

## Abstract

**Objective:** To compare the effect of bilingualism on working memory in children at 48 months and 72 months.

**Methods:** Bilingualism was determined using the “language spoken at home” section of the Mini International Neuropsychiatric Interview (MINI). Working memory index (WMI) scores were obtained using the Wechsler Preschool and Primary Scales of Intelligence – Fourth edition (WPPSI-IV) administered at 48 month and 72 month assessments.

**Results:** Bilingualism did not demonstrate a significant advantage on WMI scores in children at 48 months. Bilingual children at 72 months demonstrated significantly higher WMI scores ( $p=.04$ ) than monolingual children.

**Conclusion:** This preliminary study reflects the conflicting research on the cognitive benefits bilingualism. Further research in this field is paramount to a deeper understanding of those individuals who have been raised in a bilingual household.

## Background

**Aim:** To observe the effects of bilingualism on working memory in children at 48 and 72 months.

- Previous studies have shown conflicting reports on whether or not bilingualism impacts working memory, and other facets of executive functions<sup>1</sup>
- Bilingualism is commonly thought to enhance executive functions in people as it requires them to balance two languages in their mind at once, creating more mental exercise than monolinguals<sup>3</sup>
- A study in Turkey found that after controlling vocabulary and SES factors, bilingual children outperformed monolinguals in tasks that evaluated their executive functions; bilingual children were faster and more accurate in their responses than their monolingual counterparts<sup>2</sup>
- Other studies have found that bilingualism causes children to underperform in terms of language ability, and has no effect on working memory<sup>1</sup>

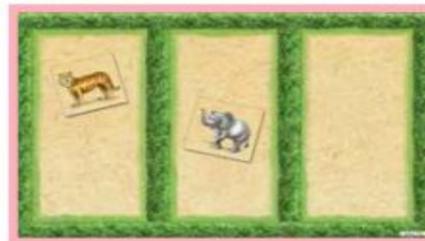
### Picture Memory

The child views a stimulus page of one or more pictures for a specified time and then selects the pictures from options on a response page.



### Zoo Locations

The child views one or more animal cards placed on a zoo layout for a specified time and then places each card in the previously viewed locations.



Photos and captions courtesy of Pearson Clinical's WPPSI-IV brochure accessed at: <https://images.pearsonclinical.com/images/Products/WPPSI-IV/brochure.pdf>

## Methods

### Sample Population:

- A cohort of 104 mother and child dyads participated in 48 (n=50) and 72 (n=54) month assessments as part of a longitudinal study of pregnancy (SIP Study, PI Yoko Nomura). Participants were recruited at the OB/GYN clinics of New York Presbyterian Queens and Mount Sinai Hospital, and were followed through pregnancy and their child's development, with annual follow-up visits at Queens College.

### Measures:

- Bilingualism, as determined by the language the child was spoken to at home, was ascertained using the MINI
- WMI scores were obtained using the Zoo Locations and Picture Memory subtests of the WPPSI-IV

### Data Analysis:

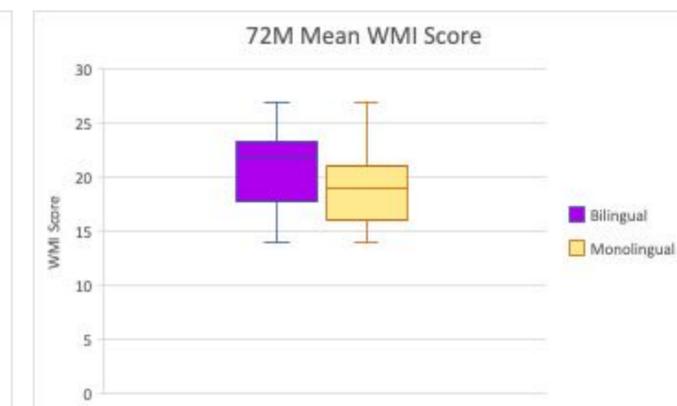
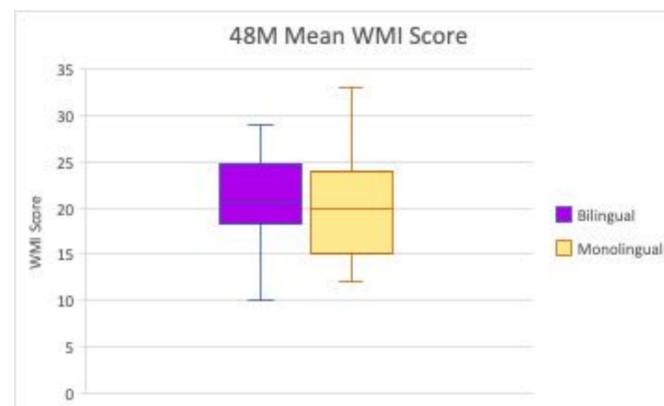
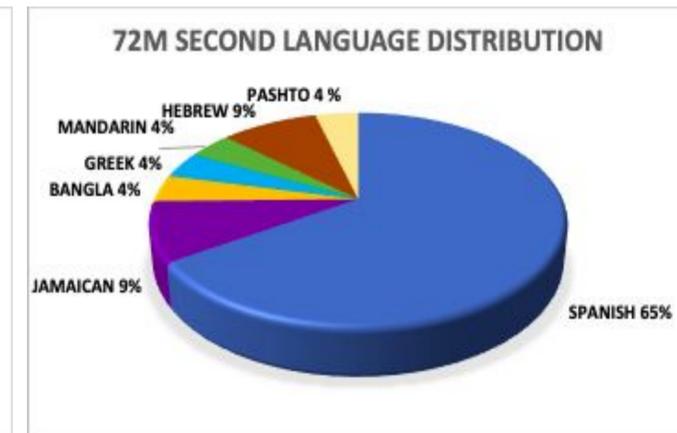
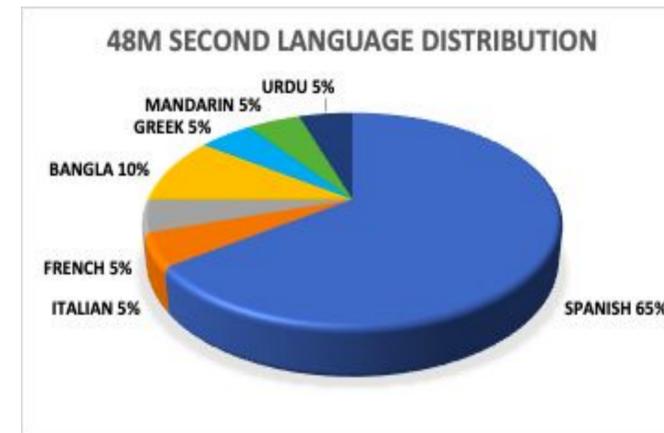
- An independent samples t-test was used to analyze the relationship between language ability and WMI scores

## Acknowledgements

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## Results

Considering bidirectional ( $p=.38$ ), and unidirectional ( $p=.19$ ) t-test results, there was no significant difference between the 48M monolinguals' (n=30, M=19.5) and the 48M bilinguals' (n=20, M=20.95) WMI scores. In a bidirectional t-test, 72M bilingual children (n=22) were not found to have significantly different WMI scores than monolingual children ( $p=.083$ ). A unidirectional analysis demonstrated that the 72M bilingual children (M=21.05) outperformed the monolingual children (M=19.26) significantly ( $p=.04$ ).



## Discussion

- The present findings indicate that 72M age bilingual children performed better on WM memory tasks than 72M age monolingual children. No significant differences were observed in children at 48 months.
  - This trend was likely only observed in 72M age children given that most children begin to attend school full time after the age of 5, where they are encouraged to use English instead of their native tongue
- The findings suggest that bilingual children experience improvement in their WMI scores over time (compare M=20.95 at 48M assessments to M=21.05 at 72M assessments), while monolingual children experienced a decline in WMI scores in the 2 years between the 48 (M=19.5) and 72 month (M=19.26) assessments
- Limitations include variations in bilingual abilities, and WM subtests that also require the use of visuospatial skills
- Additional research is necessary to better understand and solidify the relationship between bilingualism and executive functions
- Future research may include analyzing differences in visuospatial abilities (another component of executive functions) between monolingual and bilingual individuals, as well as using a factorial ANOVA to more appropriately study the effect of time on the development of these skills

## References

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