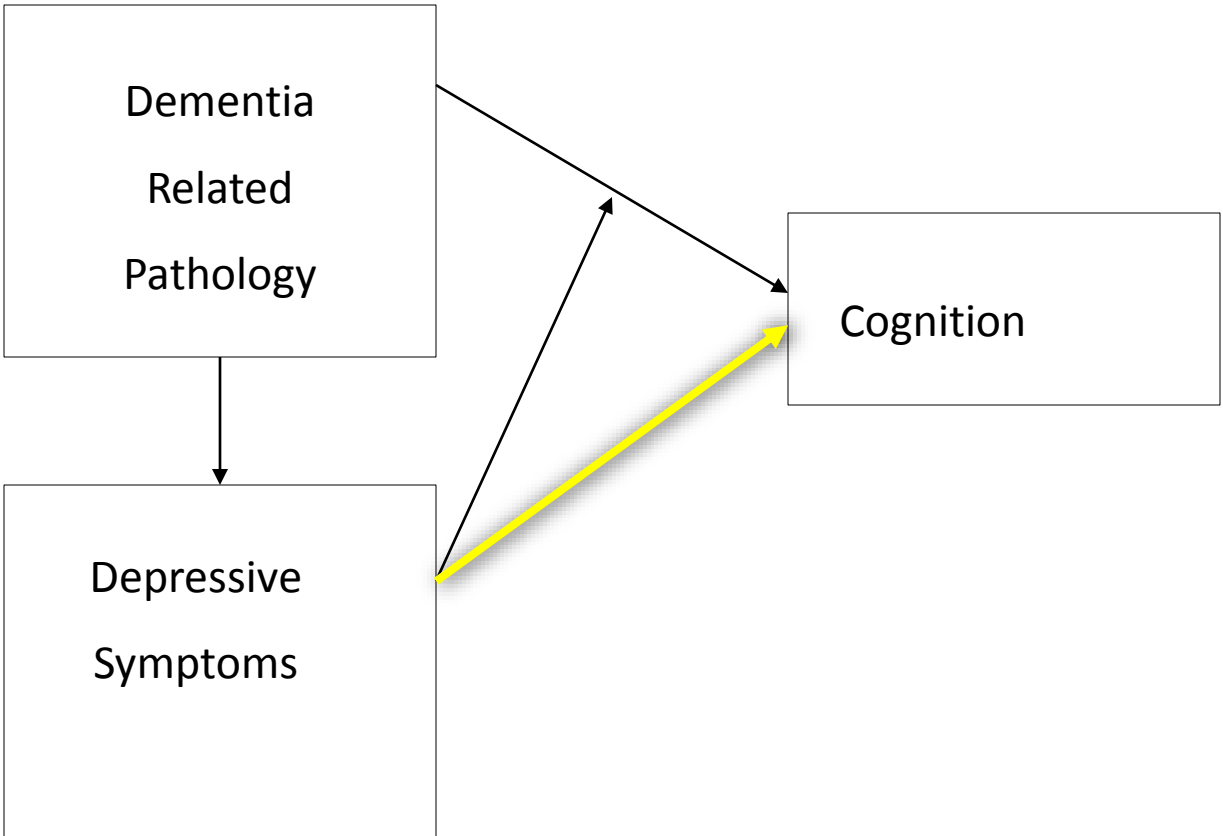


Table 3. Association of dementia related pathologies with depression

Pathologic Marker	Major Depression		Elevated Depressive Symptoms	
	Odds Ratio	95% CI	Odds Ratio	95% CI
Tangle density	0.994	0.942, 1.047	0.987	0.933, 1.043
Amyloid plaques	1.392	1.088, 1.780	0.919	0.726, 1.165
Lewy bodies	1.344	0.735, 2.455	1.350	0.767, 2.377
Hippcampal sclerosis	0.758	0.220, 2.609	0.482	0.112, 2.081
Gross Infarcts	1.218	0.686, 2.164	1.228	0.721, 2.092
Microinfarcts	1.108	0.614, 2.002	1.183	0.687, 2.039

*Note.* Estimated from 2 logistic regression models adjusted for age at death, gender, and education. CI, confidence interval.



# Cognitive Activity

## ► Predicts:

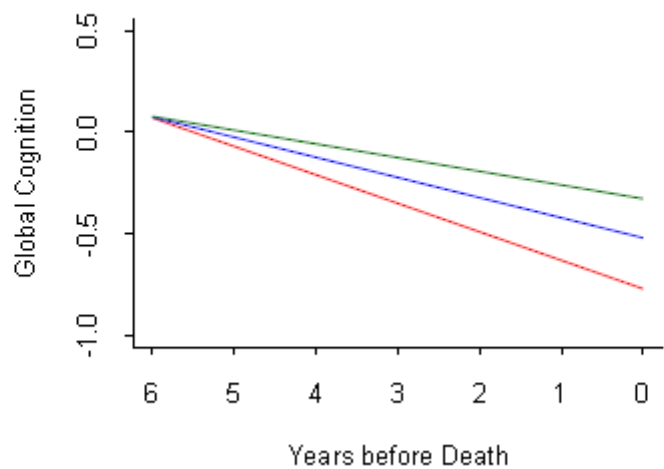
- Cognitive decline (JAMA 2002; 287 : 742-748)  
(Neurology 2012; 78 : 1123-1129)
- MCI (Neurology 2001; 57 : 2236-2242)
- Dementia (Neurology 2001; 57 : 2236-2242)  
(JAMA 2002; 287 : 742-748)  
(Neurology 2007; 69 : 1911-1920)

# Cognitive Activity

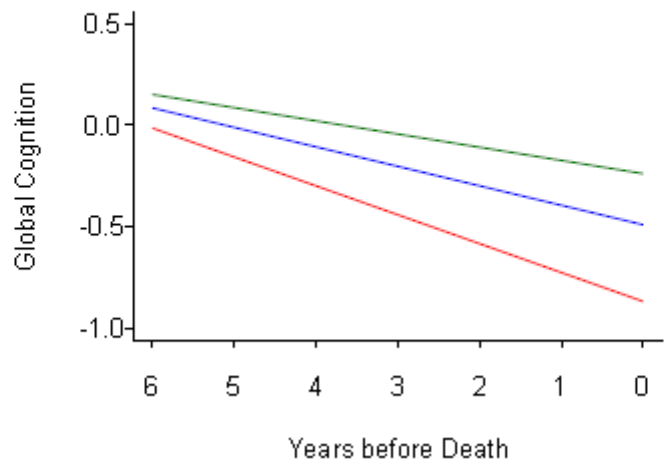
294 individuals

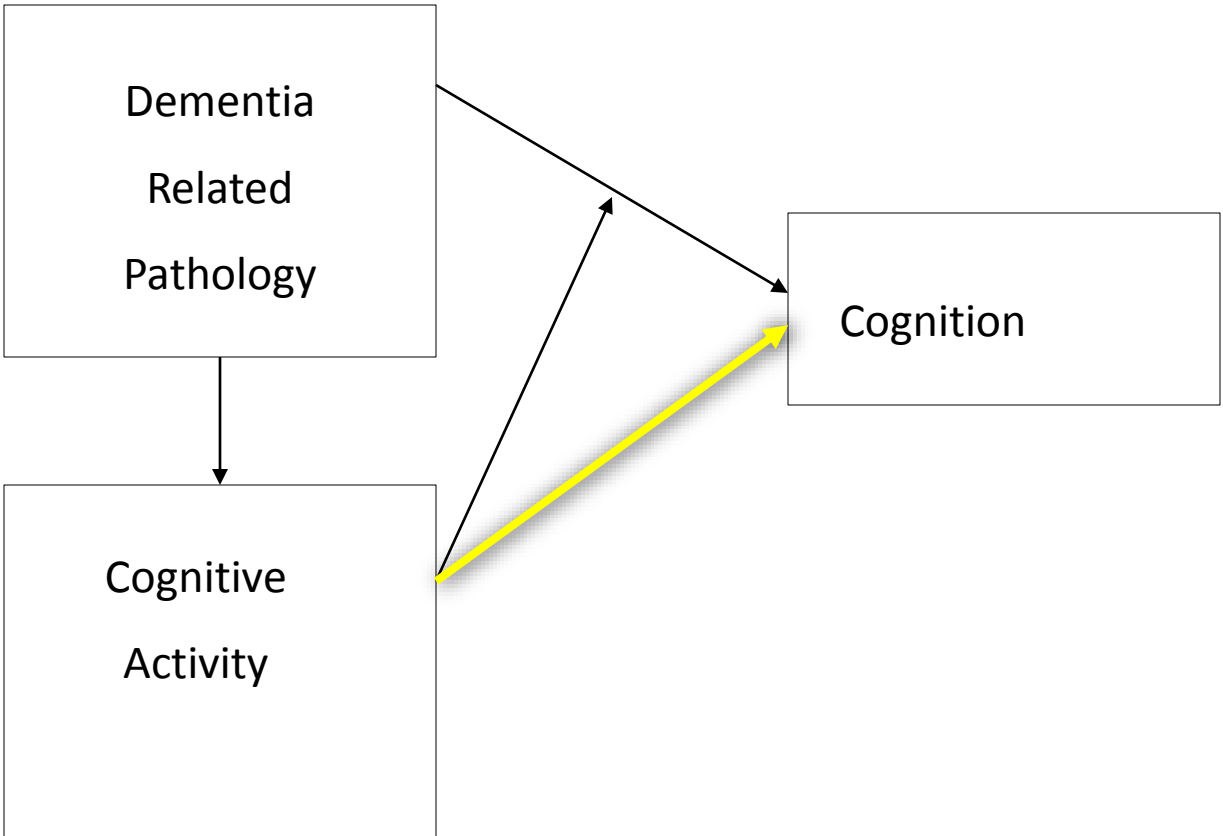
- No dementia at baseline
- Minimum of 1 year of follow-up
- Died, brain autopsy, neuropathologic examination
- Mean age at death : 89.3
- Mean education : 14.4
- Mean annual follow-ups: 5.8 years

### Early Life Cognitive Activity



### Late Life Cognitive Activity





# Conscientiousness

## ► Predicts:

- cognitive decline (Arch Gen Psychiatry 2007;64:1204-1212)  
(Am J Geriatr Psychiatry 2012;20:612-621)
- MCI (Arch Gen Psychiatry 2007;64:1204-1212)
- dementia (Arch Gen Psychiatry 2007;64:1204-1212)  
(Psychol Aging 2011;26:351-362)  
(Alz Dem 2014;10:179-186)



# Conscientiousness

309 individuals

- No cognitive impairment at baseline
- Minimum of 4 years of follow-up
- Died, brain autopsy, neuropathologic examination
- Mean age at death : 87.6
- Mean education : 18.2
- Mean annual follow-ups: 10.7 years

Table 1. Relation of Conscientiousness to Late-life Change in Global Cognition

Model term	Model A		Model B	
	Estimate	95% CI	Estimate	95% CI
Preterminal slope	-0.036	-0.046, -0.025	-0.024	-0.035, -0.012
Change point	-3.190	-3.558, -2.838	-2.849	-3.229, -2.462
Terminal slope	-0.369	-0.422 -0.317	-0.317	-0.382, -0.255
Conscientiousness x preterminal slope	0.005	-0.003, 0.013	0.002	-0.005, 0.010
Conscientiousness x change point	-0.015	-0.243, 0.218	-0.098	-0.309, 0.110
Conscientiousness x terminal slope	0.064	0.024, 0.103	0.057	0.019, 0.094
Random effects				
Var(intercept)	2.213	1.790, 2.511	1.491	1.246, 1.783
Var(preterminal slope)	0.003	0.002, 0.004	0.002	0.0018, 0.003
Var(change point)	3.314	2.539, 3.820	2.219	1.744, 2.788
Var(terminal slope)	0.060	0.045, 0.079	0.053	0.038, 0.072
Cov(intercept, preterminal slope)	0.049	0.036, 0.064	0.028	0.018, 0.038
Cov(intercept, change point)	2.037	1.656, 2.476	1.309	1.025, 1.637
Cov(intercept, terminal slope)	0.218	0.162, 0.286	0.182	0.134, 0.241
Cov(preterminal slope, change point)	0.051	0.034, 0.068	0.021	0.007, 0.034
Cov(preterminal slope, terminal slope)	0.002	0.0001, 0.005	0.002	-0.0002, 0.004
Cov(change point, terminal slope)	0.045	-0.025, 0.111	0.027	-0.030, 0.081

*Note.* From 2 mixed-effects change point models with terms for age at death, sex, and education; model B also had terms for neurofibrillary tangles, Lewy bodies, gross cerebral infarcts, and hippocampal sclerosis. CI, confidence interval.

Table 2. Interaction of Conscientiousness and Neuropathologic Conditions with Late-life Change in Global Cognition

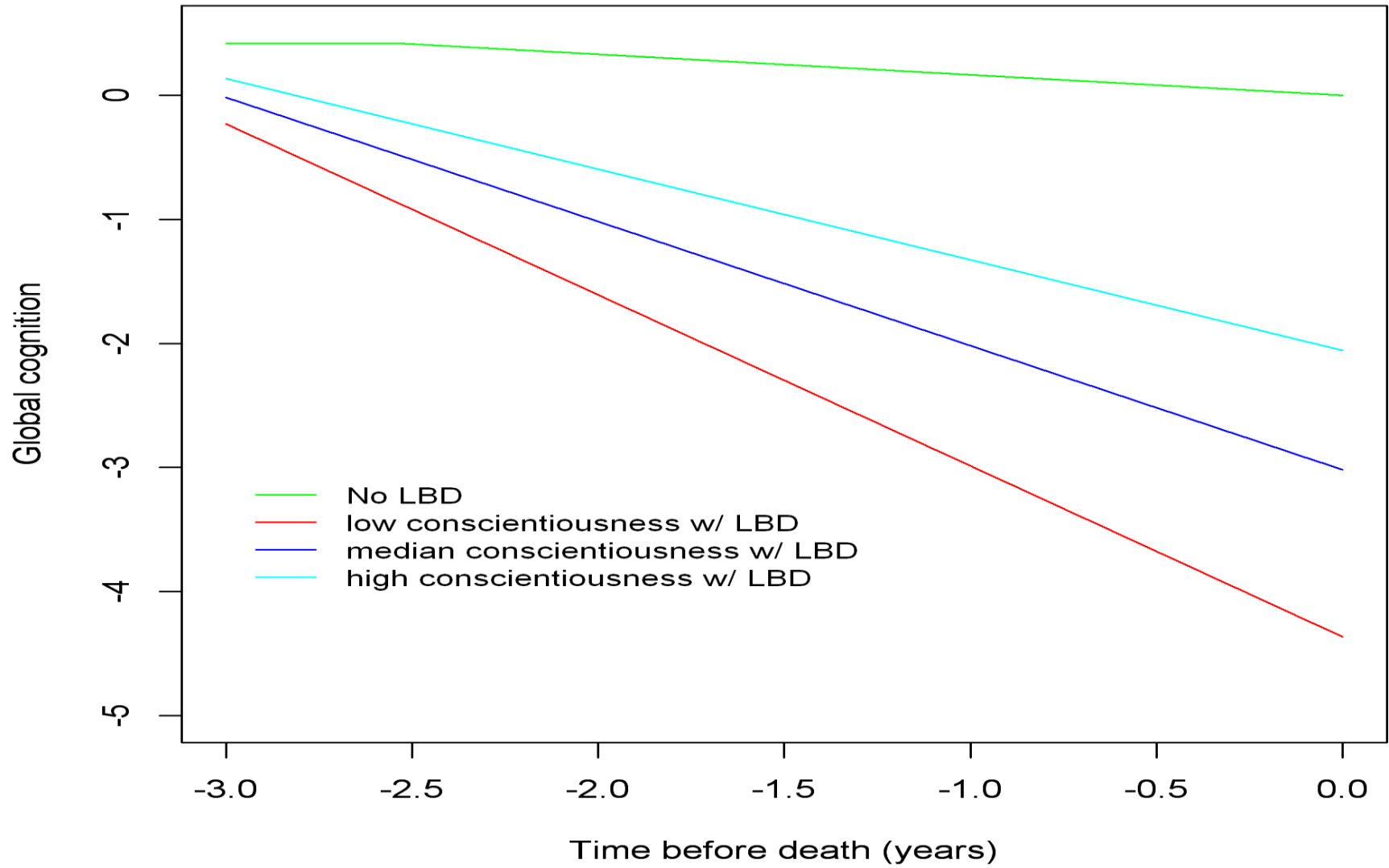
Model term	Estimate	95% CI
Conscientiousness x tangles x preterminal slope	-0.038	-0.110, 0.029
Conscientiousness x tangles x change point	-0.336	-1.851, 1.218
Conscientiousness x tangles x terminal slope	-0.276	-0.510, -0.051
Conscientiousness x Lewy bodies x preterminal slope	0.013	-0.029, 0.054
Conscientiousness x Lewy bodies x change point	0.659	-0.602, 1.892
Conscientiousness x Lewy bodies x terminal slope	0.284	0.079, 0.490
Conscientiousness x infarcts x preterminal slope	-0.016	-0.070, 0.039
Conscientiousness x infarcts x change point	0.885	-0.539, 2.369
Conscientiousness x infarcts x terminal slope	-0.017	-0.258, 0.225
Conscientiousness x hippocampal sclerosis x preterminal slope	-0.011	-0.065, 0.038
Conscientiousness x hippocampal sclerosis x change point	1.503	-0.067, 2.921
Conscientiousness x hippocampal sclerosis x terminal slope	-0.094	-0.304, 0.107

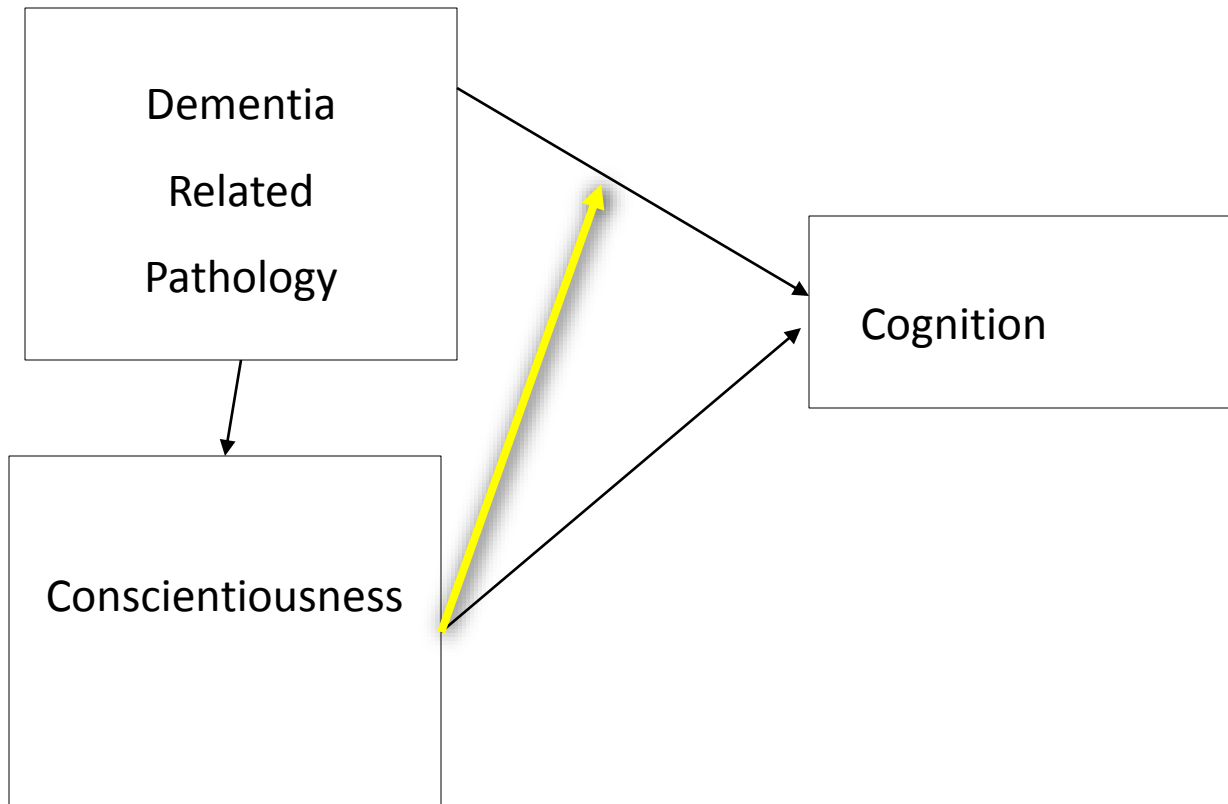
*Note.* From 4 mixed-effects change point models with terms for age at death, sex, education, neurofibrillary tangles, Lewy bodies, gross cerebral infarcts, and hippocampal sclerosis. CI, confidence interval.

Table 3. Interaction of Conscientiousness and Lewy Body Disease with Late-life Change in Global Cognition

Model term	Estimate	95% CI
Conscientiousness x nigral stage x preterminal slope	-0.003	-0.062, 0.057
Conscientiousness x nigral stage x change point	0.347	-1.511, 2.391
Conscientiousness x nigral stage x terminal slope	-0.076	-0.496, 0.595
Conscientiousness x limbic stage x preterminal slope	-0.044	-0.097, 0.006
Conscientiousness x limbic stage x change point	1.529	-0.116, 3.254
Conscientiousness x limbic stage x terminal slope	-0.131	-0.398, 0.156
Conscientiousness x neocortical stage x preterminal slope	0.030	-0.004, 0.065
Conscientiousness x neocortical stage x change point	-0.061	-1.028, 0.927
Conscientiousness x neocortical stage x terminal slope	0.280	0.116, 0.448

*Note.* From 3 mixed-effects change point models with terms for age at death, sex, education, neurofibrillary tangles, gross cerebral infarcts, and hippocampal sclerosis. CI, confidence interval.





# Conclusions

- There is much variability in cognitive aging due to factors other than dementia related pathologies, and some of this variability is associated with personality and lifestyle factors.
- Depressive symptoms and cognitive activity were each related to residual change in cognitive ability not attributable to pathology.
- The association of neocortical Lewy bodies with cognitive decline was reduced in those with higher levels of conscientiousness.
- Interventions targeting these factors may enhance late-life cognitive health.