Early Reading Challenges Forecast Later-Life Literacy Independent of Global Cognitive Impairment

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Background

Early-life reading challenges often persist as subtle literacy gaps in adulthood, but it remains unclear how these experiences shape cognitive reserve across the lifespan. We used a short elementary sub-set of the Adult Reading History Questionnaire (ARHQ)—eight childhood items scored 0–4 and scaled to a 0–1 proportion (higher = more early difficulty)—to index past reading challenges. The NIH Toolbox Oral Reading Recognition Test (TORRT) provides an age-corrected standard score for single-word reading, a crystallized language skill that may buffer against global cognition shifts in later life. We asked whether this brief ARHQ elementary proportion score predicts TORRT in older adults aged 50+ and whether that link holds after accounting for global cognition (MoCA) and demographics.

Aims

(1) Quantify ARHQ→TORRT association in adults aged 50+.
(2) Test whether association persists after adjusting for age, gender, race, and years of education.
(3) Sensitivity: verify robustness when adding MoCA (continuous) and explore group differences across ARHQ tertiles.

Methods

- Cross-sectional OLS models with HC3 robust SEs in a of 50+ adults from the ABC@USC cohort (N = 165)
- Primary model: (ORR_z ~ ARHQ_z + age + years_education + gender + race)
- We report standardized betas reported by z-scoring ARHQ/TORRT to express “per-SD” change, with point differences shown in figures for readability.

Table 1. **Sample Characteristics N= 165**

Age (years)	Mean (SD)	**64.5** (7.4)
	Range	**50–80**
Gender n (%)	female	**122** (74%)
	male	**42** (26%)
	prefer not to say	**1** (0.6%)
Race n (%)	White	**135** (82%)
	Black	**29** (18%)
	Multiracial	**1** (0.6%)
Education n (%)	Elementary	**1** (0.6%)
	High School	**25** (15%)
	College	**70** (42%)
	Graduate	**42** (26%)
	Post-Grad	**27** (16%)
MoCA (total score)	Mean (SD)	**26.4** (2.8)
	Range	**14–30**
TOORT (standard score)	Mean (SD)	**113** (16.2)
	Range	**67–144**
ARHQ (proportion score)	Mean (SD)	**0.28** (0.13)
	Range	**.125–.750**

Results

- In the primary model (ORR_z ~ ARHQ_z + age + education + gender + race), higher ARHQ (more childhood difficulty) predicted lower ORR (β = −0.40, 95% CI −0.50 to −0.30, p < .001; Adj-R^2≈.46).
- Adding MoCA barely changed the ARHQ slope (β = −0.37, 95% CI −0.47 to −0.27, p < .001; Adj-R^2≈.48), indicating that ARHQ captures literacy-specific history rather than global cognitive status.
- Converting to points: ≈ 6 points lower TORRT per +1 SD worse ARHQ (95% ≈ −7.6 to −4.4).

Figure 1.

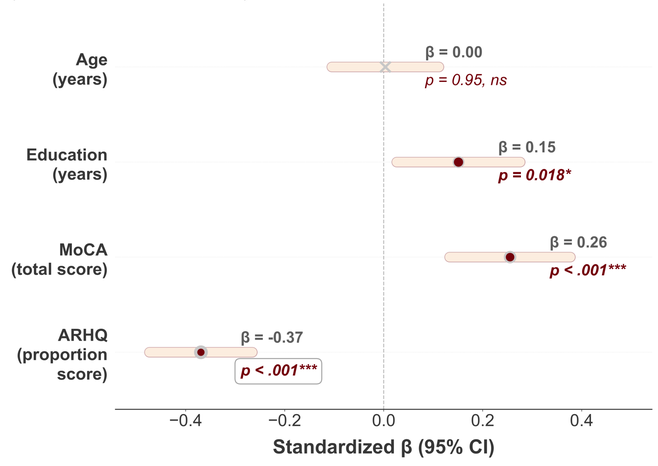
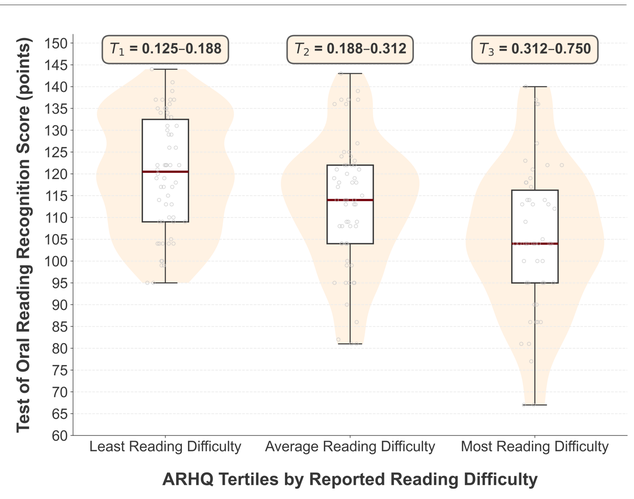


Figure 2.

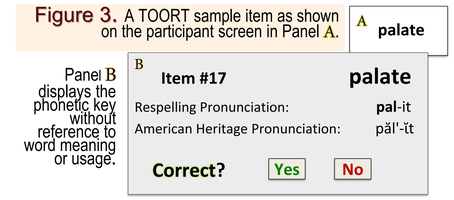


- ARHQ tertiles show a clear gradient: Least Reading Difficulty median ≈ 121 vs. Most Reading Difficulty median ≈ 104 (−17 points).

Discussion

Study take-aways are straightforward and clinically resonant: more early reading difficulty → lower later-life reading scores, after accounting for demographics and MoCA. This aligns with literature showing that reading differences persist into adulthood—sometimes masked by compensation or reduced print exposure that depresses recognition of low-frequency or irregular words. Note: TOORT items vary in length (2-14 letters), orthographic regularity (e.g., "ship" vs. "yacht"), age of acquisition (e.g., "face" vs. "visage"), and frequency (e.g., "help" vs. "succor"), but exclude jargon (e.g., "polymerase") and words with multiple acceptable pronunciations (e.g., "route," "read," "lead").

Figure 3. A TOORT sample item as shown on the participant screen in Panel A.



Panel B displays the phonetic key without reference to word meaning or usage.

Correct pronunciation is the sole criterion used by trained examiners in scoring the computer adaptive test (CAT) items.

The added value of ARHQ independent of MoCA argues for a dual-screen approach in aging and memory clinics: MoCA for global status and ARHQ to index literacy-specific risk.

References

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