



Ambulatory blood pressure variations relate to greater subjective cognitive decline in older adults: The Vanderbilt Memory & Aging Project

KA Gifford¹, D Liu¹, LR Samuels¹, X Han¹, EM Benson¹, LA Logan¹, TJ Hohman¹, EM Lane¹, EC Sumner¹, KM Wisniewski¹, ME Wiggins¹, M Godfrey¹, FL Ruberg², AL Jefferson¹

Vanderbilt Memory & Alzheimer’s Center, Vanderbilt University Medical Center, Nashville, TN, USA; ²Boston Medical Center, Boston, MA, USA



VANDERBILT MEMORY & ALZHEIMER’S CENTER

Background & Objective

- Subjective cognitive decline (SCD) may be a marker of prodromal Alzheimer’s disease but its relation to vascular disease is poorly understood.
- Ambulatory blood pressure (ABP) monitoring measures blood pressure (BP) intermittently and abnormal ABP values can indicate reduced vascular health.
- We examined whether ABP variability relates to SCD in older participants with normal cognition (NC) and mild cognitive impairment (MCI).

Methods

- Participant data were drawn from the Vanderbilt Memory & Aging Project, a case-control longitudinal study investigating vascular health and brain aging.
- At screening, participants were diagnosed with NC or MCI (Albert et al., 2011) via consensus conference following a comprehensive assessment.
- At enrollment 135 NC and 122 MCI participants completed a SCD protocol and 24-hour ABP monitoring capturing BP values every 30 minutes. See **Table 1** for participant characteristics.
- In addition to mean 24-hour measurements, systolic blood pressure (SBP) and diastolic blood pressure (DBP) data were coded based on time of day to capture wake and sleep intervals. From this information, nocturnal fluctuations were defined as:
 - Dipper (10-19% nocturnal decrease; normal)
 - Riser (>0% nocturnal increase; abnormal)
- The participant self-report SCD protocol included several questionnaires:
 - Cognitive Changes Questionnaire (derived from commonly-used and publically-available questions),
 - Cognitive Difficulties Scale,
 - Memory Functioning Questionnaire, and
 - Everyday Cognition.
- Total Complaint was calculated as the total sum of all four complaint questionnaires.

Table 1. Participant Characteristics

	NC n=135	MCI n=122	Total n=257
Age, years	73±7	73±7	73±7
Sex, % female	36	38	37
Education, years	16.4±2.5	15.5±2.8*	15.9±2.7
Race, % White	87	87	87
Geriatric Depression Scale, Total	2.2±2.6	4.2±3.9*	3.2±3.4
Diabetes, % yes	15	22	18
Cognitive Changes, Total	29±11	43±13*	36±14
Cognitive Difficulties, Total	28±18	45±23*	36±22
MFQ, Total	146±44	195±46*	169±51
Everyday Cognition, Total	52±12	67±20*	59±18
Total Complaint	253±77	352±91*	300±98
24 hour SBP, mmHg	129±11	129±11	129±11
24 hour DBP, mmHg	73±7	72±8	73±7
Awake SBP, mmHg	134±12	134±12	134±12
Awake DBP, mmHg	77±8	76±9	77±8
Sleep SBP, mmHg	119±13	122±12*	120±12
Sleep DBP, mmHg	65±9	66±8	66±8

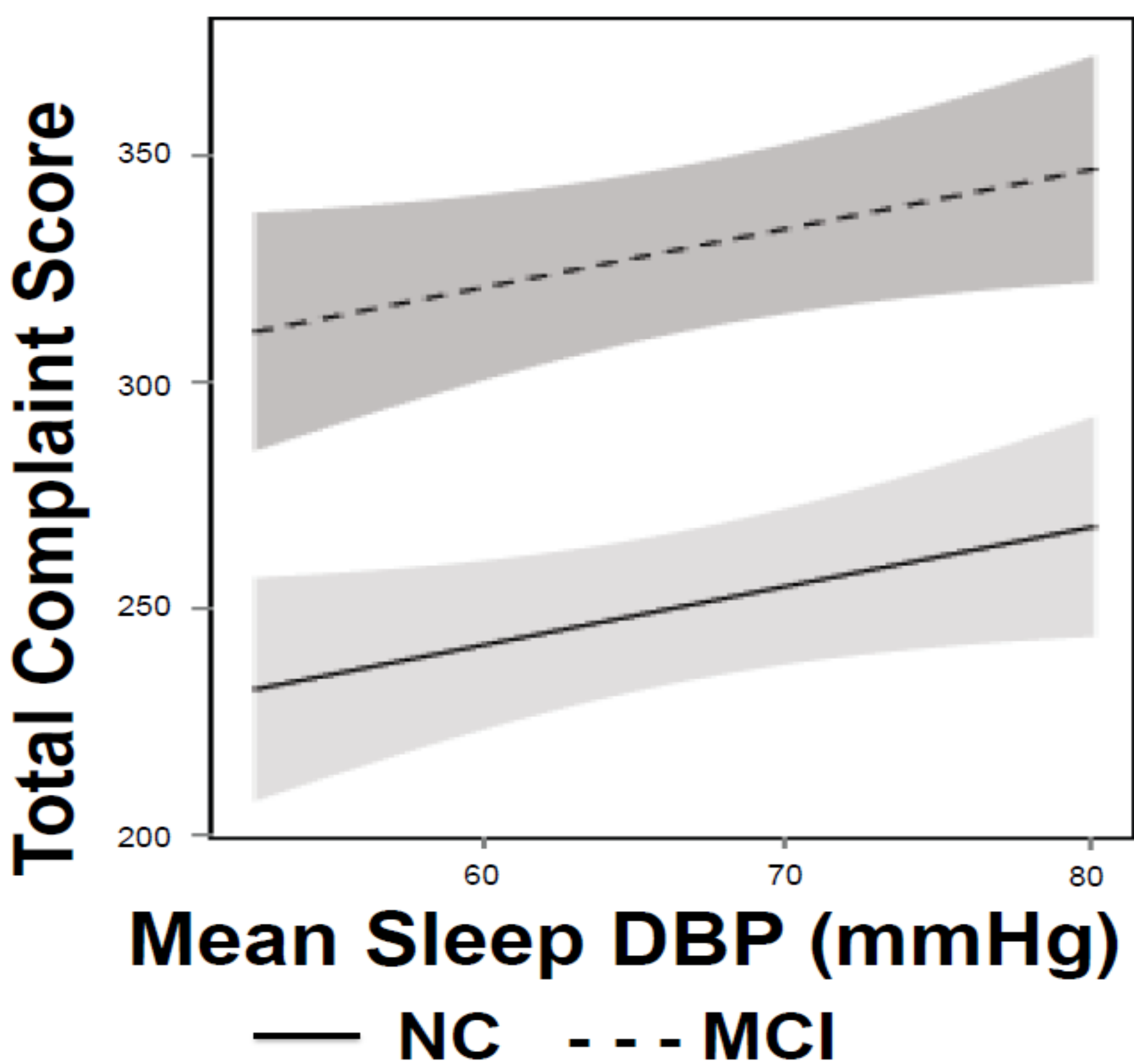
Note: *= $p<0.05$, data presented as mean \pm standard deviation or percent; MFQ=Memory Functioning Questionnaire; higher SCD scores represent increased SCD severity; SBP=systolic blood pressure; DBP=diastolic blood pressure

Table 2. Representative ABP & SCD Results

	SBP Sleep β	DBP 24-hour β	DBP Sleep β	DBP Sleep Risers** β
Total Complaint Score	0.46	1.18	1.30*	27.72
Cognitive Difficulties	0.16	0.36*†	0.37*†	9.40*
MFQ Frequent Forgetting	0.09	0.45*	0.40*	10.19*
Everyday Cognition (Ecog)	0.16*	0.36*	0.38*	4.42
ECog Organization	0.05*	0.06*	0.07*	1.34*
ECog Attention	0.02	0.05*	0.05*	0.13

Note: *= $p<0.05$; **referent group=dipping; †=cognitive diagnosis interaction $p<0.05$; MFQ=Memory Functioning Questionnaire; SBP=systolic blood pressure; DBP=diastolic blood pressure

Figure A. Sleep DBP & Total SCD



Analyses & Results

- Linear regressions, adjusting for age, sex, education, race, Geriatric Depression Scale total score and diabetes, cross-sectionally related ABP variables to each SCD measure.
- For models using the nocturnal fluctuation categories, ‘dipper’ served as the referent.
- Secondary analyses tested ABP x cognitive diagnosis interactions. See **Table 2** and **Figure A** for results.

Conclusions

- Abnormal variations in nocturnal BP and diastolic BP, reflecting compromised vascular health, related to greater SCD, particularly in individuals with MCI.
- Previous research suggests that both SCD and abnormal BP are each related to cognitive decline and diagnostic conversion, even in cohorts free of stroke and dementia.
- Taken together with the current results, individuals with SCD and poor vascular health may represent a target population for early detection and intervention.