

Rural Living Experience as a Determinant of Rapid Naming Performance in Chinese Adults

P1-001

Tianyu Gao¹, Wei Wu¹, Yapeng Liu¹, Anna Yao², Zhe Wang³, Chen Chen¹, Yuexin Ma⁴, Yifei Gao⁴, Yu-Wen Cheng², Yu Chen², Jee Eun Sung⁵, Katherine L. Possin², Elena Tsoy², Changshu Chen⁶, Maria-Luisa Gorno-Tempini², Boon Lead Tee^{2*}, **Guoyu Zhou^{1,7*}**

1 Department of Neurology, Qilu Hospital of Shandong University, Jinan, China; 2 Department of Neurology, Edward and Pearl Fein Memory & Aging Center, University of California, San Francisco, CA, USA; 3 School of Acupuncture and Tuina, Shandong University of Traditional Chinese Medicine, Jinan, China; 4 Cheeloo College of Medicine, Shandong University, Jinan, China; 5 Department of Communication Disorders, Ewha Womans University, Seoul, Korea; 6 School of Chinese Language and Literature, Shandong Normal University, Jinan, China; 7 Department of Geriatric Medicine, Qilu Hospital of Shandong University, Jinan, China

KEY MESSAGE: Rural living experience independently predicts worse rapid naming performance in cognitively healthy Chinese adults — an effect specific to language-dependent cognition, robust across naming indices, and not explained by education or socioeconomic factors.

INTRODUCTION & OBJECTIVES	METHODS	RESULTS	CONCLUSIONS	REFERENCES & CONTACT
Background Naming tests are key markers of early neurocognitive dysfunction in Alzheimer's disease. Performance reflects not only brain health but also lifelong sociocultural and language experience. ~3.5 billion people live in rural areas globally (~500 million in China) — yet the impact of rural living on naming performance is largely unexplored. Research Gap Most RNT norms derive from urban, highly educated cohorts. Applying these tools to rural individuals may introduce systematic bias and misclassification. Objectives - Evaluate psychometric properties of the RNT-C - Examine associations between rural residence ratio and naming performance - Determine domain specificity (language vs. non-verbal cognition) - Assess moderating and mediating role of education Hypothesis Greater rural living exposure will independently predict worse rapid naming performance, with effects more pronounced in language-dependent than non-verbal tasks.	Participants ► n = 93 cognitively healthy Chinese adults (age ≥50, MMSE ≥27), recruited Jan–Dec 2025, Qilu Hospital, Shandong University. ► Age: 55 (53–59) yrs Female: 60.2% ► Education: 11 (9–12) yrs ► Rural residence ratio: 0.24 (0.00–0.42) Range: 0–1 Rural Living Exposure (Key Predictor) ► Rural residence ratio = cumulative rural years / current age ► Continuous (0–1), based on NBS China urban–rural classification. Cognitive Measures ► RNT-C (primary): Total score, total time, 1st-min correct, 1st-min accuracy ► MMSE — global cognition ► Design Fluency — non-verbal executive function (n=84) Statistical Analyses - Spearman rank correlations - Multivariable linear regression (adjusted for sex, education, occupation, income, MMSE) - Moderation: education × rural proportion interaction - Bootstrap mediation (2,000 resamples) - R v4.4.3; α = 0.05	Psychometrics: Cronbach's α=0.83, split-half=0.82. Total score correlated with MMSE (ρ=0.27, p=0.009) but not Design Fluency (ρ=0.17, p=0.125), consistent with language domain specificity. Figure 1. RNT-C outcomes vs Rural Residence Ratio Figure 2. Reference measures vs Rural Residence Ratio By contrast, rural proportion was weakly correlated with MMSE (ρ=0.22, p=0.035) and non-significantly with Design Fluency (ρ=0.11, p=0.343), suggesting domain specificity. Figure 3. Domain Specificity — Standardized β across six outcomes Multivariable Regression: After adjustment for sex, education, occupation, income, and MMSE, rural proportion remained a significant independent predictor of all four RNT-C outcomes (β =0.26–0.54, all p≤0.036), but not MMSE (β=–0.22, p=0.086) or Design Fluency (β=0.003, p=0.982). Effects are language-domain specific. Table. Mediation analysis: education as mediator Indirect effects of rural proportion via education were non-significant for all outcomes (all p≥0.080). Despite this, direct effects on all four RNT-C outcomes remained statistically significant (p=0.015 to p<0.001), indicating that rural living effects on naming performance are not mediated by years of education.	Key Findings - RNT-C: good reliability (α=0.83) and domain-specific validity. - Rural living independently predicts worse naming: lower accuracy, fewer items, slower completion. - Effects are language-specific: prominent for RNT-C, absent for Design Fluency, attenuated for MMSE. - Education does not moderate or mediate — effects operate beyond formal schooling. - Findings highlight a potentially underrecognised source of bias in language-based cognitive tests used in clinical and research settings. Clinical & Research Implications - Naming norms derived from urban populations may not generalise to individuals with rural living experience. - Sociocultural and environmental context should be incorporated into cognitive test interpretation to avoid misclassification. - Future normative studies should include rural-representative samples and characterise environmental exposures across the life course. Limitations - Cross-sectional design; causal inference limited - Single province (Shandong); generalisability uncertain - Language environment not directly measured (multilingual exposure) - Developmental 66-item RNT-C; final version pending validation Future Directions <i>Longitudinal studies, diverse Chinese-speaking populations, direct measurement of language exposure, and RNT-C psychometric refinement.</i>	Selected References - Stiver J et al. Clin Neuropsychol. 2021;36:1822–43. - Atkins KJ et al. Alzheimers Dement. 2025;17:e70216. - Gorno-Tempini ML et al. Neurology. 2011;76:1006–14. - Robbins RN et al. Curr Opin Psychiatr. 2019;32:210–17. - Jia J et al. Alzheimers Dement. 2013;10:1–9. - Payne BR et al. Neuropsychol Cogn. 2012;19:122–49. - Weden MM et al. Am J Prev Med. 2018;54:164–72. Acknowledgements We thank all participants and research staff at Qilu Hospital, Shandong University and UCSF Memory & Aging Center. Statistical note: *p<0.05, **p<0.01, ***p<0.001. Regression models adjusted for sex, education, occupation, income, MMSE. Age excluded (collinearity with rural proportion). Bootstrap CIs: 2,000 resamples. Correspondence Guoyu Zhou zhouguoyu@sdu.edu.cn Qilu Hospital, Shandong University, Jinan, China Boon Lead Tee BoonLead.Tee@ucsf.edu UCSF Memory & Aging Center, San Francisco, USA