

**Analysis of *Developmental Indicators for the Assessment of Learning*, Third Edition (*DIAL-3*) Information
Participants in South Carolina Four-Year-Old Kindergarten Programs
2006-2007 School Year**

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Introduction

During the spring, summer, and fall of 2006, preschoolers entering public school 4-year-old preschool programs across South Carolina were administered the *Developmental Indicators for the Assessment of Learning, Third Edition (DIAL-3)*. The *DIAL-3* is designed to provide initial screening information about students' skills. Hence, the measure may be useful for identifying children who need more intensive diagnostic assessment or who are at risk for developmental and school readiness problems. The *DIAL-3* measures preschoolers' skills across three major areas: motor, concepts, and language skills. Each of the three skill areas yields a subscale score and those scores can then be converted into percentile ranks. Percentile ranks range from 1 to 99 and may be used to compare a students' performance to the developmental norms for the *DIAL-3*. The analysis of *DIAL-3* scores of students obtained at the time they enter a preschool program provides an indicator of the students' developmental status and needs when they entered preschool. The *DIAL-3* scores of CDEPP participants and non-participants will be used in the evaluation of CDEPP as a baseline of student performance for any future longitudinal analysis of the relationship between CDEPP participation and later academic achievement in early elementary school.

The South Carolina Department of Education (SCDE) and the Office of First Steps to School Readiness (OFS) provided the *DIAL-3* scores for students attending public school and private center programs for the evaluation. The purpose of our analyses is to determine how the *DIAL-3* scores of students enrolled in the CDEPP differed from the scores of other students attending state-funded preschools across the state when both groups of students entered preschool.

A subset of the preschoolers was also given the *DIAL-3* at the end of the school year to examine changes in students' skills over the course of the academic year. However, because *DIAL-3* posttest scores were available for less than 12% of the total sample of students having *DIAL-3* pretest scores, the study of group changes from pretest to posttest was not performed (i.e., the sample size was judged to be too small to be representative of the preschool population). Although *DIAL-3* posttest data were requested from participating school districts, many districts did not administer the posttests. District and school administrators indicated that, since the *DIAL-3* is individually administered to students, sufficient resources were not available to pull students individually from their preschool class for testing while at the same time maintaining the instructional program for the remaining students in CDEPP classrooms. For public schools, this is not an issue with the pretest *DIAL-3* assessment because most students are individually assessed during the late spring and summer prior to their entrance into preschool in August or September.

It should be noted that for the data presented that the number of children included varies from analysis to analysis. This is because some students may be missing one or more

DIAL-3 subscales and a decision was made to include as many individual child scores as possible for each analysis. From the data available, children between the ages of 3 years, 4 months and 4 years, 11 months at time of testing were selected because they represented the ages of children who were the appropriate age for CDEPP services. Students must be 4 years of age by September 1 to attend CDEPP classrooms. Potential students for the program were assessed by school district personnel during the spring and summer of the year the students will be at the age for acceptance into the school program in the fall, so some students are 3 years of age when assessed with the *DIAL-3* pretest. Private center students were assessed sometime after their enrollment in CDEPP. The total sample consists of 15,019 preschool students attending public schools (14,695) or private centers (324) preschool centers whose *DIAL-3* scores were available. The sample included students attending CDEPP classrooms and students attending other state-funded four-year-old pre-kindergarten programs, including those funded by EIA, Title I, and local funds.

Demographic information was available for 14,695 public school students who had pretest scores. Of the children attending preschool programs during the 2006-2007 school year, 7,586 (51.6%) were male and 7,109 were (48.4%) female. Their median age was 4 years, 0 months old. As shown in Table 1 below, the majority of preschool students were between the ages of 3 years, 11 months and 4 years, 8 months of age at the time they were administered the *DIAL-3* pretest.

**Table 1: Ages at the Time of Testing of Pre-kindergarten Students
DIAL-3 Pretest Scores, 2006-2007**

Age of Student	Frequency	Percent
3 years, 4 months	3	.0%
3 years, 5 months	25	.2%
3 years, 6 months	92	.6%
3 years, 7 months	175	1.2%
3 years, 8 months	402	2.7%
3 years, 9 months	760	5.2%
3 years, 10 months	770	5.2%
3 years, 11 months	987	6.7%
4 years, 0 months	1,165	7.9%
4 years, 1 months	1,165	7.9%
4 years, 2 months	1,224	8.3%
4 years, 3 months	1,189	8.1%
4 years, 4 months	1,250	8.5%
4 years, 5 months	1,238	8.4%
4 years, 6 months	1,158	7.9%
4 years, 7 months	1,078	7.3%
4 years, 8 months	874	5.9%
4 years, 9 months	463	3.2%
4 years, 10 months	475	3.2%
4 years, 11 months	202	1.4%
Total	14,695	100%

Of the 15,019 students having *DIAL-3* pretest, 2,418 or 16.2% were enrolled in the CDEPP through in either public schools (2,116 students) or private centers (324 students). Two questions were addressed in our analysis of student *DIAL-3* performance:

1. How did the *DIAL-3* pretest scores of public school students participating in CDEPP compare to the scores of public school students who are not participating in CDEPP but who are enrolled in other preschool programs in the same districts as CDEPP participants?
2. How did the *DIAL-3* pretest scores of public school students statewide who are eligible for the federal free- or reduced-price lunch program and/or are eligible for Medicaid services (students in poverty) compare to the scores from public school students not eligible for these family income-based programs (e.g., “Pay” lunch, not eligible for Medicaid)?

Question 1: How did the *DIAL-3* pretest scores of public school students participating in CDEPP compare to the scores of public school students who are not participating in CDEPP but who are enrolled in other state-funded preschools in the same districts as CDEPP participants?

Primary Finding: *When children funded by CDEPP entered school, their DIAL-3 scores were reliably lower than the scores of other preschool students enrolled in the same districts who were not participating in CDEPP.*

Because CDEPP was not offered at every school in some of the larger districts participating in CDEPP, we examined differences in *DIAL-3* pretest scores between public school students enrolled in CDEPP and students in the same districts who were not enrolled in CDEPP. To assess differences, *DIAL-3* percentile rank scores were computed for each of the three *DIAL-3* subscales (Language Skills; Concept Skills; and Motor Skills) and compared across CDEPP and non-CDEPP children from the same district. Table 2 shows the descriptive information for the *DIAL-3* scores for the two groups of students. *DIAL-3* pretest scores were higher for students not participating in CDEPP than for CDEPP participants within the same district for all three *DIAL-3* subscales. The largest differences were seen in Language Skills and Concept Skills scores. To determine if the groups were reliably different on *DIAL-3* scores, scores of students who attend CDEPP in public schools were compared to scores of students in the same district who did not attend CDEPP. Independent t-tests were used to examine mean differences. Results showed that the differences were significantly different for the *DIAL-3* Language and Concept scales, where non-CDEPP preschoolers scored higher than the CDEPP participants. The Motor Skills scale scores were the most similar between the two groups.

Table 2: Comparisons of *DIAL-3* Pretest Scores of Students Participating in CDEPP vs. Students in the Same Districts but Not Participating in CDEPP

<i>DIAL-3</i> Subscales	Comparison Groups	Number of Students	Mean Percentile Rank	Median Percentile Rank	Std. Deviation	Mean Difference Between
Language Skills	Not CDEPP	850	43.2	40.0	29.5	7.6*
	CDEPP	2,080	35.5	31.0	27.1	
Concept Skills	Not CDEPP	849	44.0	45.0	28.5	10.6*
	CDEPP	2,014	33.4	26.0	27.2	
Motor Skills	Not CDEPP	850	49.4	51.0	32.8	2.9
	CDEPP	2,077	46.5	32.0	31.0	

Note: *Indicates the difference between groups is significant at $\alpha = .05$ adjusted for multiple tests

Question 2: How did the *DIAL-3* pretest scores of public school students statewide who are eligible for the federal free- or reduced-price lunch program and/or are eligible for Medicaid services (students in poverty) compare to the scores from public school students not eligible for these family income-based programs (i.e., Pay lunch, not eligible for Medicaid)?

Primary Finding: *Before children funded by CDEPP entered school, their DIAL-3 scores (i.e., children from lower-income families who were eligible for the federal free- or reduced-price lunch program and/or for Medicaid services) were significantly lower than the scores of children of higher-income families (not eligible for these federal programs). The gap between the students’ developmental readiness scores was found both statewide and within the districts implementing CDEPP. Moreover, in CDEPP districts, the differences were larger. Approximately one-third of the higher-income students served in state-funded public school pre-kindergarten programs statewide in 2006-2007, however, scored at or below the 25th percentile on two of the three DIAL-3 subscales when they entered school. This finding indicated that they also were in need of educational intervention to improve their developmental status.*

Whereas CDEPP participants in 29 school districts had to meet income eligibility requirements for admission, there may be other preschoolers across South Carolina who are not eligible for CDEPP but whose developmental status puts them at risk for poor school readiness skills and academic failure. If CDEPP continues to be limited to students meeting income guidelines, school districts may be unable to serve children who do not meet those income restrictions but who have significant school readiness needs. For example, for EIA funded four-year-old pre-kindergarten programs, most districts use a different method to classify students who are at-risk. Often in these districts, students considered to be potentially at risk are tested with *DIAL-3*, their scores are rank-ordered, and students having the lowest *DIAL-3* scores are selected for placement in the preschool program until the district runs out of money or classroom placements. Historically, many four-year-olds served in EIA preschool programs have not been eligible for the federal lunch program. At the present time, limited information is known about these children, such as, are they really more at-risk than other children?

Our analyses that follow compared *DIAL-3* results from students statewide who are income-eligible, regardless of their CDEPP status, with students who are not income-eligible for the program. Here, income eligibility is defined as those students receiving free- or reduced-price lunch and/or Medicaid services (e.g., having a Medicaid number); non-income eligible students are those classified as pay-lunch for lunch status and do not have a Medicaid number. Students with missing data for free- or reduced-price lunch and who also were missing a Medicaid number were classified as having unknown eligibility because we could not determine their income status. Table 3 shows the income status for students in the SCDE public school database. Using the definitions described above, the majority of students statewide (9,750 or 66.3%) were eligible for assistance based on family income. Further investigations showed that of the 4,395 children classified as pay lunch status, 142 (3.2%) were enrolled in CDEPP and of the 9,750 income eligible students, 1,930 (19.8%) were enrolled in CDEPP.

Table 3: Income Status of Students Enrolled in Public School Four-Year-Old Pre-kindergarten Programs and Having *DIAL-3* Pretest Scores, 2006-2007

Student Income Status	Number of Students	Percent
Pay Lunch, not Medicaid	4,395	29.9%
Free/Reduced Lunch or Medicaid	9,750	66.3%
Unknown Eligibility Status	550	3.7%
Total	14,695	100%

Comparisons were conducted to determine if there was a difference in *DIAL-3* scores when examining the performance of higher-income students enrolled in public school four-year-old pre-kindergarten programs across the state, regardless of CDEPP status. For those students with available scores, average *DIAL-3* subscale scores are shown in Table 4. As seen in the table, students from families having higher incomes scored significantly higher than students from lower-income families on all three *DIAL-3* subscales.

Table 4: Statewide Comparison of *DIAL-3* Subscales by Income Group

<i>DIAL-3</i> Subscale	Student Income Status	Number	Mean Percentile Rank	Median Percentile Rank	Std. Deviation	Mean Difference
Language Skills	Pay Lunch, Not Medicaid	4,381	41.3	38.0	29.3	11.6*
	Free/Reduced Lunch or Medicaid	9,738	29.7	23.0	26.3	
Concept Skills	Pay Lunch, Not Medicaid	4,374	43.2	40.0	29.0	14.2*
	Free/Reduced Lunch or Medicaid	9,666	29.0	21.0	26.1	
Motor Skills	Pay Lunch, Not Medicaid	4,366	47.4	42.0	32.4	8.6*
	Free/Reduced Lunch or Medicaid	9,699	38.9	33.0	30.2	

Note: *Indicates difference between groups is significant at $\alpha = .05$ adjusted for multiple tests

The basic analysis was repeated using re-aggregated data from the 29 plaintiff school districts in which CDEPP was implemented in 2006-2007 to examine differences in developmental status among students from lower-income families compared to students from higher-income families in these districts. Again, students were divided into groups based on federal lunch program status and Medicaid eligibility. As with the statewide analyses, the analyses within the 29 CDEPP implementing districts showed significant differences in *DIAL-3* pretest scores between the income groups (Table 5). Those students in the pay for lunch, not Medicaid eligible (i.e., higher income family) groups scored higher than students from lower income families on all three *DIAL-3* subscales. Moreover, the differences between groups' average scores were higher within the 29 plaintiff CDEPP implementing districts than for the statewide comparison. The comparison of the median and mean *DIAL-3* pretest scores gives information about the distribution of *DIAL-3* scores in the 29 CDEPP participating districts. For the pay lunch/Medicaid ineligible group, the median has a higher value than the mean, meaning the majority of scores are at the higher end of the distribution and the mean is lowered by the few low scores in the distribution. For the income-eligible groups, the median values have lower values than the mean, suggesting a distribution in which most of the scores are at the lower end of the distribution of scores.

The *DIAL-3* performances across the three subscales were also analyzed for the two income groups (eligible for federal lunch program and/or Medicaid services vs. pay lunch and not Medicaid eligible) statewide (Table 6). To identify students whose scores indicated they might have significant developmental deficiencies when they entered

school the scores on the three subscales reported for each student were compared. Students whose *DIAL-3* scores were at or below the 25th percentile on two of the three subscales were judged to have performed at a level, which would suggest that further diagnosis for potential developmental problems is warranted; such students are likely to benefit from further preschool educational services.

Children belonging to the two income groups who scored at or below the 25th percentile on two of the three subscales performed at similar low levels: their median percentiles indicate that they are performing at or below the bottom 13% of the norm group on every subscale. These findings suggest that there was a significant proportion of children who were not eligible for the federal lunch program or for Medicaid services served in pre-kindergarten programs statewide in 2006-2007 who showed evidence of developmental problems upon entering school: approximately 1,490, or 34%, of the 4,381 (from Table 5 above) children in this income group scored below the 25th percentile on two of the three *DIAL-3* subscales.

Table 5: Comparison of *DIAL-3* Subscales by Income Group Students Enrolled in the 29 CDEPP Implementing Districts

<i>Dial-3</i> Subscale	Student Income Status	Number of Students	Mean Percentile Rank	Median Percentile Rank	Std. Deviation	Mean Difference Between Groups
Language Skills	Pay Lunch, Not Medicaid	645	50.4	52.0	29.4	16.4*
	Free/Reduced Lunch or Medicaid	2,221	34.0	28.0	26.6	
Concept Skills	Pay Lunch, Not Medicaid	643	50.4	52.0	28.3	18.1*
	Free/Reduced Lunch or Medicaid	2,158	32.2	26.0	26.5	
Motor Skills	Pay Lunch, Not Medicaid	645	55.8	60.0	32.0	10.8*
	Free/Reduced Lunch or Medicaid	2,218	45.0	42.0	30.9	

Note: *Indicates difference between groups is significant at $\alpha = .05$ adjusted for multiple tests

Table 6: Performance of Students Scoring At or Below the 25th National Percentile on Two of Three *DIAL-3* Subscales, By Student Income Status Statewide

Student Income Status	<i>DIAL-3</i> Subscales	N Scoring At or Below 25% on 2 of 3 subscales	Mean Percentile Rank	Median Percentile Rank	Std. Deviation
Free/Reduced Lunch or Medicaid	Language Skills	5,244	12.3	8.0	14.1
	Concept Skills	5,224	11.4	8.0	12.4
	Motor Skills	5,239	21.9	9.0	21.9
Pay Lunch, Not Medicaid	Language Skills	1,491	14.2	10.0	14.8
	Concept Skills	1,490	15.4	11.0	15.4
	Motor Skills	1,489	21.2	13.0	21.7

Summary and Recommendations

We examined preschool students’ scores on the *DIAL-3* to identify any differences in performance among public school students participating in CDEPP compared to students enrolled in non-CDEPP state-funded public school four-year-old pre-kindergarten programs in 2006-2007. Additional analyses were conducted to compare differences in *DIAL-3* pretest performance between students from lower-income families (free- or reduced-price lunch program and/or Medicaid eligible) and students from higher-income families (pay lunch, not Medicaid eligible). Data from approximately 15,000 preschool students from across the state were included in the analyses. Descriptive information and statistical comparisons revealed reliable differences among the *DIAL-3* scores for CDEPP and non-CDEPP children.

- The *DIAL-3* pretest data provides a baseline for student performance when they enter preschool. Along with the more extensive pretest assessment of a sample of students for the evaluation, the *DIAL-3* pretest data may be used in an Education Oversight Committee (EOC) longitudinal evaluation of CDEPP to provide comparative evaluations of the later elementary school achievement of students who participated in CDEPP and students who did not participate. However, *DIAL-3* pretest data were not provided by all public schools in 2006-2007. Additionally, *DIAL-3* results from private centers were not useful for our analyses because the assessments were not administered until the middle of the school year or later. The *DIAL-3* results from private centers were administered late in the school year because many of the private centers did not enroll CDEPP students until after the beginning of the school year and most private providers needed professional development on the administration of the assessment. It is expected that private providers have administered *DIAL-3* pretests to their CDEPP students in the 2007-2008 school year, although those data have not yet been provided to the EOC.

- The analyses of the *DIAL-3* pretest results suggest that in the 29 CDEPP-implementing districts in 2006-2007 the CDEPP served at-risk students who start preschool at a lower skill levels than their non-CDEPP peers.
 - ✓ The median *DIAL-3* pretest percentile ranks for students participating in public school CDEPP ranged from a low of 26 for Concept Skills to a high of 32 for Motor Skills. Somewhat less than half of CDEPP participants scored in the bottom 25% of the *DIAL-3* norms. The median scores of students not participating in CDEPP but enrolled in the same school districts as the CDEPP participants ranged from a low of 40 for Language Skills to a high of 51 for Motor Skills, indicating that non-CDEPP students scored at or somewhat below the median of the norm scale.
 - ✓ When the performance of CDEPP and non-CDEPP-participating students was compared in the 29 plaintiff school districts in which CDEPP was implemented, the *DIAL-3* pretest scores of CDEPP participants on all three subscales were significantly lower than those from non-CDEPP participants in the same district.
- Analyses by income level of both the statewide data and the data from CDEPP-implementing districts indicated that students from lower-income families (free- or reduced-price lunch and/or Medicaid eligible) had significantly lower *DIAL-3* pretest scores than students from higher-income families (pay lunch, not Medicaid eligible). This finding indicated that targeting students for preschool program services based on family income is an effective way to serve students having significant developmental needs. However, screening assessments such as the *DIAL-3* also may be needed to identify students having developmental delays who need additional diagnosis and educational services, regardless of family income. Analyses of the scores of students from families having incomes higher than the levels required for CDEPP eligibility revealed that approximately one-third of these students scored at or below the 25th percentile on two or more of the *DIAL-3* subscales when they entered preschool. This finding, suggested that these students also had developmental needs, which might benefit from a high quality, full-day preschool educational program.

Recommendations

1. We recommend that future state-funded preschool programs must provide for the timely submission of accurate *DIAL-3* pretest information. *DIAL-3* pretest data are essential to determine (a) possible eligibility for services and (b) to serve as a baseline measure for any longitudinal evaluation of the later elementary grade achievement of children funded by CDEPP. Unfortunately, during 2006-2007 not all public schools and none of the private centers provided accurate or complete pretest data. This may have occurred in part because of the rapid and initial implementation of CDEPP in 2006-2007 (private centers, for example, did not enroll CDEPP students until after the beginning of the school year).
2. This analysis of the *DIAL-3* results in 2006-2007 suggested that the eligibility criteria for enrollment in CDEPP (eligibility for the federal school lunch program and/ or Medicaid services) have successfully identified many students who were developmentally at risk for later school failure. Nevertheless, there were also many students who were not income-eligible for CDEPP who have low *DIAL-3*

scores, which indicated that they might also be at risk of later school failure. To better identify and serve children whose developmental status makes them most in need of a high-quality, full-day educational preschool program, we recommend that student eligibility for CDEPP be based on the current income requirements but also include any students who are not income-eligible but who score at or below the 25th national percentile on two of the three *DIAL-3* subscales (Language, Concepts, and Motor Skills). Providers must maintain and report documentation of income status and *DIAL-3* performance to secure funding for any students served.