# Exploring Subgroups of Preschool Academic Ability: A Strengths-Based Perspective of Bilingual Development



# Background

- Nearly a third of preschoolers are dual language learners (DLLs), 60% of whom are Spanish-English learners (Park et al., 2018).
- Preschool is a critical period of academic development (Weiland & Yoshikawa et al., 2013). Children's early grammar, vocabulary, phonological awareness, letter knowledge, and quantitative reasoning skills are strong predictors of their outcomes in reading and math (Duncan et al., 2007; NASEM, 2017).
- DLLs' academic development varies between their two languages and across skill areas (Pearson et al., 1997; Oller & Eilers, 2002; Hammer et al., 2012).
- Understanding variability *within* DLLs is essential for promoting their academic success (Castro, 2011; Goldenberg et al., 2013; NASEM, 2017).
- Identifying meaningful subgroups of preschool DLLs can help inform appropriate educational supports for children's different academic strengths and needs (Beltrán, 2012; Escobar & Tamis-Lemonda, 2017).

# Latent Profile Analysis

- Latent profile analysis (LPA) is a useful approach for identifying subgroups of young DLLs characterized by intra-individual patterns of variability in development across academic skills in each language (Lonigan et al., 2017; Halpin et al., 2021; López & Foster, 2021).
- While latent profiles provide detailed information about DLLs' academic strengths and needs at a given point of time, further investigation of changes in latent profiles is needed to better understand children's development over time.

# **Research Questions**

- 1. What are the profiles of bilingual academic development in preschool DLLs during the fall and spring prior to kindergarten entry?
- 2. Does bilingual academic profile membership change from fall to spring in preschool DLLs?

# Participants

- 344 Latino Spanish-English DLLs.
- All children were typically developing, had been exposed to Spanish since birth, in preschool, and were receiving English-only instruction.

	N= <b>344</b>
Child Gender	43% male
	57% female
Child Age at Fall (in months)	<i>m</i> =53.62 ( <i>sd</i> =4.61)
Child Age at Spring (in months)	<i>m</i> =56.51 ( <i>sd</i> =5.54)
Length of Bilingual Exposure (in months)	<i>m</i> =47.54 ( <i>sd</i> =15.99)
<b>Maternal Education</b>	
< High School	60%
High School/GED	26%
Some Post-Secondary	14%
<b>College/Graduate Degree</b>	0%

#### Measures & Procedure

**Demographic Variables** – Researcher created questionnaire (66 items) **Child Bilingual Academic Skills** 

- Clinical Evaluation of Language Fundamentals-Preschool 2<sup>nd</sup> Edition (CELF-P2) & CELF-P2 Spanish
  - Sentence Structure (SS)
  - Expressive Vocabulary (EV)
  - Phonological Awareness (PA)
- Woodcock-Johnson Tests of Achievement III (WJ-III) & Batería III
- Letter-Word Identification (LWI)
- Applied Problems (AP)

**Data Collection** – preschool year prior to kindergarten entry

- Time 1 Fall: demographic questionnaire & child assessments
- Time 2 Spring: child assessments

### Data Analysis

RQ1) Two latent profile analyses were conducted for the fall and spring timepoints using children's academic scores in Spanish and English.

- Post-hoc pairwise comparisons using the Benjamini-Hochberg
- procedure to control for Type I error inflation assessed
- within-profile differences between Spanish and English scores • between-profile differences across academic scores

RQ2) A latent transition analysis (LTA) was conducted to examine the stability of individual children's profile membership from fall to spring.

#### Results

#### RQ1) Goodness-of-fit indices for both LPAs indicated that the fourprofile model best fit the data on preschool DLLs' Spanish and English academic development in the fall and spring.

Model		Fal	l PreK	
	BIC	$\Delta$ <b>BIC</b>	Entropy	VLMF
2-Profile	15460.365	N/A	0.770	471.91
<b>3-Profile</b>	15343.799	-116.566	0.816	180.814
4-Profile	15222.149	-121.650	0.824	185.89'
5-Profile	15175.443	-46.706	0.842	110.95
6-Profile	15170.463	-4.980	0.857	69.227
		Spring PreK		
Model	BIC	$\Delta$ <b>BIC</b>	Entropy	VLMF
2-Profile	15481.153	N/A	0.739	471.27
<b>3-Profile</b>	15322.899	-158.254	0.829	222.50
<b>4-Profile</b>	15189.953	-132.946	0.855	197.19
5-Profile	15163.688	-26.265	0.817	90.512
6-Profile	15125.878	-37.810	0.833	102.05

*Note*. BIC = Bayesian Information Criterion, VLMR = Vuong-Lo-Mendell-Rubin *†* Final model fit statistics in bold to facilitate interpretation.

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# **Results Continued**

#### RQ1) Post-hoc pairwise comparisons distinguished profiles by their patterns of bilingual balance and academic ability, based on within-profile and between-profile variability, respectively, in Spanish and English academic scores.

	P	Profile 1		Profile 2		Profile 3	Р	rofile 4
Fall Academic Subtest	Spanish-	Balanced, Low	Balanced	-Spanish, Average	Mostly	English, Average	Mixed <b>E</b>	Balance, High
Sentence Structure	Spanish	<i>t</i> = 6.43***	Spanish	$t = 10.136^{***}$	Balanced	t = 1.388	Spanish	t = 7.344***
Expressive Vocabulary	Spanish	<i>t</i> = 7.01***	Spanish	<i>t</i> = 9.435***	English	<i>t</i> = 6.031***	Spanish	$t = 4.156^{***}$
Phonological Awareness	Balanced	t = 1.00	Balanced	t = 1.293	English	t = 2.940 * *	English	<i>t</i> = 3.645***
Letter-Word Identification	Spanish	t = 4.14***	Balanced	t = 1.457	English	t = 2.944 * *	English	<i>t</i> = 2.934**
Applied Problems	Balanced	t = 0.95	Balanced	t = 1.460	English	t = 7.751***	Balanced	t = 1.995
	P	Profile 1	1 Profile 2		Profile 3		Profile 4	
<b>Spring Academic Subtest</b>	Mixed Balance, Low		<b>Mixed Balance, Average</b>		English Dominant, Average		Mostly English, High	
Sentence Structure	Spanish	t = 5.354***	Spanish	t = 11.721 * * *	English	t = 3.978 * * *	Spanish	t = 2.822 **
Expressive Vocabulary	Spanish	t = 3.664 * * *	Spanish	t = 5.792 * * *	English	t = 8.038 * * *	English	t = 3.446 * *
Phonological Awareness	Balanced	t = 0.831	Balanced	t = 1.345	English	t = 4.162 * * *	English	t = 4.431***
Letter-Word Identification	Balanced	t = 0.614	English	$t = 6.486^{***}$	English	t = 6.035***	English	t = 5.440 * * *
Applied Problems	English	t = 3.245**	English	t = 4.413***	English	t = 7.413***	English	t = 3.344**

\*p < .05, \*\*p < .01, \*\*\*p < .001.



#### RQ2) Latent transition probabilities for all profiles indicated that the odds of individual children remaining in the same profile from fall to spring were high.

	Latent Status				
Latent Status Prevalence	Mixed Balance, Low	Mixed Balance, Average	English Dominant, Average	Mostly English, High	
Fall	25%	44%	11%	20%	
Spring	22%	48%	11%	19%	
Fall-Spring $\Delta$	-3%	+4%	0%	-1%	
	Probability of transitioning to Spring status				
Conditional on Fall status	Mixed Balance, Low	Mixed Balance, Average	English Dominant, Average	Mostly English, High	
Balanced-Spanish, Low	0.874	0.101	0.004	0.020	
Spanish-Balanced, Average	0.000	0.988	0.012	0.000	
Mostly English, Average	0.011	0.045	0.944	0.000	
Mixed Balance, High	0.000	0.056	0.000	0.944	

#### Discussion

- The four-profile model solutions were consistent with findings from previous studies (Halpin et al., 2021; López & Foster, 2021).
- Profiles capture the unique academic strengths and needs in subgroups of preschool DLLs that may not be detected in
- the different types of academic supports that are beneficial to different types of DLLs.

**Next Steps** – Explore the external and predictive validity of latent profile membership by examining relationships of children's profile membership with demographic predictors and longer-term academic outcomes.

• The patterns of profile transitions aligned with evidence that latent profiles distinguish DLLs' growth (Lonigan et al., 2017). studies examining DLLs as a homogenous population (Escobar & Tamis-Lemonda, 2017). This may be useful in distinguishing