

# The Effects of Language on Arithmetic and Problem-Solving Abilities in Hispanics

Lara Rifai, M.S., Kayla Kotalik, M.S., Nisha Kajani, M.S., & Charles Golden, Ph.D.

Nova Southeastern University, College of Psychology

## Author Contact:

lr1314@mynsu.nova.edu

## Introduction

- Past research has showcased Hispanic individuals to underperform on verbal comprehension related tasks.
- Hispanic parents have shown to be less likely to read to their children in English compared to Caucasian parents.
- This, thereby, limits their literacy participation at a young age, which likely carries over into adulthood.
- As such, Hispanic individuals will typically feel like they are trying to catch up (Schneider, Martinez, & Ownes, 2006).
- Language has also been found to be a significant predictor in performance on world problem solving questions.
- Research has suggested the importance in targeting text comprehension within word-problem teaching (Fuchs et al., 2018).
- Calculation intervention has shown to be ineffective in enhancing word problem learning and vice versa (Fuchs et al., 2014).

## Methodology

- N= 111
- **Caucasian:** (N= 73, mean age= 29.9; mean education = 13.25; 64.4% female, 35.6% male)
- **Latino-Hispanic:** (N= 38; mean age= 29.9; mean education= 12.89; 65.8% female, 34.2% male)
- Ages ranged from 16-84, (M= 30.66)
- De-identified Adult Clinical database
- Mean scaled scores for Keymath-3 subtests were calculated using independent *t*-tests

## Results

Table 1. Independent Samples *t*-test comparing Caucasian and Hispanic Participants' performance on KeyMath-3

Variable	<i>t</i>	<i>p</i>
Numeration	1.337	.184
Algebra	.756	.451
Geometry	.194	.846
Measurement	1.88	.063
Data Analysis	.965	.337
Basic Concepts	.694	.489
Mental Computation	.758	.450
Addition & Subtraction	.452	.652
Multiplication & Division	.387	.700
Operations	-.888	.377
Foundations of Prob. Solv.	2.513	.013*
Applied Prob. Solv.	2.16	.033*
Applications	2.12	.006*

\**p* < .05

Table 2. Descriptive Statistics for Significance in Caucasian Sample

Variable	Mean	SD
Foundations of Prob. Solv.	9.92	6.33
Applied Prob. Solv.	12.28	12.80
Applications	107.88	59.62

Table 3. Descriptive Statistics for Significance in Hispanic Sample

Variable	Mean	SD
Foundations of Prob. Solv.	7.24	2.39
Applied Prob. Solv.	7.72	3.09
Applications	87.09	13.82

## Discussion

- The current results suggest Hispanics underperform compared to Caucasians on subtests requiring verbal comprehension.
- This suggests problem solving performance is affected by a disadvantage in language and not mathematical ability.
- Hispanic adults may underperform on verbal comprehension related tasks due to less exposure to English.
- This finding suggests Hispanics may be at a disadvantage under circumstances requiring the application of math concepts (e.g., GRE).
- While Hispanics and Caucasians perform comparatively on basic concepts and operations, Hispanics' performance on application problems is hindered likely due to their English language proficiency.

## Future Directions

- Future researchers should investigate the impact of Hispanic individuals who have immigrated from other countries versus those who were born in the Unites States to Hispanic parents.

## References

- Fuchs, L. S., Powell, S. R., Cirino, P. T., Schumacher, R. F., Marrin, S., Hamlett, C. L., ... & Chngas, P. C. (2014). Does calculation or word-problem instruction provide a stronger route to prealgebraic knowledge?. *Journal of educational psychology, 106*(4), 990.
- Fuchs, L. S., Gilbert, J. K., Fuchs, D., Seethaler, P. M., & N. Martin, B. (2018). Text comprehension and oral language as predictors of word-problem solving: Insights into word-problem solving as a form of text comprehension. *Scientific Studies of Reading, 22*(2), 152-166.
- Schneider, B., Martinez, S., & Owens, A. (2006). Barriers to educational opportunities for Hispanics in the United States. *Hispanics and the future of America, 179-227*.