

## Background and Aims

- Both language and fine motor skills predict academic achievement.<sup>1,2,3</sup>
- Recently, hand preference for age appropriate fine motor behaviors has been linked to language outcomes. Children who exhibited a consistent right hand preference for object acquisition as infants (6 to 14 months) demonstrated advanced language outcomes at 2 years of age, compared to children with an inconsistent hand preference as infants.<sup>4</sup>
- The recent identification of distinct hand preference trajectories during development<sup>5</sup> may help elucidate whether individual differences in hand use relate to skills linked to later academic achievement.
- Here we asked whether hand preference trajectories account for variance in language and fine motor outcome as children approach school age. We hypothesized that children who exhibit consistent hand use patterns will have more advanced language and fine motor skills compared to children with inconsistent hand use, independent of direction (i.e., left or right).

## Method

- Participants:** 22 children participated in the study. Children completed 9 monthly infant hand preference assessments from 6 to 14 months. Children returned at 3, 4 and 5 years of age for annual preschool hand preference assessments. At age 5, children were additionally assessed on school readiness, language development, and motor development skills.
- Infant Hand Preference:** Infant hand preference was assessed from 34 toy presentations per test session; the hand used to acquire the toy was scored offline from videotape.<sup>5</sup> Mean %R was calculated. Preference was categorized as consistent or inconsistent using 95% CI.
- Preschool Hand Preference:** Preschool hand preference was assessed from 29 toy presentations per session; the hand used to manipulate the toy was scored offline from videotape.<sup>4</sup> Mean %R was calculated. Preferences were categorized as consistent or inconsistent using 95% CI.
- School Readiness:** School readiness was assessed using the Bracken School Readiness Assessment 3<sup>rd</sup> edition (BSRA-3). Hypothesis-based analysis focused on the Letter Knowledge subscale.
- Language:** Language was assessed using the Preschool Language Scales (PLS-5). The PLS-5 has 2 subscales: Expressive Communication and Auditory Comprehension.
- Motor Development:** Motor development was assessed using the Peabody Developmental Motor Scales 2<sup>nd</sup> edition (PDM-2). Hypothesis-based analysis focused on the Fine Motor subscale.

## Results and Discussion

- Hand Preference:** Overall, 32% of children demonstrated a consistent hand preference during infancy, with all of the consistent children having a right hand preference. During the preschool years, 77% of children demonstrated a consistent hand preference, with 76% of consistent children having a right hand preference.
- School Readiness:** Children with a consistent hand preference in infancy scored significantly higher on the BSRA-3 Letters subscale at 5 years of age ( $M=94.29$ ,  $SE=2.22$ ) compared to children with an inconsistent hand preference as an infant ( $M=83.36$ ,  $SE=4.17$ ,  $p=0.03$ ,  $d=1.08$ , see Fig. 1). There was no significant effect of preschool hand preference on the BSRA-3.
- Language:** Children with a consistent hand preference as preschoolers scored significantly higher on the PLS-5 Auditory Comprehension subscale at 5 years old ( $M=105.82$ ,  $SE=3.57$ ) compared to children with an inconsistent hand preference during the preschool years ( $M=96.25$ ,  $SE=2.32$ ,  $p=0.04$ ,  $d=1.10$ , see Fig. 2). There were no significant effects of preschool hand preference on the PLS-5 Expressive Communication subscale, and no significant effects of infant hand preference on either PLS-5 subscale.
- Motor Development:** Children with a consistent hand preference as preschoolers had marginally higher scores on the PDM-2 fine motor subscale ( $M=115.38$ ,  $SE=2.17$ ) compared to children with an inconsistent hand preference as preschoolers ( $M=105.25$ ,  $SE=5.25$ ,  $p=0.06$ ,  $d=0.95$ ). There was no effect of infant hand preference on the PDM-2.

Fig. 1. Infant hand preference groups on letter knowledge.

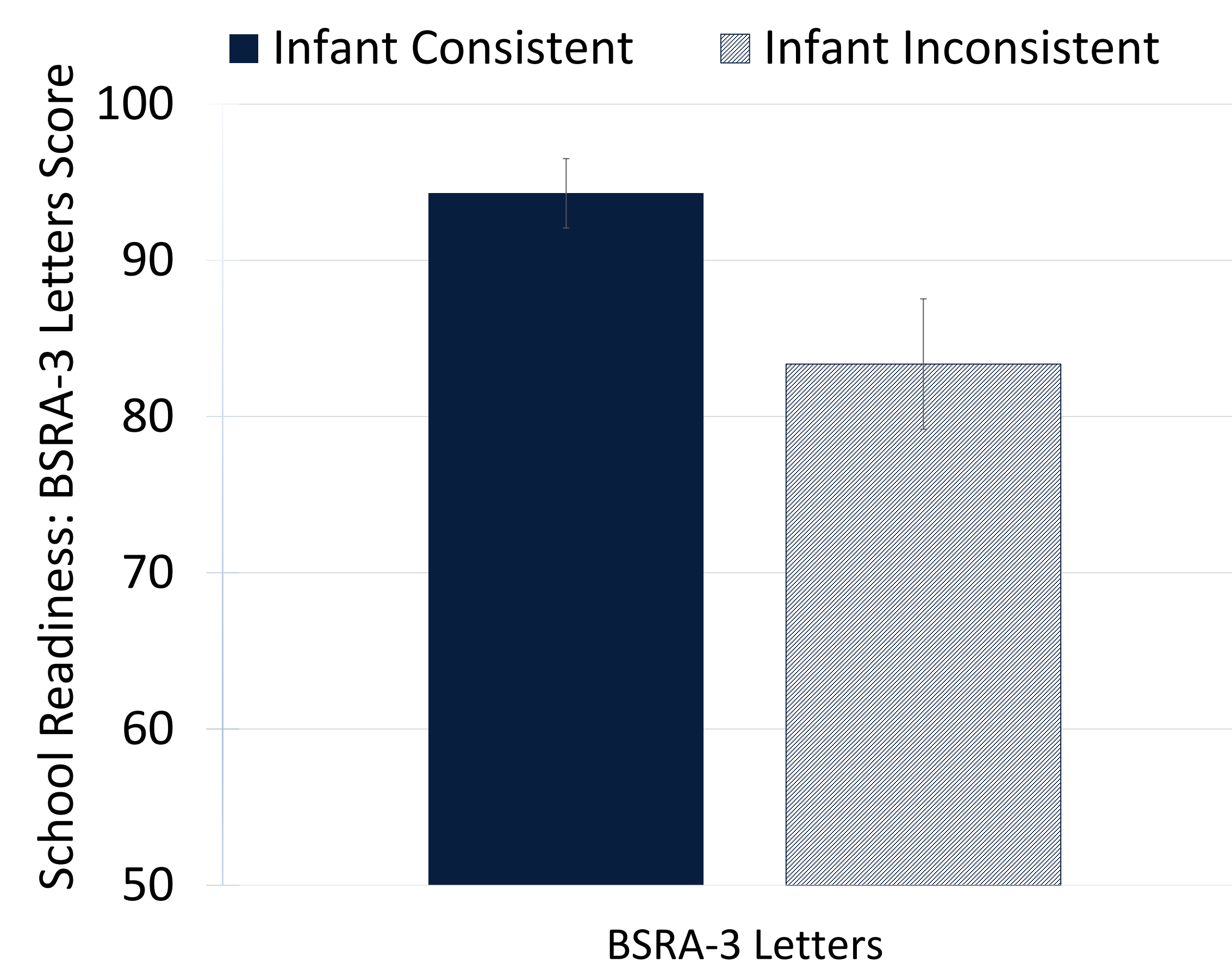
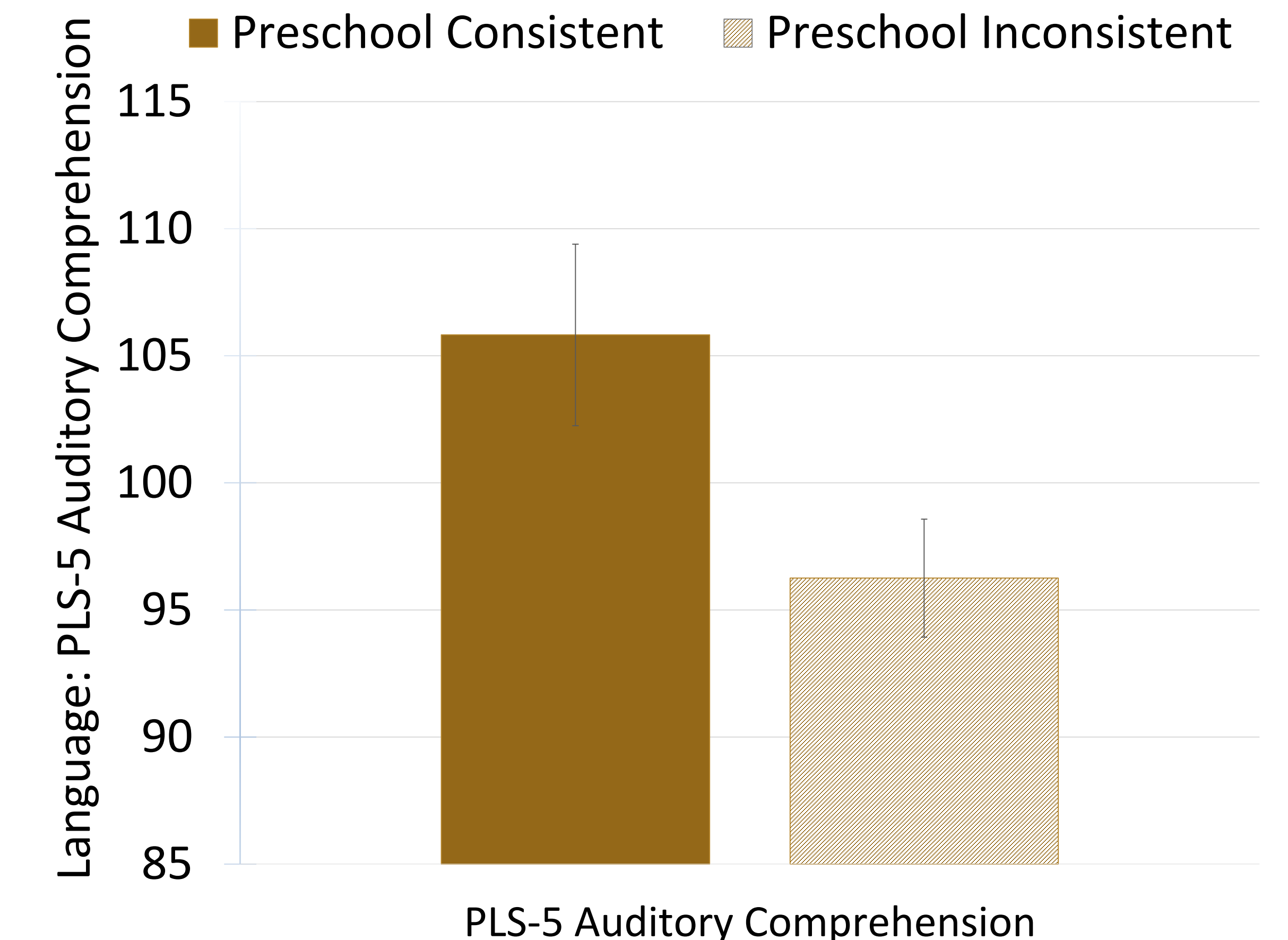


Fig. 2. Preschool hand preference groups on language comprehension.



### Take-Home Points:

Consistent Infant Hand Preference (6 to 14 months) → ↑ Letter Knowledge at 5 years of age

Consistent Preschool Hand Preference (3 to 5 years) → ↑ Auditory Comprehension at 5 years of age

## Acknowledgements & References

Supported by NIH/NIGMS R25GM061347 to SLG, NIH/NICHHD T32 HD-007376 to ELN, and NSF DLS0718045 to GFM. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. We thank the families for their time. 🙌 Correspondence to: Sandy Gonzalez (sgonz219@fiu.edu).

<sup>1</sup>Dinehart et al. (2013). DOI: 10.1080/10409289.2011.636729

<sup>2</sup>Duncan et al. (2007). DOI: 10.1037/0012-1649.43.6.1428

<sup>3</sup>Grissmer et al. (2010). DOI: 10.1037/a0020104

<sup>4</sup>Nelson et al. (2013). DOI: 10.1037/a0033803

<sup>5</sup>Michel et al. (2014). DOI: 10.1037/a0033312