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Research Brief

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Gains in Language and Cognitive Scores Among Children in Their First and Second Years of Head Start

Key findings

- Children returning for their second year of Head Start (second-year children) made smaller gains across a year of Head Start than children entering their first year (first-year children) in four language and cognitive scores (expressive vocabulary, or how well they can name pictures; letter-word knowledge; early writing; and early math), but made similar gains in receptive vocabulary, or the words they understand.
- We wanted to understand why second-year children made smaller gains in language and cognitive scores than first-year children.
  - As expected, second-year children were older than first-year children. After accounting for age, first- and second-year children made similar gains in early writing and early math.
  - Second-year children also had higher fall scores on all five assessments of language and cognitive skills than first-year children, and this difference partially explained why second-year children made smaller gains in letter-word knowledge during the year than first-year children.
  - First- and second-year children had similar family background characteristics, enrollment in part-day Head Start classrooms, and classroom quality; these characteristics did not explain the remaining differences in gains in letter-word knowledge and expressive vocabulary.
  - Second-year children had teachers with fewer years of experience than first-year children, but this fact did not explain remaining differences in gains in letter-word knowledge or expressive vocabulary.
- We also wanted to understand whether the difference in gains between first- and second-year children was smaller if children were in classrooms with children of their same age. Differences in gains between first- and second-year children did not vary according to whether children were in mixed- or single-age classrooms.

Prior research has found that children who attend Head Start for more than one year tend to score higher on cognitive skills at the end of pre-K or at kindergarten entry than children who attend for one year or less (Lee 2011; Wen et al. 2012b; Xue et al. 2016). Although attending Head Start for more years is linked with higher cognitive scores, children's gains across the years may not be comparable (Yoshikawa et al. 2013). In nationally representative data from the Head Start Family and Child Experiences Survey 2014–2018 (FACES 2014), we found that, on average, first-year children showed larger gains in language and cognitive scores from fall to spring of the program year than second-year children (Kopack Klein et al. 2018).[1] One explanation might be that first-year children are younger and have more skills to learn, but even when comparing first- and second-year children who were the same age when they entered Head Start, second-year children made smaller gains in some language and cognitive scores (Kopack Klein et al. 2018).

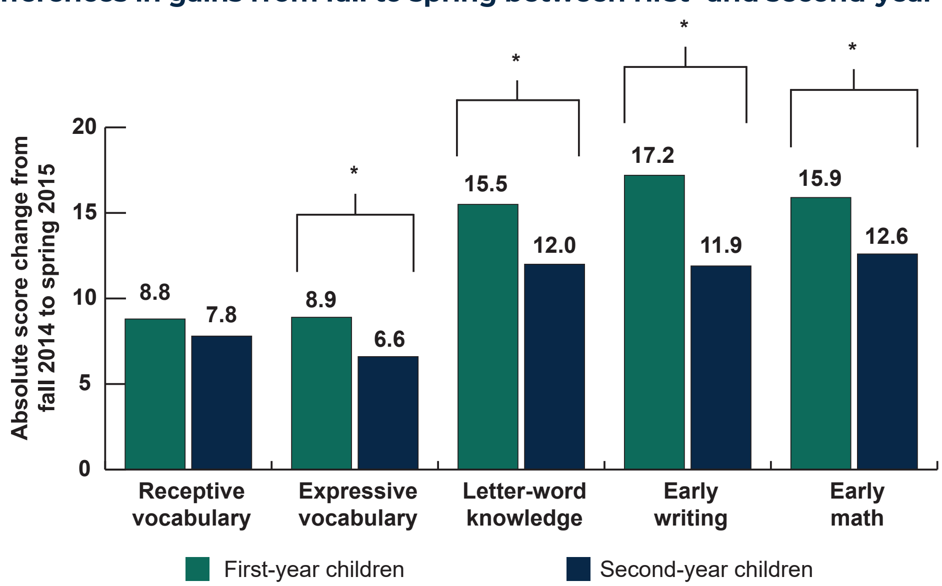
In this brief, we use data across one year of Head Start (from fall 2014 to spring 2015) from FACES 2014 to expand this finding and explore possible explanations for why second-year children made smaller gains in language and cognitive scores than first-year children during the Head Start program year (see methods in the box at the end of the brief). We explore whether differences between first- and second-year children's gains across the program year can be explained by differences in child and family characteristics, including age; fall language and cognitive scores; part-day enrollment; classroom quality; or teacher experience and education. In other words, we explore whether second-year children made smaller gains than first-year children because they had different characteristics or experiences that are associated with smaller gains. We also explore whether differences in gains varied for children in mixed-age classrooms. If teachers focused instruction on children who needed support with basic skills, it could lead to second-year children—who had already gained these skills—making smaller gains in classrooms that included younger children compared to in single-age classrooms (Ansari et al. 2015).

How do gains in language and cognitive scores during the program year differ for first- and second-year children?

In the spring of the 2014–2015 program year, 35 percent of children attending Head Start were second-year children (Kopack Klein et al. 2018).

Second-year children made smaller gains in language and cognitive scores than first-year children. Second-year children showed smaller fall to spring gains than first-year children in four of the five language and cognitive assessments we examined: expressive vocabulary, letter-word knowledge, early writing, and early math (Exhibit 1). First- and second-year children made similar gains in receptive vocabulary scores.

Exhibit 1. Differences in gains from fall to spring between first- and second-year children



Source: Fall 2014 and Spring 2015 Direct Child Assessment and Survey Management System.
Note: Statistics were weighted to represent all children who were enrolled in Head Start in fall 2014 and were still enrolled in spring 2015. This analysis controlled for months between the fall and spring direct assessments.
* Asterisk indicates that the difference in gains between fall and spring for first- and second-year children was statistically significant at the $p \leq .05$ level.

Do first- and second-year children have different background characteristics? If so, do these characteristics explain the difference in gains between first- and second-year children?

Families decide to enroll children in a second year of Head Start for various reasons, including parents' work schedules, the availability of other early care and education (ECE) options such as state pre-K, and their knowledge about different types of ECE. Second-year children might differ from first-year children if families with certain characteristics are more likely to stay for a second year (Lee 2011). If first- and second-year children have different characteristics, differences in gains in language and cognitive scores over a year of Head Start might be attributable to something other than experiences during Head Start.

First- and second-year children differed in age, race/ethnicity, and the language always or usually spoken to them at home, but they were similar in other child and family background characteristics. Second-year children were older than first-year children at the time of the spring direct assessment (60 versus 54 months old), less likely to be White, less likely to live in a home where English was always or usually spoken to them, and more likely to live in a home where Spanish was always or usually spoken to them. However, they did not differ from first-year children in sex (Exhibit 2; Table A.1). First- and second-year children did not differ in family background characteristics, including who lived in the household, parent education, parent employment, or household poverty threshold. They also did not differ in the percentage of children served in pre-K in the child's state.[2]

Child age explained differences between first- and second-year children in gains in early math and writing scores, but neither age nor other child and family background characteristics explained differences in other language and cognitive scores.

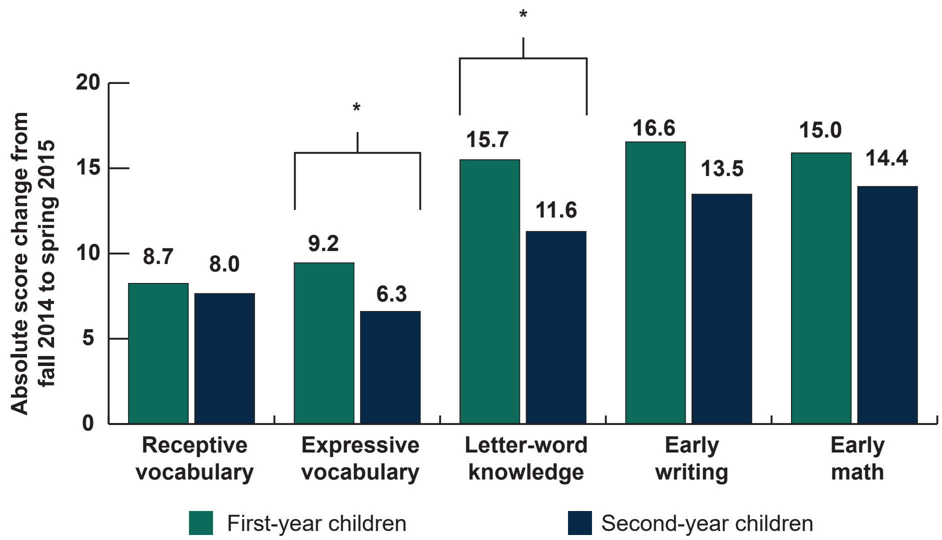
Exhibit 2. Differences in child and family background characteristics

Variables	Second-year children differed from first-year children
Child characteristics	
Age in months at the spring direct assessment	Yes, older
Race/ethnicity	Yes, less likely to be White
Language always or usually spoken to child at home	Yes, more likely to be Spanish, less likely to be English
Sex	No
Family background characteristics	
Who lived in the household	No
Parent education	No
Parent employment	No
Household poverty threshold	No
Percentage of children served in pre-K in the child's state	No

Note: Yes means that the difference between first- and second-year children was statistically significant at the $p \leq .05$ level.

After accounting for age, first- and second-year children made similar gains in early math and writing (Table A.2). This finding is consistent with past research that found that younger children made larger gains in cognitive scores during Head Start than older children (Wen et al. 2012a). However, age did not explain the difference in gains in expressive vocabulary or letter-word knowledge. Similarly, other child and family background characteristics (race/ethnicity, language always or usually spoken to child at home, sex, who lived in the household, parent education, parent employment, and household poverty threshold) did not help explain the difference in gains in language and cognitive scores between first- and second-year children (Exhibit 3; Table A.2).

Exhibit 3. Differences in gains from fall to spring between first- and second-year children, accounting for child and family background characteristics



Source: Fall 2014 and Spring 2015 Direct Child Assessment, Parent Survey, and Survey Management System.
Note: Statistics were weighted to represent all children who were enrolled in Head Start in fall 2014 and were still enrolled in spring 2015. This analysis controlled for months between the fall and spring direct assessments, age in months at the spring direct assessment, race/ethnicity, sex, language always or usually spoken to the child at home, who lived in the house, parent education, parent employment, and household poverty threshold.
* Asterisk indicates that the difference in gains between fall and spring for first- and second-year children was statistically significant at the $p \leq .05$ level.

Do first- and second-year children's language and cognitive scores differ at the start of the program year? If so, do fall language and cognitive scores explain the difference in gains between first- and second-year children?

Second-year children may have higher language and cognitive scores in the fall of the program year because they gained skills during their first year. Compared to second-year children who have already gained many skills, first-year children are experiencing a novel setting in the fall and may receive an initial boost in skills. In prior research, regardless of age, children who entered Head Start with lower cognitive scores experienced more benefits from attending Head Start than children who entered with higher cognitive scores, on average (Lee 2011).

Second-year children had higher language and cognitive scores in the fall than first-year children. Second-year children scored higher on all five language and cognitive assessments in the fall compared to first-year children (Exhibit 4; Table A.1).

Exhibit 4. Differences in fall language and cognitive direct assessment scores

Language and cognitive assessment	Second-year children differed from first-year children
Receptive vocabulary	Yes, higher scores
Expressive vocabulary	Yes, higher scores
Letter-word knowledge	Yes, higher scores
Early writing	Yes, higher scores
Early math	Yes, higher scores

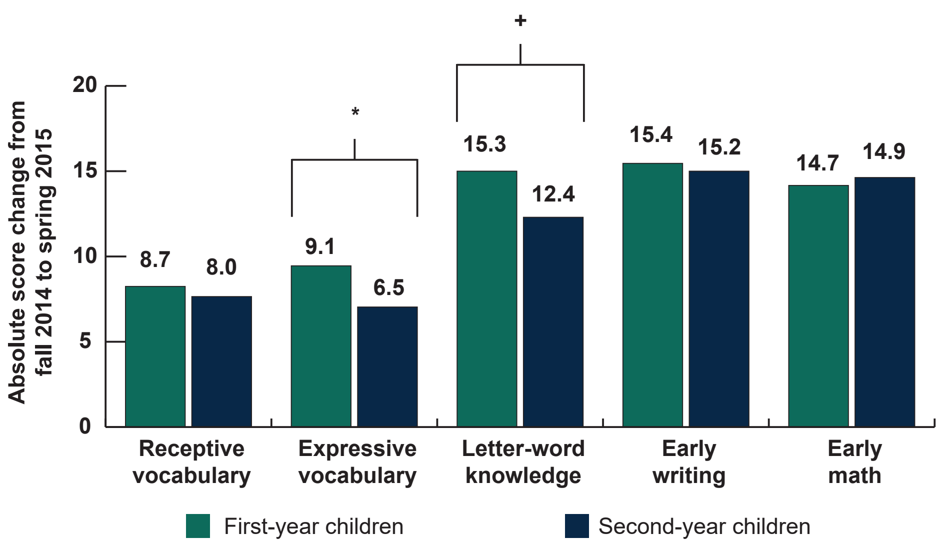
Note: Yes means that the difference between first- and second-year children was statistically significant at the $p \leq .05$ level.

Fall letter-word knowledge scores helped explain differences in gains between first- and second-year children in letter-word knowledge. After accounting for family and child background characteristics, fall letter-word knowledge explained nearly one-third of the difference between first- and second-year children's gains in letter-word knowledge (Exhibit 5; Table A.2).[3] This finding is consistent with research showing that children who entered ECE with lower cognitive scores gained more from ECE (Burchinal et al. 2002). However, fall expressive vocabulary scores did not help explain the difference in gains in expressive vocabulary.

Does first- and second-year children's enrollment in part-day Head Start classrooms differ? If so, does part-day enrollment explain the difference in gains between first- and second-year children?

We explored whether second-year children were more likely to be enrolled in part-day Head Start classrooms, in case spending less time in Head Start helped explain smaller gains. Research has shown that children who attended ECE only part time made smaller cognitive gains than children who attended for a full day (Atteberry et al. 2019; Lee et al. 2006; Reynolds et al. 2014).

Exhibit 5. Differences in gains from fall to spring between first- and second-year children, accounting for child and family background characteristics and fall language and cognitive scores



Source: Fall 2014 and Spring 2015 Direct Child Assessment, Parent Survey, and Survey Management System.
Note: Statistics were weighted to represent all children who were enrolled in Head Start in fall 2014 and were still enrolled in spring 2015. This analysis controlled for months between the fall and spring direct assessments, age in months at the spring direct assessment, race/ethnicity, sex, language always or usually spoken to the child at home, who lived in the house, parent education, parent employment, household poverty threshold, and the fall language or cognitive score of the outcome examined.
* Asterisk indicates that the difference in gains between fall and spring for first- and second-year children was statistically significant at the $p \leq .05$ level.
+ Cross indicates that the difference in gains between fall and spring for first- and second-year children was statistically significant at trend level ($p \leq .10$).

First- and second-year children's part-day enrollment did not differ. Similar percentages of first- and second-year children were enrolled in part-day Head Start classrooms (50 versus 44 percent, respectively, Exhibit 6; Table A.1). For this reason, the length of the program day could not explain why second-year children made smaller gains.

Exhibit 6. Differences in part-day enrollment

Variables	Second-year children differed from first-year children
Part-day classroom enrollment	No

Note: Yes means that the difference between first- and second-year children was statistically significant at the $p \leq .05$ level.

Does the quality of first- and second-year children's classrooms differ? If so, does classroom quality explain the difference in gains between first- and second-year children?

We explored whether second-year children were more likely to experience lower quality classrooms, in case lower quality learning experiences were contributing to smaller gains. Characteristics such as observed classroom quality, frequency of engaging in literacy and math activities, and teachers' individualization of instruction have been linked to gains in cognitive skills in prior research (Bodovski and Farkas 2007; Burchinal et al. 2009; DeBaryshe et al. 2009; Howes et al. 2008; Silinskas et al. 2016).

First- and second-year children were in classrooms that were similar on nearly all aspects of quality. Compared with first-year children, second-year children had teachers who provided more frequent literacy activities. There were no other differences in classroom characteristics, including the frequency of math activities, use of assessments to individualize instruction, or observed classroom quality measured by the Classroom Assessment Scoring System-Pre-K (Pre-K CLASS) or Early Childhood Environment Rating Scale, revised edition, short form (ECERS-R short form) (Exhibit 7; Table A.2). Researchers have found that children in classrooms with more frequent literacy activities tend to make larger gains in cognitive scores (Bodovski and Farkas 2007; Howes et al. 2008; Silinskas et al. 2017), so we would not expect experiencing more frequent literacy activities to explain why second-year children made smaller gains. Because there were no differences in other aspects of classroom quality, these classroom experiences could not explain why second-year children made smaller gains.

Exhibit 7. Differences in classroom quality

Variables	Second-year children differed from first-year children
Pre-K CLASS Emotional Support	No
Pre-K CLASS Classroom Organization	No
Pre-K CLASS Instructional Support	No
ECERS-R short form Teaching and Interactions	No
ECERS-R short form Provisions for Learning	No
Frequency of literacy activities	Yes, more frequent
Frequency of math activities	No
Teachers' use of assessment information to individualize instruction	No

Note: Yes means that the difference between first- and second-year children was statistically significant at the $p \leq .05$ level.
CLASS = Classroom Assessment Scoring System-Pre-K; ECERS-R = Early Childhood Environment Rating Scale, revised edition.

Do first- and second-year children have teachers with different education and experience? If so, does teacher education and experience explain the difference in gains between first- and second-year children?

We explored whether second-year children had teachers with less education and experience, in case such differences helped explain smaller gains. In higher grades, having a teacher with less experience contributed to lower student achievement (Clotfelter et al. 2007;Ladd and Sorenson 2017), so it is possible that having teachers with less experience could contribute to second-year children making smaller gains.

Second-year children had teachers with less experience but similar education compared to first-year children. Second-year children had teachers with fewer years of experience than first-year children (13.5 versus 15.3 years), but their teachers' education (bachelor's degree or more versus associate's degree or less) was similar (Exhibit 8; Table A.1).

Exhibit 8. Differences in teacher characteristics

Variables	Second-year children differed from first-year children
Teacher years of experience	Yes, less experience
Teacher education	No

Note: Yes means that the difference between first- and second-year children was statistically significant at the $p \leq .05$ level.

Teacher experience did not help explain differences in gains between first- and second-year children. After accounting for child and family characteristics and fall language and cognitive scores, teacher years of experience did not explain the difference in gains between first- and second-year children (Table A.2). As reported in the technical report for this brief, teacher experience was not significantly associated with gains in any language and cognitive scores (see Gleason et al. 2021), which indicates teacher experience may not contribute to language and cognitive gains for younger children (McMullen et al. 2020).

After accounting for all selected variables, second-year children still showed smaller gains on some language and cognitive scores. After accounting for child and family background characteristics, fall language and cognitive scores, and teacher years of experience, second-year children still showed smaller gains in expressive vocabulary and letter-word knowledge than first-year children, although the difference in gains in letter-word knowledge decreased in size (Table A.2).

Does the difference in gains for first- and second-year children vary based on whether children are in mixed- or single-age classrooms?

We explored whether the difference in gains for first- and second-year children varied according to whether children were in mixed- or single-age classrooms. By design, Head Start classrooms often include children of different ages, with both first- and second-year children. Teachers tailor instruction so that new skills build on prior skills for each child, regardless of age and prior Head Start attendance. However, if teachers are unable to tailor instruction, some second-year children may get the same instruction they received during their first year (Jenkins et al. 2016), limiting the possible gains. Children may be more likely to receive the same instruction when they are in mixed-age classrooms, if teachers focus instruction on younger children. Indeed, prior research demonstrates that 4-year-olds made smaller gains in academic skills during the preschool year when they were in classes with more 3-year-olds (Ansari et al. 2016).

The difference in gains between first- and second-year children did not vary according to whether children were in mixed- or single-age classrooms.[4,5] That is, second-year children made similar gains regardless of whether they were in classrooms with both 3- and 4-year-olds or only children of the same age as them.

Limitations

We aimed to identify characteristics that could explain why second-year children made smaller gains than first-year children across a year of Head Start. Because FACES 2014 only follows children across one year of Head Start, we compared gains for two different groups of children. Although we identified that age and fall language and cognitive scores explained differences in gains, we cannot conclude that these characteristics caused changes in gains; other factors associated with age and fall scores could be the true explanation for why first- and second-year children's gains changed after accounting for age and fall scores. We examined several characteristics that we expected to explain differences in gains in children's language and cognitive scores, but we were unable to include some potentially important characteristics, such as children's prior ECE experiences. We also limited analyses to children who were tested in English at both time points so that we could examine gains in language and cognitive scores; this limitation means our findings may not be generalizable to all Head Start children. Finally, although we did examine whether gains varied for first- and second-year children according to whether they were in mixed- or single-age classrooms, our approach generally assumed that family, child, and classroom characteristics influenced gains in the same way for first- and second-year children.

Conclusions

Children made significant gains in language and cognitive scores across their first- and second-years of Head Start (Kopack Klein et al. 2018). However, second-year children made smaller gains in expressive vocabulary, letter-word knowledge, early writing, and early math than first-year children, although they made similar gains in receptive vocabulary. We set out to explore possible explanations for why second-year children made smaller gains in some language and cognitive scores. We examined child and family background characteristics, including child age; children's language and cognitive scores at the beginning of the program year; part-day enrollment; classroom quality; and teacher characteristics.

We found some different patterns for different language and cognitive scores, but overall found that family background characteristics and characteristics of children's classrooms and teachers did not account for the smaller gains made by second-year children. Child age did explain differences in gains in early writing and early math scores. This finding is consistent with past research, which found that younger children tended to make larger gains in cognitive scores during Head Start than older children (Wen et al. 2012a). For letter-word knowledge, we found that children's fall scores explained some, but not all, of the difference in gains. This finding is also consistent with prior research showing that children who entered ECE with lower cognitive scores gained more from ECE (Burchinal et al. 2002).

Even after examining child and family background characteristics, children's scores at the beginning of the program year, and children's classroom and teacher characteristics, unexplained differences in gains between first- and second-year children remained for letter-word knowledge and expressive vocabulary. These remaining differences suggest that second-year children's smaller gains may be because of something that we did not measure in FACES 2014; for example, whether Head Start teachers were appropriately modifying the curriculum for second-year children or whether children were receiving the same content for two years. Past research found that children who attended one year of Head Start followed by one year of state pre-K had higher cognitive scores at kindergarten entry compared to children who attended two years of Head Start, which the authors suggest could be because they received different content in the year of state pre-K (Jenkins et al. 2016).

Taken together, our findings suggest one of two possibilities. Unlike second-year children, first-year children experience a novel setting with new staff, new peers, and a fresh exposure to a curriculum, which may result in an initial boost in skills. The leveling off in the second year might be a developmental phenomenon as children adjust to the environment. A second possibility is that second-year children, who are older and have higher entering scores, would benefit from novel, individualized, or higher-level content that extends the experiences of the prior year, to continue to make gains at the same rate.

Head Start FACES

This research brief included data from fall 2014 and spring 2015 of FACES 2014. FACES provides information at the national level about Head Start programs, centers, and classrooms and about the children and families that Head Start serves.

Head Start is a national program that helps young children from low-income families get ready to succeed in school. It works to promote their early learning, health, nutrition and their family's well-being. Head Start connects families with medical, dental, and mental health services to be sure that children are receiving the services they need to develop well. Head Start also tries to involve parents in their children's learning and development, and to help parents make progress on their own goals, such as housing stability, continuing education, and financial security (Administration for Children and Families 2020). Head Start operates by providing grants to local public and private nonprofit and for-profit agencies. The agencies in turn deliver comprehensive child development services to economically disadvantaged children and families.

Sample

For FACES 2014, we selected a sample of Head Start programs from the 2012–2013 Head Start Program Information Report, with two centers per program and two classrooms per center. Within each classroom, we randomly selected 12 children for the study. In total, 176 programs, 346 centers, 667 classrooms, and 2,206 children (in 60 programs) were study participants in spring 2015. The sample used for this brief included 1,921 children who were enrolled in Head Start in fall 2014 and were still enrolled in spring 2015. All findings were weighted to represent this population.

Methods overview

We first examined differences between first- and second-year children on child and family background characteristics, fall language and cognitive scores, part-day enrollment, classroom quality, and teacher experience and education.[6,7]

We then conducted a series of regression models predicting gains in language and cognitive scores based on whether children were first- or second-year children.[8, 9, 10, 11] We added sets of variables in a stepwise fashion, with each model including the variables from the prior models. We wanted to determine whether accounting for these characteristics would explain why second-year children made smaller gains than first-year children. For example, if the association between year in Head Start and children's gains disappeared only when we added teacher years of experience, it would suggest that second-year children made smaller gains because they were more likely to be in classrooms with teachers with fewer years of experience. We first accounted for child and family background characteristics that we expected to be associated with gains in children's language and cognitive scores; we began with age because we expected second-year children to be older than first-year children. We then included fall scores on the language or cognitive assessment to account for differences in children's scores at the beginning of the program year. We then included other variables on which first- and second-year children differed, if these variables differed in ways that could explain why second-year children made smaller gains based on prior research and theory. The five sets of variables included:

- Months between fall and spring direct assessments
- Child's age in months at the spring direct assessment
- Other child and family background characteristics (race/ethnicity, sex, the language that was always or usually spoken to the child at home, who lived in the household, parent education, parent employment, and household poverty threshold)
- Fall scores on the language and cognitive assessment
- Teacher years of experience

We then examined whether the difference in gains varied for children in mixed-age classrooms. We explored this question by including the interaction between being a second-year child and being in a mixed-age classroom, after accounting for the five sets of variables.

More information on the study methodology and measurement in FACES 2014 is available in the FACES 2014–2015 Data Tables and Study Design report (Aikens et al. 2017). See the technical report for the current analyses for more details about the variables used, the sample included in analyses, treatment of missing data, the analytic models, full results, and supplementary analyses (Gleason et al. 2021).

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Endnotes

[1] Status as a first- or second-year child came from information gathered from Head Start programs: child's date of birth, whether the child was attending their first year of Head Start, and date the child first enrolled in any Head Start program. We used data on the children's date of birth and whether they were attending for their first year of Head Start—which were collected before the spring 2015 data collection—to construct this variable for the majority of children. Drawing on follow-up inquiries, we also used the date a child first enrolled in any Head Start program for a subset of children.

[2] To assess whether there were statistically significant differences between first- and second-year children, we used t-tests to examine differences. All cited differences were statistically significant at the .05 level and lower.

[3] Before accounting for fall letter-word knowledge scores, first-year children's gains in letter-word knowledge scores outpaced those of second-year children by 4.1 points. After accounting for the fact that second-year children had higher fall scores, the difference in gains was reduced by 29 percent, to 2.9 points.

[4] We coded mixed-age classrooms based on teacher reports of the ages of children in their classrooms in spring. Similar percentages of first- (67 percent) and second-year (59 percent) children were in mixed-age classrooms (p = 0.186).

[5] We examined the difference in gains between first- and second-year children in mixed-age classrooms in a model that interacted year in Head Start and mixed-age classroom status. None of the interaction effects for the five language and cognitive scores were statistically significant (p = 0.32–0.89; see Gleason et al. 2021).

[6] To assess whether there were statistically significant differences between first- and second-year children, we used t-tests to examine differences. All cited differences were statistically significant at the .05 level and lower.

[7] The sample included children assessed in English at both time points, which was 79 percent of first-year children and 83 percent of second-year children (p = 0.06).

[8] We used W/Growth Score Value (GSV) and raw scores in the analysis because these have more variability. These scores indicate absolute rather than relative performance. W/GSV scores permit measurement of change or gains in performance on the same scale over time.

[9] Gain scores have some limitations because they can increase measurement error in the outcome, which may attenuate associations. However, we used them because they are more intuitive to interpret than regression analyses that predict spring outcomes by adjusting for the fall measure. We have used gain scores in recent FACES analyses of children's outcomes (Kopack Klein et al. 2018; Hutchison et al. 2020).

[10] For the multilevel regression analyses, we report whether coefficients were significant at the .05 level and lower or whether coefficients were statistically significant at trend level (.10 level and lower).

[11] These models included children who were missing data on some family background characteristics by using missing dummy codes. See the technical report for more details (Gleason et al. 2021).

Table A.1. Comparison of first- and second-year children

Variable	First-year children			Second-year children				
	n	Mean or percentage	SD	n	Mean or percentage	SD	*P*	Range
Children's gains in language and cognitive scores[a]								
Gains in receptive vocabulary (PPVT-4 GSV score)[b]	873	8.7	0.51	562	7.5	0.67	0.053	-30-73
Gains in expressive vocabulary (EOWPVT-4 raw score)	833	8.8	0.48	454	7.1	0.74	0.039*	-42-57
Gains in letter-word knowledge (WJ III Letter-Word Identification W score)	898	15.8	1.06	554	12.3	1.05	0.004*	-64-111
Gains in early writing (WJ III Spelling W score)	912	16.5	1.64	565	11.9	1.32	0.020*	-110-143
Gains in early math (WJ III Applied Problems W score)	905	15.3	0.84	560	13.2	1.12	0.151	-85-97
Fall language and cognitive scores								
Receptive vocabulary (PPVT-4 GSV score)	876	106.7	1.04	564	113.6	0.79	<0.001*	60-157
Expressive vocabulary (EOWPVT-4 raw score)	833	41.5	1.04	454	49.6	0.92	<0.001*	0-107
Letter-word knowledge (WJ III Letter-Word Identification W score)	903	309.3	1.13	560	325.6	1.76	<0.001*	264-486
Early writing (WJ III Spelling W score)	912	339.2	2.26	565	365.1	1.58	<0.001*	277-426
Early math (WJ III Applied Problems W score)	906	373.4	1.78	560	388.3	1.46	<0.001*	318-453
Child and family characteristics								
Months between fall and spring direct child assessments	912	5.5	0.05	565	5.6	0.07	0.273	4-8
Percentage of children served in pre-K in child's state[c]	918	25.9	2.85	541	28.1	2.80	0.242	2-77
Female	912	50.2	1.81	554	51.0	2.47	0.809	0-100
Age in months at spring direct assessment	912	53.6	0.53	565	60.2	0.25	<0.001*	39-70

Variable	First-year children			Second-year children			*P*	Range
	n	Mean or percentage	SD	n	Mean or percentage	SD		
Race/ethnicity	**912**			**565**				
White, non-Hispanic/Latino		36.2	3.92		22.1	3.59	0.001*	0-100
African American, non-Hispanic/Latino		25.9	4.05		27.6	5.63	0.767	0-100
Hispanic/Latino		28.7	3.83		40.9	6.12	0.022*	0-100
Other, non-Hispanic/Latino[d]		9.3	1.45		9.5	1.81	0.901	0-100
Language always or usually spoken to the child at home	**912**			**565**				
English		88.7	1.93		78.9	3.53	0.003*	0-100
Spanish		8.6	1.51		16.3	2.98	0.006*	0-100
Other (non-Spanish) language		2.7	0.97		4.8	1.22	0.109	0-100
Children living with	**912**			**565**				
Biological/adoptive mother and biological/adoptive father		41.5	2.25		38.9	3.79	0.537	0-100
Biological/adoptive mother only		42.5	2.21		45.0	3.77	0.517	0-100
Biological/adoptive father only		3.1	0.78		2.3	0.68	0.467	0-100
Neither biological/adoptive mother nor biological/adoptive father		4.2	0.76		4.0	0.83	0.827	0-100
Missing family structure		8.8	1.17		9.8	1.29	0.459	0-100
Highest level of education completed by parents of children living with at least one biological/adoptive parent	**912**			**565**				
Less than high school diploma		14.7	1.35		16.6	1.92	0.391	0-100
High school diploma or GED		32.4	1.45		32.3	2.65	0.981	0-100
Some college/vocational/technical		37.9	1.79		36.6	2.06	0.631	0-100
Bachelor's degree or higher		10.2	1.39		9.0	1.93	0.604	0-100
Missing education		4.8	0.84		5.5	1.29	0.648	0-100

Variable	First-year children			Second-year children			P	Range
	n	Mean or percentage	SD	n	Mean or percentage	SD		
Employment status of the most-employed parent of children living with at least one biological/adoptive parent	**912**			**565**				
Working full-time		44.2	2.63		47.6	3.11	0.298	0-100
Working part-time		19.8	1.79		19.3	1.94	0.845	0-100
Looking for work		11.1	1.05		8.2	1.41	0.084	0-100
Not in labor force		11.3	2.26		10.9	1.83	0.911	0-100
Missing employment		13.7	1.43		14.0	1.53	0.853	0-100
Household poverty threshold	**912**			**565**				
50 percent or less		27.5	1.93		26.3	2.13	0.671	0-100
50 to 131 percent		44.6	2.82		46.3	3.02	0.700	0-100
131 percent or more		19.1	2.56		17.6	2.61	0.658	0-100
Missing poverty threshold		8.8	1.17		9.8	1.29	0.459	0-100
Part-day enrollment								
Enrolled in part-day classroom	907	50.1	5.94	564	44.0	6.03	0.251	0-100
Head Start classroom quality								
Pre-K CLASS Emotional Support	861	5.5	0.05	537	5.4	0.07	0.084	2.8-7.0
Pre-K CLASS Classroom Organization	861	4.8	0.08	537	4.7	0.09	0.138	2.6-6.8
Pre-K CLASS Instructional Support	861	2.4	0.11	537	2.5	0.10	0.432	1.0-6.3
ECERS-R short form Teaching and Interactions	866	5.2	0.10	538	5.1	0.12	0.277	1.7-7.0
ECERS-R short form Provisions for Learning	866	4.5	0.14	538	4.6	0.13	0.373	2.2-6.8
Frequency of literacy activities	902	5.1	0.06	557	5.2	0.06	0.005*	2.9-6.0
Frequency of math activities	900	5.0	0.09	554	5.1	0.08	0.102	3-6
Teacher uses assessment information to individualize instruction	828	91.9	2.79	494	95.6	1.78	0.153	0-100

Variable	First-year children n	Mean or percentage	SD	Second-year children n	Mean or percentage	SD	*P*	Range
Head Start teacher education and experience								
Teacher has associate's degree or less (versus bachelor's degree or higher)	912	29.8	4.97	565	28.9	4.74	0.833	0-100
Teacher years of experience	912	15.3	0.94	565	13.5	10.91	0.045*	0-40

Source:

Fall 2014 and Spring 2015 Direct Child Assessment, Parent Survey, Teacher Survey, Classroom Observation, and Survey Management System.

Note: Statistics were weighted to represent all children who were enrolled in Head Start in fall 2014 and were still enrolled in spring 2015.

The N column in this table includes unweighted sample sizes to identify the number of children with valid data in each category.

[a] These gains differ from those shown in figures because they are mean differences that do not account for the similarity of children within classrooms, centers, and programs.

[b] W/GSV/raw scores are absolute scores rather than scores that illustrate relative performance by age. W/GSV scores permit measurement of change or growth in performance on the same scale over time.

[c] This variable was coded based on the NIEER state of pre-K yearbook (Friedman-Krauss et al. 2018) and includes the percentage of children served in pre-K and pre-K special education.

[d] Other, non-Hispanic includes respondents who specified a language or religion, or who did not fit into a specified category.

* Asterisk indicates that the difference between first- and second-year children was statistically significant at the $p \leq .05$ level.

SD = standard deviation; CLASS = Classroom Assessment Scoring System-Pre-K; ECERS-R = Early Childhood Environment Rating Scale, revised edition.

Table A.2. Prediction of gains in children's language and cognitive scores based on being in the second year of Head Start

Outcome	Model 1 (unadjusted)			Model 2 (age)			Model 3 (child and family characteristics)			Model 3 (fall scores)			Model 5 (teacher experience)			
	b	SE	*p*-value	b	SE	*p*-value	b	SE	*p*-value	b	SE	*p*-value	b	SE	*p*-value	n
Receptive vocabulary (GSV score)[a]	-1.00	0.74	0.177	-0.67	0.86	0.432	-0.72	0.87	0.404	-0.66	0.77	0.390	-0.66	0.77	0.389	1,444
Expressive vocabulary (raw score)	-2.31	0.82	0.005*	-2.87	0.95	0.003*	-2.93	0.96	0.002*	-2.66	0.91	0.004*	-2.67	0.92	0.004*	1,296
Letter-word knowledge (W score)	-3.45	1.34	0.010*	-4.22	1.53	0.006*	-4.14	1.55	0.008*	-2.82	1.49	0.058+	-2.86	1.49	0.055+	1,462
Early writing (W score)	-5.26	2.04	0.010*	-3.17	2.34	0.176	-3.14	2.36	0.183	-0.16	2.04	0.937	-0.19	2.05	0.927	1,477
Early math (W score)	-3.34	1.55	0.032*	0.20	1.74	0.910	-0.58	1.78	0.743	0.16	1.47	0.914	0.10	1.47	0.947	1,475

Source: Fall 2014 and Spring 2015 Direct Child Assessment, Teacher Survey, Parent Survey, and Survey Management System.

Note: Statistics were weighted to represent all children who were enrolled in Head Start in fall 2014 and were still enrolled in spring 2015. Each successive model included all previous model variables plus the new variables for that model. Model 1 controlled for months between the fall and spring direct assessments; Model 2 also controlled for age in months at the spring direct assessment; Model 3 also controlled for race/ethnicity, sex, language always or usually spoken to the child at home, who lived in the house, parent education, parent employment, and household poverty threshold; Model 4 also controlled for fall scores on the assessment; Model 5 also controlled for teacher years of experience. The coefficient shows the growth for children in their second year, so a negative coefficient demonstrates that gains among second-year children were smaller than gains among first-year children. Because of software limitations, we manually adjusted the standard error estimates to account for the design effect attributable to unequal weighting of the sample (see the technical report for more details).

[a] W/GSV/raw scores are absolute scores rather than scores that illustrate relative performance by age. W/GSV scores permit measurement of change or growth in performance on the same scale over time.

* Asterisk indicates that the difference in gains between fall and spring for first- and second-year children was statistically significant at the $p \leq .05$ level.

+ Cross indicates that the difference in gains between fall and spring for first- and second-year children was statistically significant at trend level ($p \leq .10$).

SE = standard error.

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