

KINDERGARTEN ENTRANCE AGE
AND READING ACHIEVEMENT
AT THE END OF FIRST AND THIRD GRADE

THESIS

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Abstract

This study was designed to investigate kindergarten entrance age and its relationship to reading achievement at the end of first and third grade.

Standardized reading test scores of 463 third grade students in a southern Wisconsin school district were studied to test these hypotheses:

1. No significant relationship exists between kindergarten entrance age and reading achievement as measured by the CTBS at the end of first and/or third grade.

2. The strength of the relationship does not vary from first to third grade.

3. The strength of the relationship does not vary with sex at the first or third grade level.

4. No significant relationship exists between kindergarten entrance age and placement in the Gifted and Talented Program.

5. No significant relationship exists between kindergarten entrance age and retention.

Results indicate that there is a significant relationship between entrance age of Young (<63 mos. at entrance) and Old (>69 mos.) group subjects and their

Abstract (continued)

third grade reading scores. However, when the sexes were considered separately, no significant relationship was found between entrance age and third grade scores for males or females.

No significant relationship was found between entrance age and first grade reading scores.

Although no significant relationship was found between entrance age and placement in the Gifted and Talented Program, a strong relationship between entrance age and retention was evident. Students in the Young (<63 mos.) group were almost twice as likely to be retained as those in the Middle (63-69 mos.) group, while none of the retention subjects were from the Old (>69 mos.) group.

Boys were also more likely to be retained, as they made up over 69% of the retention population.

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CHAPTER I

STATEMENT OF THE PROBLEM

Despite the development of numerous screening devices to determine a child's readiness for kindergarten, many school districts rely on the chronological age of a child as the major criterion for entrance. Much of the current research demonstrates that other criteria may be more appropriate to screen kindergarten entrants and help predict academic success in later years.

However, since school districts continue to put emphasis on chronological age, it remains important to consider entrance age and its possible effects on achievement. If academic success is influenced by school entry age, then what age is appropriate to begin formal education? Is there an optimal age that will promote greatest achievement?

There is little evidence of an optimal age appropriate for all the varying rates at which individual children mature. Some researchers have, however, found differences in achievement between students who entered school early and those who were considered late entrants.

PURPOSE

This study was designed to determine if a child's age at entrance to kindergarten is related to his/her achievement in reading at the end of first and third grades.

QUESTIONS

1. Is there a significant relationship between kindergarten entrance age and reading achievement as measured by the McGraw-Hill Comprehensive Test of Basic Skills (CTBS) at the end of first grade?
2. Is there a significant relationship between kindergarten entrance age and reading achievement as measured by the CTBS at the end of third grade?
3. If a strong relationship exists between kindergarten entrance age and reading achievement, does it differ significantly from the end of first grade to the end of third grade?
4. If a significant relationship exists between kindergarten entrance age and reading achievement at the end of first grade, does the strength of that relationship vary with the sex of the subjects?

5. If a significant relationship exists between kindergarten entrance age and reading achievement at the end of third grade, does the strength of the relationship vary with the sex of the subjects?

6. Is there a significant relationship between kindergarten entrance age and enrollment in the Gifted and Talented program at the end of third grade?

7. Is there a significant relationship between kindergarten entrance age and retention through third grade?

NEED FOR THE STUDY

The influence of a child's age at entrance to school on academic achievement in subsequent grades has been the subject of much research.

Although many studies find a strong relationship between entrance age and achievement, the evidence has not all been in agreement. Much of the data, aside from the most recent studies, has been based on first grade entrance and deal with achievement in many areas. Since kindergarten attendance has recently become the national norm and the beginning of formal reading instruction,

it is appropriate to use that as the base from which to study entrance ages.

The following study is derived from students' kindergarten entrance ages and deals with reading achievement in first and third grade.

DEFINITION OF TERMS

Gifted and Talented Group - Subjects admitted to the district's Gifted and Talented Program which begins at the fourth grade level. Admission is based on a combination of test scores, teacher inventories, creativity and problem solving skills tests, and IQ.

Kindergarten Entrance Age - Age of subject (in months) on September 1, 1983 during first month of kindergarten.

Reading Achievement - As measured by the national curve equivalent of the total reading score on the McGraw-Hill Comprehensive Test of Basic Skills (CTBS).

Retention Group - Subjects who began kindergarten in September of 1983 with the third graders of this study but were retained in a subsequent grade without special placement.

LIMITATIONS OF STUDY

This study is limited to reading achievement that is measured by standardized testing only. This does not take into account a student's classroom achievement which may differ greatly from standardized scores for various reasons. It also does not consider possible limitations of the CTBS itself.

Students enrolled in the Gifted and Talented program were included in the study; however, those who have special placement because of learning disabilities, or are considered second language or EMR students were not included.

Although the data include students who have changed schools, only those who remained in the district from first to third grade and had test scores available were considered.

The district in this study has a kindergarten entrance age requirement of five-years-old by September 1. Data from schools with a later cut-off date may have different results.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

Through his research, Benjamin Bloom concluded that "from conception to age four the individual develops 50% of his mature intelligence" (Bloom, 1964, p. 88). Even though there were problems with Bloom's paper and he has since set aside his opinion that this justifies early schooling, many others have not.

The greater demands being put on children at younger ages reflect the thinking that "earlier is better," and that four-year-olds are capable of and should be exposed to formal instruction. Thus, reading instruction formerly reserved for first graders, is now a major part of many kindergarten curriculums.

According to Jean Piaget, a child's brain development "probably can but probably should not be speeded up . . . the optimal time is not the minimal time" (Moore, 1982, p. 360). Attempts to determine if there actually is an optimal time to begin formal instruction has been the subject of much research.

In 1931, a landmark study by Morphett and Washburne concluded that students with a mental age of six years-

six months will have greatly reduced chances of failure and discouragement. These results were widely accepted and have greatly influenced beginning reading by suggesting that formal instruction be delayed until the child reaches this optimal mental age. This study helped to establish the 6-year-old first grade admission requirement in practice in most school districts to this date.

It appeared to have ended the much debated topic of when children should begin to read. However, as pointed out by Gentile (1983) in a critique of the study, generalizations should not be made outside of the "one measure of one facet of the reading process" that Morphett and Washburne investigated (p. 173). He also points out that in Britain, a mental age of 4.5 - 5.5 is considered appropriate for formal reading instruction and children begin school at age 5. Yet, the assumption is made by many in the United States that a mental age of 6.5 is the most important factor in determining success or failure in beginning reading.

A 1937 study by Gates supports the predictive value of mental age when it is considered in conjunction with other factors. He found student success at mental ages of 5.0 - 6.5 depending on the type of materials and instruction involved.

The great influence of Morphett and Washburne's study has helped set some school entrance standards. Its simplicity in determining the "right" time to begin reading instruction made it attractive to parents and educators. Today, however, few would agree that one optimal age to begin reading exists. Thus, the debate continues.

Early Entrants at Risk

Mawhinney (1964 as cited by Uphoff, 1985) demonstrated the reason for stopping the early entrance program for "bright" students in the Grosse Point, Michigan schools. A 14 year investigation showed nearly one-third of these "bright" students were considered poorly adjusted, while one-fourth were below average or had to repeat a grade.

A study conducted in the Austin public schools concluded that 87% of the early school entrants had achievement below that of normal aged children (Carter, 1956). A similar Tennessee study revealed that younger entrants were more likely to fall below grade level, repeat a grade, have higher rates of absenteeism, and indicate poor personal and social adjustment in school (King, 1955).

Although it is difficult to strictly identify early entrants since school districts have different age requirements, studies such as one conducted in Upstate New York suggest that even a few months can make a great difference in school achievement. In this study of first graders, Carroll (1963) found age to be a significant factor in school success and warns against first grade placement of five-year-olds.

Aside from less success academically (Baer, 1959), early entrance ages have been correlated with poorer social-emotional development (Gott, 1963; Hamalainen, 1951), lack of leadership qualities (Mawhinney, 1964 and Forrester, 1955 as cited in Uphoff, 1985), and more psychological referrals (DiPasquale, Moule, and Flewelling, 1980; McGlauchlen, 1984). Erion (1983) found a very strong relationship between lower chronological age and incidence of learning disabilities in the elementary grades. Maddux (1980) also concluded that young entrants may be more likely to be labeled learning disabled.

However, Diamond (1983) concludes from a study conducted in Hawaii, that the disproportionate number of lateborn LD students is associated with seasons and maternal nutrition that may affect perinatal health.

This is the case in a study by Pasamanick and Knowbloch (1966) which showed a connection between winter-month births and greater incidence of mental deficiency. This, they believe, is associated with hotter summer temperatures during the third fetal month when cellular differentiation is at its peak. It was found that cooler summers did not increase risk of mental deficiency. The effect of temperatures on maternal health and nutrition may be combined with the apparent excess of August/September births among lower socio-economic women (Warren & Tyler, 1979) to contribute to the lateborn LD population.

Along with having a disproportionately high number of early entrants labeled as LD, research shows that fewer of these young students are referred for gifted programs (McGlauchlen, 1984; Maddux, Stacey, & Scott, 1981). This is particularly important since many students who enter early are admitted because they are considered gifted.

Other Factors to Consider

Chronological age in itself may not be enough to determine a child's readiness for school success. Some research combines age and intelligence quotient to determine probable school achievement (Hampleman, 1959).

According to an early New Jersey study, a child between six years and six years four months with an intelligence quotient of 110 or more is "practically certain" to succeed in school (Bigelow, 1934). Younger children are more likely to succeed if they have reached a certain mental age rather than chronological age upon entering school (Bigelow, 1934; Hobson, 1947; Spillman & Lutz, 1985).

Others believe that the chronological age and the mental age necessary for reading success will vary greatly with the materials, methods, and organization of instruction. Thus, determining one, optimal, chronological or mental age becomes impossible (Gates, 1937).

Perhaps much more than age needs to be considered when predicting school success. Simner (1983) suggests psychometrically based screening and intervention programs for students at risk of failure will be more productive than manipulation of entrance age requirements.

Early Entrants Succeed

Despite the evidence presented in these studies, much of the current research does not see early entrants as a lot doomed for failure or special services. They

do not support school district practices of stringent adherence to chronological age requirements above all other screening programs.

Two such investigations that followed academic achievement through fourth grade found no significant differences when comparing kindergarten entrance age-groups. It was concluded that a student's birthday had little or no effect on his/her academic achievement and performance in subsequent years (Dietz & Wilson, 1985; Kinard & Reinherz, 1986). Similarly, the achievement of 200 Alberta, Canada youths from second to tenth grade showed no significant relationship to first grade entrance age (Pain, 1981). When investigating reading ability specifically, McGlauchlen (1984) found that it was not affected by entrance age.

Some of the research points to early achievement differences as a maturational lag that is eventually overcome by younger entrants. These early deficiencies diminish as younger students "catch-up" to the level of classmates (DiPasquale et al., 1980). Some researchers have found that maturation-related achievement differences may disappear by as early as second grade (Miller and Norris, 1967). Others found no significant differences by eighth grade (Davis, Trimble, & Vincent, 1980) or by the high school years (Kalk, Langer, & Searls, 1982).

In direct contrast, other data demonstrate that a disproportionate number of underaged entrants do not overcome their inferior academic positions as they progress through the elementary grades (Campbell, 1985; Carter, 1956).

Is Early Entrance Worthwhile?

With obviously conflicting evidence over apparent disadvantages of early entrance, it may be appropriate to explore possible advantages to younger students. In his review of entrance age research, Haliwell (1966) attempts to answer the question, "Is early entrance worthwhile?" He states that although early entrants are a year ahead in school they appear to be only three months superior in achievement to the regular entrant. When these younger students are compared to pupils of similar intelligence and grade level but who are one year older, they appear to be about seven months behind. One has a tendency to speculate about possible achievement if these bright, younger students waited a year before entering kindergarten.

A similar review by Weiss (1962) warns against the development of unfavorable attitudes by early entrants asked to perform tasks or function in a group that may be beyond their maturity level.

Maturational Lag of Boys

Maturity level is an important aspect when considering entrance age requirements. Overwhelming evidence from a majority of studies in this area attest to the maturational level of boys. Since boys appear to mature later in school-related abilities (DiPasquale et al., 1980; Ilg, Ames, Haines, & Gillespie, 1978) - even six months behind in reading as Dietz and Wilson (1985) found, early entrance can have a negatively compounded effect on their achievement (Baer, 1958; Carter, 1956).

Some suggest adapting the entrance age requirements for boys (Pauley, 1951; Hall, 1963; Spillman & Lutz, 1985) to combat their lag which contributes to a higher retention rate (King, 1955; Langer, Kalk, & Searls, 1984), and a greater need for special services (Kinard & Reinherz, 1986).

Early Entrants and Retention

Retention has been a popular practice in dealing with students who are considered immature. The debate continues as to whether retaining students, as Donofrio (1977) believes, has a positive effect on their feeling of success and achievement, or if it should be used as a last resort because of its negative effects on self-esteem and confidence (DiPasquale et al., 1980).

Whatever the results, the fact remains that many early entrants are retained. Some researchers believe this high retention rate reflects different teacher attitudes about, and expectations of, younger students and generally less reluctance in retaining them (Braga, 1971; Gredler, 1980a; Pain, 1981; Phye, 1980).

An extended experience in the same grade may be one possible solution for immature children, but it can also lead to overaged students inappropriately grouped with younger students. As Hamalainen (1951) observed, overaged students face as many school problems as the early entrant does - particularly in social-emotional development.

Summary

It appears that no manipulation of entrance age will solve all academic problems. As Green and Simmons (1962) point out, changing age requirements may only give the advantage to a different group of students rather than insure success for more. This advantage also varies greatly with instructional methods (Gates, 1937). And as Gredler (1978; 1980b) believes, it is instruction and teacher attitudes, rather than admission requirements, that should be adjusted to help meet individual needs.

Yet, school districts must determine appropriate requirements for entrance and many continue to rely on chronological age as the major criterion. If age is related to achievement, particularly if one optimal age is a myth, it becomes important to develop programs and curriculum designed to meet the needs of younger students and to allow for their success.

CHAPTER III

Design of the Study

Purpose

This study was designed to determine if a child's age at entrance to kindergarten is related to his/her achievement in reading at the end of first and third grade.

Hypotheses

The following hypotheses were investigated in the null form:

No significant relationship exists between kindergarten entrance age and reading achievement as measured by the CTBS at the end of first grade.

No significant relationship exists between kindergarten entrance age and reading achievement as measured by the CTBS at the end of third grade.

The strength of the relationship does not vary from first to third grade.

The strength of the relationship does not vary with sex at the first grade level.

The strength of the relationship does not vary with sex at the third grade level.

No significant relationship exists between kindergarten entrance age and placement in the Gifted and Talented program.

No significant relationship exists between kindergarten entrance age and retention.

Methodology

Subjects

The subjects selected for this study consisted of second and third grade students enrolled in the 11, predominantly white, public schools of a suburban, middle-class school district in southern Wisconsin.

Of the third grade students, 463 remained in the study after those with the following characteristics were removed:

a) Had full or partial special placement or referral for placement in LD, EMR, or ESL classes. Students in the Gifted and Talented program were included.

b) Did not have first and third grade reading test scores available.

c) Had repeated a grade and were thus of fourth grade age.

The 26 second graders who had entered kindergarten in September of 1983 with this group of third graders but were retained in a subsequent grade without special

placement were included for the retention portion of the study.

Instruments

Reading scores consisted of the total reading National Curve Equivalent (NCE) scores of the McGraw-Hill Comprehensive Test of Basic Skills (CTBS) administered in March of 1985 (first grade) and March of 1987 (third grade).

Procedures

Birthdate, sex, and total reading NCE scores were collected from the personal files of the subjects. Age upon entrance to kindergarten (September 1, 1983) was converted to months.

Statistical Analysis

A Contingency table and Chi Square table were used to compare the oldest and youngest groups of subjects and any disproportions in observed and expected frequencies of high, average, and low test scores at the first and third grade level.

A similar procedure was used with scores divided by sex to determine if the relationship varied with sex.

Percentages of old and young students were investigated to determine if either group was over-represented in the Gifted and Talented Program or the retention group.

CHAPTER IV

Analysis of Data

Purpose

This study was designed to determine if a child's age at entrance to kindergarten is related to his/her achievement in reading at the end of first and third grade.

Findings and Interpretations

The 463 third graders involved in this study were divided into six groups according to sex and age. The Old group included all students over 69 months of age at entrance to kindergarten on September 1, 1983. The Middle group consisted of all students from 63-69 months of age when entering kindergarten. The Young group was composed of all students under 63 months of age at entrance. The groups were further divided by sex. (See appendix for data tables and descriptive statistics for each group.)

The 21 students enrolled in the Gifted and Talented Program were included within the groups listed above but were also analyzed as a separate group for another portion of the study.

Those who also began kindergarten on September 1, 1983 but were retained in a subsequent grade compose an eighth group to be studied.

Entrance Age and First Grade Scores

Contingency and Chi Square tables were used to compare observed and expected frequencies of the first grade Comprehensive Test of Basic Skills (CTBS) total reading national curve equivalent (NCE) scores for both the Young (<63 mos.) and Old (>69 mos.) group.

Since the first grade scores are normally distributed (skew = $-.113$), the mean score (64.4) ± 1 standard deviation (14.5) was used to divide the scores into High (>78), Average (50-78), and Low (<50) categories.

TABLE 1

Entrance Age and First Grade Scores

Contingency Table

Age Group	Scores	>78 High A1	50-78 Average A2	≤50 Low A3	Total
<Young 63 B1	Fo	11	56	16	83
	Fe	15.052	52.446	15.482	
>Old 69 B2	Fo	24	66	20	110
	Fe	19.948	69.534	20.518	
Total		35	122	36	193

Degrees of Freedom = 2 X^2 Critical = ± 4.61
at 90% Confidence Level

Chi Square Table

Cell	Fo	Fe	(Fo-Fe) / Fe
B1A1	11	15.052	1.091
B1A2	56	52.446	.241
B1A3	16	15.482	.017
B2A1	24	19.948	.823
B2A2	66	69.534	.180
B2A3	20	20.518	.013

 $X^2 = 2.365$

RETAIN THE NULL HYPOTHESIS

Since the Chi Square required for 2 degrees of freedom at the 90% confidence level is ± 4.61 and since the Chi Square obtained is 2.365, the null hypothesis must be retained, concluding that there is little or no relationship between kindergarten entrance age and first grade CTBS NCE total reading scores.

Entrance Age and Third Grade Scores

Again, Contingency and Chi Square tables were used to determine if any disproportions exist between observed and expected frequencies in third grade reading scores for the Old and Young groups.

Because the third grade NCE scores are distributed normally (skew = .168), the mean (59.8) \pm 1 standard deviation (15.0) were used to determine the High (>74), Average (46-74), and Low (<46) scores.

TABLE 2

Entrance Age and Third Grade Scores

Contingency Table

Age Group	Scores	>74 High A1	46-74 Average A2	<46 Low A3	Total
Young B1 <63	Fo Fe	10 15.912	56 52.036	17 15.052	83
Old B2 >69	Fo Fe	27 21.088	65 68.964	18 19.949	110
Total		37	121	35	193

Degrees of Freedom = 2 X^2 Critical = ± 4.61
at 90% Confidence Level

Chi Square Table

Cell	Fo	Fe	(Fo-Fe) / Fe
B1A1	10	15.912	2.197
B1A2	56	52.036	.302
B1A3	17	15.052	.252
B2A1	27	21.088	1.657
B2A2	65	68.964	.228
B2A3	18	19.948	.190
		X^2 Critical	= 4.826

REJECT THE NULL HYPOTHESIS

TABLE 3

Entrance Age and Third Grade Scores

Probability Table

Age Group	Scores	>74 High	46-74 Average	<46 Low	Total
Young B1 <63	Po	.05	.29	.09	.43
	Pe	.08	.27	.08	
Old B2 >69	Po	.14	.34	.09	.57
	Pe	.11	.36	.10	
Total		.19	.63	.18	1.00

Conditional Probabilities

$$\begin{aligned}
 P_o(B1/A1) &= \frac{P_o(B1 \text{ and } A1)}{P(A1)} = \frac{.05}{.19} = .26 = 26\% \\
 P_e(B1/A1) &+ \frac{P_e(B1 \text{ and } A1)}{P(A1)} = \frac{.08}{.19} = .42 = 42\% \\
 P_o(B2/A1) &= \frac{P_o(B2 \text{ and } A1)}{P(A1)} = \frac{.14}{.19} = .74 = 74\% \\
 P_e(B2/A1) &= \frac{P_e(B2 \text{ and } A1)}{P(A1)} = \frac{.11}{.19} = .58 = 58\%
 \end{aligned}$$

Since the Chi Square required for 2 degrees of freedom at the 90% confidence level is ± 4.61 , and since the Chi Square obtained is 4.826, the null hypothesis must be rejected, concluding that there is a relationship between kindergarten entrance age and third grade total reading scores on the CTBS.

The major cause of the relationship is found in the disproportions associated with the observed and expected probabilities of subjects in the High score group. The expected probability of Young group members having high scores was 42%, while the observed probability is only 26%. This 16% discrepancy is balanced by members of the Old group where high scores observed were 16% greater than expected.

Because no relationship was found at the first grade level between kindergarten entrance age and reading scores but the null hypothesis was rejected at the third grade level, it must be concluded that the relationship varies with age between the first and third grade.

Entrance Age, Sex, and Reading Scores

The following four contingency and Chi Square tables (tables 4-7) compare expected and observed score frequencies of Old and Young females and males. They will determine if any relationship exists for each sex at the

first and/or third grade level and if that relationship varies with sex. Once again, the individual group mean ± 1 standard deviation was used to determine the High, Average, and Low score categories.

TABLE 4

Entrance Age and First Grade Scores - Females

Contingency Table

Mean score = 63.6 Standard Deviation = 14.1

Age Group	Scores	>79 High A1	52-79 Average A2	<52 Low A3	Total
Young B1 <63	Fo	5	30	10	45
	Fe	6.429	29.176	9.396	
Old B2 >69	Fo	8	29	9	46
	Fe	6.571	29.824	9.604	
Total		13	59	19	91

Degrees of Freedom = 2 X^2 Critical = ± 4.61 at
90% Confidence Level

Chi Square Table

Cell	Fo	Fe	(Fo-Fe) / Fe
B1A1	5	6.429	.318
B1A2	30	29.176	.023
B1A3	10	9.396	.039
B2A1	8	6.571	.311
B2A2	29	29.824	.023
B2A3	9	9.604	.038
			X ² = .752

RETAIN THE NULL HYPOTHESIS

TABLE 5

Entrance Age and First Grade Scores - Males

Contingency Table

Mean Score = 63.5 Standard Deviation = 14.8

Age Group	Scores	>78 High A1	49-78 Average A2	<49 Low A3	Total
Young B1 <63	Fo	6	23	9	38
	Fe	8.196	21.980	7.824	
Old B2 >69	Fo	16	36	12	64
	Fe	13.804	37.020	13.176	
Total		22	59	21	102

Degrees of Freedom = 2 X^2 Critical = ± 4.61 at
90% Confidence Level

Chi Square Table

Cell	Fo	Fe	(Fo-Fe) / Fe
B1A1	6	8.196	.588
B1A2	23	21.980	.047
B1A3	9	7.824	.177
B2A1	16	13.804	.349
B2A2	36	37.020	.028
B2A3	12	13.176	.105
			1.294

$X^2 =$

RETAIN THE NULL HYPOTHESIS

TABLE 6

Entrance Age and Third Grade Scores - Females

Contingency Table

Mean Score = 59.8 Standard Deviation = 15.1

Age Group	Scores	>74	45-74	<45	Total
		High A1	Average A2	Low A3	
Young B1 <63	Fo	4	34	7	45
	Fe	7.912	30.165	6.923	
Old B2 >69	Fo	12	27	7	46
	Fe	8.088	30.835	7.077	
Total		16	61	14	91

Degrees of Freedom = 2 X^2 Critical = ± 4.61 at
90% Confidence Level

Chi Square Table

Cell	Fo	Fe	(Fo-Fe) / Fe
B1A1	4	7.912	1.934
B1A2	34	30.165	.488
B1A3	7	6.923	.001
B2A1	12	8.088	1.892
B2A2	27	30.835	.025
B2A3	7	7.077	.001

			$x^2 = 4.341$

RETAIN THE NULL HYPOTHESIS

TABLE 7

Entrance Age and Third Grade Scores - Males

Contingency Table

Mean Score = 59.9 Standard Deviation = 15.0

Age Group	Scores	>74 High A1	49-74 Average A2	<49 Low A3	Total
Young B1 <63	Fo Fe	6 7.824	20 20.118	12 10.059	38
Old B2 >69	Fo Fe	15 13.176	34 33.882	15 16.941	64
Total		21	54	27	102

Degrees of Freedom = 2 X^2 Critical = ± 4.61 at
90% Confidence Level

Chi Square Table

Cell	Fo	Fe	(Fo-Fe) / Fe
B1A1	6	7.824	.425
B1A2	20	20.118	.001
B1A3	12	10.059	.374
B2A1	15	13.176	.253
B2A2	34	33.882	.030
B2A3	15	16.941	.222

 $X^2 = 1.0305$

RETAIN THE NULL HYPOTHESIS

Since the Chi Square required for 2 degrees of freedom at the 90% confidence level is ± 4.61 , and since the Chi Square obtained in each of the four previous cases is within that range (First Grade/Females = .752; /Males = 1.294; Third Grade/Females = 4.341; /Males = 1.305), the null hypothesis must be retained in each case.

There is no statistically significant relationship between entrance age and first grade score or third grade score for males and females when considered individually. It is interesting to note that the sexes combined did show a relationship when age and third grade score were tested previously.

Entrance Age and Gifted and Talented

Program Placement

Twenty-one of the third grade subjects are currently (Fall, 1987) enrolled in the district's Gifted and Talented Program. A combination of criteria that includes CTBS test data, teacher inventory, creativity and problem solving skills tests, and IQ are used to determine entrance to the program.

The following table (#8) shows the percentage of each age group and sex represented in the Gifted and Talented Program.

TABLE 8

GIFTED AND TALENTED GROUP

n = 21

	AGE	FEMALES	MALES	% OF TOTAL
YOUNG (<63 Mos.)				
	56	-	1	4.8 %
	62	-	2	9.5 %
MIDDLE (63-69 Mos.)				
	64	-	2	9.5 %
	65	1	1	9.5 %
	66	-	1	4.8 %
	67	5	2	33.3 %
	68	1	-	4.8 %
	69	1	1	9.5 %
OLD (>69 Mos.)				
	70	-	2	9.5 %
	73	1	-	4.8 %

Young (<63 mos.) = 3/21 = 14.3 %

Middle (63-69 mos.) = 15/21 = 71.4 %

Old (>69 mos.) = 3/21 = 14.3 %

Males = 12/21 = 57.1 %

Females = 9/21 = 42.9 %

Since an equal percentage of Old and Young Group subjects (14.3%) with a very even distribution of ages is represented in the Gifted and Talented Group, no relationship between entrance age and gifted placement is assumed.

Although there is a greater number of males in this program the percentage (57.1%) closely resembles the percentage of males in the entire study population (54%).

Entrance Age and Retention

Table 9 places the 26 subjects that began kindergarten with this class in September of 1983 but have been retained, into the familiar age groups - Old, Middle, Young. It includes a breakdown of retained students by month and sex.

TABLE 9

RETENTION GROUP

n = 26

	AGE	FEMALES	MALES	% OF TOTAL
YOUNG	(<63 Mos.)			
	58	-	1	3.8 %
	60	3	6	34.6 %
	61	-	3	11.5 %
	62	2	2	15.4 %
MIDDLE	(63-69 Mos.)			
	63	-	2	7.7 %
	64	1	-	3.8 %
	65	1	1	7.7 %
	66	1	1	7.7 %
	67	-	1	3.8 %
	69	-	1	3.8 %
OLD	(>69 Mos.)			
	-	-	-	0.0 %

Young (<63 mos.) = 17/26 = 65.4 %

Middle (63-69 mos.) = 9/26 = 34.6 %

Old (>69 mos.) = 0/26 = 0.0 %

Males = 18/26 = 69.2 %

Females = 8/26 = 30.8 %

While over 65% of those retained came from the Young Group (<63 mos.) and 35% from the Middle Group (63-69 mos.), none were part of the Old Group (>69 mos.).

The retention group in this study represents a strong relationship between entrance age and retention, with younger students much more likely to be retained. The Young Group subjects are nearly twice as likely to repeat a grade as those in the Middle Group.

A disproportion of males in the retention group was also evident. Although males make up 54% of the population in this study, they make up over 69% of the retention group.

Summary

The Chi Square tables used demonstrate that no significant relationship exists between the kindergarten entrance ages of Young and Old entrants and their first grade total reading scores. The same type of investigation shows that there is a relationship between entrance age of Young and Old subjects and third grade reading scores. This relationship varied very little with the sex of the subjects and was, in fact, non-existent when the sexes were considered separately.

No significant relationship was found between entrance age and the placement of 21 subjects in the Gifted and Talented Program which has an even distribution across age groups. However, subjects in the Young age group were almost twice as likely to be retained as those in the Middle group. None of the subjects in the retention portion were from the Old age group.

CHAPTER V

Conclusions and Implications

Purpose

This study was designed to determine if a child's age at entrance to kindergarten is related to his/her achievement in reading at the end of first and third grade.

Restatement of Hypotheses with Conclusions

1. No significant relationship exists between kindergarten entrance age and reading achievement at the end of first grade as measured by the total reading NCE scores of the CTBS.

No significant relationship was found when data for Old and Young groups were analyzed using the Chi Square method. The critical X^2 for 2 degrees of freedom is ± 4.61 and the obtained X^2 is 2.365 - retaining the null hypothesis.

2. No significant relationship exists between kindergarten entrance age and reading achievement at the end of third grade as measured by the total reading NCE scores for CTBS.

The null hypothesis is rejected since the X^2 obtained (4.826) is outside the critical limits (± 4.61). This is evidence of a significant relationship between third grade reading scores and kindergarten entrance age.

3. The strength of the relationship does not vary from first to third grade.

Since a significant relationship was found at the third grade level but none at the first grade level, the strength of the relationship does vary from first to third grade.

4. The strength of the relationship does not vary with sex at the first grade level.

Chi Square tables for Young and Old subjects divided by sex at the first grade level showed a X^2 obtained within the critical X^2 of ± 4.61 . No relationship was found. Thus, there is no variation between the sexes at the first grade level.

5. The strength of the relationship does not vary with sex at the third grade level.

Despite the relationship that exists between kindergarten age and scores at the third grade level, a breakdown by sex shows no significant relationship for males or females when comparing entrance age and scores at the third grade level.

6. No significant relationship exists between kindergarten entrance age and placement in the Gifted and Talented Program.

Percentages of students enrolled in the Gifted and Talented program were evenly distributed across age groups showing no apparent relationship between entrance age and placement in the program.

7. No significant relationship exists between kindergarten entrance age and retention.

A significant relationship exists between age group and percentage of subjects in the retention group. No retention subjects were classified as Old (>69 mos.) students and over 65% of those retained were from the Young (<63 mos.) group. Boys were also over-represented in the retention group - over 2 to 1.

Although a significant relationship between entrance age and third grade total reading scores exists, a similar relationship was not found for age and first grade scores. This may be explained by a possible discrepancy of first grade standardized test scores and actual ability. First grade is many times the first experience a student has with standardized testing and scores may reflect more of a test-taking aptitude rather than actual reading ability.

Little evidence was found to support the maturation-al lag of boys when scores and entrance age were investigated. However, the retention portion of the study shows more than twice as many males as females were retained. The fact that over 65% of retained students were from the Young group (while no Old group subjects were retained) may reflect less reluctance in retaining young students rather than great differences in achievement, or a combination of both.

Implications for Research

Different results may be found if this investigation was repeated in a school district where younger students are allowed entrance to kindergarten. The district studied has a cut-off date of five years by September 1 to be admitted - unless parents of younger students request, and the students pass, a stringent screening program. Other districts have cut-off dates as late as December and a similar study of their population may show conflicting evidence.

Results may also be altered if this study were repeated using different measures of reading ability - including teacher ratings, breakdown of reading scores, or different testing materials.

Retention practices may be investigated further to determine policies, standards, and teacher attitudes that influence retention decisions that may in turn be related to the age of the student.

Despite the possible influence of entrance age, many other factors such as - teaching methods, materials, and motivation need to be further investigated to determine which of these factors can be adapted to allow for the greatest success for the most students.

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TABLE 10

YOUNG (<63 mos.) / FEMALES

Ss	K-AGE (Mos.)	1st GRADE NCE	3rd GRADE NCE
1	54	70	84
2	60	61	45
3	60	58	74
4	60	76	78
5	60	78	84
6	60	66	60
7	60	68	47
8	60	61	45
9	60	73	63
10	60	44	61
11	60	60	55
12	60	75	73
13	61	74	65
14	61	77	74
15	61	51	62
16	61	70	53
17	61	67	51
18	61	89	73
19	61	49	46
20	61	48	38
21	61	54	74
22	61	77	81
23	61	71	64
24	61	81	55
25	61	62	56
26	61	82	60
27	61	56	46
28	62	69	64
29	62	55	51
30	62	73	68
31	62	65	45
32	62	65	58
33	62	55	59
34	62	51	42
35	62	64	60
36	62	47	44
37	62	50	30
38	62	78	71
39	62	58	49
40	62	42	36

TABLE 10 (continued)

YOUNG (<63 mos.) / FEMALES

Ss	K-AGE (mos.)	1st GRADE NCE	3rd GRADE NCE
41	62	48	36
42	62	89	74
43	62	80	70
44	62	48	39
45	62	60	68

Mean -	61	64.333	58.467
Stan. Dev. -	1.331	12.340	13.939

Age and First Grade Scores

$$r = -.156 \quad r^2 = .024$$

Age and Third Grade Scores

$$r = -.378 \quad r^2 = .143$$

TABLE 11

YOUNG (<63 mos.) - MALES

Ss	K-AGE (mos.)	1st GRADE NCE	3rd GRADE NCE
1	56	46	46
2	56	89	68
3	60	58	51
4	60	54	53
5	60	72	73
6	60	39	41
7	60	60	58
8	60	73	78
9	60	47	43
10	60	48	10
11	60	53	65
12	60	70	75
13	61	68	48
14	61	61	47
15	61	61	56
16	61	73	69
17	61	73	84
18	61	86	68
19	61	68	56
20	61	50	47
21	61	52	56
22	62	39	39
23	62	69	78
24	62	80	74
25	62	41	38
26	62	60	51
27	62	65	42
28	62	45	35
29	62	46	46
30	62	61	56
31	62	66	56
32	62	52	60
33	62	89	58
34	62	53	69
35	62	69	75
36	62	48	66
37	62	89	84
38	62	89	71

TABLE 11 (continued)

YOUNG (<63 mos.) - MALES

Mean	-	60.921	62.158	57.632
Stan. Dev.	-	1.440	14.751	15.658

Age and First Grade Scores

$$r = -.002 \quad r^2 = .000$$

Age and Third Grade Scores

$$r = .065 \quad r^2 = .004$$

TABLE 12

MIDDLE (63-69 mos.) / FEMALES

Ss	K-AGE (mos.)	1st GRADE NCE	3rd GRADE NCE
1	63	62	51
2	63	66	46
3	63	44	48
4	63	71	66
5	63	71	54
6	63	71	66
7	63	63	51
8	63	36	29
9	63	45	72
10	63	74	66
11	63	42	60
12	63	89	84
13	63	54	35
14	63	43	45

TABLE 12 (continued)

MIDDLE (63-69 mos.) / FEMALES

Ss	K-AGE (mos.)	1st GRADE NCE	3rd GRADE NCE
15	63	80	64
16	63	39	36
17	63	80	58
18	63	63	72
19	63	69	75
20	64	89	84
21	64	65	67
22	64	86	58
23	64	65	73
24	64	49	44
25	64	51	44
26	64	52	41
27	64	58	43
28	64	89	84
29	64	66	55
30	64	81	58
31	64	58	47
32	64	57	59
33	64	81	69
34	64	89	75
35	64	89	84
36	65	46	36
37	65	89	64
38	65	40	42
39	65	39	47
40	65	80	52
41	65	50	54
42	65	80	78
43	65	76	84
44	65	43	40
45	65	58	52
46	65	39	26
47	65	89	84
48	66	70	67
49	66	63	72
50	66	36	35
51	66	75	66
52	66	74	71
53	66	65	58
54	66	60	53
55	66	80	58

TABLE 12 (continued)

MIDDLE (63-69 mos.) / FEMALES

Ss	K-AGE (mos.)	1st GRADE NCE	3rd GRADE NCE
56	66	75	53
57	66	61	43
58	66	76	59
59	66	54	34
60	66	64	50
61	66	55	38
62	66	41	50
63	66	76	54
64	66	48	60
65	66	72	60
66	66	70	40
67	66	57	51
68	67	56	55
69	67	66	66
70	67	71	65
71	67	75	54
72	67	89	78
73	67	54	36
74	67	64	52
75	67	75	58
76	67	55	49
77	67	67	77
78	67	45	51
79	67	43	62
80	67	72	74
81	67	76	55
82	67	82	84
83	67	89	81
84	67	80	66
85	67	77	84
86	67	89	84
87	67	89	84
88	68	76	69
89	68	73	56
90	68	74	58
91	68	53	44
92	68	67	45
93	68	66	67
94	68	51	50
95	68	60	69
96	68	64	48

TABLE 12 (continued)

MIDDLE (63-69 mos.) / FEMALES

Ss	K-AGE (mos.)	1st GRADE NCE	3rd GRADE NCE
97	68	47	84
98	68	58	58
99	68	43	47
100	68	61	60
101	68	74	70
102	68	57	64
103	68	77	60
104	68	83	84
105	68	57	58
106	68	80	84
107	69	59	41
108	69	82	61
109	69	74	75
110	69	64	73
111	69	73	44
112	69	59	54
113	69	81	55
114	69	76	76
115	69	81	84
116	69	65	53
117	69	67	84
118	69	43	37
119	69	73	84
120	69	79	84

Mean	- 65.992	65.825	59.958
Stan. Dev.	- 1.985	14.570	15.068

Age and First Grade Scores

 $r = .112$ $r^2 = .012$

Age and Third Grade Scores

 $r = .163$ $r^2 = .026$

TABLE 13

MIDDLE (63-69 mos.) / MALES

Ss	K-AGE (Mos.)	1st GRADE NCE	3rd GRADE NCE
1	63	57	58
2	63	89	60
3	63	53	62
4	63	82	59
5	63	61	55
6	63	34	33
7	63	46	54
8	63	53	66
9	63	39	42
10	63	80	69
11	63	59	49
12	63	44	40
13	63	65	84
14	63	51	32
15	63	74	59
16	63	44	38
17	63	73	50
18	63	53	84
19	63	47	48
20	63	70	39
21	63	38	47
22	63	42	61
23	63	81	75
24	63	61	51
25	63	48	84
26	64	67	59
27	64	51	51
28	64	70	58
29	64	80	84
30	64	64	84
31	64	53	58
32	64	67	78
33	64	64	65
34	64	69	76
35	64	80	71
36	64	57	53
37	64	45	46
38	64	47	38
39	64	89	55
40	64	61	75
41	64	50	45
42	64	50	53

TABLE 13 (continued)

MIDDLE (63-69 mos.) / MALES

Ss	K-AGE (mos.)	1st GRADE NCE	3rd GRADE NCE
43	64	58	68
44	64	61	69
45	64	89	84
46	64	68	68
47	65	67	69
48	65	68	50
49	65	68	52
50	65	37	56
51	65	34	6
52	65	45	42
53	65	52	64
54	65	80	58
55	65	72	47
56	65	43	36
57	65	89	70
58	65	48	41
59	65	42	53
60	65	45	36
61	65	80	84
62	65	53	59
63	65	48	28
64	65	68	53
65	65	80	73
66	65	80	54
67	65	69	72
68	65	58	52
69	65	80	57
70	65	52	52
71	65	80	84
72	66	54	68
73	66	89	73
74	66	74	84
75	66	59	71
76	66	58	45
77	66	71	65
78	66	75	60
79	66	81	77
80	66	89	64
81	66	57	58
82	66	80	78
83	67	56	36
84	67	80	84

TABLE 13 (continued)

MIDDLE (63-69 mos.) / MALES

Ss	K-AGE (mos.)	1st GRADE NCE	3rd GRADE NCE
85	67	41	47
86	67	59	47
87	67	66	59
88	67	65	55
89	67	43	32
90	67	50	49
91	67	57	53
92	67	55	45
93	67	51	44
94	67	65	69
95	67	69	74
96	67	80	75
97	67	39	49
98	67	49	59
99	67	72	70
100	67	89	84
101	67	44	55
102	67	74	69
103	67	51	43
104	67	64	69
105	67	89	71
106	67	73	55
107	67	64	46
108	67	48	47
109	67	56	73
110	67	80	84
111	68	80	66
112	68	75	63
113	68	62	45
114	68	63	51
115	68	81	66
116	68	57	68
117	68	77	80
118	68	81	64
119	68	76	71
120	68	58	59
121	68	70	57
122	68	75	69
123	68	65	53
124	68	55	52
125	68	52	45

TABLE 13 (continued)

MIDDLE (63-69 mos.) / MALES

Ss	K-AGE (mos.)	1st GRADE NCE	3rd GRADE NCE
126	68	61	67
127	69	80	60
128	69	70	51
129	69	64	75
130	69	52	45
131	69	68	77
132	69	81	67
133	69	61	39
134	69	58	59
135	69	68	75
136	69	59	63
137	69	52	64
138	69	54	68
139	69	57	45
140	69	78	84
141	69	49	31
142	69	68	44
143	69	49	38
144	69	89	71
145	69	49	53
146	69	75	59
147	69	70	75
148	69	75	69
149	69	86	67
150	69	80	69

Mean	- 65.926	63.544	59.329
Stan Dev.	- 2.080	14.132	14.652

Age and First Grade Score

r = .179 r² = .032

Age and Third Grade Score

r = .070 r² = .005

TABLE 14

OLD (>69 mos.) / FEMALES

Ss	K-AGE (Mos.)	1st GRADE NCE	3rd GRADE NCE
1	70	76	84
2	70	80	48
3	70	55	38
4	70	74	64
5	70	64	75
6	70	51	65
7	70	63	65
8	70	71	53
9	70	68	66
10	70	80	67
11	70	76	74
12	70	58	60
13	70	67	70
14	70	78	75
15	70	78	75
16	70	84	75
17	70	70	60
18	70	89	65
19	71	36	16
20	71	47	52
21	71	71	84
22	71	67	84
23	71	71	54
24	71	31	50
25	71	89	49
26	71	54	43
27	71	72	72
28	71	70	58
29	71	65	59
30	71	81	78
31	71	49	54
32	71	47	46
33	71	60	67
34	71	70	80
35	71	73	78
36	71	69	50
37	72	38	21
38	72	67	62
39	72	66	52
40	72	61	52

TABLE 14 (continued)

Old (>69 mos.) / FEMALES

Ss	K-AGE (mos.)	1st GRADE NCE	3rd GRADE NCE
41	73	89	68
42	73	73	84
43	75	41	33
44	75	89	84
45	75	68	40
46	78	44	38

Mean	- 71.196	66.048	60.587
Stan. Dev.	- 1.668	14.563	16.578

Age and First Grade Scores

$$r = -.202 \quad r^2 = .041$$

Age and Third Grade Scores

$$r = -.273 \quad r^2 = .074$$

TABLE 15

OLD (> 69 mos.) / MALES

Ss	K-AGE (Mos.)	1st GRADE NCE	3rd GRADE NCE
1	70	80	74
2	70	58	47
3	70	79	84
4	70	65	69
5	70	71	78
6	70	54	60
7	70	50	49
8	70	57	67
9	70	61	74
10	70	89	62
11	70	76	84
12	70	63	69
13	70	72	84
14	70	75	73
15	70	89	72
16	70	48	45
17	70	67	51
18	70	69	46
19	70	89	71
20	70	89	74
21	70	63	52
22	70	80	71
23	70	89	67
24	70	81	84
25	70	89	75
26	71	44	44
27	71	78	75
28	71	33	27
29	71	61	73
30	71	80	69
31	71	82	84
32	71	75	75
33	71	46	45
34	71	45	69
35	71	64	69
36	71	46	47
37	71	52	63
38	71	73	73
39	71	48	47
40	71	36	49
41	71	64	71
42	71	57	38

TABLE 15 (continued)

OLD (>69 mos.) / MALES

Ss	K-Age (mos.)	1st GRADE NCE	3rd GRADE NCE
43	71	72	70
44	71	44	45
45	71	72	59
46	71	89	84
47	71	89	71
48	71	70	84
49	71	80	84
50	71	57	55
51	71	59	77
52	71	60	75
53	72	58	41
54	72	57	53
55	72	69	53
56	72	29	35
57	72	19	29
58	73	44	39
59	73	56	63
60	73	84	59
61	73	58	84
62	74	50	50
63	74	57	51
64	76	68	44

Mean	- 70.984	64.500	62.578
Stan. Dev.	- 1.188	16.471	15.514

Age and First Grade Scores

$$r = -.293 \quad r^2 = .086$$

Age and Third Grade Scores

$$r = -.340 \quad r^2 = .116$$

DESCRIPTIVE STATISTICS

	All	Males	Females
n =	463	252	211
AGE			
Range =	54-78		
Mean =	66.2786	66.460	66.062
St. Dev =	3.712	3.639	3.804
Variance =	13.782		
Skew =	.225		
FIRST GRADE SCORES			
Range =	19-89		
Mean =	64.454	65.524	65.564
Md =	65		
St Dev =	14.481	14.805	14.074
Variance =	209.695	219.183	198.076
Skew =	-.113		
w/Age r^2 =	.002		
THIRD GRADE SCORES			
Range =	6-84		
Mean =	59.840	59.917	59.749
Md =	59		
St Dev =	15.033	15.010	15.132
Variance =	226.490	225.288	228.989
Skew =	.168		
w/Age r^2 =	.004		