Examination of Individual Differences in Literacy Achievement

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ABSTRACT

Accumulating evidence has documented that large numbers of U.S. school children are disadvantaged academically (Hardway & Morrison, 1994; Morrison et al., 1993; Stevenson & Stigler, 1992; Mullis & Jenkins, 1990; Stevenson & Lee, 1990; Applebee et al., 1989; Alexander & Entwisle, 1988) and the American education system is typically faulted for the supposed shortcomings of its students. Yet, few researchers have studied the origins of achievement gaps between students. Answers are provided for a number of important questions regarding individual differences in achievement. Background demographics, the family literacy environment, and literacy skills were compared for subjects (N=402) from two communities. Results indicated that there was a gap in children's skills at the start of elementary school with literacy skills highly interrelated. During the first years of school this disparity did not diminish.
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CHAPTER I
INTRODUCTION

A decade ago the National Commission on Excellence in Education (NCEE) published *A Nation at Risk: The Imperative for Educational Reform*, which reflected a rising concern about the state of education in the United States (NCEE, 1983). Accumulating evidence has documented that large numbers of U.S. school children are disadvantaged academically (Hardway & Morrison, 1994; Morrison et al., 1993; Stevenson & Stigler, 1992; Mullis & Jenkins, 1990; Stevenson & Lee, 1990; Applebee et al., 1989; Alexander & Entwisle, 1988) and the American education system is typically faulted for the supposed shortcomings of its students. Yet, few researchers have studied the origins of achievement gaps between students. In addition, it is not clear whether children possess a mosaic of strengths and weaknesses or if high/low performance in one area is related to high/low performance in other subjects. Answers are still lacking for a number of important questions regarding individual differences in achievement. Namely, is there a gap in children's skills at the start of elementary school, how widespread is the gap, are literacy skills domain specific or related, and what does or does not happen to any differences during the first years of school? The current thesis addressed these questions. The nature and extent of literacy skill differences and their progression were examined over the kindergarten year.

**U.S. Literacy Crisis**

Business leaders claim undergraduate recruits were ill-prepared for the workforce; that college graduates have difficulty writing coherent sentences and communicating basic ideas. A multitude of converging information has further suggested there is a
literacy crisis in the United States. Both popular and scientific media have reported on the shortcomings of supposedly literate American adults and children.

Are literacy skills sub-par among adults in the United States? Functional illiteracy, the inability to perform daily required reading and writing activities, is indeed a large problem. NCEE (1983) reported that approximately 20 million adults were functionally illiterate. However, the implication that American adults are unable to read and write is a fallacy. Ninety-eight percent of adults possess the rudimentary skills necessary to decode letters and read simple passages (Mikulecky, 1987). Society has merely expanded criteria of a literate adult. In 1990, the National Assessment of Education Progress (NAEP) report distinguished the following levels of reading skills: rudimentary (ability to decode and read simple passages), basic (understand information), intermediate (ability to generalize), adept (locate, comprehend, and summarize complex passages and information), and advanced (possession of adept skills coupled with the ability to learn from specialized text) (Mullis & Jenkins, 1990).

NAEP reported that from 1971-1988 all of the 17-year olds included in their systematic evaluation of the nation's schools performed at or above the rudimentary literacy skill level. Further, the majority also possessed basic reading skills. Relatively few of the high school students evidenced adept (42%) or advanced (5%) literacy functioning (Mullis & Jenkins, 1990). The fact that over half of high school graduates were not able to read at levels to gain information to perform a task and summarize complex information solidified concern about functional literacy levels. As the U.S. workplace continues to become increasingly technological, adults need to perform higher level literacy tasks. When coupled with an increasingly competitive global economy, this presents a nationwide problem.
Cross-Cultural Comparisons

International comparisons have validated worries about the U.S. education system. Cross-cultural research has consistently indicated that American elementary school students rank significantly lower than their Asian and European counterparts in mathematics, and slightly lower in reading as EARLY as first grade (Stevenson et al., 1993; White, 1993; Stevenson & Stigler, 1992; Stevenson & Lee, 1990; LaPoine et al., 1989). Deficits continued to increase as children progressed through school.

For over a decade Stevenson and colleagues have been conducting a comprehensive comparison of American and Asian students. Beginning in 1980, reading, mathematics, and general information achievement tests were administered to 4,260 first and fifth grade students representing the U.S., Japan, and Taiwan/China. A team of American, Japanese, and Chinese researchers used curriculum guidelines and texts from each country to construct the tests, which were created specifically for the study. Additional information was gathered by interviewing two hundred and forty target children and their families per grade from each community (Stevenson & Lee, 1990). The first graders were followed up in 1984 and 1990-91 when they were in fifth and eleventh grades, respectively. The sample was supplemented in 1987 with students from Beijing, China, Fairfax, VA, and Chicago, IL (Stevenson & Stigler, 1992) and again in 1990-91 with additional eleventh graders to compensate for attrition effects (Stevenson et al, 1993). Because of its representativeness and size, the study provided a comprehensive comparison of international scholastic achievement.

Results from Stevenson and his colleagues provided a bleak picture of American students' skills. This was particularly the case in mathematics where American students were already significantly behind their Japanese and Chinese peers in computation and problem solving skills in first grade. The disparity remained severe through eleventh grade. Most strikingly, sixty-seven American fifth graders were among the 100 overall
lowest in math and only 1 American child was included in the 100 highest scores (Stevenson & Lee, 1990). American children were similarly over-represented at the bottom in reading. Further, math and reading scores were positively related to each other. The only exception to this was for general information scores. American students performed better on the general information test in first grade, but by eleventh grade Sendei, Taipei, and Minneapolis scores were similar. Stevenson and Lee interpreted these findings as indicating that "...American students proved to be as capable as or even more capable than the Asian students when they were tested with items not based on the school curriculum" (Stevenson & Lee, 1990, p. 55).

Stevenson and Lee succinctly concluded their 1990 monograph with the following statement:

The poor performance of the American children in this study was due to numerous factors, many of which are neither elusive nor subtle. Some of the most salient reasons for poor performance appear to be the following: insufficient time and emphasis were devoted to academic activities; children's academic achievement was not a widely shared goal;...and an emphasis on nativism may have undermined the belief that all but seriously disabled children should be able to master the content of the elementary school curriculum. (Stevenson & Lee, 1990, p. 103)

What does cross-cultural research tell us about American education? Stevenson and Lee seemed to imply that American deficits were the result of the education system. Clearly educators have been concerned about American students' poor performance internationally. Therefore, in order to understand and eradicate deficits, we must examine educational practices in the United States.

National Assessments

Since 1969, NAEP has surveyed U.S. students across grade levels in a variety of subject areas. NAEP's national report card recently reported that basic proficiency of 9-, 13-, and 17-year olds students has increased over time and reached levels comparable to the 1970's in reading, writing, math and science (Mullis & Jenkins, 1990; Applebee et al., 1989). While these results sound promising, these proficiency levels were disappointing
when translated into actual performance. Comments about reading levels contained in the *Crossroads in American Education: A Summary of Findings* were particularly noteworthy:

...the failure of 61% of the 17-year-olds to demonstrate the ability to find, understand, summarize, and explain relatively complicated information, including material about topics they study in school, suggests that most students leaving secondary school do not have the comprehension skills often needed in the worlds of higher education, business or government. (Applebee et al., 1989, p. 22)

Math, science, and writing skill levels were equally dismal. For instance, 65% of eleventh graders could adequately complete a job application, but less than a quarter could communicate persuasively or perform analytic tasks. Applebee et al. hypothesized that different learning objectives held by NAEP and school systems could explain the discrepancy between test scores and actual skills. They contended that students showed the least improvement for integrating knowledge beyond classroom lessons.

In partial response to NAEP nationwide report cards and the NCEE call for reform, then-President Bush convened an education summit in 1989 and created a National Education Goals Panel. This group of governors, congresspersons, and administrators has generated a series of national goals and yearly updates about U.S. education. The group has redressed the NCEE concern that "...the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a nation and a people" (NCEE, 1983, pg. 11). Legislators recently passed *Goals 2000: Educate America Act* (1994), which originated from the National Education Goals Panel report, citing academic readiness for all kindergarten children as a top priority. In order to ensure that children will begin school ready to learn, we need to investigate what skills children possess at school entry.

Former U.S. Secretary of Education, William Bennett, was optimistic about the state of elementary education in his report *First Lessons: A Report in Elementary Education in America* (1986). He acknowledged that his views were based on personal
observation and that he lacked elementary school experience. Nonetheless, he concluded elementary education was in decent shape and though there was room for improvement, it was in better condition than years past. Recent evidence, however, suggests children's literacy problems in this country begin at a very early age. For example, in an evaluation program, Success for All, Slavin and several colleagues found that the bottom 25% of students could barely read at the end of first grade (Slavin et al., 1992). National research has confirmed that large individual differences in rudimentary academic skills existed as children began school (Morrison et al., 1993; Entwisle & Alexander, 1992) and these differences existed across subjects (Morrison et al., 1993; Stevenson & Lee, 1990). Students' performance was similar across subject areas. In light of the fact that American children exhibited lower reading and math scores at the beginning of elementary school, early childhood has become the focus of research aimed at understanding the nature and sources of America's literacy problem. To this end the National Opinion Research Center (NORC) is conducting the Early Childhood Longitudinal Study (ECLS), to describe and analyze kindergarten transition and the first 5 years of school performance on a national scale. Despite the prevalence of information on the middle and high school years, there is little empirical evidence regarding performance in elementary grades.

**Previous Research on Early Elementary Education**

**Beginning School Study**

Alexander and Entwisle initiated the Beginning School Study (BSS) in Baltimore, MD in 1982. The landmark study addressed the important, but often neglected, issue of children's transition to formal schooling. Academic development was studied in the first and second grades because they believed the transition period had profound implications for future academic success. BSS was particularly concerned with cognitive development in school and the performance of minority students (Alexander & Entwisle, 1988).
The BSS sample was randomly selected from 20 urban schools. The sample of 625 children was heterogeneous. Since the district was 86% African-American, Euro-Americans were oversampled for comparison purposes. Forty-five percent of the sample was Euro-American. The data included four predictor clusters (social structure, psychological, personal, and experiential variables) to identify and explain "good" or "bad" school performance. The BSS data reported in Alexander and Entwisle's 1988 monograph were collected in three phases: at the transition to formal schooling, mid-way through the school year, and at year end for the first two grades. The dataset provided thorough information on a multitude of child, family, and school variables.

BSS results revealed a high degree of school performance predictability from year to year (Alexander & Entwisle, 1988). Scholastic trajectories appeared to be established during the first grade. Achievement patterns in place at the beginning of first grade were solidified by second grade. Existing achievement levels influenced the subsequent acquisition of new skills. This implied that individual differences in scholastic achievement were part of a coherent thread from the beginning of first grade. Initial California Achievement Test scores were not significantly different for Euro- or African-American students in either the verbal or quantitative domains; however, by second grade group differences had emerged in both domains. Although there was no difference between Euro- and African-American students' standardized test scores in first grade, teachers' scholastic marks were higher for Euro-American students in both grades (Entwisle & Alexander, 1993). Both objective (achievement tests) and subjective (teacher grades) criteria played an important role in schooling experiences. This disparity provided confirmation for suggestions that U.S. schools are not effective in redressing inequalities between races. Alexander and Entwisle attempted to link racial differences to poverty status and a constellation of risk factors. The BSS was one of the first reports
to specifically highlight the importance of early achievement and continuity in the American educational system.

The BSS has provided an abundance of information about first and second graders' educational experiences in Baltimore, but it did not address the transition to formal schooling per se, the domain specificity of early academic skills, or generalizability to other geographic locations. The project began collecting data in first grade, but kindergarten is the point at which formal schooling begins for most children in the United States. As such, it is important to include kindergartners' skills in an investigation of pathways to school success or failure. Efforts to profile elementary school students' strengths and weaknesses should include baseline data from the start of elementary school. Second, an understanding of the interrelatedness of scholastic skills is crucial to illuminate commonalities (or lack thereof) across academic subjects. BSS was a representative sample of Baltimore, but further information is needed to determine if the city's racial and economic make-up can be compared to other U.S. cities. In general, however, the BSS revealed the importance of early schooling experiences and provided an exemplar for future investigations.

Greensboro Early Schooling Study

Concurrently, Morrison and colleagues have been examining multiple factors that contribute to school success and failure in an on-going longitudinal study conducted in Greensboro, NC. The Greensboro Early Schooling Study (GESS) began investigating kindergarten readiness and the transition to formal schooling in 1990. Initially the project utilized a "cut-off" methodology to identify students who had either just missed or made the kindergarten chronological age cut-off requirements. Morrison and Griffith (1994) confirmed that the association between entrance age and academic achievement fades out during early elementary grades. The extensive GESS data allowed Morrison and colleagues to further concentrate on differences among children's literacy skills at school
entry and through the early grades. With the inclusion of kindergartners, researchers were able to examine if the results of the BSS were replicable in a different sample while also extending the analysis to kindergarten.

The GESS is following three successive kindergarten cohorts into middle school. A total of 531 subjects were given a battery of academic (vocabulary, reading, mathematics, general knowledge, and alphabet recognition) and self-perception (peer and maternal acceptance and cognitive and physical competence) tests during the fall and spring of the traditional school year. Their parents completed a questionnaire containing background information and inquiries about the home literacy environment (e.g., who reads to the child and how often, parental reading habits, access to books and other literacy enhancing tools, television viewing habits, use of a computer, possession of stereo, dictionary, encyclopedias, etc.) and teachers rated the children's social skills. The comprehensive battery of measures provided information on a multitude of predictor and outcome variables.

A primary aim of the GESS was to examine the nature of literacy skill differences in elementary students. The data clearly demonstrated that sizable individual differences existed when children entered school. For example, though all the subjects were 5.5-6 years old, an age equivalent spread of 8 years was found between the lowest-scoring child (1 year 9 months) and the highest-scoring child (9 years 10 months) and a standard deviation of 18.73 on the vocabulary test. This degree of disparity was also evident across the reading, mathematics, and general information domains. To illustrate, vocabulary skills were significantly correlated at the p<.001 level with reading (r=.54), math (r=.59), and general information (r=.79). If a child was performing below average in one domain, he or she also tended to be below average in the remaining literacy domains. Most importantly, the achievement gap was not successfully reduced by early schooling experiences (Hardway & Morrison, 1994; Morrison et al., 1993). A range of
factors within the child and his/her environment were related to academic outcomes and continue to be studied in detail. Namely, child's IQ, maternal education, teacher rated work related skills, and the home literacy environment contributed significant, unique variance in regression analyses.

Racial Differences in Elementary Education

One final source of concern in recent years has been the persistent gap across racial groups in literacy attainment and academic areas. Herrnstein and Murray (1994) reignited the racial controversy in *The Bell Curve* with their claim that IQ is related to a number of important outcomes, including academic achievement, and the IQ of African-Americans is on average one standard deviation below Euro-Americans. Even with stringent inclusion criteria, they asserted research historically supported a gap in Euro- and African-American IQ scores. According to NAEP academic assessments, performance gaps between African- and Euro-American students have narrowed, particularly in reading and math skills. African-American scores are increasing while Euro-Americans remain the same. Despite this progress, the difference between the races remains substantial (Applebee et al., 1989).

In their sample of Baltimore children, Alexander and Entwisle (1988) reported minimal differences between Euro- and African-American first graders on achievement tests that became more pronounced by second grade. They claimed the differences originated during the first and second grades, but that they were not large or practically meaningful. However, their study included a select sample of different racial groups. Baltimore and its school population changed during the course of BSS. Euro-Americans moved out of the city (population decreased by 40%) while the African-American population increased slightly. School population demographics changed as well and the school population was more economically disadvantaged than the city-wide population.
Additional data is necessary to confirm both the representativeness of the sample and BSS racial results.

Sample characteristics in research examining racial differences are critical because many researchers believe that observed racial differences can be attributed to socio-economic status (SES) factors. For example, Alexander and Entwisle found negligible race differences, but large SES effects (1993). They believed family factors and the match between home/school environments could be larger influences than race. Herrnstein and Murray, on the other hand, reported that when SES was extracted, the size of the racial IQ gap shrank but did not disappear in their meta-analysis (Herrnstein & Murray, 1994). Though Herrnstein and Murray were concentrating on IQ and not academics, they agreed that family values and practices were important influences and could be potential means for intervention.

Present Investigation

In order to determine the generalizability of the previous findings and examine academic skills in more detail, the project aimed to answer the following questions:

1. How large are individual differences in children's literacy skills at school entry?
2. Is performance linked across academic domains?
3. What happens to individual differences as children progress through early elementary school?
4. What is the extent and nature of racial differences in early literacy skills?

The project directly compared GESS results with the current sample of Evanston, IL kindergartners. Based on previous research (Entwisle & Alexander, 1992; Morrison et al., 1993), variability among entering Evanston students was predicted to be substantial and their performance was expected to be linked across academic domains at school entry. It was further anticipated that individual differences in Evanston children at the fall of kindergarten would be maintained or magnified over the school year. Finally, no
racial achievement differences were expected in the fall. A slight divergence was predicted over the kindergarten year so Euro-Americans would be scoring higher than African-Americans in the spring. In summary, kindergarten children were expected to show the same pattern of results as the Greensboro, NC students.
CHAPTER II
METHOD AND PROCEDURE

In 1993, a project was begun in the Evanston-Skokie School District 65 utilizing a sequential longitudinal design. Its objective was to determine the nature and course of academic skills development in early elementary students through a multi-trait, multi-method investigation and compare the findings with data obtained from previous research. Subjects were tested individually during the fall and spring of the academic year. Data collected from the Evanston, IL kindergartners was compared to archival data from Greensboro, NC children.

Subjects

Evanston Sample

Evanston is a midwestern suburb bordering Chicago, Illinois and home to Northwestern University. As such, it combines urban accessibility and influence with a suburban locale and atmosphere. According to 1993 census data provided by Evanston-Skokie District 65, there were 73,233 residents in Evanston. Both the community and school district were made up of individuals from varied racial, ethnic, and socio-economic backgrounds. In 1993, forty-seven percent of the district's students were minorities. To ensure equal treatment of all students the school system instituted a 60/40 mandate stating that no school may have more than 60% or less than 40% of its student body from one racial/ethnic group. City-wide integration was accomplished via bussing and attendance in one of two magnet schools. In addition, Evanston-Skokie District 65 makes an effort to intervene and remediate the lowest performing students in the early
elementary grades. Moreover, District 65 is reputed to have one of the strongest secondary education programs in Cook County (Chicago Tribune, 1995).

Kindergarten subjects in the current thesis attended three elementary schools in the district (there were 11 elementary schools in Evanston-Skokie District 65); one of the participating schools was a magnet school which emphasized cross-cultural education. The students (N=107) were tested in the fall and spring of the 1994-95 academic year. The racial make-up of the sample, as identified by the subjects' parents, was as follows: 56.1% Euro-American, 27.1% African-American, 9.3% Bi-racial, 5.6% Hispanic, and 1.9% Asian. According to parental self reports, parents had on average graduated with a bachelor's degree and had a mean age of 37 for mothers and 40 for fathers. All of the participants were mainstream students attending full-day kindergarten programs. See Table 1 for additional demographic information on the Evanston sample.

Archival Greensboro Early Schooling Study (GESS) Sample

In 1990, Morrison and several associates began a longitudinal project to ascertain the relationship between chronological age and school achievement. The research was conducted in the southeastern city of Greensboro, NC. Greensboro is a university city of 185,000 people and part of the geographical Triad which consists of Greensboro, Winston-Salem, and Highpoint. It is west of Chapel Hill and North Carolina's research triangle region (Chapel Hill site of University of North Carolina at Chapel Hill, Durham where Duke University is located, and Raleigh which is the state capital). Since its origin, GESS has had a close working relationship with the Greensboro school district.

Three consecutive waves of subjects were initially tested in the fall of kindergarten and they will be followed to the end of third grade. After that point standardized test scores will be provided by the school system. To date, there is complete data on 295 children from the fall of kindergarten to the end of second grade. This sub-sample was used as a comparison for the current investigation. The sample was 61% Euro-American
and 38% African-American. Demographic information on this sub-sample is contained in Table 1. Subjects attended 16 Greensboro public schools (out of 25 elementary schools in the district); four magnet schools and one extended year school participated in the project.

Measures

The current thesis utilized a multi-trait, multi-method approach. Several literacy domains, background demographic variables, and family literacy activities were examined as part of a larger battery assessing a broad range of psychological skills. Each student was individually tested by trained child interviewers.

Receptive Vocabulary

The revised Peabody Picture and Vocabulary Test (PPVT-R; Dunn & Dunn, 1981) was used to determine subjects' linguistic skills. Participants were asked to identify which of four pictures corresponded to a stated word. For example, when an experimenter said, "Show me tying", the subject would point to the quadrant with a girl tying her shoes. Age equivalent scores were generated from the raw scores. Split-half internal reliability coefficients for this age group ranged from .73 to .84.

General Knowledge and Academic Achievement

Reading, mathematics, and general information skills were assessed using three of the Peabody Individual Achievement Test sub-tests. The general information test provided an indication of children's knowledge about their culture, historical information (i.e. nursery rhymes, describing native American teepees), and activities in the community (i.e. describing the American flag, visiting the dentist). Its split-half reliability coefficients ranged from .93 to .94 for this age group.

Reading recognition test items ranged from matching letters and words to reading rows of words on a page. The PIAT-R assessed letter and word decoding skills. Split-half reliability coefficients ranged from .94 to .97. The mathematics sub-test ranged in
difficulty from matching numbers to addition/subtraction story problems to deciphering graphs. Starting items were determined by performance on the previous subject test. Again, age equivalent scores were computed from subjects' raw scores. Split-half reliability coefficients ranged from .84 to .94 for the mathematics sub-test.

Finally, letter recognition was tested with an alphabet/letter naming task. Subjects were asked to identify all 26 letters from a set of alphabet flash cards. The percentage correct was computed for each child.

Intelligence Test

The short form of the Stanford-Binet-Revised intelligence test was given to obtain an IQ score for each subject. The short form encompasses six sub-scales: vocabulary, bead memory, quantitative reasoning, sentence memory, pattern analysis, and comprehension. According to the publisher, reliability coefficients for the intelligence test ranged from .95 to .97.

Background Information and Family Literacy Environment

A two page Background Questionnaire was distributed to determine both background information and the family's literacy activities. There was a 94% response rate for the self-report instrument. Parents provided information on demographic variables such as parental employment (full-time, part-time, unemployed), occupation, education, child's race/ethnicity, health history, and preschool experience.

In addition, a Family Literacy Environment (FLE) score was obtained by summing responses to questions about literacy activities in the home. Questions such as who reads to the child, how often, how often do the parents read to themselves, the number of children's books/puzzles/math workbooks in the home, family trips to the library, television and video game viewing, and magazine and newspaper subscriptions were included on the Parenting Questionnaire. The FLE scale was continuous (higher scores
denoted better literacy environments) and provided information about what families did

to encourage and foster literacy skills.

Procedure

Three rounds of consent requests were sent to parents of kindergartners at the
beginning of the 1994-95 school year. The receptive vocabulary, cultural knowledge,
and academic achievement measures were administered to provide baseline data on
participating students. IQ tests were administered after all other testing was completed in
the fall of 1994. Simultaneously, parents were mailed a background questionnaire and a
parenting questionnaire which they completed and returned at their convenience. Finally,
the receptive vocabulary, cultural knowledge, and academic achievement battery was
again administered at the end of the kindergarten year to ascertain progress over the
school year. The subjects were tested individually by trained interviewers during school
hours on school grounds.
CHAPTER III
RESULTS

Comparison of Evanston, IL and Greensboro, NC

The comparability of the Evanston and Greensboro Early Schooling Study samples was evaluated by ANOVA and Levene Test of Homogeneity analyses on nine background variables and five outcome measures at the beginning of kindergarten. Table 1 illustrates similarities and differences between the two communities.

ANOVA results revealed significant mean differences between the samples for the following background variables: child's IQ ($F(1, 398)=4.67, p<.05$), parental education ($F(1, 383)=49.36, p<.001$ for mothers; $F(1, 312)=45.36, p<.001$ for fathers), parental occupation status ($F(1, 335)=30.28, p<.001$ for mothers; $F(1, 305)=24.83, p<.001$ for fathers), parental age ($F(1, 375)=10.86, p<.001$ for mothers; $F(1, 301)=8.98, p<.01$ for fathers), and the FLE ($F(1, 324)=10.72, p<.001$). In general, Evanston participants had higher mean scores on the background variables. There were also significant mean differences between Evanston and Greensboro on four of the five fall outcome measures. Evanston subjects scored higher on tests of receptive vocabulary ($F(1, 400)=35.29, p<.001$), general information $F(1, 400)=18.15, p<.001$), reading $F(1, 400)=14.83, p<.001$), and math $F(1, 400)=9.07, p<.01$).

Given the higher Evanston averages, Levene tests for homogeneity of variances were conducted to compare the shape of the two cities' distributions. With the exception of parental occupational status, maternal age, and child's preschool experience, the background variable variances were comparable in Evanston and Greensboro.
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<td>(15.53)</td>
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<td><strong>Background Var.</strong></td>
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<td>Father’s Age (yr)</td>
<td>40.11</td>
<td>37.57</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>(7.25)</td>
<td>(6.49)</td>
<td>(ns)</td>
<td></td>
</tr>
<tr>
<td>Number of Siblings in the Home</td>
<td>1.35</td>
<td>1.29</td>
<td>ns</td>
</tr>
<tr>
<td>(0.79)</td>
<td>(1.00)</td>
<td>(ns)</td>
<td></td>
</tr>
<tr>
<td>Child’s Preschool Attendance (mo)</td>
<td>27.27</td>
<td>23.82</td>
<td>ns</td>
</tr>
<tr>
<td>(13.82)</td>
<td>(18.08)</td>
<td>(&lt;.001)</td>
<td></td>
</tr>
<tr>
<td>Family Literacy Environment</td>
<td>12.76</td>
<td>11.35</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>(3.42)</td>
<td>(3.49)</td>
<td>(ns)</td>
<td></td>
</tr>
<tr>
<td><strong>Fall K Outcomes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptive Vocabulary</td>
<td>72.35</td>
<td>59.88</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>(18.42)</td>
<td>(18.66)</td>
<td>(ns)</td>
<td></td>
</tr>
<tr>
<td>General Information</td>
<td>20.39</td>
<td>15.54</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>(11.93)</td>
<td>(9.35)</td>
<td>(ns)</td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>12.69</td>
<td>9.17</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>(11.80)</td>
<td>(6.27)</td>
<td>(&lt;.001)</td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>14.91</td>
<td>12.84</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>(7.07)</td>
<td>(5.69)</td>
<td>(ns)</td>
<td></td>
</tr>
<tr>
<td>% Correct Alphabet</td>
<td>82.23</td>
<td>77.32</td>
<td>ns</td>
</tr>
<tr>
<td>(26.68)</td>
<td>(30.56)</td>
<td>(&lt;.05)</td>
<td></td>
</tr>
</tbody>
</table>

Greensboro had greater variability in mother's occupation ($F(1, 335)=7.11, p<.01$), maternal age ($F(1, 375)=4.10, p<.05$), and months of preschool attendance ($F(1, 391)=14.34, p<.001$) and Evanston had greater variability in father's occupation ($F(1, 305)=12.77, p<.001$). There were no significant differences between Evanston and Greensboro on three of the five outcome measures (receptive vocabulary, general information, and math). Reading scores had more variability in Evanston ($F(1, 400)=18.20, p<.001$); on the other hand, alphabet recognition had a slightly higher variance in Greensboro ($F(1, 400)=6.24, p<.05$). For the most part, both communities had similarly shaped distributions on more than half of the background variables and fall outcome measures; however, the Evanston sample was on average shifted higher than Greensboro.

**Method of Statistical Analysis for the Evanston Sample**

To analyze individual literacy skills differences in the Evanston sample, students were assigned to one of three groups based on their IQ scores [low ($\leq 89$), middle ($>89$ and $<110$), and high ($\geq 110$)] because IQ was strongly and significantly correlated with the literacy measures. One-way analyses of variance (ANOVA's) followed by a posteriori Tukey honestly significant difference tests (HSD) were computed for each of the five outcome measures (receptive vocabulary, cultural knowledge, reading recognition, mathematics, and alphabet recognition) to examine whether there were any significant differences in entering literacy skills between the three groups. Once any achievement gaps had been revealed, Pearson correlation coefficients were computed to elucidate the degree of relatedness in entering skills. Finally, repeated measures ANOVAs were conducted for each of the five outcome measures to identify testphase (fall, spring) or group main effects and any interactions. This strategy was then repeated to examine racial differences in both the Greensboro and Evanston samples.
Nature of Individual Differences in the Evanston Sample

Fall of Kindergarten (Entering Achievement Gaps)

Based on the Greensboro results, significant individual differences between kindergartners' scores were hypothesized for the Evanston sample. As predicted, there was substantial variability at school entry. In receptive vocabulary skills, student's age equivalent scores ranged from a low of 2 years 6 months to a high of 11 years 10 months, over a nine year spread with a 18.42 standard deviation. Differences also existed between the highest and lowest scoring subjects in general information (seven and a half year range, sd=11.92), reading (five year range, sd=11.80), math (four year range, sd=7.07), and alphabet recognition (from 4% correct to 100% correct, sd=26.68). Large numbers of children were below age expectancies in the fall of kindergarten. These findings dovetailed with the enormous individual differences GESS found at the beginning of formal schooling.

To statistically explore individual differences in the fall of kindergarten, the Evanston sample was split into IQ tertiles and one-way ANOVAs were conducted on the vocabulary, general knowledge, reading recognition, math, and alphabet scores. Table 2 shows the mean scores for each IQ group. There were significant differences between the groups on every literacy measure ($F(2, 102)=29.29$, $p<.001$ for vocabulary; $F(2, 102)=22.10$, $p<.001$ for general information; $F(2, 102)=10.26$, $p<.001$ for reading recognition; $F(2, 102)=21.59$, $p<.001$ for math; and $F(2, 102)=3.04$, $p<.05$ for alphabet recognition). Tukey HSD tests revealed significant differences at the .05 level between the highest and lowest IQ group on every outcome measure. In addition, there were also differences between the highest, middle, and lowest IQ groups in vocabulary, general information, and mathematics scores. On the reading recognition test, there were significant differences between the high and low groups and the middle and high groups, but no difference between the low and middle IQ groups. For the alphabet naming task,
### TABLE 2

**EVANSTON MEAN SCORE BY IQ GROUP COMPARISONS BY ANOVA IN FALL OF KINDERGARTEN**

(with Standard Deviations in Parentheses)

<table>
<thead>
<tr>
<th></th>
<th>Low IQ</th>
<th>Middle IQ</th>
<th>High IQ</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receptive Vocabulary</td>
<td>55.22</td>
<td>69.59</td>
<td>84.07</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(15.45)</td>
<td>(17.47)</td>
<td>(11.66)</td>
<td></td>
</tr>
<tr>
<td>General Knowledge</td>
<td>11</td>
<td>17.72</td>
<td>27.53</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(5.42)</td>
<td>(7.38)</td>
<td>(13.51)</td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>6.13</td>
<td>10.38</td>
<td>18.09</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(4.43)</td>
<td>(8.67)</td>
<td>(14.55)</td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>8.70</td>
<td>14.49</td>
<td>18.83</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(3.11)</td>
<td>(5.74)</td>
<td>(7.26)</td>
<td></td>
</tr>
<tr>
<td>Alphabet % Correct</td>
<td>71.96</td>
<td>80.51</td>
<td>88.47</td>
<td>&lt;.05</td>
</tr>
<tr>
<td></td>
<td>(30.48)</td>
<td>(26.78)</td>
<td>(23.35)</td>
<td></td>
</tr>
</tbody>
</table>
there were no significant differences between the middle and high or low IQ groups. In summary, there were significant differences between the IQ groups on the five outcome measures. The gaps in literacy skills were significant at the fall of kindergarten for the Evanston students.

Domain Specificity of Achievement

Second, to ascertain the interrelatedness of entering skills, Pearson Correlation Coefficients were computed for the five outcome measures and child’s IQ. As in GESS, it was predicted that Evanston kindergartners’ performance would be highly correlated across all five outcome measures. Table 3 illustrates that kindergartners’ performance was linked across the literacy domains. In addition, IQ was strongly and significantly related to performance on the vocabulary, general knowledge, reading, math, and alphabet tasks.

TABLE 3
PEARSON CORRELATION COEFFICIENTS FOR EVANSTON FALL SCORES

<table>
<thead>
<tr>
<th>IQ</th>
<th>Receptive Vocab.</th>
<th>General Know.</th>
<th>Reading</th>
<th>Math</th>
<th>Alphabet Naming</th>
</tr>
</thead>
<tbody>
<tr>
<td>---</td>
<td>---</td>
<td></td>
<td>---</td>
<td></td>
<td>---</td>
</tr>
<tr>
<td>Receptive Vocab.</td>
<td>.69**</td>
<td></td>
<td>.67**</td>
<td>.68**</td>
<td>.27*</td>
</tr>
<tr>
<td>General Know.</td>
<td>.67**</td>
<td>.68**</td>
<td>---</td>
<td></td>
<td>.34**</td>
</tr>
<tr>
<td>Reading</td>
<td>.47**</td>
<td>.44**</td>
<td>.56**</td>
<td>.48**</td>
<td>.33**</td>
</tr>
<tr>
<td>Math</td>
<td>.66**</td>
<td>.60**</td>
<td>.58**</td>
<td>.48**</td>
<td>.32**</td>
</tr>
<tr>
<td>Alphabet Naming</td>
<td>.27*</td>
<td>.34**</td>
<td>.33**</td>
<td>.32**</td>
<td>.39**</td>
</tr>
</tbody>
</table>

* p<.01

**p<.001
All of the correlation coefficients were positive, indicating that higher scores in one domain were related to high scores in the remaining literacy domains. Pearson correlation coefficients generally ranged from approximately .5 to .8; however, the correlation between performance on alphabet recognition and the other tests were lower (in the .3 to .4 range), undoubtedly as a result of a ceiling effect on this measure (over half of the sample identified at least 96% of the letters correctly). As in Greensboro, high and low performance was not isolated to a specific literacy skill. To statistically test whether there were no differences in the degree of correlation between Evanston and Greensboro, correlation coefficients from both samples were converted into standardized scores. With only one exception, there were no significant differences in the interrelatedness of the two communities' entering skills (there was a difference in the receptive vocabulary and general information correlation, \( z = -2.12, p > .05 \)).

Progression of Skills From Fall to Spring

The third question concerned the progression of individual differences from fall to spring of the kindergarten year. Based on GESS findings, it was predicted that the individual differences observed in Evanston would be maintained or magnified over the kindergarten year. Repeated measures ANOVAs, with group (levels: low, middle, and high IQ) as the between-subjects variable and testphase (levels: fall of kindergarten, spring of kindergarten) as the within-subjects variable, were conducted to compare the progress made in literacy skills over the school year. The degree of progress over the school year for Evanston students was similar to that of Greensboro students. Specifically, achievement gaps between the groups in Evanston were maintained or magnified for all of the literacy measures.

In vocabulary, general information, reading, and alphabet recognition there was no interaction between testphase (score in fall, score in spring) and IQ group. There were testphase main effects in all three literacy domains which indicated that students scored
significantly better on the spring receptive vocabulary, general information and reading recognition measures ($F(1, 102)= 45.09, p<.001$; $F(1, 102)= 43.20, p<.001$; $F(1, 102)= 96.48, p<.001$; and $F(1, 102)= 5.70, p<.01$ respectively).

A slightly different picture emerged for math. There was a significant interaction between testphase and IQ group, resulting from greater disparity in the spring than the fall math scores for the three groups ($F(2, 102)= 3.39, p<.05$). This interaction was qualified by a simple main effect for testphase ($F(1, 102)= 25.73, p<.001$). The Evanston math scores began to diverge over the kindergarten year; children in the high IQ group made more progress than their peers. In summary, individual differences noted at school entry did not decrease during the school year; instead, these differences were either maintained (vocabulary, general information, and reading) or magnified (math).

**Racial Differences in Greensboro and Evanston**

**Greensboro Sample**

Racial gap analyses have heretofore been unpublished for the GESS. As such, the data will be analyzed in the current thesis and then compared to results from Evanston. The Greensboro sample was representative of the community at large (roughly 60% Euro-American and 40% African-American). Table 4 provides mean outcome scores for the Greensboro sample.

To answer the question of whether differences existed at school entry, one-way ANOVAs were performed for fall kindergarten literacy skills. There were significant gaps between Euro- and African-American students in vocabulary ($F(1, 291)= 185.59, p<.001$), general information ($F(1, 291)= 13.35, p<.001$), reading ($F(1, 291)= 40.84, p<.001$), math ($F(1, 291)= 75.23, p<.001$), and alphabet naming ($F(1, 291)= 27.21, p<.001$). Euro-American students also outperformed their peers in all academic outcome measures at the end of the school year. Further, repeated measures ANOVAs revealed significant testphase by racial group interactions resulting from an increase in the
### TABLE 4

**GREENSBORO MEAN SCORE BY RACIAL GROUP COMPARISONS**
(with Standard Deviations in Parentheses)

<table>
<thead>
<tr>
<th></th>
<th>White Mean Score</th>
<th>Black Mean Score</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample Size</strong></td>
<td>180</td>
<td>113</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>IQ</strong></td>
<td>107.35</td>
<td>89.39</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(13.44)</td>
<td>(11.30)</td>
<td></td>
</tr>
<tr>
<td><strong>Fall of K</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptive Vocabulary</td>
<td>69.02</td>
<td>45.11</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(15.12)</td>
<td>(13.80)</td>
<td></td>
</tr>
<tr>
<td>General Knowledge</td>
<td>19.43</td>
<td>9.26</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(8.87)</td>
<td>(6.24)</td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>10.93</td>
<td>6.41</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(6.57)</td>
<td>(4.60)</td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>14.84</td>
<td>9.56</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(5.61)</td>
<td>(4.06)</td>
<td></td>
</tr>
<tr>
<td>Alphabet % Correct</td>
<td>84.23</td>
<td>66.38</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(25.05)</td>
<td>(35.32)</td>
<td></td>
</tr>
<tr>
<td><strong>Spring of 2nd Grade</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptive Vocabulary</td>
<td>100.70</td>
<td>82.50</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(10.84)</td>
<td>(13.72)</td>
<td></td>
</tr>
<tr>
<td>General Knowledge</td>
<td>46.36</td>
<td>30.70</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(14.36)</td>
<td>(13.63)</td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>52.26</td>
<td>39.18</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(12.56)</td>
<td>(14.57)</td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>43.02</td>
<td>29.64</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(11.90)</td>
<td>(10.31)</td>
<td></td>
</tr>
<tr>
<td>Alphabet % Correct</td>
<td>99.32</td>
<td>98.84</td>
<td>&lt;.01</td>
</tr>
<tr>
<td></td>
<td>(.51)</td>
<td>(7.77)</td>
<td></td>
</tr>
</tbody>
</table>
disparity between the groups over the first two years of school for general information \( (F(1, 291) = 17.67, p<.001) \), reading \( (F(1, 291) = 35.17, p<.001) \), and math \( (F(1, 291) = 48.33, p<.001) \). In vocabulary and alphabet recognition the groups began to converge \( (F(1, 291) = 15.23, p<.001; F(1, 291) = 24.23, p<.001) \), but there were still significant group differences in the spring of the kindergarten year.

Finally, forced-entry regression analyses were conducted to determine the unique contribution of race, after accounting for the effects of several child, social, and economic background variables. First, maternal education, child's IQ, and the home literacy environment were entered as a block. Next, child's race was entered into the regression equation. Results indicated that race explained 6% of the variance in fall vocabulary scores, 7% of the variance in the spring vocabulary scores, and 2% of the variance in fall and spring general information scores. Race did not contribute significant variance for reading and math.

Evanston

The racial composition of the Evanston sample population was similar to that of Greensboro, with Euro-Americans comprising almost 60% and African-Americans almost 30% of the sample. Table 5 provides mean outcome scores for the Evanston sample.

One-way ANOVAs were performed to compare fall literacy scores of Euro- and African-American students. As in Greensboro, Euro-American students scored higher than their African-American peers in vocabulary \( (F(1, 87) = 54.13, p<.001) \), general information \( (F(1, 87) = 20.65, p<.001) \), reading \( (F(1, 87) = 3.86, p<.001) \), and math \( (F(1, 87) = 19.36, p<.001) \). These racial differences were still present in the spring. There was no significant difference between the racial groups on the alphabet recognition task at either testing period. Repeated measures ANOVAs revealed a significant interaction between race and testphase in math, resulting from divergence of the groups between fall
TABLE 5
EVANSTON MEAN SCORE BY RACIAL GROUP COMPARISONS
(with Standard Deviations in Parentheses)

<table>
<thead>
<tr>
<th></th>
<th>White Mean Score</th>
<th>Black Mean Score</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Size</td>
<td>60</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>IQ</td>
<td>112.52</td>
<td>89.21</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(13.58)</td>
<td>(13.14)</td>
<td></td>
</tr>
<tr>
<td>Fall of K</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptive Vocabulary</td>
<td>81.15</td>
<td>57.76</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(13.16)</td>
<td>(15.78)</td>
<td></td>
</tr>
<tr>
<td>General Knowledge</td>
<td>24.72</td>
<td>13.03</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(12.77)</td>
<td>(7.60)</td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>14.42</td>
<td>9.17</td>
<td>&lt;.05</td>
</tr>
<tr>
<td></td>
<td>(11.51)</td>
<td>(12.36)</td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>17.35</td>
<td>10.69</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(7.72)</td>
<td>(3.71)</td>
<td></td>
</tr>
<tr>
<td>Alphabet % Correct</td>
<td>84.95</td>
<td>76.62</td>
<td>ns</td>
</tr>
<tr>
<td></td>
<td>(26.35)</td>
<td>(27.90)</td>
<td></td>
</tr>
<tr>
<td>Spring of K</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptive Vocabulary</td>
<td>89.86</td>
<td>63.20</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(11.13)</td>
<td>(18.85)</td>
<td></td>
</tr>
<tr>
<td>General Knowledge</td>
<td>30.19</td>
<td>17.90</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(12.06)</td>
<td>(10.11)</td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>21.83</td>
<td>13.79</td>
<td>&lt;.01</td>
</tr>
<tr>
<td></td>
<td>(14.43)</td>
<td>(12.07)</td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>25.12</td>
<td>13.38</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(10.35)</td>
<td>(5.06)</td>
<td></td>
</tr>
<tr>
<td>Alphabet % Correct</td>
<td>97.76</td>
<td>89.45</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>(4.76)</td>
<td>(20.03)</td>
<td></td>
</tr>
</tbody>
</table>
and spring ($F(1, 85)= 11.8, p<.001$). Unlike Greensboro, differences between racial groups remained constant for vocabulary, general information, and reading in Evanston. This difference could have been because the Evanston data were from the kindergarten year, whereas the Greensboro sample had complete data from the fall of kindergarten to the spring of second grade.

Hierarchical regression analyses were conducted with maternal education, child's IQ, and the home literacy environment removed in one block to investigate the unique contribution of race. After accounting for the other background variables, race was not a significant predictor of general information, reading, and math scores, but it did account for 3% and 6% of the variance in pre and post vocabulary skills. In summation, initial variability between racial groups was pronounced in both samples, although in most instances was accounted for by differing social and economic factors. Differences between Euro- and African-American students were remarkably similar for the two samples.
CHAPTER IV
DISCUSSION AND IMPLICATIONS

Results from the current investigation in Evanston, IL indicated that individual differences in literacy skills began early, probably before children started school. The widespread and interrelated gaps were not reduced by the schools. These results were consistent with previous research. In particular, variability between racial groups was pronounced, although in most instances these differences were accounted for by differing child, social, and economic factors of the Euro- and African-American samples.

Similarities and Differences Between Greensboro and Evanston Samples

An aim of this thesis was to discover whether the timecourse and patterns of literacy achievement in GESS generalized to a different geographical region. Students in Evanston demonstrated similar achievement patterns. Evanston mean scores were significantly higher than Greensboro's on child's IQ, parental education, age, and occupational status, Family Literacy Environment, fall receptive vocabulary, general information, reading, and math scores. The Greensboro and Evanston distributions looked similar, except Evanston had higher means, for the majority of background variables and fall of kindergarten measures. Greensboro did have greater variability in maternal age and occupation, months of preschool attendance, and alphabet recognition; whereas paternal occupation and reading scores were more variable in Evanston. Nevertheless, Evanston findings were congruent with previous GESS results.

One issue remained unaddressed in the Evanston sample. Did the higher mean scores in Evanston reflect an overall community difference, or were they a function of sampling bias? Evanston participants closely resembled District 65 averages, but the
Evanston sample may not have reflected the bottom of the distribution and the range of students in the community. If this were the case, GESS lower mean scores could be in part because of a sample containing higher achieving Evanston kids and lacking the bottom of the distribution which is present in the Greensboro sample. For the next wave of data collection, an additional school with a greater proportion of children at the lower end of the spectrum was included in the study. However, the aforementioned caveat only strengthened the current results. With a conservative sample, the study confirmed that there was indeed evidence of disparate literacy skills in children at the initiation of formal schooling.

Four Main Conclusions
In addition to the comparison of two geographically distinct communities, four main conclusions can be drawn from this investigation.

Individual Differences at School Entry.

There was significant variability among student's skills at school entry in both the Evanston and Greensboro school districts. The observed large discrepancies in children's achievement at kindergarten entry supported the hypothesis that children enter school with different literacy skills. Gaps did not magically appear during the school year. Additional research is necessary to delve into the sources of literacy skill discrepancies. Possible factors influencing a child's readiness before he or she begins formal schooling could include child related variables discussed by behavior geneticists, the family, parenting practices, home literacy environment, and/or child care arrangements. Further investigations are needed to flesh out the individual and interactional contributions of these and other important pre-schooling influences on academic skills.

Literacy Skills are Interrelated

Individual achievement patterns generalized across literacy skills in both Evanston and Greensboro. Performance was linked across literacy domains so that children who
scored relatively low in one area tended to score poorly in the other areas. The interrelatedness of skills in this investigation supported findings that math and reading achievement were positively related (Stevenson & Lee, 1990) and that previous skills influenced future achievement (Alexander & Entwisle, 1988).

Achievement Gaps are Maintained

Differences in achievement levels between children at school entry remained constant or increased over the kindergarten year. The fall data collection provided important baseline information and allowed an evaluation of literacy skill progression over the kindergarten year. The so-called "Matthew effect" from the Judeo-Christian Old Testament described both Evanston and Greensboro schools where the rich got richer and poor remained poor. Variation in entering skills did not decrease over time in either community. Follow-up data on the kindergartners will address whether scholastic trajectory was set in the first year of school as suggested by previous research (Hardway & Morrison, 1994; Morrison et al., 1993; Alexander & Entwisle, 1988).

Given the substantial differences among children at school entry that did not decrease over the year, a logical next step will be to chronicle these children and determine if schooling eventually closes the gap. As doubtful as this may be, if schooling is indeed the "great equalizer", developmental scientists will not need to worry about literacy gaps because disadvantaged children will naturally catch up. Though previous findings strongly suggest that this will not be the case, understanding schooling influences is important for prevention and intervention in elementary school. Evanston-Skokie District 65 implements two remediation programs for at risk students (lowest 20%) in the first grade. Some percentage of the 1994-1995 sample will be enrolled in one of these efforts which should allow for future evaluations of systemic early intervention.
Racial Differences are Evident at School Entry

Finally, racial gaps in academic skills were present in both Greensboro and Evanston at the start of elementary school, and these remained over the kindergarten year in Evanston and through second grade in Greensboro. This was one of the first comprehensive investigations of racial differences in the early grades. The BSS finding that differences between Black-White students were not significant at school entry (Entwisle and Alexander, 1993) contradict GESS and Evanston data. The discrepancy between these and BSS results could reflect different racial achievement patterns. More likely, the discrepancy could be an artifact of Baltimore's unique population. According to Alexander and Entwisle (1988), Baltimore city was 55% African-American at the start of the BSS and racial segregation intensified over the course of the study. Euro-American participants tended to be from low SES backgrounds, but there were both middle and lower class African-Americans in the BSS sample.

The overall disparity between Euro- and African-American students did not diminish and was magnified in some cases over the kindergarten year (with the exception of small receptive vocabulary gains for African-American students from kindergarten to second grade in Greensboro). To end the account at this point would distort perceptions about racial inequality in achievement. Race effects disappeared in reading and mathematics when the child's IQ, parental education, and the family literacy environment was taken into account, which was consistent with previous reports (Entwisle & Alexander, 1992). Vocabulary achievement gaps between African- and Euro-American students that remained significant after the effect of socioeconomic status was removed were potentially the result of different linguistic backgrounds.

Research on various racial and ethnic groups confirmed that a child's achievement cannot be explained solely by their race or ethnicity (Huntsinger et al., 1994; Eccles, 1993; Entwisle & Alexander, 1983); rather, anyone has the potential to succeed in a
supportive environment that places a high priority on academic pursuits. Heath (1984) and Branscombe (1991) demonstrated in an ethnographic study of low income black children from Trackton housing projects that any parent can communicate expectations for academic success. Clark (1983) examined factors related to the academic success of impoverished black children from an urban area and argued that families could not be explained by surface compositional properties. Though all of the 10 families he sampled were at risk for school failure based on background demographics (low economic standing, single, teenage parents with little education, etc.), five had successful students. Racial gaps were present at the beginning of formal schooling, but investigations of racial differences must also consider its interaction with other influencing factors.

**Implications for Future Research**

The large achievement gaps between kindergartners provides evidence that children enter school with disparate skill levels. By the time children begin formal schooling they have established learning patterns (McLane & McNamee, 1990; Rutter, 1989). Combined results from the current study further indicated the variation in entering skills did not decrease during the first two years of elementary school. Efforts to ameliorate achievement gaps need to focus both on pre-schooling influences and on educational reform in the early grades.

The current study examined school achievement in a macro-context. Future research is needed to disentangle the child nested within his/her social settings and link experiences to academic achievement. Researchers must remember that learning does not occur in a vacuum. Mediators and moderators need to be examined to capture the child's learning experience. What extended families, neighbors, and community organizations contribute to children's development is undoubtedly substantial and might compensate for weaknesses in the home, child care centers, or schools. Now that the nature and extent of individual differences in early elementary school are clear, it is
important to investigate the sources of these differences and combat problems before they become deficits.
REFERENCES


VITA

Education

Master of Arts expected May 1996 from Loyola University Chicago College of Arts and Science. Developmental Psychology Concentration. Thesis: Examination of Individual Differences in Literacy Achievement

Bachelor of Arts from the University of Michigan in Ann Arbor, Michigan. Graduated from the College of Literature, Science, and the Arts with a diverse background in Social Sciences and Humanities.

Teaching Experience

Guest Developmental Psychology Lecturer for Dr. Paul Jose during 10/95 at Loyola University Chicago. Lectured for 2 class periods on historical and contemporary parenting styles and the home learning environment in an introduction to developmental psychology course. Prepared and graded a series of multiple choice and essay questions on material from the lectures which was included on a course exam.

Guest Statistics Lecturer for Dr. Debbie Holmes during 4/95 at Loyola University Chicago. Taught non-parametric statistics unit to undergraduate students which included assigning relevant practice problems to aid in student comprehension and writing, administering, and grading unit exam.

Research in Progress

Graduate Research Assistant from 9/93 to the present at Loyola University Chicago under the supervision of Dr. Fred Morrison. I collect, code, and analyze data on literacy related cognitive measures, perform literature reviews, and assist with additional research responsibilities for a NICHD funded research project.
Also a Graduate Research Assistant for Dr. Debbie Holmes from 9/95 to the present at Loyola University Chicago. I am responsible for initiating literature review on infant temperament and its interaction with other background variables. In addition, I have organized and analyzed portions of a longitudinal dataset from a March of Dimes funded project investigating the effects of biological risk on infant development.

From 5/94 until 8/94, I was a Graduate Research Assistant at the National Opinion Research Center at the University of Chicago under the direction of Dr. Norman Bradburn. I conducted extensive literature searches on issues pertaining to early childhood development and co-authored a relevant issues summation for the Early Childhood Longitudinal Study-Kindergarten Cohort (ECLS-K), an NCES funded project.

Finally, while still an undergraduate at the University of Michigan, I was a Research Assistant and worked as a member of a laboratory team studying the ability of K-1st grade pairs to jointly compose a story on a computer. As such, I transcribed videotapes, developed coding systems, applied data codes, and analyzed data.

**Professional Awards and Experience**

Department of Psychology Travel Award, Loyola University Chicago

Competitive application was reviewed by department division heads and awarded stipend to be applied toward 1996 expenses for convention presentations.

Student Representative, Loyola University Chicago

During September of 1995, appointed liaison between graduate students and faculty in the developmental division. Responsibilities include participation at monthly faculty meetings, communicating departmental policies to fellow graduate students, and polling peers to understand their concerns and suggestions to improve the department.

**Professional Societies**

American Educational Research Association (AERA)

Chicago Consortium on Child and Family
Midwestern Psychological Association (MPA)
Society for Research in Child Development (SRCD)

**Articles**


**Conference Papers**


THESIS APPROVAL SHEET

The thesis submitted by Ramie A. Robeson has been read and approved by the following committee:

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The final copies have been examined by the director of the thesis committee and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the thesis is now given final approval by the committee with reference to content and form.

The thesis is, therefore, accepted in partial fulfillment of the requirements for the degree of Master of the Arts.

[Signature]
Date: 4-3-96

Director's Signature