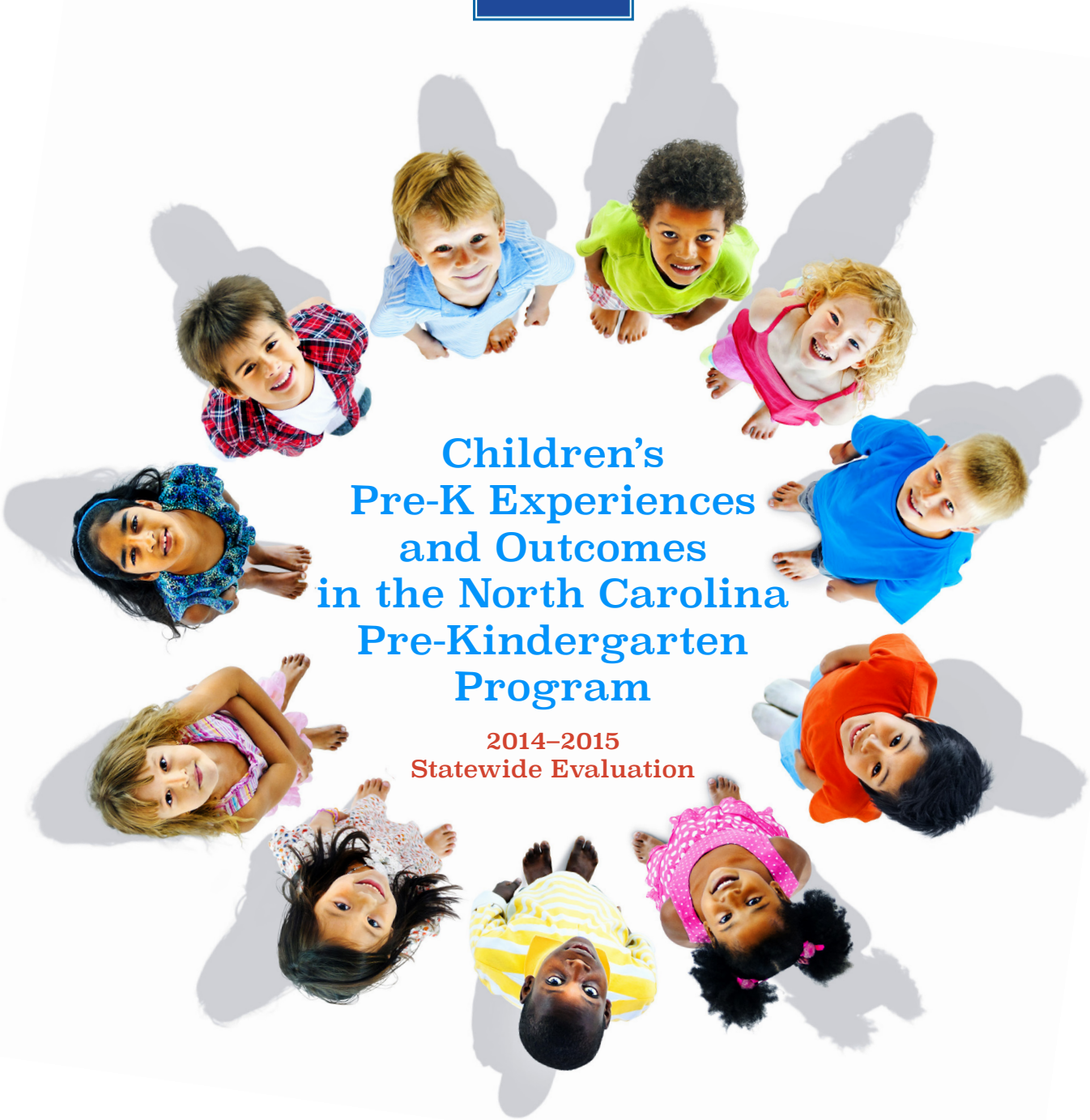
NC Pre-K Program Evaluation Project



Children's Pre-K Experiences and Outcomes in the North Carolina Pre-Kindergarten Program

2014–2015 Statewide Evaluation

UNC FRANK PORTER GRAHAM CHILD DEVELOPMENT INSTITUTE

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This report is available at http://www.fpg.unc.edu/projects/evaluation-nc-pre-kindergarten-program.

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Purpose of the NC Pre-Kindergarten Evaluation Study

The purpose of the 2014-2015 NC Pre-Kindergarten (NC Pre-K) Evaluation study was to examine the characteristics and quality of the program and the outcomes for children during pre-k, along with comparisons to previous years. Since the inception of the statewide pre-k program in North Carolina in 2001–2002, the evaluation has been conducted by the FPG Child Development Institute at the University of North Carolina-Chapel Hill. See Table 1 for a list of previous reports for further information about prior years, including studies of classroom quality and longitudinal and comparison studies of children's outcomes.

The primary research questions addressed by this evaluation included: 1) What were the outcomes of children attending the NC Pre-K Program and what factors were associated with better outcomes?, 2) What was the quality of the NC Pre-K classrooms attended by children and what factors were associated with better quality?, and 3) What were the key characteristics of the local NC Pre-K programs?

To address these questions, information was gathered from multiple sources, including individual assessments of children's outcomes, observations of classroom quality, parent and teacher surveys, and statewide administrative data. The study included a sample of 595 children who attended a random sample of 102 NC Pre-K classrooms during 2014-2015, including a subsample of 133 Spanish-speaking dual language learners (DLLs). Data were gathered at the beginning and end of the program year to examine gains in language, literacy, math, general knowledge, and behavior skills. For the DLL subsample, skills were measured in both English and Spanish using parallel measures. Children's language proficiency and classroom quality were examined as potential moderators of their gains in skills. Parent surveys provided additional demographic information about the children in the study sample. Observations of classroom practices provided information about global classroom quality, teacher-child instructional interactions, language and literacy environment, and sensitivity of teacher-child interactions. Information about classroom characteristics and teacher beliefs provided by teacher surveys, and teacher and classroom characteristics from the statewide administrative data were examined as predictors of quality. Information about characteristics of the local NC Pre-K settings and the children served was obtained from the statewide administrative data. In addition, relevant data from previous years of the program (2003-2004 to 2013-2014) were included to examine whether there were any changes across time in various program characteristics or levels of quality.

Overview of the NC Pre-Kindergarten Program

NC Pre-K is a state-funded educational program for eligible 4-year-olds, designed to enhance their school readiness skills. Initiated in 2001–2002, the program became statewide by 2003–2004[a]. Since its inception, the statewide pre-k program has served over 321,000 children. According to program guidelines[i], children are eligible for NC Pre-K primarily based on age and family income. Children must be four years old by August 31 of the program year, with a gross family income of no more than 75% of state median income. Within a given program, up to 20% of age-eligible children with higher family incomes may be enrolled if the child has at least one of the following additional factors: limited English proficiency, identified disability, chronic health condition, or educational need as indicated by results from developmental screening. In addition, children with a parent serving in the military are eligible regardless of family income or other eligibility factors[b]. NC Pre-K provides funding for serving eligible children in classroom-based educational programs in a variety of setting types, including public schools, Head Start, and private child care centers (both for-profit and nonprofit).

The requirements for NC Pre-K are designed to provide a high-quality, classroom-based educational experience for children, and to ensure uniformity in the program across the state, to the extent possible. The NC Pre-K Program operates on a school day and school calendar basis for 6-1/2 hours/day and 180 days/year. Local sites are expected to meet a variety of program standards around curriculum, screening and assessment, training and education levels for teachers and administrators, class size, adult:child ratios, North Carolina child care licensing levels, and provision of other program services.[i] Class sizes are restricted to 18 children with a lead and assistant teacher, with adult:child ratios of 1:9. Lead teachers are required to hold or be working toward a NC Birth through Kindergarten (B-K) license or the equivalent and assistant teachers are required to hold or be working toward an Associate Degree in early childhood education or child development (ECE/CD) or a Child Development Associate (CDA) credential. Classroom activities and instruction are based on the state early learning standards[ii] and an approved curriculum; classroom staff are expected to conduct developmental screenings and ongoing assessments to gather information on individual children's growth and skill development as well as to inform instruction. Monthly reimbursement rates by the NC Pre-K Program vary by the type of classroom and teacher qualifications, ranging from up to $400 per child (in Head Start sites) to a maximum of $650 (private sites with a B-K-licensed lead teacher), with an approximate average annual cost per child of $5,000.[iii]

[a] In 2011, the North Carolina General Assembly transferred the existing state pre-k program from the Department of Public Instruction (DPI) to the Division of Child Development and Early Education (DCDEE) in the North Carolina Department of Health and Human Services (DHHS) and renamed it from the More at Four Pre-Kindergarten Program to the North Carolina Pre-Kindergarten Program.

[b] This eligibility factor was added to the program guidelines in 2007–2008.

Method

Participants

Programs/Classrooms

The sample included 102 pre-k classrooms, located within 99 sites, that were randomly selected from the 1,952 NC Pre-K classrooms operating in September, 2014. The NC Pre-K classrooms attended by children in the study sample included public school (46%), private (39%), and Head Start (15%) settings. The average class size was 16 children, with 86% of those being NC Pre-K children. All of the teachers had either a Bachelor's degree (89%) or a Master's degree (11%); most (83%) also had a B-K license. Teachers reported an average of 14 years of total teaching experience (M=13.7, SD=7.9) and an average of 12 years of experience teaching children ages birth to five (M=11.6, SD=7.0).

Analyses were conducted to examine the representativeness of NC Pre-K classrooms and teachers selected for the evaluation sample compared to those not in the sample (see Analysis Approach section for further details). There were no significant differences between the two groups in teacher education and credential levels, average class size, percentage of NC Pre-K children, or the distribution of setting types.

In addition, classroom quality data gathered from four previous cohorts of the NC Pre-K Program (formerly More at Four), along with data from the current cohort, were compared to test whether there were any changes over time. For all cohorts, classrooms were randomly sampled from all classrooms participating in the statewide pre-k program at that time (Cohort 1: 2005–2006, n=57; Cohort 2: 2007–2008, n=50; Cohort 3: 2011–2012, n=99; Cohort 4: 2012-2013, n=99; Cohort 5: 2014–2015).

Children

The study sample consisted of 595 pre-k children who were attending the 102 randomly-selected NC Pre-K classrooms, including a subsample of 133 Spanish-speaking dual language learners (DLL subsample). Parent permission forms were distributed to all children who were participating in the NC Pre-K Program in each randomly-selected classroom, with an overall permission rate of 96.6% (1120/1160). An average of five children were randomly selected from each classroom for inclusion in the study, based on the number who could be assessed on the scheduled date for fall data collection. Children were included in the DLL subsample if parents indicated that Spanish was spoken in the home (based on a series of questions) or if the teacher indicated that the child spoke Spanish.

The children in the sample were about half boys (48%) and half girls (52%); from varied racial backgrounds, including 45% White, 36% African American, 8% Native American/Alaskan native, 8% Multiracial, 2% Asian, and 1% Native Hawaiian/Pacific Islander; and more than one-quarter (27%) of these children were of Latino ethnicity. Children in the sample attended pre-k for approximately 150 days. The average age of the children on August 31, 2014 was 4.4 years.

Close to half of the children's mothers (48%) and fathers (42%) were employed. About 58% of the children had never previously been served in a pre-k setting. Most (92%) of these children qualified for free or reduced-price lunch, 20% were identified as having limited English proficiency, 22% had a developmental/educational need, 4% had an identified disability, 7% had a chronic health condition, and 6% were children of a parent serving in the military.

Based on individual assessments of English language proficiency for the full sample (see measures below), 16% (n=96) were categorized as non-English speakers (level 1), 23% (n=136) were limited English speakers (levels 2 and 3), and 61% (n=363) were fluent English speakers (levels 4 and 5). For the Spanish-speaking DLL subsample, 54% (n=72) were categorized as non-English speakers, 28% (n=37) were limited English speakers, and 18% (n=24) were fluent English speakers. In terms of Spanish language proficiency assessments for the DLL subsample, 27% (n=35) were categorized as non-Spanish speakers, 30% (n=39) were limited Spanish speakers, and 44% (n=58) were fluent Spanish speakers (see Table 2).

Analyses were conducted to compare the characteristics of NC Pre-K children selected for the evaluation sample to those not in the sample (see Analysis Approach section for further details). Overall, children in the sample were not significantly different from those who were not in the sample on most characteristics. There were no significant differences between sample and non-sample children in age; gender; most racial categories; ethnicity; the percentage of employed mothers and fathers; the percentage of children who had never previously been served; family income; the percentage of children with limited English proficiency; the percentage of children with an identified disability; the percentage of children with a chronic health condition; or the percentage of children with a parent actively serving in the military. There were some modest differences between sample and non-sample children for a few characteristics, with the sample having a higher percentage of Multiracial children [$t(29,269)=-2.07$, $p=.038$]; a higher average number of days of attendance per child [$t(29,269)= -7.76$, $p<.001$]; and a lower percentage of children with a developmental or educational need [$t(29,269)=2.20$, $p=.028$].

Measures and Procedures

Child Assessments

Child outcomes data were gathered in the fall (9/22/14–12/11/14) and spring (4/20/15–5/15/15) of the pre-k program year. The child assessment battery consisted of eight measures appropriate for pre-k children across five primary areas—language, literacy, math, general knowledge, and behavior skills. See Table 3 for an overview of all measures, including key constructs and scoring. Individual assessments of children's language and academic skills were conducted on-site at each school or child care center by trained data collectors, and teachers were asked to complete behavior rating scales following each assessment. All children were administered the child assessment measures in English. Parallel assessment procedures were used with the DLL subsample, with a second administration of the same measures in Spanish by a bilingual data collector approximately 2 weeks later. All of the child assessment measures were available in both English and Spanish versions. Most of the measures used in the study were norm-referenced, so that for most outcomes, standard scores could be used. These scores take into

account children's age, so that the standardized mean score of 100 represents the expected performance for an average child at a given age.

Language and literacy skills were assessed with four measures, with the same skills examined in English and Spanish. The Receptive One-Word Picture Vocabulary Test, 4th Edition (ROWPVT-4)[iv] and the Receptive One-Word Picture Vocabulary Test Spanish-Bilingual Edition (ROWPVT-SBE)[v] measured children's receptive vocabulary skills (understanding of language). The Expressive One-Word Picture Vocabulary Test, 4th Edition (EOWPVT-4)[vi] and the Expressive One-Word Picture Vocabulary Test Spanish-Bilingual Edition (EOWPVT-SBE)[vii] measured children's expressive vocabulary skills (expression of language). Two subtests from the Woodcock-Johnson III Tests of Achievement (WJ III)[viii] and the Batería III Woodcock-Muñoz Pruebas de Aprovechamiento (Bat III)[ix] also were used. The Letter-Word Identification subtest measured basic pre-reading and reading skills, including letter and word recognition and identification skills. The Sound Awareness-Rhyming subtest measured phonological awareness skills, including rhyming and phonemic awareness.

Math skills were assessed with two measures. The Counting Task[x] measured children's ability to count in one-to-one correspondence, with both English and Spanish versions. The WJ III/Bat III Applied Problems subtest measured math problem-solving skills including simple comparisons, counting, addition, and subtraction.

General knowledge was assessed with the Social Awareness Task[xi]. This measure examined children's knowledge and ability to communicate basic information about themselves (full name, age, birthday), with both English and Spanish versions.

Behavior skills were assessed with two subscales of the Social Skills Improvement System (SSiS)[xii] completed by teachers. The Social Skills subscale involved ratings of behaviors that promote positive interactions while discouraging negative interactions. The Problem Behaviors subscale involved ratings of negative behaviors, some commonly occurring and some less commonly, that interfere with social skills development.

In addition, the *pre*LAS 2000[xiii] measured oral language proficiency in English for all children and also in Spanish for the DLL subsample. Scores on this measure in the fall were used as covariates in the analyses to examine whether differences in children's growth on the various outcome measures were related to their level of language proficiency (1=Non-speaker, 2–3=Limited speaker, 4–5=Fluent speaker).

Classroom Observations

Several aspects of classroom quality were examined, including global classroom quality, teacher-child instructional interactions, language and literacy environment, and sensitivity of teacher-child interactions (see Table 4). Global classroom quality was measured using the Early Childhood Environment Rating Scale-Third Edition (ECERS-3)[xiv], an observational rating of the developmental appropriateness of classroom practices, including the activities and materials provided, the interactions among teachers and children, the physical environment, and the daily organization of the program. (It is important to note that these observations used the

ECERS-3, and therefore, scores are not directly comparable to prior studies using the ECERS-R.) The scale contains 35 items arranged into six subscales, from which a total score is calculated. Based on psychometric data from the developers, the ECERS-3 has demonstrated good interrater reliability (total scale ICC=.90, Cohen's Kappa=.54) and internal consistency (Cronbach's Alpha=.93)[xi].

The quality of teacher-child instructional interactions was measured using the Classroom Assessment Scoring System (CLASS)[xv]. The CLASS measures teachers' interactions with children in the areas of social and emotional functioning, classroom organization and management, and curriculum implementation to support cognitive and language development. The CLASS includes 10 dimensions organized into three domains, with separate scores calculated for each domain. The scale has demonstrated good interrater reliability based on psychometric data from the developers (mean agreement within one point=87.1%, range=78.8%-96.9%)[xv].

The quality of the general and literacy environment was measured with the Early Language and Literacy Classroom Observation Pre-K Tool (ELLCO)[xvi]. The ELLCO measures the extent to which classrooms provide support for language and literacy development. It includes two main subscales—General Classroom Environment and Language and Literacy—which consist of five sections with 19 items. Psychometric data available from the previous version (the ELLCO Toolkit) demonstrated good interrater reliability (mean agreement within one point=81%-90%) and moderate to good internal consistency (Cronbach's alpha=.66-.90)[xvi].

The sensitivity of teachers' interactions with children was measured with the Caregiver Interaction Scale (CIS)[xvii]. It includes 26 items organized into 4 subscales: Sensitivity (warm interactions), Harshness (criticism and punishment), Detachment (lacking involvement and interest in the children), and Permissiveness (lack of necessary limits on behavior). Results from the developer indicated good interrater reliability ($\geq$80%)[xvii].

Each classroom was observed on two different days during the second half of the program year (2/9/15 – 4/21/2015) to gather data on the quality of classroom practices. The CLASS and CIS were gathered on one day and the ECERS-3 and ELLCO were gathered on a different day, with an approximate two-week span between observations. The measures were gathered in counterbalanced order, with approximately half of the classrooms being observed with the CLASS/CIS on Day 1 and the ECERS-3/ELLCO on Day 2 and half in the reverse order. Each observation typically lasted 3–5 hours. Data collectors were trained to the pre-established reliability criterion on each measure prior to gathering data. Inter-rater reliability data were collected for 20% of the observations for each measure and intra-class correlations (ICC) indicated adequate reliability overall: ECERS-3 Total score=.80; CLASS Emotional Support=.79, Classroom Organization=.77, Instructional Support=.67; ELLCO General Classroom Environment=.43, Language and Literacy=.55; and CIS Total score=.86. [ICC values range from fair (.40-.59) to good (.60-.74) to excellent (.75-1.0)[xviii].]

Parent and Teacher Surveys

The parents of children participating in the evaluation study sample were asked to complete demographic surveys about their family and household, including questions such as languages used in the home and parent education level. Parent surveys were distributed to families along with the permission forms and returned to teachers. Parent surveys were received from 99.8% (594/595) of the families of children in the study sample.

Teachers in the 102 classrooms selected for the evaluation study sample were asked to complete online surveys about characteristics of the classroom, their beliefs about teaching, and their teaching background. Surveys were completed by 100% (102/102) of the teachers in the study sample. Teacher surveys included measures of beliefs about teaching practices and work climate, as well as questions focused on teacher demographics. Teachers' strength of beliefs about developmentally appropriate teaching practices were examined using the Beliefs about Teaching Scale[xix],[xx]. Teachers rated their agreement with 32 various teaching practices, including both appropriate and inappropriate practices, on a scale from 1 (strongly disagree) to 5 (strongly agree). An overall mean item score was calculated, with scores for inappropriate practices reversed, so that higher scores indicated more strongly appropriate beliefs. Teacher perceptions of the work climate were measured using the Early Childhood Work Environment Survey (ECWES)[xxi], including areas such as interactions with staff and supervisors, support for professional development, autonomy and decision-making opportunities, material and administrative resources, daily operations, and salaries and benefits. Teachers rated their agreement with 20 items on a 0 (never) to 5 (always) scale, with an overall mean item score calculated. Teachers also provided demographic information related to their teaching experience, including the total years teaching children of any age, total years teaching children birth through five years old, total years teaching prekindergarten, and total years teaching at their current school.

Statewide Administrative Data

Data on program characteristics were obtained from two statewide databases of service report data—NC Pre-K Plan (Plan) and NC Pre-K Kids (Kids). Data are entered by system users from all local NC Pre-K contracts, each representing a county or multi-county region, with Plan data updated as needed and Kids data entered on a monthly basis. Plan data include hierarchically-linked information about the contracts (agency contact information), sites (site type, licensing star rating, number of classes, and program service dates), classrooms (curriculum, ongoing assessment tools, developmental screening tools, daily hours of operation, and class size), and teachers (teacher education and licensure/credentials). Kids data include hierarchically-linked information about the sites (operation days and teacher workdays), classrooms (total monthly enrollment and classroom composition—number of NC Pre-K and non-NC Pre-K children), and individual children in NC Pre-K (household composition; prior placement; race; ethnicity; gender; birth date; primary caregiver's employment; payment reimbursement rate; attendance; and eligibility factors of family income level, limited English proficiency, developmental disability, identified educational need and/or IEP, chronic health condition, and parent military service). The NC Pre-K Program Evaluation Team downloaded, verified, corrected, and archived data from both systems monthly. The current report includes statewide data from the

2003–2004 through the 2014–2015 program years (July 1–June 30), focusing on the most recent year, along with comparisons of some key characteristics over time.

Analysis Approach

Sample Comparisons

Characteristics of NC Pre-K classrooms, teachers, and children included in the study sample were compared with those not in the study to investigate the representativeness of the randomly-selected sample using data from the statewide administrative data. These included classroom-level data of teacher education and credential levels, class size, the percentage of NC Pre-K children in the classroom, and setting type; and child-level data of child demographic variables, parent employment, prior placement status, days of program attendance, and child eligibility factors. *T*-tests were conducted to test for significant differences on all variables.

Child Outcomes

Gains during Pre-K

To investigate whether significant levels of growth occurred in children's outcomes during the pre-k year, a series of three-level hierarchical linear model (HLM) regressions were estimated, with separate models estimated for each outcome measure. The same set of analyses was conducted for the full sample on English outcome measures and the DLL subsample on both English and Spanish outcome measures. Fall and spring scores along with a time indicator (to test for growth) were included as the dependent variables. Children were nested within classrooms. The base model included a set of covariates: program type (public or private), days of attendance, child's age at the fall assessment (for non-standard scores), child gender, family income (free lunch eligibility), whether the child had a developmental/educational need, whether the child had an IEP, and whether the child had a chronic health condition.

Moderators of Gains

Moderators of gains in children's scores over the pre-k year were examined. HLM analyses were conducted by expanding the base models described above, with separate models estimated for each outcome measure. For the full sample, additions to these models included the level of children's English language proficiency at the fall assessment and the quality of practices in their pre-k classrooms, which were examined as potential moderators of children's gains in skills, after accounting for the covariates in the base models. Separate models tested the effects of language proficiency and each classroom quality measure as potential moderators. For the DLL subsample, only the level of language proficiency (English for English outcomes and Spanish for Spanish outcomes) was examined as a moderator.

To examine the effects of language proficiency as a moderator, a categorical variable based on the fall *pre*LAS score (1–5) and its interaction with time (to test for the effects on growth) were added to the base model. For outcomes measured in English for the DLL subsample, levels 4 and 5 were collapsed due to small cell sizes. These effects were retained in the remaining models, which tested for moderating effects of classroom quality by adding the quality scores

and their interactions with time (to test for the effects on growth). Separate models were conducted for each of the four measures of quality: ECERS-3 Total score; CLASS Emotional Support, Classroom Organization, and Instructional Support domain scores; ELLCO General Classroom Environment and Language and Literacy scores; and CIS Total score.

Classroom Quality

Comparisons across Time

Analyses were conducted to investigate whether there were changes over time in scores for various classroom quality measures. Data from the current and four previous cohorts of NC Pre-K/More at Four classrooms were analyzed where comparable measures were available (Cohort 1: 2005–2006, Cohort 2: 2007–2008, Cohort 3: 2011–2012, Cohort 4: 2012–2013, Cohort 5: 2014-2015). The classroom quality measures examined included CLASS Emotional Support, Classroom Organization, and Instructional Support scores (Cohorts 2–5); ELLCO (Cohorts 3-5); and CIS Total score (Cohorts 1–5). T-tests of mean differences were conducted for each classroom quality measure to test cohort effects.

Predictors of Quality

Analyses were conducted to examine whether specific teacher and classroom characteristics predicted the level of classroom quality for the current sample of NC Pre-K classrooms. A general linear models approach was used, with separate analyses conducted for each classroom quality outcome measure: ECERS-3 Total, CLASS Emotional Support, CLASS Classroom Organization, CLASS Instructional Support, ELLCO General Classroom Environment, ELLCO Language and Literacy; and CIS Total scores. These models included three types of predictor variables, based on data from the statewide administrative data and the teacher surveys: 1) teacher and classroom structural characteristics—lead teacher licensure (B-K license/equivalent or not), lead teacher education (MA/MS or above or not), and total class size; 2) characteristics of NC Pre-K children in the classroom—proportion of NC Pre-K children in the classroom, proportion with limited English proficiency, proportion with IEPs, proportion with a chronic health condition, proportion with developmental/educational need, proportion eligible for free lunch, and proportion with no prior placement status; and 3) teacher beliefs measures—teaching practices (Beliefs about Teaching Scale total score) and work climate (Early Childhood Work Environment Survey total score).

Program Characteristics

Descriptive Analyses

Descriptive analyses were conducted to examine key characteristics for the NC Pre-K Program. Data from the statewide administrative databases (NC Pre-K Kids and NC Pre-K Plan) were examined for the current study year (2014-2015), including number of sites, classrooms, and children; class size and proportion of NC Pre-K children; days of attendance and operation; licensing ratings; curricula and assessments used; setting types; child characteristics; and teacher education and licensure/credentials.

Trends over Time

Trend analyses were conducted to examine whether there were changes in key program characteristics over time. Data were examined from the statewide administrative databases (NC Pre-K Kids and NC Pre-K Plan) for each program year from 2003–2004 (the first year the program was statewide) to 2014–2015 (the current year of the study). Data from each program year were considered to be independent. The characteristics examined included teacher qualifications (whether teachers had a bachelor's degree or above, whether teachers had a B-K license or the equivalent, whether teachers had no credential), classroom setting types (public schools, private settings, and Head Start), and children's prior placement (proportion never served, proportion not served at time of enrollment), with dichotomous variables created for each of the six teacher qualifications and setting type characteristics and continuous variables created for the two prior placement variables. Separate trend analyses were conducted for each of the eight key program characteristics, with R^2 (1 - SSresidual/SStotal) calculated to estimate the trend's goodness-to-fit to the data. For these analyses, R^2 can range from 0 to 1, where 1 indicates perfect fit and $R^2 > 0.7$ indicates an acceptable linear trend.

Results

Child Outcomes

Gains during Pre-K

Children's scores were generally in the expected range for their age group, with mean scores slightly below the norm in the fall and close to the norm in the spring for most norm-referenced measures. Children exhibited significant gains in scores during pre-k across all domains of learning (as indicated by significant time effects): language and literacy skills (receptive vocabulary, expressive vocabulary, letter-word identification, phonological awareness), math skills (math problem-solving, counting), general knowledge (basic self-knowledge), and behavior skills (social skills). The only area with no significant change was problem behaviors, where children's scores remained consistent over time, with mean scores close to the norm (see Table 5, Table 6, and Table 7). Most of these skills were measured using standard scores (receptive vocabulary, expressive vocabulary, letter-word identification, math problem-solving, social skills, problem behaviors). Significant gains on these measures indicates that children progressed at an even greater rate during the time they participated in the NC Pre-K Program than would be expected for normal developmental growth. However, without a comparison group, it is not possible to establish a clear causal link between outcomes and program participation.

Moderators of Gains

Two factors, the level of children's English language proficiency at entry into pre-k and the quality of practices in their pre-k classrooms, were examined as potential moderators of children's gains in skills, after accounting for other child background characteristics and program type. Children with different levels of English proficiency exhibited similar gains during pre-k for most skills across the various domains of learning (receptive vocabulary, expressive vocabulary, letter-word identification, counting, basic self-knowledge, social skills, problem behaviors). However, there were differences in the rate of gains for two skills (based on significant interactions with time). Children at higher levels of English proficiency made significant gains in phonological awareness scores whereas children at the lower levels did not; conversely, children with lower levels of English proficiency made significant gains in math problem-solving scores whereas children at higher levels did not (see Table 6 and Table 7). On phonological awareness skills, children made gains during pre-k at the limited and fluent levels (2, 3, 4, 5), but not at the lowest, non-fluent level (1). There also were some patterns of difference between children's scores at each time point, with children at the highest fluent level (5) scoring significantly higher than their peers in the fall and spring, while children at the lowest non-fluent level (1) scored lower than peers at the fluent levels in the fall (4, 5) and at most levels in the spring (2, 4, 5) (See Figure 1). For math problem-solving, children at the two lowest English proficiency levels (1, 2) made significant gains in scores during pre-k, while there were no significant changes in rates of gain for children at higher proficiency levels (3, 4, 5). In addition, children at the two lowest proficiency levels generally had lower scores than their peers in both the fall and the spring (1 < 2, 3, 4, 5; 2 < 4, 5) (See Figure 2).

There were only two associations between classroom quality and the amount of gains children experienced during pre-k, with no consistent patterns across domains of learning or measures of classroom quality (see Table 6 and Table 7). In the area of language and literacy skills, children made greater gains in phonological awareness skills in classrooms that scored higher on CLASS Classroom Organization. (See Figure 3). On math skills, although there was a negative association between children's gains in counting skills and scores on CLASS Instructional Support, these differences were not found within the range of the data, and therefore, should be regarded with caution. There were no moderating effects for the ECERS-3, the ELLCO, or the CIS, nor were there any moderating effects on other aspects of children's learning.

DLL Subsample Gains during Pre-K

For the subsample of Spanish-speaking DLLs, children's gains in language, literacy, math, and general knowledge skills in both English and Spanish were examined using parallel measures. For skills measured in English, their scores ranged from somewhat to slightly below the norm in the fall for most standardized measures, and were closer to, but still below to slightly below the norm in the spring. Scores on expressive vocabulary skills were the lowest area (almost 1.5 standard deviations below the mean in the fall and only slightly better in the spring). For skills measured in English, children exhibited significant gains in scores across all domains during pre-k (as indicated by significant time effects), including language and literacy (receptive vocabulary, expressive vocabulary, letter-word identification, phonological awareness), math (math problem-solving, counting), and general knowledge (basic self-knowledge). (See Table 8, Table 9, and Table 10). Overall, the level of scores in Spanish looked fairly similar to their scores in English; however, receptive and expressive vocabulary scores tended to be slightly higher in Spanish than in English, while the reverse was true for the remaining literacy, math, and general knowledge skills. When measured in Spanish, children made significant gains in scores in some of the same skills, including language and literacy (phonological awareness), math (math problem-solving, counting), and general knowledge (basic self-knowledge). In contrast, for most language and literacy skills in Spanish, children exhibited no significant changes in scores in pre-k (receptive vocabulary, expressive vocabulary, letter-word identification). (See Table 8, Table 11, and Table 12.) As indicated previously, gains in these areas which used standardized measures (in both English and Spanish) indicate that children progressed at an even greater rate during the time they participated in the NC Pre-K Program than expected for normal development. Conversely, a lack of significant changes in scores indicates progress at the expected rate.

DLL Subsample Moderators of Gains

For children in the DLL subsample, level of language proficiency at entry into pre-k (English for English outcomes, Spanish for Spanish outcomes) was examined as a potential moderator of gains in skills in both English and Spanish, after accounting for other child background characteristics and program type. (Note that the sample was combined into one subgroup for those scoring at English proficiency levels 4 and 5, due to small cell sizes.) Children with different levels of English proficiency exhibited similar gains during pre-k for most skills measured in English across the various domains of learning (receptive vocabulary, expressive

vocabulary, letter-word identification, math problem-solving, counting, basic self-knowledge, social skills, problem behaviors). Differences in rates of gain were found for one skill, phonological awareness (based on the interaction with time). (See Table 9 and Table 10.) Children made gains on phonological awareness skills during pre-k at the limited and fluent levels (2, 3, 4&5), but not at the lowest, non-fluent level (1). There also were some patterns of difference between children's scores at each time point. Children at the non-fluent level scored significantly lower than those at the fluent level in the fall (1 < 4&5). By the spring, children at the lowest (non-fluent) level scored lower than their peers at all higher proficiency levels, as did children at the next lowest (limited) level compared to those at the highest (fluent) level (1 < 2, 3, 4&5; 2 < 4&5). (See Figure 4.)

For outcomes measured in Spanish, children with different levels of Spanish language proficiency also showed similar gains during pre-k for most skills (receptive vocabulary, expressive vocabulary, phonological awareness, math problem-solving, counting, social skills, problem behaviors). For two skills measured in Spanish, letter-word identification and basic self-knowledge, children, there were significant differences based on children's Spanish language proficiency. (See Table 11 and Table 12.) On letter-word identification skills, children at the lowest, non-fluent level (1) showed significant decreases in scores during pre-k, while there were no changes in scores for children at the limited and fluent levels (2, 3, 4, 5). There were no differences in fall scores for children by Spanish proficiency levels; however, by the spring, children at the non-fluent level scored significantly lower than children at the fluent levels (1 < 4, 5). (See Figure 5). For basic self-knowledge, children at the fluent level (4, 5) made significant gains in scores during pre-k, while there were no significant changes in rates of gain for children at lower proficiency levels (1, 2, 3). In addition, children at the two highest proficiency levels generally had higher scores than children at the lowest level in the fall and spring (4, 5 > 1), with these differences extending to children at the next lowest level by the spring (4, 5 > 2). (See Figure 6).

Classroom Quality

Global Quality

The global quality of classroom practices was in the medium quality range, based on the ECERS-3, with an average mean item total score of 4.2 (see Table 13). Most classrooms (87%) scored in the medium range (3.0–4.9), with a few (8%) scoring in the high range (5.0–7.0) and a few (5%) scoring in the low range (1.0–2.9). (See Figure 7) Five of the six subscales had average scores in the medium quality range as well—Space and Furnishings (4.3), Personal Care Routines (4.4), Language and Literacy (4.2), Learning Activities (3.6), and Program Structure (4.8). The one remaining subscale had an average score in the high quality range—Interaction (5.1). Looking at individual items reveals several areas of strength in the program (based on average scores at or above 5.0). These include some items related to the environment and basic care needs (furniture for routine care, play and learning; room arrangement for play; safety practices) as well as items related to learning and most interaction items (fine motor; individualized teaching and learning; staff-child interactions; peer interactions; discipline). In contrast, there are a couple of areas that especially need improvement (based on average scores

below 3.0). These include items related to both the environment (gross motor equipment) and math learning (understanding written numbers). It is important to note that these observations used the ECERS-3, and therefore, scores are not directly comparable to prior studies using the ECERS-R.

Teacher-Child Instructional Interactions

Teacher-child instructional interactions, based on average scores on the CLASS domains, were in the high range on Emotional Support (6.1) and Classroom Organization (5.7), and the middle range on Instructional Support (2.6). (See Table 14). On Emotional Support, no classrooms scored in the low range (1.0-2.4), 15% scored in the middle (2.5-5.4) range, and 85% scored in the high range (5.5-6.0) (See Figure 8). On Classroom Organization, no classrooms scored in the low range, 27% scored in the middle range, and 73% scored in the high quality range (See Figure 9). In contrast, on Instructional Support, 47% of the classrooms scored in the low range and 53% in the middle range (See Figure 10). The dimension scores within each domain were consistently higher for Emotional Support and Classroom Organization and consistently lower for Instructional Support.

Language and Literacy Environment

Based on the ELLCO Pre-K Tool, the general aspects of these classroom environments were in the strong range, while the language and literacy aspects were in the basic range. The average score on the General Classroom Environment subscale was 3.7 and the average score on the Language and Literacy subscale was 3.3 (see Table 15). On General Classroom Environment, about one-third (34%) of classrooms scored in the basic range (2.5-3.4), over half (60%) scored in the strong range (3.5-4.4), and a few (4%) scored in the exemplary range (4.5–5.0). Only one classroom scored in the inadequate range (1.5-2.4) and none scored in the deficient range (1.0-1.5) (See Figure 11.) On Language and Literacy, the pattern was reversed, with more than half (60%) of the classrooms scoring in the basic range, about one-third (34%) scoring in the strong range, a few (6%) scoring in the inadequate range, and none scoring in the deficient or exemplary ranges (See Figure 12). All of the average scores for the individual sections were in the basic to strong range, with somewhat higher scores for General Classroom Environment than for Language and Literacy.

Sensitivity of Teacher-Child Interactions

The sensitivity of teacher-child interactions, as measured by the CIS, was fairly high overall. The average Total score was 3.5 (see Table 16), and almost all classrooms (91%) scored at or above 3.0 (See Figure 13). At the subscale level, average scores were high on the Sensitivity subscale (3.1), indicating more positive interactions with children, and low on the Harshness (1.2), Detachment (1.3), and Permissiveness (1.4) subscales, indicating fewer negative interactions with children.

Predictors of Classroom Quality

Specific teacher and classroom characteristics were examined as potential predictors of the level of classroom quality: 1) teacher and classroom structural characteristics—lead teacher B-K

licensure, lead teacher education, and total class size; 2) characteristics of NC Pre-K children in the classroom—proportion of NC Pre-K children in the classroom, proportion with limited English proficiency, proportion with IEPs, proportion with chronic health condition, proportion with developmental/educational need, proportion eligible for free lunch, and proportion with no prior placement status; and 3) beliefs about developmentally appropriate teaching practices (Beliefs about Teaching Scale) and perceptions of work climate (ECWES).

The most consistent finding was that stronger beliefs in developmentally appropriate practices (as indicated by higher scores on the Beliefs about Teaching Scale) were associated with better global quality of the classroom environment, as represented by higher ECERS-3 Total and ELLCO General Classroom Environment scores. In addition, having a higher proportion of children with IEPs in the classroom was associated with higher scores on the ELLCO General Classroom Environment (see Table 17).

Comparisons across Time

Scores on available measures of classroom quality were compared for the different cohorts to examine whether there have been any changes over time (see Table, 14, Table 15, Table 16, Table 18, and Table 19). Results indicated that there were some slight differences in average scores across time. Scores on the CLASS Emotional Support and Classroom Organization domains were significantly higher for the most recent cohort (2014-2015) compared to previous cohorts (2012-2013, 2011-2012, 2007-2008). The results for the other measures of classroom quality were mixed. Scores on CLASS Instructional Support were higher for the most recent cohort (2014-2015) compared to the prior cohort (2012-2013); however, scores for the earliest cohort (2007-2008) were higher than for subsequent cohorts. On ELLCO Language and Literacy, scores for the two most recent cohorts (2014-2015 and 2012-2013) were lower than for the previous cohort (2011-2012). There were no differences across time on ELLCO General Classroom Environment scores. Scores on the CIS Total were significantly lower for the two most recent cohorts (2014-2015 and 2012-2013) compared to the previous two cohorts (2011-2012 and 2007-2008).

Program Characteristics and Services

In 2014–2015, the NC Pre-K Program served 29,271 children in 1,974 classrooms located in 1,166 sites. The majority of the programs (76%) were at the highest, five-star licensing level, with another 19% at the four-star level, and the rest temporary/in process. Almost all classrooms reported using a primary curriculum, ongoing assessment tool, and developmental screening tool from the approved lists provided by the NC Pre-K Program Guidelines. The vast majority of classrooms reported using Creative Curriculum and its companion assessment (Teaching Strategies Gold); the most common screening tools were DIAL and Brigance. On average, the total class size was 16 children, with 13 of those children (85%) funded by NC Pre-K. On average, children attended NC Pre-K for 138 days, which represents 80% of the 172 actual days of operation or 77% of the 180 planned instructional days offered by the program (see Table 20 and Table 21). NC Pre-K classrooms were located in approximately half (52%) public school settings; about one-third (33%) private settings (25% for-profit and 8% non-profit child care centers); and 15% Head Start (5% administered by public schools and 11% not). (See Table 22).

In 2014–2015, the program served children from a variety of racial and ethnic backgrounds, including over one-half children of diverse, non-white racial backgrounds and one-quarter children of Hispanic/Latino ethnicity (see Table 23). Children served by the NC Pre-K Program primarily came from low-income families, with 91% eligible for free or reduced-price lunch. Children also varied on other eligibility factors, ranging from 18-26% with limited English proficiency or a developmental/educational need to 5-6% with an identified disability, chronic health condition, or military parent (see Table 24). Information on children's prior placement indicated that 58% had never previously been served in any preschool setting and another 14% were currently unserved at the time of enrollment (see Table 25).

One consistent change in the program has been the increases in teacher education and credentials over time. Almost all lead teachers in the NC Pre-K Program in 2014–2015 had at least a bachelor's degree in both public school (over 99%) and private settings (100%). (See Table 26.) Nearly all teachers in public school settings (92%) and three-quarters of the teachers in private settings (75%) had a Birth-Kindergarten (B-K) license (or the equivalent). Relatively few teachers in public school settings (6%) and in private settings (15%) were reported to have no credential (see Table 27).

In addition, survey data gathered from the 102 teachers in the randomly-selected sample of classrooms for the 2014–2015 evaluation indicated that NC Pre-K teachers were fairly experienced on average, having taught children in the birth-5 year-old range for 12 years and having total teaching experience of 14 years. On the Beliefs about Teaching Scale, a measure of beliefs about developmentally appropriate teaching practices, teachers scored relatively high on average (3.9 on a 1–5 scale), although there was some variability in individual scores (3.2–4.7). NC Pre-K teachers rated their work climate fairly high (4.0 on a 0–5 scale) based on the ECWES, although there was quite a bit of variability in individual scores (1.4–5.0). (See Table 28.)

Results from trend analyses examined whether there have been any long-term changes in key program characteristics since the NC Pre-K Program (formerly More at Four) became statewide (2003-2004) through the current year (2014-2015). The results for the distribution of classrooms by setting types (percentages of public preschool, private, and Head Start) indicated that there was little change over time, with no evidence of linear trends for any of these categories (as indicated by $R^2 < .70$). (See Figure 14). The results for children's prior placement similarly showed fairly consistent patterns over time, with no evidence of linear trends for the proportion of children never served (never served) and the proportion not served at the time of enrollment (unserved). (See Figure 15). In contrast, there were significant changes over time for all three aspects of teacher qualifications that were examined (see Figure 16). For teacher education (percentage with bachelor's degree or above), results indicate an increasing trend over time ($R^2 = 0.75$). It should be noted that teacher education has essentially reached the maximum level from cohorts 9-12, which decreases the goodness-of-fit statistic, although it is still within the acceptable range. For lead teacher licensure and credentials, the results indicate two parallel trends – an increasing trend in the percentage of those with a B-K license ($R^2 = 0.97$) and a decreasing trend in the percentage of those with no credential ($R^2 = 0.76$). It should be noted that the large decrease in those with no credential between the first and second cohorts explains the lower goodness-of-fit statistic, although it is still within the acceptable range.

Summary and Conclusions

The 2014–2015 NC Pre-Kindergarten (NC Pre-K) Evaluation study was designed to examine the quality of the program and the outcomes for children. Child outcomes data were gathered at the beginning (fall) and end (spring) of the pre-k year to examine changes in skills for a sample of 595 children. Researchers conducted individual assessments of children's language, literacy, math, and general knowledge skills and gathered teacher ratings of behavior skills. For Spanish-speaking DLLs in the sample, assessments were conducted in both English and Spanish to examine their progress when measured in both languages. Researchers gathered classroom practices data from a randomly-selected sample of 102 NC Pre-K classrooms, including measures of global quality, teacher-child instructional interactions, language and literacy environment, and sensitivity of teacher-child interactions. Program characteristics were examined for the NC Pre-K Program, using data from the statewide databases and survey data from a sample of teachers. In addition, changes across time in various program characteristics and levels of quality were examined for relevant data from the current and previous years of the program (2003-2004 to 2014-2015).

Child Outcomes

Children in the NC Pre-K Program exhibited significant gains during their pre-k year across all domains of learning. Children made significant gains in scores during NC Pre-K in language and literacy skills (receptive vocabulary, expressive vocabulary, letter-word identification, phonological awareness), math skills (math problem-solving, counting), general knowledge (basic self-knowledge), and behavior skills (social skills). Most of these were standardized measures, so that changes indicate that children progressed at an even greater rate during the time they participated in NC Pre-K than would be expected for normal developmental growth. However, without a comparison group, it is not possible to establish a clear causal link between outcomes and program participation.

Children with different levels of language proficiency and DLLs showed different rates of gain during participation in NC Pre-K for a few skills, but similar rates of growth for most. DLLs made significant gains in all skills measured in English and many of the same skills measured in Spanish, except for most language and literacy skills. There were differences in the rates of gain for some skills based on proficiency level and home language, although these were similar for most skills. Further, although they generally exhibited gains during pre-k, children with lower language proficiency levels and DLLs had lower scores than their peers. These findings suggest that these differences across groups may warrant consideration of practices such as differentiated instructional approaches or the use of home language, in order to ensure that the NC Pre-K Program is meeting all children's learning needs.

Classroom quality generally was not related to children's gains during the NC Pre-K Program. There was little association between different aspects of classroom quality and children's outcomes for most measures. However, there was a relatively restricted range of quality in NC

Pre-K, with few classrooms scoring in the low range on the quality measures, which may have prevented the detection of such associations.

Classroom Quality

The quality of NC Pre-K classrooms in the 2014–2015 sample was in the medium to good range overall, across a number of different aspects of classroom practices. For most aspects of quality that were measured, classrooms generally scored in the medium to high quality range, with few scoring in the low quality range. The average global quality score (ECERS-3) was in the medium quality range (4.2), with most (87%) classrooms scoring in the medium range. The quality of teacher-child instructional interactions (CLASS) varied across different aspects, with average scores in the high range for Emotional Support (6.1) and Classroom Organization (5.7) and in the middle range for Instructional Support (2.6). The quality of general and language and literacy practices (ELLCO) was strong on General Classroom Environment (3.7) and basic on Language and Literacy (3.2). The sensitivity of teacher-child interactions (CIS) was fairly high based on the overall total (3.5), with high scores on positive interactions with children and low scores on negative interactions.

The average level and overall pattern of classroom quality for the NC Pre-K Program has remained similar over time, although there have been some slight changes in the scores. The general pattern of scores as well as the average level of quality for different aspects that were measured has remained fairly constant over time. However, there have been some slight changes over time in the scores. Compared to previous recent cohorts, scores on CLASS Emotional Support and Classroom Organization were slightly higher for the most recent cohort (2014-2015). For CLASS Instructional Support, scores were higher compared to the previous cohort (2012-2013), but lower than the earliest cohort (2007-2008). Findings for other aspects of quality varied, with the two most recent cohorts showing slightly lower scores compared to some earlier cohorts for ELLCO Language and Literacy and the CIS Total.

Stronger teacher beliefs in developmentally appropriate practices was the most consistent predictor of higher quality observed classroom practices. Associations were found in relation to global measures of classroom quality. Teachers with stronger beliefs in developmentally appropriate practices had classrooms with better global quality classroom environments (ECERS-3 Total and ELLCO General Classroom Environment). In addition, having a higher proportion of children with IEPs in the classroom also was associated with better global quality (ELLCO General Classroom Environment). However, no associations were found in relation to other measures of classroom quality or for other predictors of teacher qualifications, classroom characteristics, or work climate.

Program Characteristics

Many of the characteristics of the NC Pre-K Program were consistent with good quality standards, as well as with program guidelines. In 2014–2015, the average NC Pre-K class included a total 16 children, with 13 (85%) funded by NC Pre-K. This number is actually below the program guidelines which specify a maximum class size of 18. The majority of the programs (76%) were at the highest, five-star licensing level, with another 19% at the four-star level. Almost all classrooms reported using an approved curriculum and conducting ongoing assessments and developmental screenings. The average days of child attendance was 138 days (80% of the average days of operation and 77% of the intended instructional days).

In general, most program characteristics have been fairly stable over time. In 2014–2015, the NC Pre-K Program served over 29,000 children in nearly 2,000 classrooms located in more than 1,100 sites. Similarly to previous years, the program was offered in a variety of setting types, with about half in public schools, about one-third in private settings, and 15% in Head Start. The program served children from a variety of backgrounds and with different eligibility factors, including a substantial proportion of children with limited English proficiency or developmental/educational needs (18-26%), as well as children with identified disabilities and other factors (5-6%). The majority of children were from low-income families (91% qualified for free or reduced-price lunch) and over 70% of the children had never been served or were currently unserved in a preschool setting.

One continuing trend in the NC Pre-K Program has been improvement in the levels of teacher education and credentials. There have been significant trends toward increasing teacher education and licensure levels, and a significant decreasing trend in those with no credential over the past 12 years, since NC Pre-K became a statewide program. In 2014–2015, almost all NC Pre-K lead teachers had at least a bachelor's degree in both public school and private settings (>99%). Nearly all lead teachers in public schools and three-quarters in private settings had a B-K license, while relatively few teachers had no credential.

Table 1. List of Pre-K Evaluation Reports

Peisner-Feinberg, E. S. (2003). *Child and program characteristics of the North Carolina More at Four Pre-kindergarten Program: Year 1 (January–June 2002).* Chapel Hill: The University of North Carolina, FPG Child Development Institute.

Peisner-Feinberg, E. S., & Maris, C. L. (2005). *Evaluation of the North Carolina More at Four Pre-kindergarten Program: Year 2 (July 1, 2002–June 30, 2003).* Chapel Hill: The University of North Carolina, FPG Child Development Institute.

Peisner-Feinberg, E. S., & Maris, C. L. (2005). *Evaluation of the North Carolina More at Four Pre-kindergarten Program: Year 3 Report (July 1, 2003–June 30, 2004).* Chapel Hill: The University of North Carolina, FPG Child Development Institute.

Peisner-Feinberg, E. S., & Maris, C. L. (2006). *Evaluation of the North Carolina More at Four Pre-kindergarten Program: Children's longitudinal outcomes and classroom quality in kindergarten.* Chapel Hill: The University of North Carolina, FPG Child Development Institute.

Peisner-Feinberg, E. S., Elander, K.C., & Maris, C. L. (2006). *Evaluation of the North Carolina More at Four Pre-kindergarten Program: Year 4 (July 1, 2004–June 30, 2005) Program characteristics and services.* Chapel Hill: The University of North Carolina, FPG Child Development Institute.

Peisner-Feinberg, E. S., & Schaaf, J. M. (2007). *Evaluation of the North Carolina More at Four Pre-kindergarten Program: Children's outcomes and program quality in the fifth year.* Chapel Hill: The University of North Carolina, FPG Child Development Institute.

Peisner-Feinberg, E. S., & Schaaf, J. M. (2008). *Evaluation of the North Carolina More at Four Pre-kindergarten Program: Children's longitudinal outcomes and program quality over time (2003–2007).* Chapel Hill: The University of North Carolina, FPG Child Development Institute.

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Peisner-Feinberg, E. S., & Schaaf, J.M. (2010). *Long-term effects of the North Carolina More at Four Pre-kindergarten Program: Children's reading and math skills at third grade*. Chapel Hill: The University of North Carolina, FPG Child Development Institute.

Peisner-Feinberg, E. S., & Schaaf, J.M. (2011). *Effects of the North Carolina More at Four Pre-kindergarten Program on children's school readiness skills Key Findings*. Chapel Hill: The University of North Carolina, FPG Child Development Institute.

Peisner-Feinberg, E. S., Schaaf, J. M., Hildebrandt, L., & LaForett, D. R. (2013). *Quality and characteristics of the North Carolina Pre-Kindergarten Program: 2011–2012 Statewide evaluation.* Chapel Hill: The University of North Carolina, FPG Child Development Institute.

Peisner-Feinberg, E. S., LaForett, D. R. Schaaf, J. M., Hildebrandt, L. M., Sideris, J., & Pan, Y. (2014). *Children's kindergarten outcomes and program quality in the North Carolina Pre-Kindergarten Program: 2012-2013 Statewide Evaluation.* Chapel Hill: The University of North Carolina, FPG Child Development Institute.

Peisner-Feinberg, E. S., Schaaf, J. M., Hildebrandt, L. M., Pan, Y., & Warnaar, B. L. (2015). *Children's outcomes and program quality in the North Carolina Pre-Kindergarten Program: 2013-2014 Statewide Evaluation.* Chapel Hill: The University of North Carolina, FPG Child Development Institute.

Table 2. Child Language Proficiency Levels

	English Language Proficiency				Spanish Language Proficiency	
	Full Sample		DLL Subsample		DLL Subsample	
*pre*LAS Proficiency Level	%	n	%	n	%	n
Level 1 (Non-Speaker)	16.1	96	54.1	72	26.5	35
Level 2 (Limited Speaker)	7.1	42	11.3	15	8.3	11
Level 3 (Limited Speaker)	15.8	94	16.5	22	21.2	28
Level 4 (Fluent Speaker)	32.4	193	15.1	20	22.0	29
Level 5 (Fluent Speaker)	28.6	170	3.0	4	22.0	29
Total	100.0	595	100.0	133	100.0	132

Table 3. Child Outcome Measures

Measure	Scoring
Language and Literacy Skills	
Receptive Vocabulary	
Receptive One-Word Picture Vocabulary Test, 4th Edition / Receptive One-Word Picture Vocabulary Test, Spanish Bilingual Edition	Standard score Mean=100, SD=15
Expressive Vocabulary	
Expressive One-Word Picture Vocabulary Test, 4th Edition / Expressive One-Word Picture Vocabulary Test, Spanish Bilingual Edition	Standard score Mean=100, SD=15
Letter-Word Identification	
Woodcock-Johnson III Tests of Achievement Letter-Word Identification (Subtest 1) / Batería III Woodcock Muñoz Pruebas de Aprovechamiento Identificación de Letras y Palabras (Prueba 1)	Standard score Mean=100, SD=15
Phonological Awareness	
Woodcock-Johnson III Tests of Achievement Sound Awareness - Rhyming (Subtest 21A) / Batería III Woodcock Muñoz Pruebas de Aprovechamiento Discernimiento de Sonidos - Rima (Prueba 21A)	Raw score Range=0–17
Math Skills	
Math Problem-Solving	
Woodcock-Johnson III Tests of Achievement Applied Problems (Subtest 10) / Batería III Woodcock Muñoz Pruebas de Aprovechamiento Problemas Aplicados (Prueba 10)	Standard score Mean=100, SD=15
Counting	
Counting Task (English and Spanish)	Total score Range=0–40
General Knowledge	
Basic Self-Knowledge	
Social Awareness Task (English and Spanish)	Total score Range=0–6
Behavior Skills	
Social Skills	
Social Skills Improvement System (SSiS) Social Skills subscale	Standard score Mean=100, SD=15
Problem Behaviors	
Social Skills Improvement System (SSiS) Problem Behaviors subscale	Standard score Mean=100, SD=15

Table 4. Classroom Quality Measures

Measure	Scales Used in Analysis	Scoring
Global classroom quality		
Early Childhood Environment Rating Scale-Third Edition (ECERS-3)	Total	Total score range=1.0–7.0 low (1.0-2.9); medium (3.0-4.9); high (5.0–7.0)
Teacher-child instructional interactions		
Classroom Assessment Scoring System (CLASS)	Emotional Support Classroom Organization Instructional Support	Domain score range=1.0–7.0 low (1–2); middle (3–5); high (6–7)
Language and literacy environment		
Early Language and Literacy Classroom Observation Pre-K Tool (ELLCO)	General Classroom Environment Language and Literacy	Subscale score range=1.0–5.0 deficient (1); inadequate (2); basic (3); strong (4); exemplary (5)
Teacher sensitivity		
Caregiver Interaction Scale (CIS)	Total	Total score range=1.0-4.0

Table 5. Child Outcome Scores for Full Sample (2014–2015)

Measure	Fall n	Fall Mean (SD) Range	Spring n	Spring Mean (SD) Range
Language and Literacy				
Receptive Vocabulary (ROWPVT-4[a])	580	97.0 (13.9) 55–131	567	98.2 (11.9) 62–158
Expressive Vocabulary (EOWPVT-4[a])	549	97.2 (16.5) 55–145	558	97.3 (16.7) 55–141
Letter-Word Identification (WJ III Letter-Word Identification[a,b])	594	95.0 (12.0) 62–148	567	98.3 (11.9) 62–158
Phonological Awareness (WJ III Sound Awareness - Rhyming[b,c])	593	1.9 (2.3) 0–14	567	4.0 (3.7) 0–16
Math				
Math Problem-Solving (WJ III Applied Problems[a,b])	593	97.4 (13.1) 58–136	567	99.5 (11.0) 56–131
Counting (Counting Task[d])	594	13.7 (9.4) 0–40	567	21.6 (11.5) 0–40
General Knowledge				
Basic Self-Knowledge (Social Awareness Task[e])	595	3.7 (1.7) 0–6	567	4.6 (1.4) 0–6
Classroom Behavior				
Social Skills (SSiS[a])	595	95.2 (15.0) 44–129	560	99.5 (14.1) 54–128
Problem Behaviors (SSiS[a])	595	99.5 (13.4) 82–160	562	98.4 (13.3) 82–160

[a] Indicates standard scores on norm-referenced measure with mean=100, SD=15.
[b] Scores reflect use of updated normative tables (2007).
[c] Possible range=0–17.
[d] Possible range=0–40.
[e] Possible range=0–6.

Table 6. Full Sample Child Outcomes Regression Results—Language and Literacy

	Receptive Vocabulary (ROWPVT-4) n=569		Expressive Vocabulary (EOWPVT-4) n=551		Letter-Word Identification (WJ III Letter-Word ID) n=578		Phonological Awareness (WJ III Sound Awareness - Rhyming) n=578	
	Est[a]	(SE)	Est[a]	(SE)	Est[a]	(SE)	Est[a]	(SE)
Model 1								
Intercept	101.52	(1.72)	99.97	(2.41)	100.55	(1.55)	-3.89	(1.45)
Time	2.48***	(0.41)	1.94***	(0.42)	3.18***	(0.47)	2.09***	(0.16)
Program Type[b]	-1.38	(1.26)	-3.32	(1.84)	-1.51	(1.17)	-0.53*	(0.22)
Attendance	0.00	(0.10)	0.01	(0.14)	-0.07	(0.09)	-0.04*	(0.02)
Age	--	--	--	--	--	--	1.62***	(0.32)
Gender[c]	-1.35	(1.03)	1.25	(1.34)	-1.58	(0.88)	-0.48**	(0.18)
Income[d]	-4.10***	(1.22)	-4.18**	(1.61)	-3.43**	(1.05)	-0.66	(0.22)
Dev/Ed Need[e]	-1.26	(1.42)	-0.95	(1.95)	-2.18	(1.27)	0.42	(0.26)
IEP[f]	0.53	(2.83)	2.88	(3.79)	-3.67	(2.42)	-0.62	(0.50)
Chronic Health Need[g]	0.06	(2.00)	0.23	(2.62)	0.61	(1.72)	0.18	(0.36)
Model 2								
English Proficiency[i]	5.61***	(0.30)	5.52***	(0.36)	2.01***	(0.28)	0.46***	(0.06)
Time x English Prof	-0.26	(0.38)	0.54	(0.43)	-0.18	(0.32)	0.52***	(0.11)
Model 3a[h]								
ECERS-3 Total	-0.74	(0.68)	-0.55	(1.02)	1.40	(0.89)	0.10	(0.16)
Time x ECERS-3 Total	0.90	(0.68)	0.76	(0.72)	-1.11	(0.70)	-0.07	(0.25)
Model 3b[h]								
CLASS Emotional Support	-3.44*	(1.53)	0.38	(2.30)	0.54	(2.04)	-0.11	(0.37)
CLASS Instructional Support	-0.73	(0.78)	-1.32	(1.18)	0.16	(1.03)	0.20	(0.19)
CLASS Classroom Organization	1.56	(1.15)	-0.63	(1.73)	0.07	(1.53)	-0.05	(0.28)

[a] Significance levels are *p< .05, **p< .01, ***p< .001

[b] Private site=0, Public school site=1.

[c] Female=0, Male=1.

[d] Not eligible for free lunch=0 , Eligible for free lunch=1.

[e] No Developmental/Educational need=0, Developmental/Educational need=1.

[f] No IEP=0, IEP=1.

[g] No Chronic health need=0, Chronic health need=1.

[h] Separate models were used to test effects of each classroom quality measure.

[i] English Proficiency Level 5 is the reference cell.

Table 6. Full Sample Child Outcomes Regression Results—Language and Literacy

	Receptive Vocabulary (ROWPVT-4) n=569		Expressive Vocabulary (EOWPVT-4) n=551		Letter-Word Identification (WJ III Letter-Word ID) n=578		Phonological Awareness (WJ III Sound Awareness - Rhyming) n=578	
	Est[a]	(SE)	Est[a]	(SE)	Est[a]	(SE)	Est[a]	(SE)
Time x CLASS Emotional Support	-0.35	(1.58)	-2.72	(1.66)	-1.76	(1.64)	-0.67	(0.56)
Time x CLASS Instructional Support	1.34	(0.80)	1.61	(0.84)	-0.44	(0.82)	-0.52	(0.28)
Time x CLASS Class Organization	-0.11	(1.19)	0.82	(1.25)	1.29	(1.23)	0.90*	(0.42)
Model 3c[h]								
ELLCO General Class Environment	0.79	(1.37)	1.04	(2.06)	0.30	(1.79)	0.44	(0.32)
ELLCO Language & Literacy	-1.98	(1.46)	-2.83	(2.20)	0.98	(1.91)	-0.24	(0.34)
Time x ELLCO General Class Environment	0.96	(1.38)	1.65	(1.46)	-1.46	(1.43)	0.60	(0.49)
Time x ELLCO Language & Literacy	1.09	(1.46)	0.53	(1.56)	0.68	(1.52)	-0.06	(0.52)
Model 3d[h]								
CIS Total Score	-1.57	(1.33)	-3.60	(1.97)	1.42	(1.75)	0.53	(0.31)
Time x CIS Total Score	1.89	(1.33)	2.41	(1.38)	-0.57	(1.39)	0.62	(0.48)

[a] Significance levels are *p< .05, **p< .01, ***p< .001

[h] Separate models were used to test effects of each classroom quality measure.

Table 7. Full Sample Child Outcomes Regression Results—Math, General Knowledge, and Classroom Behavior

	Math				General Knowledge		Classroom Behavior			
	Math Problem-Solving (WJ III Applied Problems) n=578		Counting (Counting Task) n=578		Basic Self-Knowledge (Social Awareness Task) n=578		Social Skills (SSiS) n=577		Problem Behaviors (SSiS) n=578	
	Est[a]	(SE)	Est[a]	(SE)	Est[a]	(SE)	Est[a]	(SE)	Est[a]	(SE)
Model 1										
Intercept	103.64	(1.48)	-13.38	(5.50)	1.15	(0.87)	93.30	(2.22)	99.04	(1.96)
Time	2.17***	(0.37)	7.87***	(0.52)	0.84***	(0.07)	3.83***	(0.87)	-0.98	(0.70)
Program Type[b]	-1.07	(1.06)	-1.87*	(0.88)	-0.49**	(0.16)	1.84	(2.00)	-1.28	(1.67)
Attendance	-0.09	(0.08)	-0.01	(0.07)	-0.01	(0.01)	0.21	(0.12)	-0.10	(0.11)
Age	--	--	6.87***	(1.22)	0.71***	(0.19)	--	--	--	--
Gender[c]	-1.97*	(0.92)	-1.06	(0.70)	-0.15	(0.11)	0.61	(0.90)	1.16	(0.90)
Income[d]	-4.02***	(1.09)	-1.49	(0.83)	-0.24	(0.13)	-1.68	(1.12)	1.88	(1.11)
Dev/Ed Need[e]	-2.80*	(1.24)	-1.81	(0.98)	0.10	(0.16)	-0.33	(1.52)	0.17	(1.46)
IEP[f]	-1.32	(2.49)	-1.72	(1.91)	-0.12	(0.30)	-3.03	(2.57)	2.56	(2.55)
Chronic Health Need[g]	-0.23	(1.78)	-0.48	(1.36)	0.52*	(0.22)	-1.20	(1.80)	0.54	(1.80)
Model 2[h]										
English Proficiency[i]	4.25***	(0.27)	1.67***	(0.24)	0.61***	(0.04)	1.32***	(0.32)	-0.10	(0.31)
Time x English Prof	-0.95**	(0.32)	0.32	(0.37)	-0.08	(0.05)	-0.55	(0.40)	0.16	(0.38)
Model 3a										
ECERS-3 Total	1.08	(0.68)	0.84	(0.65)	0.02	(0.10)	0.69	(1.57)	-1.19	(1.29)
Time x ECERS-3 Total	-0.64	(0.58)	-0.46	(0.79)	0.13	(0.10)	0.54	(1.37)	-0.07	(1.09)
Model 3b[h]										
CLASS Emotional Support	-3.09*	(1.55)	-1.31	(1.47)	-0.29	(0.22)	3.24	(3.46)	-2.04	(2.88)
CLASS Instructional Support	1.72*	(0.78)	1.51*	(0.74)	0.02	(0.11)	2.71	(1.76)	-2.21	(1.46)
CLASS Classroom Organization	1.11	(1.16)	-1.17	(1.10)	0.02	(0.17)	-2.86	(2.61)	2.57	(2.17)
Time x CLASS Emotional Support	1.69	(1.37)	-0.01	(1.82)	-0.09	(0.23)	0.65	(3.15)	2.38	(2.52)
Time x CLASS Instructional Support	-0.59	(0.68)	-1.95*	(0.91)	0.06	(0.12)	1.05	(1.59)	-1.02	(1.27)
Time x CLASS Class Organization	-0.99	(1.03)	2.13	(1.37)	0.21	(0.17)	-2.53	(2.36)	-0.61	(1.89)

[a] Significance levels are *p< .05, **p< .01, ***p< .001

[b] Private site=0, Public school site=1.

[c] Female=0, Male=1.

[d] Not eligible for free lunch=0 , Eligible for free lunch=1.

[e] No Developmental/Educational need=0, Developmental/Educational need=1.

[f] No IEP=0, IEP=1.

[g] No Chronic health need=0, Chronic health need=1.

[h] Separate models were used to test effects of each classroom quality measure.

[i] English Proficiency Level 5 is the reference cell.

Table 7. Full Sample Child Outcomes Regression Results—Math, General Knowledge, and Classroom Behavior

	Math				General Knowledge		Classroom Behavior			
	Math Problem-Solving (WJ III Applied Problems) n=578		Counting (Counting Task) n=578		Basic Self-Knowledge (Social Awareness Task) n=578		Social Skills (SSiS) n=577		Problem Behaviors (SSiS) n=578	
	Est[a]	(SE)	Est[a]	(SE)	Est[a]	(SE)	Est[a]	(SE)	Est[a]	(SE)
Model 3c[h]										
ELLCO General Class Environment	0.46	(1.39)	1.68	(1.30)	0.15	(0.20)	-1.31	(3.11)	-0.03	(2.56)
ELLCO Language and Literacy	0.28	(1.48)	-0.11	(1.39)	-0.27	(0.21)	2.98	(3.34)	1.72	(2.75)
Time x ELLCO General Class Environment	0.16	(1.17)	-1.96	(1.60)	-0.06	(0.20)	1.25	(2.75)	0.44	(2.20)
Time x ELLCO Language & Literacy	0.27	(1.25)	1.23	(1.71)	0.37	(0.21)	-2.43	(2.93)	-1.31	(2.34)
Model 3d[h]										
CIS Total Score	1.92	(1.32)	-0.48	(1.28)	-0.13	(0.19)	2.62	(3.07)	-0.31	(2.54)
Time x CIS Total Score	0.22	(1.13)	-1.01	(1.55)	0.17	(0.20)	0.88	(2.70)	-2.57	(2.13)

[a] Significance levels are *p< .05, **p< .01, ***p< .001

[h] Separate models were used to test effects of each classroom quality measure.

Figure 1. Growth in Phonological Awareness (WJ III) by English Proficiency
n=578

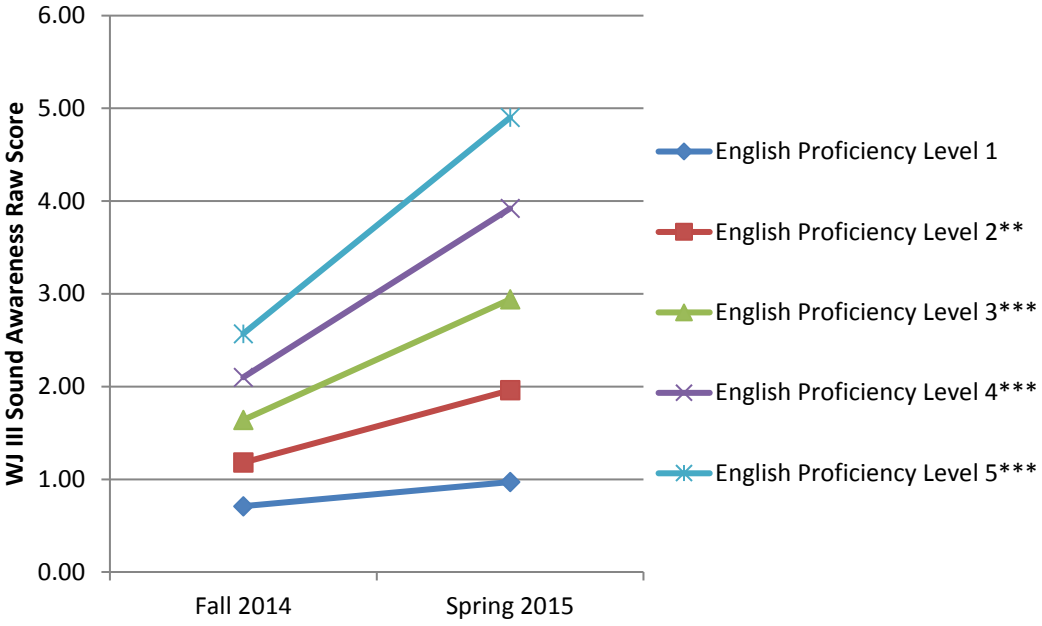


Figure 2. Growth in Math Problem-Solving (WJ III) by English Proficiency
n=578

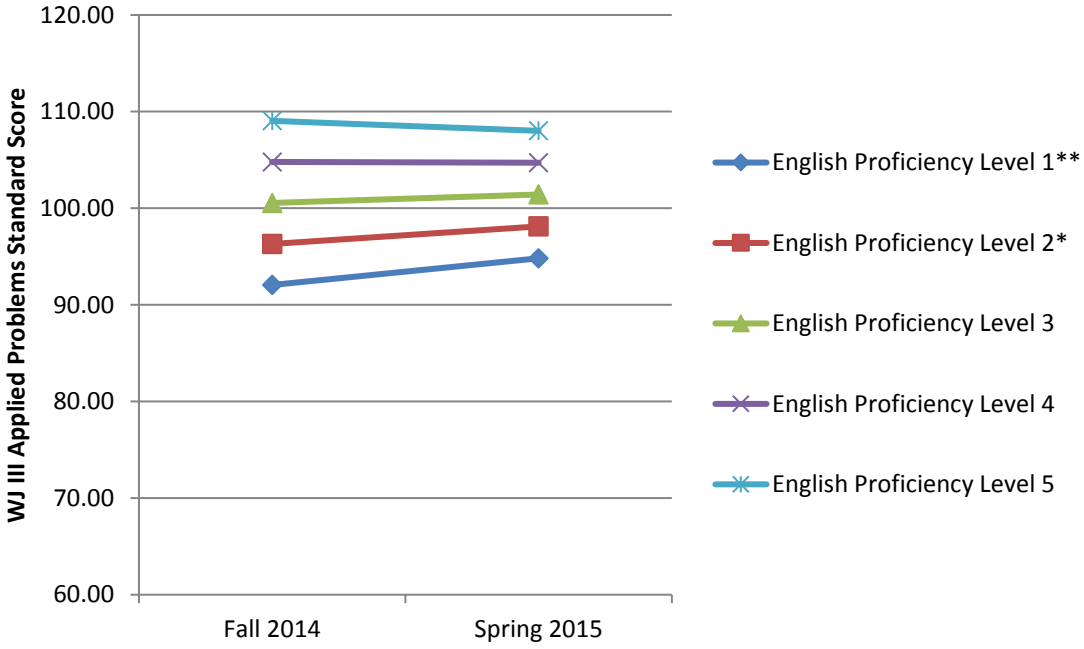


Figure 3. Growth in Phonological Awareness (WJ III) by CLASS Classroom Organization

n=578

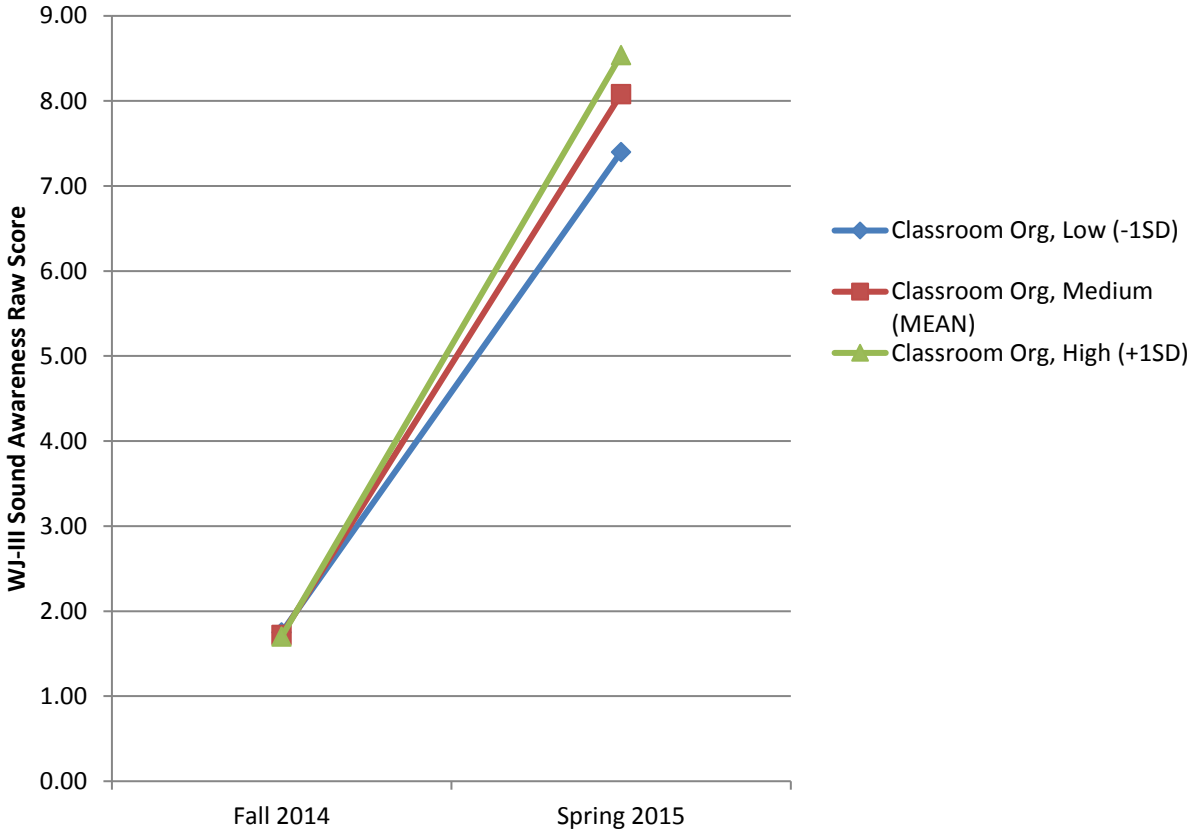


Table 8. Child Outcome Scores for DLL Subsample

	English Outcomes				Spanish Outcomes			
	Fall		Spring		Fall		Spring	
		Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)
Measure	n	Range	n	Range	n	Range	n	Range
Language and Literacy								
Receptive Vocabulary (ROWPVT-4 / SBE[a])	120	84.4 (13.2) 55–114	125	88.9 (12.5) 55–119	130	91.8 (11.5) 60–116	124	93.22 (12.5) 58–123
Expressive Vocabulary (EOWPVT-4 / SBE[a])	92	78.5 (14.7) 55–107	120	80.0 (14.3) 55–114	118	87.3 (17.0) 55–138	111	86.4 (16.9) 55–131
Letter-Word Identification (WJ III / Bat III Letter-Word Identification[a,b])	133	91.2 (11.1) 62–119	129	96.0 (12.7) 69–139	132	87.2 (7.8) 71–116	128	87.1 (10.4) 62–112
Phonological Awareness (WJ III / Bat III Sound Awareness - Rhyming[c])	133	1.1 (1.2) 0–5	129	2.6 (2.8) 0–13	131	0.6 (0.9) 0–4	128	1.4 (1.9) 0–11
Math								
Math Problem-Solving (WJ III / Bat III Applied Problems[a,b])	133	89.8 (12.9) 58–120	129	95.2 (11.8) 56–130	131	90.1 (12.9) 55–123	128	92.7 (12.7) 53–132
Counting (Counting Task[d])	133	11.1 (8.0) 0–40	129	18.7 (10.7) 0–40	132	7.1 (5.4) 0–35	128	9.8 (6.4) 0–40
General Knowledge								
Basic Self-Knowledge (Social Awareness Task[e])	133	2.0 (1.4) 0–6	129	3.5 (1.5) 1–6	132	2.3 (1.2) 0–5	128	3.0 (1.2) 0–6

[a] Indicates standard scores on norm-referenced measure with mean=100, SD=15.
[b] Scores reflect use of updated normative tables (2007).
[c] Possible range=0–17.
[d] Possible range=0–40.
[e] Possible range=0–6.

Table 9. DLL Subsample English Child Outcomes Regression Results—Language and Literacy

	Receptive Vocabulary (ROWPVT-4) n=123		Expressive Vocabulary (EOWPVT-4) n=106		Letter-Word Identification (WJ III Letter-Word ID) n=131		Phonological Awareness (WJ III Sound Awareness - Rhyming) n=131	
	Est[a]	(SE)	Est[a]	(SE)	Est[a]	(SE)	Est[a]	(SE)
Model 1								
Intercept	86.42	(3.84)	76.35	(4.92)	93.22	(3.34)	-0.60	(1.70)
Time	5.51***	(0.94)	5.36***	(0.96)	4.81***	(1.09)	1.58***	(0.29)
Program Type[b]	-0.39	(2.34)	-3.30	(3.25)	-1.50	(2.16)	0.03	(0.22)
Attendance	-0.14	(0.18)	-0.15	(0.25)	-0.00	(0.17)	-0.03*	(0.02)
Age	--	--	--	--	--	--	0.49	(0.38)
Gender[c]	-3.61	(2.18)	-2.36	(2.58)	-0.73	(1.84)	-0.34	(0.22)
Income[d]	0.78	(3.01)	4.28	(3.53)	-0.72	(2.56)	0.07	(0.29)
Dev/Ed Need[e]	-0.88	(3.28)	-3.11	(4.24)	-1.62	(2.96)	0.17	(0.32)
IEP[f]	-20.47	(13.37)	--	--	-23.33*	(10.60)	0.55	(1.22)
Chronic Health[g]	0.97	(5.56)	3.30	(6.26)	-1.42	(4.67)	-0.23	(0.55)
Model 2								
English Prof[h]	5.57***	(0.69)	6.2.7***	(0.76)	2.28***	(0.63)	0.38***	(0.08)
Time x English Prof	-0.04	(0.82)	-0.62	(0.91)	-0.11	(0.67)	0.61***	(0.16)

[a] Significance levels are *p< .05, **p< .01, ***p< .001.

[b] Private site=0, Public school site=1.

[c] Female=0, Male=1.

[d] Not eligible for free lunch=0 , Eligible for free lunch=1.

[e] No Developmental/Educational need=0, Developmental/Educational need=1.

[f] No IEP=0, IEP=1.

[g] No Chronic health need=0, Chronic health need=1.

[h] English Proficiency Level 5 is the reference cell.

Table 10. DLL Subsample English Child Outcomes Regression Results—Math and General Knowledge

	Math				General Knowledge	
	Math Problem-Solving (WJ III Applied Problems) n=131		Counting (Counting Task) n=131		Basic Self-Knowledge (Social Awareness Task) n=131	
	Est[a]	(SE)	Est[a]	(SE)	Est[a]	(SE)
Model 1						
Intercept	93.70	(3.49)	-19.04	(10.45)	-0.54	(1.73)
Time	5.53***	(0.90)	7.69***	(0.98)	1.21***	(0.15)
Program Type[b]	-0.65	(2.11)	-1.35	(1.60)	-0.28	(0.23)
Attendance	-0.25	(0.17)	0.03	(0.12)	-0.03	(0.02)
Age	--	--	6.60**	(2.30)	0.79*	(0.38)
Gender[c]	-4.15*	(1.99)	-1.08	(1.33)	-0.32	(0.22)
Income[d]	1.66	(2.77)	2.71	(1.83)	0.01	(0.30)
Dev/Ed Need[e]	-1.97	(3.00)	-3.15	(2.17)	0.08	(0.33)
IEP[f]	-18.07	(11.49)	-11.16	(7.57)	-2.29	(1.24)
Chronic Health[g]	-4.36	(5.17)	-4.98	(3.32)	0.56	(0.55)
Model 2						
English Prof[h]	4.51***	(0.66)	1.62**	(0.49)	0.43***	(0.08)
Time x English Prof	-1.06	(0.72)	-0.06	(0.65)	0.06	(0.10)

[a] Significance levels are *p< .05, **p< .01, ***p< .001.

[b] Private site=0, Public school site=1.

[c] Female=0, Male=1.

[d] Not eligible for free lunch=0 , Eligible for free lunch=1.

[e] No Developmental/Educational need=0, Developmental/Educational need=1.

[f] No IEP=0, IEP=1.

[g] No Chronic health need=0, Chronic health need=1.

[h] English Proficiency Level 5 is the reference cell.

Figure 4. DLL Subsample English Growth in Phonological Awareness (WJ III) by English Proficiency

n=131

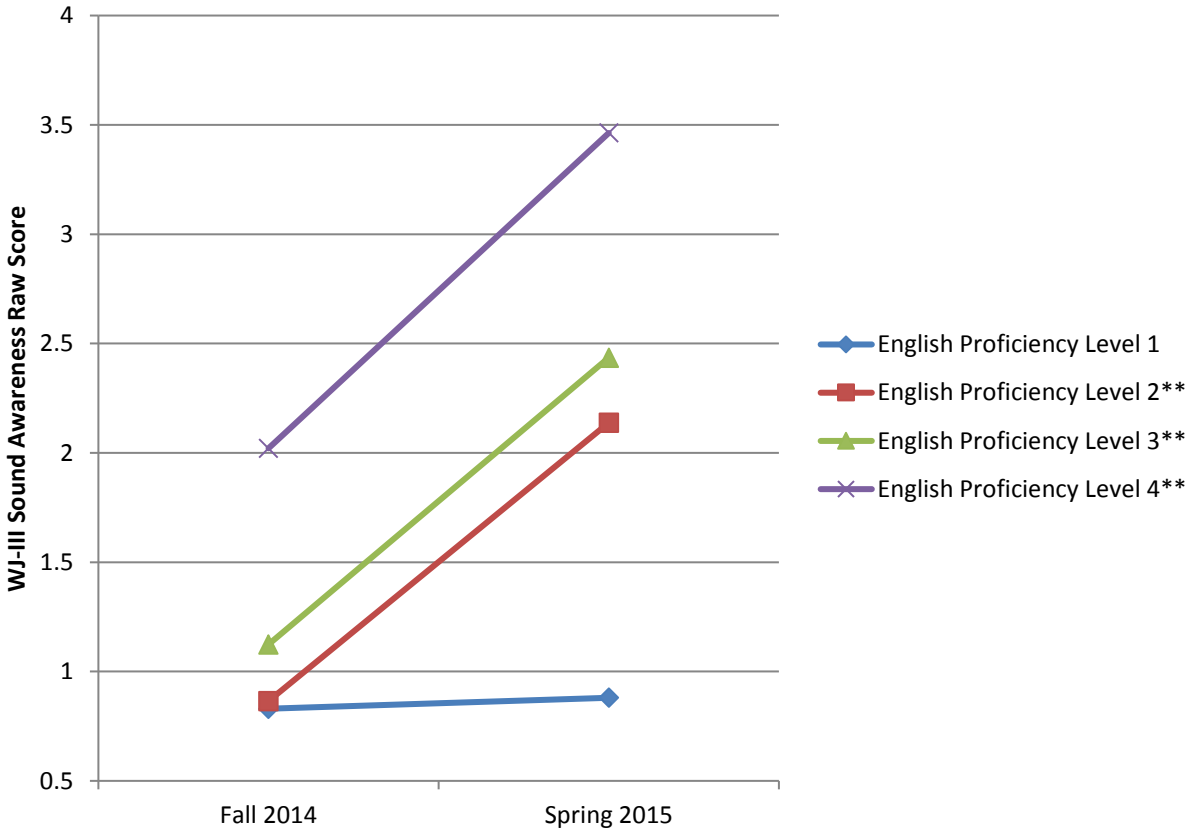


Table 11. DLL Subsample Spanish Child Outcomes Regression Results—Language and Literacy

	Receptive Vocabulary (ROWPVT-SBE) n=127		Expressive Vocabulary (EOWPVT-SBE) n=115		Letter-Word Identification (Bat III Letter-Word ID) n=131		Phonological Awareness (Bat III Sound Awareness - Rhyming) n=131	
	Est[a]	(SE)	Est[a]	(SE)	Est[a]	(SE)	Est[a]	(SE)
Model 1								
Intercept	93.94	(3.54)	94.54	(5.79)	89.03	(2.27)	-0.50	(1.34)
Time	1.06	(0.76)	-1.56	(0.99)	-0.37	(0.88)	0.78***	(0.17)
Program Type[b]	1.14	(2.24)	0.13	(3.58)	-3.26*	(1.39)	0.02	(0.17)
Attendance	-0.13	(0.17)	0.06	(0.28)	-0.10	(0.11)	-0.01	(0.01)
Age	--	--	--	--	--	--	0.31	(0.29)
Gender[c]	-0.89	(1.99)	-1.68	(3.07)	2.76*	(1.31)	-0.04	(0.17)
Income[d]	-1.08	(2.76)	-9.03*	(4.32)	-0.07	(1.81)	-0.20	(0.23)
Dev/Ed Need[e]	1.81	(3.10)	2.82	(4.75)	1.30	(1.97)	0.03	(0.25)
IEP[f]	-28.58*	(11.45)	-25.14	(16.69)	-9.86	(7.53)	-0.40	(1.92)
Chronic Health[g]	-4.59	(5.13)	1.42	(9.33)	0.66	(3.41)	-0.50	(0.43)
Model 2								
Spanish Prof[h]	3.62***	(0.51)	4.48***	(0.66)	0.79	(0.42)	0.17**	(0.05)
Time x Spanish Prof	0.72	(0.65)	-0.27	(0.74)	1.60**	(0.60)	0.04	(0.12)

[a] Significance levels are *p< .05, **p< .01, ***p< .001.

[b] Private site=0, Public school site=1.

[c] Female=0, Male=1.

[d] Not eligible for free lunch=0 , Eligible for free lunch=1.

[e] No Developmental/Educational need=0, Developmental/Educational need=1.

[f] No IEP=0, IEP=1.

[g] No Chronic health need=0, Chronic health need=1.

[h] Spanish Proficiency Level 5 is the reference cell.

Table 12. DLL Subsample Spanish Child Outcomes Regression Results—Math and General Knowledge

	Math				General Knowledge	
	Math Problem-Solving (Bat III Applied Problems) n=131		Counting (Counting Task) n=131		Basic Self-Knowledge (Social Awareness Task) n=131	
	Est[a]	(SE)	Est[a]	(SE)	Est[a]	(SE)
Model 1						
Intercept	93.88	(3.54)	-1.44	(6.86)	1.25	(1.47)
Time	2.42*	(0.93)	2.64***	(0.56)	0.66***	(0.11)
Program Type[b]	-0.84	(2.14)	-1.53	(1.04)	-0.23	(0.21)
Attendance	-0.23	(0.17)	0.02	(0.08)	0.00	(0.02)
Age	--	--	1.92	(1.51)	0.25	(0.33)
Gender[c]	-2.80	(2.03)	-0.46	(0.87)	-0.28	(0.19)
Income[d]	1.51	(2.82)	1.44	(1.20)	0.21	(0.25)
Dev/Ed Need[e]	-2.56	(3.04)	-1.36	(1.41)	-0.03	(0.29)
IEP[f]	-27.52*	(11.67)	-7.02	(4.93)	-1.78	(1.05)
Chronic Health[g]	-11.15*	(5.34)	-5.53*	(2.19)	-0.08	(0.48)
Model 2						
Spanish Prof[h]	3.30***	(0.60)	0.84**	(0.28)	0.25***	(0.06)
Time x Spanish Prof	0.54	(0.73)	0.40	(0.39)	0.16*	(0.07)

[a] Significance levels are *p< .05, **p< .01, ***p< .001.

[b] Private site=0, Public school site=1.

[c] Female=0, Male=1.

[d] Not eligible for free lunch=0 , Eligible for free lunch=1.

[e] No Developmental/Educational need=0, Developmental/Educational need=1.

[f] No IEP=0, IEP=1.

[g] No Chronic health need=0, Chronic health need=1.

[h] Spanish Proficiency Level 5 is the reference cell.

Figure 5. DLL Subsample Spanish Growth in Letter-Word Identification (Bat III) by Spanish Proficiency

n=131

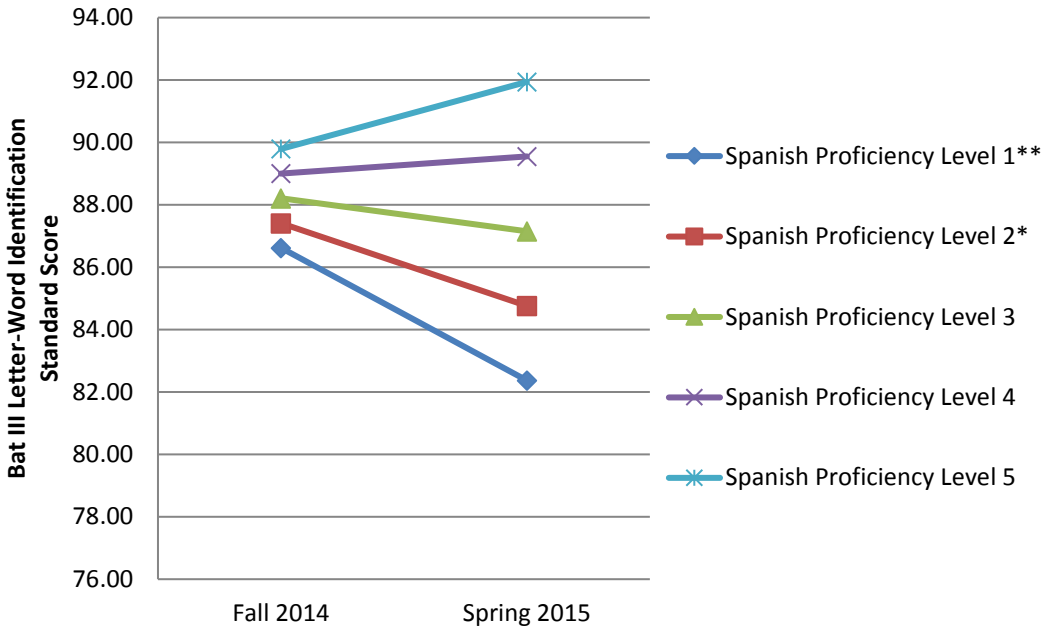


Figure 6. DLL Subsample Spanish Growth in Basic Self-Knowledge (Social Awareness Task) by Spanish Proficiency

n=131

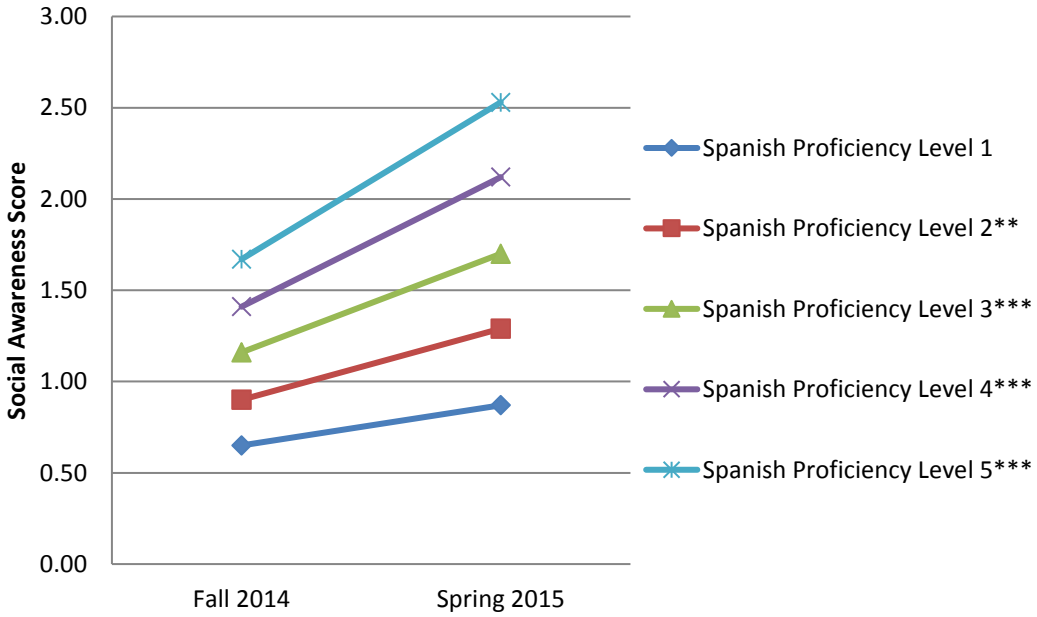


Table 13. Global Classroom Environment Quality (ECERS-3): NC Pre-K Classrooms (2014–2015)

ECERS-3 Subscale/Item n=102	Mean	(SD)	Range[a]
Total Score	4.2	(0.7)	2.2–5.4
Space and Furnishings Subscale	4.3	(0.8)	2.6–5.9
Indoor space	4.8	(1.8)	1–7
Furniture for routine care, play, and learning	5.1	(1.4)	2–7
Room arrangement for play	5.1	(1.3)	3–7
Space for privacy	4.9	(1.6)	1–7
Child-related display	3.9	(1.2)	1–7
Space for gross motor play	3.5	(1.7)	1–7
Gross motor equipment	2.6	(1.7)	1–7
Personal Care Routines Subscale	4.4	(1.0)	2.0–7.0
Meals/snacks	4.1	(1.5)	1–7
Toileting/diapering	4.0	(1.5)	1–7
Health practices	4.3	(1.4)	1–7
Safety practices	5.2	(1.4)	2–7
Language and Literacy Subscale	4.2	(0.9)	2.0–6.4
Helping expand vocabulary	3.9	(1.3)	1–7
Encouraging children to communicate	4.9	(1.6)	1–7
Staff uses books with children	4.2	(1.8)	1–7
Encouraging use of books	4.3	(1.2)	2–7
Becoming familiar with print	3.6	(1.1)	1–6
Learning Activities Subscale	3.6	(0.7)	1.8–5.1
Fine motor	5.0	(1.4)	2–7
Art	4.1	(1.4)	1–7
Music/movement	3.6	(1.2)	1–7
Blocks	3.6	(1.0)	1–6
Dramatic play	3.9	(1.5)	1–7
Nature/science	3.0	(1.0)	1–6
Math materials	3.1	(1.3)	1–7
Math in daily events	3.1	(1.2)	1–7
Understanding written numbers	2.3	(1.2)	1–7
Promoting acceptance of diversity	4.4	(1.3)	1–7
Appropriate use of technology	3.8	(1.3)	1–7

[a] Total score and subscale scores could range from 1.0–7.0; item scores could range from 1–7.

Table 13. Global Classroom Environment Quality (ECERS-3): NC Pre-K Classrooms (2014–2015)

ECERS-3 Subscale/Item	n=102	Mean	(SD)	Range[a]
Interaction Subscale		5.1	(1.1)	1.0–7.0
Supervision of gross motor activities		4.1	(1.9)	1–7
Individualized teaching and learning		5.6	(1.4)	1–7
Staff-child interactions		5.6	(1.7)	1–7
Peer interactions		5.2	(1.6)	1–7
Discipline		5.0	(1.6)	1–7
Program Structure Subscale		4.8	(1.2)	2.3–7.0
Transitions/waiting times		4.7	(1.6)	1–7
Free play		4.9	(1.4)	1–7
Whole-group activities		4.6	(1.4)	1–7

[a] Total score and subscale scores could range from 1.0–7.0; item scores could range from 1–7.

Figure 7. Global Classroom Quality (ECERS-3 Total)
n=102

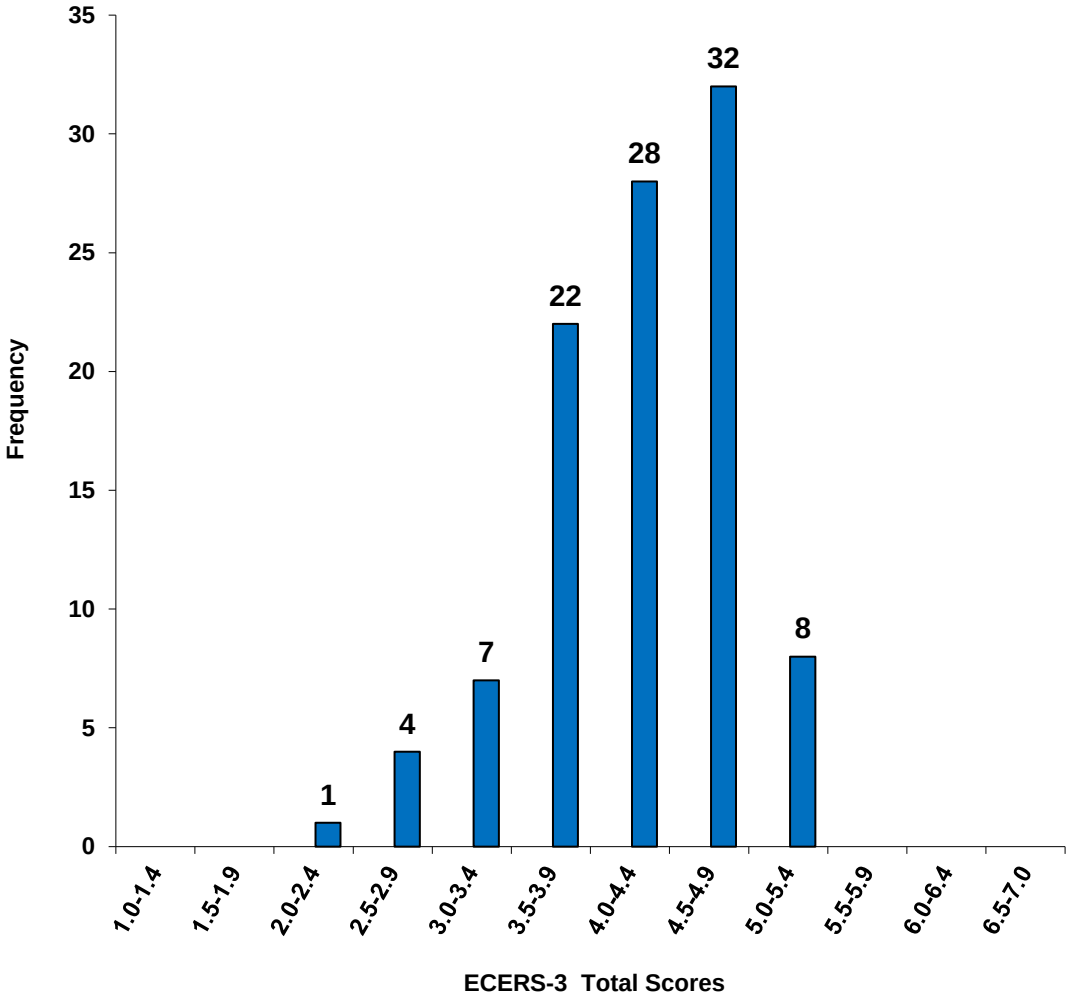


Table 14. Teacher-Child Instructional Interactions (CLASS): NC Pre-K Classrooms (2014–2015)

CLASS Domain/Dimension	n=102	Mean	(SD)	Range[1]
Emotional Support Domain		6.1	(0.5)	4.5–7.0
Positive climate		6.3	(0.7)	4.0-7.0
Negative climate[a]		1.0	(0.1)	1.0-1.8
Teacher sensitivity		6.0	(0.8)	3.8-7.0
Regard for student perspectives		5.2	(0.9)	3.2-7.0
Classroom Organization Domain		5.7	(0.7)	3.4-6.8
Behavior management		6.0	(0.8)	4.0-7.0
Productivity		6.1	(.09)	2.2-7.0
Instructional learning formats		5.1	(0.8)	2.2-6.6
Instructional Support Domain		2.6	(0.9)	1.0-4.7
Concept development		2.3	(0.8)	1.0-4.8
Quality of feedback		2.5	(0.9)	1.0-4.8
Language modeling		2.9	(1.0)	1.0-5.2

[a] Lower scores on Negative climate represent greater emotional support. Scores on this dimension are reversed for Emotional Support.

Figure 8. Emotional Support (CLASS)
n=102

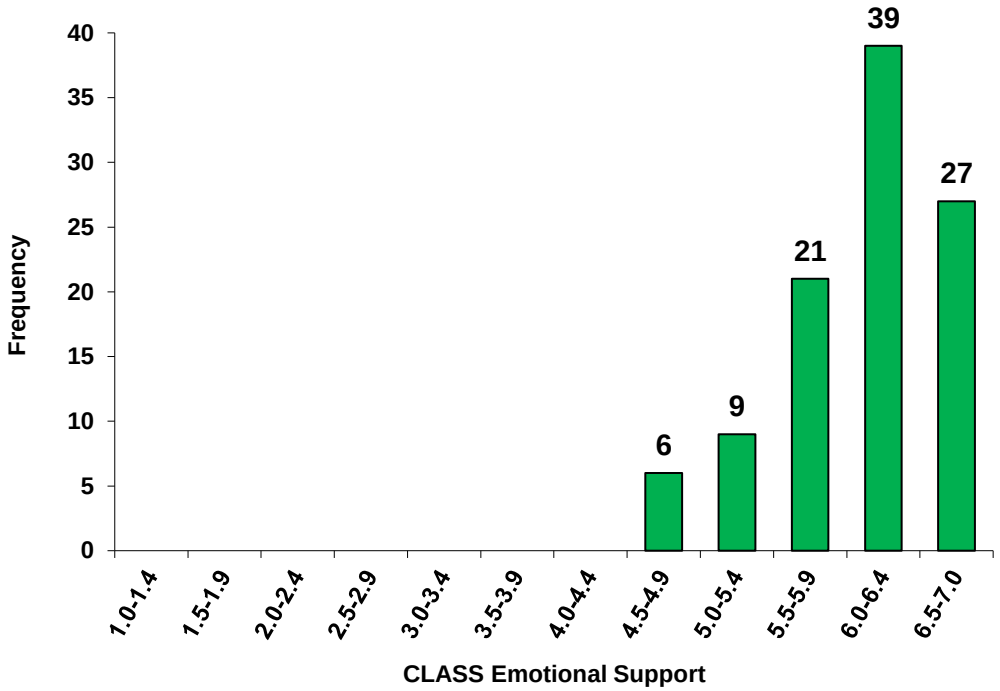


Figure 9. Classroom Organization (CLASS)
n=102

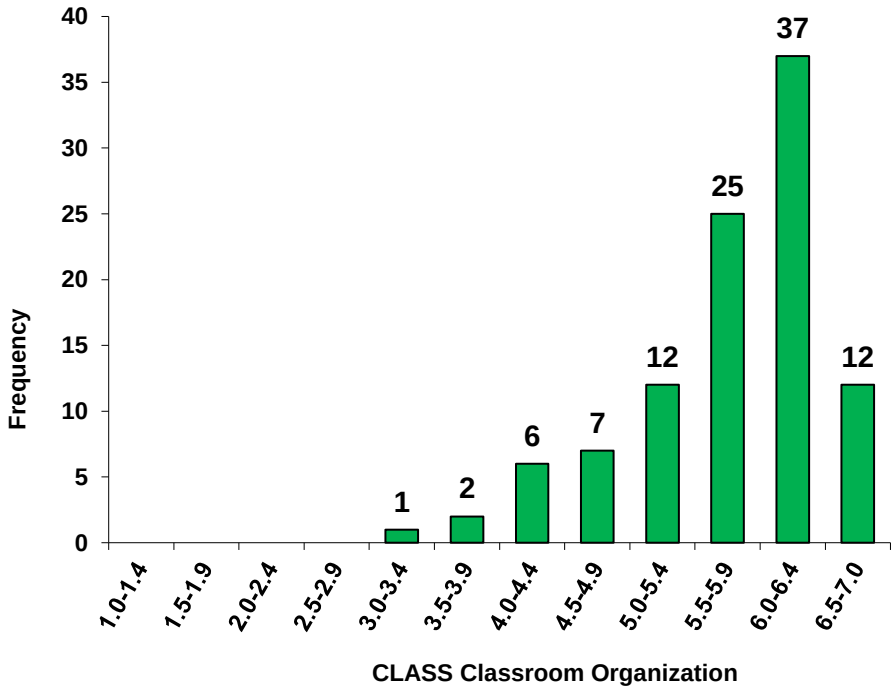


Figure 10. Instructional Support (CLASS)
n=102

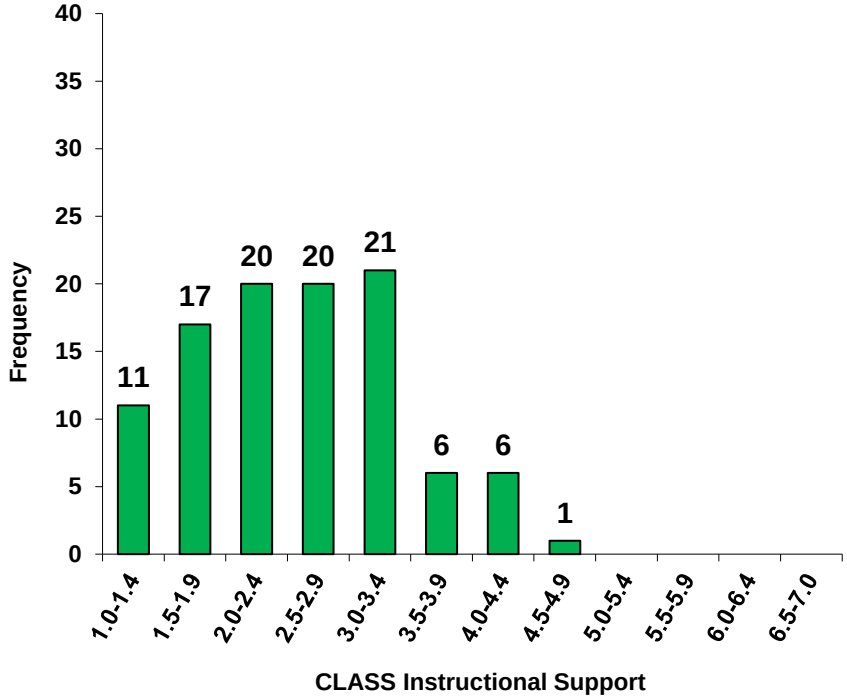


Table 15. General and Language and Literacy Environment (ELLCO): NC Pre-K Classrooms (2014–2015)

ELLCO Subscale/Section	n=102	Mean	(SD)	Range[a]
General Classroom Environment Subscale		3.7	(0.5)	2.1–4.9
Classroom Structure		3.9	(0.6)	2.5–5.0
Curriculum		3.4	(0.6)	1.7–5.0
Language and Literacy Subscale		3.3	(0.5)	1.8–4.3
Language Environment		3.1	(0.6)	1.3–4.3
Books and Book Reading		3.5	(0.6)	1.8–5.0
Print and Early Writing		3.1	(0.6)	1.7–4.7

[a] Scores could range from 1.0–5.0.

Figure 11. General Classroom Environment (ELLCO)
n=102

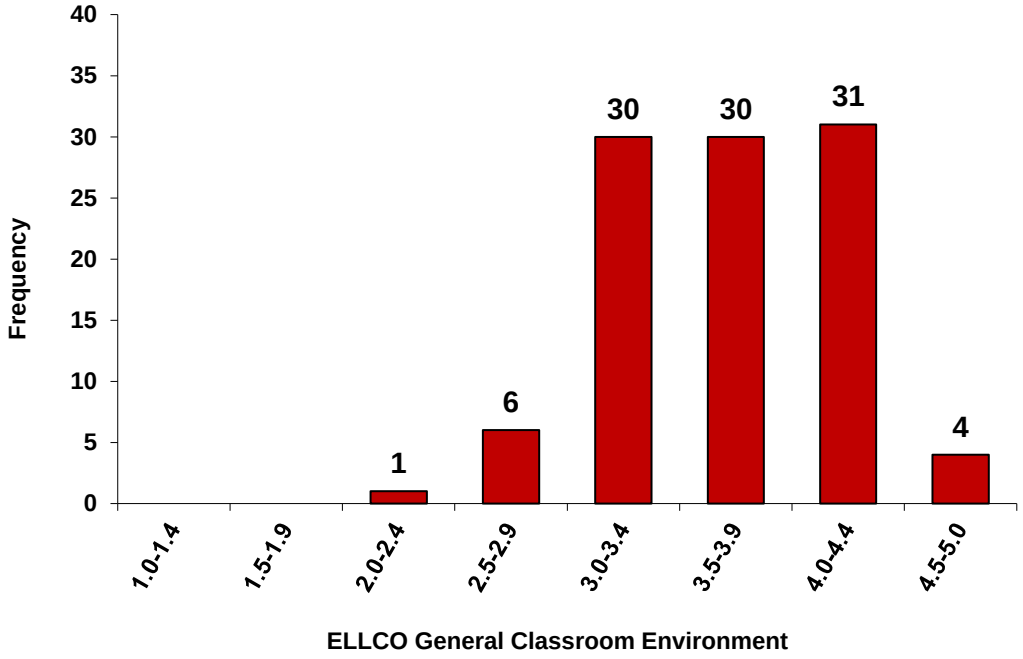


Figure 12. Language and Literacy (ELLCO)
n=102

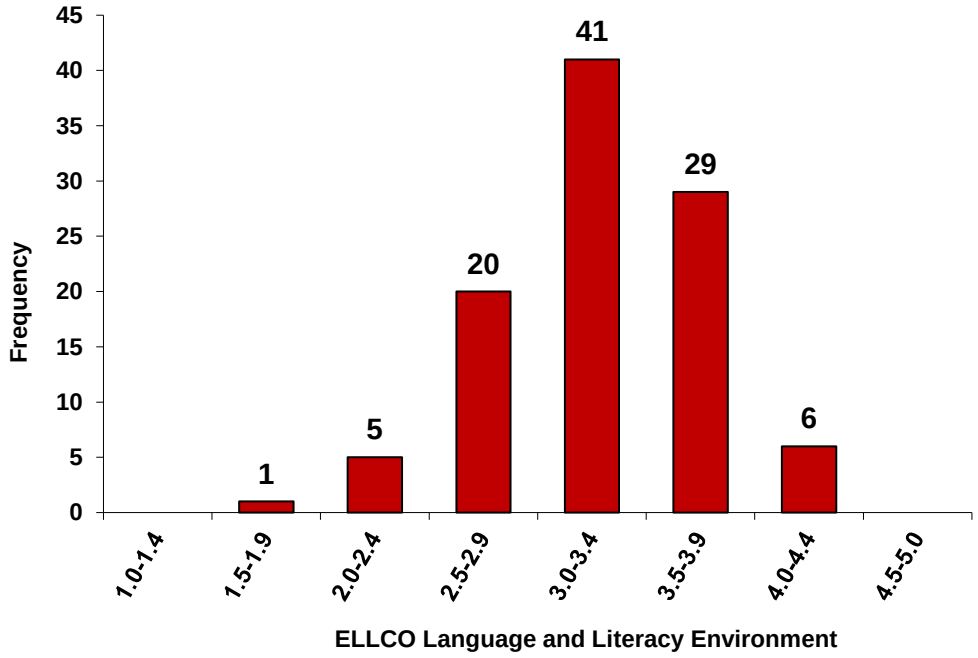
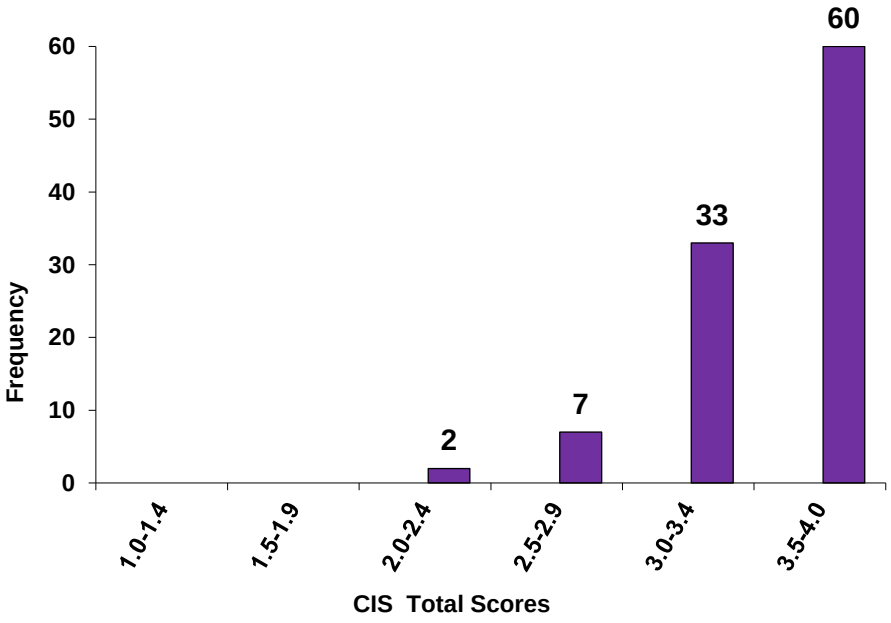


Table 16. Sensitivity of Teacher-Child Interactions (CIS): NC Pre-K Classrooms (2014–2015)

CIS Subscale	n=102	Mean	(SD)	Range[a]
Total Items Score[b]		3.5	0.3	2.4–3.9
Sensitivity Subscale		3.1	0.5	1.8–3.8
Harshness Subscale		1.2	0.4	1.0–2.8
Detachment Subscale		1.3	0.4	1.0–2.5
Permissiveness Subscale		1.4	0.5	1.0–2.7

Figure 13. Sensitivity of Teacher-Child Interactions (CIS Total)
n=102



[a] Scores could range from 1.0–4.0.
[b] For the Total score calculation, scoring is reversed on the Harshness, Detachment, and Permissiveness subscales; for these subscale scores, lower scores represent more positive interactions. For the Total score and Sensitivity subscale, higher scores represent more positive interactions.

Table 17. Predictors of Classroom Quality Regression Results: NC Pre-K Classrooms (2014–2015)

	ECERS-3 n=102	CLASS n=102			ELLCO n=102		CIS n=102
	Total Score	Emotional Support	Classroom Organization	Instructional Support	General Classroom Environment	Language and Literacy	Total Score
	Est[a] (SE)	Est[a] (SE)	Est[a] (SE)	Est[a] (SE)	Est[a] (SE)	Est[a] (SE)	Est[a] (SE)
	R^2=0.17	R^2=0.05	R^2=0.08	R^2=0.10	R^2=0.20	R^2=0.10	R^2=0.13
Intercept	2.11 (0.92)	5.72 (0.84)	4.81 (1.09)	1.75 (1.28)	2.24 (0.70)	2.30 (0.71)	3.48 (0.49)
Teacher/Classroom Characteristics							
Teacher has BK license	0.31 (0.20)	0.13 (0.18)	0.12 (0.24)	0.27 (0.28)	-0.01 (0.15)	0.11 (0.15)	0.06 (0.11)
Teacher has MA/MS or higher	-0.04 (0.22)	0.13 (0.20)	0.17 (0.26)	0.09 (0.30)	-0.08 (0.17)	-0.12 (0.17)	0.00 (0.12)
Classroom size	-0.00 (0.02)	-0.02 (0.02)	-0.03 (0.03)	-0.02 (0.03)	0.01 (0.02)	0.00 (0.02)	-0.02 (0.01)
Classroom-wide NC Pre-K Child Characteristics							
% NC Pre-K children in class	0.03 (0.26)	-0.00 (0.23)	-0.04 (0.30)	0.18 (0.35)	0.19 (0.19)	0.27 (0.20)	0.01 (0.14)
% limited English proficiency	-0.29 (0.32)	0.21 (0.30)	0.49 (0.38)	0.51 (0.45)	-0.09 (0.25)	-0.09 (0.25)	0.10 (0.17)
% with IEP	0.99 (0.79)	-0.99 (0.75)	-1.40 (0.97)	-1.81 (1.14)	1.45* (0.63)	0.63 (0.63)	0.39 (0.44)
% with chronic health condition	0.17 (0.82)	0.02 (0.80)	-0.42 (1.04)	0.16 (1.22)	0.73 (0.67)	0.49 (0.67)	0.22 (0.47)
% with dev/ed need	-0.06 (0.26)	-0.05 (0.24)	0.09 (0.30)	0.09 (0.36)	0.03 (0.20)	0.17 (0.20)	-0.14 (0.14)
% eligible for free lunch	-0.12 (0.35)	0.11 (0.34)	0.02 (0.43)	0.28 (0.51)	-0.27 (0.28)	-0.09 (0.28)	-0.36 (0.19)
% no prior placement	-0.08 (0.37)	-0.16 (0.25)	-0.23 (0.32)	-0.70 (0.38)	-0.10 (0.21)	0.16 (0.21)	-0.11 (0.14)
Teacher Beliefs							
Teaching practices	0.51* (0.20)	0.15 (0.18)	0.34 (0.24)	0.17 (0.28)	0.31* (0.15)	0.14 (0.15)	0.14 (0.11)
Work environment	-0.01 (0.09)	0.02 (0.08)	0.01 (0.10)	0.08 (0.12)	0.03 (0.07)	-0.00 (0.07)	-0.00 (0.05)

[a] Significance levels are *p< .05, **p< .01, ***p< .001.

Table 18. Pre-K Classroom Quality Scores (2005–2013)

	Cohort 1 2005–2006 n=57			Cohort 2 2007–2008 n=50			Cohort 3 2011–2012 n=99			Cohort 4 2012-2013 n=99		
	Mean	(SD)	Range	Mean	(SD)	Range	Mean	(SD)	Range	Mean	(SD)	Range
CLASS Emotional Support[a]	--	--	--	5.8	(0.8)	2.8–7.0	5.8	(0.5)	4.4–6.6	5.8	(0.6)	2.8–6.9
CLASS Classroom Organization[a]	--	--	--	5.3	(0.8)	2.9–6.7	5.4	(0.6)	3.4–6.6	5.2	(0.7)	1.5–6.8
CLASS Instructional Support[a]	--	--	--	3.1	(1.0)	1.4–5.3	2.4	(0.6)	1.3–4.7	2.2	(0.8)	1.1–5.5
ELLCO Classroom Enviroment[b]	--	--	--	--	--	--	3.8	(0.6)	2.7–4.9	3.7	(0.6)	1.3–5.0
ELLCO Language and Literacy[b]	--	--	--	--	--	--	3.5	(0.6)	2.3–4.8	3.2	(0.7)	1.3–5.0
CIS Total	3.4	(0.4)	2.4-3.9	3.5	(0.4)	2.3–4.0	3.4	(0.4)	2.0–4.0	3.5	(0.4)	2.4–4.0

[a] CLASS data were not gathered prior to the 2007-2008 study (Cohort 2).

[b] Comparable ELLCO data were not available from previous cohorts because a revised version of this measure was used beginning with the 2011-2012 study (Cohort 3).

Table 19. Comparisons of Pre-K Classroom Quality over Time (2005–2015)

	CLASS						ELLCO				CIS	
	Emotional Support		Classroom Organization		Instructional Support		General Classroom Environment		Language and Literacy		Total Score	
Year	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)	Est	(SE)
2005–2006 vs. 2007–2008	--	--	--	--	--	--	--	--	--	--	0.07	(0.07)
2005–2006 vs. 2011–2012	--	--	--	--	--	--	--	--	--	--	0.02	(0.06)
2005–2006 vs. 2012–2013	--	--	--	--	--	--	--	--	--	--	0.13*	(0.06)
2005–2006 vs. 2014–2015	--	--	--	--	--	--	--	--	--	--	0.12*	(0.05)
2007–2008 vs. 2011–2012	-0.01	(0.11)	0.13	(0.12)	-0.62***	(0.14)	--	--	--	--	-0.06	(0.07)
2007–2008 vs. 2012–2013	0.05	(0.11)	-0.05	(0.12)	-0.84***	(0.14)	--	--	--	--	0.06	(0.07)
2007–2008 vs. 2014–2015	0.34**	(0.11)	0.40**	(0.13)	-0.53**	(0.16)	--	--	--	--	0.02	(0.06)
2011–2012 vs. 2012–2013	0.06	(0.09)	-0.17	(0.10)	-0.22*	(0.11)	-0.10	(0.09)	-0.27**	(0.09)	0.11*	(0.05)
2011–2012 vs. 2014–2015	0.33***	(0.07)	0.32***	(0.09)	0.19	(0.11)	-0.10	(0.08)	-0.21**	(0.08)	0.10*	(0.05)
2012–2013 vs. 2014–2015	0.29***	(0.08)	0.48***	(0.10)	0.43***	(0.12)	0.01	(0.08)	0.11	(0.09)	0.03	(0.05)

Note: ***p < .001; **p < .01; *p < .05

Table 20. NC Pre-K Program Characteristics (2014–2015)

Program Characteristic		
Total NC Pre-K Sites (Centers/Schools)	n=1,166	
Total NC Pre-K Classrooms	n=1,974	
Total Children Served	n=29,271	
	Mean	(SD)
Class Size	15.8	(3.3)
Number of NC Pre-K Children per Class	13.2	(4.4)
Proportion of NC Pre-K Children per Class	0.84	(0.2)
Days of Attendance per Child	138	(40.3)
Days of Operation	172	(8.5)
Licensing Star Ratings	%	n
Five-Star	76.1	887
Four-Star	18.7	218
Temporary	0.7	8
Public School in Process	4.5	53

Table 21. NC Pre-K Classrooms: Curricula, Assessment Tools, and Developmental Screening Tools (2014–2015)

Educational Resources	n=1,974	%	n
Primary Curriculum			
Creative Curriculum		86.2	1,703
OWL		7.8	154
HighScope		3.5	69
Tools of the Mind		1.9	38
Other[a]		0.3	6
Not reported		0.2	4
Ongoing Assessment Tool			
Teaching Strategies Gold/Creative Curriculum Assessment		89.8	1,773
Work Sampling System		4.8	95
HighScope Preschool Child Observation Record (COR)		3.4	67
Galileo Online Assessment System		1.2	23
Other[b]		0.8	16
Developmental Screening Tool			
Developmental Indicators for the Assessment of Learning (DIAL)		55.8	1,102
Brigance		34.8	687
Ages & Stages Questionnaire (ASQ)		6.9	135
Parents' Evaluation of Developmental Status (PEDS)		2.5	50

[a] Other approved curricula included Bank Street, Passports: Experiences for PreK Success, and Tutor Time LifeSmart.
[b] Other approved ongoing assessment tools included Investigator Club, Learning Accomplishment Profile-3rd edition (LAP-3), Learning Care System, mCLASS: CIRCLE, and Tools of the Mind Assessment.

Table 22. Distribution of NC Pre-K Classrooms by Setting Type (2014–2015)

Setting Type	n=1,974	%	n
Public Preschool		51.6	1,019
Private		33.2	655
Private For-Profit		24.9	491
Private Non-Profit		8.3	164
Head Start		15.2	300
Head Start Not Administered by Public School		10.6	209
Head Start Administered by Public School		4.6	91

Table 23. Characteristics of NC Pre-K Children (2014–2015)

Characteristic n=29,271	%/Mean	n
Child's age on 8/31 of program year	4.4	29,271
Gender		
Male	50.9%	14,895
Female	49.1%	14,376
Race		
White/European-American	47.9%	14,018
Black/African-American	36.0%	10,552
Native American/Alaskan Native	6.4%	1,859
Multiracial	6.3%	1,851
Asian	2.1%	620
Native Hawaiian/Pacific Islander	1.3%	371
Ethnicity		
Non-Hispanic/Latino	74.9%	21,914
Hispanic/Latino	25.1%	7,357
Parents Employed		
Mother	47.3%	13,844
Father	41.7%	12,215
Mother or Father	75.8%	22,192

Table 24. Eligibility Factors for NC Pre-K Children (2014–2015)

Eligibility Factors[a]	n=29,271	%	n
Family Income			
130% of poverty and below (eligible for free lunch)		76.2	22,289
131–185% of poverty (eligible for reduced-price lunch)		14.9	4,356
186–200% of poverty		2.5	737
201–250% of poverty		3.3	980
>251% of poverty		3.1	909
Limited English Proficiency			
Family and/or child speak limited or no English in the home		18.1	5,304
Developmental/Educational Need			
Developmental/educational need indicated by performance on a developmental screen		25.8	7.538
Identified Disability			
Child has an IEP		4.5	1,315
Chronic Health Condition(s)			
Child is chronically ill/medically fragile		5.7	1,665
Military Parent		6.2	1,810

[a] Children are eligible for the NC Pre-K Program primarily based on age and family income. Children must be four years old by August 31 of the program year, with a gross family income of no more than 75% of state median income. Children who do not meet the income eligibility may be eligible if they have at least one of the following: limited English proficiency, identified disability, chronic health condition, developmental/educational need, or a parent actively serving in the military.

Table 25. Prior Placement for NC Pre-K Children (2014–2015)

Prior Placement n=29,271	%	n
Children who have never been served in any preschool or child care setting.	57.7	16,904
Children who are currently unserved (may previously have been in preschool or child care setting).	13.9	4,055
Children who are in unregulated child care.	2.2	646
Children who are in a regulated preschool or child care setting, but are not receiving subsidy.	17.2	5,022
Children who are receiving subsidy and are in some kind of regulated child care or preschool program.	8.8	2,575
Not reported	0.2	69

Table 26. Education Levels of NC Pre-K Lead Teachers (2014–2015)

		Highest Education Level							
		MA/MS or higher		BA/BS		AA/AAS		HS diploma/GED	
Setting Type[a]	Total n	%	n	%	n	%	n	%	n
Public School	1,149	19.4	223	80.4	924	0.1	1	0.1	1
Private	911	10.0	92	90.0	819	0.0	0	0.0	0
All	2,060	15.3	315	84.7	1,743	0.0	1	0.0	1

Table 27. Licensure/Credential Levels of NC Pre-K Lead Teachers (2014–2015)

		Highest Licensure/Credential[b]									
		B-K[c]		Other Teacher's License		CDA Credential		NCECC		None	
Setting Type[a]	Total n	%	n	%	n	%	n	%	n	%	n
Public School	1,149	91.7	1,054	1.7	20	0.0	0	0.5	6	6.0	69
Private	911	74.5	679	6.3	57	0.1	1	4.3	39	14.8	135
All	2,060	84.1	1,733	3.8	77	0.0	1	2.2	45	9.9	204

[a] Teachers in Head Start classrooms administered by public schools are included in public school setting types; teachers in Head Start classrooms not administered by public schools are included in private setting types.
[b] Note: B-K = Birth-Kindergarten, CDA = Child Development Associate, NCECC = North Carolina Early Childhood Credential. Other teacher's license includes non-early childhood licenses and licenses from other states.
[c] This category includes teachers with a B-K license, B-K Standard Professional I or II, provisional B-K license, or Preschool Add-on.

Table 28. NC Pre-K Teacher Survey Results (2014–2015)

Characteristic	n	Mean	(SD)	Range
Years of experience teaching birth–5	102	11.6	(7.0)	0.4–29.0
Total years of teaching experience	102	13.7	(7.9)	1.2–36.0
Beliefs about Teaching Scale[a]	102	3.9	(0.4)	3.2–4.7
Early Childhood Work Environment Survey[b]	102	4.0	(0.8)	1.4–5.0

[a] Rated on a scale of 1–5 with higher scores representing stronger beliefs about developmentally-appropriate teaching practices.
[b] Rated on a scale of 0–5 with higher scores representing a more positive work environment.

Figure 14. Trend of NC Pre-K Setting Types by Cohort (2003-2004 – 2014-2015)

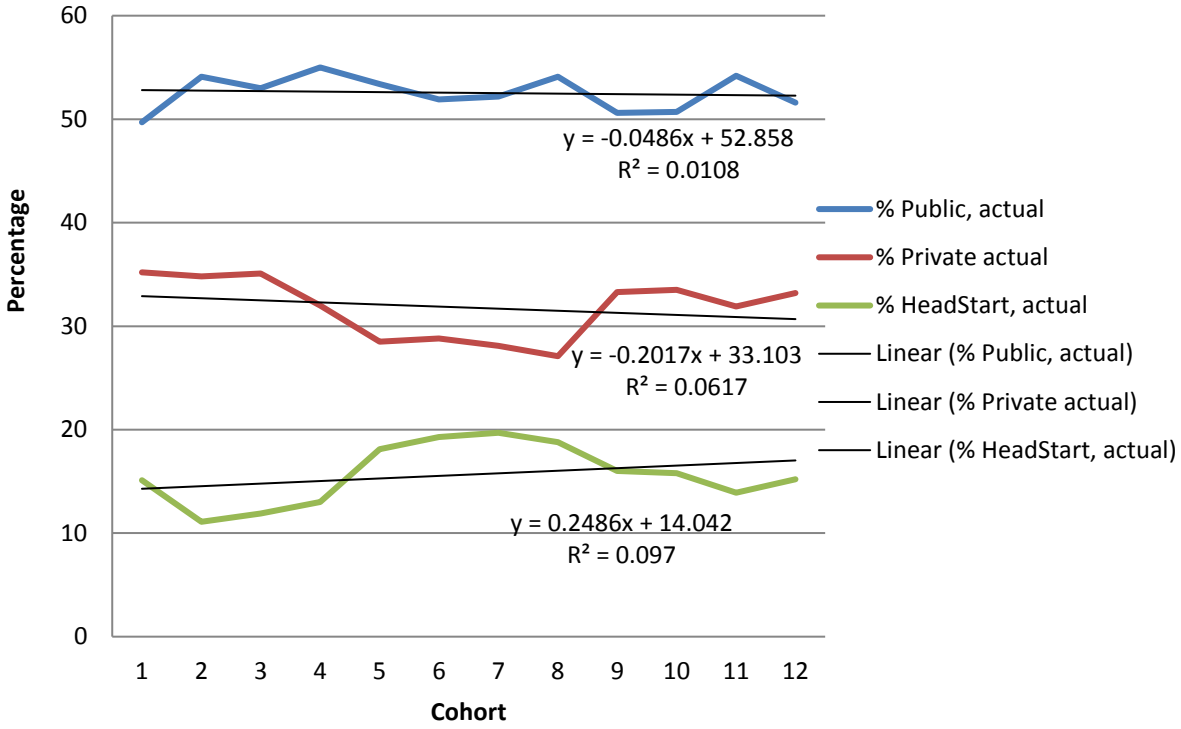


Figure 15. Trend of Prior Placement for NC Pre-K Children by Cohort (2003-2004 – 2014-2015)

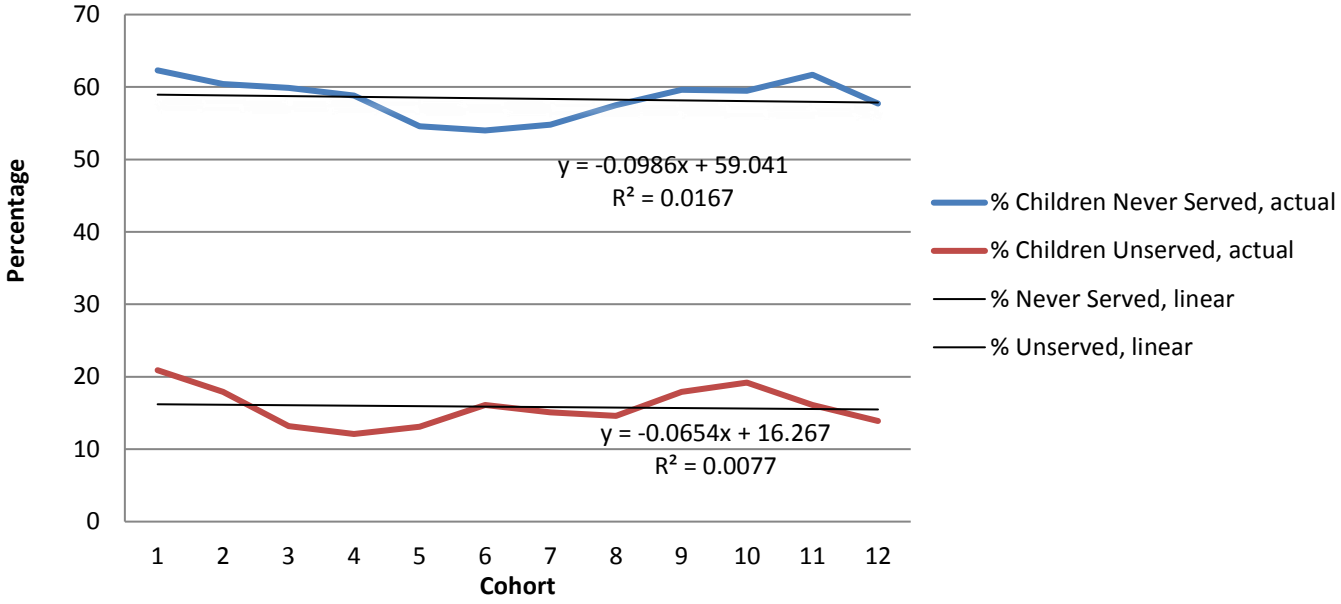
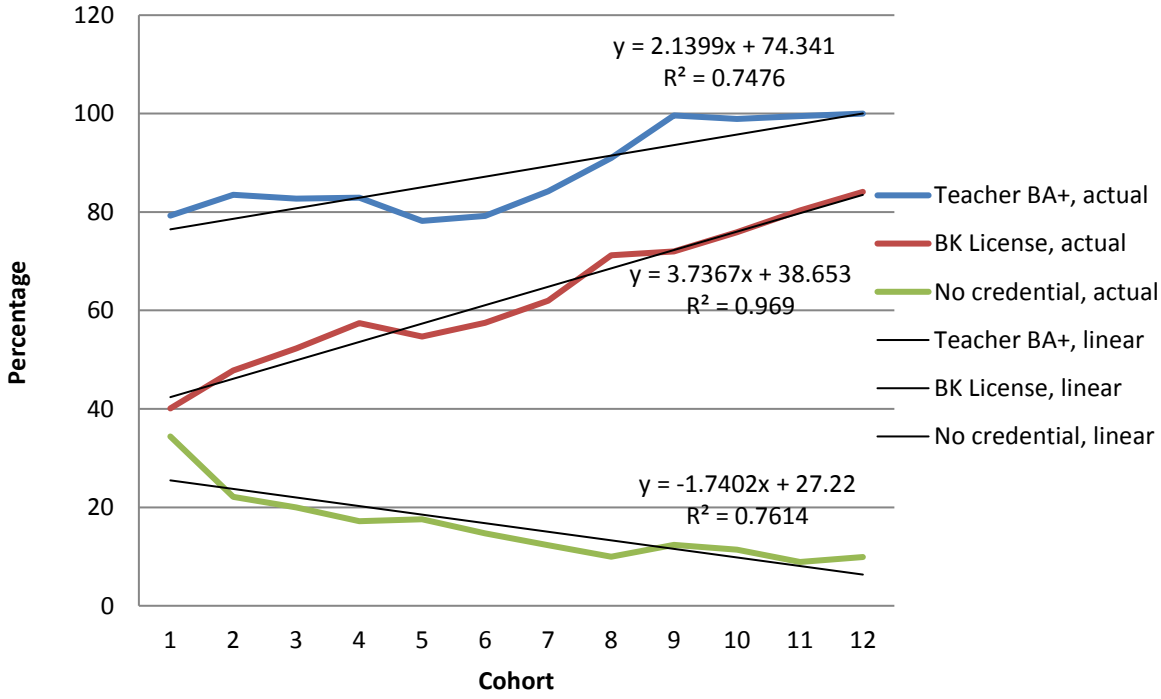


Figure 16. Trend of NC Pre-K Teacher Qualifications by Cohort (2003-2004 – 2014-2015)



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