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The Impact Of Parental Involvement On Academic Achievement In Children

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THE IMPACT OF PARENTAL INVOLVEMENT ON ACADEMIC ACHIEVEMENT IN CHILDREN

by

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This thesis, submitted by Martin Blank in partial fulfillment of the requirements for the Degree of Master of Science in Applied Economics from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

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This thesis is being submitted by the appointed advisory committee as having met all of the requirements of the School of Graduate Studies at the University of North Dakota and is hereby approved.

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PERMISSION

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TABLE OF CONTENTS

LIST OF TABLES

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Abstract

Academic achievement in children is affected by many factors including family income, family structure, class size, parental education, and parental expectations. Recent research on academic achievement has evaluated the relationship between parental involvement in children's education and academic achievement. Using data from the National Education Longitudinal Study of 1988, this study investigates the socioeconomic and parental factors that affect academic achievement in children. The question of endogeneity between parental involvement and academic achievement is also explored. The statistical analysis performed utilized OLS regression and instrumental variable techniques. OLS regression techniques demonstrate a negative relationship between parental involvement and academic achievement while instrumental variable techniques demonstrate a strong positive relationship. The results of this study provide evidence of the importance of parental involvement in children's academic achievement and may serve as an impetus for further research into the effect of specific parental factors on academic achievement in children.

CHAPTER I

INTRODUCTION

Academic achievement in children has been shown to be affected by many factors, including family income (Dahl & Lochner, 2012), family structure (Jeynes, 2005), class size (Nye, Hedges & Konstantopoulos, (2000), school climate (O'Malley, Voight, Renshaw & Eklund, 2015), parental education (Davis-Kean, 2005), parental expectations (Davis-Kean, 2005), and parental involvement (Jeynes, 2005). Research in this area is important because a thorough understanding of the factors that impact academic achievement may allow government agencies and families to optimally direct their resources and maximally impact academic achievement in children. Considerable past research focused on the impact of school and teachers on academic achievement while more recent research increasingly addressed the impact of parental factors on children's academic outcomes. The importance of parental involvement has been demonstrated, but research results have not always been consistent. The purpose of this study is to clarify the impact of parental involvement on academic achievement in children.

The data selected for use in this study is the National Educational Longitudinal Study of 1988. This database is a public-use source of information and variables that characterize the experiences and impressions of a sample of 24,599 eighth-grade students, their parents, teachers, and school administrators. The cohort is followed as they progress through eighth, tenth, and twelfth grade and then into their post-secondary education or entry into the work force. The initial cohort was surveyed in 1988, 1990, 1992, 1994, and finally in 2000. The database is comprehensive in its assessment of the students, parents, teachers, and school administrators and

1

allows for investigation into many facets of the cohort's lives, including an analysis of the impact of parental factors on the children's academic achievement.

The primary area of interest of this study, the impact of parental involvement on academic achievement, was evaluated with a compilation of summary statistics, inference with multiple regression, and instrumental variable techniques. The dependent variables selected to represent academic achievement were the results of standardized tests administered to the students in reading, mathematics, and science. The predictor variables used in the multiple regressions included gender, socioeconomic status, and factors indicative of parental involvement, such as a parent helping their children with homework and a parent discussing school activities with their children. The results of Ordinary Lease Squares regression demonstrated an unexpected negative relationship between parental involvement and academic achievement in the sample of children studied. These results led to further analysis into the interaction between predictor variables as well the potential for endogeneity between parental involvement and academic achievement.

The results of the instrumental variable techniques confirmed the presence of endogeneity between the variables representing parental involvement and academic achievement and demonstrated a significant impact of parental involvement on academic achievement in the children studied. This finding is important in that it identifies a factor that can be exploited by government agencies and families to positively affect academic achievement in children. This finding also provides a direction for further research into factors affecting academic achievement in children.

CHAPTER II

LITERATURE REVIEW

Much of the past research on academic achievement focused on the academic achievement gap or the difference in academic achievement in children of different socioeconomic statuses. The results of research into the academic achievement gap demonstrated a positive relationship between increasing socioeconomic status (SES) and academic achievement though the finding was not universal. One of the landmark meta-analyses of studies relating socioeconomic status to academic achievement was that performed by White in 1982. White demonstrated a positive relationship between SES and academic achievement but found that SES was only weakly correlated with academic achievement when the student was the unit of analysis (White, 1982). This finding was contrary to much of the research at the time, which described a strong relationship between SES and academic achievement.

Further research into the relationship between SES and academic achievement demonstrated the impact of SES on academic achievement and showed a widening of the academic achievement gap in certain groups. Sirin, furthering the research of White, performed a meta-analytic review of research studying socioeconomic status and academic achievement and demonstrated a medium-to-strong relationship between socioeconomic status and academic achievement (2005). Reardon looked at the academic achievement gap and showed that the gap in academic achievement in children of different socioeconomic statuses widened over the past fifty years (2011). Caro, McDonald and Williams demonstrated that the academic achievement gap widened more so in particular age groups: the academic achievement gap remained stable

from the age of 7-11 years and widened at an increasing rate from the age of 12-15 years in the populations they studied (Caro, McDonald & Willms, 2009).

The study of the relationship between socioeconomic status and academic achievement was significant not only because it provided a target for early attempts at improving academic achievement in children, but also because it provided a launching point for research into other non-SES factors that might be affecting academic achievement, such as parental factors.

Fan and Chen (2001) performed one of the early studies on the relationship between parental involvement and academic achievement. In their paper, Fan and Chen presented an important theoretical framework for studying parental involvement. The authors grouped the definitions of parental involvement into: a) educational expectation/aspiration for children; b) communication with children about school-related matters; c) parental supervision/home structure related to school matters; d) parental participation in school activities; and e) other/general parental involvement.

The authors found a small-to-moderate relationship between parental involvement and academic achievement. Parental aspiration/expectation for children's education achievement had the strongest relationship, whereas parental home supervision had the weakest relationship. The authors cautioned that the finding of a weak relationship between parental home supervision and educational achievement should not be simplistically interpreted as indicating that home supervision does little to enhance children's education. They reasoned that the weak relationship may be due to a requirement for closer supervision with students who are not doing well academically. This paper is important because it provided a useful framework for studying parental involvement that is still relevant today and contributed to the choice of variables used in my study. The paper is also important because it demonstrated the complexity of the

relationships between factors of parental involvement and indicators of academic achievement and provides an indication of potential endogeneity between parental involvement and academic achievement.

As research progressed into the relationship between parental involvement and academic achievement, authors started to identify and discriminate between different aspects of parental involvement. Jeynes (2005) studied the effects of parental involvement on the academic achievement of African American 12th-grade youths. The results of Jeyne's focused investigation suggest that parental involvement does have a positive influence on the academic achievement in African American 12th graders; however, the results also indicate that the extent of parental involvement is highly related to SES. When SES variables were added into the regression analysis, the regression coefficients were no longer statistically significant, indicating that parental involvement is strongly related to SES as a predictor.

Jeynes research on the relationship between SES and parental involvement identified another important relationship that was also identified in my analysis: the interaction between SES and parental involvement. Jeynes commented that the presence of this relationship does not negate the influence of parental involvement and discussed reasons for this pattern, such as the high personal drive of higher-achieving, higher SES parents that is carried over in their relationships with their children or perhaps a greater availability of parents with higher SES to help their children.

Jeynes (2007) performed another meta-analysis to help determine the influence of parental involvement on the educational outcomes of urban secondary students. Jeynes found that parental involvement had a positive impact on academic achievement in the urban secondary students studied. Of note, the effect sizes in this study of urban secondary students were smaller

than the effect sizes obtained in Jeynes' meta-analysis of urban elementary students (Jeynes, 2005). Jeynes noted that parental involvement is a better predictor of achievement at the elementary school level than at the secondary school level. He reasoned that children are generally more influenced by parental values in the lower grades than in their later years of schooling and that parents are generally more involved in their children's lives when the children are young. This reasoning helped explain the findings of earlier researchers who showed that the academic gap widened as the students progressed through later grades (Caro, McDonald & Willms, 2009).

Shute, Hansen, Underwood and Razzouk (2011) reviewed the relationship between parental involvement and secondary school student academic achievement. In their review the authors helped define prominent aspects of parental involvement, grouping them into two main categories of home and school activities. The home activities included discussing school activities, reading at home, checking homework, and home rules and supervision. School activities included contacting school personnel, attending school conferences, and volunteering at school.

Parent-child discussion refers to conversations about school-related activities, programs, near- and long-term school plans, and other academic issues. Parent-child discussion had the strongest positive association with academic achievement. Parental aspirations and expectations represent the degree to which parents presume their children will perform well in school. The authors reported that this variable had a generally positive effect on student achievement.

Reading at home reflects parental support for reading and is positively associated with academic achievement. Checking homework by parents was found to have a positive association with academic achievement in some but not all studies. Home supervision and rules, which refers

to moderate levels of parental support, when combined with appropriate monitoring of behaviors such as watching television, showed a positive association with academic achievement. The results of the study of Shute, Hansen, Underwood and Razzouk and their description of aspects of parental involvement helped me to further refine my selection of variables included in my study.

Nunez et al. (2015) studied the relationship between perceived parental involvement in homework, student homework behaviors, and academic achievement in students in elementary, junior high and high school students. They found that perceived parental control and support for homework were directly related to students' academic achievement but in different manners. There was a positive relationship between perceived parental homework support and achievement and a negative relationship between perceived parental homework control and achievement. These findings are similar to the results reported by Karbach, Gottschling, Spengler, Hegewald, and Spinath (2013).

Jeynes (2012) studied the relationship between various types of parental involvement programs and academic achievement in urban pre-kindergarten through 12th-grade students. The author demonstrated that school-based parental involvement programs have a positive relationship with student academic achievement. The author also demonstrated that certain elements of these programs may have the greatest impact on academic achievement. Parental involvement initiatives that involve parents and their children in "shared reading", parents checking homework, and parent and teacher communication and partnering have important impact on academic achievement.

An important consideration when discussing the relationship between parental involvement and student academic achievement is the potential for endogeneity between the two

factors. Neymotin (2013) utilized an instrumentation strategy to clarify the effect of parental involvement on student behavior and found that parental involvement has an even more important effect on student behavioral outcomes than baseline estimates would indicate.

This review of the literature covers the impact of SES and parental involvement on many aspects of learning and academic achievement. The articles highlight the relationship between SES and parental factors and the academic achievements of elementary, junior high and high school students. The review shows that the relationship between socioeconomic status, parental factors, and academic achievement is complex. To differentiate these factors, I performed a retrospective study analyzing the effect of factors on academic achievement in children.

CHAPTER III

Method

The National Education Longitudinal Study of 1988 is a public-use database compiled from a nationally representative sample of 24,599 eighth-graders attending 1,052 high schools across the United States (Kaufman, Bradley, & National Center for Education Statistics, 1992). Students were first surveyed in 1988 with a sample of those surveyed in 1988 undergoing follow-up surveys in 1990, 1992, 1994, and 2000. Data were collected from students, parents, teachers, and school administrators with collection instruments that included questionnaires and interviews. The follow-up surveys provided longitudinal measurements and trend data as the students progressed through middle or junior high school, high school, and post-secondary school or the work force (Curtin, Ingels, Wu, & Heuer, 2002).

In the Base-Year Study of 1988, the 1,052 schools selected included public and private schools with approximately twenty-four students randomly selected from each school (Curtin, Ingels, Wu, & Heuer, 2002). Questionnaires and cognitive tests were administered to each of the students. The student questionnaire topics included the students' school experiences and activities, their attitudes and plans, as well as background information and language proficiency. The parent questionnaire was directed to one parent of each student and the topics included family characteristics and student activities. Two teachers for each student were surveyed about the students, the school and themselves. The school principals were questioned about the school. The cognitive tests administered to the students covered reading, mathematics, science, and social studies.

The First Follow-up Study was performed in 1990. Most of the students at that time were high school sophomores and the topics surveyed were similar to that of the 1988 Base-Year Study minus the parent component (Curtin, Ingels, Wu, & Heuer, 2002). As some students dropped out of school the student sample was "freshened" with additional students to ensure a representative sample.

The Second Follow-up Study was performed in 1992 when most of the student were high school seniors. The study also included surveys of many of the students who dropped out at previous points in the study. The questions used in the surveys addressed not only the educational and family components included in the previous two studies, but also addressed the transition of students from high school to post-secondary education and the work force. As in the Base-Year Study, the students' parents, teachers, and school administrators were surveyed.

The Third Follow-up Study was performed in 1994 when most of the students had graduated high school and started their post-secondary education or entered the work force. The data from this point forward were collected via telephone interviews. The study addressed issues of post-secondary education and employment. The Fourth Follow-up Study was performed in 2000, eight years after most of the students had graduated from high school and were at an age of twenty-six years. The topics surveyed included post-secondary education, employment opportunities and outcomes, and marriage and family structure.

Data from the Base-Year, First Follow-up, and Second Follow-up studies were used in this current analysis of the impact of parental involvement on student's academic achievement. The dependent variables used for analysis of academic achievement were standardized test scores in reading, mathematics, and science. Test scores were available for the three periods studied: eighth, tenth, and twelfth grade. The availability of test scores for the three periods

enabled consistent measurement and trending of academic achievement across the periods analyzed.

The predictor variables selected for the study included gender, socioeconomic status, and several variables indicative of parental involvement. The variables selected to represent parental involvement were selected, in part, based on the previous work of Fan and Chen (2001), Shute, Hansen, Underwood and Razzouk (2011), and Nunez et al. (2015). The variables include measurements of how often a parent helps their child with homework, talks with their child about school experiences, contacts the school about the student's academic performance, and volunteers for school activities. Intuitively, these actions are indicative of the parent's level of involvement in their student's academic career.

Data for socioeconomic status and gender were consistent across the time periods; however, data for measurement of parental involvement were not consistent across the time periods. Parent surveys were conducted in the Base-Year Study and the Second Follow-up Study, but not in First Follow-up Study. The lack of consistent parent-based information necessitated compiling data regarding parental involvement from a combination of student-based and parent-based questionnaires. The data utilized regarding parental involvement was applicable, but not completely consistent over the three periods.

The discrepancy in consistency of some of the predictor variables was managed by closely matching the parent-based and student-based questions used in the analysis. For example, the parent-based Base-Year Study question "How often help child with homework" was matched with the student-based First Follow-up Study question "How often parent helps respondent with homework". Similarly, the parent-based Second Follow-up Study question "Discussed with teen school activities" was matched with the student-based First Follow-up Study question

"Discussed school activities with parent". Careful matching of the predictor variables allowed for comparison and trending of these variables and analysis of parental involvement across the three time periods studied.

As discussed above, endogeneity may be a factor in the relationship between parental involvement and student behavior. In the case of parental involvement and academic achievement reverse causation may exist. It is not clear if parental involvement leads to an increase in academic achievement or if poor academic achievement leads a parent to increase involvement with their student. There may also be effects unexplained by the included variables. To help sort out the relationship between these two factors, instrument variable techniques were employed.

The variable selected for an instrumental variable in this analysis is *attends PTO meetings*. It seems logical that a parent's attendance of PTO meetings would be a reflection of their level of involvement separate from direct involvement in the child's academic performance, such as by helping their child with homework. Based on this assumption *attends PTO meetings* was selected for use as an instrument variable.

Statistical analysis was performed using Stata SE 14 software package. Statistical analysis included computation of summary statistics, inference with multiple regression, and the application of instrument variable techniques.

The descriptive statistics for these dependent and predictor variables for 1988, 1990, and 1992 are summarized in Tables 1–6. A description of the variables included in the statistical analysis is displayed in Table 1.

Table 1. Description of variables

Name	Variable	Description
Helps with homework	helphw	How often parent helps student with homework
Talks about school experiences	talksclexp	How often parent talks to student about school experiences
Contacts school about academic performance	contsclacperf	How often parent contacts school about student's academic performance
Volunteers at school	vol	How often the parent acts as a volunteer at school
Attends school events	attsclevent	How often the parent attends school events with student
Finds out about friends	findoutfriends	How often parent finds out about student's friends
Discusses school activities	discsclact	How often student discusses school activities with parent
Reading standardized score	read	Reading standardized score
Math standardized score	math	Mathematics standardized score
Science standardized score	science	Science standardized score
Female	female	Female gender
Socioeconomic status	ses	Socioeconomic status composite

The descriptive statistics for the variables include the number of observations, mean, standard deviation, minimum and maximum values. The total number of observations for the initial sample is 43,495. Due to missing date and students who dropped out of the initial sample,

7530 (16.8%) of the total initial observations are excluded. Included in the analysis are 37,248 observations with 13,294 observations in the 1988 sample, 13,056 observations in the 1990 sample, and 10,898 observations in the 1992 sample. The number observations vary slightly between subsamples again due to missing data and dropped students.

The sample is 50.94% female; 49.06% male (Table 2). The socioeconomic status of the students is quantified in a composite score based on questionnaire data regarding their father's level of education, mother's level of education, father's occupation, mother's occupation, and family income. The socioeconomic status composite score has a range of –3.290 to 2.762 (Table 3). The overall mean socioeconomic score is -.1016954 with a standard deviation of .8029017.

Table 2. Summary Statistics for Female

Variable	Observations	Percent		Min	Max
Female 1988	13,822	51.34		0 (Male)	1 (Female)
Female 1990	14,758	50.82		0 (Male)	1 (Female)
Female 1992	14,915	50.69		0 (Male)	1 (Female)
Female overall	43,495	50.94		0 (Male)	1 (Female)

Table 3. Summary Statistics for Socioeconomic Status (SES)

Variable	Observations	Mean	Std. Dev.	Min.	Max.
SES 1988	13,820	-.1320586	.7869498	-2.970	2.560
SES 1990	13,614	-.0844719	.8097796	-3.290	2.762
SES 1992	14,452	-.0888849	.81069	-3.243	2.753
SES overall	41,886	-.1016954	.8029017	-3.290	2.762

The predictor variables for 1988, 1990, and 1992 are summarized in Tables 4 and 5. Table 4 explains the values used to score the predictor variable. Table 5 describes the summary statistics for the predictor variables. Examination of the summary statistics for the predictor variables shows that parental involvement, gauged by how often the parents helps with homework, talked about school activities, contacted the school about the student's academic performance, volunteered at school activities, attended school activities, tried to find out about the student's friends, and discussed school activities, was consistent over the three time periods studied.

Table 4. Explanation of Values Used for Predictor Variables

Name	Variable	Value
Helps with homework	helphw	1=never, 2=rarely, 3=sometimes, 4=often
Talks about school experiences	talksclexp	1=not at all, 2=rarely, 3=occasionally, 4=regularly
Contacts school about academic performance	contsclacperf	1=none, 2=1 or 2, 3=3 or 4, 4=more than 4
Volunteers at school	vol	0=no, 1=yes
Attends school events	attsclevent	1=never, 2=1 or 2, 3=more than 2
Finds out about friends	findoutfriends	1=not at all, 2=just a little, 3=some, 4=a lot
Discusses school activities	discsclact	1=never, 2=sometimes, 3=often

Table 5. Summary Statistics for Predictor Variables

Variable	Observations	Mean	Std. Dev.	Min.	Max
1988					
Helps with homework	12,649	2.208791	.9931606	1	4
Talks about school experiences	12,711	3.742349	.5356815	1	4
Contacts school about academic performance	12,265	1.707705	.8482899	1	4
Volunteers for school activities	12,421	.2010305	.4007869	0	1
1990					
Helps with homework	12,461	2.333922	.902002	1	4

15

Attends school events	11,818	1.915214	.8814393	1	3
Finds out about friends	11,969	3.429109	1.014768	1	4
Discusses school activities	12,238	2.038405	.6707777	1	3
1992					
Helps with homework	11,159	2.68671	.9449225	1	4
Contacts school about academic performance	12,634	1.834494	.9624028	1	4
Discusses school activities	12,531	2.504908	.6158616	1	3
Attends school activities	11,147	2.799767	1.122622	1	4

The dependent variables used to analyze academic achievement are the standardized test scores for reading, mathematics, and science in 1988, 1990, and 1992. The standardized test scores range from 29.01 to 80.14 and are summarized in Table 6.

Table 6. Summary Statistics for Standardized Test Scores

Variable	Observations	Mean	Std. Dev.	Min.	Max
Reading					
1988	13,294	50.66046	10.06477	31.75	70.55
1990	13,056	50.40569	9.948796	30.58	68.91
1992	10,898	50.47737	9.93159	29.01	68.35
Mathematics					
1988	13,286	50.83626	10.179	33.90	77.20
1990	13,032	50.56038	10.11708	31.43	71.93
1992	10,897	50.67023	10.06762	29.63	71.37
Science					
1988	13,274	50.65367	10.02571	31.62	80.14
1990	12,949	50.34561	10.04886	31.56	72.54
1992	10,827	50.41847	9.977737	29.70	70.81

Ordinary Least Squares (OLS) regression was used to study the effect of parental involvement and academic achievement. OLS regression was performed on each of the measures of academic achievement (reading, math, and science) for each of the time periods studied (1988, 1990, and 1992). For clarity, only the regressions for the year 1988 are presented in the results section. The regressions for 1988 are presented in Table 7–9. The regressions for 1990 and 1992 are presented in Appendix A.

Multiple regression was performed and controlling for all other variables all effects were found to be significant due to the large sample size.

Examination of the OLS regression on the standardized reading test scores in 1988 shows a negative relationship between some of the measures of parental involvement and academic achievement. In particular, *helping with homework* and *contacts school about academic performance* had a negative effect on the standardized reading test scores. *Helping with homework* had a negative effect of 1.50 points for each increase in level of parental help; *contacts school about academic performance* had a negative effect of 1.11 points. The predictor variables *talking about school experiences* and *volunteering for school activities* had a positive effect on the standardized reading test scores. *Talking about school experiences* had a positive effect of 1.06 points for each increase in level of talking about school experiences; *volunteering for school activities* had a positive effect of 1.12 when parents volunteered for school activities.

The negative effect of *helping with homework* was consistent across all of the measures of academic achievement (reading, math, and science standardized test scores) and across all of the time periods (1988, 1990, and 1992). The predictor variable *contacts school about academic performance* were scored only in the 1988 and 1992 studies. The negative relationship between *contacts school about academic performance* and the standardized tests scores was also consistent across the standardized test scores (reading, math, and science) and the periods studied. The other measures of parental involvement *attended school activities, tried to find out about the student's friends*, and *discussed school activities,* had a positive effect on the standardized test scores in the periods studied.

The effect of *female* on the standardized test scores differed depending on the subject studied but was consistent across the three time periods. Being of female gender had a positive

17

effect on standardized reading test scores and a negative effect on math and science.

Socioeconomic status had a consistently positive effect on standardized test scores across subject and the three time periods. *Socioeconomic status* had a positive effect and its magnitude is the largest (about 5 to 6 units) among all effects studied.

Table 7. OLS Regression on Standardized Reading Test 1988

Variable	Coefficient	Std. Err.	t	P>t
Helps with homework	-1.50472	.086653	-17.36	0.000
Talks about school experiences	1.065123	.1658615	6.42	0.000
Contacts school about academic performance	-1.108052	.1011136	-10.96	0.000
Volunteers for school events	1.274777	.2117665	6.02	0.000
Female	2.020266	.1661526	12.16	0.000
Socioeconomic status	5.640835	.1128447	49.99	0.000

Table 8. OLS Regression on Standardized Math Test 1988

Variable	Coefficient	Std. Err.	t	P>t
Helps with homework	-1.638452	.0862401	-19.00	0.000
Talks about school experiences	.3297392	.1651384	2.00	0.046
Contacts school about academic performance	-1.292068	.1006549	-12.84	0.000
Volunteers for school events	1.117141	.2106559	5.30	0.000
Female	-.5132214	.1653316	-3.10	0.002
Socioeconomic status	6.44411	.1123153	57.38	0.000

Table 9. OLS Regression on Standardized Science Test 1988

Variable	Coefficient	Std. Err.	t	P>t
Helps with homework	-1.464603	.0882693	-16.59	0.000
Talks about school experiences	.8799062	.1689629	5.21	0.000
Contacts school about academic performance	-1.014794	.1029396	-9.86	0.000
Volunteers for school events	.8836717	.2155299	4.10	0.000

Female	-1.735492	.1691751	-10.26	0.000
Socioeconomic status	5.35974	.1149556	46.62	0.000

The negative relationship between *helps with homework* and the standardized test scores and the strong positive relationship between *socioeconomic status* and the standardized test scores prompted further investigation into these relationships as well as the interaction between *helps with homework* and *socioeconomic status.* A new regression was performed that included the same dependent standardized test scores, the same predictor variable *helps with homework,* newly created dummy variables for socioeconomic status measured by quartile, and interaction terms for *helps with* homework and the new socioeconomic status dummy variables. The results of this regression for standardized reading test scores in 1988, 1990, and 1992 are presented in Table 10–12, respectively.

The OLS regression for standardized reading scores in 1988 with the *helps with homework * SES by quartile* interaction terms showed that there was a significant interaction effect between these two variables. Still, SES had a positive effect and its magnitude was larger than that of the other variables in all four quartiles (see next paragraph). Compared with the 1st quartile, the scores increased by about 6, 9, and 13 units for the students in the 2nd, 3rd, and 4th quartiles, respectively.

In the 1st quartile, *helps with homework* has a negative effect of 0.67 units. In the 2nd, 3rd, and 4th quartiles, the negative effects were about 1.72 (0.67+1.05), 2.07 (0.67+1.30), and 1.50 (0.67+0.83), respectively. The results were highly statistically significant, but the small increases may not be considered as practically significant.

In the 1988 regression all three interaction variables were significant; however, the interaction terms in 1990 and 1992 were not always significant. All main effects were approximately the same across years, but five of the six interaction terms in 1990 and 1992 were

19

not significant. The non-significant results suggest that the effect of *helps with homework* does

not always change as SES increased in 1990 and 1992.

Table 10. OLS Regression with Interaction Terms for Standardized Reading Test 1988

Variable	Coefficient	Std. Err.	T	P>t
Helps with homework	-.6724114	.1578424	-4.26	0.000
2nd quartile SES	6.169975	.5369858	11.49	0.000
3rd quartile SES	9.265935	.5554984	16.68	0.000
4th quartile SES	13.32263	.558665	23.85	0.000
Helps with homework*2nd SES	-1.05023	.2285001	-4.60	0.000
Helps with homework*3rd SES	-1.304711	.2328619	-5.60	0.000
Helps with homework*4th SES	-.8335785	.2332286	-3.57	0.000
Constant	46.97664	.3564224	131.80	0.000

Table 11. OLS Regression with Interaction Terms for Standardized Reading Test 1990

Variable	Coefficient	Std. Err.	T	P>t
Helps with homework	-.9705371	.1731316	5.61	0.000
2nd quartile SES	3.744062	.6187888	6.05	0.000
3rd quartile SES	6.445241	.6344431	10.16	0.000
4th quartile SES	11.04706	.6473538	17.06	0.000
Helps with homework*2nd SES	-.1264462	.2536186	-0.50	0.618
Helps with homework*3rd SES	-.1069754	.2562889	-0.42	0.676
Helps with homework*4th SES	-.0693957	.2601024	-0.27	0.790
Constant	48.15583	.4155631	115.88	0.000

Table 12. OLS Regression with Interaction Terms for Standardized Reading Test 1992

Variable	Coefficient	Std. Err.	t	P>t
Helps with homework	-.5762972	.1939829	-2.97	0.003
2nd quartile SES	3.783556	.7976623	4.74	0.000
3rd quartile SES	7.572304	.8116678	9.33	0.000
4th quartile SES	11.55307	.7898377	14.63	0.000
Helps with homework*2nd SES	-.1677198	.2847608	-0.59	0.556
Helps with homework*3rd SES	-.5980175	.2857519	-2.09	0.036
Helps with homework*4th SES	-.4948554	.2808865	-1.76	0.078
Constant	47.72757	.531517	89.80	0.000

It is reasonable to assume that *helps with* homework is correlated with some unobserved variables such as the student's ability. Accordingly, concern for endogeneity between *helps with homework* and the standardized test scores led to the implementation of instrument variable (IV) techniques. The variable *attends PTO meetings* was selected as the instrument for *helps with homework.* This selection seemed valid since a parent's attendance of PTO meetings can be an indication of their involvement in their children's education, but attendance is not correlated with standardized test scores. Before the IV regressions were performed, tests for endogeneity and for weak instruments were performed and the results of these tests displayed in Table 13 and 14.

The Durbin-Wu-Hausman test of endogeneity was performed using the standardized test scores for the dependent variable, *helps with homework* as the endogenous variable, *attends PTO meeting* as the instrument variable, and *female* as an exogenous variable. With this set of variables, the results were significant, demonstrating that *helps with homework* is indeed endogenous. When SES is added to the test of endogeneity as an additional exogenous variable, the results were no longer significant; therefore, based on this result, SES was not used in the IV regressions.

Table 13. Durbin-Wu-Hausman test of endogeneity for Standardized Reading Test Score 1988

Endogenous Variable	Instrument Variable	Durbin-Wu-Hausman test
Helps with homework	Attends PTO meeting	76.089 (p=0.000)

After testing for endogeneity, a weak instrument test for just-identified models was performed. The F-statistic was 97.1757, which was greater than the critical value of 16.38 indicating that the instrument was not weak.

After testing for endogeneity and ensuring that the instrument was not weak, 2SLS IV regression was performed with the results displayed in Table 15. The regression results show an

increase in the effect of *helps with homework* on *standardized reading test score* from -1.50472 to 7.889168 with a p-value=0.000. The effect changes from negative to positive (which is consistent with intuition) and the difference is large. This is an indication that the IV technique works well in this analysis.

The same tests for endogeneity and weak instruments as well IV regression were performed for the standardized math and science test scores with similar results. The results of these tests and regressions are displayed in Appendix B.

Table 14. Weak instrument test – Just identified model – Standardized Reading Test Score 1988 First-stage regression summary statistics

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	Robust F(1,11934)	Prob > F
Helps with homework	0.0081	0.0080	0.0081	97.1003	0.0000

Minimum eigenvalue statistic = 97.5187

Critical Values   # of endogenous regressors: 1
H_0: Instruments are weak   # of excluded instruments: 1

	10%	15%	20%	25%
2SLS Size of nominal 5% Wald test	16.38	8.96	6.66	5.53

Table 15. 2SLS Estimation on Reading 1988

Reading 1988	Coefficient	Std. Err.	Z	P>z
Helps with homework	7.889168	1.358647	5.81	0.000
Gender	1.922462	.2425542	7.93	0.000
Constant	32.53674	3.012926	10.80	0.000

CHAPTER V

DISCUSSION

The key finding in this study is the positive effect of parental involvement on academic achievement measured by how often a parent helps their child with homework. Using OLS regression, parental involvement measured by how often a parent helps their child with homework had a negative effect; however, using IV regression techniques, the effect was positive and with an effect that is larger in absolute value (+7.5 vs. -1.5).

If instrument variables were not utilized in this study, the findings and recommendations would have been quite different. Based on OLS regression alone, the results indicate that a parent helping their child with homework has a negative effect. This effect could be explained in terms of an actual negative effect or by an alternative effect such as endogeneity. An actual negative effect could occur if the parent lacks skills to effectively help their child. Or, if a parent creates an environment detrimental to learning, this could also cause a negative effect. This explanation will be further explored in the discussion of the interaction between parental involvement and SES.

Another explanation for the negative effect of parental involvement on academic achievement is endogeneity. It is not obvious if parental involvement causes a negative effect on academic achievement or if the reverse case exists in which a child's poor academic achievement prompts a parent to help their student. Related to endogeneity is the possibility that there are unexplained effects due to an omitted variable. The use of instrument variable techniques was implemented to study potential endogeneity.

Though it is possible that a parent may lack the skills necessary to effectively help their child with homework or that a parent could create an environment detrimental to learning, these explanations for the most part seem unlikely. It seems more likely that there is another explanation for the negative effect, such as endogeneity. The use of IV techniques helped clarify this issue showing that parental involvement as measured by how often a parent helps their child with homework has a positive impact on academic achievement. This finding has important implications as parents and society as a whole look for ways to improve the education of children.

In addition to endogeneity due to reverse causation, there may be endogeneity due to the effect of an omitted variable such as SES. This explanation was considered and explored using an OLS regression with interaction terms for the interaction between SES and a parent's helping their child with homework. The regression performed on the 1988 standardized reading test score showed a significant interaction between SES and a parent's helping their child with homework. The negative effect of helping with homework was increased by about one unit as the parent's SES increased from level one to the other three levels. The regressions using the SES interaction terms did not generate significant results for all interaction terms for the 1990 and 1992 standardized test scores suggesting an inconsistent effect of SES.

The idea that SES is an important factor in a child's academic achievement is plausible and is supported by the results of the OLS regressions performed in this study. The effect of SES on standardized test scores was consistently positive and is larger in absolute value on test scores than did the measures of parental involvement such as helping with homework and discussing school experiences. The importance of SES is recognized in the literature, but affecting SES as a method to improve academic performance may not be feasible.

The results of this study demonstrate that a parent can impact the academic achievement of their children through involvement in their education process. Helping their children with homework has a positive effect as does talking to their children about school experiences, discussing school activities, and volunteering at school activities. The exact manner in which parental involvement improves academic achievement in children is not certain, but the finding is strong enough to recommend that parents become involved and support their children's education in whatever manner is most comfortable for the parent and child.

Table 16. OLS Regression on Standardized Reading Test 1988

Variable	Coefficient	Std. Err.	T	P>t
Helps with homework	-1.50472	.086653	-17.36	0.000
Talks about school experiences	1.065123	.1658615	6.42	0.000
Contacts school about academic performance	-1.108052	.1011136	-10.96	0.000
Volunteers for school events	1.274777	.2117665	6.02	0.000
Female	2.020266	.1661526	12.16	0.000
Socioeconomic status	5.640835	.1128447	49.99	0.000

Table 17. OLS Regression on Standardized Math Test 1988

Variable	Coefficient	Std. Err.	T	P>t
Helps with homework	-1.638452	.0862401	-19.00	0.000
Talks about school experiences	.3297392	.1651384	2.00	0.046
Contacts school about academic performance	-1.292068	.1006549	-12.84	0.000
Volunteers for school events	1.117141	.2106559	5.30	0.000
Female	-.5132214	.1653316	-3.10	0.002
Socioeconomic status	6.44411	.1123153	57.38	0.000

Table 18. OLS Regression on Standardized Science Test 1988

Variable	Coefficient	Std. Err.	T	P>t
Helps with homework	-1.464603	.0882693	-16.59	0.000
Talks about school experiences	.8799062	.1689629	5.21	0.000
Contacts school about academic performance	-1.014794	.1029396	-9.86	0.000
Volunteers for school events	.8836717	.2155299	4.10	0.000
Female	-1.735492	.1691751	-10.26	0.000
Socioeconomic status	5.35974	.1149556	46.62	0.000

Table 19. OLS Regression on Standardized Reading Test 1990

Variable	Coefficient	Std. Err.	T	P>t

Helps with homework	-1.652867	.1070936	-15.43	0.000
Attends school events	1.393606	.112259	12.41	0.000
Finds out about friends	1.013373	.0927258	10.93	0.000
Discusses school activities	2.220002	.1532233	14.49	0.000
Female	1.054795	.1825006	5.78	0.000
Socioeconomic status	-.0315007	.0068457	-4.60	0.000

Table 20. OLS Regression on Standardized Math Test 1990

Variable	Coefficient	Std. Err.	T	P>t
Helps with homework	-2.085704	.1084279	-19.24	0.000
Attends school events	1.938413	.1136169	17.06	0.000
Finds out about friends	.9116523	.0939091	9.71	0.000
Discusses school activities	2.126449	.1551156	13.71	0.000
Female	-1.342606	.1847145	-7.27	0.000
Socioeconomic status	-.0397297	.0069082	-5.75	0.000

Table 21. OLS Regression on Standardized Science Test 1990

Variable	Coefficient	Std. Err.	T	P>t
Helps with homework	-1.900017	.1016836	-18.69	0.000
Attends school events	.9754314	.1077691	9.05	0.000
Finds out about friends	.661707	.0881896	7.50	0.000
Discusses school activities	1.002998	.1465118	6.85	0.000
Female	-2.93917	.1733305	-16.96	0.000
Socioeconomic status	4.891093	.1136671	43.03	0.000

Table 22. OLS Regression on Standardized Reading Test 1992

Variable	Coefficient	Std. Err.	T	P>t
Helps with homework	-1.104035	.106734	-10.34	0.000
Contacts school about academic performance	-1.112684	.1033851	-10.76	0.000
Discusses school activities	1.042537	.1787624	5.83	0.000
Attends school activities	.3214975	.0944747	3.40	0.001
Female	2.261199	.1883023	12.01	0.000
Socioeconomic status	4.91574	.1224364	40.15	0.000

Table 23. OLS Regression on Standardized Math Test 1992

Variable	Coefficient	Std. Err.	T	P>t
Helps with homework	-1.433799	.1029901	-13.92	0.000
Contacts school about academic performance	-1.722679	.0997373	-17.27	0.000
Discusses school activities	.8087461	.1724636	4.69	0.000
Attends school activities	.8600041	.0912242	9.43	0.000
Female	-.8314073	.1817142	-4.58	0.000
Socioeconomic status	5.619144	.1179814	47.63	0.000

Table 24. OLS Regression on Standardized Science Test 1992

Variable	Coefficient	Std. Err.	T	P>t
Helps with homework	-1.168329	.1063156	-10.99	0.000
Contacts school about academic performance	-1.286575	.1029927	-12.49	0.000
Discusses school activities	.6951624	.177895	3.91	0.000
Attends school activities	.6442334	.0941619	6.84	0.000
Female	-2.791634	.1874842	-14.89	0.000
Socioeconomic status	5.082567	.121727	41.75	0.000

APPENDIX B
IV REGRESSIONS

Table 25. Durbin-Wu-Hausman test of endogeneity on Standardized Reading Test Score 1988

Endogenous Variable	Instrument Variable	Durbin-Wu-Hausman test
Helps with homework	Attends PTO meeting	76.089 (p=0.000)

Table 26. Weak instrument test – Just identified model – Standardized Reading Test Score 1988

First-stage regression summary statistics

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	Robust F(1,11934)	Prob > F
Helps with homework	0.0081	0.0080	0.0081	97.1003	0.0000

Minimum eigenvalue statistic = 97.5187

Critical Values   # of endogenous regressors: 1
H_0: Instruments are weak   # of excluded instruments: 1

	10%	15%	20%	25%
2SLS Size of nominal 5% Wald test	16.38	8.96	6.66	5.53

Table 27. 2SLS Estimation on Reading 1988

Reading 1988	Coefficient	Std. Err.	z	P>z
Helps with homework	7.889168	1.358647	5.81	0.000
Gender	1.922462	.2425542	7.93	0.000
Constant	32.53674	3.012926	10.80	0.000

Table 28. Durbin-Wu-Hausman test of endogeneity on Standardized Math Test Score 1988

Endogenous Variable	Instrument Variable	Durbin-Wu-Hausman test
Helps with homework	Attends PTO meeting	70.5883 (p=0.000)

Table 29. Weak instrument test – Just identified model – Standardized Math Test Score 1988

First-stage regression summary statistics

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	Robust F(1,11934)	Prob > F
Helps with homework	0.0081	0.0080	0.0081	97.0918	0.0000

Minimum eigenvalue statistic = 97.5187

Critical Values   # of endogenous regressors: 1
H_0: Instruments are weak   # of excluded instruments: 1

	10%	15%	20%	25%
2SLS Size of nominal 5% Wald test	16.38	8.96	6.66	5.53

Table 30. 2SLS Estimation on Math 1988

Math 1988	Coefficient	Std. Err.	z	P>z
Helps with homework	7.571287	1.365305	5.55	0.000
Gender	-.5670755	.2437988	-2.33	0.020
Constant	34.72108	3.028256	11.47	0.000

Table 31. Durbin-Wu-Hausman test of endogeneity on Standardized Science Test Score 1988

Endogenous Variable	Instrument Variable	Durbin-Wu-Hausman test
Helps with homework	Attends PTO meeting	58.1231 (p=0.000)

Table 32. Weak instrument test – Just identified model – Standardized Science Test Score 1988

First-stage regression summary statistics

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	Robust F(1,11934)	Prob > F
Helps with homework	0.0081	0.0080	0.0081	97.1003	0.0000

Minimum eigenvalue statistic = 97.5028

Critical Values   # of endogenous regressors: 1
H_0: Instruments are weak   # of excluded instruments: 1

	10%	15%	20%	25%
2SLS Size of nominal 5% Wald test	16.38	8.96	6.66	5.53

Table 33. 2SLS Estimation on Science 1988

Science 1988	Coefficient	Std. Err.	z	P>z
Helps with homework	6.785088	1.288745	5.26	0.000
Gender	-1.814583	.2301437	-7.88	0.000
Constant	36.93417	2.858781	12.92	0.000

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