

# Description of the Sample of Preschool-Aged DLLs Included in Analyses of Instruction

Sample Report for Briefs 1–3 in the Instructional Series

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*American Institutes for Research*

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**FIRST 5 CALIFORNIA**  
**Dual Language Learner**

PILOT STUDY



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# Contents

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- Introduction ..... 1
- About Our Sample ..... 3
  - Characteristics of the Children and Their Families ..... 5
  - Characteristics of the Classrooms and Teaching Teams ..... 19
  - Characteristics of the Early Learning Programs ..... 25
- About Our Outcomes ..... 26
  - Description of Outcome Measures ..... 26
  - Performance of the Sample Children ..... 28
- Relationships Between Sample Characteristics and Child Outcomes ..... 33
  - Characteristics of the Children and Their Families ..... 33
  - Characteristics of the Classrooms and Programs ..... 39
- Conclusion ..... 40
- References ..... 41
- Appendix ..... 43

## Exhibits

---

Exhibit 1. Number of Participating Preschool-Aged DLLs, Classrooms, and Programs, by Home Language (HL) Group .....	4
Exhibit 2. Months at the Early Learning and Care Program, by HL Group .....	6
Exhibit 3. Hours per Week at the Early Learning and Care Program, by HL Group.....	7
Exhibit 4. Extent to Which Parents Selected the Program for Its Support of the Home Language, by HL Group .....	8
Exhibit 5. Home Language Exposure at Home, by HL Group .....	10
Exhibit 6. Age of First Exposure to English, by HL Group.....	11
Exhibit 7. Parent Proficiency in the Home Language, by HL Group .....	12
Exhibit 8. Parent Proficiency in English, by HL Group.....	12
Exhibit 9. Parent Preferred Language, by HL Group.....	13
Exhibit 10. Annual Household Income (Pre-Pandemic), by HL Group .....	14
Exhibit 11. Parent Education Level, by HL Group .....	15
Exhibit 12. Family Structure (Pre-Pandemic), by HL Group .....	16
Exhibit 13. Child Age at Time of Direct Assessment, by HL Group.....	17
Exhibit 14. DLL Composition of Sample Classrooms.....	20
Exhibit 15. Child Composition of Sample Classrooms.....	21
Exhibit 16. Average Teaching Team Proficiency in English and the Home Language .....	23
Exhibit 17. Background of Teaching Teams in Sample Classrooms .....	24
Exhibit 18. Numbers of Participating Centers and Family Child Care Homes (FCCHs), by HL Group .....	25
Exhibit 19. Information About the Outcome Measures .....	26
Exhibit 20. Child Outcome Measures: Mean (Standard Deviation), Observed Range, Sample Size, and Histogram.....	29
Exhibit 21. Mean Score Age Equivalents for the Assessments Administered in Both English and Spanish (Spanish-HL Sample Only) .....	31

Exhibit 22. Estimated Relationship Between Months Enrolled at Early Learning Program and Vocabulary Outcomes for Spanish-language DLLs.....	34
Exhibit 23. Estimated Relationship Between Exposure to Spanish at Home and Vocabulary Outcomes for Spanish-language DLLs .....	35
Exhibit 24. Estimated Relationship Between Age of First Exposure to English and Vocabulary Outcomes for Spanish-language DLLs .....	36
Exhibit 25. Estimated Relationship Between Annual Household Income (Pre-Pandemic) and Vocabulary Outcomes for Spanish-language DLLs.....	37
Exhibit 26. Estimated Relationship Between Child Age at Time of Assessment and Vocabulary Outcomes for Spanish-language DLLs .....	38
Exhibit A1. Child/Family Background Characteristics Significantly Associated With Outcomes, Spanish-HL Sample.....	43
Exhibit A2. Child/Family Background Characteristics Significantly Associated With Outcomes, Cantonese-HL Sample .....	45
Exhibit A3. Child/Family Background Characteristics Significantly Associated With Outcomes, Mandarin-HL Sample .....	46
Exhibit A4. Child/Family Background Characteristics Significantly Associated With Outcomes, Vietnamese-HL Sample .....	47
Exhibit A5. Classroom/Program Characteristics Significantly Associated With Outcomes, Spanish-HL Sample.....	48



## Introduction

More than half of children aged 5 and younger in California live in households where a language other than English is spoken (UCLA Center for Health Policy Research, 2020a). Yet relatively little is known about how these young dual language learners (DLLs) are served—and how they can *best* be served—by the state’s early learning and care programs. The [First 5 California \(F5CA\) DLL Pilot Study](#), a large-scale study funded by F5CA and conducted by the American Institutes for Research® (AIR®) and partners, was designed to examine how teachers support DLLs from diverse backgrounds in early learning settings, as well as how various types of supports, including those related to classroom instruction, relate to child outcomes. The study has generated a series of four research briefs that address these questions. The first three of the briefs focus on preschool-aged DLLs, as follows:

**Brief 1:** Relationships Between Teacher Language Use in the Classroom and Outcomes for Preschool-Aged Dual Language Learners

**Brief 2:** A Deeper Look at Classroom Language Approaches and How They Relate to Language Skills and Other Outcomes for Dual Language Learners

**Brief 3:** Promising Strategies for Supporting Dual Language Learners, Regardless of the Languages Teachers Speak

This report provides important context and background information for these three briefs. Specifically, this report:

- describes the sample of preschool-aged DLLs, including background characteristics of the children and their families;
- presents background information on the classrooms and programs the preschool-aged children were attending;
- describes the outcome measures we used to gauge the skills of the preschool-aged children in the sample; and
- examines how the background characteristics were related to the outcomes.

The report serves as a technical supplement to these briefs to describe the sample and outcome measures and to provide justification for the inclusion of control variables in the statistical models that underlie the results shared in the briefs. Relationships between background characteristics and outcomes are not described in detail but are presented because of the important role they play as control variables in our analyses of how instructional practices are related to DLLs’ language and learning outcomes.

## HIGHLIGHTS OF THIS REPORT

- Most of the DLLs in the study were exposed to at least some English at home, and for many, exposure to English began at birth or soon after.
- Most parents were proficient in the home language, according to their self-ratings; there was more variability in their proficiency in English.
- Although there was variability among study families in socioeconomic status, most tended toward the more disadvantaged end, except in the Mandarin-HL group.
- DLLs of Spanish language background tended to be in classrooms where a majority of students shared that language background; DLLs of other language backgrounds were more likely to be in more multilingual classrooms without a clear majority.
- Most classrooms' teaching teams averaged high in (self-rated) English and Spanish fluency; teaching teams' fluency in Cantonese, Mandarin, and especially Vietnamese was lower, mainly because fewer teachers spoke those languages at all.
- Most classrooms had teachers with bachelor's degrees and several years of experience teaching young children.
- Although all sample children were DLLs, average proficiency was higher in English than in the home languages.
- The longer Spanish-language DLLs had been at their early learning and care program, the better they performed on the English outcomes.
- For Spanish-language DLLs, the more Spanish they were exposed to at home, and the older they were when they were first exposed to English, the less well they did on English outcomes, but the better they did on Spanish outcomes.
- Higher annual household income was associated with better performance on all 10 outcomes for Spanish-language DLLs.
- For Cantonese-, Mandarin-, and Vietnamese-language DLLs, greater exposure to the home language at home was related to better performance on outcomes assessed in the home language.
- For Spanish-language DLLs, having a teacher with a DLL-related certification was associated with higher performance on the English outcomes and some Spanish ones.



## About Our Sample

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The overall study sample for the analyses of relationships between instruction and outcomes for preschool-aged DLLs—presented in Briefs 1–3—consisted of 1,604 children aged 3 to 5 who were exposed at home to any of the study’s four focal languages: Spanish, Cantonese, Mandarin, and Vietnamese. At the time the data were collected, in late 2019 and early 2020, the children were in 271 classrooms in 153 early learning and care programs. The programs were located in 16 California counties: Butte, Calaveras, Contra Costa, Fresno, Los Angeles, Monterey, Orange, Riverside, Sacramento, San Diego, San Francisco, Santa Barbara, Santa Clara, Sonoma, Stanislaus, and Yolo.<sup>1</sup>

Although large and diverse along multiple dimensions (e.g., geography, language backgrounds, early learning settings, and sociodemographics), the sample of programs, classrooms, and children included in the analyses of instruction was not designed to be representative of all DLLs and DLL-serving programs in California. Therefore, the findings presented in this report and its accompanying briefs are not technically generalizable beyond the sample but do provide a broad representation of early learning programs and DLLs in California.

The analyses for this report, as well as those for Briefs 1 and 3,<sup>2</sup> were conducted separately for each of the four home language (HL) groups the study focused on; Exhibit 1 shows the numbers of children, classrooms, and programs within each group. The Spanish home language group was the largest by far, constituting 86% of the study sample of preschool-aged DLLs. Cantonese- and Mandarin-language DLLs together made up approximately 10% of the sample, and Vietnamese-language DLLs made up the remaining 4%. These percentages closely mirror the statewide percentages among children aged 3 to 5 hearing Spanish, Chinese, or Vietnamese at home (UCLA Center for Health Policy Research, 2020b).<sup>3</sup>

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<sup>1</sup> We selected the 16 counties as follows. First, we selected four counties where supports or initiatives for DLLs were being rolled out, and which had a strong focus on supporting DLLs, because we wanted to make sure our study sample included places using promising practices. Next, we selected the two counties with the largest DLL diversity in the state, based on kindergarten enrollment of English language learners. Lastly, we randomly selected 10 counties using population-weighted probabilities (a procedure by which counties that serve more DLLs had a higher probability of being selected, but all counties had a chance to be included). Selection of these 10 counties was stratified by region, with two counties selected in each of the state’s five geographical regions.

<sup>2</sup> Brief 2 focuses on Spanish-language DLLs and the classrooms serving them.

<sup>3</sup> According to the *Ask CHIS (California Health Interview Survey)* data tool, 612,000 children in California lived in homes where Spanish, Chinese, or Vietnamese was spoken (with or without English) across the years 2018, 2019, and 2020. Of those 612,000 children, 532,000 (87%) heard Spanish at home; 67,000 (11%) heard Chinese at home; and 13,000 (2%) heard Vietnamese at home.

**Exhibit 1. Number of Participating Preschool-Aged DLLs, Classrooms, and Programs, by Home Language (HL) Group**

	DLL study participants whose home language was ...				Total
	Spanish	Cantonese	Mandarin	Vietnamese	
Number of children in analysis sample	1,387	107	50	60	<b>1,604</b>
Number of classrooms the children were in	249	23	21	24	<b>271</b>
Number of programs the children and classrooms were in	139	15	16	19	<b>153</b>

*Note.* These numbers represent our overall analysis sample of preschool-aged DLLs. Ten children with data on one or more assessments were omitted because we did not have classroom data (from the teacher survey, see next section) for their classrooms. For the numbers of classrooms and programs, the columns sum to more than the total because some classrooms and programs included study participants of more than one of the four languages and thus are included in multiple columns. In any given analysis of relationships (such as those presented later in this report and the analyses relating instruction to outcomes presented in Briefs 1–3), the *Ns* may be smaller due to missing data on specific outcomes or predictors related to instruction.

Early learning programs were recruited for participation in the study from the fall of 2019 into early 2020. We invited programs to participate that we knew served DLLs based largely on program directors’ responses to a survey administered earlier in 2019. In programs that had multiple classrooms, we selected particular classrooms for participation based on the number and language backgrounds of the DLLs in each classroom according to information provided by our contact at each program. In most cases, all DLLs in the selected classrooms were eligible to participate in the study if they met basic criteria (i.e., exposed at home to one of the four study languages and within the study’s targeted age range).<sup>4</sup> Staff at the participating programs distributed and collected parent intake forms, which also served as consent forms. Essentially all parents who returned consent forms agreed to participate in the study, but some parents did not return the forms at all; only parents who returned (affirmative) forms were included (and had their children included) in study data collection activities.<sup>5</sup> Therefore, the study did not necessarily include *all* DLLs—even of the four study languages—in the participating classrooms.

<sup>4</sup> In the later stages of recruitment, we limited participation in some classrooms that had large numbers of Spanish-language preschool-aged DLLs because we had already exceeded our target number of participants in that category.

<sup>5</sup> Because program staff distributed and collected the forms, we do not have information on the percentage of parents who returned them.

## Characteristics of the Children and Their Families

Most of our data on child and family background characteristics come from surveys of parents conducted in early 2020 and again in summer 2020.<sup>6</sup> Age and gender data come from the study intake form, also completed by parents (although the child’s birth date, used to calculate age, was confirmed on the parent surveys).

We examine four categories of child and family background characteristics:

1. The care background of the children: how long they had been at their early learning program, how many hours per week they attended the program for, and the extent to which parents selected the program for its language approach
2. The children’s language background: amount of exposure to the home language at home, age at which they were first exposed to English, parent proficiency in both languages, and parent preferred language
3. Family socioeconomic status (annual household income and highest education level) and family structure
4. Basic child characteristics (age and gender) and parent race/ethnicity

Depending on the home language group, some or all of these characteristics were used as control variables in the analyses of relationships between instruction and child outcomes that are the focus of the three briefs associated with this report. (See the “Relationships” section later in this report and the tables in the Appendix for further details on which variables were included as controls).

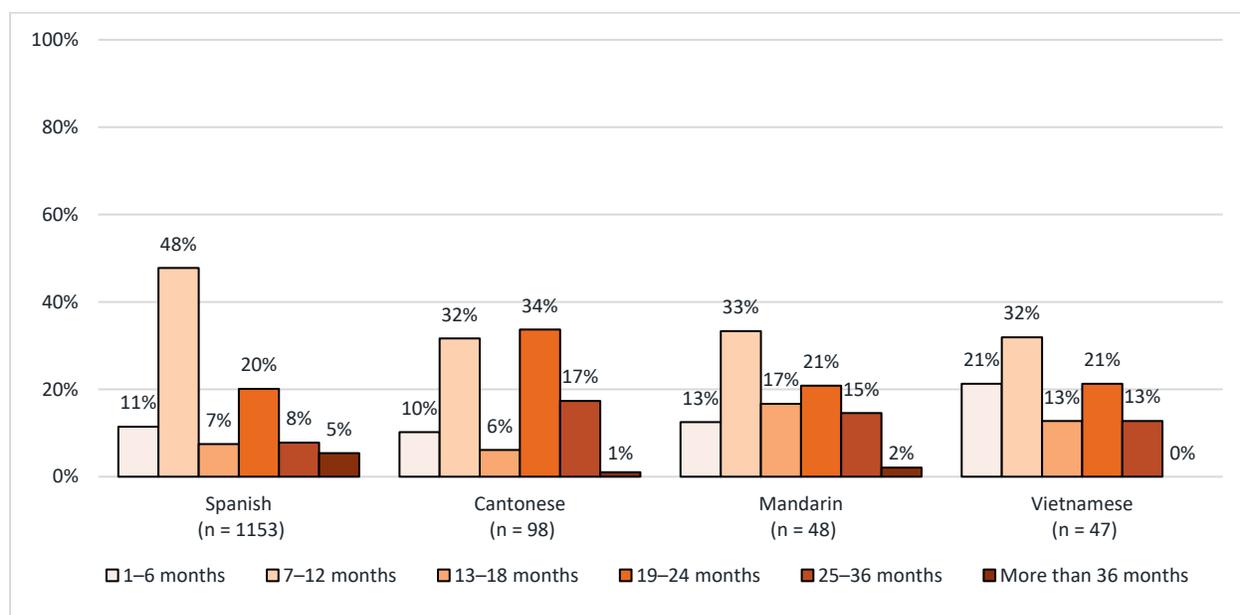
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<sup>6</sup> For the analysis sample of 1,604 children, a total of 1,413 parents (88%) completed one or both surveys. Both surveys included most of the background and demographic questions, but parents who answered these questions on the first survey were not asked them again on the second survey. Close to one quarter of the parents (335 / 1,413) completed only the second survey. Parents were not required to answer the background questions, so descriptive *N*s do not always sum to 1,413. In addition, a few questions, such as about the age the child was first exposed to English, were included only on the second survey and were asked of all respondents to that survey.

## Care Background of the Children

*Months at the early learning and care program.* We asked parents to list the month and year the study child had first started attending the early learning and care program and then calculated the number of months the child had been attending as of March 2020 (when pandemic-related disruptions began). The average was 14.2 months for the Spanish-HL sample, 16.4 for the Cantonese sample, 15.5 for the Mandarin sample, and 13.3 for the Vietnamese sample. For Spanish, nearly half of the children (48%) had been at the program for 7–12 months, suggesting that the school year of the study (2019–20) may have been their first year in the program. There was more variability among the other three language groups (Exhibit 2).<sup>7</sup>

### Exhibit 2. Months at the Early Learning and Care Program, by HL Group

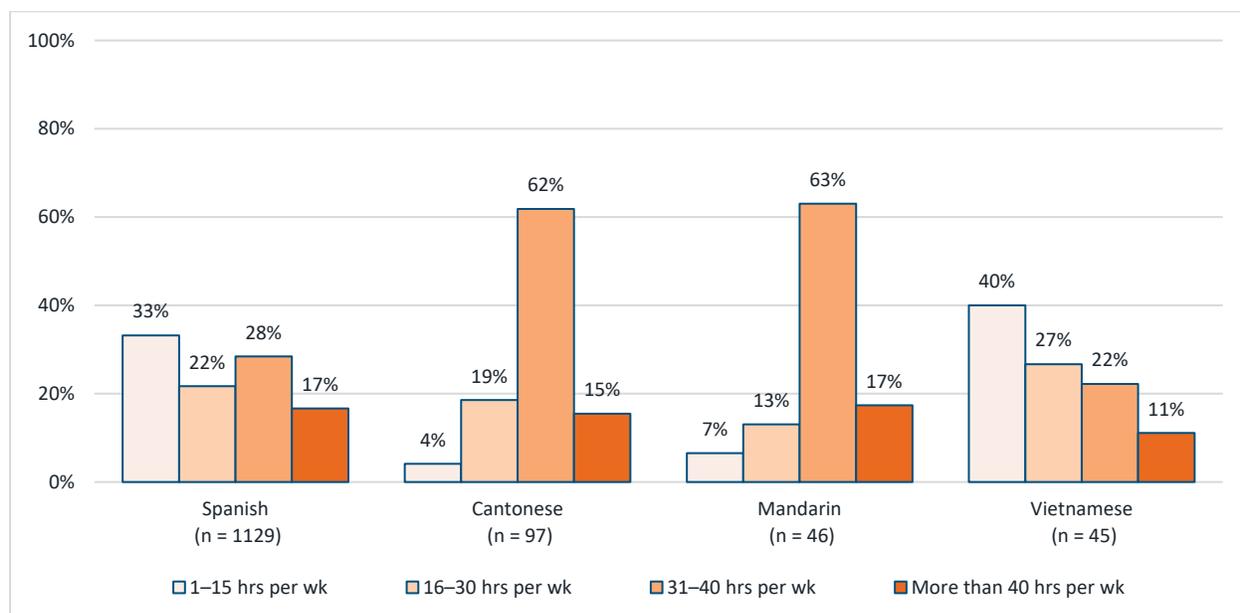


*Note.* Months at program was a continuous variable and was treated as such in analyses. The categories shown here are for illustrative purposes only.

<sup>7</sup> One might expect the number of months children had been at their program to be related to their age (for example, 4-year-olds having been at their program longer than 3-year-olds). Interestingly, for Spanish-language DLLs, the correlation between months at program and age (as of the time of direct assessment) was quite low: only .17 ( $n = 1,077$ ). This is likely because, as shown in Exhibit 2, a large proportion of the Spanish-language DLLs were relatively new to their program (59% having started in the previous 12 months; only 33% having been there for more than 18 months). For Cantonese- and Mandarin-language DLLs, the correlations between months at program and age were higher: .61 ( $n = 90$ ) for Cantonese and .43 ( $n = 44$ ) for Mandarin. This, too, is consistent with the data shown in Exhibit 2, namely, fairly large proportions of these children who had been at their programs for more than 18 months (52% for Cantonese and 38% for Mandarin). For Vietnamese-language DLLs, the correlation between months at program and age was .25 ( $n = 43$ ).

*Hours per week at the early learning and care program.* In the Spanish-HL group and the Vietnamese-HL group, more than half of the children attended their program 30 or fewer hours per week (Exhibit 3). For both of these groups, the most commonly reported number of hours was 15; 29% of the Spanish-HL children and 27% of the Vietnamese-HL children attended their program for 15 hours per week, most likely for 3 hours per day, such as in a morning preschool. Cantonese-HL and Mandarin-HL children, on the other hand, were more likely to be in full-day programs, with more than 60% of these children attending 31 to 40 hours per week. For these two groups, exactly 40 hours per week was the most common response (35% for Cantonese and 39% for Mandarin).

**Exhibit 3. Hours per Week at the Early Learning and Care Program, by HL Group**



*Note.* Parents filled in the number of hours per day, which we then summed to the number of hours per week and constructed the categories shown here. In analyses, hours per week was dichotomized to *less than 30 hours per week* and *greater than or equal to 30 hours per week*. Parents who completed only the summer 2020 survey were asked about hours of attendance prior to COVID-19 disruptions.

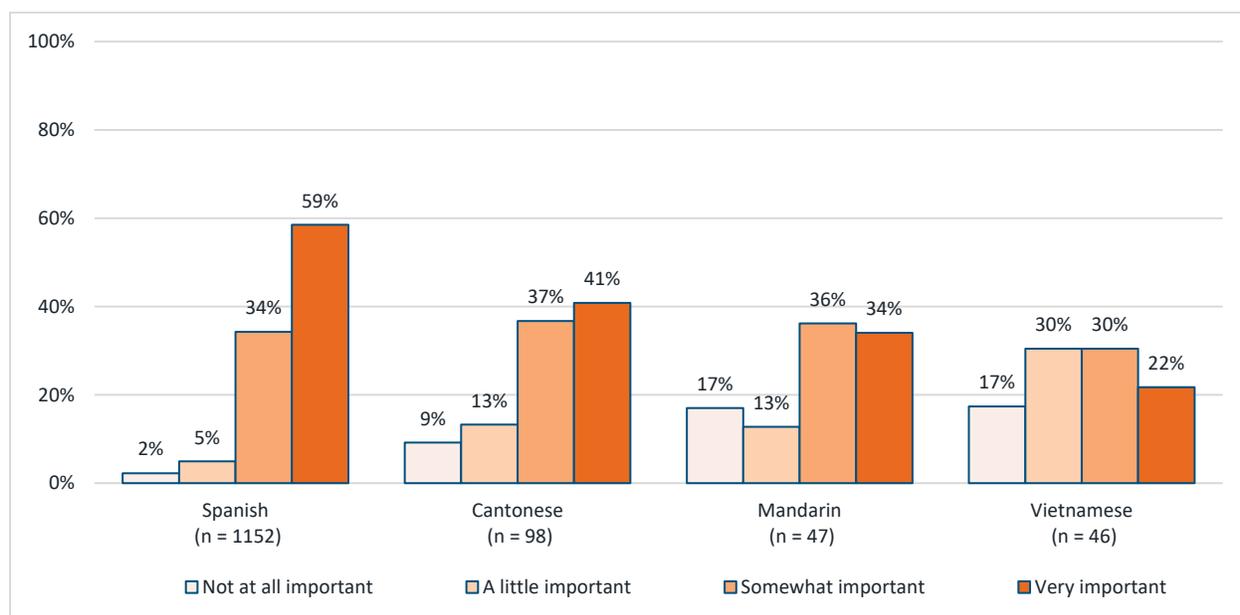
*Extent to which parents selected the early learning and care program for its support of the home language.* The parent survey asked parents to indicate how important various factors were for them in selecting the program for the study child. Three of the factors were related to the program’s support for the home language:

- “They will help [child] learn [home language]”
- “They will help [child] become bilingual”
- “They have a caregiver or teacher who speaks [home language] with [child]”

From these three survey items, each rated by parents on a scale from *not at all important* to *very important*, we calculated a measure of the extent to which parents chose the program because of its support for the home language.<sup>8</sup>

In all four home language groups, more than half the parents indicated at least *somewhat important* on the composite measure (Exhibit 4). For the Spanish-HL group, 59% of parents selected *very important* for all three factors. The average ratings were somewhat lower for the other three language groups. However, given that the survey asked about the selection of the *particular* program the child was *currently* attending, it is possible that the ratings in these groups were lower simply because of a relative scarcity of programs offering much support for Cantonese, Mandarin, or Vietnamese. In other words, the parents of DLLS in these language groups did not necessarily think home language support was less important than did Spanish-HL parents—they just may not have had as many options for their child to attend a program offering such support.

**Exhibit 4. Extent to Which Parents Selected the Program for Its Support of the Home Language, by HL Group**



*Note.* This was a continuous variable (running from 1 to 4) and was treated as such in analyses. The response categories shown here are for illustrative purposes only. *Not at all important* includes values from 1.00 to 1.99; *a little important* includes values from 2.00 to 2.99; *somewhat important* includes values from 3.00 to 3.99; and *very important* includes values of 4.00 (i.e., a rating of *very important* for all three survey items constituting the composite measure).

<sup>8</sup> The measure was internally consistent and reliable, with a Cronbach’s alpha of 0.85 ( $n = 1,343$ ).

## Children’s Language Background



**Most of the DLLs in the study were exposed to at least some English at home, and for many, exposure to English began at birth or soon after.**

Although a major purpose of the F5CA DLL Pilot Study was to learn about DLLs’ exposure to different languages in their early learning and care program classrooms, placing these findings in context also requires understanding the children’s language backgrounds more generally. Based on research (Duncan & Paradis, 2016; Hoff et al., 2012; Kim et al., 2014; Winsler et al., 2014), the study employed five measures of children’s language background:

1. An index of their level of exposure to the home language at home, constructed from four different parent survey questions about which languages were used at home and who at home—the responding parent, other adults (if any), and other children (if any)—spoke how much of which language to the study child. This index runs from 0 (no exposure to the home language at home) to 100 (exposure solely to the home language, and no other languages, at home) and can thus be thought of as a pseudo-percentage of home language exposure.<sup>9</sup>
2. Age of the child’s first exposure to English. This was asked of parents on a survey administered in summer 2020. The survey question offered nine different age-range response options (from *birth to 3 months* up to *[Child] has not been exposed to English*), but for analysis purposes, we collapsed responses into six categories.
3. Parent proficiency in the home language. This measure was constructed from a set of four survey questions that asked parents how well they spoke, read, wrote, and understood others speaking the home language, with response options *not at all*, *not well*, *well*, and *very well*.<sup>10</sup>
4. Parent proficiency in English, paralleling the one for parent proficiency in the home language.<sup>11</sup>
5. The language the parent requested, on the study intake form, for written study communications (either the home language or English).

*Home language exposure (at home).* The average value on the home language exposure measure ranged from 58.8 for Mandarin up to 67.1 for Cantonese. In all four language groups, more than half the children had a value greater than 50, but all four groups also had sizeable percentages of children (ranging from 22% for Spanish and Cantonese up to 35% for Mandarin)

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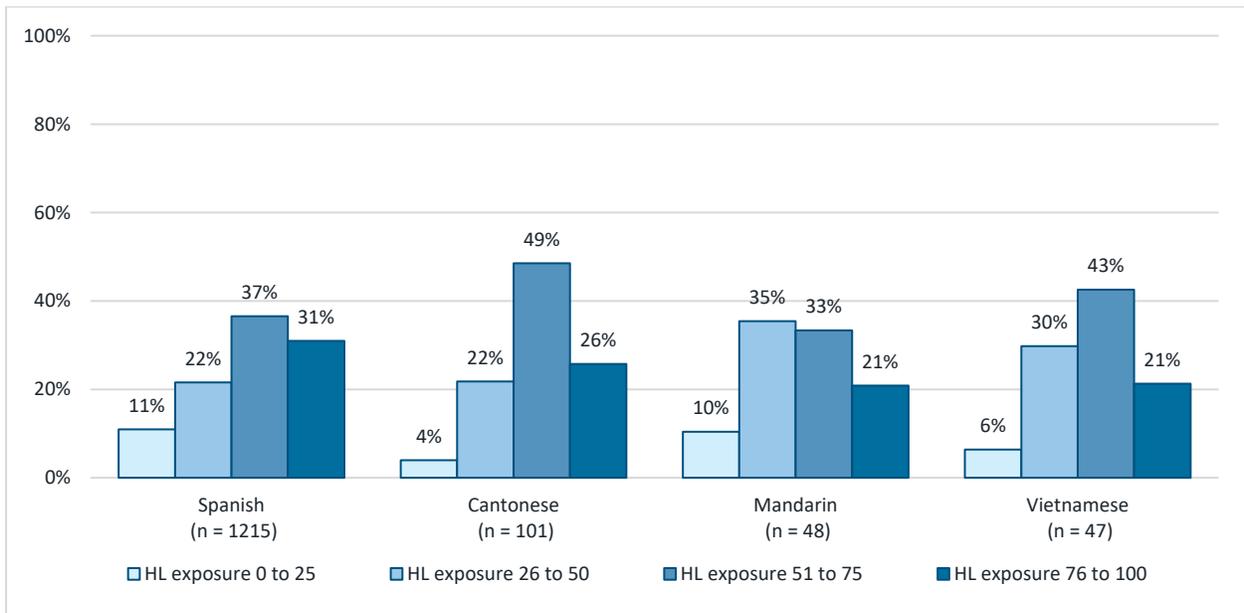
<sup>9</sup> In theory, no child in the study should have a value of 0 because a requirement for entering the study was exposure to at least *some* of any of the four study languages at home. The index does not actually represent a percentage given that the survey questions were not asked in numeric terms.

<sup>10</sup> The measure of parent proficiency in the home language had a Cronbach’s alpha of 0.89 ( $n = 1,411$ ).

<sup>11</sup> The measure of parent proficiency in English had a Cronbach’s alpha of 0.98 ( $n = 1,410$ ).

in the 26-to-50 category (Exhibit 5). Relatively few children, however, had home language exposure values of 25 or less—from 4% for Cantonese up to 11% for Spanish. The same was true at the other end of the scale. For Spanish, Cantonese, and Vietnamese, only about 10% of the children heard *solely* the home language at home (i.e., had a value of 100 on the home language exposure measure); for Mandarin, only a single child (representing 2% of the Mandarin-HL group) had a value of 100. Thus, nearly all the study children did hear at least some home language at home (as the study intended), but most heard at least one other language, most commonly English, as well.

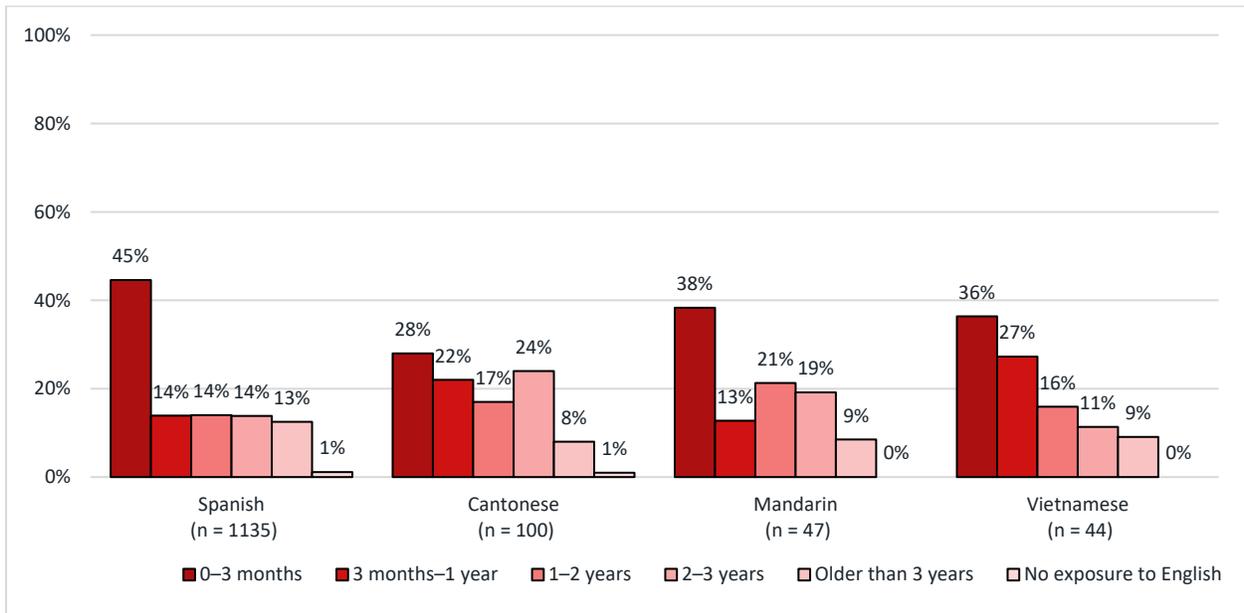
**Exhibit 5. Home Language Exposure at Home, by HL Group**



*Note.* Home language exposure was a continuous variable (running from 0 to 100) and was treated as such in analyses. The categories shown here are for illustrative purposes only.

*Age of first exposure to English.* In the Spanish-, Mandarin-, and Vietnamese-HL groups, more than half the children had been exposed to English by age 1, and more than a third had been exposed to English by age 3 months (Exhibit 6). In Cantonese, the percentages were only slightly lower—50% by age 1 and 28% by age 3 months. Hardly anyone in the study had had *no* exposure to English, according to parents, and relatively few were older than 3 at time of first exposure. This may not be surprising given that all of the children lived in the U.S (California specifically) and were preschool aged at the time of data collection.

**Exhibit 6. Age of First Exposure to English, by HL Group**

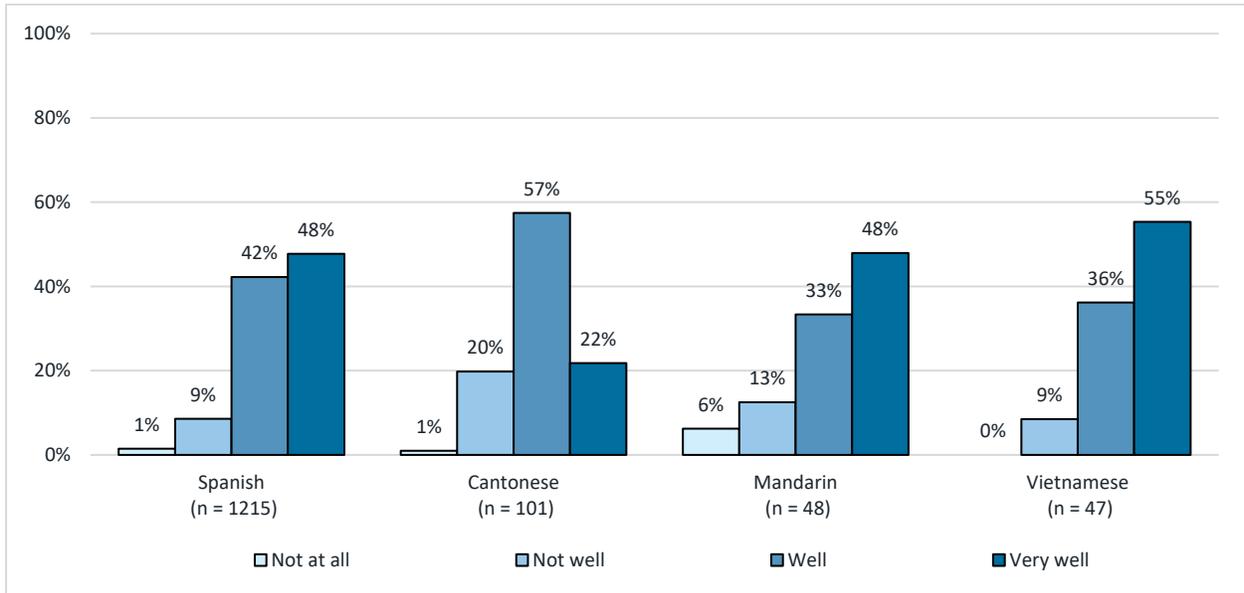


 **Most parents were proficient in the home language, according to their self-ratings; there was more variability in their proficiency in English.**

*Parent proficiency in the HL and in English.* Most parents—approximately 80% or more, in each of the four HL groups—indicated proficiency in the home language, meaning that they answered *well* or *very well* to the four language skills the survey asked them about (Exhibit 7). In Spanish, Mandarin, and Vietnamese, close to half of parents answered *very well* for all four skills. Hardly any parents indicated not knowing the HL at all, which provides reassurance that the study reached the types of families it was targeting.

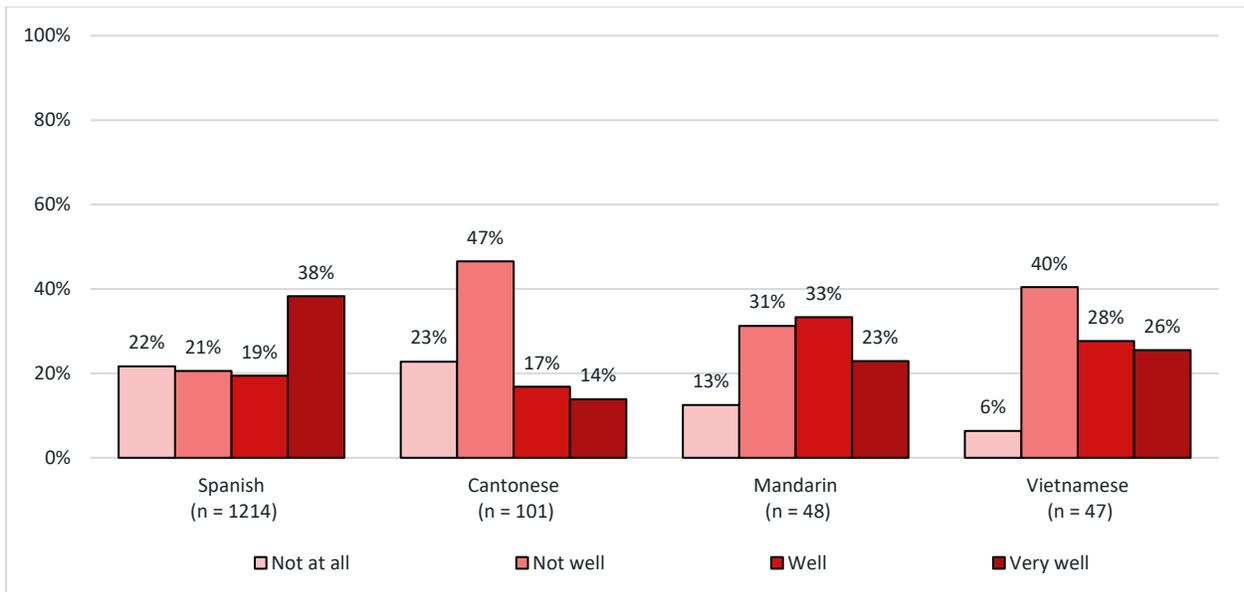
Parent proficiency in English, meanwhile, was more variable (Exhibit 8). Among the four HL groups, Spanish had the highest percentage of parents rating themselves as fully proficient in English, while Cantonese had the lowest.

### Exhibit 7. Parent Proficiency in the Home Language, by HL Group



*Note.* Parent proficiency in the home language was a continuous variable (running from 1 to 4), calculated from the four survey questions parents answered, and was treated as such in analyses. The categories shown here are for illustrative purposes only. *Not at all* includes values from 1.00 to 1.99; *not well* includes values from 2.00 to 2.99; *well* includes values from 3.00 to 3.99; and *very well* includes values of 4.00 (i.e., a rating of *very well* for all four survey items constituting the composite measure).

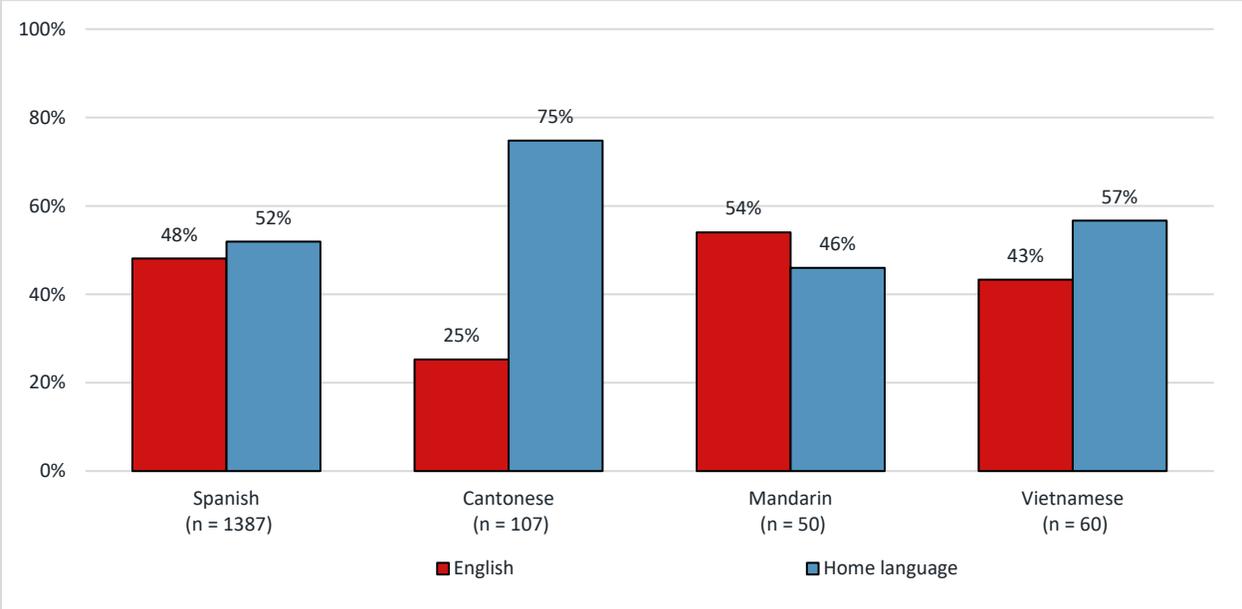
### Exhibit 8. Parent Proficiency in English, by HL Group



*Note.* Parent proficiency in English was a continuous variable (running from 1 to 4) and was treated as such in analyses. The categories shown here are for illustrative purposes only. *Not at all* includes values from 1.00 to 1.99; *not well* includes values from 2.00 to 2.99; *well* includes values from 3.00 to 3.99; and *very well* includes values of 4.00 (i.e., a rating of *very well* for all four survey items constituting the composite measure).

*Parent preferred language (for written/mailed study communications).* In the Spanish-, Mandarin-, and Vietnamese-HL groups, parents were fairly evenly split in whether they wanted the study to communicate with them in the home language (52%, 46%, and 57% for parents of DLLs of Spanish, Mandarin, and Vietnamese backgrounds, respectively) or in English (48%, 54%, and 43% for parents of DLLs of Spanish, Mandarin, and Vietnamese backgrounds, respectively). For Cantonese, however, 75% of parents requested communication in Chinese, compared with only 25% who preferred English (Exhibit 9).

**Exhibit 9. Parent Preferred Language, by HL Group**



*Note.* For Mandarin and Cantonese, “home language” = Chinese, given that this was about parents’ preference for *written* communications. We did offer the choice between simplified characters and traditional characters, but we collapsed those into a single category for analysis purposes given the small number of parents who selected either one.

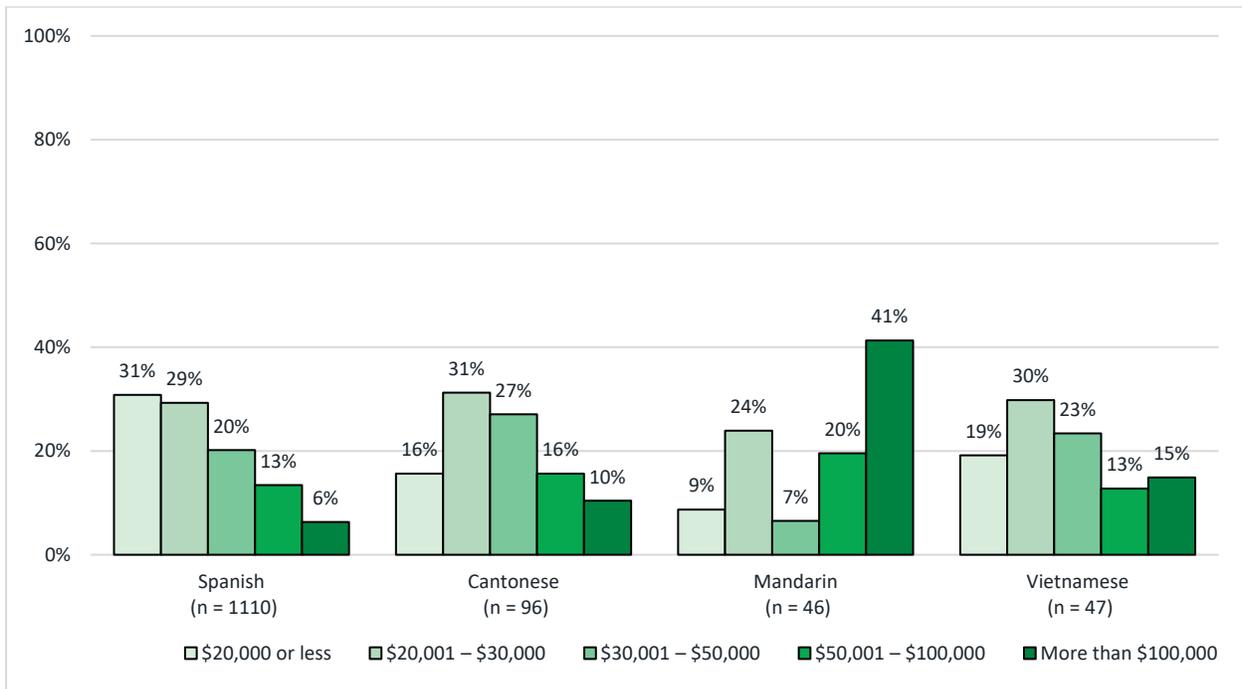
## Socioeconomic Status and Family Structure

 Although there was variability among study families in socioeconomic status, most tended toward the more disadvantaged end, except in the Mandarin-HL group.

Family socioeconomic characteristics (household income, parent education) and family structure (two-parent, etc.) are known to be strongly related to child outcomes, so we collected data on them to use as covariates in our main analyses of other predictors of child outcomes. Just as in the general population, there is variation among DLL families in these background characteristics, and our study sample was no exception.

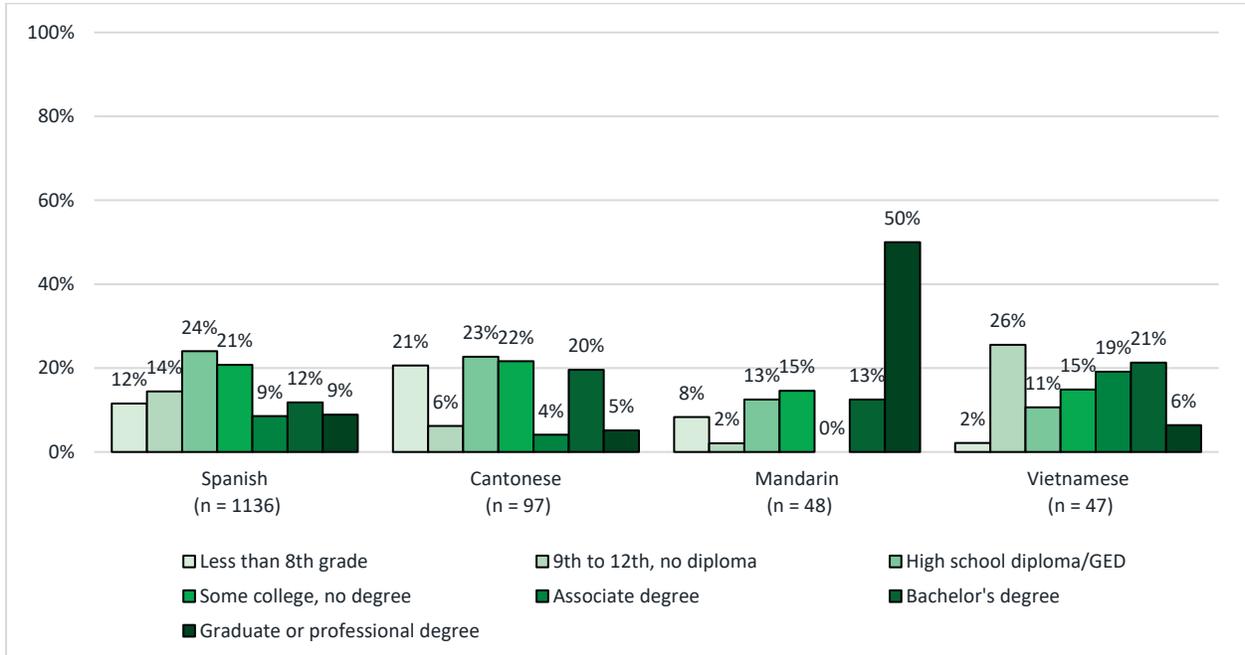
*Annual household income (pre-pandemic).* As shown in Exhibit 10, more than half of parents (60%) in the Spanish-HL group reported an annual household income (prior to the COVID-19 pandemic) of less than or equal to \$30,000, which is less than half of the median household income of \$78,672 in the state (U.S. Census Bureau, n.d.) and just above the 2019 federal poverty level for a family of four (ASPE, 2019). In the Cantonese- and Vietnamese-HL groups, less than half of parents (47% and 49%, respectively) reported incomes of \$30,000 or less. In all three of these HL groups, no more than 15% of parents reported incomes greater than \$100,000. The pattern for the study’s Mandarin-HL families, however, looked different. In the Mandarin group, only one third of parents reported an annual household income of \$30,000 or less, while 41% reported an income exceeding \$100,000.

**Exhibit 10. Annual Household Income (Pre-Pandemic), by HL Group**



*Parent education level.* There was considerable variability in the responding parent’s highest level of education in the Spanish-, Cantonese-, and Vietnamese-HL groups, with no more than about one quarter of parents in any one education level category (Exhibit 11). As with household income, the pattern was different for the Mandarin-HL group, in which half the parents reported having a graduate or professional degree. None of the other three HL groups had even as many as 10% of parents in that category.

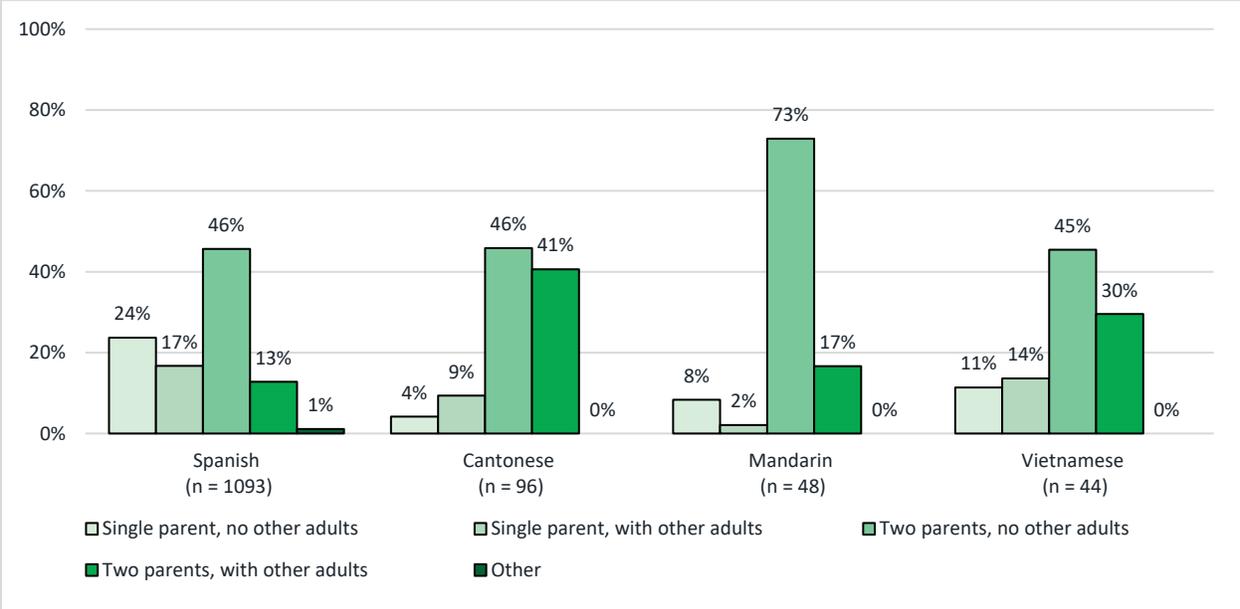
**Exhibit 11. Parent Education Level, by HL Group**



*Note.* In analyses, the top four categories (starting with some college, no degree) were combined into a single category. Education level is that of the parent who completed the parent survey (typically the mother); the survey did not ask about any other family member’s education level.

*Family structure (pre-pandemic).* In all four HL groups, a traditional family structure—two parents, with no other adults in the home—was the most common, although only the Mandarin group had more than half the families in this category (Exhibit 12). For the three Asian language groups, the second most common family structure was two parents with other adults—this structure was particularly common in the Cantonese and Vietnamese groups; in the Cantonese group, it was nearly as common as two parents without other adults. In the Spanish-HL group, meanwhile, the second most common family structure was single parent, no other adults.

**Exhibit 12. Family Structure (Pre-Pandemic), by HL Group**



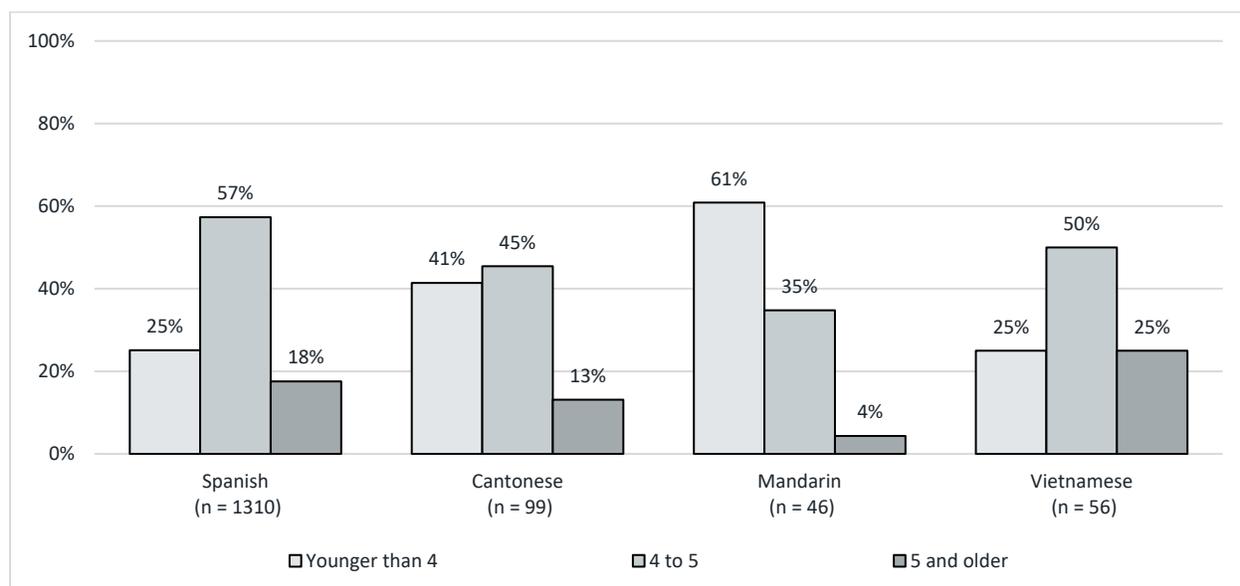
*Note.* Analyses collapsed the two “...with other adults” categories and the “other” category into a single category, for a total of three family structure categories (plus an additional category for missing family structure information).

### Child Age, Child Gender, and Parent Race/Ethnicity

**Child age.** Children in the study’s preschool sample<sup>12</sup> ranged in age from 3.0 to 5.6 years old at the time they were assessed by study data collectors.<sup>13</sup> The average age was 4.4 years old for children in both the Spanish-HL and Vietnamese-HL samples, 4.2 for Cantonese, and 3.9 for Mandarin.

As shown in Exhibit 13, children aged 4 to 5 made up 57% of the Spanish-HL sample, 50% of the Vietnamese- HL sample, 45% of the Cantonese-HL sample, and 35% of the Mandarin-HL sample. Mandarin was the only language group in which children aged 4 to 5 did not outnumber *both* of the other age groups (age 3 to 4 and age 5 and older), with 61% of the Mandarin-HL children aged 3 to 4. Children 5 and older made up the smallest age group for Spanish (18%), Cantonese (13%), and Mandarin (4%); Vietnamese had equal percentages 3 to 4 and 5 and older (25% for each).

**Exhibit 13. Child Age at Time of Direct Assessment, by HL Group**



*Note.* Child age was a continuous variable and was treated as such in analyses. The categories shown here are for illustrative purposes only. This exhibit omits 93 children who had social-emotional scores but were missing data for the other outcomes as a result of not being directly assessed.

<sup>12</sup> Children younger than 3 were part of the study’s infant/toddler sample and are discussed in Brief 4.

<sup>13</sup> Child age was slightly different for analyses of the social-emotional outcome; in those analyses, child age was the age when the parent completed the social-emotional inventory rather than the age when the child was assessed directly by study assessors. Those analyses also had a smaller and somewhat differing sample of children. Average age was 4.4 for Spanish ( $n = 862$ ), 4.4 for Cantonese ( $n = 70$ ), 4.0 for Mandarin ( $n = 37$ ), and 4.4 for Vietnamese ( $n = 32$ ). The range was the same as for the direct assessment sample: 3.0 to 5.6.

*Child gender.* Of the children whose home language was Spanish or Mandarin, half were girls and half were boys. For home language Cantonese, 54% of the participating children were girls and 46% were boys, and for Vietnamese, 48% were girls and 52% were boys.

*Parent race/ethnicity.* The study did not collect data on the race or ethnicity of the participating children, but the survey of parents did ask for the responding parent's race/ethnicity. Of the parents who responded, nearly all selected the race/ethnicity typically associated with the home language (though they may have selected additional options as well). For families whose home language was Spanish, 98% of parents selected *Hispanic or Latino/a* as (at least one of) their race/ethnicity responses ( $n = 1,135$ ). Similarly, 100% of Cantonese-, 98% of Mandarin-, and 98% of Vietnamese-HL group parents selected *Asian* ( $n = 97, 48, \text{ and } 47$ , respectively).

## Characteristics of the Classrooms and Teaching Teams

In addition to collecting background data on the children and families participating in the F5CA DLL Pilot study, we also collected some basic information about the classrooms and teaching teams participating in the study. These data, too, provide important context for interpreting results about DLLs' performance.

The data come from a survey of teachers conducted in roughly the same period as the parent survey and the child assessments (the first half of 2020). The analyses in this section are based on the survey responses of 572 teachers<sup>14</sup> in the 271 classrooms that included preschool-aged DLLs in the study sample. Because we were interested mainly in classroom composition and characteristics of the classrooms' teaching teams, we combined the responses of teachers in each classroom to create classroom-level measures, discussed in the following subsections. Here we discuss only compositional and background characteristics of the classrooms; information on their instructional approaches is provided in Briefs 1–3.

### *Classroom Composition*

Most of our classroom composition measures were created by averaging the survey responses of teachers within each classroom.<sup>15</sup> We were mainly interested in examining the DLL composition of the classroom—how many different languages were represented and how many children from the four study language backgrounds there were—but we also considered the total number of children and the age mixture of the children (in particular, whether the classroom consisted only of preschool-aged children or also included children younger than 3).

 **DLLs of Spanish language background tended to be in classrooms where a majority of students shared that language background; DLLs of other language backgrounds were more likely to be in more multilingual classrooms without a clear majority.**

Exhibits 14 and 15 provide information about the DLL composition of the classrooms. As shown in both exhibits, in the 249 classrooms in which the study assessed preschool-aged DLLs of Spanish language background, Spanish-language DLLs vastly outnumbered DLLs of other language backgrounds. According to teacher report, these classrooms had an average of 11 Spanish-language DLLs (only some of whom may have been in the study sample) and fewer

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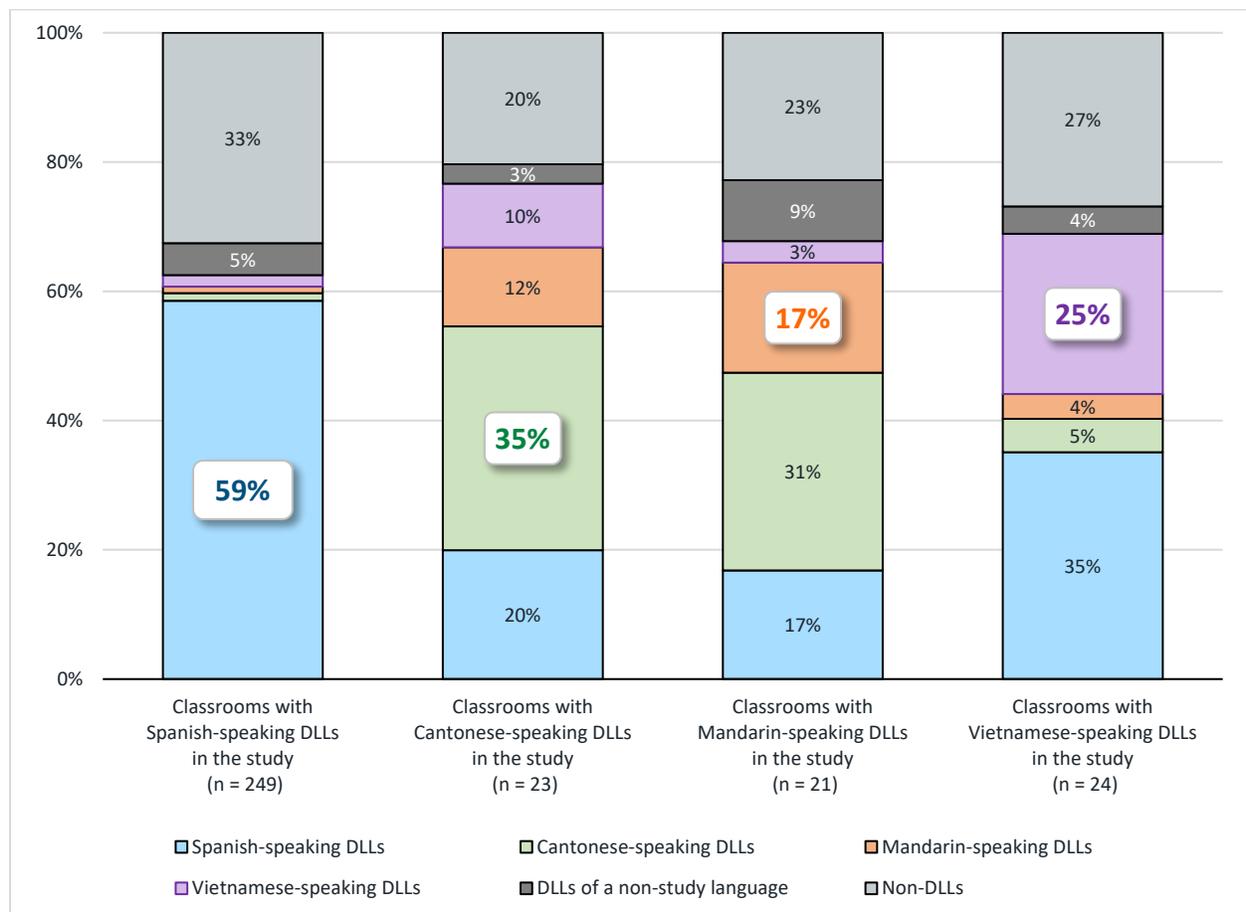
<sup>14</sup> Sixty-one of the teachers taught in two classrooms and, at the request of the study team, completed a separate survey about each classroom, given that their practices may have differed in the two classrooms. Thus, we had 633 survey responses from the 572 teachers. "Teachers" included assistants and aides as well as lead teachers, associate teachers, co-teachers, and so forth.

<sup>15</sup> In calculating these classroom-level averages, we gave more weight to teachers who indicated having a classroom role with greater responsibility (such as lead teacher), teachers who had been teaching in the classroom for more than a few months, and teachers who spent more time in the classroom, on the assumption that these teachers would have greater knowledge about the classroom and (anticipating our subsequent analyses of relationships between instruction and child performance) exert the greatest influence on the children they were working with.

than one DLL of any other single language background. In almost half of the 249 classrooms (118), teachers reported DLLs of *no* language background other than Spanish (not shown in either exhibit).

In the 23 classrooms in which the study assessed preschool-aged DLLs of Cantonese language background, Cantonese-language DLLs outnumbered DLLs of other language backgrounds but not by a huge margin. According to the teachers, these classrooms had, on average, about 15 DLLs of any language background, of whom 6.5 were Cantonese speakers, 3.7 were Spanish speakers, 2.3 were Mandarin speakers, and 1.8 were Vietnamese speakers.

**Exhibit 14. DLL Composition of Sample Classrooms**



In the 21 classrooms in which the study assessed preschool-aged DLLs of Mandarin language background, Mandarin-language DLLs were outnumbered by DLLs of Cantonese language background almost two to one (average of 6.0 Cantonese-language DLLs vs. 3.3 Mandarin-language DLLs), and there were, on average, the same number of Spanish-language DLLs as Mandarin-language DLLs (3.3). Finally, in the 24 classrooms in which the study assessed

preschool-aged DLLs of Vietnamese language background, there were, on average, more Spanish-language DLLs (6.7) than Vietnamese-language DLLs (4.7).<sup>16</sup>

Notably, of classrooms in which we assessed Cantonese-, Mandarin-, and Vietnamese-language DLLs, each set had some classrooms in which *no teacher* reported any DLLs of that language: five classrooms for Cantonese, three for Mandarin, and three for Vietnamese.<sup>17</sup> That is, one or more parents in these classrooms reported that their child was exposed to a particular language at home, but none of the teachers reported any DLLs of that language background in the class. This indicates that teachers may not always be aware of the language backgrounds of all of the children in their class, particularly if the language background is not Spanish. (See Manship et al., 2021, for additional findings from the F5CA DLL Pilot Study related to identification of DLLs.)

### Exhibit 15. Child Composition of Sample Classrooms

	Classrooms with DLL study participants whose home language was ...			
	Spanish (n = 249 classrooms)	Cantonese (n = 23 classrooms)	Mandarin (n = 21 classrooms)	Vietnamese (n = 24 classrooms)
Average number of children	19.0	18.6	19.5	19.1
Average number of DLLs of any language	12.8	14.8	15.1	13.9
Average number of Spanish-language DLLs	11.1	3.7	3.3	6.7
Average number of Cantonese-language DLLs	0.2	6.5	6.0	1.0
Average number of Mandarin-language DLLs	0.2	2.3	3.3	0.7
Average number of Vietnamese-language DLLs	0.3	1.8	0.6	4.7
Average number of non-English languages represented by DLLs in the classroom	1.8	2.9	3.1	2.9
Percentage of classrooms with infants/toddlers as well as preschoolers	17.7%	39.1%	33.3%	20.8%

*Note.* Room age is based on information provided by site contacts. All other cell contents are based on teacher self-report; individual classroom values were weighted averages across the teachers in the room.

<sup>16</sup> There was some, but not complete, overlap between the 23 classrooms in which the study included Cantonese-language DLLs and the 21 classrooms in which the study included Mandarin-language DLLs. The study included preschool-aged DLLs from Cantonese and/or Mandarin language backgrounds (as identified from parent information) in a total of 33 classrooms. Eleven of these classrooms had both, while 12 had Cantonese-language DLLs participating in the study but no Mandarin-language DLLs, and vice versa for 10 classrooms.

<sup>17</sup> For the Cantonese and Mandarin classrooms, it is possible that teachers were not able to distinguish between Cantonese and Mandarin home language backgrounds and misattributed children of one background to the other.

Exhibit 15 (top row) also shows that classrooms averaged approximately 19 children, total; this was the case for all four sets of classrooms. There was more variation across the four classroom sets in whether they had infants or toddlers (i.e., children younger than 3) as well as preschool-aged children (Exhibit 15, bottom row). Only 18% of the Spanish-HL classroom sample had children younger than 3, but higher percentages of classrooms in the other three HL groups—up to nearly 40% of the classrooms in the Cantonese-HL sample—had infants or toddlers as well as preschoolers.

### ***Teaching Team Characteristics***

We also looked at the following characteristics of classroom teaching teams:

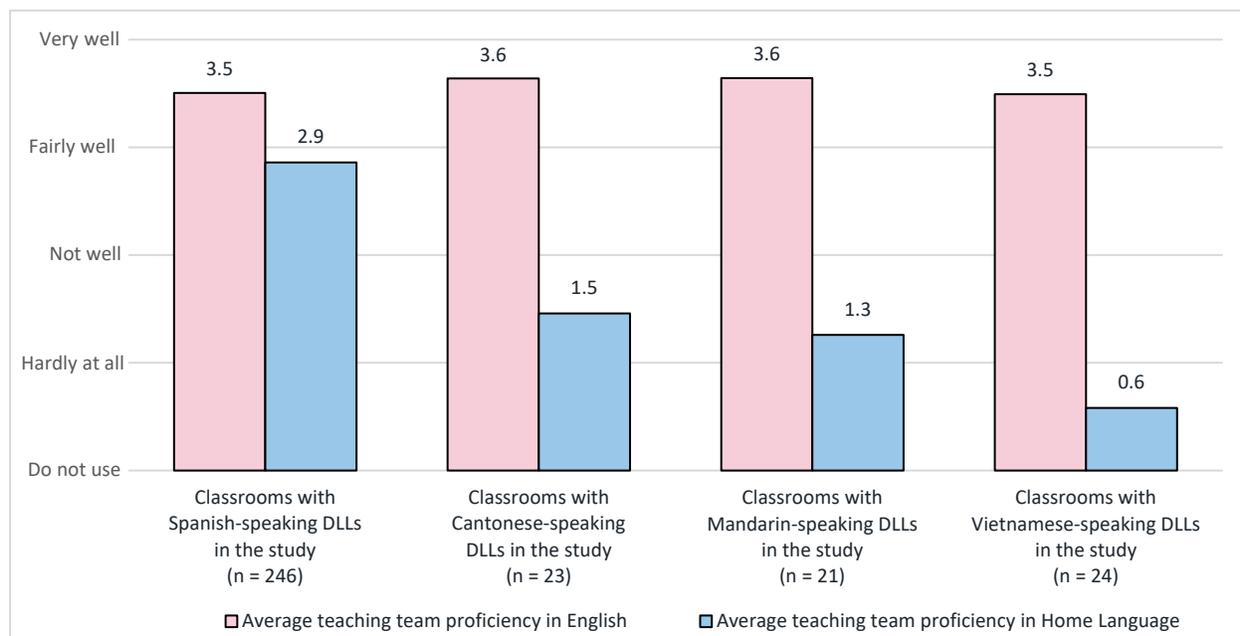
- average fluency (across teachers) in each of the four study languages, if there were children of that language background in the classroom;
- whether at least one teacher had a bachelor’s degree;
- whether at least one teacher had DLL-related certification; and
- average years of experience teaching young children.



**Most classrooms’ teaching teams averaged high in (self-rated) English and Spanish fluency; teaching teams’ fluency in Cantonese, Mandarin, and especially Vietnamese was lower, mainly because fewer teachers spoke those languages at all.**

Exhibit 16 shows that most teachers were (according to self-report) fluent in English: Teaching teams averaged 3.5 or higher, on a 0-to-4 scale, in English fluency. Average fluency in Spanish was also relatively high: 2.9, for the 246 classrooms with Spanish-HL children and teaching team Spanish fluency data. Average fluency in each of the other three study languages was notably lower, especially for Vietnamese (0.6).

## Exhibit 16. Average Teaching Team Proficiency in English and the Home Language



Note. Individual classroom values were weighted averages across the teachers in the room.

However, because these fluency ratings were formed by averaging across teachers in the room, a low fluency rating likely means that *fewer teachers in the room spoke the language at all* rather than that most teachers spoke it with low fluency. Specifically:

- Of the 249 classrooms with Spanish-language DLLs, only 2 (less than 1%) had *no* teachers who reported using Spanish in the classroom.
- Of the 23 classrooms with Cantonese-language DLLs, 8 (35%) had no teachers who reported using Cantonese in the classroom.
- Of the 21 classrooms with Mandarin-language DLLs, 8 (38%) had no teachers who reported using Mandarin in the classroom.
- Of the 24 classrooms with Vietnamese-language DLLs, 12 (50%) had no teachers who reported using Vietnamese in the classroom.

Our child outcome analysis models included a variable for the *number of teachers* in each room who reported using the home language at all (which was 0 for some classrooms).<sup>18</sup>

<sup>18</sup> This number, on average across classrooms, was 2.0 teachers in the classrooms with Spanish-language DLLs, 1.2 teachers in the classrooms with Cantonese-language DLLs, 1.0 teacher in the classrooms with Mandarin-language DLLs, and 0.6 teachers in the classrooms with Vietnamese-language DLLs. We treated this variable as a *key predictor* of child outcomes rather than as a control variable, so this document does not include results for this variable. (It is also worth noting that the number of teachers who used the language at all is partly a function of how many teachers any given classroom *had*, total, and how many responded to the survey.)



**Most classrooms had teachers with bachelor’s degrees and several years of experience teaching young children.**

Finally, Exhibit 17 provides data on the educational background and level of experience of classroom teaching teams. In each of the four HL groups, more than half of the classrooms had at least one teacher with a bachelor’s degree. On the other hand, few classrooms had at least one teacher with a DLL-related certification. Although early learning teachers holding certain permits are eligible to receive such a certification, these certifications are designed and geared mainly for K–12 teachers, so it is not surprising that few teachers in our sample held one.

Classroom teaching teams were relatively experienced at teaching young children. In classrooms with Spanish-language and Vietnamese-language DLL study participants, teaching teams had an average of approximately 13 years’ experience teaching young children. For classrooms with Cantonese-language DLLs, teaching teams averaged approximately 15 years of experience, and for classrooms with Mandarin-language DLLs, the average experience level was approximately 16 years.<sup>19</sup>

**Exhibit 17. Background of Teaching Teams in Sample Classrooms**

	Classrooms with DLL study participants whose home language was ...			
	Spanish	Cantonese	Mandarin	Vietnamese
Percentage of classrooms in which at least one responding teacher reported having a bachelor’s degree	68% (169/247)	65% (15/23)	76% (16/21)	79% (19/24)
Percentage of classrooms in which at least one responding teacher reported having DLL-related certification <sup>a</sup>	6% (15/244)	13% (3/23)	10% (2/21)	17% (4/24)
Average years of experience teaching young children (ages 0 to 5)	13.2 (n = 241)	14.6 (n = 23)	16.3 (n = 21)	13.4 (n = 24)

*Note.* Data are based on teacher self-repot. For years of experience, individual classroom values were weighted averages across the teachers in the room.

<sup>a</sup>DLL-related certification is any of the following: Crosscultural, Language, and Academic Development (CLAD) credential; Bilingual Crosscultural, Language, and Academic Development (BCLAD) credential; Teaching English as a Foreign Language (TEFL) certification; Teaching English to Speakers of Other Languages (TESOL) certification.

<sup>19</sup> Medians for the years of experience were about 1 year less than the means for each of the four language groups.

### Characteristics of the Early Learning Programs

The only characteristic of early learning programs that we included in our statistical models was whether the program was center-based or a family child care home (FCCH).<sup>20</sup> Of the 153 early learning programs with preschool-aged DLLs participating in the study, 126 (with 244 classrooms) were centers and 27 (each with only a single classroom) were FCCHs. Exhibit 18 provides the breakdown by HL group.

**Exhibit 18. Numbers of Participating Centers and Family Child Care Homes (FCCHs), by HL Group**

	DLL study participants whose home language was ...				Total
	Spanish	Cantonese	Mandarin	Vietnamese	
Number of programs the children and classrooms were in	139	15	16	19	<b>153</b>
Number of centers	115	13	14	16	<b>126</b>
Number of FCCHs	24	2	2	3	<b>27</b>

<sup>20</sup> We also considered including variables related to programs’ funding sources, but given the complexity of funding sources, along with preliminary analyses indicating that they were not related to child outcomes in consistent ways or in ways that made theoretical sense, we decided not to control for them in our analyses. Of the 153 early learning programs with preschool-aged DLLs participating in the study, 22% (34 programs, with 53 classrooms) had Head Start or Early Head Start funding, 53% (81 programs, with 164 classrooms) had California State Preschool Program funding, and 45% (69, with 129 classrooms) had another source of public funding. Programs could have more than one of these sources of funding; 81% (124, with 230 classrooms) had some source of public funding.



## About Our Outcomes

This section of the report describes the measures of children’s language and learning that we analyzed as outcomes in our study of the relationships between instruction and outcomes for preschool-aged DLLs.

### Description of Outcome Measures

The study examined 10 different outcome measures for participating preschool-aged DLLs (Exhibit 19). These data were collected in late 2019 and early 2020, prior to disruptions caused by the COVID-19 pandemic. Eight of the outcomes were based on direct assessment of the children by trained assessors. These included three skills—vocabulary, oral comprehension, and basic mathematics—assessed in *both* English and the home language, for a total of six outcome measures. The other two directly assessed outcomes—basic literacy skills (concepts of print) and executive function—were administered in *either* English or the home language, whichever the child performed better in on the vocabulary and oral comprehension assessments.<sup>21</sup> From the pair of vocabulary measures, we calculated a measure of bilingualism (see the “[About the Bilingualism Measure](#)” box). The tenth outcome was a parent-reported measure of the child’s social-emotional well-being.

#### Exhibit 19. Information About the Outcome Measures

Outcome	Language of assessment	Developer/publisher	Specific measure
Vocabulary in English	English	Schrank et al. (2014)/Riverside Insights	<i>Woodcock-Johnson IV Tests of Oral Language: Picture Vocabulary</i> subtest
Vocabulary in the home language	Home language	Schrank et al. (2014)/Riverside Insights	<i>Woodcock-Johnson IV Tests of Oral Language: Vocabulario sobre dibujos</i> subtest (then translated from the Spanish into Chinese and Vietnamese)
Bilingualism	English & home language	F5CA DLL Pilot Study Team/AIR	(calculated from the raw scores of the English and home language vocabulary assessments; see the “ <a href="#">About the Bilingualism Measure</a> ” box)

<sup>21</sup> The Applied Problems assessments (basic mathematics skills) were administered only to children aged 4 and older. Otherwise, nearly all of the children who were directly assessed have scores for all of the direct assessments.

Outcome	Language of assessment	Developer/publisher	Specific measure
Oral comprehension in English	English	Schrank et al. (2014)/Riverside Insights	<i>Woodcock-Johnson IV Tests of Oral Language: Oral Comprehension</i> subtest
Oral comprehension in the home language	Home language	Schrank et al. (2014)/Riverside Insights	<i>Woodcock-Johnson IV Tests of Oral Language: Comprensión Oral</i> subtest (then translated from the Spanish into Chinese and Vietnamese)
Basic math skills as assessed in English <sup>a</sup>	English	Woodcock et al. (2001, 2007), Riverside	<i>Woodcock-Johnson III Tests of Achievement: Applied Problems</i> subtest
Basic math skills as assessed in the home language <sup>a</sup>	Home language	Muñoz-Sandoval et al. (2005)/Riverside	<i>Batería III Woodcock-Muñoz Pruebas de aprovechamiento: Problemas aplicados</i> subtest (then translated from the Spanish into Chinese and Vietnamese)
Literacy skills	English OR Home language <sup>b</sup>	F5CA DLL Pilot Study Team/AIR	Concepts of Print
Executive functioning	English OR Home language <sup>b</sup>	Carlson & Zelazo (2014)/University of Minnesota & Reflection Sciences	<i>Minnesota Executive Function Scale (MEFS)</i>
Social-emotional well-being	Completed by parents	Squires et al. (2015)/Brookes	<i>Ages and Stages Questionnaires: Social-Emotional, 2<sup>nd</sup> Ed. (ASQ-SE2)</i>

<sup>a</sup> These math assessments were administered only to children aged 4 and older. The study administered a different math assessment to children who were between 3 and 4, but only in English or the home language. Because of that and the small sample sizes for that age group (especially for DLLs of the three Asian language backgrounds), we decided not to include that outcome in our analyses.

<sup>b</sup> Language of assessment for the literacy skills outcome and the executive functioning outcome was determined based on the sum of the raw scores of the vocabulary and oral comprehension assessments in each of English and the home language—whichever was higher.

## ABOUT THE BILINGUALISM MEASURE

Using vocabulary scores in English and the home language, we created a **bilingual score** for each child that represents both *proficiency* in each language and the *balance* of proficiency across the two languages. We calculated the measure as follows:

$$\frac{\text{Low Score}}{\text{High Score}} \times \frac{\text{Low Score} + \text{High Score}}{\text{Total Possible}^a} \times 100^b = \text{Bilingual Score}$$

*(Balance)*                      *(Proficiency)*

<sup>a</sup> We used the raw scores from the vocabulary assessments rather than the *w* scores and considered 35 to be the total possible correct on both the English and Spanish measures.

<sup>b</sup> We multiplied by 100 so that the resulting score would range from 0 to 100 instead of 0 to 1.

## Performance of the Sample Children



**Although all sample children were DLLs, average proficiency was higher in English than in the home languages.**

In all four HL groups, study children’s performance fit typical patterns (a normal, or bell curve, distribution) on the English vocabulary, math as assessed in English, executive function, and social-emotional outcomes (Exhibit 20). On the other measures, however, scores concentrated at the low end. This was particularly the case for the bilingual score and oral comprehension in both English and the home language.

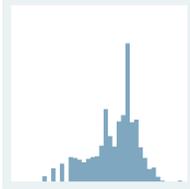
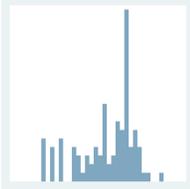
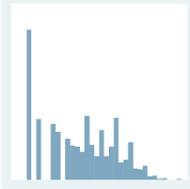
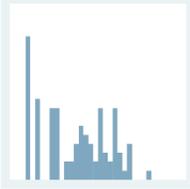
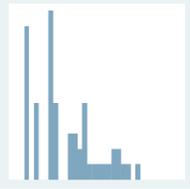
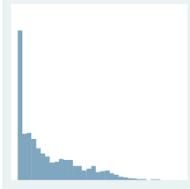
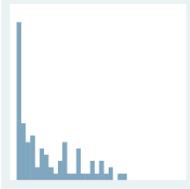
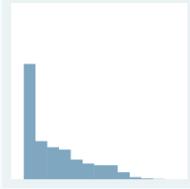
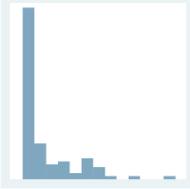
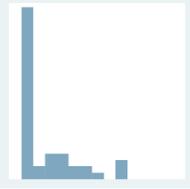
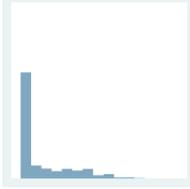
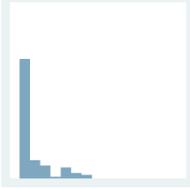
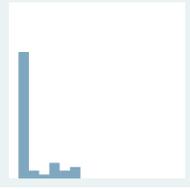
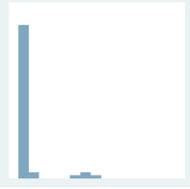
For outcomes that were assessed in both English and the home language, as well as the bilingual measure, means and distributions indicate greater proficiency (of the sample as a whole) in English than in the home language. For instance, for the Spanish-HL group, the average English vocabulary score was 438, while the average Spanish vocabulary score was 406.

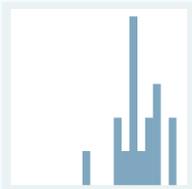
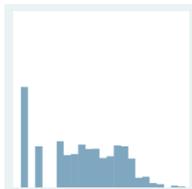
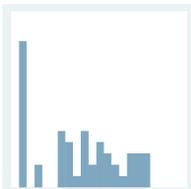
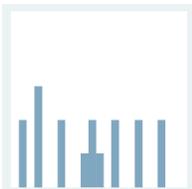
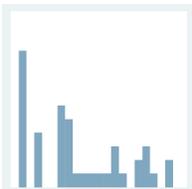
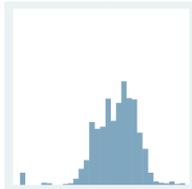
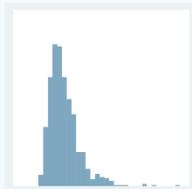
A more dramatic example of children’s greater proficiency in English, compared with the HL, is the bilingual score. A property of note about the bilingualism measure is that if either the English or the HL score is 0 (i.e., no question answered correctly), the *balance* portion will be 0, which means that the bilingual score will be 0.<sup>22</sup> Of the 1,304 children in the Spanish-HL group who had a bilingual score calculated, 234 (18%) had a value of 0. But the source of these 0s was quite lopsided: 227 children had a 0 on the Spanish vocabulary, while only 7 had a 0 on the English vocabulary.

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<sup>22</sup> If the child’s English and HL scores are both 0, a bilingual score is not calculated.

**Exhibit 20. Child Outcome Measures: Mean (Standard Deviation), Observed Range, Sample Size, and Histogram**

Outcome	Spanish	Cantonese	Mandarin	Vietnamese
Vocabulary in English	438 (21) 374 to 495 <i>n</i> = 1,308 	432 (26) 374 to 482 <i>n</i> = 98 	436 (23) 374 to 472 <i>n</i> = 46 	452 (16) 398 to 479 <i>n</i> = 56 
Vocabulary in the home language	406 (32) 360 to 494 <i>n</i> = 1,307 	403 (31) 360 to 472 <i>n</i> = 96 	417 (36) 360 to 476 <i>n</i> = 45 	396 (29) 360 to 461 <i>n</i> = 56 
Bilingualism	14 (14) 0 to 69 <i>n</i> = 1,304 	14 (15) 0 to 51 <i>n</i> = 91 	19 (17) 0 to 53 <i>n</i> = 45 	12 (16) 0 to 66 <i>n</i> = 56 
Oral comprehension in English	422 (19) 405 to 484 <i>n</i> = 1,308 	416 (18) 405 to 490 <i>n</i> = 97 	418 (19) 405 to 466 <i>n</i> = 45 	426 (22) 405 to 470 <i>n</i> = 56 
Oral comprehension in the home language	402 (18) 390 to 470 <i>n</i> = 1,306 	397 (12) 390 to 437 <i>n</i> = 95 	397 (13) 390 to 432 <i>n</i> = 45 	394 (12) 390 to 442 <i>n</i> = 56 

Outcome	Spanish	Cantonese	Mandarin	Vietnamese
Basic math skills as assessed in English	385 (28) 318 to 444 <i>n</i> = 965 	392 (27) 318 to 432 <i>n</i> = 52 	410 (19) 366 to 444 <i>n</i> = 17 <sup>a</sup> 	399 (33) 318 to 449 <i>n</i> = 42 
Basic math skills as assessed in the home language	360 (38) 301 to 456 <i>n</i> = 964 	354 (39) 301 to 417 <i>n</i> = 51 	363 (43) 301 to 430 <i>n</i> = 17 <sup>a</sup> 	353 (44) 301 to 438 <i>n</i> = 42 
Literacy skills	27 (18) 0 to 90 <i>n</i> = 1,299 	22 (17) 0 to 70 <i>n</i> = 87 	24 (19) 0 to 80 <i>n</i> = 44 	30 (22) 0 to 90 <i>n</i> = 56 
Executive functioning	96 (8) 61 to 123 <i>n</i> = 1,290 	95 (6) 83 to 107 <i>n</i> = 80 	99 (11) 61 to 113 <i>n</i> = 44 	98 (9) 80 to 123 <i>n</i> = 51 
Social-emotional well-being <sup>b</sup> (lower scores reflect greater social-emotional well-being)	-0.33 (0.55) -1.16 to 3.81 <i>n</i> = 862 	0.07 (0.74) -1.08 to 1.77 <i>n</i> = 70 	-0.17 (0.66) -1.25 to 1.85 <i>n</i> = 37 <sup>a</sup> 	-0.24 (0.6) -1.03 to 1.74 <i>n</i> = 32 <sup>a</sup> 

Note. *Ns* are maximum possible. Individual analyses, particularly those reported in Briefs 1–3, may have had slightly fewer cases due to missing data on key (instructional) predictors.

<sup>a</sup> Because of the small sample size, we did not analyze this outcome for this HL group.

<sup>b</sup> Because the social-emotional measure was based on parent report on an online survey and was collected separately from the direct assessment data, the sample of children with social-emotional scores was not the same as the sample of children with direct assessment scores, although there was considerable overlap. Across all four languages, 908 children had scores for at least one of the directly assessed outcomes and also for the social-emotional outcome; 603 children had scores for at least one of the directly assessed outcome measures but lacked a score for the social-emotional outcome; and 93 children had a score for the social-emotional outcome but lacked scores for any of the directly assessed outcomes.

Based on the age equivalents provided by the publisher of the three pairs of assessments administered in both English and Spanish (for the Spanish-HL sample), the age equivalent for our sample’s mean score on the Spanish assessments was at least one year younger than the age equivalent for the sample’s mean score on the English assessments (Exhibit 21).<sup>23</sup> Even the English mean score age equivalent was well below the actual average age of the study sample, but the study sample differed from the norming samples in ways that may help explain this discrepancy. Most importantly, unlike the norming samples, the study sample consisted entirely of DLLs. It is not uncommon for young DLLs’ language development in any one language to lag behind that of non-DLLs for that language, perhaps because they are learning two languages at once (Hammer et al., 2014).

**Exhibit 21. Mean Score Age Equivalents for the Assessments Administered in Both English and Spanish (Spanish-HL Sample Only)**

Outcome	Study sample mean score	Age equivalent of mean score	Mean age of sample children
Vocabulary in English	438	3 years, 1 month	4 years, 5 months
Vocabulary in Spanish	406	Less than 2 years	
Oral comprehension in English	422	2 years, 9 months	
Oral comprehension in Spanish	402	Less than 2 years	4 years, 8 months
Basic math skills assessed in English	385	3 years, 9.5 months	
Basic math skills assessed in Spanish	360	2 years, 9.5 months	

*Note.* Age equivalents, provided by the assessment publisher, are based on the norming sample for the assessment. For the age equivalents shown in Exhibit 21, some approximation—or in some cases interpolation—was necessary because the publisher-provided age equivalents are available only for score points that are possible for an individual child (as opposed to the group means shown in the table).

There was of course variation among the study children in their performance on all of the outcome measures, as illustrated by the histograms (as well as by the standard deviations and

<sup>23</sup> Because the study had these assessments translated into the other three study languages, age equivalents are not available for the assessments in those languages. Thus, we present these results only for the Spanish-HL group.

ranges) in Exhibit 20. Therefore, it is possible to examine what kinds of factors are associated with higher performance. Relationships between background characteristics and outcomes are discussed in the following section; relationships between instructional factors (at children’s early learning and care programs) and outcomes are discussed in Briefs 1–3.



## Relationships Between Sample Characteristics and Child Outcomes

In this section, we describe how the sample characteristics described in the first part of this document relate to the outcomes described in the second part. Although these relationships are important and interesting in their own right, the main reason for presenting them here is that these variables—many of which are significantly related to outcomes—are important to control for in analyses of relationships between instruction and outcomes. The results presented in this report, however, are from models that do not include any of the instructional predictors discussed in Briefs 1–3.

### Characteristics of the Children and Their Families

We begin with the characteristics of the children and their families, which we were able to examine in relation to outcomes both for Spanish-language DLLs and (to a lesser extent) for the other three home language groups. As noted earlier, the analyses were conducted separately for each of the four home language groups; this is because the analyses of instruction (discussed in Briefs 1–3) were also conducted separately for each language, given that instructional practices differed across the four languages.

#### *Children With Spanish Language Background*

For preschool-aged DLLs of Spanish language background, many child background characteristics were significantly related to multiple outcomes; Exhibit A1 in the Appendix provides a full list.<sup>24</sup> The following paragraphs summarize the findings organized by the categories of background characteristics described earlier in this report.



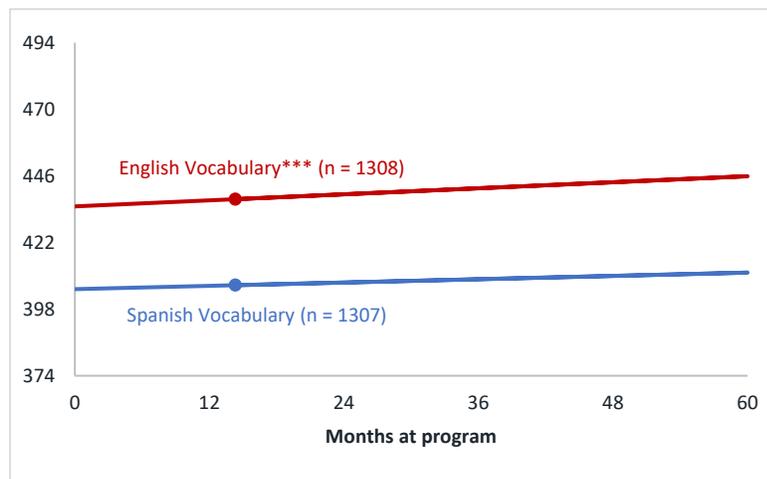
**The longer Spanish-language DLLs had been at their early learning and care program, the better they performed on the English outcomes.**

*Care background of the children.* On average and all else equal, the longer children had been at their early learning and care program, the better they performed on the three English outcomes, as well as on the bilingual and literacy outcomes. Exhibit 22 illustrates the positive relationship between months at the program and English vocabulary (upward sloping red line); the exhibit also shows that number of months at the program appears positively related to Spanish vocabulary (blue line), although this relationship was not statistically significant.

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<sup>24</sup> With just a few exceptions mentioned in the notes underneath Exhibit A1, all background characteristics were included in analyses of all outcomes. Analyses used a three-level multilevel model (children within classrooms within early learning and care programs).

## Exhibit 22. Estimated Relationship Between Months Enrolled at Early Learning Program and Vocabulary Outcomes for Spanish-language DLLs



*Note.* Lines depict statistically estimated relationships, with all other background characteristics held constant. Dots show average (within-sample) performance for children with the average (within-sample) months at the program. \*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < .05$ ; † $p < .10$ .

On the other hand, attending the program for 30 hours per week or more did not have a positive effect on any outcome and had significant negative associations with three outcomes: basic mathematics as assessed in Spanish, literacy skills, and executive functioning (not shown in an exhibit).

The extent to which parents chose the program for its language approach had a significant positive relationship with one outcome—social-emotional well-being—and no significant negative relationships with any outcomes. (Briefs 1 and 2 examine the relationships between classroom language use practices and child outcomes.)

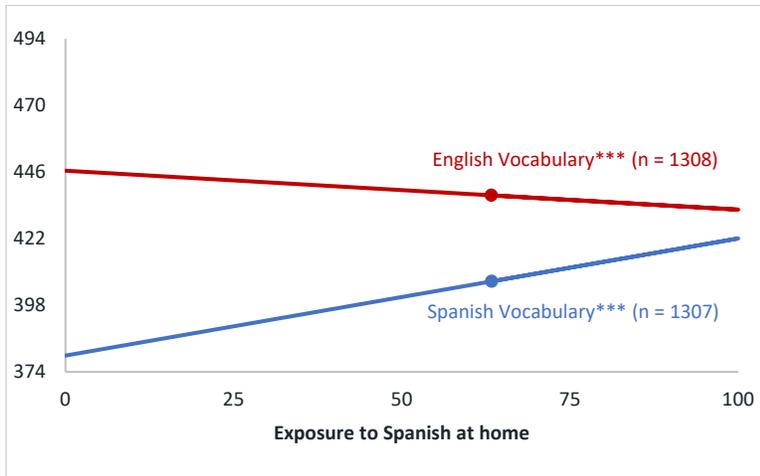
*Children’s language background.* Parent proficiency in English and parent preference for English in study communications were positively associated with children’s performance on all three outcomes measured in English. Similarly, parent proficiency in Spanish and parent preference for Spanish in study communications were positively associated with children’s performance on all three outcomes measured in Spanish.

 **For Spanish-language DLLs, the more Spanish they were exposed to at home, and the older they were when they were first exposed to English, the less well they did on English outcomes, but the better they did on Spanish outcomes.**

The amount of Spanish children were exposed to at home was positively associated with the three outcomes in Spanish and the bilingual measure (relationship with Spanish vocabulary shown in Exhibit 23, upward sloping blue line) but negatively related to English vocabulary

(downward sloping red line in Exhibit 23) and English oral comprehension. In addition, the older children were when they were first exposed to English, the less well they did on the English outcomes, but the better they did on the Spanish outcomes. Exhibit 24 demonstrates this relationship for the two vocabulary measures (general downward pattern of the first set of bars and general upward pattern of the second set).

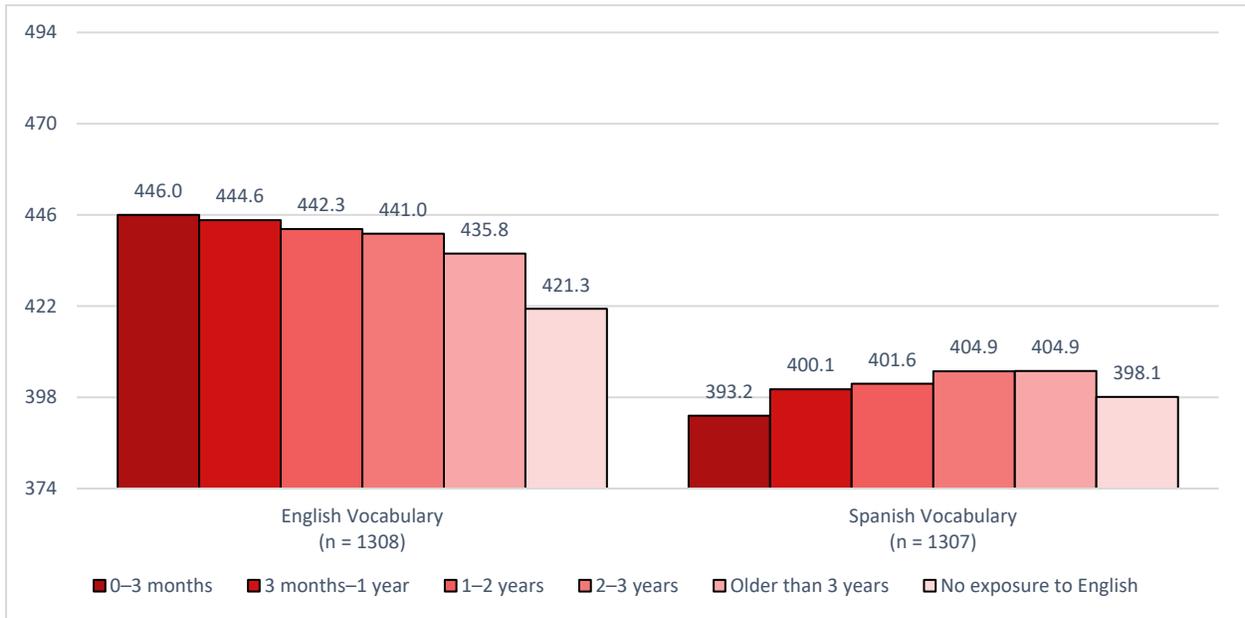
### Exhibit 23. Estimated Relationship Between Exposure to Spanish at Home and Vocabulary Outcomes for Spanish-language DLLs



*Note.* Lines depict statistically estimated relationships, with all other background characteristics held constant. Dots show average (within-sample) performance for children with the average (within-sample) exposure to Spanish at home.

\*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < .05$ ; † $p < .10$ .

## Exhibit 24. Estimated Relationship Between Age of First Exposure to English and Vocabulary Outcomes for Spanish-language DLLs



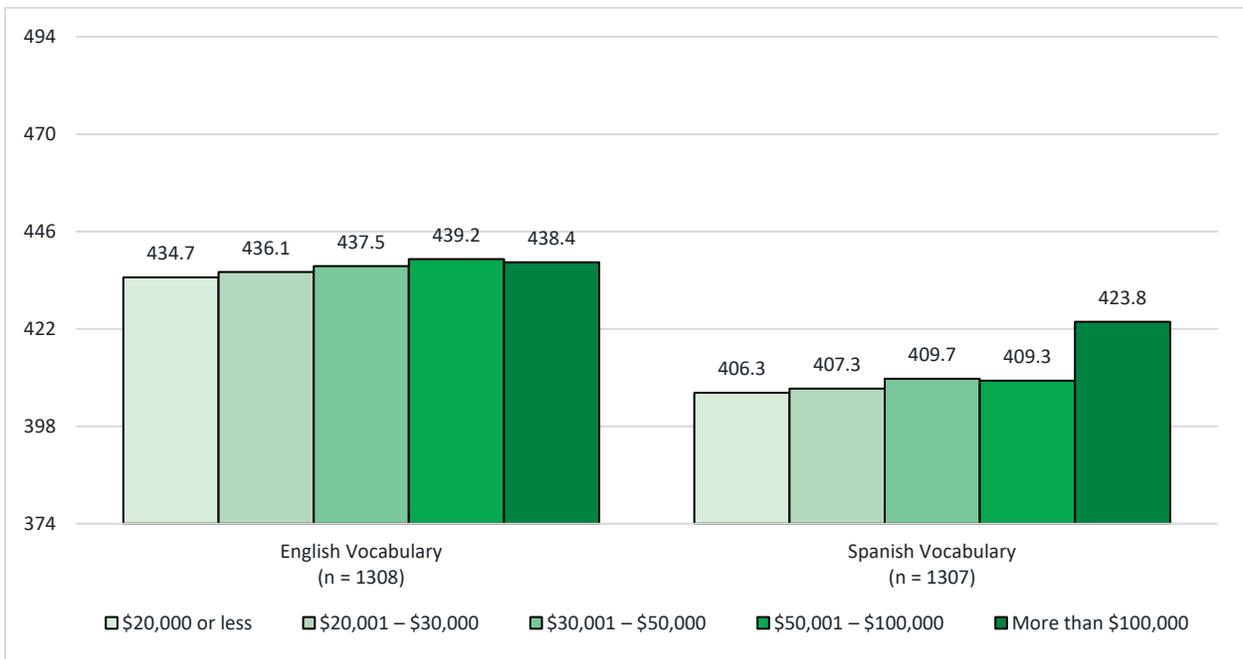
*Note.* The scores for *0-3 months* are unadjusted; the scores for all other age-of-first-exposure categories are adjusted for other background characteristics to allow for an “all-else-equal” comparison (i.e., if the composition of each of the other groups was the same as that of the *0-3 months* group in terms of other background characteristics). For English vocabulary, all of the age groups had significantly lower scores than the *0-3 months* group except for *3 months to 1 year*. For Spanish vocabulary, all of the age groups had significantly higher scores than the *0-3 months* group except for *no exposure to English*. (As shown in Exhibit 6 earlier, very few Spanish-language DLLs had had no exposure to English.)



## Higher annual household income was associated with better performance on all 10 outcomes for Spanish-language DLLs.

*Socioeconomic status and family structure.* Compared with children from households at the study’s lowest annual household income level (\$20,000 or less), children from households in at least one higher income category—most commonly the study’s highest income category of greater than \$100,000 per year—performed significantly better on all 10 outcomes. The positive relationship between annual household income and children’s performance is illustrated in Exhibit 25 for the two vocabulary outcomes, as examples.

**Exhibit 25. Estimated Relationship Between Annual Household Income (Pre-Pandemic) and Vocabulary Outcomes for Spanish-language DLLs**

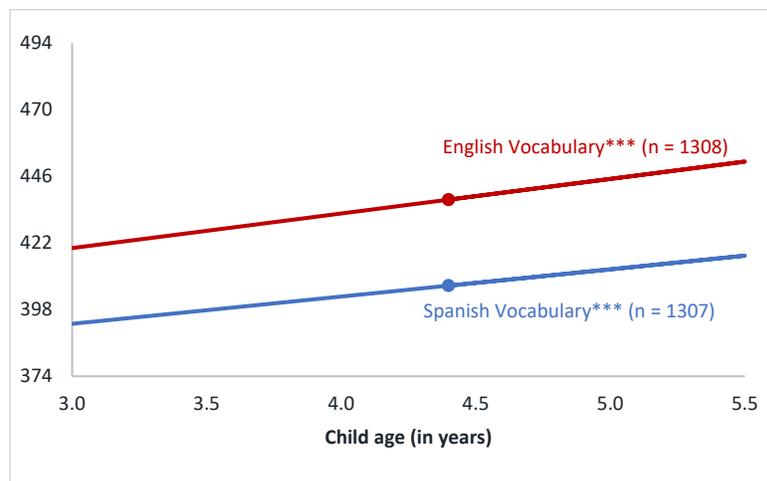


*Note.* The scores for \$20,000 or less are unadjusted; the scores for all the other annual household income groups are adjusted for other background characteristics to allow for an “all-else-equal” comparison (i.e., if the composition of each of the other groups was the same as that of the \$20,000 or less group in terms of other background characteristics).

Parent highest education level was significantly related to some outcomes—most significantly executive functioning—but not as many as household income was. (Parent education is correlated with household income, so it may be difficult to distinguish the effects of income and education.) Family structure indicators also had significant relationships with several outcomes. In particular, households in which the only adults were parents—even single parents—tended to have higher-performing children than households in which there were additional adults.

*Child characteristics.* Two of the most consistent predictors of child outcomes, and often among the strongest predictors, were child gender (with females outperforming males) and child age (with older children outperforming younger children.) Exhibit 26 illustrates the latter relationship for the two vocabulary outcomes.

### Exhibit 26. Estimated Relationship Between Child Age at Time of Assessment and Vocabulary Outcomes for Spanish-language DLLs



*Note.* Lines depict statistically estimated relationships, with all other background characteristics held constant. Dots show average (within-sample) performance for children of the average (within-sample) age. \*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < .05$ ; † $p < .10$ .

### Children With Cantonese, Mandarin, and Vietnamese Language Backgrounds

Sample sizes for the three Asian language groups permitted inclusion only of a small number of child background characteristics in the statistical models. To identify the characteristics that had significant relationships with any given outcome—and that should thus be controlled for in the analyses that are the subject of Briefs 1 and 3—we began by testing one characteristic at a time and then proceeded to test combinations of a few characteristics that had individually been significant.<sup>25</sup> When sample sizes permitted, we included one or two additional characteristics based on theory even if they had not been significant in preliminary testing. We also tried to use the same sets of background characteristics in analyses that had both English and Spanish versions (e.g., vocabulary).<sup>26</sup>

Exhibits A2, A3, and A4 in the Appendix show which characteristics were included in our analysis models (after preliminary testing) for Cantonese-, Mandarin-, and Vietnamese-

<sup>25</sup> We did not test all possible combinations and therefore cannot rule out the possibility that a characteristic that was not significant on its own could have been significant in combination with other characteristics.

<sup>26</sup> Preliminary analyses also informed the modeling strategy employed, namely, whether we used a multilevel model or an ordinary-least-squares (OLS) model. Multilevel models were two-level models only (children in classrooms).

language DLLs, respectively, and which ones remained significantly associated with outcomes in these “final” models (but still before the addition of instructional predictors).

 **For Cantonese-, Mandarin-, and Vietnamese-language DLLs, greater exposure to the home language at home was related to better performance on outcomes assessed in the home language.**

For DLLs of Cantonese language background, child age, exposure to Cantonese at home, and parent preferred language were the most consistently significant predictors (across outcomes), and these relationships were almost all in the expected direction. Months at program was significantly positively associated with bilingualism and executive function. As with the Spanish-language DLLs, parent education level was also positively associated with executive function.

For Mandarin-language DLLs, child age and exposure to Mandarin at home were consistently significant predictors of the English and Mandarin language measures, in the expected directions. Whether the parent had at least some college education also significantly (and positively) predicted several outcomes: the two English measures, literacy skills, and executive functioning. Unlike with the other HL groups, this parent education variable was a better predictor than annual household income for the Mandarin-HL group. This may be because, as described earlier, this group had a larger proportion of high-income families (above \$100,000) in the sample.

For the Vietnamese-HL group, child age, parent preferred language, and exposure to Vietnamese at home each significantly predicted multiple outcomes. Months at program positively predicted English oral comprehension and basic mathematics as assessed in English.

## **Characteristics of the Classrooms and Programs**

Here we present the relationships of classroom and program characteristics to outcomes, which we were able to analyze robustly only for the Spanish-HL group.

 **For Spanish-language DLLs, having a teacher with a DLL-related certification was associated with higher performance on the English outcomes and some Spanish ones.**

For relationships between characteristics of classrooms (and programs), the results for the Spanish-HL group are summarized in Exhibit A5 in the Appendix. Perhaps most notably, children in classrooms in which a teacher had a DLL-related certification (such as CLAD or BCLAD) performed significantly better, compared with children in classrooms where no teacher had such a certification, on all three outcomes assessed in English as well as Spanish oral comprehension and basic mathematics as assessed in Spanish. Average teacher proficiency in

English was associated with higher scores for English vocabulary and basic mathematics as assessed in English but with lower scores for Spanish vocabulary and Spanish oral comprehension. Children in family child care homes performed better (all else equal) than children in center-based care on basic mathematics in both languages and in Spanish vocabulary. The presence of children younger than 3 in the classroom, meanwhile, was associated with lower scores in Spanish vocabulary and basic mathematics as assessed in Spanish.

Small sample sizes in the three Asian language groups generally did not permit inclusion of classroom- and program-level variables, as controls, in statistical models. We did, however, consider teacher proficiency in English and the home language as *key predictors* in our analyses of instruction for all of the languages.<sup>27</sup> For the Cantonese sample, we found that teacher proficiency in Cantonese had a significant positive relationship with the three outcomes assessed in Cantonese (especially the vocabulary measure) as well as with the bilingual score, so we included it as a control in the other models examining relationships between instructional measures and those outcomes (see Briefs 1 and 3).



## Conclusion

This report has described the sample of children, classrooms, and programs included in our analyses of the relationships between classroom instruction and child-level outcomes for preschool-aged DLLs. It also described those child-level outcomes—including children’s language, literacy, math, executive functioning, and social-emotional skills—and how child, family, classroom, and program characteristics were related to them. This information serves as important context for the instructional analyses that are discussed in the series of research briefs associated with this report. The research briefs drawing on these data can be found [here](#).

Although the main purpose of this report was to provide context for the accompanying briefs, it also describes several relationships between background characteristics and child outcomes that are worth noting. We found that the longer Spanish-language DLLs had been at their early learning and care program, the better their scores were on measures of English language skills and math as measured in English (on average and controlling for other background characteristics). We also found that for Spanish-language DLLs, having a teacher with a DLL-related certification was associated with higher performance on the English outcomes and some Spanish ones. These findings, along with potential implications for policy and practice, will also be addressed in the study’s final summary brief.

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<sup>27</sup> By *key predictor*, we mean a variable entered in a single model designed specifically to test the effect of that variable, controlling for other variables. Key predictors are not included as control variables in all models.



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# Appendix

**Exhibit A1. Child/Family Background Characteristics Significantly Associated With Outcomes, Spanish-HL Sample**

Outcome	Associated with higher score	Associated with lower score	
<b>Outcomes Assessed in English</b>			
English Vocabulary	Months at program*** Parent English proficiency*** Parent preferred language English* Household income***a	Single parent† Child age*** Child female** Parent race other**	Amount of Spanish at home*** Older first exposure to English***a Parent Spanish proficiency* Parent has at least some college education**
English Oral Comprehension	Months at program* Parent English proficiency*** Parent preferred language English** Household income***a Single parent†	Traditional family* Child age*** Child female*** Parent race Asian** Parent race other†	Amount of Spanish at home† Older first exposure to English***a
Basic Mathematics	Months at program** Parent English proficiency† Parent preferred language English** Household income >\$100K***	Single parent* Traditional family† Child age*** Child female***	No exposure to English*
<b>Outcomes Assessed in Spanish</b>			
Spanish Vocabulary	Amount of Spanish at home*** Older first exposure to English***a Parent Spanish proficiency*** Parent preferred language Spanish** Household income >\$100K***	Parent has at least some college education† Child age*** Child female** Parent race Asian†	Parent English proficiency*
Spanish Oral Comprehension	Amount of Spanish at home*** Older first exposure to English**a Parent preferred language Spanish*	Household inc. >\$100K*** Child age*** Child female*	Single parent†
Basic Mathematics	Amount of Spanish at home*** Older first exposure to English***a Parent Spanish proficiency***	Household inc. >\$100K*** Child age*** Child female***	≥30 hours/week at program†
<b>Hybrid or Other Outcomes</b>			
Bilingualism	Months at program* Amount of Spanish at home*** Older first exposure to English***a Parent Spanish proficiency** Parent preferred language Spanish*	Household income***a Trad family† Child age*** Child female***	No exposure to English** HS diploma/GED†
Literacy Skills	Months at program* Parent English proficiency† Household income***a Parent highest educ**a	Child age*** Child female*** Parent race Asian† Parent race other*	≥30 hours/week at program*
Executive Functioning	Household income >\$100K† Parent highest education***a Traditional family† Child age*	Parent race Asian† Parent race other* Assessment admin. in Spanish***b	≥30 hours/week at program*
Social-Emotional Well-Being (signs reversed)	Parent chose program for language approach** Parent Spanish proficiency*** Household income***a	Traditional family* Child female*** Parent race other*	Home has other children†c

*Note.* *Traditional family* means two parents, no other adults. Reference group for *traditional family* and *single parent* is households with adults other than parents, as well as “other.” For parent race/ethnicity, the reference group is Hispanic. For parent education level, the reference group is less than Grade 9. Handling of missing data: For the analysis of any given outcome, we dropped cases that were missing that outcome. So as not to lose cases missing data on any given background characteristic, we employed dummy variable imputation, which involves the inclusion of a missingness indicator for each background characteristic. Some of these indicators had significant relationships with outcomes; these are not shown in this exhibit.

<sup>a</sup> More than one level significant (in same direction); significance level is highest observed among the various levels of the predictor variable, in comparison with the base (reference) level.

<sup>b</sup> This predictor only included for literacy skills and executive functioning outcomes.

<sup>c</sup> This predictor only included for social-emotional outcome (based on preliminary analysis).

\*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < .05$ ; † $p < .10$ .

## Exhibit A2. Child/Family Background Characteristics Significantly Associated With Outcomes, Cantonese-HL Sample

Outcome	Model	Included based on preliminary analysis	Significantly associated with score
<b>Outcomes Assessed in English</b>			
English Vocabulary	2-level	Child age, amount of Cantonese at home, parent preferred language, child female, months at program	↑Child age*** ↓Amount of Cantonese at home* ↑Parent preferred language English***
English Oral Comprehension	2-level	Child age, amount of Cantonese at home, parent preferred language, child female, months at program	↑Child age*** ↓Amount of Cantonese at home* ↑Parent preferred language English***
Basic Mathematics	OLS	Child age, amount of Cantonese at home, parent preferred language	↑Child age* ↑Parent preferred language English*
<b>Outcomes Assessed in Cantonese</b>			
Cantonese Vocabulary	2-level	Child age, amount of Cantonese at home, parent preferred language, child female, months at program	↑Amount of Cantonese at home***
Cantonese Oral Comprehension	2-level	Child age, amount of Cantonese at home, parent preferred language, child female, months at program	↑Child age** ↑Amount of Cantonese at home*
Basic Mathematics	OLS	Child age, amount of Cantonese at home, parent preferred language	↑Child age* ↑Amount of Cantonese at home**
<b>Hybrid or Other Outcomes</b>			
Bilingualism	2-level	Child age, amount of Cantonese at home, parent preferred language, child female, months at program	↑Amount of Cantonese at home*** ↑Parent preferred language English† ↑Months at program†
Literacy Skills	OLS	Child age, parent preferred language, child female, assessment administered in Cantonese	↑Child age*** ↑Parent preferred language English*** ↑Child female* ↑Assessment administered in Cantonese†
Executive Functioning	OLS	Child age, parent has at least some college education, months at program, assessment administered in Cantonese	↑Parent has at least some college education† ↑Months at program*
Social-Emotional Well-Being	2-level	Child age, household income greater than \$20,000, parent English proficiency	↓Child age** ↑Household income greater than \$20,000† ↑Parent English proficiency***

Note. ↑ indicates positive relationship and ↓ indicates negative relationship.

\*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < .05$ ; † $p < .10$ .

**Exhibit A3. Child/Family Background Characteristics Significantly Associated With Outcomes, Mandarin-HL Sample**

Outcome	Model	Included based on preliminary analysis	Significantly associated with score
<b>Outcomes Assessed in English</b>			
English Vocabulary	2-level	Child age, parent has at least some college education, amount of Mandarin at home	↑Child age*** ↑Parent has at least some college education*** ↓Amount of Mandarin at home***
English Oral Comprehension	OLS	Child age, parent has at least some college education, amount of Mandarin at home	↑Child age*** ↑Parent has at least some college education* ↓Amount of Mandarin at home**
<b>Outcomes Assessed in Mandarin</b>			
Mandarin Vocabulary	2-level	Child age, parent has at least some college education, amount of Mandarin at home	↑Amount of Mandarin at home**
Mandarin Oral Comprehension	OLS	Child age, parent has at least some college education, amount of Mandarin at home	↑Child age* ↑Amount of Mandarin at home**
<b>Hybrid or Other Outcomes</b>			
Bilingualism	2-level	Child age, parent has at least some college education, amount of Mandarin at home	(none)
Literacy Skills	OLS	Child age, parent has at least some college education	↑Child age*** ↑Parent has at least some college education†
Executive Functioning	2-level	Child age, parent has at least some college education, assessment administered in Mandarin	↑Parent has at least some college education†

Note. ↑ indicates positive relationship and ↓ indicates negative relationship.

\*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < .05$ ; † $p < .10$ .

## Exhibit A4. Child/Family Background Characteristics Significantly Associated With Outcomes, Vietnamese-HL Sample

Outcome	Model	Included based on preliminary analysis	Significantly associated with score
<b>Outcomes Assessed in English</b>			
English Vocabulary	OLS	Child age, amount of Vietnamese at home, child female	↑Child age***
English Oral Comprehension	2-level	Child age, parent preferred language, months at program	↑Child age*** ↑Parent preferred language English* ↑Months at program†
Basic Mathematics	OLS	Child age, months at program	↑Months at program†
<b>Outcomes Assessed in Vietnamese</b>			
Vietnamese Vocabulary	OLS	Child age, amount of Vietnamese at home, child female	↑Child female* ↑Amount of Vietnamese at home***
Vietnamese Oral Comprehension	OLS	Child age, parent preferred language, months at program	↑Parent preferred language Vietnamese†
Basic Mathematics	2-level	Amount of Vietnamese at home, household income greater than \$20,000, child female	↑Amount of Vietnamese at home*** ↑Household income greater than \$20,000* ↑Child female**
<b>Hybrid or Other Outcomes</b>			
Bilingualism	OLS	Child age, amount of Vietnamese at home, child female	↑Amount of Vietnamese at home***
Literacy Skills	2-level	Child age, household income greater than \$20,000, months at program	↑Child age*** ↑Household income greater than \$20,000*
Executive Functioning	2-level	Child age, parent preferred language, assessment administered in Vietnamese	↑Parent preferred language English**

Note. ↑ indicates positive relationship and ↓ indicates negative relationship.

\*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < .05$ ; † $p < .10$ .

**Exhibit A5. Classroom/Program Characteristics Significantly Associated With Outcomes, Spanish-HL Sample**

Outcome	Associated with higher score	Associated with lower score
<b>Outcomes Assessed in English</b>		
English Vocabulary	Teachers' proficiency in English*** Any teacher has DLL-related certification*	(none)
English Oral Comprehension	Any teacher has DLL-related certification† Total number of children in classroom†	(none)
Basic Mathematics	Teachers' proficiency in English* Any teacher has DLL-related certification*** Total number of children in classroom* Site is FCCH†	(none)
<b>Outcomes Assessed in Spanish</b>		
Spanish Vocabulary	Site is FCCH**	Teachers' proficiency in English** Room has infants/toddlers**
Spanish Oral Comprehension	Any teacher has DLL-related certification*	Teachers' proficiency in English†
Basic Mathematics	Any teacher has DLL-related certification† Site is FCCH***	Room has infants/toddlers**
<b>Hybrid or Other Outcomes</b>		
Bilingualism	(none)	Number of Spanish-language DLLs in the classroom†
Literacy Skills	(none)	(none)
Executive Functioning	Average years of experience teaching young children†	(none)
Social-Emotional Well-Being	(none)	(none)

\*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < .05$ ; † $p < .10$ .

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