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Does a Child's Entrance Age Effect 2nd and 4th Graders CAT Performance?

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Does a Child's Entrance Age Effect 2nd and 4th Graders CAT Performance?

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ED. S. FIELD PROJECT ACCEPTANCE

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Abstract

Second and fourth graders NCE reading, math, and language arts scores from the CAT were analyzed using a multiple regression and 3-way ANOVA to determine the effects of a child's entrance age on achievement and whether the interaction effect was significant. The study also controlled for SES by using the children's lunch payment status. Participants were divided into four groups based on their age when entering kindergarten: youngest, middle, older, and held back/retained. In the regression analysis, CAT performance was generally found to be a positive function of entrance age. However, entrance age was found to be statistically significant only for reading, marginally significant for math, and not significant for language arts. Results of the study were viewed relative to the mixed findings regarding entrance age in the literature.

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Does a Child's Age Effect Second and Fourth Graders' CAT Performance?

For many decades, educators have been interested in research regarding whether or not a child's entrance age in kindergarten influences or predicts later success in school. It is a widely held belief that children born in the months prior to the official eligibility dates will not be as successful as older children (Russell & Startup, 1986; Bell & Daniels, 1990) and parents may decide to wait a year before starting their children in school (May & Welch, 1986). This recommendation has been used regardless of whether the child met the age criterion for admission to school, which is being at least five years of age when starting school or turning five within the first few months (Cryan, Sheehan, Wiechel, & Bandy-Hedden, 1992; Siegel & Hanson, 1991; Sweeney, 1995). Many differences exist between states and school districts regarding the age at which a child can start school. Examples of the extremes are children who must be five by the first day of school and children who must be five by the first of December or January (Shepard & Smith, 1986; Siegel & Hanson, 1991).

The topic of school entrance age has reemerged as parents and teachers consider keeping children out an extra year to ensure their readiness and success in kindergarten (Meisels, 1992; Mergendoller, Bellisimo, & Horan, 1990). Cosden, Zimmer, and Tuss (1993) found that approximately ten percent of parents are holding back children that they consider too young for kindergarten. In addition, some school districts and teachers recommend that parents consider a second year of kindergarten when children are the youngest in their class and can benefit from the acquisition of more skills (DeMeis &

Stearns, 1992; Smith, 1989). Increased discussions of the appropriate entrance age has led to debates within school districts and state legislatures about school policies and the possibility of "rolling back" or advancing the dates at which a child can start school to ensure children are more successful (Jones & Mandeville, 1990).

Discussions regarding changes in school policies and entrance ages may be premature. Some researchers have found that entrance age affects the child's success with academics, while other researchers have found no effects of entrance age on academic success (DeMeis & Stearns, 1992). Others have reported that small differences exist between younger and older students' achievement in lower grades but the differences disappear as students progress through school (May & Welch, 1986). Generally, persons examining the effects of entrance age have used standardized measures of academic progress such as the South Carolina Basic Skills Assessment Program (Jones & Mandeville, 1990), year-end examinations (Borg & Falzon, 1995), or the California Achievement Test (Bickel, Zigmond, & Strayhorn, 1991). Other studies have investigated the effects of birth month on psychological referrals, special education placements, and retentions (DeMeis & Stearns, 1992; DiPasquale, Moule, & Flewelling, 1980), or examined the effects of entrance age on children's social acceptance and self perceptions (Spitzer, Cupp, & Parke, 1995) .

Davis, Trimble, and Vincent (1980) examined the reading, language, and mathematics scores of 54,000 Kentucky school children to determine the affects of students' ages on achievement. Differences were found in the performance of both first and fourth graders. The authors found that students who started school at the age of six

performed significantly better than the children that entered school at age five (Davis et al., 1980). Donoforio (1977) reported similar results when examining a child's school performance and month of birth. He concluded that a child with a birthday between July and December demonstrated "inadequate school performance" and should spend more time in kindergarten or first grade (Donoforio, 1977). In a longitudinal study with 152 children, May and Welch (1986) found developmental differences in school readiness with kindergarten students when birth months were examined. However, when the same children were investigated in third grade, achievement differences by the month of birth were small and nonsignificant (May & Welch, 1986).

DiPasquale, et al. (1980) examined psychological referrals as an indicator of school success or failure to assess the effects of a child's entrance age. The authors found that males born late in the school eligibility year (birthday during the summer or first months of school) were more likely to be referred for psychological services. Similarly, Diamond (1983) found a significant relationship between a child's season of birth and Special Education classification. A higher percentage of children born late in the school eligibility year were classified as Learning Disabled (Diamond, 1983).

More recently, Bell and Daniels (1990) found that entrance age affected the science test results of 11, 13, and 15 year old students in England, Wales, and Northern Ireland. The authors found that a student's birth date affected science performance in all three age groups (Bell & Daniels, 1990). Jones and Mandeville (1990) reported similar results when examining first, second, third, and sixth graders performance on the South Carolina Basic Skills Assessment Program which measures reading, math, and writing.

A significant number of younger students with birthdays in August, September, and October failed to meet the state reading standards across all grades. However, the entrance age effect lessened with the higher grades as the differences were found to diminish (Jones & Mandeville, 1990).

Bickel, Zigmond, and Strayhorn (1991) argued that delaying the school entrance of younger children should not be justified solely on previous research that "younger" children do not perform as well as "older" children. The authors did not believe the age effect alone was strong enough to delay a child's entrance into school. They controlled for "relevant covariates" and explored the effects of entrance age with several measures of school success as well as the persistence of the age effect over time. Two hundred twenty two Pittsburgh students' achievement, conduct, and mainstreaming status were examined at first grade and four years later. Bickel et al. (1991) found that age of school entrance was significantly related to achievement in first grade. There were no significant relationships found between age of school entrance and first grade conduct, achievement four years later, or mainstreaming status (i.e., the student was not pulled out of the classroom for individual help during the school day). The authors concluded that their results were consistent with previous studies. Entrance age impacted achievement performance in first grade, but did not have a persistent effect over time (Bickel, et al., 1991).

Sharp, Hutchison, and Whetton (1994) found comparable results with 7 year olds when comparing their "season of birth" with criterion referenced testing for English, math, and science. Three groups of children included autumn born children with

September to December birth dates, spring born with January to April birth dates, and summer born with May to August birth dates. As with previous research, the summer born children, who started school close to four years of age, performed less well on criterion referenced testing (Sharp, et al., 1994).

Borg and Falzon (1995) investigated whether a relationship existed between a student's age and performance on year-end examinations in Malta. The authors examined the test results of 4,123 children in third, fourth, and fifth grade and found significant age effects among the students' achievement. Multivariate tests demonstrated that students' achievement was affected by age in all three grades. The "oldest" children in each grade performed better than the "youngest" children (Borg & Falzon, 1995).

In agreement with Bickel, et al. (1991), Sweeney (1995) believed that the effects of age should not be used to routinely recommend delaying school entry for students with birthdays late in the eligibility year. To add to the generalizability of the age effect, the author studied the relationship of age with the school performance of high ability and intellectually gifted second, fourth, sixth, and eighth grade students in Ohio. Student performance on the Cognitive Abilities Test, the Iowa Tests of Basic Skills, Citizenship Checklist, and Handwriting Checklist were compared against their birth dates which were separated into trisections. The first trisection included children with birth dates between October 1st and January 30th, the second trisection were children with birth dates between February 1st and May 31st, and the third trisection were children with birth dates between June 1st and September 30th. Sweeney (1995) found a significant difference for students whose birth dates fell in the first and last trisections; the younger

students demonstrated lower achievement when compared to their older classmates. No significant findings were found between the effects of age and a student's classroom behavior or visual motor skills (Sweeney, 1995).

But some recent studies found no significant age effect in school performance. DeMeis and Stearns (1992) asserted that younger students should be referred more frequently for psycho-educational evaluations and less often for programs for the gifted, if, in fact, they do experience more academic or social difficulties than their older counterparts. The authors examined 1,676 student records for referrals to psychologists and placements into the behavior programs, gifted programs, and pre-first grade programs. The findings did not support the idea that a younger student experiences more academic and social difficulties than an older classmate. Students were referred for academic evaluations in proportion with the rate of birth within the school district and a proportionate number of students who were youngest in the school eligibility year qualified for the gifted education program (DeMeis & Stearns, 1992). However, it was found that younger students were placed more frequently in the pre-first grade programs than older classmates. DeMeis and Stearns (1992) believed that kindergarten teachers were observing differences in students based on their age. This was thought to be logical as age differences in development would be expected with a 12 month difference in some students' age (DeMeis & Stearns, 1992).

Most recently, Quinlan (1996) studied New Jersey third graders' performance on the Metropolitan Achievement Test (MAT). Students were divided into three groups dependent on their entrance age into kindergarten (early, medial, and late). The author

found that there was a negligible relationship between the child's kindergarten entrance age and overall reading ability at the end of third grade. In addition, there were no significant differences between the independent variables of age and gender on a students' achievement (Quinlan, 1996).

Many questions regarding the impact of school entrance age on a child's school success are still being raised. Results have varied because of different settings and research methodology. The present study seeks to add to the literature by examining the effects of age of entrance on second and fourth graders performance on the California Achievement Test, while controlling for socio-economic status. (Socio-economic status has been controlled in some of the studies cited above and this study because of its potential to interact and confound the results.) It is hypothesized that second graders born late in the school eligibility year (those with summer or early fall birthdays) would not perform as well as students born early in the eligibility year (those with winter and spring birthdays) on the achievement test. In support of May and Welch (1986), it is hypothesized that the entrance age differences would have lessened and/or fully diminished by fourth grade. It is believed that negligible differences between a child's birth date and achievement performance will be found in the older sample of students. It is also hypothesized that any age effect on achievement will be more evidenced in the low socio-economic group.

METHOD

Participants

Participants were all second and fourth grade students enrolled in Fremont Public Schools during the 1996-97 school year. There were 285 students in the fourth grade sample and 326 students in the second grade sample. Students were divided into four groups based on their age in months when starting kindergarten. The youngest group (Group 1) had children with ages between 59 months and 61 months (birthdays falling from August to mid-October). The middle group (Group 2) had children with ages between 62 months and 64 months (birthdays falling from May to July). The oldest group (Group 3) had children with ages between 65 months and 71 months (birthdays falling from mid-October to April). A fourth group (Group 4) was comprised of children who were a year older than their peers as a result of retention or being held back based on parental decision. For example, a child with an August birthday who could have started school when four but was held out until the following year when he or she was five and about to turn six. The children in the fourth group had ages between 71 months and 83 months.

Lunch payment status was used to classify children's socio-economic status. Those students on free and reduced lunches comprised the low socio-economic status group and those playing full price comprised the high socio-economic status group.

Students were excluded from the analysis based upon three criteria: if the child qualified for Special Education and received resource room or pull-out support on a daily basis, if the child qualified for English as a Second Language programs, and if the child did not complete the entire examination (due to illness, absence, etc.). Thirty one second graders and twenty nine fourth graders were removed from their respective samples due

to incomplete examinations and or Special Education or English as a Second Language status.

Materials

Students' scholastic achievement was estimated using the National Curve Equivalent (NCE) scores from the compiled results of the California Achievement Test (CAT). (The NCE scores ranged from 0 to 99 with a mean of 50 and a standard deviation of 21). The Microsoft Excel spreadsheet and Statistical Package for Social Sciences (SPSS) were used to record and analyze data.

Procedure

Students' NCE scores for reading, mathematics, and language arts and birthdates were collected from CAT results compiled by the district's Director of Assessment. The lunch payment status of the children was collected from the Food Services Director. The information was entered onto two separate spreadsheets - one for second grade and one for fourth grade. Data was analyzed using Microsoft Excel multiple regression spreadsheet program. To determine main effects and interactions, the data was analyzed with a three factor analysis of variance (ANOVA) using SPSS. The NCE scores from the CAT were the dependent variables and the age of the student, their lunch payment status, and their grade level at the time of the CAT were the independent variables.

RESULTS

Second grade sample. The second grade sample included 295 students from the 1996-97 school year. Of the 295 students, 103 were on free and reduced lunch payment status. The mean age was 68.6 months or five years, eight months with a range of 59.2 to

83.5 and standard deviation of 5.0. Table 1 presents the mean NCE score, range, and standard deviation for the reading, math, and language arts scores. Overall, the second grade sample manifested achievement above the mean. The mean scores for every area were within one standard deviation above the mean.

Multiple regressions were completed to determine whether age and lunch status had an effect on a child's scholastic achievement obtained from the CAT. The following model was used for each regression: $DV = \beta_0 + \beta_1(LUNCH) + \beta_2(AGE)$. As depicted in Table 2, positive and significant relationships were found between a second graders' age and his or her NCE scores for language arts and math, $t\ (2,292) = 2.033$, $p<.05$ and $t\ (2,292) = 2.940$, $p<.05$, respectively. While a positive relationship was also found with the NCE scores for reading, it was not significant, $t\ (2,292) = 1.26$, $p>.05$. Positive and significant relationships were found between a second grader's SES and achievement performance in all areas.

Fourth grade sample. The fourth grade sample included 256 students from the 1996-97 school year. Of the 256 students, 65 were on free and reduced lunch payment status. The mean age was 68.1 months or five years, one month with a range of 53.4 to 84.3 and standard deviation of 4.7. Table 3 presents the mean NCE score, range, and standard deviation for the reading, math, and language arts scores. Achievement was found to be above the mean in the fourth grade sample. All of the mean NCE scores were within one standard deviation above the mean.

Multiple regressions were completed to determine whether age and lunch status had an effect on a fourth graders' scholastic achievement. The same regression formula

as described for the second graders was used. As depicted in Table 4, scholastic achievement on the CAT was found to be a positive function of age at the .05 level of probability. While NCE scores increased with age in each area, none of the relationships between a child's age and NCE scores were significant in the fourth grade sample (see Table 4). Positive relationships were also found between SES and achievement, but none were significant.

To investigate the relationship between entrance age and grade level, a 4 x 2 x 2 (age x SES x grade) ANOVA was completed.

Reading achievement. Table 5 presents the results of the ANOVA involving reading achievement as a dependent variable. The main effect of entrance age was statistically significant, $F(3, 547) = 4.66$, $p<.05$. The reading means for the groups based on entrance age were 58.8 for Group 1, 55.2 for Group 2, 61.3 for Group 3, and 62.5 for Group 4. The significant relationship between entrance age and reading achievement is graphed in Figure 1. As depicted in Figure 1, with the exception of the middle age groups, the older the child was when entering school, the higher the reading achievement. The drop in reading achievement witnessed by second graders in Group 2 was unexpected and probably represents sampling error.

The main effect for SES was statistically significant with $F(1, 547) = 9.12$, $p<.05$. The reading achievement means based on SES were 56.40 for free/reduced payment and 62.03 for full payment. The higher income students were performing better than low income students in reading achievement based on the CAT.

The main effect for grade was not significant and none of the interactions were significant. Unfortunately, the important interaction of entrance age and grade level was not significant (see Figure 2).

Language Arts achievement. Table 6 presents the results of the ANOVA involving language arts as the dependent variable. The main effect for language arts was not significant. The main effect of SES was statistically significant with $F(1, 547) = 13.30$, $p<.05$. The language arts mean for free/reduced payment was 56.08 and 62.78 for full payment. The higher income students were performing better than low income students in reading achievement.

The main effect for grade was not significant and none of the interactions were significant. As noted in Figure 3, the language art means for the groups based on entrance age were 55.68 for Group 1, 55.72 for Group 2, 62.67 for Group 3, and 62.62 for Group 4. These scores were not statistically different, but were generally in the expected direction. Again, the important interaction of entrance age and grade level was nonsignificant (see Figure 4).

Mathematics achievement. Table 7 presents the results of the ANOVA involving mathematics as the dependent variable. The main effect for the entrance age of the child was not significant, but was close to statistical significance with $F(3, 547) = 2.52$, $p<.057$. The mathematics means for entrance age based on group were 59.05 for Group 1, 60.44 for Group 2, 64.73 for Group 3, and 69.06 for Group 4 and are graphed in Figure 5.

The main effect of SES was statistically significant with $F(3, 547) = 23.77$, $p<.05$. The mathematics mean for free/reduced payment was 58.37 and 67.27 for full payment. These scores were significantly different and indicated again that higher income students were performing better in math than low income students. The main effect for the grade of the student was also statistically significant, $F(3, 547) = 4.88$, $p<.05$. The mathematics mean for second graders was 62.75 and 66.63 for fourth graders. Since the CAT is grade normed, fourth graders were performing better as a whole when compared to second graders.

No significant interactions were found. Again, the important entrance age and grade level interaction was nonsignificant (see Figure 6).

DISCUSSION

Several important conclusions may be garnered from the regression analysis. The entrance age of students in the second grade sample significantly impacted the NCE scores on the California Achievement Test. Socio-economic status (SES) as measured with the student's lunch payment and entrance age were found to effect performance for the language arts and mathematics scores. Increases in NCE scores in these areas were found to be a positive function of entrance age. Second grade students in the upper SES group were found to perform at a higher level in all areas. While a positive relationship existed between entrance age and reading performance, entrance age did not significantly affect reading performance on the CAT. The reading NCE scores were not significantly impacted by the birthdate of the child. However, the differences were in the predicted direction.

With one exception, entrance age did not significantly affect fourth graders' performance on the CAT. Positive relationships existed between a child's performance and their socio-economic status (lunch payment status) and age. However, none of the relationships were significant. While the fourth graders' reading and language arts performances were not significantly related to their birthdate, math performances were significantly impacted by the age of the child. A child who started school when he or she was about to turn six, performed better than a child who started school when four. The results supported the hypothesis that the effects of entrance age would be negligible or diminished by the time a student reached fourth grade. But to test for the significance of the entrance age effect, a three-way ANOVA was conducted which specifically tested the relationship of a student's grade level and entrance age.

A main effect for entrance age was found in reading achievement. No other main effects were found between entrance age and achievement in language arts and mathematics (the latter was close to statistical significance at the .057 level). However, main effects were found between SES and achievement in all three areas. A significant main effect was also found between math performance and students' grade. No significant interactions were found in the ANOVA. Therefore, the regression results which suggested that the entrance age effect diminished with age was not found to be statistically significant using the analysis of variance.

Results of the present study supported some of the previous research regarding entrance age affects on a child's academic performance in lower grades. Children in lower grades who are the "youngest" in their classrooms did not perform as well on

achievement measures as their "older" classmates (Bell & Daniels, 1990; Bickel, et al., 1991, Davis, et al., 1980; Jones & Mandeville, 1990; & Sweeney, 1995).

Although Bickel et al. (1991) also observed the effects of school entrance age on first graders' achievement, they did not find the effects on achievement to continue over time. The authors reported that age of school entrance was significantly related to achievement in first grade. However, the entrance age effect did not persist in developmentally older subjects. A review of their achievement four years later did not produce significant findings. As with the present study, entrance age affects diminished in the older grades. May and Welch (1986) found the same results in a longitudinal study with kindergartners' school readiness and subsequent achievement in third grade. Significant birthdate effects were found in kindergarten, but when the same children were examined three years later, the birthdate effects were small. Children's academic performance in the upper elementary grades has not been shown to be affected by a student's entrance age as significantly as the academic performance of children in lower grades. This could be explained by the negatively accelerated growth curve that postulates greater developmental differences between early and late elementary school children. There would be a greater developmental difference between early and late starters in second grade when compared to early and late starters in fourth grade. If these developmental differences were true, then the effects of entrance age should diminish when children in later grade levels are examined.

The present study did not support the results of DeMeis and Stearns (1992) or Quinlan (1996). These authors found only small differences between younger and older

students' academic performance. In the case of DeMeis and Stearns (1992), a proportionate number of students with various birthdates were referred for academic evaluations and qualified for a gifted education program. Quinlan (1996) found that birthdate was not significantly related to a third grader's reading performance on the Metropolitan Achievement Test.

It is hoped that the present study adds to the literature on the effects of a child's birthdate on scholastic achievement as measured by the CAT. Naturally, limitations of the study exist. One limitation is the generalizability of the results due to the achievement scores used in the study being above the mean. The average NCE scores were at least one standard deviation above the mean in all areas for the fourth grade sample and every area with the exception of reading in the second grade sample. The results may generalize to other school districts in small midwestern towns with similar achievement performances.

A related limitation is the homogenous population of the school district which may affect the generalizability of the results to school districts or communities with more heterogeneous populations. The small midwestern town used in the study is mostly Caucasian with very few other minorities represented in the population. While new industry has brought in more minority families, a large proportion are Hispanic in origin and were removed from the study due to limited English proficiency. The results found may generalize to similar communities with a small proportion of minority families.

Another limitation is the experimental design used for the present study. The ideal or best test of entrance age effects would be a longitudinal design using the same

subjects in lower and upper elementary grades. In the interest of time, the present study examined two different groups of children. A longitudinal design with the same students would be a much more powerful test of entrance age effects. It would allow for repeated measures on the same subjects. Future research may want to consider a longitudinal design.

It is hoped that the present study has contributed further information to the question of whether parents should consider holding back their young kindergarten students to increase success in school. Based on the results of the present study, there do not appear to be advantages or disadvantages either way. A child who is held back may perform better in the younger elementary grades. However, the effects of being the youngest in a class appear to have little effect on achievement by fourth grade. An "older" student may demonstrate stronger academic skills than peers in second grade and perform similarly to "younger" classmates by fourth grade. Further research on the social-emotional effects (i.e., behavioral problems) of being the oldest or youngest in a class may provide more information on the question of whether to hold back young children in order to ensure success in school. This could be researched by examining students' ages in relation to psychological referrals for behavior evaluations (DeMeis & Stearns, 1992; Diamond, 1983; DiPasquale, et al., 1980; Spitzer, et al., 1995). Due to the effects of age on achievement washing out by the upper elementary grades, parents and school personnel may consider the mental health and well-being of a child who is noticeably older and or younger in the classroom when considering starting or holding back a young child.

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Table 1

Descriptive Statistics for the Second Grade Sample

	Variable			
Statistic	Age	NCE Reading	NCE Language Arts	NCE Mathematics
Mean	68.6	59.0	61.2	61.7
Range	59.2-83.5	14 - 99	6 - 99	18 - 99
Standard Deviation	5.0	19.7	17.6	18.5

Table 2

Regression Analysis of Entrance Age Effects/Coefficients and t Values of the Second Grade Sample

Variable	β_o	β_1	β_2
NCE Reading	35.52	6.62*	.279
		(2.79)	(1.26)
NCE Language Arts	28.83	8.43*	.392*
		(4.06)	(2.03)
NCE Mathematics	15.53	11.37*	.581*
		(5.35)	(2.94)

Note. *$p < .05$. t values reported in ( ).

Table 3

Descriptive Statistics for the Fourth Grade Sample

	Variable			
Statistic	Age	NCE Reading	NCE Language Arts	NCE Mathematics
Mean	68.1	51.8	60.2	66.6
Range	53.4 - 84.3	22 - 99	6 - 99	20 - 99
Standard Deviation	4.7	18.3	20.0	19.4

Table 4

Regression Analysis of Entrance Age Effects/Coefficients and t Values of the Fourth Grade Sample

Variable	β_o	β_1	β_2
NCE Reading	52.63	3.41 (1.30)	.083 (.393)
NCE Language Arts	38.35	4.27 (1.49)	.232 (.877)
NCE Mathematics	27.00	4.01 (1.45)	.456 (1.79)

Note. *$p < .05$. t values reported in ( ).

Table 5

Analysis of Variance for Reading Achievement

	df	Mean Square	F	Significance of F
Age	3	1652.59	4.66	.003*
SES	1	3231.84	9.12	.003*
Grade	1	914.99	2.58	.109
Age x SES	3	72.52	.205	.893
Age x Grade	3	487.37	1.38	.250
SES x Grade	1	322.24	.909	.341
Age x SES x Grade	3	176.71	2.132	.683

Note. *$p < .05$.

Table 6

Analysis of Variance for Language Arts Achievement

	df	Mean Square	F	Significance of F
Age	3	1425.09	4.19	.006*
SES	1	4519.48	13.30	.000*
Grade	1	290.40	.854	.356
Age x SES	3	41.79	.123	.947
Age x Grade	3	61.22	.180	.910
SES x Grade	1	385.00	1.13	.288
Age x SES x Grade	3	155.47	.457	.712

Note. *$p < .05$.

Table 7

Analysis of Variance for Mathematics Achievement

	df	Mean Square	F	Significance of F
Age	3	841.13	2.52	.057**
SES	1	7926.44	23.77	.000*
Grade	1	1627.48	4.88	.028*
Age x SES	3	150.95	.453	.716
Age x Grade	3	449.20	1.35	.258
SES x Grade	1	1813.12	5.44	.020*
Age x SES x Grade	3	308.68	.925	.428

Note. *$p < .05$. **Very close to significance.

Figure Captions

Figure 1. Reading achievement means by entrance age groups.

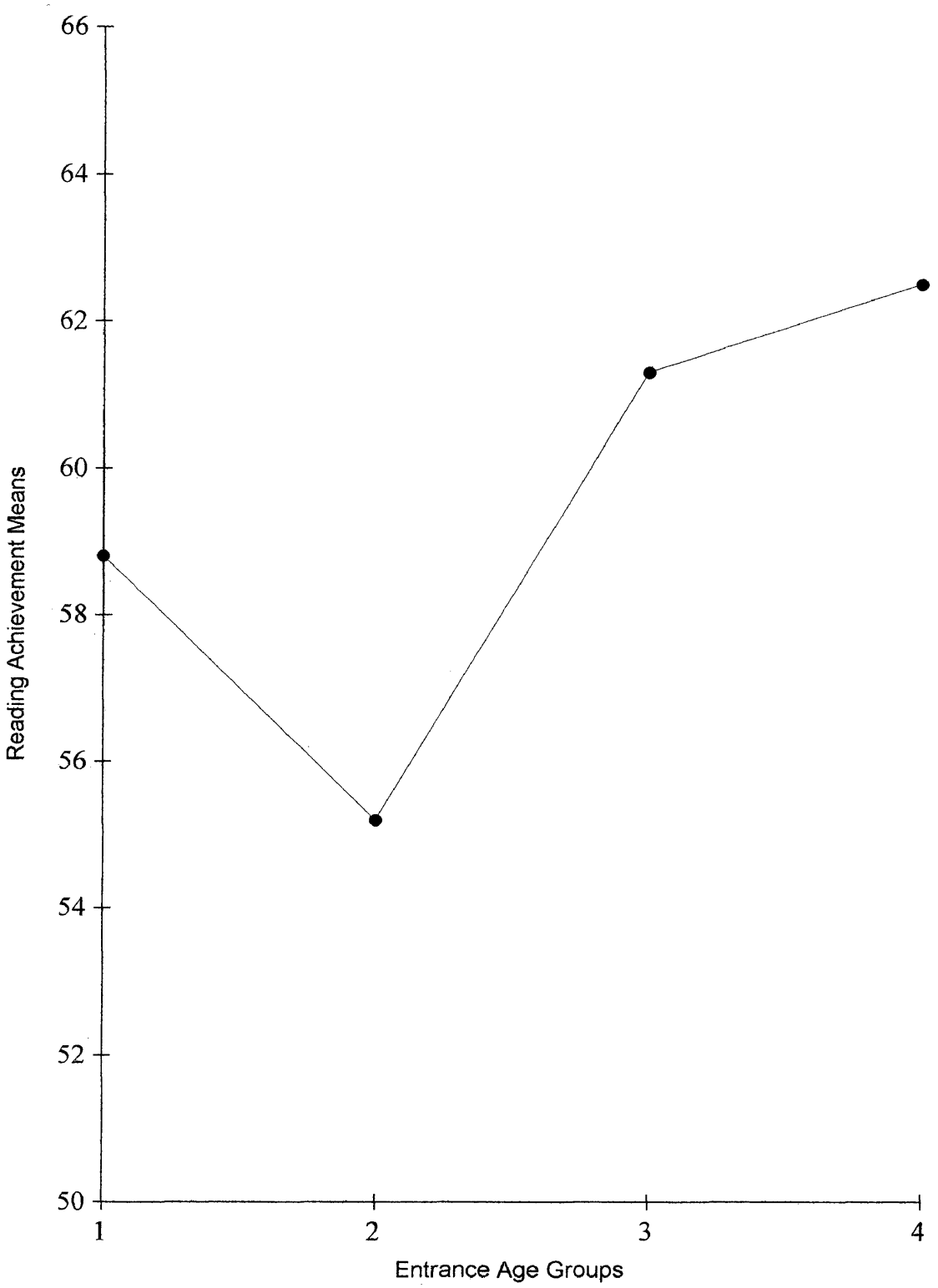
Figure 2. Reading achievement interactions by entrance age group and grade.

Figure 3. Language Arts achievement means by entrance age groups.

Figure 4. Language Arts achievement interactions by entrance age group and grade.

Figure 5. Mathematics achievement means by entrance age groups.

Figure 6. Mathematics achievement interactions by entrance age groups and grade.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Reading Achievement Means
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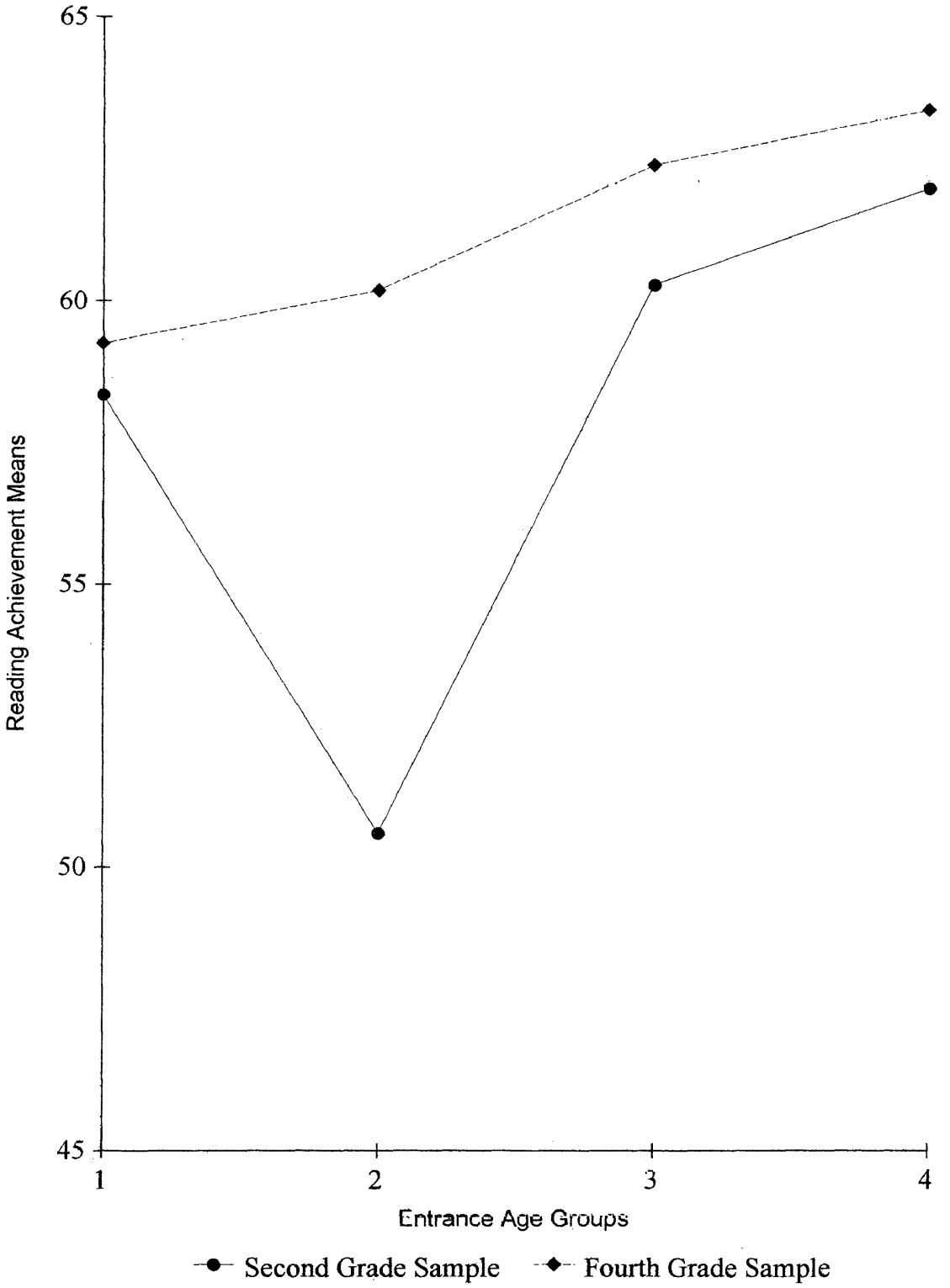
Entrance Age Groups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Reading Achievement Means
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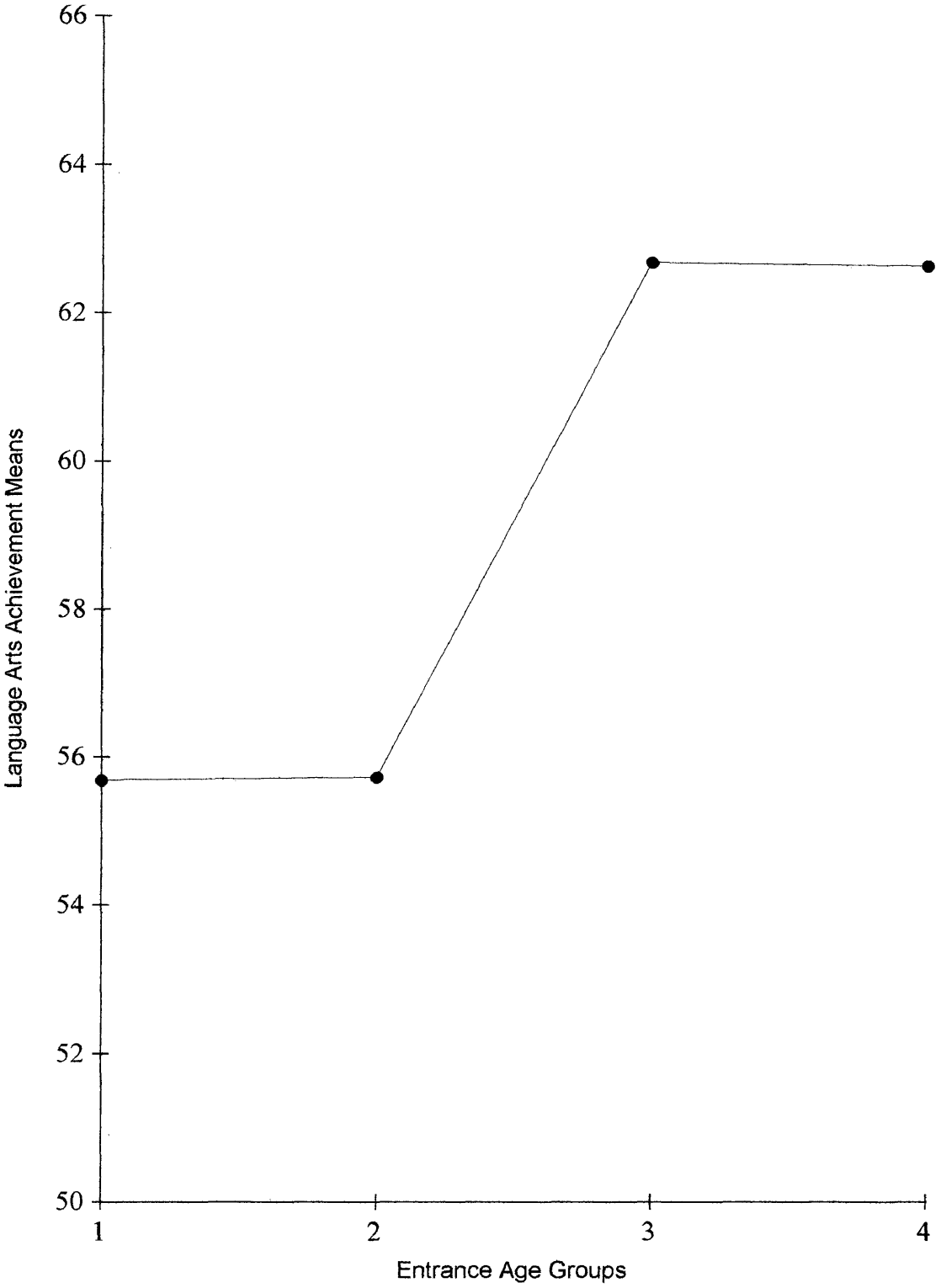
Entrance Age Groups
Second Grade Sample
Fourth Grade Sample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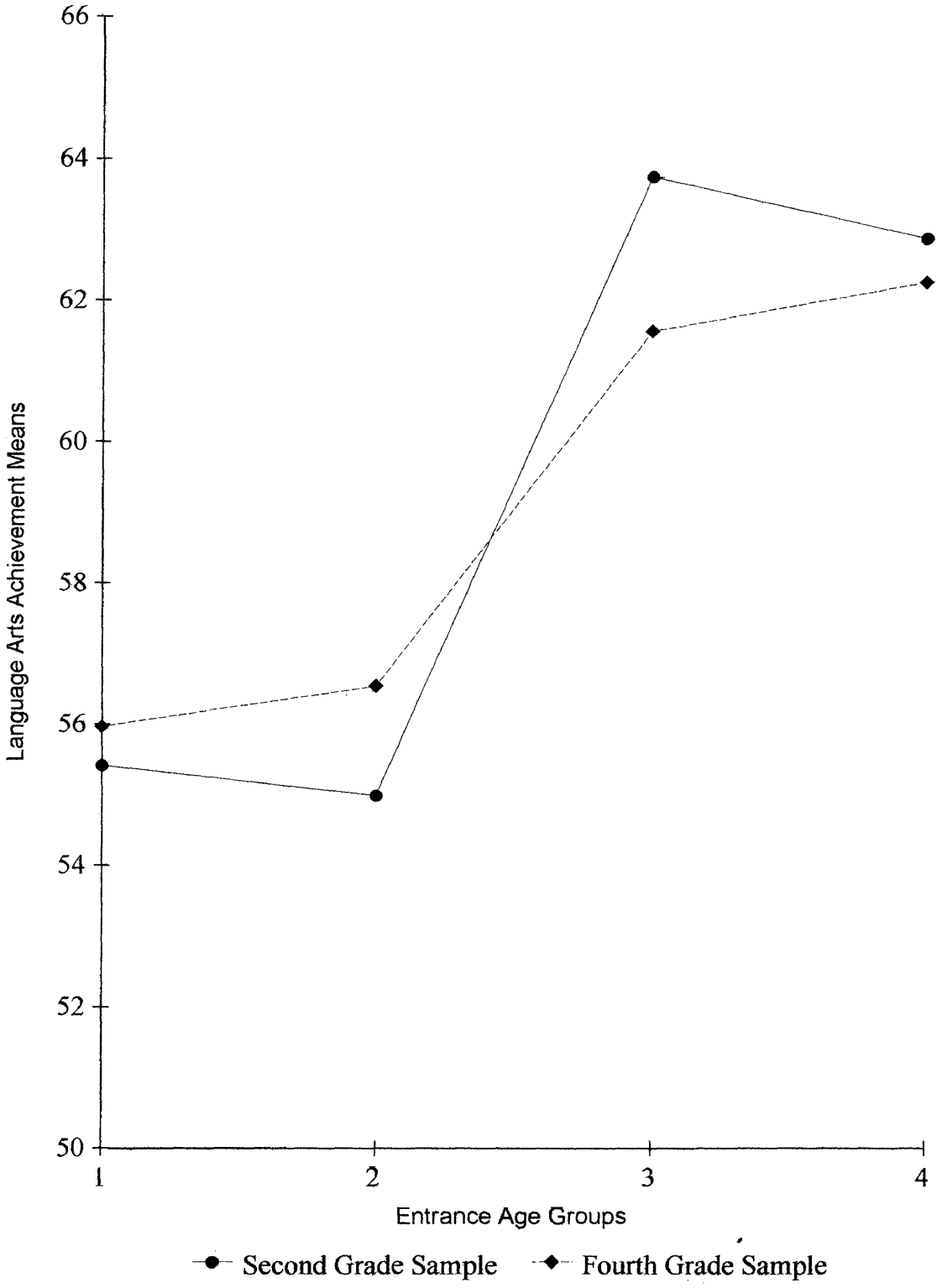
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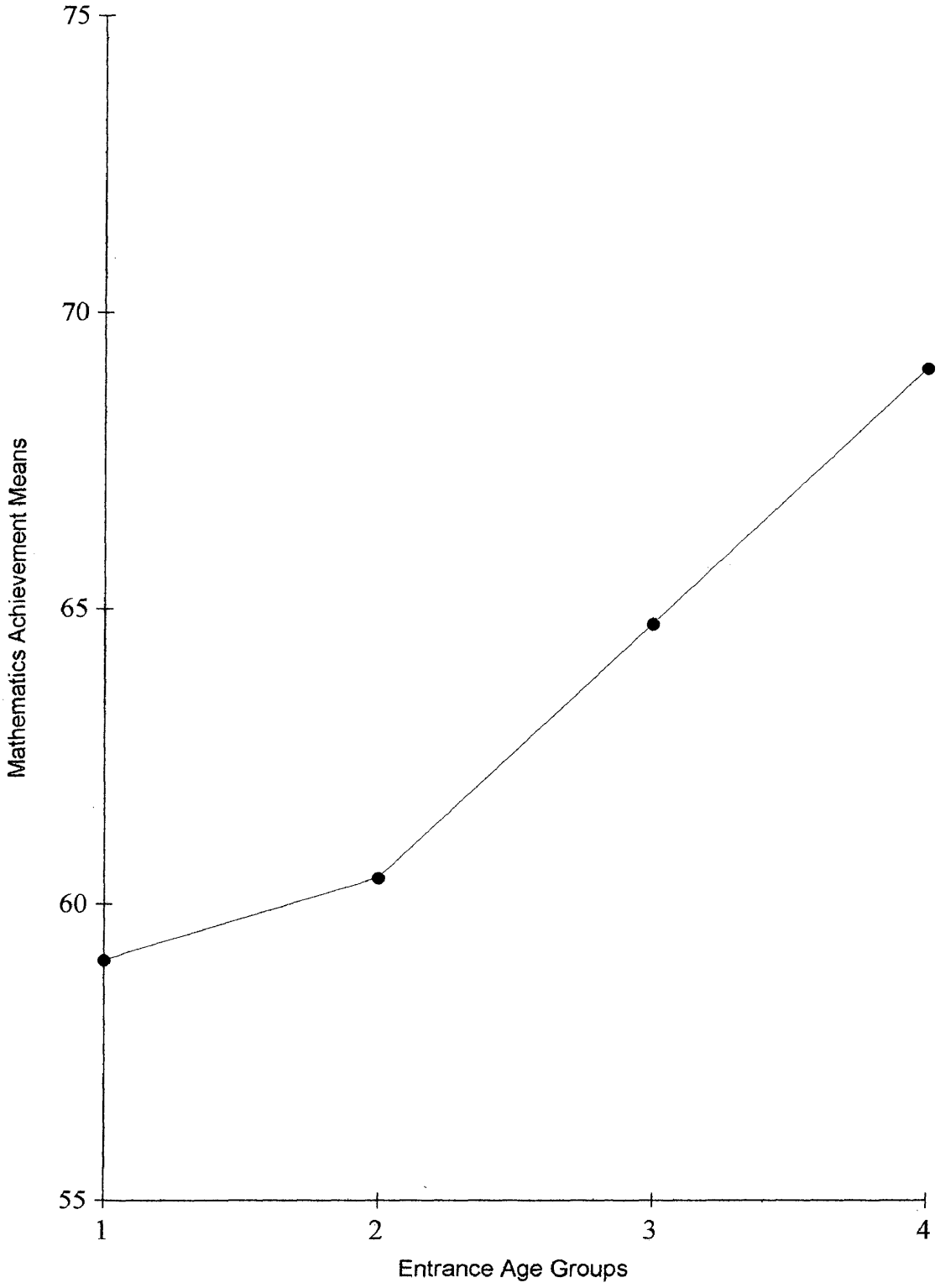
Entrance Age Groups
Second Grade Sample
Fourth Grade Sample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Mathematics Achievement Means
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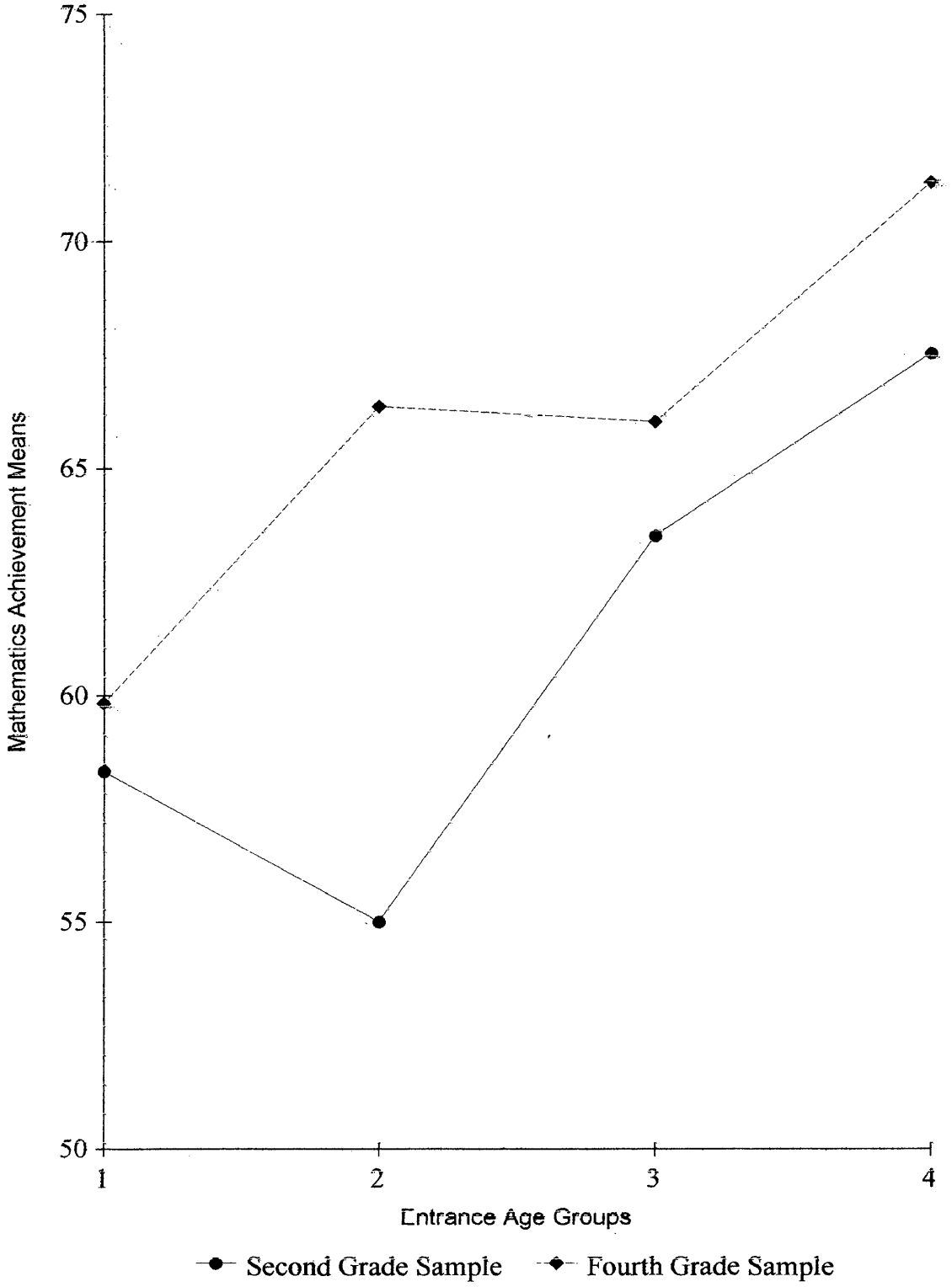
Entrance Age Groups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Mathematics Achievement Means
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Entrance Age Groups
Second Grade Sample
Fourth Grade Sample