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EFFECTS OF AFTER SCHOOL PROGRAMS ON ELEMENTARY
SCHOOL STUDENTS' LANGUAGE ARTS AND
MATHEMATICS ACHIEVEMENT

by

Jennifer Presnell

A thesis submitted to the faculty of

Brigham Young University

in partial fulfillment of the requirements for the degree of

Educational Specialist

Department of Counseling Psychology and Special Education

Brigham Young University

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BRIGHAM YOUNG UNIVERSITY

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ABSTRACT

EFFECTS OF AFTER SCHOOL PROGRAMS ON ELEMENTARY SCHOOL STUDENTS LANGUAGE ARTS AND MATHEMATICS ACHIEVEMENT

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This study evaluated after school program participation on student academic achievement as a way of helping schools meet Adequate Yearly Progress (AYP) standards set by the No Child Left Behind Act. After school programs were divided into academic after school programs and traditional after school programs. Student achievement was measured through Criterion Referenced Tests in Language Arts and Mathematics. This study took place in a small urban school district located in the Intermountain West. Students in after school programs were matched with students not participating in the programs on several background characteristics including socioeconomic status, English language proficiency status, school area, race, gender, and guardianship. Hierarchical cross-classified modeling was then used to assess the impact of participation in an after school program on student test scores. This study found that participation in an after

school program was associated with a decrease in Language Arts test scores and found no difference on Mathematics test scores. As well, academic after school program participants test scores were not considerably different from traditional program participants. This study shows that after school programs are not an effective way at raising student achievement and thus helping schools to meet AYP.

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INTRODUCTION

A recent report promoting after school programs shows that approximately seven million school aged children spend time alone after school (Durlack & Weissburg, 2007). An earlier study by Public Agenda showed that 36% of children report spending time alone after school at least once a week, 16% spend three to four days unsupervised a week and 13% reported spending five days a week alone at home (National Institute on Out of School Time, 2006). Hofferth and Sandburg estimated that in 2001, 51 hours or 30 percent of a child's week is spent unsupervised. The time children spend after school on their own is rising.

Research shows that children who engage in high amounts of self care (four hours or more a week) are more likely to have behavioral, social and academic difficulties (Pettit et al., 1997). With respect to behavioral problems, children who are unsupervised after school are more likely to be truant, stressed, have poor grades, abuse substances or engage in other risk taking behaviors. These effects increase when children begin spending more hours on their own after school at a younger age (Marshall et al., 1997; Pettit et al., 1997; Vanderpoleg, 2006). Thus, one motivation for after school programs is to offer a safe place for children who are unsupervised in the after school hours.

After school programs are not only promoted as a way in which to provide children with quality places to spend their after school time but they have also been promoted as a way in which to help children achieve better academically (After School Programs, 2001; Boehmer, 2009) Because poor academic outcomes are connected to unsupervised after school hours in several studies (e.g., National Research Council and Institute of Medicine, 2003; Pettit et al., 1997; Vandell & Posner, 1999; Vandell &

Shumow, 1999) alternative academic enrichment activities after school have been created to directly improve educational achievement (Newman et al., 2000).

In some studies, children who participate in high quality out-of-school programs have been shown to develop skills related to school success; feelings of self-confidence and self-esteem, school bonding (positive feelings and attitudes toward school), positive social behaviors (Durlack & Weissburg, 2007), school grades and achievement test scores (Durlack & Weissburg; Welsh et al., 2002). Yet, some evidence shows after school programs are not an effective means for boosting academic achievement. Some research suggests that students who attend after school programs do not do better on tests of achievement (Dynarski et al., 2003; Vandell & Corasaniti, 1998). In light of the conflicting evidence suggesting the efficacy of after school programs, it is difficult to make decisions concerning implementation of after school programs as a way to help students perform better academically.

Since the inception of the No Child Left Behind Act (NCLB) after school programs have been intended to help failing schools meet academic standards, which are set by each state according to federal government regulations. These standards are measured through Adequate Yearly Progress (AYP). Individual States establish requirements for meeting AYP (Office of Elementary and Secondary Education, 2001). AYP is measured by standardized assessments in Language Arts and Mathematics as well as through participation rates (U.S. Department of Education, 2004).

Title 1 schools that fail to meet AYP standards must give the option for their students to transfer to schools meeting the specified requirements. After three years of failure to meet AYP, supplemental services are then offered, which include after school

program services (An act to close the achievement gap with accountability, flexibility, and choice, so that no child is left behind, 2001). These services are selected from a list of state approved providers and are funded by the local education agency (An act to close the achievement gap with accountability, flexibility, and choice, so that no child is left behind, 2001). Schools have thus been led to look to the after school hours as time that can be utilized to provide student academic services (National Institute on Out-of-School Time, 2001) and to meet the goals of NCLB (Gayl, 2004).

Although after school programs have been implemented to improve students' academic performance and thereby assist failing schools in meeting AYP, research is inconclusive as to their ability to meet these goals. To help define the effects of after school programs this study investigates the impacts of after school programs on student achievement as measured by standards that are used to determine AYP.

LITERATURE REVIEW

Research suggests that what students do in their out of school time has a significant impact on how successful they are during school hours and that after school programs can have mixed effects on a child's academic performance (National Institute, 2006). Greater accountability, under the No Child Left Behind Act puts schools under pressure to adequately assist each student in meeting state and federal guidelines for academic achievement and thus makes providing additional learning opportunities increasingly important (Gayl, 2004).

Many schools have looked to the time after school to provide these learning opportunities. In the 1990's after school programs increased substantially. The 21st Century Community Learning Center after school programs have received increased funding from 40 million in 1997 to 1 billion in 2002. With an increase in funding more services were implemented and by 2001 two-thirds of principals reported their schools providing after school programs, which jumped from 22 percent in 1998 (National Association of Elementary School Principals, 2001).

This trend for after school programs is rising therefore, the need to assess after school program outcomes as a way to meet student needs and increase academic achievement is essential. Assessing how after school programs are connected to helping schools meet AYP is necessary in assisting policy makers to make the best decision on how to raise student and school achievement and success.

Academic Outcomes of After School Programs

All School-age Students

The research showing a relationship between participation in after school programs and academic achievement is mixed. Some studies report that increased participation in after school programs has a direct and positive influence on reading grades and also on mathematics grades for low performing students (Chang-Rios & Karin, 2007; Jones, 2005). These studies cited limitations, which may have influenced their results such as small sample sizes, excessive missing data, correlational designs, non-experimental designs, and not taking into account enrichment activities outside of the specific after school programs studied.

Longitudinal studies of after school programs academic effects have shown that higher participation in an after school program was significantly related to positive achievement on standardized tests of mathematics, reading, and language arts (Cosden et al., 2001; Huang et al., 2000; Mahoney, Lord, & Carryl, 2005; Vanderpoleg, 2006). These studies limitations may limit generalizing outcomes though. For example, Cosden et al. report's findings for one type of after school program: homework help. and Mahoney, Lord & Carryl report that their findings didn't take into account program quality and student engagement.

These beneficial results diverge noticeably from other studies investigating after school program impacts on academic achievement. For example, Redd and colleagues (2004) conclude that after school programs improve academic grades and have mixed effects on standardized test scores. Also, Vandell and Corasaniti (1988) found that children in elementary schools who attend formal after-school programs reported poorer

academic grades and standardized test scores than those in mother care or self-care arrangements. The authors note that these negative results may have been found due to the low quality of the programs. Programs in this study had a high student to teacher ratio and limited age appropriate activities.

In a non-experimental report for Mathematica on the 21st CCLC programs and The After School Corporation (TASC), after school programs for elementary school participants were found not to improve scores on math or standardized reading tests (Dynarski et al., 2003). In this report the authors acknowledge that participation rates and teacher buy-in may have impacted their findings. For instance, participation in the after school programs among participants was sporadic. As well, center directors and coordinators of after school programs noted that teachers' had little desire to teach after the regular school day. In addition, after the report for Mathematica, several reviews called into question the validity of their results sighting rates of participation, sample size and statistical power as factors that may have skewed the study's findings (Jacobsen, 2003; Kane, 2003).

The current literature, which examines the benefits of after school programs, is limited in several ways. As with this study, many limitations in past research are methodological. Several examinations of after school program effects on academic achievement have used pre to post test measurements which don't account for maturation or acquired learning through school curriculum. The use of one measure of achievement at pretest another measure at post-test as well as absences of control group and experimental groups have all been part of past study designs. From the current literature it is evident that research so far addressing academic outcomes from participation in after

school programs is inconclusive. Study weaknesses imply a need to further investigate the effects of after school programs.

Low-income Students

Under the NCLB act, if a Title I school fails to make AYP for two years the school must provide supplemental services, such as tutoring or after school programs, for its economically disadvantaged students (An act to close the achievement gap with accountability, flexibility, and choice, so that no child is left behind, 2001). Much of the research, which addresses after school program effects, looks at their influence on academic achievement specifically on low-income students. Students are more likely to perform poorly academically when they come from homes in poverty, are English language learners, recent immigrants, part of a minority group, or are receiving special education services (Welsh et al., 2002). Many after school programs try to pull in disadvantaged students (Wimer, 2002) because they are more likely to be failing academically than their affluent peers (Grossman et al. 2001).

Several studies evaluating after school program effects on academic functioning targets low-income children (Cosden, 2001; Huang, 2000; Jones, 2005; Mahoney, Lord, Carryl, 2005; Posner and Vandell, 1994; Powell, Peet & Peet, 2002). Targeting these students is based on research, which suggests that increasing instructional time for disadvantaged students is particularly beneficial in increasing their academic achievement and that these children are more likely than affluent peers to lack resources for improving their time out of school (President and Fellows of Harvard College, 2007).

Academic benefits of after school program participation are most apparent when children are disadvantaged (Posner & Vandell, 1994, 1999; Welsh et al., 2002). Test

scores increased more for these students when they were in an after school program compared to nonparticipants (Welsh et al.). Low-income students also demonstrate greater improvement in grades than non-participants (Posner & Vandell, 1994).

Research addressing after school program benefits for low-income students has limitations that need to be considered. Posner and Vandell (1994) used a correlational design when evaluating program effects, and Grossman and colleagues (2001) used a non-experimental design in reporting on achievement impacts. In addition, several of these studies look at program effects over only one or two years (Jones, 2005; Posner & Vandell, 1994; Powell, Peet & Peet, 2002). In seeking to establish the effects of after school program participation on achievement for low-income students, these limitations suggest a need for studies to apply more methodologically sound designs to establish accurate findings.

Type of After School Programs

In addition to looking at the affects of after school programs on academic achievement, a review of specific types of after school programs is also necessary. The current literature attempts to disentangle the affects of achievement according to the type of after school program attended. This explanation is necessary considering that some after school programs, which target a particular group of students, may be more influential in increasing student achievement.

The effect of after school program activities on academic achievement may differ according to the focus. After school programs can include a variety of activities. Some of these activities include extracurricular activities such as sports, music or clubs; enrichment activities such as health or lifestyle lessons; academic or tutoring helps or

special interest groups. Existing literature uses all of these activities to assess the benefits of participation on student academic achievement. Their results are inconclusive in determining which type of after school program is most helpful in raising student achievement.

Academic Programs

Academic after school programs refers to those programs that only provide academic support. Academically oriented after school programs have mixed effects on student achievement. Students attending Title 1 schools that have failed AYP for three years in a row are offered supplemental services in the form of after school programs that are required to have an academic focus to thus help raise student achievement and assist schools in meeting AYP (Office of Elementary and Secondary Education, 2002). An analysis by Redd et al. (2002) of several after school programs showed that some evidence exists that programs with a stronger academic emphasis are more effective at improving academic outcomes. Bartko and Eccles (2003) found that students involved in homework or reading programs after school reported higher GPA's than their peers. Homework and academic help programs particularly benefit children who are more likely do poorly academically, especially those who don't have an alternative structured environment after school (Cosden, 2001; Hollister, 2003). Mayesky (1980) and Sheley (1984) found that low-income children report improvement in grades and achievement test scores associated with academically oriented after-school programs where they received one to one assistance with their homework.

Although most findings support an academic focus as part of an after school program to increase achievement one study found that an academic focus was not related

to an increase in student achievement. Dynarski et al. (2003) found that students' academic achievement increased more when they did not have an academic focus as a major objective of the program they participated in. Although there is evidence that academic oriented after school programs are better at improving academic outcomes, more research is needed to determine this (Redd et al., 2002).

Limitations in the research which report that academic after school programs increase achievement suggest a need to investigate further the effects of program participation using more rigorous methodology. For example, Barko and Eccles (2003) use a correlational design to conclude the effects of program participation on student achievement. Cosden (2001) investigates program effects only on 4th grade students. And finally, Sheley (1984) includes in his study only 39 students. Thus, considering these limitations, research which addresses these limitations is needed to provide more conclusive results.

Traditional Programs

Participation in after school programs with a focus on recreational activities was also found to improve academic achievement (Vandell & Shumow, 1999). As well, involvement in literacy after school activities (tutoring, reading and visiting a library) paired with other traditional activities (shopping, chores, playing, watching television, music or dance lessons, sports, church, 4-H and Scouts) showed no difference in grades when examining the frequency of participation in these activities (Powell, Peet & Peet, 2002). Thus, although an academic component may be included in an after school program, the addition of other activities may counteract the assistance the academic component offered.

This may not be true though for all traditional activities. For instance, children who consistently participated in extracurricular activities during the first years of elementary school obtained higher scores on standardized tests of math skills than children who participated less consistently in these activities (National Institute of Child Health, 2004). Contrary to these findings, Posner and Vandell (1994) found that students engaging in recreational after school programs were negatively related to academic grades. These studies conclude two different findings measuring two different types of academic achievement. According to research reporting on traditional activities' influence on achievement it appears that they showed no difference in grades or were negatively related to grades, whereas they were associated with higher test scores.

Much of the research documenting the effects of traditional after school program participation on achievement is limited in that these effects are observed over a one year period (Posner & Vandell, 1994; Powell, Peet & Peet 2002). Because results may emerge gradually and may not be seen after one year of participation it is important to assess program effects over a longer period of time (Kane, 2004; Welsh et al., 2002). As well, with these differences in achievement outcomes throughout the literature there is an increasing need to evaluate how specific types of after school programs effect student achievement. Redd et al. (2002) determined in their meta-analysis that more research was needed to determine achievement outcomes by program type.

Statement of Problem

Many studies, investigating after school programs, emphasize that they are beneficial in raising student achievement, while other studies contend this finding by concluding that after school programs have no effect on student achievement. Although

after school programs are supported by legislation as a means of supplementing academic learning and raising student achievement, it is undetermined whether they are doing the job they are intended to do. Limitations of past research also suggest there is a need for continued assessment of the effects of after school program participation on academic achievement.

This study examines who participates in academic and all types of after school programs controlling for student characteristics. This study will also attempt to conclude whether after school programs are serving the purpose they are intended to: raising individual student academic achievement to help schools raise student achievement. More specifically, this study attempted to identify the effects of after school programs on achievement as measured through the standards defined by the NCLB Act. Additionally, this study seeks to clarify the differences in achievement among type of after school program participated in considering various student background and school characteristics.

Three questions were asked in this study: 1) What are the effects of after school program participation on student academic achievement? 2) Is there a difference in academic achievement between students participating in strictly academic focused after school programs compared to those who don't attend an after school program and 3) Is there a difference in achievement between those participating in traditional after school programs compared to students not attending an after school program?

CONTEXT OF THE STUDY

To assess the degree to which after school program participation is related to academic achievement this study was conducted in a small, urban, school district located in the Intermountain West. The school district is geographically small stretching 12 miles from North to South and East to West. Due to its size, the district offers a unique advantage for students to participate because there are few transportation issues.

Transportation Challenges to Accessing After School Programs

Transportation has been a long standing challenge for after school programs in providing services to students because it affects hours of programming, the cost of the program, and who is able to participate (Grossman et al., 2001). In a study by Grossman and colleagues over 60 after school programs offered at schools, in 17 cities, were evaluated and in none of these were transportation services offered to students attending the programs. This was cited as a major barrier to participation for a large amount of students.

The school district in this study is typical in that buses take students home from school, but are not scheduled to take kids home from after school programs. Therefore, if students participate in an after school program and live far enough away from the school in which they are participating in an after school program, their parents must arrange for transportation instead of relying on district buses. However, students in the district are zoned to their neighborhood school and because the district is so small the majority of students live within walking distance of the school they attend. As well, after school programs are offered to students at schools located within the district. Thus, although transportation has been found in past research to be a barrier to participating in after

school programs (Little, 2009), the size of this district permits easier access to participating in an after school program compared to other school districts.

District and After School Program Size

The size of the district's student population is also relatively small. The following table shows how many students attended a school in the district in the years of this study. The population of the districts student body has increase from the 2003-2004 school year to the 2006-2007 school year. This study uses data collected within the school years from 2003-2004 to 2006-2007 because specific standardized test score data have been consistently collected within this time range. Table 1 also shows how many students in grade K-12 participated in an after school program during the years of this study. The district has offered approximately 21 different after school programs at schools within the district for 10 years. As seen in the table, the number of students who participated in a program increases each year also.

Table 1

Descriptive Information on After School Programs in the District

School year	Student Population	After school program participation	Number of academic after school programs	Number of traditional after school programs
2003-2004	27,873	6,981 (25%)	1	16
2004-2005	28,807	7,519 (26.1%)	1	15
2005-2006	29,332	8,139 (27.7%)	3	20
2006-2007	29,363	8,090 (27.6%)	3	20

As seen in Table 1, of the 21 after school programs provided in the district 7 were created during the last two years of the study. Two of the programs created were academic after school programs. Thus, the increase in the number of students who

participated in after school programs for the last two years of the study is likely due to the creation of more programs.

Program Differences

In all 21 after school programs, students receive homework help despite the type of program they participated in. For the purposes of this studies research questions these programs were divided into two groups: academic after school programs, and traditional after school programs. The academic program group is programs which focus solely on offering academic help. The traditional program group is made up of programs which offer homework help in addition to alternative recreational or enrichment activities such as arts or sports.

Significant differences exist between the two types of programs that help to define the type of service a student receives when they participate in an after school program. For example, students who participate in an academic after school program participate in solely academic activities and are served by certified teachers. Academic after school programs are also offered mainly at Title 1 schools within the district and aim to raise achievement in order to assist schools in meeting AYP standards. Although the programs in this district all have an academic component, these programs are designed specifically to help students in Title 1 schools increase their academic achievement. Academic after school programs in the district do this by offering support in literacy, math, science, and social studies. They also provide study and test taking skills lessons and tutoring.

Traditional after school program leaders are not necessarily certified teachers and the time allotted for academic and non-academic activities is not defined.. Activities included in traditional programs include art, sports, technology skills training, and

recreational activities. Students who participate in an academic versus traditional after school program may attend for different reasons also. Students may be required to attend academic after school programs if their academic performance is low. Parents also may use an after school program as a convenient after school care arrangement that may or may not be consistent throughout the year.

Demographics of Students Participating in After School Programs

The after school programs provide services to a diverse population of students from the district. Table 2 provides descriptions of characteristics of those who participated in elementary after school programs in the district during the study years. Elementary age students are used to describe the diverse composition of the district because research suggests that the influence of participating in an after school program is greater for younger students (Grossman et al., 2001). In after school programs in the district 42.8% of elementary students are Hispanic, 37% are White, 6.7% are Black, 6.8% are Pacific Islander, 4.3 are Asian, 2.1% are Native American, and less than 1 % are of another ethnicity. When compared to the percentages of all elementary students in the district, more Hispanic, Black, Asian, and Pacific Islander students are represented in after school programs whereas less White students are represented. This indicates that after school programs are serving a more diverse population than the district average.

The district average of elementary students on free and reduced lunch is 60%. This percent is much higher for after school program participants. Of the students participating in academic after school programs, 70.3% are low-income, and among students participating in traditional after school programs 75.5% are low-income. Again, after school programs are serving a more diverse population than the district average.

Also, English language learners are represented at higher rates in after school programs than in the district. The district percent of students who are English language learners is 32%, whereas, among students participating in academic after school programs, 43% are English language learners, and 48% of students in traditional after school programs are English language learners. After school programs are promoted in the literature to target disadvantaged students which include minority students and low-income students (Zief, Lauver & Maynard, 2006) because these students are the least likely to enroll (Wimer, 2002). The after school programs in this district are similar in that they are providing services to a majority of low-income and minority students.

Student Language Arts and Mathematics proficiency is slightly lower among elementary students participating in after school programs compared to the elementary students in the district. Proficiency percentages for Mathematics are higher for the district, with 62.7% of students proficient in Mathematics, while 60.8% of academic after school program participants are proficient, and 56.9% of traditional program participants are proficient. For Language Arts, 69.6% of students in the district are proficient while 64.1% of academic program participants are proficient and 60.2% of traditional program participants are proficient.

Elementary students who participate in academic after school programs are more likely to be low-income and attend Title 1 schools, or lower performing schools than the district average. These schools are also less likely to meet AYP. Also, the majority of English language learners in the district attend Title 1 schools. These reasons are a likely explanation that students who participate in academic after school programs are less likely to be proficient in Language Arts. The make up of the district described here

indicates that after school programs are serving students who are more disadvantaged than the district average. Thus, after school programs are providing services to students who are likely to need the most academic support according to research (Grossman et al., 2001; Welsh et al., 2002).

Table 2

District and After School Program Descriptive Statistics

	District Percentages	After School Programs' Percentages		
		All	Academic	Traditional
Asian	4.1%	4.3%	4.6 %	4.0%
Black	4.4%	6.7%	6.9%	7.0%
Native American	2.3%	2.1%	1.7%	2.1%
White	49.7%	37.0%	37.9%	34.9%
Hispanic	34.8%	42.8%	42.2%	44.7%
Pacific Islander	4.5%	6.8%	6.2%	7.1%
Other Ethnicity	0.1%	0.2%	0.4%	0.2%
Socioeconomic Status	60.0%	72.8%	70.3%	75.5%
English Language Learner	32.0%	46.0%	43.0%	48.0%
Language Arts Proficient	69.6%	61.9%	64.1%	60.2%
Mathematics Proficient	62.7%	58.0%	60.8%	56.9%

METHOD

Sample

Participants in this study include elementary age students who attended schools in the school district between the school years of 2003-2004 to 2006-2007. These specific years were included in the analysis because data on after school programs and academic outcomes, measured through achievement scores, have both been consistently collected over this period of time. In addition elementary school age students were used in this study because research suggests that after school programs are more beneficial when students attend at a younger age (Grossman et al., 2001). Table 3 shows that in the 2003-2004 school year 2988 students participated in one or more after school programs offered in the district. In 2004-2005, 4397 students participated in after school programs, in 2005-2006, 2693 students attended, and in 2006-2007, 3056 students attended after school programs.

Students who participated in less than 30 days of an after school program were excluded from the analysis. Participation of 30 days or more specifies the U.S. Department of Education's definition of an after school program participant (Jenner, 2007). Therefore in the first year of our analysis there were 1574 who participated in a program for 30 days or more, in year two there were 2239 students, in year three there were 1730 students, and in the last year there were 2037 students.

Variables

This analysis uses a quasi-experimental design to estimate affects on achievement of students participating in an after school program compared to students who did not participate in the programs. This was done after accounting for factors influential

Table 3

Student Participation in After School Programs

School Year	Students (n) in After School Program ^a	Students (n) in After School Program > 30 Days
2003-2004	2,988	1,574
2004-2005	4,397	2,239
2005-2006	2,693	1,730
2006-2007	3,056	2,037

Note.^a Students participated in after school programs ranging from 1 day to 1 school year.

on achievement outside of participation in an after school program. Students were first matched using propensity scores. Hierarchical cross-classified modeling (HCM) with measures at three hierarchical levels was generated: student time variant, student time invariant, and school-level, to evaluate the expectation that participation in an after school program would influence scores on CRT tests for students in the district of interest from 2003-2007.

Propensity Scores

The decision to participate in an after school program is nonrandom and is influenced by many factors. After school care arrangements dictate largely if parents put their children in an after school program and single parents or working parents are more likely to have their children in a formal after school care arrangements (Grossman et al., 2001). Decisions of participation can also depend on prior academic achievement. Students struggling academically may be more likely to choose to participate in or may be required to participate in an academic after school program to help them boost their grades. Interests also influence participation. For instance, a student particularly

interested in a sport may be more likely to choose to participate in a sports related after school program.

The probability that a student will participate in an after school program is also related to gender race, ethnicity, socioeconomic background, English language proficiency, and residence in a single parent home. The non-random process of selection of students to after school programs presents difficulties in establishing causation in studies of after school programs. Because after school programs have been used in the past as a method to increase academic achievement, it might be assumed that participation in an after school program would increase achievement, yet it is difficult disentangling the effects of attending an after school program from the likelihood of any particular student to attend an after school program. Variation in these effects was addressed through the method of propensity score matching.

Propensity scores provide a way for adjusting for selection bias by summarizing covariates about treatments in a graduated arrangement, which allows for casual inference when comparing treatments to non-treatments (Love, 2003). Propensity score matching is useful when there are many dimensions in which to match subjects on (Dehejai & Wahba, 1998). Advantages of propensity score matching are the minimization of differences on all covariates which addresses selection issues regarding the relationship between students attending an after school program and academic achievement. Using a propensity score provides for the adjustment of selection bias because treatment and control subjects are similar in terms of everything that effects their academic achievement, except participation in an after school program. By using a

propensity score comparing after school program participation will allow for causal inferences (Love).

In this study, students participating in after school programs were divided into two groups before matches were created. The first group included students participating in academic after school programs that were matched to students who didn't participate in an after school program at all. The second group included students who participated in traditional after school programs who were matched to students not participating in any after school program. Students who participated in an after school program for less than 30 days were deleted from the analysis so that students participating for more than 30 days were only matched with students who did not participated in an after school program.

Separate matches were run for each year of the study for both Language Arts and Mathematics. This was done so that students in after school programs were matched with students in the sample of that same year and who also took the same standardized tests. Students with missing data for Language Arts or Mathematics scores were removed from the analysis.

Each student who participated in an after school program was matched with a student who did not participate in an after school program, but who shared similar background characteristics. A one-to-one match, was performed which paired treated students (after school program participants) with untreated students (students not participating in an after school program) on seven different background characteristics. This match was done without replacement, meaning that students not participating in an after school program were only matched one time with a student in an after school

program. This was done so that students not attending an after school program would not be matched to more than one student participating in an after school program. A nearest neighbor matching algorithm was also specified because prior to matching, cases were sorted according to student neighborhood. Because participation in an after school program can be influenced by many factors, students were matched on as many possible background characteristics available in the data set. These variables included SES, language proficiency, gender, ethnicity, attendance at a title 1 school, grade, and neighborhood.

Table 4 shows means for academic and traditional after school program participants and their matches. The means show that the matched and unmatched sample are similar on student background characteristics influential in a student choosing to attend an after school program. The treatment group are attendees in an after school program and the matches indicated are students who have been matched on the factors identified above. The means for these factors indicate that students were similar on specified characteristics and thus the match created is good.

Outcome Indicators

Academic achievement was used as the outcome of interest in this study. The NCLB act specifies that a school provide adequate instruction to meet achievement requirements measured through AYP. Achievement is measured by Criterion Reference Tests, which have been used since 2003 to inform the district on student achievement. These tests are intended to measure how well a student has learned knowledge and skills within two domains for the purpose of this study: Language Arts and Mathematics. Criterion-referenced tests are designed to describe the current level of performance in

school aged students. They can compare a student's performance or the performance of a group of students to established criteria. CRT scores inform school personnel of how well a student or group of students has mastered specific content. Thus, they are meant to enable educators to infer the level of performance of students to a larger content area and to help educators better understand what students know, can do and have mastered. Scores, which indicate the level of student performance, as measured by criterion referenced tests, are not dependent on the performance of other students and therefore, provide for the purposes of this research an objective measurement of academic achievement (Mertler, 2007).

Students in all grades, in the district, were scored on a scale from 130 to 180. A score of 130 is the lowest score a student can obtain and a score of 180 is the highest score a student can obtain. For all grades in this analysis, students were scored within this same 50-point range. Therefore, although a student may score the same from year to year, in this range, their score would indicate progress in learning because the content of the tests from year to year reflects a student's grade level achievement. Using CRT scores in this study will allow for measurement on student academic achievement at their grade level on criteria the district has predetermined.

Treatment indicator

The treatment variable in this study is participation in an after school program, specifically participation in an academic or traditional after school program. After school program participation variables are dichotomous indicating whether or not a student

Table 4

Means of Matched and Unmatched Samples on Variables in the Propensity Score Equation.

	Language Arts		Mathematics	
	Participants	Matches ^a	Participants	Matches
Academic After School Programs				
	<i>n</i> = 815	<i>n</i> = 815	<i>n</i> =818	<i>n</i> = 818
Ethnicity				
White	0.22	0.19	0.2	0.18
Asian	0.03	0.04	0.03	0.04
Black	0.03	0.05	0.03	0.05
Native American	0.01	0.01	0.01	0.01
Hispanic	0.65	0.67	0.66	0.67
Pacific Islander	0.06	0.05	0.06	0.05
Guardian Status				
Two parent	0.64	0.62	0.63	0.62
Single parent	0.35	0.37	0.35	0.37
Other Guardian	0.02	0.01	0.02	0.01
Gender	0.45	0.47	0.47	0.47
Language Proficiency Level	0.61	0.63	0.62	0.63
Socioeconomic Status	0.87	0.87	0.88	0.87
Language Arts Scaled Scores	162.26	160.81	161.78	161.91
Traditional After School Programs				
	<i>n</i> =5057	<i>n</i> = 5057	<i>n</i> =5038	<i>n</i> = 5038
Ethnicity				
White	0.35	0.33	0.34	0.33
Asian	0.04	0.04	0.05	0.04
Black	0.04	0.06	0.05	0.06
Native American	0.02	0.01	0.02	0.01
Hispanic	0.49	0.5	0.5	0.51
Pacific Islander	0.49	0.5	0.06	0.05
Guardian Status				
Two parent	0.62	0.6	0.62	0.61
Single parent	0.35	0.37	0.35	0.37
Other Guardian	0.03	0.02	0.03	0.02
Gender	0.49	0.48	0.48	0.47
Language Proficiency Level	0.52	0.52	0.52	0.52
Socioeconomic Status	0.77	0.76	0.77	0.76
Language Arts Scaled Scores	162.91	162.23	163.90	163.69

Note.^a Matches are students not attending After School Programs. Matches are similar students, based on background demographics.

attended an after school program for more than 30 days, coded as 1, and students who didn't attend an after school program and who were matched with after school program participants on various background characteristics, coded as 0.

Student Time Indicators

Variant factors. HCM organizes variables into three levels: level 1, row variables, and column variables. In this analysis, level 1 variables or student background characteristics were used as covariates in this analysis because they are by themselves influential on a student's academic achievement (Welsh et al., 2002). Accounting for these factors allows for a closer view of how participation, in an after school program, influences academic achievement. Background characteristics were measured through numerous variables illustrating socioeconomic status, language status, grade in school, guardianship, ethnicity, gender, year, and title 1 school. Student participation in free or reduced lunch services is a proxy for student socioeconomic status. It is coded 1 for students who participate in free or reduced lunch and 0 for students who do not.

Language status is also a dichotomous variable where students are coded 1 if they are an English language learner and 0 if they are not. Grade in school measured through a series of dummy variables for each grade: first grade, second grade, third grade, fourth grade, fifth grade, and sixth grade. Sixth grade is the reference group in this analysis because research suggests that students are more likely to participate in an after school program at a younger age (Grossman et al., 2001). To measure guardianship students were categorized as living in a two-parent home, one-parent home, or 'other' guardianship. Year was measured through a variable coded 0 for students attending in the school year 2003-2004, 1 for students attending from 2004-2005, 2 for students attending during

2005-2006 and 3 for students who attended during 2006-2007. Measuring time in this way acts as an estimator for annual rate of growth. These background indicators are time-varying which allows for the possibility that student's status, according to these variables, may change from year to year.

In addition, an interaction effect was also calculated for SES and participation in an after school program. This variable was dichotomous and coded 1 if the student was in an after school program and was considered low SES, and coded 0 if the student was not in an after school program or considered low SES or high SES. This variable was created according to estimate the effects of participation in an after school program for students considered low-income. This is based on research, which suggests that low-income students do better on achievement tests when they participated in an after school program compared to their more affluent peers (Posner & Vandell, 1994, 1999; Welsh et al., 2002).

Invariant factors. Other background characteristics used in this study, at the row level, were student ethnicity and gender, which are considered time invariant variables because they do not change over time. Ethnicity was measured through a series of dummy variables on seven racial/ethnic categories: White, Asian, Black, Native American, Hispanic, Pacific Islander and Other. The White category was used as a reference group. Gender was also measured dichotomously with female coded 1 and male coded 0. Male acts as the reference group in this analysis.

School Level Factors

Variables at the school level were included in this study, as column variables, to account for how school environment is related to a student's academic achievement

(Scales & Leffert, 1999; New Detroit: The Coalition, 2003). Controlling for these affects can allow for a more accurate estimation of how participation in an after school program influences academic achievement. Three school level variables were used: school size, school achievement measured through AYP criteria, and SES.¹ The number of students attending each school indicated a school size variable. A dichotomous variable was used to measure each school's status towards meeting AYP standards as outlined in the No Child Left Behind (NCLB). This measure was coded 1 if the school did not meet AYP, and coded 0 if the school did meet AYP criteria. Finally, a dichotomous variable was created to measure school level SES, where 1 indicated over 60% of students in each school participating in the districts free and reduced lunch program and 0 indicating students not receiving free or reduced lunch services. This cut-off level of 60% was used to allow for identification of schools with higher-than-average concentrations of low income students.

Analysis using Cross-classified Modeling

To determine if students attending after school programs do better on their tests of achievement a hierarchical cross-classified model (HCM) was used with student academic achievement entered as the dependent variable and after school program participation as the independent variable. Control variables also consisted of ethnicity, English language proficiency, guardianship, gender, language and SES, school SES, school size, and if a school met AYP.

Hierarchical linear modeling (HLM) is a technique for modeling multilevel data when observations at lower levels are nested within observations at higher levels.

¹ In this regression analysis, the percentage of ethnic students is highly correlated with the percentage of students with low-SES.

Because cases exist within a nested structure, independence cannot be assumed.

Therefore, after school program participation is situated as a random effect, so that program participation effects are observed after accounting for other effects on academic achievement (DeMars, 2002).

In this study, time points are nested within students, and students are nested within schools. Specifically cross-classified growth models (HCM), were applied to investigate student achievement as a result of participating in an after school program. This type of analysis was chosen because a traditional HLM is inadequate when assessing student longitudinal data in which students are nested within more than one school over time. A traditional HLM approach is adequate when lower level units are nested within only one higher level unit, yet over the four years of data collected for this study students were located within multiple schools, or higher level units. Therefore, the nesting structure of the data necessitated a cross-classified model (HCM) in which individual, time varying student observations, are cross classified by time invariant student characteristics and schools. HCM also allowed for each observation in the sample to be used because this type of modeling does not require all cases to have the same number of waves of data (Singer & Willett, 2003).

HLM 6.0 was used to evaluate student level variables entered at the first two levels and school variables entered at the third or column level. Analyses were run using Language Arts scaled scores as the outcome variable and then again with Mathematics scaled scores as the outcome variable when assessing participation in academic and traditional after school programs. Using HCM to accommodate the nested structure of the

data the degree of shared variance in academic outcomes among students participating in after school programs could be tested (Bryk & Raudenbush, 1992).

The first level of my analysis, using a cross classified model in HLM was calculated using this equation:

$$Y_{ijk} = \pi_{0jk} + \pi_{ijk} \text{ VARIANT STUDENT BACKGROUND}_{ijk} + \text{ASP PARTICIPATION}_{ijk} + \text{SES} \times \text{ASP INTERACTON}_{ijk} + e_{ijk},$$

where Y_{ijk} indicates the mean student academic achievement, at time point i , for student j , who attended school k , and π_{0jk} is the mean achievement for student j , attending school k . $\text{VARIANT STUDENT BACKGROUND}_{ijk}$, indicates the regression coefficients of each of the student background characteristics that vary over time, which are ethnicity, SES, language proficiency level, guardianship status, grade and years of participation (coded 0 for school year 2003-2004, 1 for school year 2004-2005, 2 for school year 2005-2006, and 3 for school year 2005-2006). $\text{ASP PARTICIPATION}_{ijk}$, indicates the regression coefficient of participation in any type of after school program. Using this same equation, $\text{AASP PARTICIPATION}_{ijk}$ was used to represent the regression coefficient of participation when assessing participation in an academic after school program. $\text{SES} \times \text{ASP PARTICIPATION}_{ijk}$ represents the regression coefficient of students who are low-SES and who also attend an after school program which is intended to assess whether or not after school program participation is related to helping low-income students perform better on tests of achievement. Finally, e_{ijk} represents the deviation of ijk or error of the sample mean of students attending after school programs compared to their matches.

The level 2 model, or between-cell model of our HLM analysis includes all row and column predictors, which reads as follows:

$$\pi_{0jk} = \theta_0 + \gamma_{01} \text{ INVARIANT STUDENT BACKGROUND}_j + b_{00j}$$

INVARIANT STUDENT BACKGROUND_j, in this equation, indicates the coefficients associated with each of the student background measures used in the analysis, which remain constant over time. These include student race and gender. Within the cross-classified model framework, these variables are considered row-level predictors. The residual effect of student *j* after controlling for student characteristics in the model is indicated as *b_{00j}* in the equation.

All level-1 coefficients are fixed and therefore are not allowed to vary randomly as is detailed in the equation below:

$$\pi_{pjk} = \theta_p$$

In this equation π_{pjk} , indicates the regression coefficients relating the *VARIANT STUDENT BACKGROUND_{ijk} + ASP PARTICIPATION_{ijk}* measures to *Y_{ijk}* whether or not student *j* in time period *i* in school *k* participated in an after school program. θ_p indicates the model intercept and is also the expected value of π_{pjk} when all explanatory variables are set at zero. The relationship between row and column variables are assumed fixed.

RESULTS

Due to this relatively recent stipulation, under the No Child Left Behind Act, it was hypothesized that participating in any kind of after school program would positively influence a student's academic achievement and that participating in an academic after school program would result in even greater gains on CRT scores. Presented in the following tables are HCM regression estimates for models predicting the effects of after school program participation, academic after school program participation, and participation in a traditional after school program on achievement. The results of this analysis are presented by first discussing results of the analysis on Language Arts test scores and then on Mathematics test scores.

Table 5 explains results for Language Arts test scores and Table 6 represents scores for Mathematics. The first models in tables 5 and 6 presents scores obtained for students participating in any after school program and their matches, the second is for academic after school program participants and their matches and the third model contains scores for traditional after school program participants and their matches.

Language Arts Performance

All After School Programs

Table 5 shows results for students participating in any kind of after school program, and their matched control on Language Arts achievement. Model 1 in this table shows that students who participated in an after school program scored 1.33 points lower on their Language Arts tests ($p < .01$) compared to a matched sample of students not participating in these programs. In other words, students participating in an after school

Table 5

Cross-Classified Models Predicting Language Arts Academic Achievement

Variable list	Model 1: Full sample ^a			Model 2: Academic ASP ^b			Model 3: Traditional ASP ^c		
Intercept	172.71	1.36	***	174.10	2.23	***	172.76	1.43	***
Time variant factors									
Student in ASP	-1.330	.41	**	-1.683	.69	*	-1.305	-.43	**
SES interaction with ASP	1.116	.45	*	0.862	.64		1.034	.48	*
SES - student in free lunch program	-5.137	.39	***	-3.994	.98	***	-5.051	-.42	***
Student English language learner	-0.760	.22	***	-0.402	.52		-1.158	.25	***
^d One parent	-0.700	.22	**	-0.013	.51		-0.817	.24	***
Other guardianship	-2.225	.64	***	-3.213	1.93		-2.283	.68	***
^e First Grade	-0.045	.32		-0.318	.88		-0.081	.35	
Second Grade	-0.645	.31	*	-1.588	.83		-0.530	.35	
Third Grade	0.008	.30		0.583	.72		-0.234	.35	
Fourth Grade	0.717	.30	*	0.705	.72		0.728	3.45	*
Fifth Grade	-0.295	.29	*	0.366	.73		-0.276	.34	
Time invariant factors									
^f Asian	1.137	.57	*	2.230	1.46		1.295	.23	*
Black	-6.439	.54	***	-12.053	1.41	***	-5.651	.56	***
Native American	-6.529	.89	***	-5.594	2.65		-6.264	.92	***
Hispanic	-5.161	.32	***	-5.841	.75		-4.780	.34	***
Pacific Islander	-2.863	.54	***	-3.273	1.23	**	-2.624	.56	***
^g Female	-1.886	.21	***	-1.730	.49	***	-1.909	.23	***
School level factors									
School size	-0.004	.00		-0.004	.00		-0.003	.00	
^h School met AYP	1.934	.39	***	1.830	.50	***	1.825	.42	***

^aAfter School Program (ASP) Model 1: Level 1 $N = 11,744$; Row $N = 8365$, & Column $N = 108$ across 4 year period.

^bAfter School Program (ASP) Model 2: Level 1 $N = 1,630$; Row $N = 1484$, & Column $N = 81$ across 4-year period.

^cAfter School Program (ASP) Model 3: Level 1 $N = 10,114$; Row $N = 7734$ & Column $N = 108$ across 4-year period.

^dStudent's guardianship (ref = 2 parents)

^eStudent grade reference = sixth grade

^fStudent race reference = white

^gStudent gender reference = male

^hSchool reference = failed

* $p < .05$, ** $p < .01$, *** $p < .001$.

program score over 1 point lower on their Language Arts tests than do students who do not participate in an after school program. Model 1 also shows that if a student was considered low-income (they participated in the free or reduced lunch service offered in the district) and also participated in an after school program they scored 1.11 points higher on their Language Arts tests ($p < .05$) than students who did not participate in an after school program. This finding is also supported by research, which suggests that disadvantaged students academic achievement is improved as they participated in an after school program (Posner & Vandell, 1994, 1999; Welsh et al., 2002).

Language Arts achievement was influenced by several time varying factors. If a student was an English language learner, was low-income, or lived with a single parent or other guardian they scored lower on their Language Arts tests of achievement with the lowest drops evident for students who are low-income. Female students scored lower than males ($p < .001$), Asian students scored higher than White students ($p < .05$), Black students, Native American students, Hispanic students, and Pacific Islander students scored lower on their Language Arts test than did White students ($p < .001$). Finally, Students at schools that meet AYP standards scored higher on their tests ($p < .001$). And students who participated in schools with over 60% of the student body considered low-income, test scores dropped ($p < .005$).

Academic After School Programs

Table 5, Model 2 shows that on Language Arts tests, students participating in an academic after school program scored 1.68 points lower on their Language Arts tests compared to students not attending an after school program ($p < .05$). Past research has been inconclusive regarding achievement gains when students participate in an

academically oriented after school program. Redd et al. (2002) proposed that more research was needed to determine the effects of participation in an academically oriented after school program on achievement. For students participating in an after school program and who were considered low-income scored .862 points higher, although this finding was not significant.

Other factors influential on Language Arts achievement, considering academic after school program participants and their matches, were SES and years attending a school in the district as shown in Model 2. As well, female students scored lower than their male peers. Black students scored lower than their White peers. And Native American, Hispanic, and Pacific Islander students scored lower on their tests than White students. Students attending schools meeting AYP criteria scored higher than students not attending these schools and for schools with over 60% of the students considered low-income were associated with a decrease in test scores.

Traditional After School Programs

Model 3, in Table 5, shows that students participating in traditional after school programs scored 1.30 points lower than students not participating in a traditional after school program ($p < .01$). This is similar to the sample, which included students in all types of programs. Compared to students not participating in an after school program, students who attend traditional after school program score lower on their tests of achievement. This finding is consistent with Vandell & Posner (1994) who also found that participation in an after school program focusing on non-academic activities was related to poorer academic outcomes than for students who participated in an academically oriented after school program.

For students participating in a traditional after school program who were also considered low-income, scored 1.03 points higher on their Language Arts tests ($p < .05$) than students who were not considered low-income and who didn't participate in an after school program. This is also a similar finding to the analysis considering students attending all types of after school programs and is consistent with research that suggests low-income students who participated in an after school program score higher on their tests of achievement.

Model 3 shows that other factors significant for students participating in traditional after school programs and their matched comparisons, on Mathematics test scores, were if the student was an English language learner, was low-income, lived with a single parent or other guardian, and if they were in the district for more than one year. For students participating in traditional after school programs and their matched comparisons, female students scored lower than males. Also, Asian students scored higher on their tests than White students. Black students, Native American students, Hispanic students, and Pacific Islander students scored lower on Language Arts tests than White students. When students attend a school meeting AYP they scored higher and when they attend schools with 60% or more low-income they scored lower.

These results show that participation in an after school program was associated with a decrease in Language Arts scores for all types of after school programs compared to students who did not participate in an after school program. This is consistent across participation in an academic or traditional after school program. Student SES consistently influenced Language Arts test scores. For all types of after school programs and their matches, student SES was related to a significant drop in achievement on Language Arts

tests. Interestingly, low-income students who also participated in an after school program did better on their tests of achievement in Language Arts. This finding has been supported in past research, which also suggests that disadvantaged students make the greatest gains in academic achievement when they participate in an after school program (Posner & Vandell, 1994, 1999; Welsh et al., 2002). Yet, this study found that for low income students, participation in an after school program may increase their test scores but this increase is small compared to the decrease in test scores low-income students experience if they don't participate in an after school program.

Mathematics Performance

All After School Programs

Table 6, Model 1 shows that students participating in an after school program scored .71 points lower on their Mathematics tests than matched students not participating in an after school program. This finding was not significant. In addition, if students participated in an after school program and where low-income students they scored .866 points higher on the Mathematics tests but this finding also was not significant.

Model 1 also shows student characteristics significantly influential on Mathematics achievement were if the student was an English language learner, was low-income, or lived with a single parent or other guardian. Asian students scored higher than White students on their tests of Mathematics and all other student scored lower than their White peers. For every year a student was in the study they scored higher than students in the study for only one year. For schools meeting AYP standards, students scored higher

Table 6

Cross-Classified Models Predicting Mathematics Academic Achievement

Variable list	Model 1: Full sample ^a			Model 2: Academic ASP ^b			Model 3: Traditional ASP ^c		
Intercept	172.03	1.72	***	172.51	2.82	***	172.09	1.79	***
Time variant factors									
Student in ASP	-0.710	.47		-0.818	-1.37		-0.789	.49	
SES interaction with ASP	0.866	.52		1.210	1.46		0.752	.55	
SES - student in Free lunch program	-4.734	.44	***	-3.036	1.222	*	-5.118	0.473	***
Student an English language learner	-0.941	.25	***	-1.049	.58		-0.857	.29	**
^d One parent	-1.028	.24	***	-0.682	.52		-1.022	.26	***
Other guardianship	-2.093	.73	**	-1.977	1.96		-2.076	.78	**
^e First Grade	1.879	.36	***	0.534	.95		2.065	.40	***
Second Grade	0.172	.35		0.349	.91		0.463	.39	
Third Grade	1.291	.35	***	1.958	.79	*	1.206	.40	**
Fourth Grade	1.810	.35	***	1.979	.80	*	1.877	.40	***
Fifth Grade	0.767	.34	*	1.006	.82		0.908	.40	*
Time invariant factors									
^f Asian	2.393	.23		3.394	1.50	*	2.531	.65	***
Black	-7.120	.57	***	-12.110	.29	***	-6.363	.60	***
Native American	-6.630	1.00	***	-2.894	2.50		-6.583	1.04	***
Hispanic	-4.404	.35	***	-2.527	.79		4.458	.38	***
Pacific Islander	-2.810	.59	***	-0.075	1.30		-3.001	.62	***
^g Female	.2977	.23		0.631	.50		0.270	.25	
School level factors									
School size	-0.004	.00		-0.009	.00	*	-0.003	.00	
^h School met AYP	2.024	.51	***	3.050	.65	***	1.900	.65	*

^aAll participants, Model 1: Level 1 $N = 11,712$; Row $N = 8,362$; & Column $N = 108$ over 4-year period.

^bAfter School Program (ASP) Model 2: Level 1 $N = 1,636$; Row $N = 1,505$; & Column $N = 81$ over 4-year period.

^cAfter School Program (ASP) Model 3: Level 1 $N = 10,076$; Row $N = 7,728$; & Column $N = 108$ over 4-year period.

^dStudent's guardianship (ref = 2 parents)

^eStudent grade reference = sixth grade

^fStudent race reference = white

^gStudent gender reference = male

^hSchool reference = failed

* $p < .05$, ** $p < .01$, *** $p < .001$.

and for schools with 60% or more students low-income, students scored lower on their Mathematics tests.

Academic After School Programs

Model 2, in Table 6, show non-significant findings for students in an academic after school program. These students scored .818 points lower on their Mathematics tests compared to students not participating in an after school program. In addition, students participating in these programs who were also considered low-income were found to score 1.21 points higher on their Mathematics tests although this finding too was not significant. Although this combination was not significant, low-income students in academic after school programs and their matched comparisons scored 3 points lower on their Mathematics tests than their peers who were not receiving free or reduced lunch services ($p = .05$).

For academic after school program participants and their matched comparisons, Asian students scored higher than White students and Black students and Hispanic students lower than White students on these tests. Students participating in an academic after school program plus their matches scored lower on their Mathematics tests when ten students were added to the school size and students attending schools meeting AYP scored higher.

Traditional After School Programs

As seen in Model 3 of Table 6, students participating in a traditional after school program, compared to students not participating in a program, scored .789 points lower on their Mathematics tests. This was not a significant finding. Also, no statistical differences were found for students participating a traditional after school program who

were also low-income. For students and their matches attending these programs though, low-income students again scored lower on their Mathematics tests ($p = .001$).

Students living with one parent or with another guardian other than a parent they scored lower on their Mathematics tests. For each year a student was in the study, or for each year they gained was associated with an increase in their test scores.

Asian students scored higher on their Mathematics tests than White students. Black students, Native American students, Hispanic student, and Pacific Islander students scored lower than White students. Finally, students scored higher on these tests if their school met AYP and the scored lower if they attended a school with more than 60% low-income.

In summary, students participating in all types of after school programs had lower scores on their Mathematics tests than their peers who didn't participate in an after school program, but these findings were not significant for any type of program. There were also no differences found among these students in any type of program who were also considered low-income either. SES was consistently and significantly influential in a student's performance on tests of Mathematics, but the interaction between participation in a program and low-income was not a significant finding. These findings indicate that on Mathematics tests students who are low-income score lower on their tests and that participation in an after school program, regardless of the type of program, made no difference in student scores.

DISCUSSION

After school programs have been promoted as effective ways in which to enrich student life and to influence achievement. Two societal concerns have contributed to the promotion of after school programs: the increasing amount of time children spend on their own and the belief that more time spent in academic activities will improve learning for disadvantaged children (Kugler, 2001). Implementation of NCLB and pressure on schools to meet the standards of this act has led schools to use time after school to augment academic achievement (Gayl, 2004). This study assessed participation in an after school program as a means in which to help schools meet these standards. Literature reviewing after school program effects provides inconclusive results. This study provides the current literature with a strong argument concerning the impacts of after school programs. To evaluate program impacts, this study used the measures of assessment NCLB dictates in meeting these standards. Thus, the results of this study are specific in concluding after school programs effects so far as they help failing schools.

Impact of After School Programs

All School-age Students

Participation in an after school program was associated with decreases in tests scores or was not associated with gains after student background and school characteristics were accounted for. Specifically, a decrease in Language Arts test scores was found for participation in any type of after school program with participation in an academic after school program showing the biggest drops in these scores.

These findings are contradictory to longitudinal analysis of after school programs academic affects on standardized tests scores (Cosden et al., 2001; Huang, 2000;

Mahoney, Lord, & Carryl, 2005; Vanderploeg, 2006; Welsh et al., 2002). Although past research indicates that participation in an after school program is associated with better results on achievement tests, there is some research that indicates that this is not true (Dynarski et al., 2003; Vandell & Corasaniti, 1998) or that there are mixed affects on standardized test scores (Redd et al., 2002). In accord with these latter findings, this study suggests that after school program participation results in lower achievement test scores or makes on difference on test scores. The findings presented in this study add significance to the current literature in that the strengths of the study add substantial evidence concerning after school program participation effects on student academic achievement.

Differences were found for Language Arts and Mathematics tests scores as well. Students scored lower on their Language Arts test scores if they participated in an after school program, yet there were no differences for these students on Mathematics test scores. One possible reason this finding may be accounted for the percentage of English language learners in after school programs. Because English language learners access after school programs more than their non-English language learner peers, and Language Arts tests require a certain level of English proficiency whereas math tests do not, these scores could likely be affected and thus account for negative findings.

Low-income Students

Overall, standardized test scores did not increase when students participated in any type of after school program. Instead they are more likely to drop approximately 1 point for Language Arts and almost 1 point for Mathematics, although for Mathematics this drop was not statistically significant. Even more noteworthy though is the influence

of low-income student background characteristics on standardized test scores. Drops in achievement were much larger for low-income students compared to students participating in an after school program. These drops ranged from 3 to 5 points for low-income students to as much as 12 points for Black students who participated in academic after school programs and their matched comparisons.

Although students who participated in an after school program were not found to score higher on their tests of achievement, increases in Language Arts test score achievement were found for students who were low-income and who also participated in an after school program. This is a consistent finding past research highlights that increases in academic achievement are more prominent when students are disadvantaged (President and Fellows of Harvard College, 2007; Posner & Vandell, 1994, 1999; Welsh et al., 2002). This finding was small compared to the decrease in test scores for low-income students and therefore does not compensate for the effect of low-income on student achievement. Therefore, because after school programs do not help raise student achievement, they are likely to make little difference in assisting schools to raise achievement and thus meet AYP.

Comparison of Academic and Traditional After School Programs

The second and third questions this study addressed were to discover the differences between achievement for students who participated in an academic after school program compared to students who participated in a traditional type after school program. Some evidence exists that promotes after school programs with a stronger academic focus as positively influential on achievement (Mayesky, 1980; Redd et al., 2002; Sheley, 1984). Reisner (2004) suggests that for after school programs to influence

high stakes test scores after school program activities need to be linked to regular school instruction. In other words after school programs with an academic focus should raise tests scores. However, the current study showed that academic after school program participants test scores were not considerably different from traditional program participants.

The current literature reviewing after school program participation is inconclusive to their effects on achievement. The results of this study indicate that after school programs do not help students to improve their achievement, as measured by Language Arts and Mathematics achievement tests and thus are not assisting schools to meet AYP standards set by the NCLB act. This finding is somewhat different when taking assessing their effects on low-income students. For these students, participating in an after school program was associated with an increase in Language Arts test scores yet their increase was not substantial.

Contrary findings in the literature may be due to study limitations. Limitations in previous studies have involved inadequate sample sizes. Samples which included students not in school, of one ethnic group or significantly small sample sizes ($n = 60$) have been employed to explain after school program benefits. Several studies in the past have examined after school program impacts on academic achievement only evaluating students in one or two grades of elementary school whereas this study involved students in grades 1 through 6. In addition, this study includes a diverse ethnic group as well as cases from 4 years of data collected and thus provides a large sample size in which to more adequately assess program effects on achievement. These are strengths in this study because program effects are measured on students of various backgrounds and therefore

results can more easily be generalized. As well, assessing after school program effects on a diverse population of students allows for identification of program impacts on students most targeted for program participation (Wimer, 2002).

Another advantage of this research is the context in which the study took place. Evaluating program effects on achievement in one location or district allows for implications within local and state program policies. This is important to consider because supplemental services required through NCLB are regulated by districts and monitored by states (Adequate Yearly Progress - Frequently Asked Questions, 2009). Finally, this study used a quasi-experimental design which suggests that causation can be inferred, thus strengthening the validity of its findings.

Although these findings support research suggesting after school programs are not effective at raising achievement, a number of factors may have contributed to these results differences from studies which suggest after school programs are effective. Some of these factors include the quality and delivery of after school programs, school attendance, or teacher buy-in. In addition to these factors, another factor to consider is the enrichment activities students not participating in after school programs may be getting. For instance, students who don't participate in after school programs may get academic help from parents or family members who may be providing more individualized and intensive academic assistance, such as with homework.

Limitations of Study

Although these differences could not be assessed in this study the results presented here make a strong case that the effects of participating in an after school program, at least in this district, generate lower scores on Language Arts standardized

tests or are not necessarily large enough to make a difference when assessed by standardized test scores. Yet limitations to this study suggest further research is needed. One limitation is found in the use of standardized test scores to measure achievement. Although it is the prescribed way in assessing AYP, they may not adequately reflect academic gains a student makes due to participation in an after school program. Test scores were used particularly in this study to measure the possible affect participation in an after school program had on achievement because they are used to measure AYP under the NCLB Act. For schools to meet these standards, students must achieve a certain level on their standardized test scores. Therefore, according to the prescribed method of measurement to assess AYP students do not do better on standardized tests when they participate in an after school program, but could possibly do better in other areas of achievement such as school grades (Chang-Rios & Karin, 2007; Jones, 2005).

Second, although this study was not a program evaluation there are some interesting alternative interpretations to these studies findings. For example, participation in an after school program has been shown to increase school attendance with greater school attendance linked to higher achievement scores. (Huang, 2000; Shumow, 2001; Welsh et al., 2002). Although number of days participation in an after school program was accounted for, attendance in regular school hours was not accounted for. Other possible factors to consider include engagement of students in an after school program such as how much time is spent on academic activities or the ratio of students in the program to program teachers or instructors. For academic after school programs in this study, certified teachers instructed programs, but for traditional after school programs, instructors were not required to meet this criterion. Teacher buy-in could possibly effect

the experience students have in an after school program. It is likely that there may be little desire for teachers and even students to engage in academic activities after the normal school day. Thus, engagement in teaching and learning may be lower quality than that experienced during regular school hours.

Although student achievement did not increase in meaningful ways as a result of participation in an after school program, investigating other possible outcomes may lead to explanations of after school program benefits. After school programs have been shown to decrease aggressive behaviors (Shumow, 2001), increase self-esteem (Durlack & Weissburg, 2007), and help students adjust better emotionally (Posner & Vandell, 1994). Students who participate in an after school program may do better in these areas. These benefits may be also linked to higher achievement scores although participation alone may not be. In addition, this study included four years but did not look at growth across the years because few students were observed in an after school program for more than one school year. Although participation in an after school program may not show benefits in achievement for one year alone, achievement may increase the more years a student is involved in an after school program.

Policy Recommendations

Given the current mandates of NCLB that schools meet AYP, as measured by standardized test scores after school programs are shown by this study not to contribute to this goal. A possible reason for these negative results is students choice in participating in an after school program. Random assignment was not possible in this study and therefore who participated in an after school program relied on external factors to the study. The duration of participation was also uncontrollable. Many students in the study participated

in after school programs during only one school year. As well attendance could not be manipulated and therefore students participating in a program may have participated inconsistently.

To meet AYP, a school must account for students who are low income (An act to close the achievement gap with accountability, flexibility, and choice, so that no child is left behind, 2001). After school program participation in this study was associated with an increase in Language Arts achievement for low-income students although their increase in achievement from participating in these programs was not more than their drop simply due to their low-income status. This is interesting when considering that after school programs are promoted as a tool in which to raise achievement specifically for disadvantaged youth (President and Fellows of Harvard College, 2007). Yet, the assumption that engaging in school related or academic activities beyond the typical school day will assist students in improving their achievement may not be accurate. Given these findings, after school programs as identified as a supplemental service under the NCLB act may not be the best option.

Instead these findings suggest there may be a need for alternative choices to after school programs offered as a supplemental service instead to assist in achieving this objective. Types of alternative programs to consider are Extended School Year services, which offer students academic instruction during non-school days such as off track times or during summer months. In addition, offering services during school hours that target specific areas of needed improvement may be more helpful in raising test score achievement than participating in an after school program. After attending a full school day, students may not be motivated to work more; therefore offering needed academic

help within the realm of a structured school day may be a positive alternative. During such programs students are likely to receive more individualized help and therefore may make more progress. These suggestions as to alternative services in place of after school programs to meet the requirement of supplemental services offered to schools who fail to meet AYP may be more likely to raise student achievement than extending the school day through after school programs.

In conclusion, the results of the current study suggest that after school programs may be detrimental in raising academic achievement as measured by standardized test scores, although they may have other positive effects not measured by this study. After school programs may have effects on student success that can be just as influential as achievement. An important issue for further study would be to assess these effects as an implication in offering successful services to failing schools. This study also suggests a need for policy makers to re-evaluate the effectiveness of after school programs as a supplemental service and consider possible alternatives to provide students the resources they need to raise achievement.

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