

Associations Between Glycemic Control and Cognitive Performance in Older Adults

Mohib S. Haider¹, Justin M. Barber², Tian Yu Gao³, Stephen R. Dundon³, Amanda C. Glueck², Jordan P. Harp², Pinar Coskun^{1,2}, David K. Powell³, Linda J. Van Eldik², Larry B. Goldstein¹, Frederick A. Schmitt^{1,2}, Gregory A. Jicha^{1,2}, Ahmed A. Bahrani^{1,2}.

¹Department of Neurology, University of Kentucky, Lexington, Ky. ²Sanders-Brown Center on Aging, University of Kentucky, Lexington, Ky. ³Magnetic Resonance Imaging and Spectroscopy Center, University of Kentucky, Lexington, Ky.



Introduction

Cognitive decline has been associated with several metabolic and vascular risk factors. Glycated hemoglobin (A1C), a marker of long-term blood glucose control, may be related to cognitive performance and neurological health. This study examined the relationships between cognitive performance, gait velocity, and metabolic measures in older adults. Identifying accessible, noninvasive biomarkers of early cognitive vulnerability is a critical priority in aging research. Beyond traditional clinical and metabolic indicators, functional measures of mobility may reflect integrated neurological, vascular, and musculoskeletal integrity. Gait velocity is proposed as a potential functional biomarker of brain health, but its independent relationship to cognitive performance relative to common clinical risk factors is incompletely characterized. We evaluated whether gait velocity can serve as an independent biomarker of cognitive performance in older adults after accounting for age, blood pressure, and diabetes status.

Key Findings

- Higher A1C associated with lower cognition
- A1C remained significant after adjustment
- Velocity correlated with cognition but was not independently predictive.

Methods

Participants completed a standardized gait assessment at the University of Kentucky, where walking velocity and spatiotemporal gait parameters were collected. Cognitive performance was measured using a timed animal-naming task. Diabetes status and blood pressure were obtained from clinical records. Hierarchical linear regression models examined associations with cognitive performance. In Step 1, age, biological sex, systolic and diastolic blood pressure, and diabetes status were entered as covariates. In Step 2, gait velocity was added to assess its incremental predictive value as a functional biomarker.

Results

Data from Year 1 and Year 2 visits were combined for analysis. Spearman correlation analyses demonstrated a negative association between A1C and cognitive performance (MoCA Total Score; $r = -0.17$). A positive association was observed between gait velocity and cognitive performance ($r = 0.31$), while glucose showed little association with cognition ($r = -0.04$).

Multiple linear regression was performed using MoCA Total Score as the dependent variable and A1C, age, sex, and education as predictors. A1C was significantly associated with cognitive performance ($\beta = -1.78$, $p = 0.036$), whereas age, sex, and education were not significant predictors. The overall regression model explained a small proportion of variance in cognitive performance ($R^2 = 0.03$).

Association Between A1C and MoCA Score

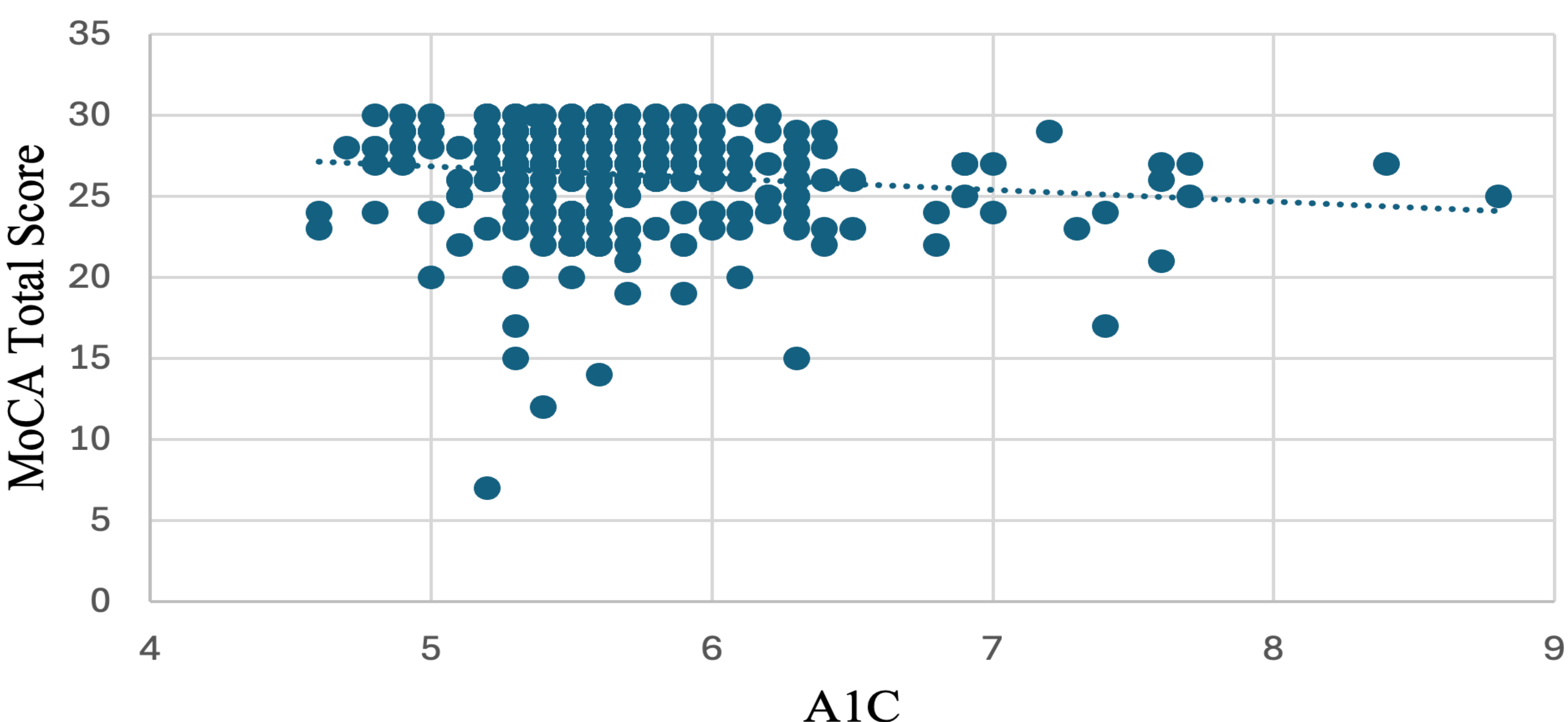


Figure 1. Relationship between A1C and MoCA Total Score. Higher A1C levels were associated with lower cognitive performance (Spearman $r = -0.18$)

Predictor	β	p-value
A1C	-1.78	0.036
Age	0.016	0.812
Sex	0.16	0.853
Education	-0.017	0.964

Table 1. Spearman correlation coefficients between cognitive performance (MoCA Total Score) and clinical variables. A weak negative association was observed between A1C and cognition ($r = -0.18$), while gait velocity demonstrated a moderate positive association with cognitive performance ($r = 0.31$).

Spearman Correlations

Variables	r
MoCA vs A1C	-0.18
MoCA vs Velocity	0.31
MoCA vs Glucose	-0.04

Table 2. Multiple linear regression analysis predicting cognitive performance (MoCA Total Score) from A1C, age, sex, and education. A1C was the only significant independent predictor of cognition ($\beta = -1.78$, $p = 0.036$) after adjustment for demographic covariates.

Conclusions

Long-term glycemic control, as measured by A1C, was independently associated with cognitive performance in this cohort. These findings suggest that metabolic health may be an important factor related to cognitive outcomes in older adults.

References

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Acknowledgments

We are grateful to the colleagues and research participants who made this study possible. This work was partially supported by the National Institute on Aging P30AG072946 and P30AG028383..