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Kindergarten readiness among children who participated in the Washington state Early Childhood Education and Assistance Program (ECEAP)

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ABOUT THE ERDC

The research presented here utilizes data from the Education Research and Data Center (ERDC), located within the Washington Office of Financial Management (OFM). ERDC works with partner agencies to conduct powerful analyses of learning that can help inform the decision-making of Washington legislators, parents, and education providers. ERDC's data system is a statewide longitudinal data system that includes de-identified data about people's preschool, educational, and workforce experiences.

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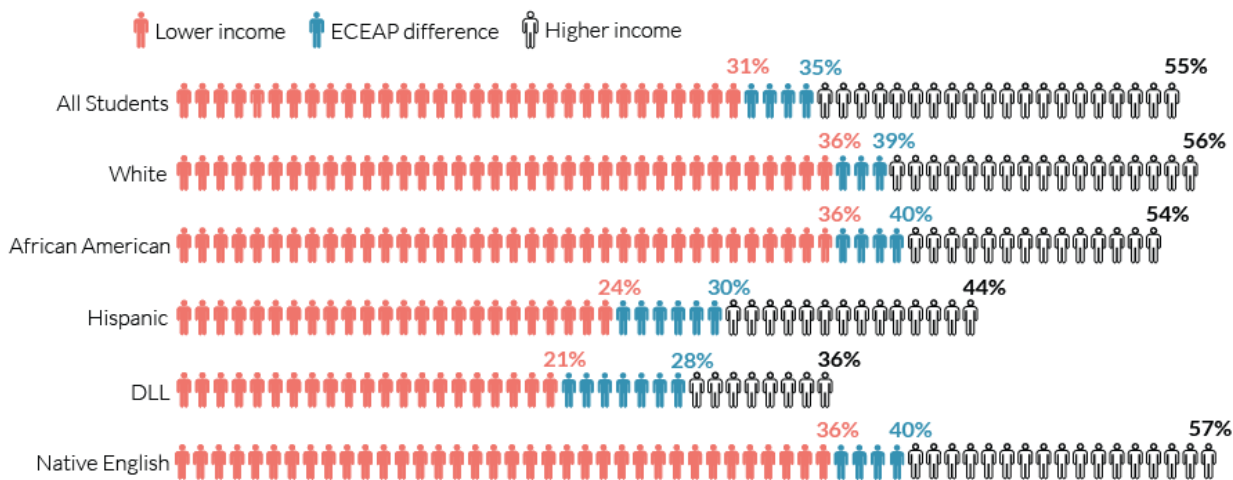
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Executive Summary

This study explored the relationship between participation in Washington state’s Early Childhood Education and Assistance Program (ECEAP) and subsequent performance on the Washington Kindergarten Inventory of Developing Skills (WaKIDS). Children who participated in ECEAP during the 2014-15 academic year were compared to children from both higher- and lower- income households who did not participate in ECEAP. ECEAP participation was linked to subsequent WaKIDS performance in 2015-16 using Washington’s P-20 education data warehouse. The findings indicate that ECEAP participants are consistently more likely than lower income non-participants to be kindergarten-ready, regardless of race/ethnicity, English proficiency, or special education needs, referred to here as the “ECEAP advantage.” Finally, ECEAP participation was associated with greater gains in kindergarten readiness for children of color compared to white students and dual language learners compared to English speakers.

Key Findings

- Former ECEAP participants were more likely to be ready for kindergarten than lower income kindergartners who did not participate in ECEAP.
- The positive relationship between ECEAP participation and kindergarten readiness extended to non-White students, dual language learners (DLLs), and students with special education needs.
- ECEAP participation is positively correlated with kindergarten readiness rates among lower income students at the county level.



Contents

| | |
|---|----|
| Introduction | 5 |
| <i>ECEAP participation and kindergarten readiness</i> | 5 |
| Study Design..... | 6 |
| <i>Research questions</i> | 6 |
| <i>Cohort and comparison groups</i> | 6 |
| <i>Cohort demographics</i> | 7 |
| Results..... | 8 |
| <i>Finding 1</i> | 8 |
| <i>Finding 2</i> | 9 |
| <i>Finding 3</i> | 13 |
| Discussion | 15 |
| References | 16 |
| Appendix A. Data Tables..... | 18 |
| Appendix B. Technical Notes..... | 24 |

Introduction

Individual and group-level variations in kindergarten readiness have been attributed to many factors, the most common of which involve inequitable access to economic, social and material resources. A large body of research has shown that poverty is negatively associated with school readiness and subsequent academic achievement (Ryan, Fauth & Brooks-Gunn, 2006; Brooks-Gunn, 2003). When children enter kindergarten without the foundational skills for success, their school career begins with an “opportunity gap” that often widens over time (McCoy, et al, 2015; Roy & Raver, 2014).¹ Quality early learning environments can help close this opportunity gap by addressing the unique needs of lower-income children (Ansari & Winsler, 2013; De Feyter & Winsler, 2009; Kay & Pennucci, 2014a & 2014b; McCoy, et al, 2015; Root Cause, 2011).

Washington’s Early Childhood Education and Assistance Program (ECEAP) was established in 1985 to provide education to very low income or otherwise eligible preschool children, along with health, nutrition, and family support (DEL, 2016a).² However, despite recent increases in funding and availability, the number of children who meet the eligibility criteria continues to outpace the number of available ECEAP slots. An estimated 26,929 children across the state, or 57 percent of those eligible, were not served either by ECEAP or its federal counterpart, Head Start, in 2014-15 (DEL, 2016b). The present study explores the relationship between ECEAP participation and subsequent kindergarten readiness as indicated by performance on the WaKIDS inventory of kindergarten readiness.³

ECEAP participation and kindergarten readiness

Income level is strongly associated with a lack of kindergarten readiness and subsequent academic challenges, due in large part to the link between poverty and other risks factors (Heckman, 2008). For example, compared to more affluent children, those living in poverty are more likely to have been underweight at birth, exposed to environmental toxins, and/or live in over-crowded, chaotic households (Brooks-Gunn, 2003). Lower-income parents are more likely than more affluent parents to work multiple jobs, suffer from stress-related mental health or substance abuse issues, or experience domestic violence, all of which can negatively impact the parent-child relationship (Brooks-Gunn, 2003). Further, higher-income neighborhoods tend to have better services and institutions that benefit all community members, while children living in high-poverty areas are more likely to be exposed to violence in the community (Brooks-Gunn, 2003; Carpiano, Lloyd & Hertzman, 2009; Lloyd & Hertzman, 2009).

1. The term “**opportunity gap**” is used by educators to refer to the ways in which race, ethnicity, socioeconomic status, and English proficiency, and other factors contribute to suppressed academic aspirations and achievement for some groups of students. See www.edglossary.org for more information.

2. Please refer to the technical notes for more information on ECEAP eligibility criteria.

3. Please refer to the technical notes for more details on the WaKIDS assessment, or visit this website: <http://www.k12.wa.us/WaKIDS>.

One might argue that no preschool program could address even a fraction of the poverty-related risks outlined above. However, quality early childhood education (ECE) programs can teach children the needed behavioral skills to succeed academically, both directly and through the establishment of strong relationships with adults (Brotman, et al., 2005). In addition, parent and family engagement are integral parts of most ECE programs, which can lead to improvements in parent-child interactions in the home, and provide support for parents facing social or emotional difficulties (Dunst & Trivette, 2005; Green, et al, 1996; Harvard Family Research Project, 2006). Finally, there is evidence that quality early education may directly ameliorate poverty via gains in parental education and earning capacity (Sabol & Chase-Lansdale, 2015).

Study Design

Research questions

This exploratory and descriptive study was designed to address the following questions:

- What are the characteristics of children who participate in ECEAP?
- Are there any differences in kindergarten readiness (as measured by performance on the WaKIDS) between lower-income children who did and did not participate in ECEAP?
- Does ECEAP benefit children of all backgrounds the same?

Cohort and comparison groups

The data used in this analysis included administrative data for children enrolled in ECEAP in Washington during the 2014-15 school year, linked to their WaKIDS assessment scores in the fall of 2015. The final study population consisted of the 5,252 children who participated in ECEAP in the 2014-15 school year, were enrolled in kindergarten the following year, and were assessed on the WaKIDS in the fall of 2015, referred to hereafter as the “ECEAP cohort.”

The comparison groups included the entire statewide population of kindergartners in 2015-16 who were assessed on the WaKIDS and had attended an elementary school also attended by a former ECEAP student. This population was divided into the “lower-income” cohort, identified as those eligible for free or reduced price lunch (FRPL) and the “higher-income” cohort, who were not FRPL eligible (refer to technical notes for more details on the study design, data linkage, and population).

While this comparison group offers useful context, it has limitations: First, we do not know which children received services through Head Start or private preschool, or were in high quality child care. In addition, the use of FRPL as a proxy for lower income is imprecise. For example, the Head Start program data indicate that in the 2014-2015 school year Head Start and Migrant Head Start served over 7,300 4-year olds, and that over 54% of them were Hispanic.

The experiences of children who qualify for ECEAP (mostly below 110 percent federal poverty level) may be different from those who qualify for FRPL (up to 185 percent federal poverty level). This means that differences in the kindergarten readiness of ECEAP participants may be even more pronounced than reported here, as the lower-income comparison group includes children from higher income households than the ECEAP group.

The outcomes of interest included “readiness flags” in each of the six WaKIDS domains; social emotional, physical, language, cognitive, literacy, and math, and a flag indicating that they were kindergarten ready all six WaKIDS domains. A child is flagged as “ready” in a given domain when s/he achieves a certain score on the combined objectives comprising the domain in question.

Cohort demographics

By definition, most former ECEAP students were from lower-income households and were eligible for FRPL when they entered the K-12 system. As shown in the figure below, the ECEAP and lower-income cohorts have similar racial and ethnic characteristics, and similar rates of special program participation. For example, students enrolled in the Transitional Bilingual Program for dual language learners (referred to henceforth as “DLLs”) constituted 39 and 33 percent of the ECEAP and lower-income cohorts, respectively, compared to only 10 percent of the higher-income cohort.

The demographic profile of the higher-income cohort was so different from those of the ECEAP and lower-income cohorts that any direct comparisons would be problematic. However, their performance is important to include here, as it demonstrates the opportunity gap between higher and lower-income students.

Total sample and comparison group size



Demographic characteristics

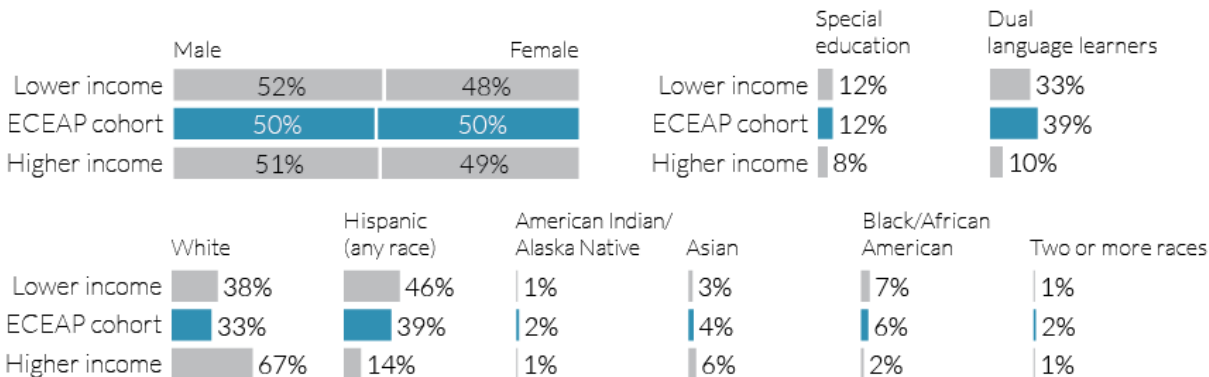


Figure 1. Demographic characteristics and program participation of the ECEAP cohort and the lower- and high-income comparison groups (see also Table A1).

Results

Finding 1: Former ECEAP participants were more likely to be ready for kindergarten than lower-income kindergartners who did not participate in ECEAP.

While higher-income students were more likely than either lower-income or former ECEAP students to be kindergarten ready in each WaKIDS domain (as well as in all six domains), former ECEAP students were more likely to be kindergarten ready than their lower-income peers (see Figure 2). The higher rates of kindergarten readiness among former ECEAP students compared to the lower-income cohort were statistically significant in every domain ($X^2, p < .001$).

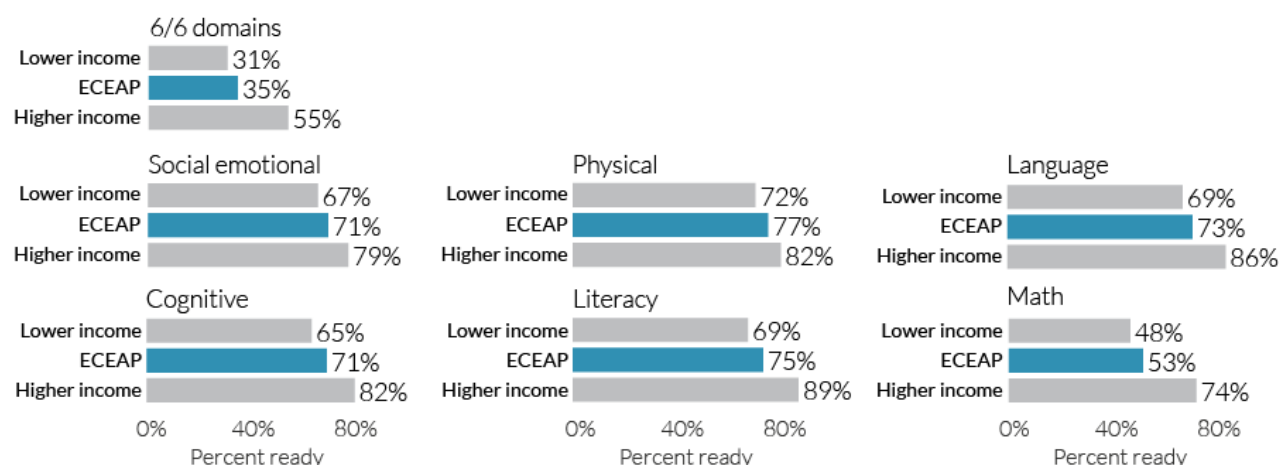


Figure 2. Proportion of children kindergarten ready in each domain and in 6 of 6 domains, by cohort membership (see also Table A2).

The proportion of kindergartners who are “ready in six of six domains” is a commonly used measure of success by early educators. The present results indicate that former ECEAP participants were more likely than lower-income students to be ready in six of six domains (35 compared to 31 percent, X^2 sig. $p < .001$) (see Figure 3). However, former ECEAP participants were also less likely to be ready in fewer than four domains. This suggests that ECEAP participation benefits students at all levels of ability and need.

This relative difference in kindergarten readiness for former ECEAP students (compared with their lower-income peers) is displayed in Figure 4. This represents the increased likelihood of a lower-income student being kindergarten

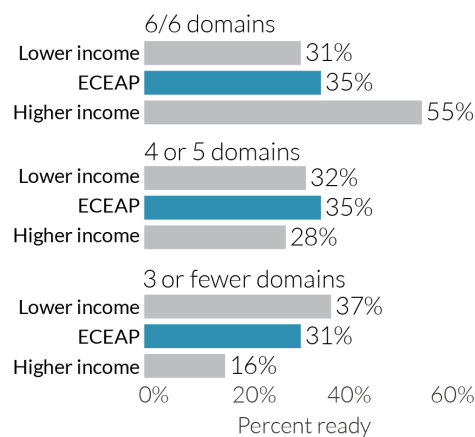


Figure 3. Proportion of children kindergarten ready in six of six, four or five of six, and less than four domains (see also Table A3).

ready in any given domain if he or she participated in ECEAP.⁴ Compared to their lower-income counterparts, 13 percent more former ECEAP participants than non-ECEAP lower-income students were kindergarten ready in six of six domains, ten percent more in the math domain, and so on.

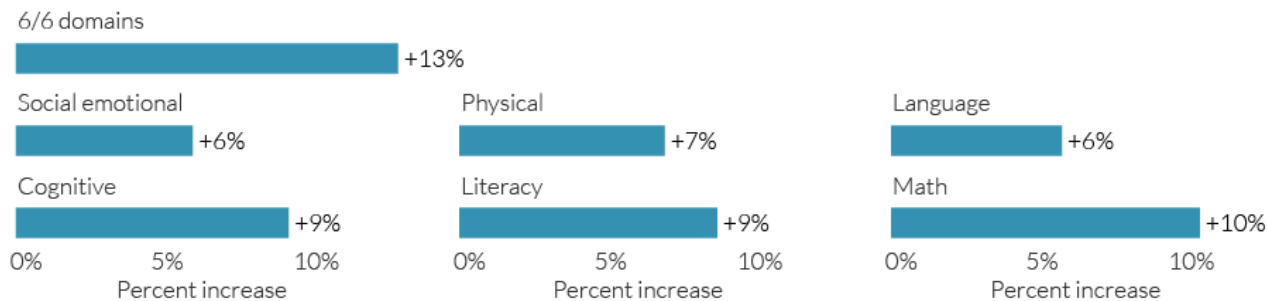


Figure 4. The percent increase in kindergarten readiness of former ECEAP students compared with their lower-income peers (see also Table A2).

Finding 2. The positive relationship between ECEAP participation and kindergarten readiness extended to children of color, dual language learners (DLLs) and students with special education needs.

Both the ECEAP and lower-income cohorts were far more likely than the higher-income students to identify as Hispanic, Asian, black, or other races, to be DLLs,⁵ and to participate in special education services. An important question, therefore, is whether or not ECEAP participation provides benefits to these students. The results indicate that ECEAP participation is associated with increased rates of kindergarten-readiness within each of these subpopulations, and that the differences were more pronounced for some groups than others.

Race/Ethnicity

There was a distinct pattern of racial and ethnic disparities in kindergarten readiness that cut across income groups (see Table A4). While these disparities reached statistical significance in all domains (X^2 sig. $p < .001$), they were especially pronounced in the more “academic” areas of language, cognitive, literacy and math. Students who identified as

4. This is calculated as the proportion of former ECEAP students who are kindergarten ready minus the proportion of lower-income students who are kindergarten ready, divided by the number lower-income students kindergarten ready. $(ECEAP\ Kready - lower\ income\ Kready) / lower\ income\ Kready$.

5. Identified by enrollment in Washington’s “Transitional Bilingual” program for non-native English speakers.

white were more likely than any other racial/ethnic group to be kindergarten ready in all four academic domains, and had among the highest rates of readiness in the physical and social-emotional areas. On the other hand, Hispanics were among the least likely to be kindergarten ready, particularly in literacy and math. The performance of Asian and black/African American students fell approximately in the middle.

Not only did former ECEAP students consistently out-perform their lower-income counterparts across all racial or ethnic groups,⁶ the differences were greater for Asian and Hispanic students compared to white or black/African American students. Figure 5 displays the relative size of the ECEAP difference for all students combined and separately for white, black/African American, Hispanic and Asian students. Again, the bars represent the proportion of *additional* students in the ECEAP group, compared to the lower-income group, who were kindergarten ready in each domain.

Asian ECEAP students outperformed the Asian lower-income group across each domain, but these differences only reached significance in literacy and math. Among

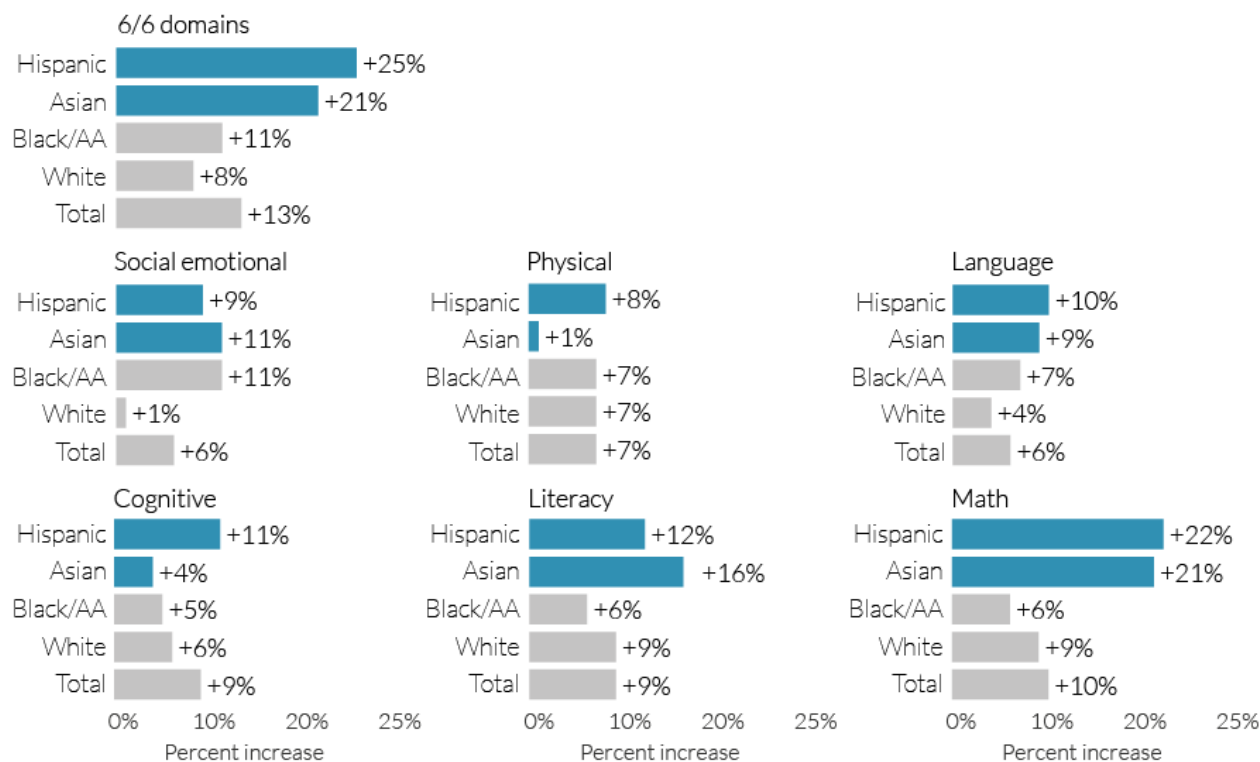


Figure 5. The percentage increase in former ECEAP compared to non-ECEAP lower-income students who were kindergarten ready by race/ethnicity (see also Table A5).

6. This did not always reach statistical significance, possibly due to the small numbers of students in some of the race categories (e.g., American Indian/Alaska Natives and Hawaiian/other Pacific Islanders). Because of these small numbers, the remainder of this analysis centers on Asians, black/African American, Hispanic and white students.

Hispanics, the ECEAP difference was larger and more consistent than for any other racial/ethnic category. Black/African American ECEAP cohort members were slightly more likely than their low income counterparts to be kindergarten ready across all domains, but this only reached significance in the social emotional domain (X^2 sig. $p < .001$). Finally, white students showed almost no difference in the social emotional and language domains, but a significant (X^2 , $p < .001$) difference in the other domains.

Dual language learners

Compared to native English speakers, dual language learners (DLLs) were much less likely to be kindergarten ready generally (X^2 sig. $p < .001$). For example, while 77 percent of the total population was kindergarten ready in the language domain, only 57 percent of DLLs were kindergarten ready in the language domain. Relative to native speakers, DLLs appear to struggle in the literacy, cognitive and math domains as well (Table A4).

However, DLLs who participated in ECEAP were significantly more likely than their lower-income DLL peers to be kindergarten ready across all domains (X^2 sig. $p < .001$). As Figure 6 shows, not only did former ECEAP DLL students outperform lower-income DLLs across domains, but they were virtually equivalent to their higher-income DLL counterparts in the social emotional, physical and language domains. In fact, DLLs were the only subpopulation in which former ECEAP participants performed at the level of the higher-income group on any domain.

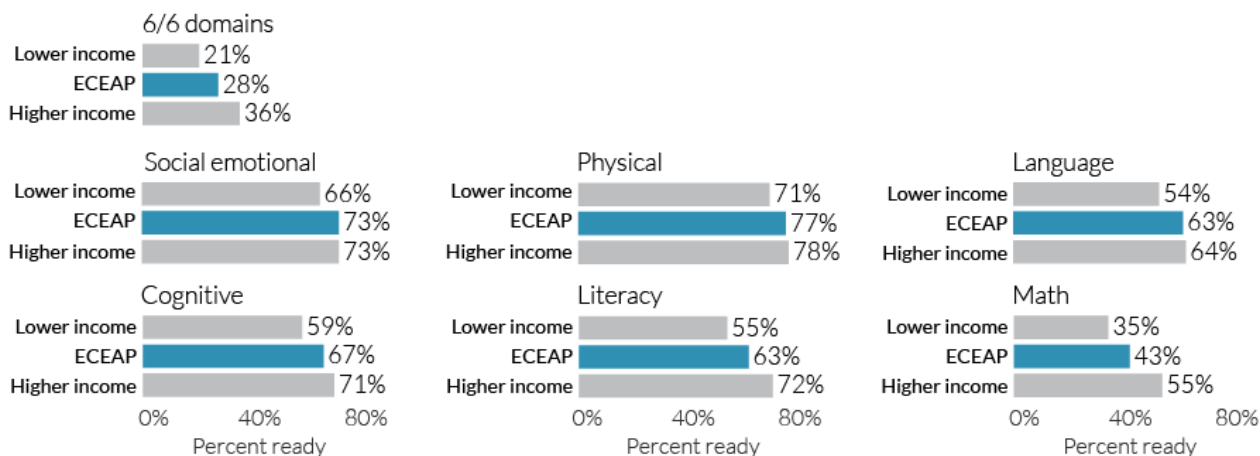


Figure 6. Proportion of children kindergarten ready in each domain, DLL only (see also Table A6).

As illustrated in Figure 7, the ECEAP *difference* was larger for DLLs than for the population as a whole in every domain. This difference was very pronounced in some domains. For example, the greatest difference observed for the ECEAP group as a whole was in the math domain, and was ten percent. Among DLLs, however, that difference was 23 percent. For more information on the differences observed for Hispanic and DLL students, please refer to a separate ECEAP report published by the ERDC that focuses on this group.

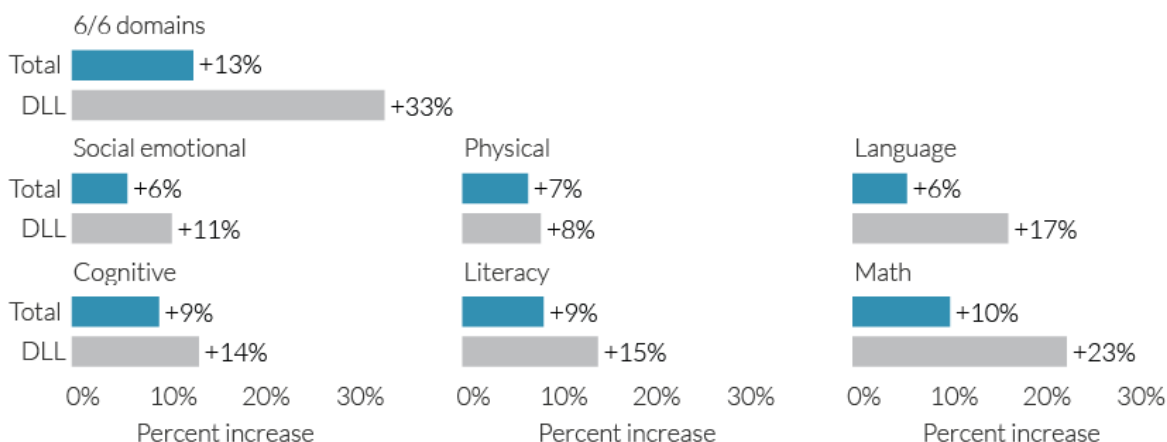


Figure 7. The percent **increase** in former ECEAP compared to non-ECEAP lower-income students who were kindergarten ready, DLL compared with all ECEAP students (see also Table A6).

Special Education

Students eligible for special education services were much less likely than their peers to be kindergarten ready across all domains. However, former ECEAP students who were eligible for special education services in kindergarten consistently outperformed their lower-income counterparts in all domains (see Figure 8 and Table A5).

The differences between the ECEAP and lower-income cohorts within the special education population were relatively small compared to the population as a whole, and reached statistical significance only in the social emotional and physical domains (X^2 sig. $p < .001$). However, the fact that differences existed in every domain suggests that ECEAP may play an important role in helping students with special needs. Further, the differences in the social emotional and physical domains were larger than for the entire group combined.

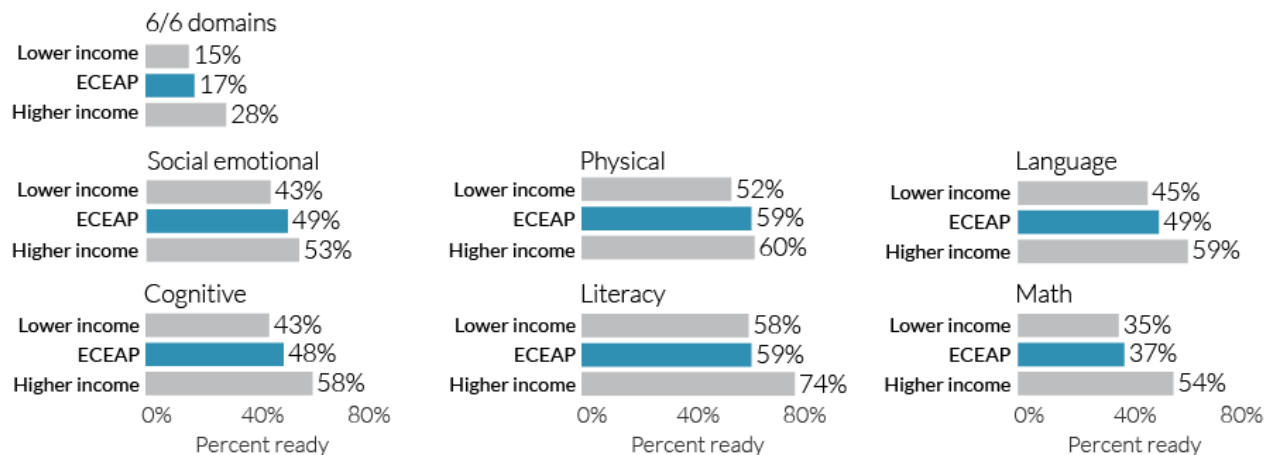


Figure 8. Proportion of children kindergarten ready in each domain, special education only (see also Table A7).

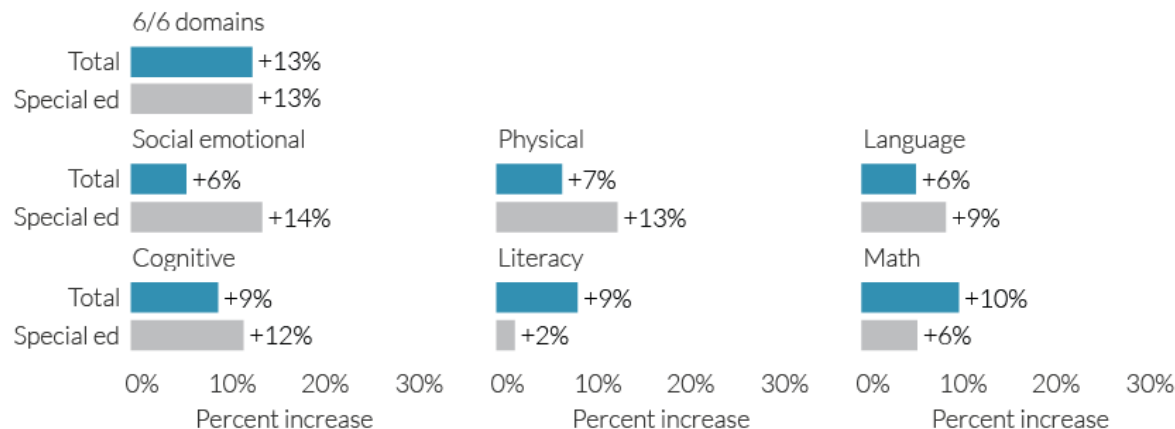


Figure 9. The percentage **increase** in former ECEAP compared to non-ECEAP lower-income students who were kindergarten ready, special education compared with all ECEAP students (see also Table A7).

Finding 3. ECEAP participation is positively correlated with kindergarten readiness rates among lower-income students at the county level

Figure 10 presents a state map with each county shaded according to the total proportion of kindergarten students in each county who were either in the lower-income or ECEAP cohorts.⁷ For example, 82 percent of the study population from Yakima county were lower income, compared to 60 percent from King county and 46 percent from Whatcom county (see also Table A8).

At least at the county level, the relationship between the proportion of kindergartners who were lower income and the proportion of lower-income students in ECEAP was close to zero ($r=.014$, $p=.932$). In other words, whether or not a county had a low-income population of 80 percent or of 10 percent, the proportion enrolled in ECEAP did not vary.

There was a moderately high and very significant correlation between ECEAP enrollment rates and kindergarten readiness among lower-income children ($r = .55$, $p < .001$), with the averages for all counties given equal weight.⁸ Figure 11 plots the relationship between the percent of lower-income children who received ECEAP services and the percent of lower-income children who were kindergarten ready in all six domains, by county. Each county is represented by a dot that is also shaded to represent the overall proportion of students who were lower income (see also Table A8).

7. As mentioned earlier, the higher and lower-income comparison populations were restricted to students who attended elementary schools with former ECEAP students. For this reason, the results may differ from other standard measures and are most accurate for counties with high numbers of former ECEAP students in their kindergarten classes.

8. This refers to the proportion of all lower-income and former ECEAP children combined, not just former ECEAP students themselves.

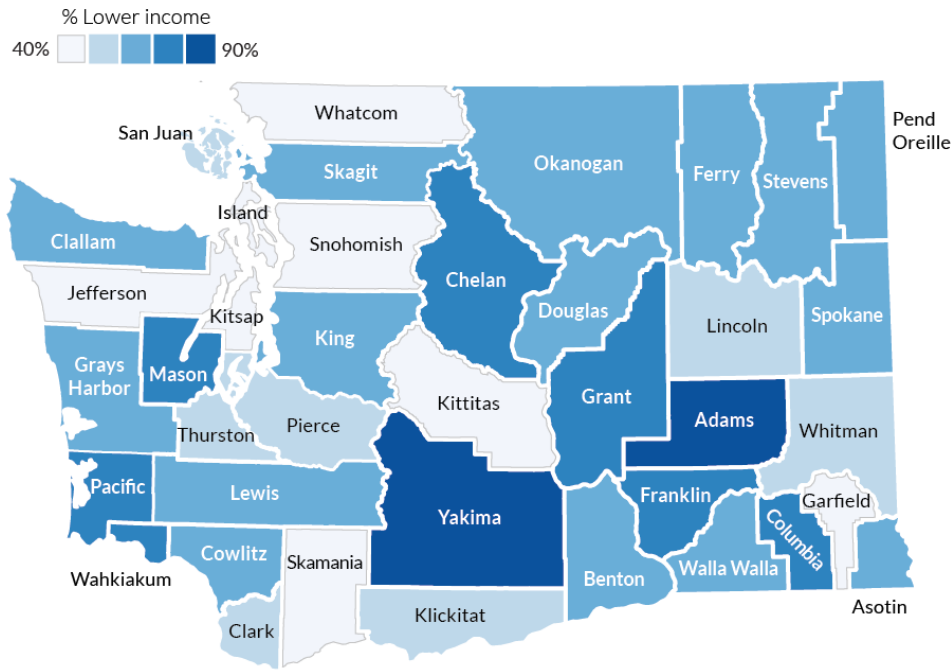


Figure 10. Lower-income or former ECEAP kindergartners as a proportion of the total study cohort, by county (see also Table A8).

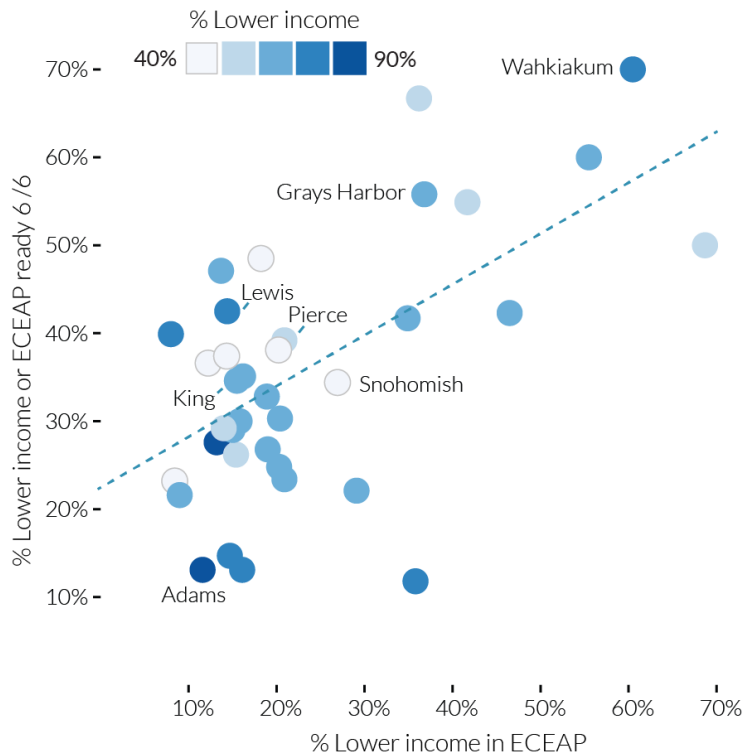


Figure 11. The relationship between the percentage of lower-income children in ECEAP, and the percentage of lower-income children who are kindergarten ready (see also Table A8).

Those familiar with Washington geography will notice that the counties with greater percentages of lower-income students in ECEAP consist mostly of smaller, more rural counties, while larger counties had relatively fewer lower income students enrolled in ECEAP. The observed correlation between ECEAP enrollment and kindergarten held true for both groups, with some exceptions. For example, Lewis county, with a medium-size kindergarten population of whom 74 percent were lower income, had an ECEAP enrollment rate of only 14 percent yet 43 percent of the lower-income students were kindergarten ready in six of six domains. Much more work is needed to isolate the various factors that may contribute to the results presented here.

Discussion

In conclusion, we found a consistent and statistically significant relationship between ECEAP participation in 2014-15 and subsequent success on the assessment portion of the 2015-16 WaKIDS Inventory of Kindergarten Readiness. For example, there was a moderately high positive correlation at the county-level between the proportion of lower-income children enrolled in ECEAP and the proportion of lower-income children who were kindergarten ready in all six domains. Further, while the higher-income cohort outperformed both former ECEAP students and the lower-income cohort, ECEAP participants significantly outperformed their lower-income counterparts.

This was true for virtually all population subgroups including race/ethnicity, DLL status, special education eligibility, and gender. Certain populations (such as dual language learners and Hispanic students) showed a larger increase in kindergarten readiness associated with ECEAP participation than white students or native English speakers. In other words, ECEAP participation was associated with a greater percentage increase in kindergarten readiness among Hispanics, blacks, and Asians compared to white students and dual language learners compared to fluent English speakers, a finding that corresponds with previous research (Ramey, et al, 2000; Root Cause, 2011).

While these results point to the benefit of ECEAP services, there were clear limitations to the study that deserve consideration. First, factors beyond the ECEAP program almost certainly influenced observed differences, as ECEAP participation could not be isolated from potentially confounding factors. In addition, this study does not include information about the preschool experiences of the non-ECEAP cohorts, who may have attended another type of high-quality ECE program.

Further, the income requirements for FRPL eligibility are higher than those for ECEAP, so the lower-income non-ECEAP group was not directly comparable – although this means that the differences in kindergarten readiness among ECEAP learners (compared to their lower-income peers) could be more pronounced than described here. Finally, children enrolled in ECEAP may have differed in other unmeasured ways from children who were eligible but did not enroll in an ECEAP program. However, even with these caveats in mind, the strength of the results presented in this study are provocative and warrant further research, and can inform discussions about how best to optimize the positive impact of early childhood education.

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Appendix A. Data Tables

Table A1. Demographic characteristics and program participation of the ECEAP cohort and the lower- and higher-income comparison groups.

| | Lower income (No ECEAP) | ECEAP cohort | Higher income (No ECEAP) |
|-------------------------------------|----------------------------|--------------|-----------------------------|
| # | 24,427 | 5,252 | 20,278 |
| Gender | | | |
| Male | 52% | 50% | 51% |
| Female | 48% | 50% | 49% |
| Race/ethnicity | | | |
| Hispanic (any race) | 39% | 46% | 14% |
| White | 38% | 33% | 67% |
| Black/African American | 6% | 7% | 2% |
| Two or more races | 9% | 7% | 9% |
| Asian | 4% | 3% | 6% |
| American Indian/Alaska Native | 2% | 1% | 1% |
| Native Hawaiian/Other PI | 2% | 1% | 1% |
| Special education | 12% | 12% | 8% |
| Dual language learners (DLL) | 33% | 39% | 10% |

Table A2. Proportion of children kindergarten ready in each domain and in 6 of 6 domains, by cohort, and the percent increase in kindergarten readiness in the ECEAP cohort compared with the lower-income cohort.

| | Lower income (No ECEAP) | ECEAP cohort | Higher income (No ECEAP) | % increase |
|--------------------|----------------------------|--------------|-----------------------------|------------|
| Social emotional** | 67% | 71% | 79% | 6% |
| Physical** | 72% | 77% | 82% | 7% |
| Language** | 69% | 73% | 86% | 6% |
| Cognitive** | 65% | 71% | 82% | 9% |
| Literacy** | 69% | 75% | 89% | 9% |
| Mathematics** | 48% | 53% | 74% | 10% |
| 6/6 domains** | 31% | 35% | 55% | 13% |

** Chi-square sig p<.001

Table A3. Proportion of children kindergarten ready in six of six, four or five of six, and less than four domains.

| | Lower income (No ECEAP) | ECEAP cohort | Higher income (No ECEAP) |
|--------------------|----------------------------|--------------|-----------------------------|
| 3 or fewer domains | 37% | 31% | 16% |
| 4 or 5 domains | 32% | 35% | 28% |
| 6/6 domains | 31% | 35% | 55% |

Table A4. Proportion of students who were kindergarten ready in each domain and in 6/6 domains by racial/ethnic category, gender, DLL and special education status in all three cohorts combined.

| | Social emotional | Physical | Language | Cognitive | Literacy | Math | 6/6 domains |
|-------------------------------|---------------------|----------|----------|-----------|----------|------|-------------|
| Total | 72% | 76% | 77% | 73% | 78% | 59% | 41% |
| Gender | | | | | | | |
| Male | 66% | 71% | 73% | 69% | 75% | 59% | 38% |
| Female | 79% | 82% | 80% | 77% | 80% | 60% | 45% |
| Race/Ethnicity | | | | | | | |
| Hispanic (any race) | 70% | 73% | 65% | 65% | 63% | 43% | 29% |
| White | 74% | 78% | 83% | 78% | 85% | 68% | 48% |
| Black/African American | 67% | 73% | 77% | 69% | 80% | 60% | 40% |
| Two or more races | 74% | 78% | 82% | 76% | 84% | 65% | 47% |
| Asian | 74% | 80% | 72% | 74% | 82% | 66% | 47% |
| American Indian/Alaska Native | 67% | 72% | 69% | 65% | 71% | 49% | 32% |
| Native Hawaiian/Other PI | 71% | 74% | 69% | 67% | 68% | 44% | 32% |
| Dual language learners | 68% | 73% | 57% | 62% | 59% | 39% | 25% |
| Special education | 47% | 55% | 50% | 48% | 63% | 41% | 19% |

** Chi-square sig p<.001, all subgroups by domain

Table A5. Proportion of children kindergarten ready in each domain, and the percent increase in kindergarten readiness in the ECEAP cohort compared with the lower-income cohort, by race/ethnicity.

| | Lower income (No ECEAP) | ECEAP cohort | Higher income (No ECEAP) | % increase | | Lower income (No ECEAP) | ECEAP cohort | Higher income (No ECEAP) | % increase |
|-------------------------|----------------------------|--------------|-----------------------------|------------|--------------------|----------------------------|--------------|-----------------------------|------------|
| Social emotional | | | | | Physical | | | | |
| Hispanic** | 67% | 73% | 78% | 9% | Hispanic** | 71% | 77% | 78% | 8% |
| Asian | 70% | 78% | 81% | 11% | Asian | 78% | 79% | 81% | 1% |
| Black/AA* | 64% | 71% | 81% | 11% | Black/AA | 70% | 75% | 81% | 7% |
| White | 67% | 68% | 83% | 1% | White** | 72% | 77% | 83% | 7% |
| Total | 67% | 71% | 82% | 6% | Total | 72% | 77% | 82% | 7% |
| Language | | | | | Cognitive | | | | |
| Hispanic** | 61% | 67% | 76% | 10% | Hispanic** | 61% | 68% | 76% | 11% |
| Asian | 67% | 73% | 77% | 9% | Asian | 71% | 74% | 78% | 4% |
| Black/AA | 74% | 79% | 84% | 7% | Black/AA | 66% | 69% | 77% | 5% |
| White | 76% | 79% | 89% | 4% | White** | 69% | 73% | 84% | 6% |
| Total | 69% | 73% | 86% | 6% | Total | 65% | 71% | 82% | 9% |
| Literacy | | | | | Mathematics | | | | |
| Hispanic** | 59% | 66% | 78% | 12% | Hispanic** | 37% | 45% | 61% | 22% |
| Asian** | 75% | 87% | 88% | 16% | Asian* | 57% | 69% | 74% | 21% |
| Black/AA | 77% | 82% | 89% | 6% | Black/AA | 55% | 57% | 75% | 6% |
| White** | 76% | 83% | 92% | 9% | White** | 55% | 60% | 77% | 9% |
| Total | 69% | 75% | 89% | 9% | Total | 48% | 53% | 74% | 10% |
| 6/6 domains | | | | | | | | | |
| Hispanic** | 24% | 30% | 44% | 25% | | | | | |
| Asian | 39% | 47% | 54% | 21% | | | | | |
| Black/AA | 36% | 40% | 54% | 11% | | | | | |
| White* | 36% | 39% | 58% | 8% | | | | | |
| Total | 31% | 35% | 55% | 13% | | | | | |

* Chi-Square SIG. P<.01

** Chi-square sig p<.001

Table A6. Proportion of children kindergarten ready in each domain, and the percent increase in kindergarten readiness in the ECEAP cohort compared with the lower-income cohort, DLL only.

| Dual language learners | Lower income (no ECEAP) | ECEAP cohort | Higher income (no ECEAP) | % increase |
|------------------------|-------------------------|--------------|--------------------------|------------|
| # | 8161 | 2058 | 1942 | |
| Social emotional** | 66% | 73% | 73% | 11% |
| Physical** | 71% | 77% | 78% | 8% |
| Language** | 54% | 63% | 64% | 17% |
| Cognitive** | 59% | 67% | 71% | 14% |
| Literacy** | 55% | 63% | 72% | 15% |
| Mathematics** | 35% | 43% | 55% | 23% |
| 6/6 domains** | 21% | 28% | 36% | 33% |

** Statistically significant p. < .001

X² calculated within DLLs and excluding higher income

Table A7. Proportion of children kindergarten ready in each domain, and the percent increase in kindergarten readiness in the ECEAP cohort compared with the lower-income cohort, special education only.

| | Lower income (no ECEAP) | ECEAP cohort | Higher income (no ECEAP) | % increase |
|--------------------|-------------------------|--------------|--------------------------|------------|
| # | 3031 | 649 | 1541 | |
| Social emotional** | 43% | 49% | 53% | 14% |
| Physical** | 52% | 59% | 60% | 13% |
| Language | 45% | 49% | 59% | 9% |
| Cognitive | 43% | 48% | 58% | 12% |
| Literacy | 58% | 59% | 74% | 2% |
| Mathematics | 35% | 37% | 54% | 6% |
| 6/6 domains | 15% | 17% | 28% | 13% |

* X² statistically significant p. < .01

** Statistically significant p. < .001

Table A8. Lower-income or former ECEAP kindergartners as a proportion of the total study cohort, the percentage of lower-income children in ECEAP, and the percentage of lower-income children who are kindergarten ready, by county.

| County | Total students all cohorts | Lower income or former ECEAP as % of total | ECEAP participants as % of lower income | % of lower income or ECEAP who were kindergarten ready in 6/6 domains |
|--------------|----------------------------|--|---|---|
| Adams | 418 | 82% | 11% | 13% |
| Asotin | 226 | 62% | 29% | 22% |
| Benton | 1930 | 64% | 20% | 25% |
| Chelan | 639 | 73% | 16% | 13% |
| Clallam | 299 | 62% | 16% | 35% |
| Clark | 3210 | 59% | 15% | 26% |
| Columbia | 23 | 74% | 35% | 12% |
| Cowlitz | 1089 | 63% | 14% | 29% |
| Douglas | 447 | 68% | 18% | 33% |
| Ferry | 33 | 61% | 55% | 60% |
| Franklin | 1396 | 72% | 14% | 15% |
| Grant | 1314 | 70% | 20% | 23% |
| Grays Harbor | 729 | 65% | 36% | 56% |
| Island | 560 | 42% | 18% | 49% |
| King | 8809 | 60% | 15% | 35% |
| Kitsap | 1690 | 49% | 20% | 38% |
| Kittitas | 326 | 46% | 8% | 23% |
| Klickitat | 168 | 53% | 13% | 29% |
| Lewis | 668 | 74% | 14% | 43% |
| Lincoln | 74 | 57% | 36% | 67% |
| Okanogan | 411 | 63% | 34% | 42% |
| Pend Oreille | 107 | 64% | 13% | 47% |
| Pierce | 8947 | 50% | 20% | 39% |
| San Juan | 38 | 58% | 68% | 50% |
| Skagit | 960 | 65% | 9% | 22% |
| Snohomish | 4131 | 47% | 26% | 34% |
| Spokane | 3405 | 65% | 18% | 27% |
| Stevens | 275 | 69% | 15% | 30% |
| Thurston | 1972 | 50% | 14% | 37% |
| Wakiakum | 28 | 71% | 60% | 70% |
| Walla Walla | 505 | 67% | 20% | 30% |
| Whatcom | 1116 | 46% | 12% | 37% |
| Whitman | 96 | 53% | 41% | 55% |
| Yakima | 3477 | 82% | 13% | 28% |

| County | Total students all cohorts | Lower income or former ECEAP as % of total | ECEAP participants as % of lower income | % of lower income or ECEAP who were kindergarten ready in 6/6 domains |
|--|-------------------------------|--|--|--|
| Mason N (Olympic Kitsap Peninsula EL) | 65 | 65% | 2% | 36% |
| Mason S (West Central EL) | 180 | 73% | 9% | 41% |
| Pacific N (West Central EL) | 86 | 69% | 76% | 42% |
| Pacific S (Southwest EL) | 110 | 71% | 23% | 42% |

Appendix B. Technical Notes

Early Childhood Education and Assistance Program (ECEAP)

Washington's state-funded preschool program, ECEAP, was established in 1985 to provide education to eligible preschool children, combined with health, nutrition, and family support (DEL, 2016). Participation is limited to those who meet one of the following criteria: Family income at or less than 110% of the federal poverty level; eligible for special education services; or the family has one of several other defined risk factors. To be eligible for participation, children must be older than 3 and younger than 5 years on August 31 of their academic enrollment year.

Statewide, 336 different ECEAP sites consisting of 732 separate ECEAP classrooms were identified as providing ECEAP services in 2014-15.⁹ Most ECEAP classrooms are located in public schools, followed by child care or Head Start facilities, non-profits and faith-based organizations (DEL 2016a). ECEAP services are currently available in 36 of the 39 counties in Washington.

As of the study date, all ECEAP classrooms operated on one of three funding models, including part-day programs funded only with ECEAP dollars, and full- and extended-day models supplemented by subsidized child care funds. In 2014-15, the majority (81 percent) of ECEAP classrooms provided part-day services, with 12 and 6 percent providing full or extended-day services, respectively. There was variability across the state in the availability of full- or extended-day versus part-time services. In King county, a large urban area including the city of Seattle, 65 percent of ECEAP classrooms operated on the part-day model, compared to 81 percent statewide and over 90 percent in the central, rural regions of the state.

Most ECEAP classrooms were taught using English Only (76 percent) or bilingual English/Spanish (21 percent). Few classrooms were Spanish only (2 percent) or utilized English and another language (1 percent). There was variation across the state. For example, in the North Central region, 88 percent of classrooms were either bilingual Spanish/English or Spanish only. The vast majority of the classrooms that used a language other than English or Spanish were located in King county, home to substantial populations of non-Hispanic immigrant groups.

9. This number may not exactly match those reported elsewhere due to changing site names during the year, as well as at least one case of one site "splitting" into two sites mid-year. Please refer to the technical notes for more details.

Washington Kindergarten Inventory of Developing Skills (WaKIDS)

Washington uses the WaKIDS assessment to guide the transition to kindergarten by encouraging collaborative practices within and across educational sectors, including the family. The WaKIDS assessment helps teachers to better understand and address each child's individual learning needs.¹⁰ The GOLD® assessment portion of WaKIDS includes six domains of readiness: social emotional, physical, cognitive, language, literacy, and math (Gingerich, 2014). Use of WaKIDS is required for all students in a state-funded full-day kindergarten classroom and seventy-one percent of all kindergartners in the state were assessed with the WaKIDS in the fall of 2015.

Data Sources

- State-funded preschool school participation (ECEAP): Early Learning Management Systems (ELMS), Department of Early Learning (2014-15)
- Kindergarten enrollment and program participation: Comprehensive Education Data and Research System (CEDARS), Office of Superintendent of Public Instruction (2015-16)
- Kindergarten Readiness: Washington Kindergarten Inventory of Developing Skills (WaKIDS), Office of Superintendent of Public Instruction (2015-16)

Data Linkage

ERDC maintains a statewide longitudinal database which is updated annually. For more information on procedures for linking individual data, please refer to the ERDC website.¹¹

Study population

ECEAP Cohort: 5,252 Consisted of all ECEAP students from 2014-15 who:

1. Were enrolled in ECEAP at least six months at one site;
2. Enrolled in kindergarten in the 2015-16 school year; and
3. Had WaKIDS assessment data.

10. For more information on WaKIDS, visit <http://www.k12.wa.us/wakids>

11. <http://www.erd.c.wa.gov>

Table B1: ECEAP cohort breakdown

| | | |
|-------------------------------------|--------|------|
| Total ECEAP Participation 2014/2015 | 11,409 | 100% |
| Age 4 or older on August 31, 2014 | 8,068 | 71% |
| Enrolled in kindergarten Fall, 2015 | 7,158 | 63% |
| Assessed on WaKIDS | 6,308 | 55% |
| 6+ months at ECEAP site | 5,252 | 46% |

Statewide non-ECEAP comparison cohorts. Consisted of all incoming kindergartners in Fall 2015 who:

1. Had WaKIDS assessment data;
1. Attended an elementary school in which at least one former ECEAP student was enrolled, and
1. Did not attend ECEAP at all the previous year (2014-15). The statewide non-ECEAP comparison group was further divided as follows:
 1. Lower-income comparison group: 24,427 kindergartners who were eligible for Free or Reduced Price Lunch (FRPL) in 2015-16.
 1. Higher-income comparison group: 20,278 kindergartners who were not eligible for FRPL in 2015-16.

Table B2: non-ECEAP kindergarten cohort breakdown

| | | |
|--|--------|------|
| Total Kindergarten enrollment Fall 2014/2015 | 74,535 | 100% |
| Assessed on WaKIDS Fall 2015 | 51,956 | 70% |
| Attended a school with ECEAP cohort member | 44,705 | 60% |
| Lower income (FRPL eligible) | 24,427 | 55% |
| Higher income (not FRPL eligible) | 20,278 | 45% |

Variable definitions

Student demographics. Both the ECEAP program and the K-12 system collect information about their students. This report uses demographic information (age, gender, race/ethnicity) and program eligibility/risk factor information (special education, DLL) from both sources, but prioritizes the K-12 CEDARS data when ECEAP students are being compared to lower- and higher-income students from the K-12 system.

Income level (K-12 data). Within the K-12 system, a “lower-income student” means a student who qualifies for free or reduced price lunch (FRPL) because his/her parent(s) or guardian(s) have an annual income equal to or less than one hundred eighty-five percent of the Income Poverty Guidelines . A higher-income student means a student who does not qualify for FRPL. Source: <http://apps.leg.wa.gov/wac/default.aspx?cite=392-100-100>

Dual language learner (K-12 data). A student who meets the following two conditions is eligible for the Transitional Bilingual Instructional Program:

- The primary language of the student is other than English; and
- The student's English skills are sufficiently lacking or absent as to delay learning .

Source: <http://www.k12.wa.us/MigrantBilingual/pubdocs/TBIPGuidelinesIdentification.pdf>

Special education student (K-12 data). "Special education student" means a student qualified by their school district for special education services under RCW 28A.155.020. This includes all students with a school-determined individualized education plan (IEP).



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