

Introduction

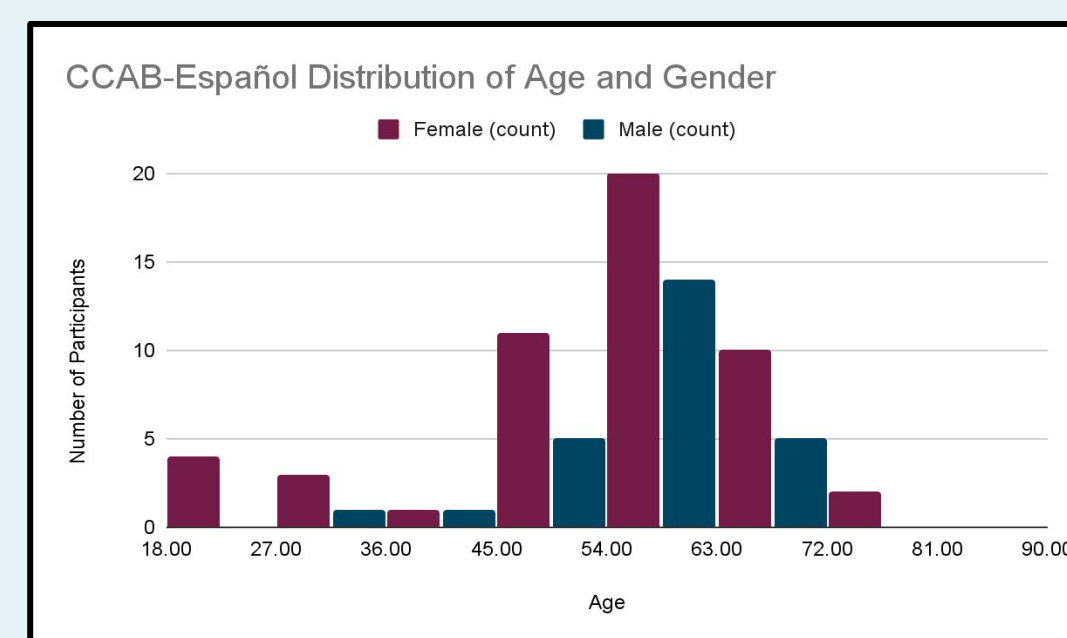
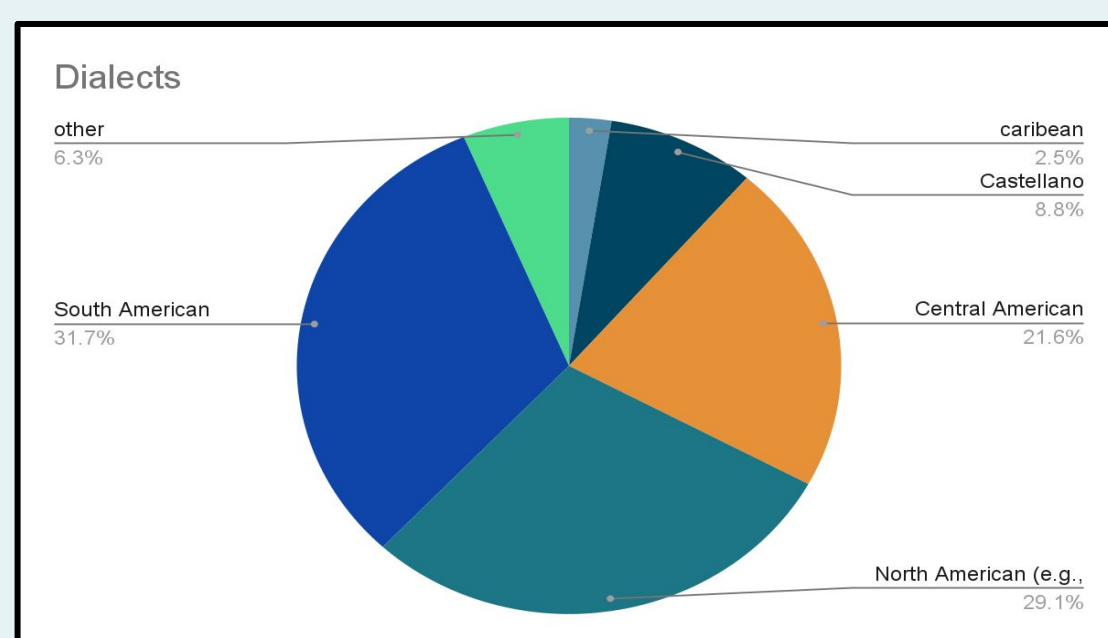
Hispanics are considered the largest minority group in the U.S., with a projected increase by 2060 from 59 million to 119 million [1]. Correspondingly, the incidence of ADRD is predicted to increase 6-fold in the US Hispanic population by 2060 [2]. However, cognitive testing of US Hispanics is complicated by limited Spanish-language test materials, lack of regional/dialectal representation, biased test standardization, and a dearth of examiners fluent in Spanish. Here, we present preliminary results from an automated computerized battery, CCAB–Español, that administers and scores verbal and non-verbal tests in Spanish.

Development

CCAB Español: CCAB is a computerized, standardized cognitive test battery designed for at-home use, featuring automated real-time scoring and supported by longitudinal data from over 1,000 participants. CCAB-Español, currently in its preliminary norming phase with 79 participants, replicates the English version to ensure reliability. It accounts for dialectal and regional variations among Spanish speakers, with translations by native and proficient Spanish speakers. The stimuli incorporate unique linguistic features of Spanish. The normative sample includes diverse Spanish-speaking adults, both bilingual and monolingual, with all materials—advertisements, emails, consent forms, and instructions—carefully translated for accessibility.

Methods

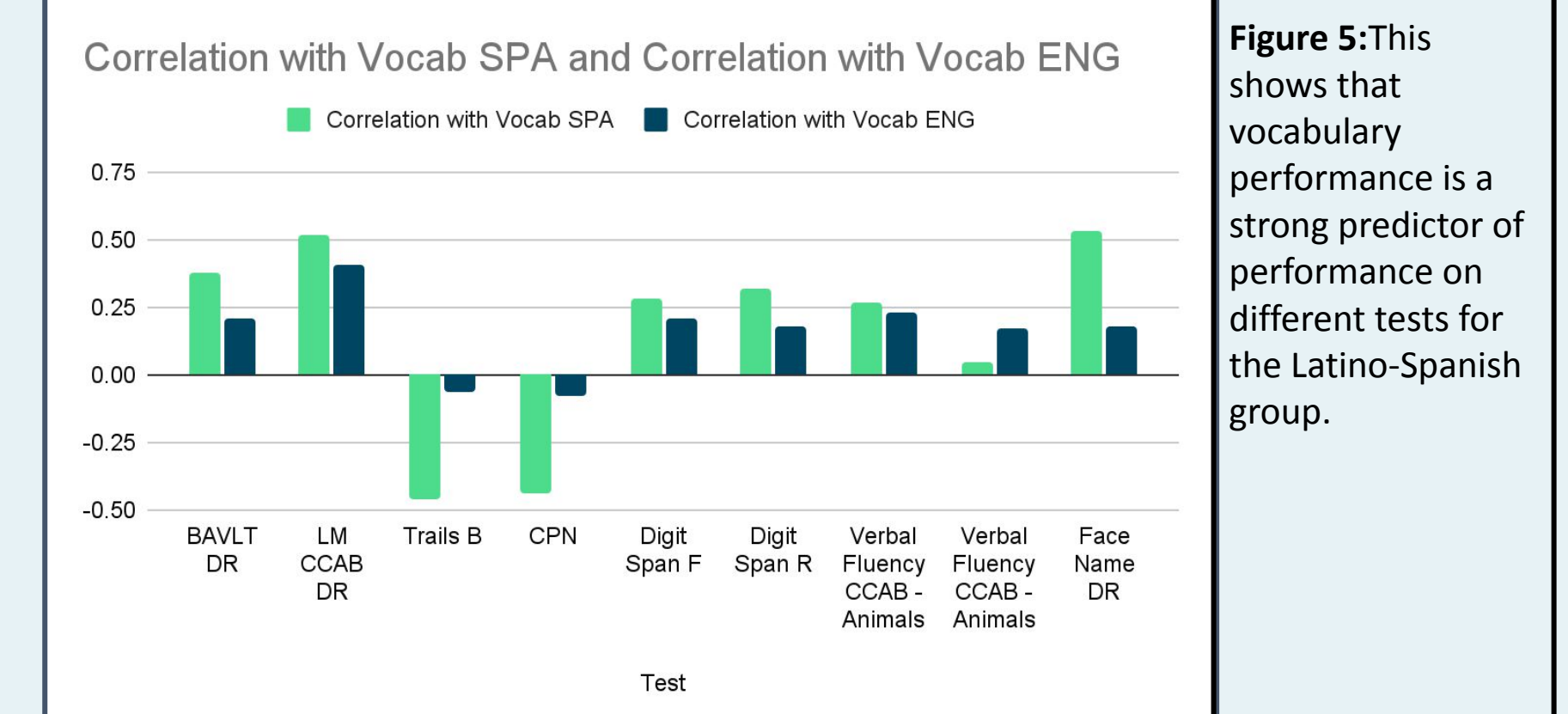
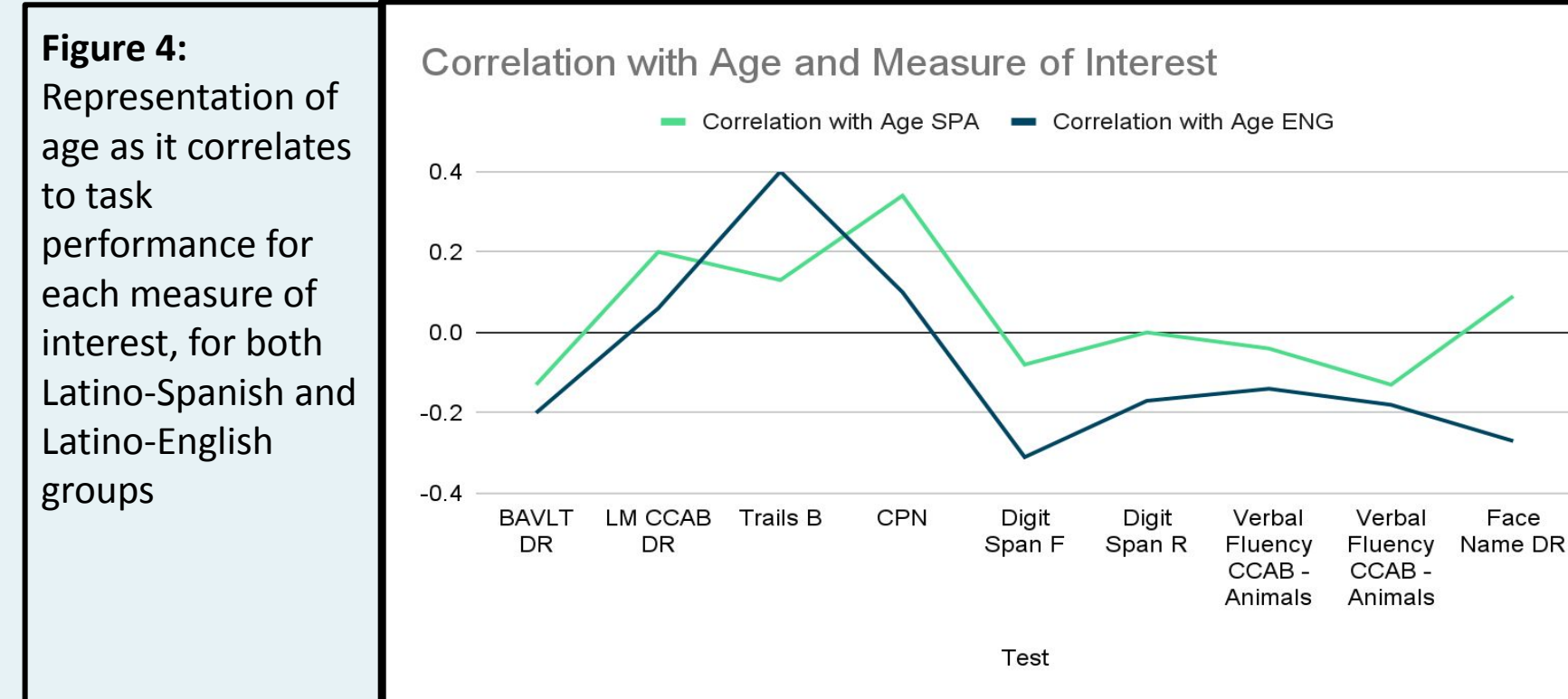
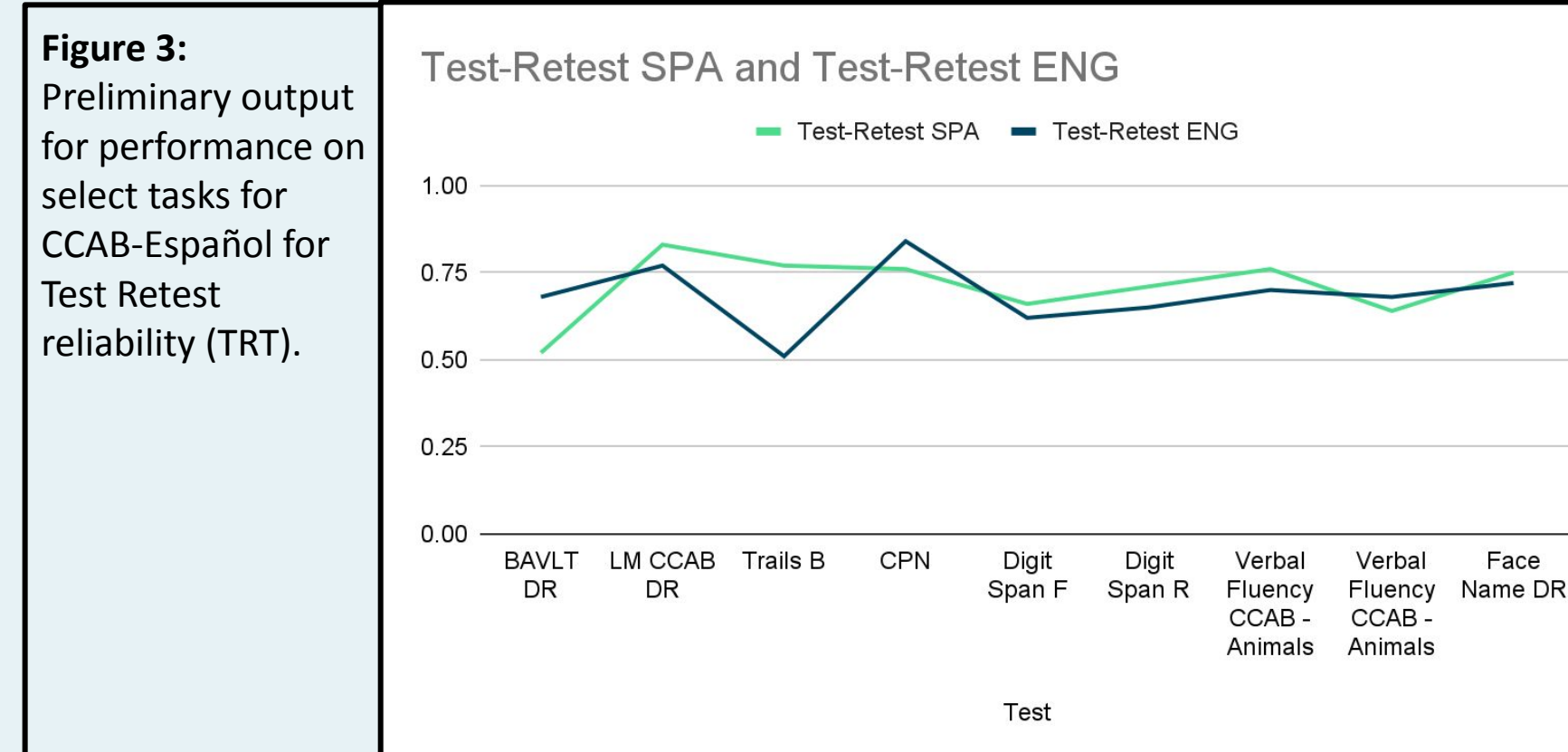
Participants: Participants (n=79; age 18-79; 60% women). Among the participant sample, 22% Central American, 4% Caribbean, 3% Spanish, 25% Mexican, 32% South American, 14% other



Technology: Tests were administered in participants' homes and remotely monitored by Spanish-speaking examiners. Verbal tasks were objectively scored using Consensus Automatic Speech Recognition (CASR). Selected tests were administered twice to assess test-retest reliability.

Task: Each participant was asked to complete 32 unique tests over three days, including verbal, visual, memory, and processing speed tests, as well as demographic, general health and psychological questionnaires.

Results



Group	Test Failures (%)	Test Duration (m)
Spanish	0.015	177.6
English	0.007	152.1

Figure 3: Preliminary output for performance on select tasks for CCAB-Español for Test Retest reliability (TRT).

Figure 4: Representation of age as it correlates to task performance for each measure of interest, for both Latino-Spanish and Latino-English groups

Figure 5: This shows that vocabulary performance is a strong predictor of performance on different tests for the Latino-Spanish group.

Table 1: Overall test failure rate for both Latino-English and Latino-Spanish groups were <2%. Also shown are average test durations for both groups, not including the intro, progress updates and breaks.

Summary

Reaction times, response accuracy, error types, and speech metrics were collected and analyzed. Participant satisfaction was high, with 100% completing all testing days.

- Reliability:**
 - Tests demonstrated excellent test-retest reliability. For example, the delayed recall on a story recall task had a test-retest value of $r = .83$.
 - The test-retest reliability scores for CCAB-Español strongly correspond to the English version, indicating consistent measures across both assessments.
- Performance Indicators:**
 - Vocabulary task performance was a strong indicator of performance on other tests.

Discussion

Ongoing normative data collection indicates that CCAB-Español is an efficient and scalable platform for cognitive assessment of US Spanish speakers. While significant efforts were made for standardization and translation accuracy, further development is needed.

- Normative Sample Size:**
 - Spanish speakers: 79
 - English speakers: 101
 - Small sample size for Spanish speakers may affect output values compared to English sample.
- Data Collection Needs:**
 - More data is required to address distribution differences and increase sample diversity.
- Preliminary Findings:**
 - CCAB-Español shows high accuracy and reliability for cognitive assessment.
 - Minimal issues observed in the overall assessment.

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References

- [1] Morlett Paredes, A., et al. (2021) DOI: <https://doi.org/10.1080/13854046.2020.1729866>
- [2] Matthews, K. A., et al. (2019) DOI: <https://doi.org/10.1016/j.jalz.2018.06.3063>
- [3] Woods, D., et al. (2024) <https://doi.org/10.3389/fnhum.2023.1305529>

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