A Lifespan Longitudinal Analysis of Receptive Language Ability

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Introduction

- Normal aging is associated with cognitive decline (Hills, 2025; van Boxtel & Lawyer, 2021).
- Crystallized intelligence - knowledge gained from past learning and experiences - increases with age (Hills, 2025).
- Receptive language is the ability to comprehend spoken and written language and is a type of crystallized intelligence (Wingfield & Grossman, 2006; Zhuang et al., 2016).
  - Working memory and other cognitive processes are necessary for receptive language, but they rapidly decline in adults over 85. In some individuals the brain cannot compensate for the severe deficits effectively anymore (Daffner et al., 2011)
  - Receptive language may be hindered by cognitive decline in adults over 85.
- We wanted to know if receptive language develops similarly to crystallized intelligence.

Hypothesis

We hypothesized that receptive language will increase with age but slightly decline in older adults.

Methods

Participants

- N = 697, (61% female), ages 3 to 98.
- Participants were from the community and received $25, or from Kwantlen Polytechnic University and received course credit.
- Older adults were screened for and excluded if they had head trauma, a stroke, a major psychotic illness, dementia, or consumed 3+ alcoholic drinks per day on average.

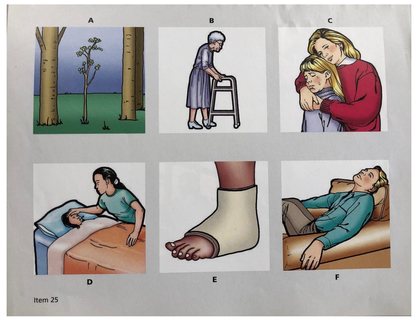
Materials

- Data for this study was collected from an ongoing longitudinal social cognition study. Recruitment for the study began in 2015.
- KBIT-II accesses general intelligence. The vocabulary section was administered to test receptive language.
  - 60 trials in total, but the test ended when 4+ questions were answered incorrectly in a row. All incorrect responses then are subtracted from the score at the end. The possible score range was 0 to 60.

Methods (Cont.)

Procedure

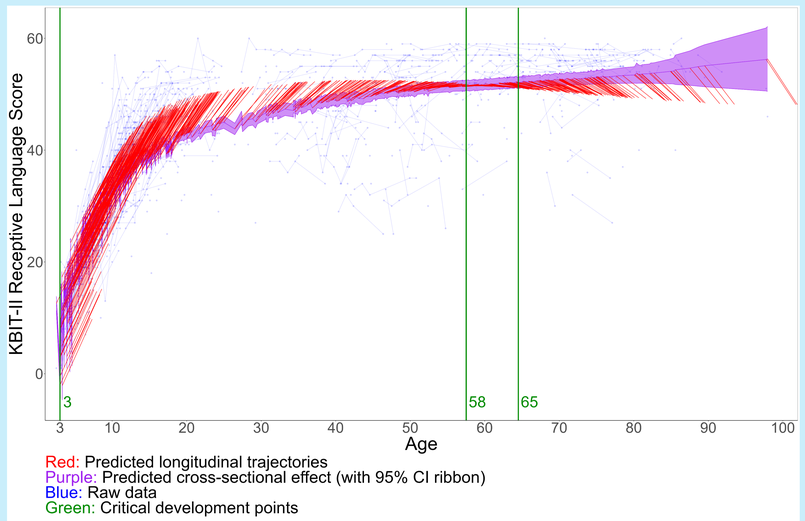
- Participants were told a vocabulary word or asked a factual question and then pointed to the picture that represents the word or question.
  - e.g., "Elderly" → answer: B



- 1-7 waves of testing (*M* = 2.03, SD = 1.28).
  - *M* = 2.16-year delay between waves, SD = 1.28.
  - *M* = 4.5 years in study.

Results

- Statistical analysis conducted was a mixed effects linear model to predict KBIT-II scores from interactions of age and time in study.
- The model explained 96% of variance in KBIT-II scores.



Discussion

- Our hypothesis was supported: receptive language significantly improved in ages 3 to 57 and declined in ages 65 and over.
- Our results are contrary to prior work that suggests crystallized intelligence increases with age (Hills, 2025). But our results could also indicate that receptive language does not develop similarly to the other facets of crystallized intelligence as previously believed.
- Age-related declines in working memory, processing speed, and lack of neural compensation may account for our results (Daffner et al., 2011; van Boxtel & Lawyer, 2021).
- This research indicates that our previous understanding of receptive language might be incomplete. Therefore, it would be important to update educational materials to include receptive language decline. Additionally, the research could inform the creation of new cognitive interventions for older adults to prevent receptive language decline.
- Future research could explore if:
  1. Working memory and processing speed decline, and lack of neural compensation contribute to receptive language decline.
  2. Education level, absence of learning, or occupation are correlated with receptive language decline in older adults.

References

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