

**Does Preschool Matter?
A Comparison among Local Preschool Intervention Programs**

A Dissertation

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by

Patricia Guarini-Reyes, B.A., M.A.

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ABSTRACT

This study investigated academic outcomes for 1105 alumni students of four different local preschool intervention programs designed for “at-risk” 4 year-olds. Seven years of archival data measuring kindergarten readiness skills (PALS-K) test scores along with 3rd and 5th grade Standards of Learning (SOL) Reading and Math test scores were analyzed. Tests of significance were applied to determine whether children who attended one of the local federally-funded preschool intervention programs demonstrated greater kindergarten readiness skills than those attending school for the first time in kindergarten; and whether students who received the early and follow-on intervention of the Bright Stars program outperformed students from the Head Start and/or No Preschool group in both initial kindergarten readiness skills and in the subsequent elementary school years. Results indicated that students who did not attend any form of preschool earned significantly lower PALS-K mean scores than students from the other three preschool groups. Tests of between-subject variance indicated that children with a primary language of English and classification of African American and Caucasian ethnicity earned significantly higher PALS-K mean test scores than did non-English and Hispanic children. No significant differences were found among the four preschool groups in regards to 3rd grade Reading SOL mean test scores. Significant differences were found for 3rd Grade Math SOL mean test scores (with and without co-variance for PALS-K scores) and 5th grade Reading SOL mean scores, with the Head Start group earning a

significantly lower mean test score than both the No Preschool and Private Preschool groups.

Department of Human Services
Curry School of Education
University of Virginia
Charlottesville, Virginia

APPROVAL OF THE DISSERTATION

This dissertation, "Does Preschool Matter?: A Comparison among Local Preschool Intervention Programs," has been approved by the Graduate Faculty of the Curry School of Education in partial fulfillment of the requirements for the degree of Doctor of Education.

Ronald Reeve
Ronald Reeve, Ph.D., Advisor

Antoinette Thomas
Antoinette Thomas, Ph.D

Bruce Gansneder
Bruce Gansneder, Ph.D.

Paige Pullen
Paige Pullen, Ph.D.

12/13/07 Date

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Chapter I

Introduction and Statement of Purpose

Growing interest in how pre-kindergarten programs can enhance school readiness in young children has prompted a flurry of political debates, furthering the need for identification of qualitative components that comprise an effective program and quantifiable proof that these programs produce beneficial long-term outcomes. Much of the existing research focuses on large federally-funded urban programs targeting low income and minority populations, such as Head Start, with mixed long-term results. Little research has been devoted to the identification of key components of successful pre-kindergarten programs, and no research exists at the local county level. Given that two-thirds of the pre-kindergarten funding comes from the locality, along with the growing need to provide services in underserved areas, and long wait-lists that exist in heavily populated areas, more research is needed to justify the expenditure on existing programs and any future expansion.

In Virginia, Governor Tim Kaine has vowed to make preschool available to every Virginia four-year old whose parents choose to enroll them. Start Strong is a \$300 million-a-year program designed to dramatically increase access to early childhood education in Virginia, without regard to a parent's income. Currently, about 24,000 of the state's 100,000 4-year-olds attend publicly funded preschool. Along with Head Start,

some individual localities offer school-based pre-kindergarten programs for at-risk/low income families. However, two-thirds of the funding typically comes from the school division, and not all divisions can afford to allocate this money.

Governor Kaine's proposed plan bears resemblance to the Oklahoma Universal Pre-K program, which is one of only three statewide programs in the nation to offer free pre-kindergarten to all students in participating school districts on a voluntary basis. Gormley and Phillips (2005) found that children exposed to the Oklahoma pre-kindergarten program on average demonstrated a 16% increase in their overall achievement test scores, had improved language and cognitive skills, and demonstrated some motor skill improvement; however, no statistically significant effects were found on socioemotional development. A closer look at the racial and ethnic subgroups revealed that Hispanic and black children benefited most from the program, while no statistically significant effects were reported for white children. The research team concluded that while the Oklahoma program results suggest that targeted programs (rather than universal) may focus resources on the children who generate the greatest benefits, other considerations point to the value of a universal approach. Those considerations included widespread public support and concerns regarding equity of access across racial and economic lines. The debate remains whether or not universal preschool is the answer, given the unequal fiscal situations and the inability to show lasting effects on less disadvantaged comparison groups.

Rationale for the Study

At this time, 38 states have some sort of state-funded preschool program with over 800,000 children enrolled. Most function as separate entities from the public K-12 school system. Interest in closing the achievement gap for low-income children has resulted in an explosion of public policy debate. Multiple studies continue to point to overwhelming evidence that quality preschool programs can provide an immediate boost to children's cognitive and academic performance and reduce their placement in special education classes. Moderate evidence also indicates that quality preschool programs decrease grade retention and increase the likelihood of high school graduation. Additional studies have found that teaching "at-risk" children literacy skills before they reach kindergarten subsequently lowers the probability of them later dropping out of school, becoming criminals, and receiving welfare (Dresang & Carr, 2005).

Economists, politicians, and business leaders are now advocating for early childhood education as a form of economic development. Evidence suggests that the savings on a societal level may be even greater, as much as a \$7 savings for every \$1 spent on early childhood education (Dresang & Carr, 2005). According to a study by Pre-K Now and the Trust for Early Education (Dresang & Carr, 2005), for every \$1 put into four-year olds' learning, Wisconsin schools would save 68 cents on later costs. The 68 cent savings is broken down by: 25 cents in higher teacher satisfaction, 20 cents reduction in special education services, 9 cents in lower teacher turnover, 7 cents in improved school

safety and climate, 4 cents in reduced pressure for aid programs, and 3 cents reduced need for substitute teachers. The same report finds that the city of Milwaukee would save 76 cents for every \$1 invested in high-quality pre-k. The Rand Corporation found that high-quality universal pre-k in California would return \$2 to \$4 to society for every \$1 spent (Dresang & Carr, 2005). Early childhood experts agree that quality universal pre-schooling would save schools money, but some prefer programs that target the kids who need it most. Bruce Fuller, a UC Berkeley professor, warns advocates and policy makers that one should not generalize from the results of research projects aimed at the most disadvantaged children (Dresang & Carr, 2005).

A Local Preschool Intervention Program

A county located in Central Virginia, in conjunction with the local Department of Social Services (DSS) and various community agencies, offers a unique program called Bright Stars, which affords 4-year-olds the opportunity to attend a pre-kindergarten program at the same school where they will attend kindergarten. Bright Stars is funded partially through DSS, along with money set aside from the Virginia Preschool Initiative state fund. What makes this program unique from other pre-k programs (such as Head Start) is that Bright Stars is staffed with certified early childhood educators, has entry criteria that are not solely related to income, and has continued family support throughout the 7 years (pre-k-grade 5) a child attends elementary school (provided they remain

within the district where a Bright Stars program operates). A Family Support Worker hired through DSS serves as a case manager, providing ongoing “follow on” family support to address individualized physical, social-emotional, and academic needs of the Bright Stars students and alumni, including their family members.

The goal of the Bright Stars program is to provide consistent and comprehensive early interventions for both the students and their families so they can acquire the knowledge and skills to eliminate or reduce risk factors (economic, socio-emotional, physical, and academic) and decrease academic failure. The Bright Stars program uses a classroom approach that emphasizes active learning and social emotional competence. Expected outcomes of the program include: demonstrated performance of basic preschool skills; fostered and increased parent-school involvement; students’ recognition of school as a safe learning environment; participation with community agencies to provide consistent and comprehensive services for families; and a smooth and seamless transition to kindergarten and beyond (Bright Stars Website).

Bright Stars has been in existence for 10 years and is offered at 6 out of 16 county elementary schools. Each of the 6 schools has one class of approximately 16 students, with the exception of one of the schools, which added a 2nd class for the 2006-2007 school year. The Bright Stars program utilizes the High/Scope approach to early childhood education, a nationally recognized teaching method in which children are

active learners, as a foundation from which teachers provide materials and opportunities to explore and experiment in different ways (High/Scope Educational Research Foundation, 2006). The curriculum offers a focus on social-emotional competence including problem solving, meta-cognitive skills, and positive communication, as well as academic skills in literacy, math, and science. The High/Scope curriculum is supplemented by the Virginia Foundation Blocks for Learning in Reading and Math in order to balance the child-centered approach with teacher-directed learning (Virginia Department of Education, 2005). The children have opportunities to be part of the larger school environment in preparation for the following years through participation in music, art, library, cafeteria time, book buddies with older students, and physical education. The Bright Stars program follows a regular 6.5 hour school day, five days a week. Class ratios are limited to 16 students with 2 teachers (1 fully-certified teacher and 1 teaching assistant).

In addition, all Bright Stars students receive free breakfast, lunch, and snack provided by the USDA and supplemented by the program. Lunch is served family style with a focus on language development and good manners. Parent involvement is an expectation and a key component of the Bright Stars program. Each week an information packet is sent home containing a newsletter, books, activity suggestions, and materials for parents to help their children build basic skills. Monthly family nights include a dinner, family activities, and parent education. In order to bridge the gap between home and

school, each Bright Stars classroom has a Family Support Coordinator to help address the individualized needs of families. These coordinators provide family assessments, home-school services and referrals within the community, planned family-school events, and parent education. Initial home visits are made by the teacher along with the Family Coordinators at the beginning of the school year and then as needed by the coordinator throughout the 7 years of elementary school. Although this population tends to be somewhat transient, should a Bright Stars child move to another county school with a Bright Stars program, the coordinator at the new school will continue providing follow on services.

As noted above, the selection criteria for entry differs from Head Start and other programs in that selection is based on a point system as an equitable means for identifying the "greatest need" as set forth in the Bright Stars definition of "at-risk." According to the Bright Stars manual, the selection criteria include: parent's background (reading ability, level of education, English proficiency, and age at time of the child's birth), family/household demographics (siblings in school with behavioral or academic problems, income, domestic violence, substance abuse, chronic illness, criminal activity, work history, and community agency involvement), and child factors (oral language skills, lives with other than biological parents, lives in unsafe or transient area, evidence of severe health/dental problems, developmental disability, behavioral problems, and social and personal needs).

Chapter II

Review of the Literature

Barnett (2005) asserted that the strongest evidence on long-term benefits of preschool comes from studies of two well-known preschool programs, the Perry Preschool and Abecedarian programs, in which key aspects of the programs are high quality and intensity. The programs producing larger effects had better educated teachers, smaller class sizes, stronger supervision, and other resource advantages. The Perry studies reported that for every dollar spent on a preschool program, taxpayers saved \$3 to \$6 by age 19 due to reduced grade retention, welfare usage, and crime. Increased school completion and employment rates were also reported among Perry graduates. Other areas of savings were noted in that students were less likely to be assigned to special education classes and somewhat less likely to be retained in grade (Barnett, 2005).

The High/Scope Perry Preschool program was selected by the American Psychological Association's Task Force on Promotion, Prevention, and Intervention Alternatives as an exemplary prevention program, and the Perry study was called a "prototype" in terms of design, instrumentation, and analysis. Substantial evidence of the long-term benefits and the cost effectiveness of high quality early childhood education for disadvantaged children was demonstrated (Schweinhart & Weikart 1988). The

High/Scope Perry Preschool curriculum is based on child-initiated learning activities rather than direct instruction. Not only did the High/Scope Comparison study show improved cognitive performance, 15 year old boys and girls who had experienced this child-initiated approach reported engaging in half as much juvenile delinquency as comparable non-participants.

The child-initiated approach emphasizes active learning (children learn by doing, touching, feeling, and acting). McGill-Franzen, Lanford, and Adams (2002) argued that children of color and economically disadvantaged children are socialized to practice a different sort of literacy, one that offers limited exposure to books and that is less connected to personal and community identity. It is widely accepted that a child's earliest experience with books and print lays the groundwork for success in school, and that books promote language literacy and growth. McGill-Franzen et al. found that in public vs. private funded preschools, far fewer books were available in public programs, and the range was limited in terms of genre and linguistic complexity, content, and topics, perhaps contributing to a view of poor children as limited learners and participants in a literate culture. In addition, the children's access to print knowledge in the form of prominent display of alphabet, instruction in letter identification, and assistance with printing and writing was more limited or even nonexistent. In the publicly funded preschools, the teachers reported that they conveyed information about print only to children who demonstrated that they were "ready" to be taught. The children most at risk

appear to have the least exposure to printed text in income-eligible schools. Yet, reading is the main source of vocabulary acquisition. "One of the best-established relationships in the field of reading is the very significant relationship between vocabulary development and achievement in reading" (Baumann & Kameenui, 1991, p. 605).

Children from low-income or less educated families may be "doubly disadvantaged" by being less likely to receive stimulating care at home and less likely to be enrolled in educationally oriented care outside the home (Meyers, 2004). The evidence overwhelmingly suggests that family income is a strong predictor of academic achievement and attending preschool during the third and fourth year of life promotes children's cognitive development and educational achievement. Magnuson (2004) found that children who attended a center or a school-based preschool program in the year before school entry performed better on assessments of reading and math skills at the beginning of kindergarten. These advantages persisted in the spring of kindergarten and first grade, and participants were less likely to be retained in kindergarten. Additionally, Bradley, Burchinal, and Casey (2001) suggested that attendance in a formal preschool program that includes a cognitively stimulating environment along with positive interactions with a responsive caregiver may help compensate for a less stimulating home environment. Crone and Whitehurst (1999) found that schooling (kindergarten) has a strong impact on the development of emergent literacy and reading skills, 1.7 times stronger than the effect of other processes associated with age.

A recent report published by the National Center for Children in Poverty (Klein & Knitzer, 2006) purports that children achieve more when teachers are better educated and trained specifically in the areas of early childhood and child development. A follow-up by Early, Bryant, Pianta, Clifford, Burchinal, Ritchie, Howes, and Barbarin (2006) to the six-state NCEDE (National Center for Early Learning and Development) pre-kindergarten study concluded that having a 4-year bachelor's degree may be a necessary component for providing high-quality early learning experiences. However, the findings for achievement were inconsistent, with math being the only area of measurable difference between teachers with Bachelor's degrees and those with associate's degrees or less. Nonetheless, both studies pointed out that most academic gain is made in classrooms where the teacher engages in positive interactions that foster an environment of respect, communication, reasoning, and encouragement, and the best way to ensure high quality is when teachers are highly trained in the areas of early childhood and development.

Several states measure program "quality" only in terms of proxies, e.g. the credentials of teachers, size of facilities, amount of available learning material, and length of school day. Implementation of instruction through teacher-child interactions is a critical and often overlooked aspect of program quality (Pianta, 2007). Yet, among the state-funded pre-K classrooms in the NCEDE study, Pianta's study found only about 25% of

preschool classrooms employ high levels of emotional and instructional support. Moreover, pre-k teachers, assistant teachers, and other staff working with children in pre-k programs must be thoroughly prepared to serve a wide range of families, as many states intentionally enroll a high proportion of families with economic and social needs (Barbarin, et al., 2006). The quality of program implementation provides a central influence on prevention outcomes; superior training and support of teaching staff enhances how well a particular intervention is executed (Durlak, 2003).

Another critical area of importance is the presence of built-in supports that address family and community barriers to learning, such as child and family health and mental health. The National Consortium for Children in Poverty (NCCP) report by Klein and Knitzer (2006) highlights four key principles regarding effective early learning strategies:

#1 “High quality, continuous early care and education help low-income children do better in school” (p. 8). Programs should be offered full-day, 30 hours + per week, for a minimum of 1 year.

#2 “Social-emotional development is the foundation for, and intertwined with, early cognitive development” (p. 9). Stable and supportive social relationships form the base for the development of self-confidence, self-management, and the ability to get along with others (both peer and adult).

#3 “Formal early learning occurs in a variety of settings, including school-based, center-based, and home-based programs” (p. 9). Limited research exists on the impact different settings have on children’s early literacy and math achievement.

#4 “Closing or reducing the achievement gap between low and middle income children requires a comprehensive approach that goes beyond the effort to improve what children know” (p. 10). Support needs to be sustained and strategic to include comprehensive family services that foster a family/community system that provides bidirectional support.

Reynolds (1998) found that participation in preschool plus “follow-on” or extended childhood intervention (preschool through third grade) had more sustained effects on resilience (social and scholastic) and educational achievement than those with preschool alone. Within this study, resilience was defined as functional competence in the presence of multiple risk factors (poverty, stress, and low educational achievement).

Furthermore, results showed better school performance at the end of early childhood substantially increases the likelihood of scholastic resilience in early adolescence.

Sroufe, Egeland, and Kreutzer (1990) noted that children’s functioning is probabilistically enhanced by prior success and is constrained by prior failure, and that

preschool intervention programs have the ability to right the developmental trajectories of children.

Head Start has been extensively studied for over 4 decades, yet the long-term benefits and the magnitude of those benefits remain unclear. Lee, Brooks-Gunn, and Schnur (1988) found that although disadvantaged children benefit from exposure to the Head Start preschool experience, this exposure did not entirely close the cognitive gap. They did find that a single year of "treatment" produced large gains in intellectual abilities, yet given the disparity to begin with, they concluded that it was unrealistic to expect that one school year's experience could make up for participants disadvantage at the outset. The researchers used the data as a reason to mandate enhancing the program, suggesting that a follow up program would likely magnify and solidify the Head Start advantage. Zigler (1993) asserted that "Head Start is only effective when quality is high." Many Head Start programs have been criticized for not providing coordinated health services, provisions for parental involvement, and family support. Project Follow Through, a continuance of Head Start services to graduates through Grade 3, was adopted in 1967, but its mission was never fulfilled. Another attempt at comprehensive follow on services, the Transition Project, was initially adopted by 32 demonstration sites, yet 10 years later still remains isolated to a few centers rather than nationwide (Zigler, 1993).

CHAPTER III

METHODS AND PROCEDURES

Hypotheses

This study sought to investigate the academic outcomes for alumni students of local preschool intervention programs designed for “at-risk” identified preschool children. Archival data were culled from the past 7 years measuring kindergarten readiness skills according to PALS-K test scores given during the early fall of the kindergarten school year along with 3rd and 5th grade Standards of Learning (SOL) Reading test scores. These scores were analyzed and tests of significance attempted to answer the following research questions. Do “At-risk” children who attend one of the local federally-funded preschool intervention programs (Bright Stars and Head Start) the year prior to attending kindergarten demonstrate greater kindergarten readiness skills than those attending school for the first time in kindergarten? And, given the unique comprehensive services offered by the Bright Stars program, do “at-risk” students who received the early and follow-on intervention of the Bright Stars program outperform their counterparts who attended Head Start, as well as those who attended school for the first time in kindergarten, in both initial kindergarten readiness skills and academic achievement in the subsequent elementary school years?

H1: “At-risk” identified students who receive preschool intervention designed for 4-year-olds (Bright Stars, Head Start, or private preschool) prior to attending kindergarten will demonstrate statistically significant differences in terms of kindergarten readiness skills as measured by the PALS-K instrument than those attending school for the first time in kindergarten, with the preschool group performing better.

H2: Students who attended the Bright Stars 4-year-old preschool intervention program, which includes 6 years of “follow on” family support, will demonstrate statistically significant differences on 3rd and 5th grade Reading and Math SOL tests than “at-risk” identified students who attended the Head Start program or no preschool intervention program at all, with Bright Stars alumni performing better.

Subjects

The term “at-risk” is defined in many different ways. For the purposes of this study, local county students were deemed “at-risk” if they attended either the local Bright Stars or Head Start preschool programs and/or qualified for free/reduced lunch assistance based upon the federal guidelines for the National School Lunch Program (NSLP). The NSLP is a federally assisted meal program operating in public and nonprofit private schools in order to offer low-cost or free nutritionally balanced daily breakfast and

lunches within these schools. In order to qualify for the free and reduced lunch program, one must complete an application and qualify under the poverty guidelines established for each family size (i.e., in 2007 a family of 4 must earn less than \$20,650 a year to qualify).

Using the school division's electronic data base, 957 free/reduced lunch eligible students were identified as currently in kindergarten through the 7th grade and who attend(ed) one of the nine elementary schools housing either a Bright Stars or Head Start preschool program. Although a 66% majority (286 students) of the Bright Stars population qualifies for free and reduced lunch status, entry criteria are not solely dependent upon income and therefore 34% (148 students) Bright Stars alumni did not meet the federal NSLP guidelines. However, these Bright Stars students were added to the sample of 957 (for a total sample of 1105) by virtue of having attended a program designed for "at-risk" 4-year old pre-kindergarten children.

Out of the 1105 students, 86% of the sample met the stringent federal NSLP guidelines for free and reduced lunch and the entire Head Start, Private, and No Preschool groups are made up of free and reduced lunch eligible children. In order to account for the possibility of income producing a confounding factor, test scores were analyzed with and without the 148 "self pay" lunch children in order to determine whether income contributed to any differences found. Also within this sample, males were found to slightly outnumber female students, 570 (52%) to 535 (48%).

Additionally, an overwhelming majority of the sample students (904, 82%) are native English speakers. Among the various ethnicities represented, 43% (N = 472) are classified as Caucasian, 37% (N = 406) as African American, 15% (N = 166) as Hispanic, 3% (N = 34) as Asian, and 2% (N = 27) were condensed into an "Other" category (due to very small numbers representing each classification) and consisted of undeclared, biracial, or American Indian.

Setting or Type of Preschool Experience

The sample of 1105 students included students from four pre-kindergarten groups (Table 1) based upon the form of preschool intervention or experience received at age 4. The students attended one of the four preschool programs over the last 7 years and were 4 years-old between the 1998-2005 school years. The 1st group contained alumni who attended the Bright Stars pre-kindergarten program and consisted of 434 (39.3%) students; the 2nd group of 222 (20.1%) students was made up of Head Start pre-kindergarten alumni; the 3rd group of 305 (27.6%) students did not attend a formal preschool program at age 4 and was titled the "No Preschool" group; and the 4th group of 144 students (13.0%) attended a private or self-pay form of preschool.

Table 1

Sample by Type of Preschool Experience		
Preschool Group	N	%
Bright Stars	434	39.3%
Head Start	222	20.1%
No Preschool	305	27.6%
Private Preschool	144	13.0%
Total	1105	100%

Bright Stars Preschool Group

The Bright Stars program is a local pre-kindergarten program designed for 4 year-olds jointly operated by the County school division and the local Department of Social Services. Funding for this program is provided 2/3 by the local county and 1/3 by the Virginia Preschool Initiative (state level funding). The program began as a single classroom in 1995 and has since grown to include six classrooms, each serving approximately 16 students. The programs are strategically placed in areas (6 elementary schools) of the County demonstrating high educational and social service needs. The Bright Stars service mission is to increase the opportunities to learn by promoting family involvement and addressing risk factors (social service involvement, unemployment, parent did not graduate from high school, weak parenting skills, etc...) that affect school performance. Entry to Bright Stars is granted based upon assigned risk points along with a required application process. The program is offered free of charge and operates

within the child's base elementary school. Designed to ease with transition to kindergarten, the length of day mirrors the regular K-6 school day and students are introduced to "special" classes such as gym, art, and music. Special classes refer to classes outside the core area of language arts, mathematics socials studies, and science. Class size is limited to a maximum of 16 students per two adults (one teacher and one teaching assistant). Bright Stars teachers are fully licensed degreed early childhood educators with the minimum of a Bachelors degree in education. Once a child is admitted to the Bright Stars program, a licensed social worker is assigned as a case manager to provide family support and remains in that capacity until the child transitions to middle school in grade 6. Both the Bright Stars and the Head Start programs include a social-emotional component where preschoolers are taught skills such as how to resolve conflicts in a peaceful manner, basic friendship making and sustaining skills, and appropriate school behaviors. In addition, both programs have access to special education and/or related services (occupational and physical therapy and speech and language services) for children eligible for special education services and who require an Individualized Education Plan in order to address their specific needs (Table 2).

Head Start 4-year old Preschool

The local Head Start program is administered through grants (80-90% federally funded) to local public and private non-profit and for-profit agencies to provide comprehensive child development services to economically disadvantaged children and

families. The Head Start program dates back to the 1960's and is designed to promote school readiness by enhancing the social and cognitive development of children through the provision of educational, health, nutritional, social and other services to enrolled children and families. Although now offered birth to age 3, the students within this sample were taken exclusively from the program for 4 year-olds. The program is offered free of charge and is almost entirely based upon income guidelines, with a provision for 10% of the applicants to be non-income qualified. At the county level, the Head Start program is housed at 3 county elementary schools as well as one community center. Class sizes are generally set at 20 children for every 2 adults. Approximately 30% of Head Start teachers possess a degree in teaching, yet the majority of the teachers hold a state credential earned by attending 50 hours of training. The average salary for non-degreed Head Start teachers is \$21,000 per year, less than half the average Bright Stars teacher salary (\$43,000 a year). Differing from Bright Stars, case management or family support is provided only during the preschool year (age 4) when a child is actually enrolled in Head Start with no follow-on support for alumni.

The No Preschool Group

The No Preschool group encompasses children who did not attend any formalized preschool program and who entered school for the first time in kindergarten. These children may have been cared for in home or in a non-educational day care home or group setting.

Private or Self- Pay Preschool Group

Although the word “private” often musters ideas of exclusive high-dollar school settings, for the purposes of this study “private” generically equates to a “self-pay” form of preschool. Self-pay refers to a set tuition that is paid for by the families of the preschool children. These private preschools are not subsidized by federal funds and may include church-based or for-profit type centers offering a formalized pre-kindergarten academic program for 4-year-olds.

Table 2

Program Characteristics of Bright Stars and Local Head Start Program		
	Bright Stars	Head Start
Teacher Certification	fully licensed	CDA minimum (training-no degree)
Curriculum	High Scope	Creative Curriculum
Ratio	16:02	20:02
Location	Base School	varies (3 in schools)
# of Sites	6	4
# of Classes	7	11
Length of Day	6.5	6
Family Support	Yes	preschool years only/ 1 for every 2 schools
Amount of Follow On Support	6 years	0
Specials	varies	no
Breakfast/Lunch/Snacks	family style/100% funded	100% funded
Source of Funding	2/3 county, 1/3 Virginia Initiative	90% federally funded/"in kind" services
Social-Emotional Component	Yes	AI's Pals
Transportation	regular school bus	Maca bus, Jaunt, School Bus
Eligibility	ranking system-not solely income	90% income/10% over income
Risk	economic, developmental, educational	economically disadvantaged
Ages	4	3 and 4
Part of School System	yes	independent
Special Education	no requirement	10% enrollment opportunities
Related Services	Speech, community-based teacher	Speech, community-based teacher
# of alumni 98-06	640	560

Elementary School Sites

Once the sample was identified and categorized into one of four preschool programs/experiences, the sample was further defined by elementary school site. Naturally occurring site-based dissimilarity may provide for rival hypotheses by contributing to the disparity in long-term achievement data measured in the 3rd and 5th grade. The sample of 1105 “at-risk” county students (currently in grades kindergarten through 7th grade) attended one of nine elementary schools housing either a Bright Stars or Head Start preschool program. At the present time, 9 out of 16 elementary schools located within this county offer either a Bright Stars or Head Start preschool program. The remaining 7 elementary schools within this particular county do not have the population or funding to support one of these preschool programs. From the 9 elementary schools, 6 offer a Bright Stars preschool program and 3 schools offer a Head Start school-based preschool program. For the 9 schools involved, each was assigned a number 1-9 (in no particular order) in order to maintain anonymity (Table 3). Schools #2, 3, 4, 5, 6, and 9 include a Bright Stars program and schools #1, 7, and 8 currently house a Head Start program. Table 3 depicts what elementary school this sample of 1105 children attended for the majority of their time during elementary school. Among the 9 elementary sites (Table 2), students from School #5 were more likely to have attended a private preschool than all of the other elementary schools in this study according to a Chi-Square prediction X^2 (df = 24, N = 1105) = 237.5, $p < .001$. It should be noted that School #5 is located closest to the urban ring of the city, where many private options

exist within close proximity. In addition, students from Schools #1, 3, and 7 were less likely to attend any form of preschool, thus the “No Preschool” population sample is higher than expected. This result may be due to the fact that these schools are located in more rural areas of the county, with less access to private self-pay preschools and greater driving distances.

Table 3

Sample Distribution by School					
	Bright Stars	Head Start	No Preschool	Private	Total
School #1	0	36	37 a	6	79
School #2	71	39	60	29	199
School #3	100	9	13 a	14	136
School #4	38	34	39	14	125
School #5	80	31	47	36 a	194
School #6	78	21	38	16	153
School #7	7	34	44 a	12	97
School #8	3	7	9	7	26
School #9	57	11	18	10	96
Total	434	222	305	144	1105
X^2 (df = 24, N = 1105) = 237.5, p < .001					
a - more than expected # of students					

Sample Characteristics by Preschool Year (1998-2004) and Current Grade Level

It is important to portray the sample population and how it varied from year to year in size and distribution across the four preschool groups. With the exception of the most recent school year (2005-2006), the sample population over the years has steadily increased and more than doubled in size from a total of 78 pre-school students now currently in the 7th grade to a total of 195 currently in kindergarten (Table 4). The gradual increase can be attributed to the greater availability of preschool intervention programs now offered within this county. The Bright Stars preschool intervention group has produced the largest proportion of students within the total sample for 6 out of 7 grade levels within this study. In the 2002 preschool year (students currently in the 3rd grade), the No Preschool group slightly outnumbered the Bright Stars group in size. The largest group of students (434) attended the Bright Stars program, the next largest group (305) consisted of children who did not attend any form of preschool, the third largest group (222) was made up of Head Start program alumni, and the smallest group (144) came from the Private preschool group.

Table 4

Sample by Current Grade Level and Preschool Experience						
		Bright Stars	Head Start	No Preschool	Private	Total
Current Grade						
	K	79	46	54	16	195
	1	75	45	59	21	200
	2	64	53	35	19	171
	3	61	21	67	21	170
	4	46	12	29	21	108
	5	46	20	23	9	98
	6	34	12	20	19	85
	7	29	13	18	18	78
	Total	434	222	305	144	1105

Research Design and Procedures

Research Design

A quasi-experimental design was utilized for this research given that random selection and assignment were not possible in this naturally occurring field research utilizing ex post facto archival data. Multiple comparisons were made using test data from children (N = 1105) who attended one of four preschool intervention/experience groups (Bright Stars, Head Start, No Preschool, and Private Preschool) during the 1998-2005 school years within a single Central Virginia county school division. Kindergarten readiness was measured by a post-test (PALS-K) score obtained after completion of one year of preschool and administered in the fall of the kindergarten year, and long-term achievement was measured by 3rd and 5th grade Reading and Math SOL tests. Test

scores from 3 different points in time (entry to kindergarten, 3rd grade, and 5th grade) were individually analyzed (one-way ANOVA) initially by demographic variables (gender, income, primary language, and ethnicity) and then co-varied (three-way ANOVA) once by preschool program, gender, and ethnicity, and a second time by preschool program, gender, and primary language (ESOL designation) in order to determine the operative variable(s) and evaluate for possible interactions among these variables. In addition, test scores were analyzed by elementary school site and also by preschool year and current grade of student in order to examine differences and trends in data over time that may provide data with which to examine rival explanations to the hypotheses presented.

Procedures

Prior to writing a dissertation proposal, this researcher met with the Director of Federal Programs for the school system involved to gain preliminary approval to proceed with this study. Once a written proposal was established, application was made with the school system's Institutional Review Board. Part of the approval process included an interview with the county's IRB board members to discuss the various aspects of this study and the data needed. An agreement was reached that required a sample data base to be created within the school system's Office of Assessment and that identifying data would not leave the office until stripped of individual student names.

Additional meetings took place with the Bright Stars Coordinator, along with approval granted from the county's Director of Social Services, the department overseeing the Bright Stars preschool intervention program. The Director of Bright Stars provided this researcher with access to an extensive data base containing Bright Stars alumni information. Phone and email contact was made with the local Head Start program director and Head Start alumni enrollment data were provided for the purposes of this research.

An application was then made with the University of Virginia's Institutional Review Board for the Social and Behavioral Sciences. Once formal written approval was granted from both the county's School Institutional Review Board and the University of Virginia's Institutional Review Board, the process of identifying the sample population began using the county's electronic data base or Student Information System (SASI) within the Office of Assessment. The student data base operates through a closed network within the school division. Each school has the ability to revise or make changes to its own data, yet the main frame is managed through the County's Office of Technology. The Office of Assessment provided work space and a computer to create an Excel format list of student names (from the SASI network) currently in grades kindergarten through the 7th grade. From that list, a 2nd query was run in order to narrow the list of names down to those qualifying for free and/or reduced lunch based upon the

Federal Lunch Guidelines. At that point, a cross check was made using the Bright Stars and Head Start enrollment lists (obtained earlier from the directors of both programs) in order to add program alumni who did not qualify under the free and reduced lunch guidelines. A group of 148 former Bright Stars students were identified who did not meet the federal criteria to receive free and/or reduced lunch. However, since they qualified for the Bright Stars program due to characteristics (other than low income) classifying them as "at-risk," they were added to the sample population. Some of the "at-risk" characteristics, mentioned before, include factors such as single parent household, parent(s) who did not graduate from high school, family involvement with social services or the court system, a family with older siblings who attended the Bright stars program, etc.

Once the sample population of 1105 students (currently in grades kindergarten through 7th grade) was established, an Excel spreadsheet was organized by the county elementary school attended during the student's kindergarten school year. Additional fields were created to house information regarding current grade level, preschool intervention program/experience (Bright Stars, Head Start, private preschool, or no preschool), lunch status (free/reduced or self pay), ethnicity, gender, primary language spoken within home (ESOL status), special education designation at current grade level (if any), within county school transfer status (cross check to see if current elementary school was the same as school attended in kindergarten), the kindergarten fall Summed

Score on the Phonological Awareness and Literacy Screening test (PALS-K) test, 3rd grade Reading and Math Standards of Learning (SOL) test scores (if any), and 5th grade Reading and Math SOL test scores (if any). From the sample population identified at this point, students were removed if they had transferred outside of one of the 9 county elementary schools currently housing either a Bright Stars or Head Start preschool program.

Many unexpected challenges were encountered in the data collection process including incomplete test and demographic data, requiring this researcher to cull through paper files and gather data at the individual school level. At the present time, this school system has adopted a SchoolNet program (a more efficient up-to-date web-based data base design) with the goal of eliminating these gaps in data while allowing for teachers at the school level to manipulate and input the data themselves.

Anonymity

Upon completion of the sample population data base, individual names were removed and replaced with anonymous numerical data. Anonymity was ensured through the use of a numerical code system, and data containing individual names never left the county's Office of Assessment. The findings were reported in aggregate numerical statistical form in response to the various hypotheses; individual data are not presented. Additionally, the name of the school division and individual elementary school names

were not reported. The school division is referred to as a Central Virginia school system and individual schools were numbered from 1 to 9 and described only in terms of characteristics of the location and of the population within the school.

Limitations

In “ex post facto” field research, such as with the current study, random selection and assignment to type of intervention group are not possible which may result in a naturally occurring bias within the sample. One of the challenges encountered by this research design was that the sample size varies by measure and did not include the identical cohort of children for each analysis due to the fact that some of the students were either too young and had not been given the 3rd and/or 5th grade measures at the time of this study or they may have been absent or exempt from one or more of the measures. A pre-test (prior to entering a preschool program) would have added to the validity of this study by determining whether or not the abilities of the children were comparable prior to entering a preschool intervention program, and controlling for differences if such were found. Additionally, missing data and inconsistencies were found within the electronic data base, requiring this researcher to cull through paper files in order to gather 1105 individual PALS-K and SOL test scores. Among the missing or inconsistent data, maternal level of education and household information (single/ two-parent unit) were not fully accessible for the entire sample, such data could have added valuable information to

the results of this study given the importance of these two factors as noted within the existing literature.

Measures

The Virginia Standards of Learning (SOL) and Phonological Awareness Literacy Screening (PALS-K) instruments were chosen for this study because they are routinely given to most students within this Central Virginia school system. The Standards of Learning for Kindergarten include many of the literacy skills assessed by the PALS-K instrument. The PALS-K provides a direct means of matching reading instruction to specific literacy needs. At each grade level, the Standards of Learning (SOL's) tests were designed to measure reasonable expectations for what teachers are expected to teach and students expected to learn. Both instruments purport to measure fundamental skills to provide a means to guide instruction.

Phonological Awareness Literacy Screening

The Kindergarten Phonological Awareness Literacy Screening or PALS-K was the instrument used to measure kindergarten readiness skills for the children within this sample. Currently, this instrument is considered to be one of the best indicators of early literacy skills and is used by 98% of the school districts in Virginia (according to the PALS website). Since 2002, the PALS-K instrument has been uniformly administered to all county kindergarten students 3 times per year (fall, mid- year, and spring). The

PALS-K was designed to measure literacy fundamentals and includes six subtask areas: Rhyme Awareness, Beginning Sound Awareness, Alphabet Knowledge, Letter Sounds, Spelling, and Concept of Word. The PALS-K is both individually and small group (less than 5) administered. The subtask scores are added together to create a Summed Score which is compared against developmental expectations for the fall and spring. Students scoring below these expectations (bottom quartile) are provided with additional reading instruction during the regular school day. The PALS-K can also be used as a diagnostic tool to guide instruction. The fall administration of the PALS-K instrument is generally given in the early part of the kindergarten school year and was used to measure kindergarten entry level skills for the purposes of this study. The total fall Summed Score ranges from 0 to 102, with the criterion or "benchmark" Summed Score coinciding with the highest number at the bottom quartile.

Reliability for the PALS-K was assessed using test-retest reliability, subtask or internal consistency reliability, and inter-rater reliability (Invernizzi, et al, 2003). Test-retest reliability refers to the extent to which the same results are obtained when the measure is administered at different times. Pearson correlations indicated test-retest reliability between administrations ranging from .78 to .95. Data generated from statewide samples for internal consistency reliability determined by Cronbach's alpha ranged from .82 to .89 for the entire sample. Additionally, inter-rater reliability was found to be consistently high, within the range of .96 to .99.

For the PALS-K, three types of validity were assessed, content validity, criterion – related validity (predictive and concurrent), and construct validity. Content validity refers to the degree that the task items are relevant and represent the content addressed on the instrument. Research literature identified rhyme and phonemic awareness as two specific areas of phonological awareness. Special care was taken to ensure that items representing these skills were adequately included on the PALS-K instrument. Whether or not assessment scores are related to outcome criteria considered to be criterion validity. Both predictive and concurrent validity found medium-high correlations between kindergarten students' Summed Scores obtained from the fall of 2000 scores relative to later PALS-K and PALS 1-3 Summed Scores. In regards to predictive validity, the correlation between end-of-the-year kindergarten PALS-K Summed Scores and the Total Reading Stanford-9 scaled scores was medium to high and significant ($r = .72, p < .001$). Construct validity pertains to whether or not underlying traits of an instrument can be identified and reflect the theoretical model for which the instrument is based. The PALS instrument was designed to measure a child's knowledge of sound and print and identify students in need of additional reading instruction. Discriminant analyses have remained consistent since 1997 in accurately classifying 93% to 97% of students into Identified and Not-Identified groups in need of supplemental reading support based upon the bottom quartile benchmark.

The availability of test scores (Table 5) varied depending upon current grade level cohort within the original sample of 1105 students. Kindergarten readiness skills were measured by the Summed Score from the fall kindergarten administration of the PALS-K test. The PALS-K scores were accessed for 976 students currently in grades kindergarten through 6th grade. The initial sample of 1105 students was reduced to 976 because the PALS-K test was not routinely administered prior to the 2000-2001 school year at all of the county schools within this study; therefore, the current 7th grade cohort was not included in the analysis of PALS-K test data (reducing the sample from 1105 to 976 for this particular portion of the study). From the 976 sample, 194 attended kindergarten in 2006, 182 in 2005, 171 in 2004, 170 in 2003, 100 in 2002, 78 in 2001, and 81 in 2000. The sample population increases in size with more recent cohort groups, mirroring the availability of preschool intervention programs, as well as reflecting loss of students over time due to transfers in and out of the county.

3rd and 5th Grade Standards of Learning Tests

The Virginia Standards of Learning (SOL) are educational assessments in the areas of English (including reading skills), mathematics, history, social science, and science and describe the Commonwealth's expectations for student learning and achievement in grades K-12. The SOL tests are intended to inform parents and teachers about what students are expected to learn at each grade level and to hold schools accountable for teaching the SOL content of these predefined expectations. These tests are criterion-

based and uniformly administered to all students, with few exceptions due to the No Child Left Behind (NCLB) regulations. The NCLB regulations stipulate that all children are expected to achieve at a commensurate level regardless of identifying characteristics. The SOL tests are given in multiple-choice format. SOL scores are standardized and scores range from 0-600. A minimum of 400 is needed to be considered a passing score, while a minimum of 500 is needed to be labeled as "Advanced Proficient."

Concurrent validity is the degree to which two different measurements produce correlating results. Documentation on the concurrent validity of the SOL assessments is available in the form of correlations, with a range of .50 to .80 between SOL assessments and standardized achievement tests, such as with the Stanford 9 Achievement Test. This range is considered ideal for these assessments, given that too much or too little of a correlation between these different tests may indicate a problem with validity of the SOL assessment scores. The extent to which the same results are obtained when student responses are measured at different times refers to reliability. A Kuder-Richardson Formula 20 (KR-20) was used to estimate the internal consistency reliability (consistency and accuracy of assigning students to performance categories) of each grade and form of the SOL assessments, with coefficients ranging from .80 to .92 for the last three years. Overall, the KR-20 coefficients revealed reasonably high reliability of the SOL forms. This reliability evidence suggests that the SOL assessments are solid and typical of high quality assessments.

In 3rd and 5th grade, students are assessed in four core areas, reading, mathematics, science, and history/social studies. Academic achievement in this study was measured using the Standards of Learning (SOL) test scores given in 3rd and 5th grade. Four years of 3rd grade reading and math SOL test scores were gathered from students currently in grades 4-7 and who were in the 3rd grade during the 2002-2005 time span. Currently, these tests are not given before the spring of the 3rd grade year; thus no data were available for the younger part of the sample (students currently in grades K-3). Two years of 5th grade test scores from students currently in grades 6 and 7 and who were 5th graders during the 2004 and 2005 school years were available for the sample outlined within this study. The 5th grade SOL Reading and Math tests are not given prior to the spring of 5th grade and thus were not available for students currently in grades K through 5. The breakdown of available SOL test scores (Table 5) was as follows: 300 scores for 3rd grade reading (from students currently in grades 4-7), 292 scores for 3rd grade math (from students currently in grades 4-7), 129 scores for 5th grade reading (from students currently in grades 6 and 7), and 130 for 5th grade math (from students currently in grades 6 and 7). Last (2005-2006) school year, 4th grade was added to the test cycle in the areas of reading and math, yet due to the limited amount of data (total of 79 across all 4 intervention groups), this information was not analyzed.

Table 5

Available Test Scores By Current Grade Level Cohort								
Current Grade	Pals-K	SOL3R	SOL3M	SOL4R	SOL4M	SOL5R	SOL5M	
K	194 (05)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1	182 (04)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2	171 (03)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
3	170 (02)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
4	100 (01)	73 (05)	73 (05)	n/a	n/a	n/a	n/a	n/a
5	78 (00)	90 (04)	90 (04)	79 (05)	79 (05)	n/a	n/a	n/a
6	81 (99)	66 (03)	58 (03)	0	0	61 (05)	62 (05)	
7	n/a	71 (02)	71 (02)	0	0	68 (04)	68 (04)	
TOTAL	976	300	292	79	79	129	130	

(Numbers in parenthesis represent year score was obtained on test)

Demographic Characteristics by Preschool Program

The demographics for the total sample (1105 students) were earlier defined; however, once the sample was divided based upon the type of preschool experience received, significant program differences were noted in regards to income, later special education identification, ethnic distribution, and primary language spoken within the home (ESOL status) across the 4 preschool intervention programs or experiences. Gender is the one area not found to vary by sample or by type of preschool intervention program. The association of income was expected given that the Bright Stars program included students (approximately 33%) who do not qualify for free or reduced lunch; the other 3 groups were entirely made up of free or reduced lunch eligible children.

Most early preschool intervention programs are designed to increase later academic achievement, as well as to lower the number of students identified for special education services. The special education process begins with a referral from a concerned parent, teacher, physician, or case manager that a child may be in need of specialized services in order to achieve or meet developmental milestones. The referral source is encouraged to make a request (to the local school system) that a special education evaluation be performed in order to clarify whether or not a child is in need of support services (educational, speech, counseling, occupational or physical therapy, and/or vision and hearing services). After a comprehensive evaluation is completed, an eligibility committee convenes to review the testing results and make an informed decision as to whether a child meets the criteria as a student with a disability. Special education services are available from birth to age 21. Some of the many disability categories or designations include: Autism, Mental Retardation, Learning Disability, Other Health Impairment, Speech/ Language Impairment, and Emotional Disturbance.

For this study, eligibility for special education was recorded at the current grade level for the 1105 students within the sample population of this study. According to an analysis of special education identification rates across preschool experiences (Table 6), local Head Start alumni were disproportionately more likely (later in elementary school) to be identified for special education services, and fewer than expected Private school students were identified $X^2 (df = 3, N = 1105) = 20.38, p < .001$.

Table 6

Distribution of Special Education Designation Across Intervention Groups				
	Regular Ed.	%	Special Ed.	%
Bright Stars	358	82.5%	76	17.5%
Head Start	164	73.9%	58 a	26.1%
No Preschool	250	82.3%	55	17.7%
Private Preschool	133	92.4%	11 b	7.6%
TOTAL	905	81.8%	201	18.2%

χ^2 (df = 3, N = 1105) = 20.38, p < .001

a - more than expected # of students

b - fewer than expected # of students

Among the 4 preschool intervention programs/experiences, variation was also discovered between the amount and proportion of each of the different ethnicities represented within the four intervention groups. It is important to note differences in ethnic distributions across intervention groups because these differences may provide for a rival explanation to the hypotheses presented as well as reflect the need to close the long standing “achievement gap” that exists between many minority and non-minority students. In referring back to ethnic differences within the sample earlier mentioned, the Asian and “Other” groups accounted for a very small percentage (5%) of the total sample population. Due to the limited number of subjects from these two categories, a decision was made to examine the ethnicity variable by three classifications, Caucasian, African American, and Hispanic and disregard the Asian and Other classifications when reporting

the results of the various measurements used in this study. By removing the 61 Asian and “Other” students from the original sample of 1105, the new sample size resulted in 1044 children. In order to examine the variations in ethnic distribution among the four preschool intervention programs, a Chi-Square analysis was used. The Chi-Square (Table 7) comparison among the four preschool groups (N = 1044) indicated a disproportionate number of African American children attended the local Head Start program and disproportionately less Hispanic children attended a Private preschool program X^2 (df = 6, N = 1044) = 25.89, $p < .01$.

Table 7

Ethnicity by Preschool Group

		Ethnicity						TOTAL	
		African American		Hispanic		White			
		N	% within PS	N	% within PS	N	% within PS		
Pre-school (PS)	Bright Stars	162	38.7%	63	15.0%	194	46.3%	419	100%
	Head Start	100 a	46.8%	41	18.9%	77	35.3%	218	100%
	No Preschool	101	35.5%	55	19.4%	128	45.1%	284	100%
	Private Preschool	43	35.0%	7 b	5.7%	73	59.3%	123	100%
TOTAL		406	38.9%	166	15.9%	472	45.2%	1044	100%

X^2 (df = 6, N = 1044) = 25.89, $p < .01$

a – more than expected # of students

b – less than expected # of students

Primary language spoken within the home is considered an important variable within this research given that the measurements used in this study are administered in the

English language only. Language proficiency is thought to have a direct impact on individual performance on this type of language based measures. Students from households where English is not the primary language spoken within the home are classified by the school system as English as a Second Language (ESOL) students. At the time of kindergarten registration, parents are asked to report the primary language within the home and therefore indirectly classify their children for ESOL services if needed. ESOL services are tiered based upon a child's English language proficiency, with more intensive services offered to those less proficient in the English language. Out of 1044 children, 83.4% (N = 871) come from households where English is the primary language spoken and 16.6% (N = 173) are from homes where English is not the primary language spoken within the home. According to a Chi Square analysis X^2 (df = 3, N = 1044) = 12.59, $p < .01$, disproportionately less ESOL children attended a Private Preschool (Table 8). Only 5.7% of the children within the Private Preschool group are classified as English as a Second Language students, yet 16.9% of Bright Stars, 18.8% of Head Start, and 19.0% of the No Preschool groups are from homes where English is not the primary language. The percentage of ESOL children obviously overlaps with the percentages of children also classified as Hispanic, with smaller proportions of ESOL and Hispanic alumni from private preschool settings.

Table 8

ESOL Designation by Preschool Group

		ESOL				TOTAL	
		English		English as a 2nd Language (ESOL)			
		N	% within Preschool	N	% within Preschool		
Pre-school (PS)	Bright Stars	348	83.1%	71	16.9%	419	100.0%
	Head Start	177	81.2%	41	18.8%	218	100.0%
	No Preschool	230	81.0%	54	19.0%	284	100.0%
	Private Preschool	116	94.3%	7 b	5.7%	123	100.0%
	TOTAL	871	83.4%	173	16.6%	1044	100.0%

X^2 (df = 3, N = 1044) = 12.59, P < .01

b – less than expected # of students

CHAPTER IV

RESULTS

Kindergarten Readiness Defined by PALS-K Mean Scores

The first question this research attempted to answer was whether students who attended one of the local early preschool intervention programs earned higher scores on PALS-K tests of initial kindergarten readiness. In order to answer that question, this research first delineated the naturally occurring variations within the sample population, among the nine elementary school sites, and by preschool year and current grade level of student in relationship to the four individual preschool programs. The first step in these analyses measured PALS-K for possible differences among the sample by four independent demographic variables (gender, income, primary language, and ethnicity) using four one-way tests of variance with PALS-K as the dependent variable. Next, an analysis of PALS-K mean scores by elementary school site using a one-way analysis of variance attempted to uncover any significant PALS-K mean score differences among the nine different elementary schools. Since primary language and ethnicity were earlier found to differ by type of preschool program, those two variables along with gender, were included as independent variables in two 3-way analyses of variance in order to determine whether significant differences exist among the four preschool groups in terms of kindergarten readiness skills; and, if found, whether these differences hold across these demographic variables. A final look at PALS-K kindergarten readiness scores included

an analysis of PALS-K mean scores by current grade level cohort for the past six years (1999-2005) in order to reveal any patterns or trends over time for PALS-K test scores.

Differences in PALS-K by Sample Demographic Variables

The PALS-K is a measure of a child's knowledge of fundamental literacy skills and provides a direct means of identifying those children who are considered to be relatively behind in their acquisition of the basic literacy skills of phonological awareness, alphabet recognition, concept of word, knowledge of letter sounds, and spelling. Subtask scores are administered in the individual skill areas and then added together to create a total or Summed score. School divisions use the Summed Score to compare to grade level expectations and students receiving a bottom quartile score are identified to receive additional literacy instruction during the regular school day.

For the past 7 years, the fall testing window for PALS-K was during the month of October, and most county kindergarten students completed these assessments. Scores for the PALS-K were available for 924 out of the total 1044 (Asian and Other categories removed) students who attended kindergarten during the 2000-2006 school years. Prior to 2000, the PALS-K was not routinely administered resulting in scores not being available for students currently in the 7th grade who attended preschool during the 1998-1999 school year. Without the current 7th grade students (N = 120), the total sample was

reduced from 1044 to 924. Of the 924 students, 379 were Bright Stars, 252 did not attend preschool, 191 were from Head Start, and 102 attended a private preschool.

Income, primary language, and ethnicity were demographic variables established to vary significantly among the four preschool programs/experiences. Given those known associations, kindergarten readiness PALS-K scores were analyzed by four variables (gender, income, primary language, and ethnicity) hypothesized to contribute towards kindergarten readiness skills and later academic achievement. Four separate one-way analyses of variance were completed to determine whether PALS-K test scores differed by preschool program (N = 924) for those variables. For gender, average PALS-K scores did not differ significantly based upon a one-way ANOVA for male (M = 47.71, N = 479) and female (M = 49.99, N = 445) students. Students (M = 48.81, N = 130) who do not qualify for free and reduced lunch earned PALS-K scores that did not significantly differ from those who do qualify for the free or reduced lunch status (M = 47.39, N = 794).

However, the mean PALS-K scores were significantly lower (Table 9) for children with a primary language other than English (M = 42.81, N = 158) as compared to their English speaking peers (M = 50.05, N = 766) ($F = 11.33$, $df = 1$, 924, $p < .01$). In addition, a one-way analysis of variance ($F = 6.95$, $df = 2$, 924, $p < .01$) for PALS-K scores by ethnicity (Table 10) indicated Hispanic children (M = 41.95, N = 149) earned

significantly lower PALS-K mean scores than those obtained from both African American (M = 49.87, N = 362) and Caucasian (M = 50.35, N = 413) students within this sample. Of special interest, given the need to “close the achievement gap” among minority and non-minority students, the PALS-K mean scores obtained from both the African American and Caucasian students did not significantly differ with almost identical mean scores (when rounded to a whole number, both are 50).

Table 9

PALS-K Scores by ESOL Designation		
	N	Mean
Primary Language		
English	766	50.04
Non-English (ESOL)	158	42.81 b
Total	924	48.81

F = 11.33, df = 1, N = 924, p < .01
b – significantly lower than English

Table 10

PALS-K Scores By Ethnicity		
Ethnic Background	N	Mean
Caucasian	413	50.35
African American	362	49.87
Hispanic	149	41.95 b
TOTAL	924	48.81

F = 6.95, df = 2, N = 924, p < .01
b - significantly lower than both African American and Caucasian classification groups

Differences in PALS-K by Elementary School Site

Given that there are 9 elementary schools within this study and different programs operating out of the 9 schools, a decision was made to examine the PALS-K mean score differences among the 9 schools in order to determine if significant variance exists among the schools. A one-way analysis of variance of PALS-K mean scores by elementary school site yielded significant PALS-K mean score differences among the 9 elementary school sites ($F = 4.03$, $df = 8$, 976 , $p < .01$). The PALS-K mean score for all 9 schools combined was 49.26, with Tukey results indicating that School #9 ($M = 58.26$) earned a significantly higher mean score than School #1 ($M = 42.66$), School #2 ($M = 44.93$), School #3 ($M = 46.13$), and School #4 ($M = 47.79$). However, this significance was isolated to School #9, with no significant PALS-K mean test score variance noted among the other 8 elementary schools within this study. Since this significance in PALS-K mean scores was only found in regards to School #9, no further analyses by individual school were deemed essential to this study. However, School #9 happens to be located in a rural part of the county and for the span of this study contained the lowest percentage of minority and ESOL children.

Differences in PALS-K by Preschool Program

Prior to analyzing scores by specific type of preschool program, PALS-K scores were analyzed as a whole by separating the sample into two groups, those that had attended a formalized pre-kindergarten preschool program and those that had not received any

formal preschool intervention prior to entering kindergarten. From a sample of 924 students, 672 had attended one of three programs (Bright Stars, Head Start, or a private preschool, and the remaining 252 children did not attend a formalized pre-kindergarten program the year prior to entering kindergarten. The results ($F = 50.97$, $df = 1, 924$, $p < .01$) overwhelmingly suggest that children display significantly greater kindergarten readiness skills by attending a formal pre-kindergarten program the year prior to kindergarten ($M = 52.05$, $N = 672$) than do those who do not receive early pre-kindergarten intervention ($M = 30.50$, $N = 252$).

According to differences earlier noted within the sample, students with a primary language other than English (ESOL) and Hispanic children were found to earn significantly lower PALS-K mean scores, and these two variables would be overlap. Another analysis was completed to determine the percentage of Spanish speakers identified ESOL, since ESOL generically stands for English as a Second Language and includes any language other than English. Results indicated that 87.3% of the ESOL category were Hispanic students; 22 out of 173 children are non-Hispanic, yet classified as English as Second Language students. From that group of 22 non-Hispanic ESOL students, 11 are classified as Caucasian and are of varied descent (Russian and other European backgrounds). As for the other non-Hispanic ESOL children, 11 are classified as African American under the ESOL designation and included children from Uganda and other African countries. Since we can not definitively determine the operative

variable between the ESOL and ethnicity classification categories due to an overlap of students found in both categories, a decision was made to run two separate analyses of these variables (rather than one simultaneously).

The next step was to analyze PALS-K kindergarten readiness scores by type of preschool program, which included a three-way analysis of variance by preschool program, gender, and primary language. A 2nd analysis of PALS-K kindergarten readiness skills was completed by type of preschool program, gender, and ethnicity. Given that the number of students classified as Asian (N = 34) and "Other" (N = 27) accounted for a very small percentage of the total population, both analyses were completed with these 61 students removed. Students who did not attend any form of preschool (M = 30.50, N = 252) earned significantly lower PALS-K mean scores (F = 48.19, df = 3, 924, p < .01) than the other 3 preschool groups: Head Start (M = 53.48, N = 191), Bright Stars (M = 51.99, N = 379), and Private Preschool (M = 50.68, N = 102). The main effect of preschool program holds across programs for primary language (ESOL status) (M = 42.07, N = 158) in that children with a primary language of English (M = 51.26, N = 766) earn significantly higher PALS-K mean scores within all four preschool intervention programs/experiences (F = 9.52, df = 1, 924, p < .01). Furthermore, no interactions were found between preschool program, language, and/or gender. Male (M = 43.87, N = 479) and female (M = 49.46, N = 445) students' average PALS-K scores for do not differ significantly.

Table 11 PALS-K Mean Scores by Preschool, Gender, and ESOL Designation

Preschool (PS)	Gender	ESOL Designation	Mean	Std. Deviation	N
Bright Stars	male	English	54.09	23.92	151
		ESOL	45.23	24.25	30
		Total	52.62	24.13	181
	female	English	51.94	23.33	161
		ESOL	56.70	21.05	37
		Total	52.83	22.95	198
	Total	English	52.98	23.61	312
		ESOL	51.57	23.09	67
		Total	52.73	23.49	379
Head Start	male	English	56.34	23.78	88
		ESOL	46.39	24.44	23
		Total	54.28	24.14	111
	female	English	56.95	25.03	64
		ESOL	54.25	24.80	16
		Total	56.41	24.85	80
	Total	English	56.60	24.23	152
		ESOL	49.62	24.57	39
		Total	55.17	24.40	191
No Preschool	male	English	34.64	21.52	109
		ESOL	26.81	22.49	27
		Total	33.09	21.86	136
	female	English	38.75	21.40	95
		ESOL	21.81	21.84	21
		Total	35.68	22.37	116
	Total	English	36.55	21.51	204
		ESOL	24.63	22.12	48
		Total	34.28	22.09	252
Private Preschool	male	English	55.44	22.83	50
		ESOL	32.00	.	1
		Total	54.98	22.84	51
	female	English	61.96	18.56	48
		ESOL	53.33	26.50	3
		Total	61.45	18.87	51
	Total	English	58.63	20.99	98
		ESOL	48.00	24.13	4
		Total	58.22	21.07	102
TOTAL	male	English	49.43	24.78	398
		ESOL	39.26	24.95	81
		Total	47.71	25.07	479
	female	English	50.71	23.82	368
		ESOL	46.55	26.63	77
		Total	49.99	24.35	445
	Total	English	50.05	24.31	766
		ESOL	42.81	25.96	158
		Total	48.81	24.74	924

Table 12

Tests of Between-Subjects Effects for Preschool, Gender, and ESOL Designation with PALS-K as Dependent Variable

Source	Type I Sum of Squares	df	Mean Square	F	Sig.
Preschool (PS)	75764.5	3	25254.9	48.2	< .01
Gender	869.2	1	869.2	1.7	.20
ESOL	4990.3	1	4990.3	9.5	< .01
PS * Gender	842.1	3	280.7	.5	.66
PS * ESOL	2670.8	3	890.3	1.7	.17
Gender * ESOL	854.3	1	854.3	1.6	.20
PS * Gender * ESOL	3029.2	3	1009.7	1.9	.12
Error	475848.7	908	524.1		
TOTAL	564869.1	923			

The PALS-K scores were also analyzed using a three-way analysis of variance (N = 924), this time replacing the ESOL status variable with ethnicity by preschool group/experience and gender. Ethnic classifications included: African American (N = 362), Caucasian (N = 413), and Hispanic (N = 149). Three-way tests of between-subjects effects also indicated that students who did not attend any form of preschool (M = 32.52, N = 252) earned significantly lower PALS-K mean scores (F = 47.74, df = 3, 924, p < .01) than the other 3 preschool groups: Private Preschool (M = 59.26, N = 102), Head Start (M = 54.50, N = 191), and Bright Stars (M = 52.18, N = 379). The main effect (F = 5.13, df = 2, 924, p < .01) for ethnicity was found to be consistent across the four

preschool programs/experiences in that both Caucasian ($M = 50.35$, $N = 413$) and African American children ($M = 49.87$, $N = 362$) earned significantly higher PALS-K mean scores than did the Hispanic children within this sample ($M = 41.95$, $N = 149$), with the exception of the Private Preschool group. In addition, no interactions were found among preschool program, ethnicity, and/or gender. Once again, male ($M = 47.12$, $N = 479$) and female ($M = 51.10$, $N = 445$) students' PALS-K mean scores were not statistically different.

Table 13 PALS-K Mean Scores by Preschool, Gender, and Ethnicity

Preschool (PS)	Gender	Ethnicity	Mean	Std. Deviation	N	
Bright Stars	male	African American	52.28	22.19	58	
		Hispanic	46.58	25.97	26	
		White	54.44	24.71	97	
		Total	52.62	24.13	181	
	female	African American	54.02	22.93	82	
		Hispanic	54.94	21.76	33	
		White	50.81	23.52	83	
		Total	52.83	22.95	198	
	Total	African American	53.30	22.57	140	
		Hispanic	51.25	23.86	59	
		White	52.77	24.17	180	
		Total	52.73	23.49	379	
Head Start	male	African American	55.15	24.57	53	
		Hispanic	45.83	24.05	24	
		White	58.88	22.67	34	
		Total	54.28	24.14	111	
	female	African American	57.95	25.11	38	
		Hispanic	53.13	25.25	15	
		White	56.07	25.02	27	
		Total	56.41	24.85	80	
	Total	African American	56.32	24.69	91	
		Hispanic	48.64	24.46	39	
		White	57.64	23.58	61	
		Total	55.17	24.40	191	
No Preschool	male	African American	34.54	22.04	59	
		Hispanic	25.25	22.40	28	
		White	35.82	20.71	49	
		Total	33.09	21.86	136	
	female	African American	36.51	15.45	35	
		Hispanic	23.57	22.65	21	
		White	39.43	24.43	60	
		Total	35.68	22.37	116	
	Total	African American	35.28	19.78	94	
		Hispanic	24.53	22.29	49	
		White	37.81	22.79	109	
		Total	34.28	22.09	252	
Private Preschool	male	African American	54.24	21.21	17	
		White	55.35	23.91	34	
		Total	54.98	22.84	51	
	female	African American	61.40	17.94	20	
		Hispanic	64.00	26.87	2	
		White	61.31	19.78	29	
	Total	African American	61.45	18.87	51	
		Hispanic	58.11	19.57	37	
		White	64.00	26.87	2	
	TOTAL	male	African American	58.10	22.13	63
			Hispanic	58.22	21.09	102
			White	47.67	24.31	187
Total			38.69	25.89	78	
female		African American	51.03	24.73	214	
		Hispanic	47.71	25.07	479	
		White	52.22	22.99	175	
		Total	45.54	26.63	71	
TOTAL		African American	49.62	24.54	199	
		Hispanic	49.99	24.35	445	
		White	49.87	23.76	362	
		Total	41.95	26.38	149	
TOTAL	African American	50.35	24.62	413		
	Hispanic	48.81	24.74	924		
	White					

Table 14**Tests of Between-Subjects Effects for Preschool, Gender, and Ethnicity
with PALS-K as Dependent Variable**

Source	Type I Sum of Squares	df	Mean Square	F	Sig.
Preschool (PS)	75764.5	3	25254.9	47.7	< .01
Gender	869.2	1	869.2	1.6	.20
Ethnicity	5424.7	2	2712.4	5.1	.01
PS * Gender	823.3	3	274.4	.5	.67
PS * Ethnicity	2811.5	6	468.6	.9	.51
Gender * Ethnicity	953.7	2	476.9	.9	.41
PS * Gender * Ethnicity	1616.7	5	323.4	.6	.69
Error	476605.4	901	529.0		
TOTAL	564869.1	923			

Differences in PALS-K Mean Scores for 2000-2006

Six years of PALS-K kindergarten readiness test scores were available for students from one of the four preschool intervention groups/experiences and who attended kindergarten during the 2000-2006 school years. These scores were analyzed by year administered in order to detect trends over time.

A test of variance (two-way) using PALS-K mean scores as the dependent variable by preschool experience and year PALS-K was administered indicated that PALS-K mean scores for the Bright Stars and Private preschool groups have steadily increased for the

past 2 years (current kindergarten and 1st grade group) and both groups eventually outperformed the Head Start and No Preschool groups. Table 15 presents PALS-K scores earned at entry to kindergarten and reflects different groups of children at each grade level and year PALS-K was administered. A significant difference was noted in PALS-K mean scores for both preschool experience and year PALS-K was administered, along with an interactive effect between these two variables. In 2003, the group in 2nd grade in 2005-06 earned the highest PALS-K mean scores ($M = 61$) out of all of the years measured (1999-2005) in the county. The total mean for the sample ($N = 976$) for all 6 years was 49.8. For some unknown reason in 2004, a dip in PALS-K test scores occurred across all intervention groups, most notably for the Head Start and No Preschool groups.

Table 15 PALS-K Mean Scores by Program and Year Administered

Preschool	Current Gr.	Mean	Std. Deviation	N
Bright Stars	K (2005)	59.44	24.84	79
	1 (2004)	56.75	21.24	75
	2 (2003)	58.94	27.56	64
	3 (2002)	45.92	19.24	61
	4 (2001)	43.82	18.91	44
	5 (2000)	52.45	23.81	38
	6 (1999)	41.47	22.57	32
	Total		52.86	23.76
Head Start	K	54.57	24.19	46
	1	42.89	26.18	35
	2	69.25	21.97	53
	3	52.00	19.60	21
	4	54.60	22.63	10
	5	51.50	20.88	18
	6	45.25	19.53	12
	Total		55.33	24.46
No Preschool	K	39.59	24.44	54
	1	26.43	16.67	51
	2	48.00	23.25	35
	3	31.88	20.52	67
	4	26.69	18.29	26
	5	41.76	21.48	17
	6	35.74	20.23	19
	Total		34.89	21.29
Private Preschool	K	73.73	13.96	15
	1	63.33	21.22	21
	2	65.21	17.45	19
	3	62.24	20.84	21
	4	51.40	19.08	20
	5	34.40	18.11	5
	6	52.72	21.74	18
	Total		59.92	20.90
TOTAL	K	53.87	25.78	194
	1	46.35	25.14	182
	2	60.59	25.08	171
	3	43.15	22.38	170
	4	41.96	21.29	100
	5	48.74	22.68	78
	6	43.19	21.86	81
	TOTAL		49.26	24.79

KPALS Mean Scores by Current Grade Level

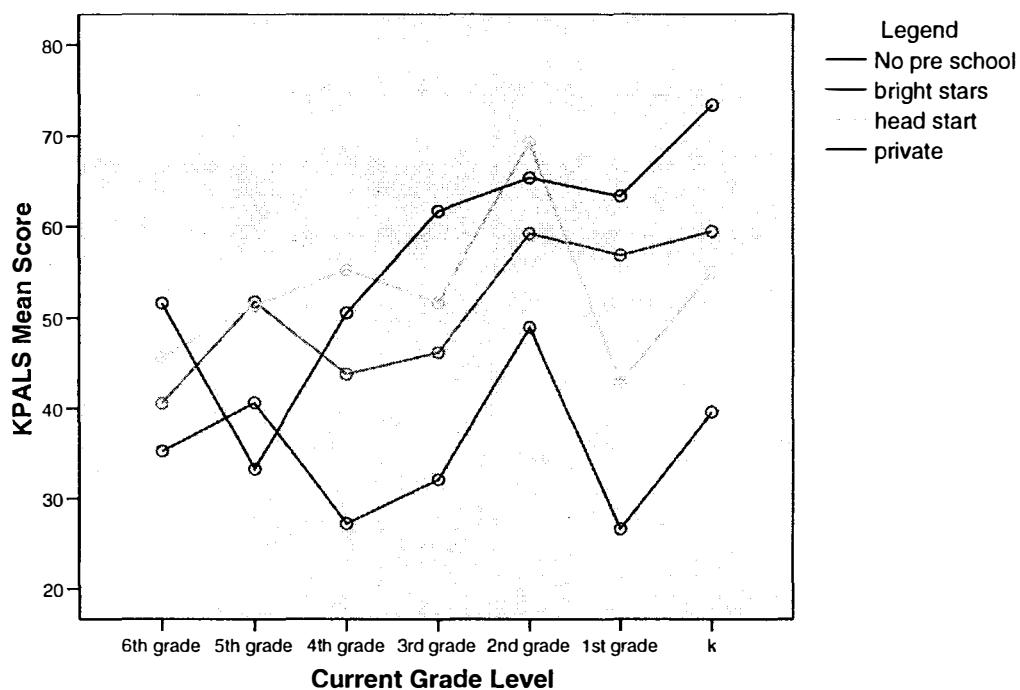


Table 16

Tests of Between-Subject Effects for Preschool and Current Grade Level with PALS-K as Dependent Variable

Source	Type I Sum of Squares	df	Mean Square	F	Sig.
Program Type (PS)	81359.9	3	27120.0	56.0	< .001
Current Grade (GR)	36987.8	6	6164.6	12.7	< .001
PS * Gr	21481.4	18	1193.4	2.5	.001
Error	459344.8	948	484.5		
TOTAL	599173.9	975			

Long-Term Achievement Defined as 3rd & 5th Grade Reading and Math SOL Scores

The next step in this research included a study of long-term achievement data using the 3rd and 5th grade Reading and Math Standards of Learning (SOL) mean test scores for the Bright Stars, Head Start, No Preschool, and Private Preschool intervention/experience groups. The Standards of Learning (SOL) tests administered to Virginia public school students outline the Commonwealth's expectations for students in grades K-12 in all academic subject areas. The majority of 3rd and 5th grade public school students in Virginia are given the Reading, Math, Science, and History SOL exams.

As found in the kindergarten readiness analyses, PALS-K mean scores were significantly lower for students of Hispanic and ESOL designations, compared to African American and Caucasian ethnicities and children from primary English language homes. Descriptive statistics for the 3rd grade data indicated dwindling sample size among the various ethnic classifications: African American (N = 115), Hispanic (N = 30), and Caucasian (N = 145). Once again, the Asian and Other classifications continue to remain removed from the total sample size for the SOL test analyses. The size of the remaining 3 ethnic categories (most notably the Hispanic group) becomes limited once the various ethnic classifications are sub-divided into the four preschool groups. The 3rd grade SOL test scores were available only for students who have already completed the 3rd grade and who are now currently in grades 4-7. The 5th grade SOL test data are even more limited because the scores are available only for students who have already

completed the 5th grade and are now current 6th and 7th graders. Due to size limitations, a decision was made to analyze 3rd and 5th grade SOL test scores first by type of preschool program (separately for reading and math) and then to co-vary or adjust 3rd grade SOL scores for PALS-K mean scores (separately by reading and math). Fifth grade SOL scores were not adjusted for PALS-K scores for the same size constraint reasons. Additionally, ethnicity, primary language, gender, and income were not part of the long-term achievement data reported due to the size constraints encountered, possibly limiting the ability to generalize and/or validate the results with cells less than 10 students.

Differences in 3rd Grade Achievement by Type of Preschool Experience

Four analyses were completed using 3rd grade SOL mean test scores as the dependent variable, the first of which included 3rd grade Reading SOL mean scores by preschool experience, and then by preschool experience adjusted for PALS-K kindergarten readiness scores. The final two analyses repeated the same design, yet this time the Reading scores were replaced with Math. The total sample size for 3rd grade SOL Reading scores was 290 obtained from those students who were of preschool age during the 1999-2002 school years and who are now currently in grades 4-7. From this group of 290, 130 students are Bright Stars alumni, 49 students are Head Start alumni, 73 did not attend preschool and made up the "No Preschool" group, and 38 students attended a Private Preschool program. The 3rd grade Reading SOL mean test scores were as follows

(Table 17): No Preschool group (M=419.15), Private Preschool group (M=412.18), Bright Stars (M=406.97), and Head Start (M=395.37). A one-way test of variance between subjects indicated no significant differences for the mean test scores among the four preschool intervention/experience groups. Students who received Bright Stars and Head Start intervention performed as well as their counterparts who either did not attend preschool or who attended a private preschool. Although not statistically significant, the Bright Stars mean score on the 3rd Grade Reading SOL was approximately 12 points higher than the Head Start group, but lower than the other two groups.

Table 17

3rd Grade Reading SOL Scores by Preschool Experience		
Preschool	N	Mean
Bright Stars	130	406.97
Head Start	49	395.37
No Preschool	73	419.15
Private Preschool	38	412.18
Total	290	408.42
F = 1.38, df = 3, N = 290, p > .05		

When co-varied with PALS-K kindergarten readiness scores, the sample dropped in size from 290 to 199; 91 students were lost because now the sample was limited to students in grades 4-6; PALS-K scores were not available for the current 7th grade cohort

because the PALS-K was not routinely administered prior to the 2000 kindergarten school year within this school system. From the sample of 199 students, 94 are Bright Stars, 35 are Head Start, 49 are from the No Preschool group, and 21 attended a private preschool. Once again, no significant differences were noted among the four preschool intervention programs/experiences with a total mean of 411.83. The 3rd grade Reading SOL mean test scores (co-varied with PALS-K) for the four preschool groups were: No Preschool (M = 415.92), Bright Stars (M = 413.17), Private Preschool (M = 409.76) and Head Start (M = 403.74).

Third grade Math SOL mean test scores were gleaned from a group of 282 children currently in the 4th-7th grades and analyzed for differences among the 4 preschool intervention groups. From that sample of 282 students, 124 are Bright Stars alumni, 47 are Head Start alumni, 75 are from the No Preschool group, and 36 are from the Private Preschool group. A significant difference was found between the Head Start versus No Preschool and Private Preschool groups, with the Head Start group earning a significantly lower 3rd grade Math SOL mean test score than these two other groups ($F = 4.49$, $df = 3$, 282 , $p < .005$). The 3rd grade SOL Math mean test scores by preschool experience were as follows (Table 18): Private Preschool (M = 456.44), No Preschool (M = 454.12), Bright Stars (M = 433.90), and Head Start (M = 405.51). The Bright Stars group performed as well as their No Preschool and Private Preschool counterparts and better than the Head Start group. Although not statistically significant, the 3rd grade Math

SOL mean test score for the Bright Stars group was approximately 28 points higher than the Head Start group, but was 20-22 points lower than the No Preschool and Private Preschool groups.

Table 18

3rd Grade Math SOL Scores by Preschool Experience		
Preschool	N	Mean
Bright Stars	124	433.90
Head Start	47	405.51 b
No Preschool	75	454.12
Private Preschool	36	456.44
Total	282	439.82

F = 4.49, df = 3, N = 282, p < .005
b – Head Start mean score significantly lower than No Preschool and Private Preschool

When 3rd Grade Math SOL test scores were co-varied or adjusted for PALS-K kindergarten readiness test scores, the sample size decreased by 90 students to 192. The new sample (current 4th-6th graders) no longer contains the 7th grade cohort due to the unavailability of these PALS-K test scores. From the sample of 192 students, 88 were in the Bright Stars group, 34 are from Head Start, 50 are from the No Preschool group, and 20 are from the Private Preschool group. A significant difference was found ($F = 5.95, df = 3, 192, p < .005$), with Head Start earning an overall mean score significantly below

both the No Preschool and Private Preschool groups. The 3rd Grade Math SOL mean test scores (adjusted for PALS-K) for the 4 preschool groups were as follows: Private Preschool (M = 469.05), No Preschool (M = 452.36), Bright Stars (M = 440.24) and Head Start (M = 416.21).

Differences in 5th Grade Achievement by Type of Preschool Experience

Once again, the same four analyses were attempted, this time using 5th grade Reading and Math SOL data independently. Scores were available from 126 students currently in 6th and 7th grades who took the 5th grade SOL Reading test during the 2004 and 2005 school years. The sample size by preschool program/experience was: Bright Stars (N = 49), Head Start (N = 24), No Preschool (N = 32), and Private Preschool (N = 21). The overall 5th grade Reading SOL mean test score for the total sample of 126 was 438.33. 5th Grade Reading SOL mean test scores by preschool intervention program/experience were as follows: No Preschool (M = 462.41), Private Preschool (M = 454.67), Bright Stars (M = 424.08), and Head Start (M = 421.04). A one-way analysis of variance (Table 19) indicated that the Head Start group earned a significantly lower 5th grade Reading SOL mean score than the No Preschool and Private Preschool groups (F=3.75, df = 3, 126, p < .05).

Table 19

5th Grade Reading SOL Scores by Preschool Experience		
Preschool	N	Mean
Bright Stars	49	424.08
Head Start	24	421.04 b
No Preschool	32	462.41
Private Preschool	21	454.67
Total	126	438.73

F = 3.75, df = 3, N = 126, p < .05
b - significantly lower than the No Preschool and Private Preschool Groups

The same analysis was completed for 127 students (currently in the 6th and 7th grades) using 5th grade Math SOL tests scores. The sample of 127 by preschool program/experience consisted of: Bright Stars (N = 49), Head Start (N = 24), No Preschool (N = 33), and Private Preschool (N = 21). The total mean score for the 127 sample was 423.66. 5th Grade Math SOL mean test scores by preschool group (Table 23) were as follows: Private Preschool (M = 463.24), No Preschool (M = 445.94), Bright Stars (M = 403.53), and Head Start (M = 399.50). A one-way analysis of variance indicated a significant difference in mean test scores by preschool program/experience with the Head Start and Bright Stars groups both earning significantly lower scores than the Private Preschool group (F = 4.43, df = 3, 127, p < .01).

Table 20

5th Grade Math SOL Scores by Preschool Experience		
Preschool	N	Mean
Bright Stars	49	403.53
Head Start	24	399.50
No Preschool	33	445.94
Private/Other	21	463.24 a
Total	127	423.66

F = 4.43, df = 3, N = 127, p < .01
a - significantly higher than Bright Stars and Head Start groups

CHAPTER V

DISCUSSION

Several important results were obtained through the course of this research. First of which, students who attended some form of preschool intervention program (Bright Stars, Head Start, or a private preschool) earned significantly higher kindergarten readiness scores (as measured by the fall administration of the PALS instrument) than economically similar students who entered kindergarten without preschool intervention. An analysis by grade level also indicated that Bright Stars PALS-K scores have steadily increased over the past 7 years, as have comparison groups, with current 2nd grade groups scoring highest across years. Another promising result, four years after the initial preschool intervention, Bright Stars students continued to perform as well as the Private Preschool and No Preschool groups according to 3rd Grade Reading and Math SOL mean test scores. Although not statistically significant, the Bright Stars group earned higher mean test scores on both the 3rd grade Reading and Math SOL tests than did the Head Start group. Six years after the initial preschool intervention, the Bright Stars group still continued to perform as well as their No Preschool and Private Preschool counterparts in the area of reading. The Head Start group, however, earned a significantly lower 5th grade Reading SOL mean test score as compared to the No Preschool and Private Preschool groups. As for 5th grade Math test scores, the Private Preschool group earned a significantly higher mean test score than the Bright Stars and Head Start groups.

Another area of preschool program difference was found in rates of special education placement. With more African American students comprising the Head Start group and more students from the local Head Start program having been identified for special education services, these results could mean that either the local Head Start program does not offer a "quality" preschool experience, or that these findings may be indicative of a systemic racial bias of assessors. The finding that relatively few Bright Stars alumni were placed in special education is encouraging for the Bright Stars program and supports prior research which indicates that a "quality" preschool program can reduce placement in special education classes.

Of special interest, given the push to close the "achievement gap" that exists between white and non-white students, Caucasian and African American children earned almost identical PALS-K mean scores of 50 (when rounded to a whole number). However, by the 3rd grade, the African American students earned significantly lower SOL Reading and Math scores as compared to other minority groups. When trying to determine reasons for these differences, extensive research has pointed to family interaction variables. Having books at home, reading to a child, and going to museums all represent activities known to enhance vocabulary development, a precursor for later reading development and academic achievement. Jencks and Phillips (1998) argue that even at the highest level of achievement, the median black American still scores below 75% of white

Americans on most standardized tests. Although the "achievement gap" may be closing in recent years, significant disparities and widespread discrimination in housing, employment, and education existed as little as one generation ago. Many African American parents were raised in less advantaged households where access to printed material and time spent interacting with young children was significantly lower than today.

Word knowledge is essential to reading comprehension, yet measures of vocabulary development are not routinely administered to county elementary students. Although vocabulary was not directly measured by the PALS-K, vocabulary development becomes a more powerful predictor of reading and academic achievement as a child ages. Given the importance of vocabulary development, it is suggested that school systems consider using tests of vocabulary as measurement tools, as well as, focusing literacy instruction with an emphasis on vocabulary development.

According to PALS-K kindergarten readiness scores, Non-English (or ESOL) students earned a significantly lower PALS-K mean test score than their English speaking counterparts. In direct relationship, Hispanic children earned significantly lower PALS-K scores than both the African American and Caucasian groups. The Hispanic population is the fastest growing population in the United States, with Hispanic children at disproportionate risk for learning, behavioral, and mental health problems

(Carrasquillo, 1991). Zepeda and Espinosa (1988) reported cross-cultural evidence that low-income, foreign born Hispanic parents have lower expectations for their children's developmental capabilities than do other low-income parents. Future research should find ways to make preschool programs more beneficial for children and families from different ethnic and racial backgrounds (McLoyd, 1998), perhaps by further increasing the involvement of Hispanic parents in the programs.

Students in these programs differed in ethnic and racial classifications, with more Asian and less Hispanic students attending a Private setting and more African Americans attending the Head Start program. Private Preschool children performed better on initial kindergarten readiness indicators than economically equivalent comparison students. Reasons for this are unclear. Perhaps length of day or intensity of curriculum among Private settings as opposed to the other settings; or these families may be better connected with community supports through church and other group affiliations (given that their children may be attending a Private school on scholarship). Or, were the children within the Private Preschool group cognitively more advanced to begin with? This question could not be answered by this particular study given that information regarding cognitive ability was not available.

This study raises a question about the extent to which the gains made during preschool and elementary school years are sustained in the secondary grades, especially when the

follow on intervention is terminated. Currently, a downward expansion of intervention programs from birth to age 3 is underway, yet concern for upward expansion to formal schooling and beyond should be considered as well (Reynolds, 1994). Future research should also examine the intervening process variables that mediate the effects of early intervention and enable the effects to be maintained over time (Campbell, et al., 2001). With the wide-spread universal pre-k initiatives, Connor, Morrison, and Slominsky (2006) suggest that more attention should be given to the content of and amount of time spent in specific preschool emergent literacy instruction and the relation of these activities to preschoolers' emergent literacy development. Furthermore, Takanishi and DeLeon (1994) convey that a linkage of early intervention programs for children and their families must be made to welfare reform, education and training for a changing global economy, community economic development, and other publicly supported child care and developmental programs.

Researchers are in a particularly important position as they seek answers to questions that may inform policy decisions that will shape the future of early childhood education. How do we better connect preschool to elementary school standards and practices? How do we best evaluate early education learning strategies? How do we define and assess quality early learning? These and other important questions deserve the attention of scientists and concerned professionals.

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