

Letter to the Editor

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High-Normal Blood Pressure and Cognition: Supplying the Missing Data

To the Editor:

In the March 2008 issue of *Hypertension*, Knecht et al¹ report that high-normal blood pressure is associated with poor cognitive performance. Predicted means of a global cognitive performance measure were plotted against mean systolic blood pressure (BP; SBP) values for a sample (N=377; mean age: 64 years) defined by the following categories: <120, 120 to 130, 130 to 140, 140 to 150, 150 to 160, 160 to 170, and >170 mm Hg. Cognitive performance decreased from the lowest BP grouping to 160 to 170 mm Hg. This inverse linear relation between SBP and cognition has been described previously.²⁻⁴

Knecht et al¹ note that the inverse relation between SBP and cognition passes through the reference range of BP values (Figure 2), but they did not relate SBP to cognitive performance in analyses limited to only those persons within the reference range of systolic and diastolic BP values, analyses that are necessary to more precisely estimate the decrement in cognitive performance for persons within the normal BP range. Knecht et al¹ measured SBP and cognition concurrently at a single examination, a limitation that they note. Although data on several domains of cognitive performance were obtained, findings were reported only for a global composite score.

Using data from the Maine-Syracuse Longitudinal Study, we performed each of the missing analyses noted above. These analyses provide important additional support for the Knecht et al¹ finding.

Initiated in 1975, the Maine-Syracuse Longitudinal Study involves 6 waves of data collection on BP and BP-related risk factors in a community-based sample.³⁻⁵ In our analysis, we relate the average of all of the available SBP measurements from wave 1 through wave 6 (15 measurements per wave) to an expanded set of cognitive performance measures introduced at

wave 6 (2001–2007).⁵ We used 4 composite scores (cognitive domains) and a single measure of abstract reasoning (Similarities) based on previous factor analysis involving 17 individual cognitive measures.⁵

Excluding persons with a history of stroke (n=35), dementia (n=8), diastolic and/or systolic BP values outside the normal to high reference range (n=308), poor English skills (n=1), and previous alcohol abuse (n=1), data were available for 780 participants (mean age: 59.9 years [SD: 12.5]; mean education: 14.7 years [SD: 2.7]; 63.3% women; 42.4% treated with antihypertensive drugs at wave 6; and SBP range: 90 to 140 mm Hg [mean: 121 mm Hg; SD: 12.1 mm Hg]). Other sample characteristics have been described in detail previously.³ Antihypertensive drug treatment by BP interactions for all of the cognitive performance measures were nonsignificant ($P_s > 0.10$); thus, the treated and untreated individuals were combined in the analyses. Our statistical analyses included sets of covariates used by Knecht et al¹: (1) basic set (sex, age, and education); (2) basic set plus risk factors (body mass index plus alcohol consumption plus cigarettes plus total cholesterol); and (3) basic set plus risk factors plus antihypertensive drugs (yes or no).

The Table shows the relation between 10-mm Hg increments in mean SBP and cognitive performance in SD units. Increments in SBP were inversely related to the level of cognitive performance. The fewest number of cognitive variables related to performance was obtained with adjustment for the basic plus risk factor plus antihypertensive drug treatment model: global performance, verbal memory, and working memory.

Given that our analyses were confined to the participants with normal to high-normal BP, we can estimate decrements in cognitive performance relative to each 10-mm Hg increment in SBP. Using the basic model and global performance as an illustration, every 10-mm Hg increment in SBP was related to a 0.075-SD decrement in cognitive performance. The 95% CI was -0.12 to -0.02 . Our results indicate that SBP-related cognitive

Table. Regression Coefficients (β) and SEs Showing the Inverse Relation Between Mean SBP (in 10-mm Hg Increments) and Cognitive Performance Measures (z Scores)

Cognitive Domain	Basic Model		Basic+Risk Factors Model		Basic+Risk Factors+Treatment Model	
	β	SE	β	SE	β	SE
Global score	-0.075*	0.027	-0.070†	0.029	-0.061†	0.030
Verbal memory	-0.078*	0.030	-0.093*	0.032	-0.080†	0.034
Working memory	-0.093*	0.032	-0.080†	0.034	-0.075†	0.035
Abstract reasoning	-0.068†	0.031	-0.053	0.032	-0.032	0.034
Visual-spatial organization/memory	-0.063†	0.029	-0.061†	0.030	-0.054	0.032
Scanning and tracking	-0.009	0.027	0.002	0.028	0.003	0.030

* $P < 0.01$.

† $P < 0.05$.

The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Heart Lung and Blood Institute or the National Institutes of Health. This research was approved by the institutional review board of the University of Maine, and informed consent was obtained from all of the participants.

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deficits within the normal BP range are modest from a clinical perspective. However, even these small deficits are important in terms of attributed risk for lowered cognition in the population.

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Disclosures

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