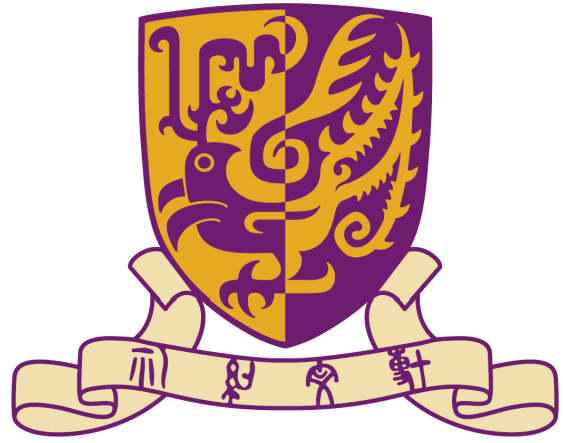


Brain Health Score: A Culturally Adapted Modifiable Risk Assessment Tool for Cognitive Impairment



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☆Culturally adapted Brain Health Score showed a strong association with cognitive impairment in Asian older adults.

☆ Each one-point Brain Health Score increase reduced cognitive impairment odds by 27.6% after adjustment for demographic confounders.

Introduction

Up to 45% of dementia cases may be attributable to modifiable lifestyle risk factors, yet existing risk assessment tools were mainly developed in Western populations. We aim to establish a culturally adapted Brain Health Score (BHS) and investigated its associations with cognitive impairment among Asian elderly.

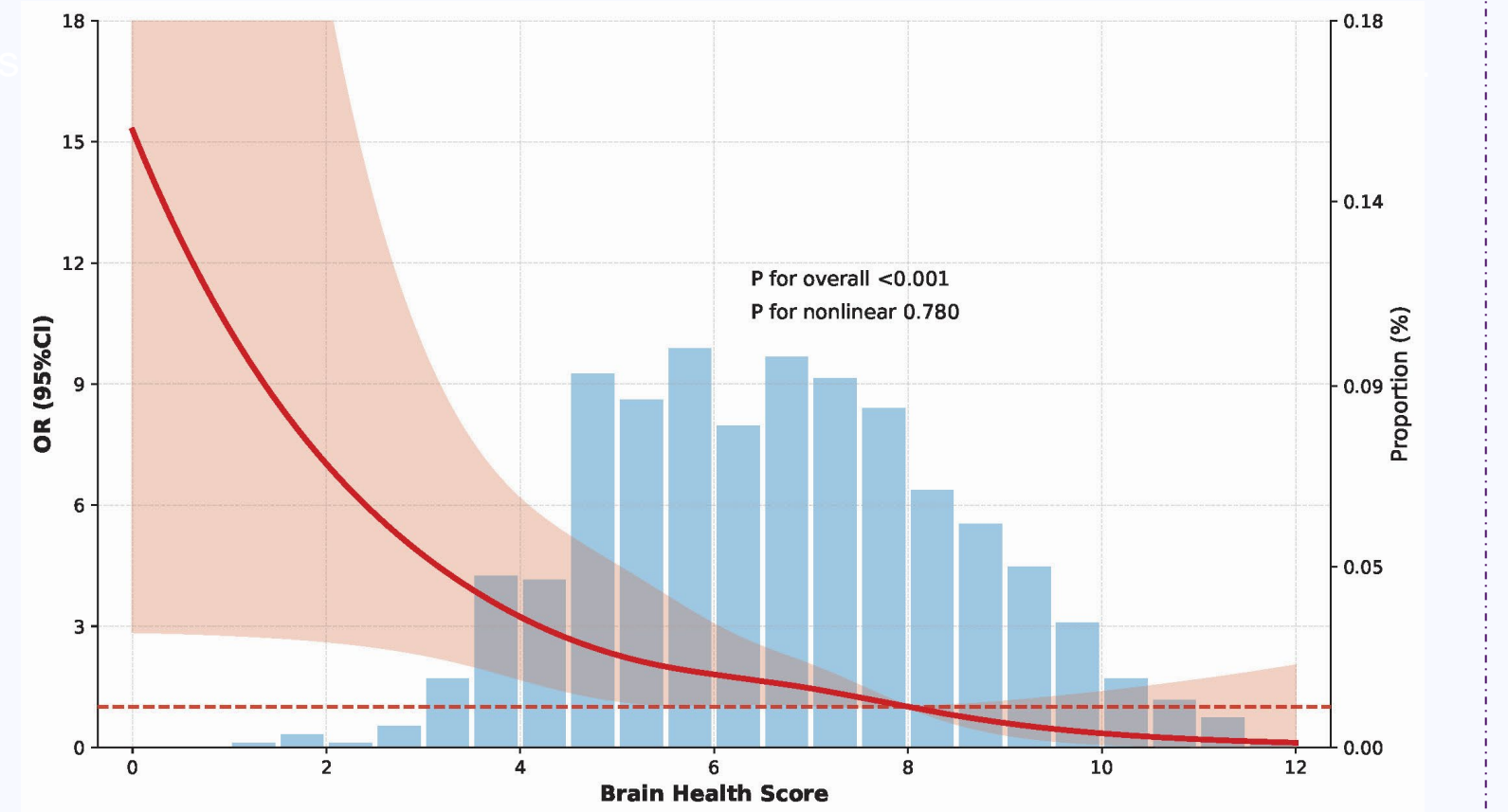
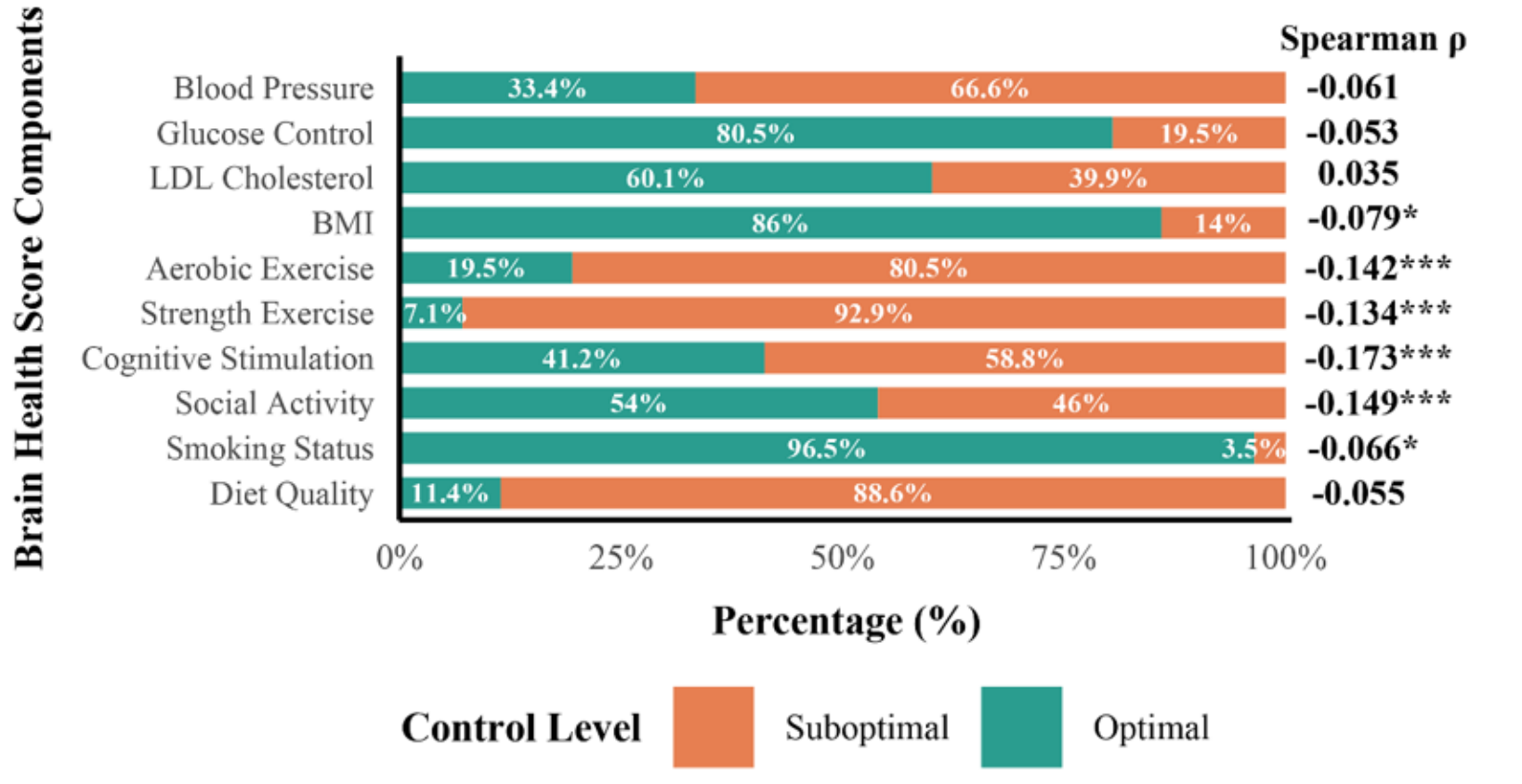
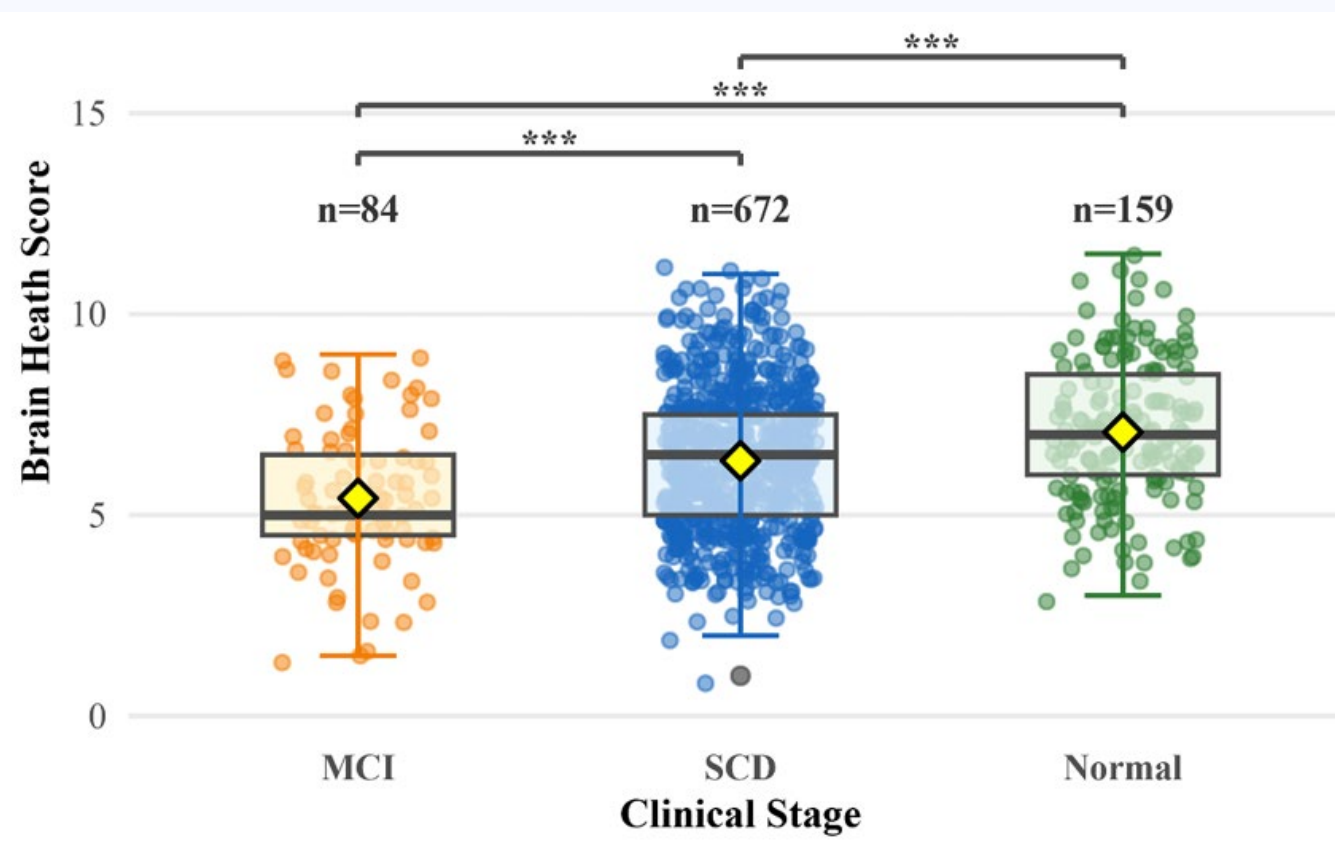
Method

We enrolled community-dwelling adults aged 60-80 years from the Brain Health Evaluation and Tailor-made Measures for Prevention of Alzheimer's Disease (BEAT AD) study. Cognitive status was assessed using MoCA-5 and modified AD8, with participants categorized into normal cognition, subjective cognitive decline (SCD), mild cognitive impairment (MCI), and dementia. The cognitive impairment (CI) group included those diagnosed as MCI and dementia. The BHS (0-12 points) quantified modifiable factors across vascular risk, physical activity, cognitive/social engagement, and diet. Cultural adaptation was made according to local culture in standardize assessment protocol. We examined the associations between baseline BHS and CI. We also investigated whether low BHS are associated with social economic factors and retinal-based brain health assessment (i-Cog Brain Health).

Results

Among 915 subjects (age: 68.2±5.1, 65.7% female), Brain Health Scores decreased across cognitive stages: normal cognition (7.1±1.8), subjective cognitive decline (6.4±1.8), and mild cognitive impairment (5.4±1.7). After adjusting for age, sex, education level, family income, family history of cognitive impairment, each one-point increase of Brain Health Score reduced the odds of cognitive impairment by 27.6% (OR=0.724, p<0.001). Restricted cubic spline analysis revealed an approximately linear significant association between Brain Health Score and odds of cognitive impairment. In the intervention subgroup, the Brain Health Score-improved group achieved an additional 0.864 MoCA points annually (p=0.013).

Variable	Total (N=915)	CI (n=84)	CU (n=831)	P-value
Age, years	68.2 ± 5.1	69.3 ± 4.7	68.1 ± 5.2	0.040
MoCA-5 score	25.4 ± 3.9	17.8 ± 4.0	26.2 ± 2.9	<0.001
Brain Health score	6.4 ± 1.9	5.4 ± 1.7	6.5 ± 1.8	<0.001
Female, n (%)	601 (65.7)	48 (57.1)	553 (66.5)	0.108
Education level, n (%)				<0.001
0 - 3 years	35 (3.8)	3 (3.6)	32 (3.9)	
4 - 6 years	130 (14.3)	24 (28.6)	106 (12.8)	
7 - 9 years	162 (17.8)	19 (22.6)	143 (17.3)	
10 - 12 years	307 (33.7)	20 (23.8)	287 (34.7)	
> 12 years	277 (30.4)	18 (21.4)	259 (31.3)	
Monthly family income, n (%)				0.022
≤ HKD \$10000	341 (37.6)	32 (38.6)	309 (37.5)	
HKD \$10001 - 20000	187 (20.6)	20 (24.1)	167 (20.3)	
HKD \$20001 - 30000	116 (12.8)	6 (7.2)	110 (13.4)	
HKD \$30001 - 40000	48 (5.3)	1 (1.2)	47 (5.7)	
HKD \$40001 - 50000	32 (3.5)	0 (0.0)	32 (3.9)	
≥ HKD \$50001	59 (6.5)	5 (6.0)	54 (6.6)	
Unable to disclose	123 (13.6)	19 (22.9)	104 (12.6)	
Family history of cognitive impairment, n (%)	214 (23.6)	13 (15.5)	201 (24.4)	0.089



Conclusion

The BHS represents a culturally adapted tool that shows strong associations with cognitive performance across different stages of cognitive decline in Asian elderly populations. Large multicentre cohort studies are needed to validate the generalizability of BHS across diverse healthcare settings.

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