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Quantifying the Return on Investment of After School Programming

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by

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INTRODUCTION

Each fiscal year, there is a battle on Capitol Hill as lawmakers wrestle with reconciling political promises to financial reality. This process is completed with the goal of efficiently allocating scarce resources, in this case tax dollars and other government revenue, across the needs of the over 325 million diverse residents of the United States. Some budget items garner almost universal support, such as defense funding, infrastructure and education. While individuals may differ on how much funding each of these causes should receive, almost all agree that they should be funded by the federal government. Other budget items, such as universal healthcare, food stamps and the National Endowment for the Arts are partisan issues, with some believing they are key government services and others believing they are a waste of their hard-earned money.

Daily, many households across the country play out this same battle. Families decide a wide range of financial issues: whether they wish to go on a vacation, send their children to private school, buy a bigger home or donate to causes they care about. Individuals also decide how to spend their time. Should they volunteer more, or use their free hours to learn a new skill or take up a new hobby? Even more specifically, families and individuals must decide **where** to spend their time and money.

Though in the private sector companies typically make decisions based on financial metrics, often times government and non-profit programs are either fiercely opposed or supported based solely on anecdotal evidence or moral concepts. The introduction of these opinions in the budget making process may limit both the government's and individual's ability to truly allocate resources efficiently and effectively.

Lately, an easy target of federal spending cuts has been the Department of Education. Although most agree the government is obligated to fund public education to some extent, the many other programs funded by the Department of Education have come under fire. According to a Washington Post article from March of 2017, one example is the $1.2 billion dollars in federal grants that are the backbone of funding for many of America's after school programs. These grants, known as 21CCLC grants, enable over 1.6 million children across the country, to access after school programming (Brown). While these cuts did not become reality in the budget passed in late March of 2018, the threat to these programs is real. If the government cuts funding, individuals may take it as a sign that these programs do not work and reduce their own donations of time and money to the cause.

The most efficient way for the government and households to reduce bias and effectively allocate resources is likely to borrow a page from the private sector and perform a numbers-based analysis of all potential options. While anecdotal evidence and moral leanings are still an important part of final decision making, beginning the process with a study of Return on Investment (ROI) improves the cost efficiency of budgets. This study will explore the potential calculation and application of ROI to after-school programming with the goal of showing these programs to be a net positive investment for the government, individuals and society at large.

Literature Review

Return on Investment (ROI) is calculated with the basic idea of dividing additional benefit received by the costs (investment) necessary to obtain the benefit. This literature review is divided into two parts. First studies attempting to quantify the benefits of after-school

programming will be explored. An analysis of funding sources for and costs of these programs will follow.

Quantifying Benefits Received

As social norms have shifted in the United States, so have family structures. According to the CDC and the U.S. Department of Labor, more children are born into single parent households (40.3% in 2015) and homes where both parents work (61.1% in 2016) than ever before ("Unmarried Childbearing," "Employment Characteristics"). These shifts make quality after school care a key issue for most families in the United States. Additionally, after school programs may level the academic playing field for some students and improve social skills for children from all family types by providing additional interaction with peers.

In the late 1990's, it was found that "juvenile crime, as measured by arrest rates, peaks between 2 p.m. and 6 p.m. on school days – just after school is dismissed" (Gottfredson, et al.). This same study focused on Maryland's After-School Community Grant Program during the 1999-2000 school year. All programs receiving the grants were tasked with meeting 6 objectives: reducing unsupervised time after-school, reducing favorable attitudes towards illegal behaviors, lowering negative peer influence, increasing social bonding between peers, improving academic performance, and strengthen social skills. The study statistically controlled for demographic differences between the control and treatment groups.

Through Gottfredson's study, it was found that after-school programming significantly increased participation in constructive activities for females, but not males. It was also found statistically significant differences in outcomes for elementary aged and middle school aged children. For elementary aged students, no significant link was found between participating in after school programming and reducing delinquency. For middle school students, however, participation in these after school programs led to a reduction in delinquency. It is important to point out that the majority of elementary aged students were not left alone to engage in delinquent behaviors, whether participating in after school programming or not. The key finding of this study was that students participating in programs that emphasized social skills and character development had the highest reduction in delinquent behaviors.

This study found little support for the idea that after school programming could reduce delinquent behavior solely by reducing unsupervised time for students. This finding was due in part to the small number of participating students who began the study with long blocks of unsupervised time, the tendency of many unsupervised students to not attend after-school programs they were enrolled in, and the fact that students in the control group were likely still exposed to after school programming to some degree.

Shortcomings of the study include a failure to measure academic outcomes, and therefore academic benefit received, as well as other important measures of student success. Additionally, this study was unable to fully separate the treatment and control groups, likely because students who were placed in the control group (no after school programming) were exposed to some form of programming or after-school care regardless. Despite these shortcomings, the significant link between reduction in delinquency and inclusion of character development in programming is a key finding for future research.

A more recent study performed by Deborah Vandell, the director of the University of California at Irvine's Center for Afterschool & Summer Excellence, focuses on outcomes related to high-quality after school programming. This study followed 3,000 low-income, diverse middle

and elementary school-aged students from 8 states over a period of 2 years (Vandell, et al.). Approximately half of the students attended high-quality programs. Program quality was determined through an assessment of community partnerships, quality of relationships between children and staff, academic support, recreational activities, and opportunities to participate in the arts and other enrichment activities. All programs (high-quality and not) were free for students to attend and ran 4 or 5 days a week. Students were expected to participate regularly.

This study found that high-quality programs facilitated positive relationships between peers and utilized varied programming, which kept students engaged. Like in Gottfredson's study, outcomes varied across age groups. For younger, elementary-aged students, regular participation in high-quality programming led to statistically significant improvements in standardized math test scores and work habits, task persistence and social skills (as measured by teachers), and significant reductions in behavioral misconduct including aggressive behavior towards peers, skipping school and fighting. Similarly, middle school students participating in high-quality programming were found to have statistically significant improvements in math standardized test scores and work habits, along with significant reductions in behavioral misconduct. Additionally, middle school aged students who participated in high-quality after school programming saw reductions in drug and alcohol use at a rate 4 to 6 times larger than those reported from school-based prevention programs (such as D.A.R.E).

This study found serious negative outcomes for disadvantaged youth left unsupervised after school as compared to their peers who were engaged in high-quality after school programming. The high-quality distinction is crucial, as after school programs consist of some "high-quality" programs which engage student in academic and social enrichment activities, but also some programs which resemble group babysitting services for older children, with lax supervision and little to no additional enrichment opportunities, as well as many programs along the spectrum.

According to the 2014 study "America After 3pm: Afterschool Programs in Demand," almost 10.2 million children were enrolled in an after-school program. Despite roughly 23% of American families utilizing after-school programs, almost 20% of students still spent time unsupervised after school. Demand for slots in after school programs is high, with parents of 19.4 million children saying their children would participate if programs were available. This study, which surveyed parents using online polls and telephone interviews, with at least 200 completed interviews in each state and the District of Columbia, found parents with children enrolled in programming overwhelmingly agreed that after school programs helped working parents. The study also found that while children from lower-income families are more likely to be currently enrolled in after school programming (a rate of 20% vs 18%), the unmet demand for programming is also highest for low income families. As compared to the 2009 results of the same study, parent satisfaction with the quality of care, homework assistance and workforce skill development (such as critical thinking, teamwork and leadership) significantly improved, suggesting more programs are attempting to provide high-quality care. It is important to note, however, that this data was recorded from parent opinions of their experiences with after school care, not pure facts.

Quantifying Costs

According to youth.gov, the government's website designed to help providers "create, maintain, and strengthen effective youth programs," there are four main federal funding sources

for after school programs("Funding"). The 21st Century Community Learning Centers (21CCLC) grants were briefly mentioned in the introduction and are the only federal funds that go directly to after school programs. According to the Office of Academic Improvement, which administers the program, 21CCLC grants are meant to support community learning centers provide academic enrichment during non-school hours, especially for students attending low-performing or high-poverty schools ("Funding Status"). For the 2017 fiscal year, $1,167,839,540 was allocated by the Department of Education for 21CCLC grants. The three other federal funding sources include the Child Care and Development Fund (CCDF), which provides both child care vouchers to subsidize participation for low income families and funds to help states improve child care quality, as well as Temporary Assistance to Needy Families (TANF) funds and Federal Food and Nutritional Programs which can also be used in support of after school programs ("Funding").

Volunteer hours may also account for a large portion of investment in after-school programs. In 2015, the Bureau of Labor Statistics collected data on volunteerism in the United States through a supplement to the Current Population Survey (CPS). The CPS surveys roughly 60,000 households nationwide monthly, to obtain information on employment and unemployment for noninstitutionalized civilians aged 16 and older ("Volunteers by Type"). According to survey results, of the 62,623 volunteers surveyed, over 25% had volunteered with an educational or youth service organization, such as an after-school program. Since volunteerism isn't usually measured as a monetary cost, a unique strategy is necessary to fully quantify the investment in after-school programming.

In 2009, "The Cost of Quality Out-of-School-Time Programs" was published (Grossman, et al.). This study attempted to value the full costs of quality after school programs as measured by cash outlays plus non-monetary contributions such as donations of a physical space for the program as well as volunteer hours that many after school programs rely on. This study did not measure costs for all after school programs, choosing instead to focus on mature, high-capacity, and high-quality after school programs, which tend to have better student outcomes as discussed in the prior section. The study collected data from 111 after school programs in 6 U.S. cities: Boston, Charlotte, Chicago, Denver, New York and Seattle. Included programs serviced various age groups in different settings, with various providers, content and hours of operation. Since purchasing power significantly varies across cities and regions, all costs were adjusted by the ACCRA Cost-of-Living Index, which centers costs in terms of Average Urban Dollars.

Cost Profile of School-Year Programs Serving Elementary/Middle School Students				
	Out-of-Pocket Expenditures		Full Cost	
	Average	Median	Average	Median
Average Annual Cost Per Slot	$3,620	$2,930	$4,320	$3,780
Average Daily Cost Per Slot	$20	$18	$24	$21
Average Hourly Cost Per Slot	$6.00	$4.00	$7.40	$5.50

Table 1

Cost Profile of School-Year Programs Serving Teens				
	Out-of-Pocket Expenditures		Full Cost	
	Average	Median	Average	Median
Average Annual Cost Per Slot	$3,840	$2,740	$4,580	$3,450
Average Daily Cost Per Slot	$27	$20	$33	$22
Average Hourly Cost Per Slot	$8.30	$5.70	$10.30	$6.40

Table 2

Tables 1 and 2 above are adaptations of the Elementary/Middle School and Teen School-Year Program Cost Profile charts found on pages 17 and 31 of the report. All costs are adjusted to 2005 "Average Urban Dollars." The Out-of-Pocket Expenditures column quantifies the full value of funds used by after school programs to support their work. The Full Cost column attempts to quantify not only cash expenses but also in-kind donations such as volunteer hours and donated space, which if not donated would require purchasing.

One additional area of focus was analyzing key funding sources for after school programs. The below table from page 43 of the study summarizes their findings.

Funding Portfolios		
Funding Sources	**Elementary/Middle School (% of total funding pool)**	**Teen Programs (% of total funding pool)**
Public Funds (Federal/State/Local)	32%	33%
Private Funds	39%	45%
Parent Fees	9%	2%
In-Kind Contributions	19%	19%

Table 3

As table 3 shows, government grants provide a large portion of necessary funding for the after-school programs surveyed in the study. However, since the government does not have an unlimited supply of money to spend on social programs, relying on government funding alone is often not enough. Private funds from foundations, corporations, individuals, United Way contributions, loans and donations from churches and other community organizations provide another major resource to after school programs. Since federal funds may come with requirements for how the money must be used, private funds can help fill the gaps. Additional common sources of funding include parent fees and in-kind contributions.

The study found that, like for-profit companies, after school programs may benefit from economies of scale. The per slot cost savings gained from growing an after-school program end once additional staff must be hired to help run the program. This finding enables programs to find the most efficient equilibrium, at which the maximum number of students are served by the lowest possible investment level. Additionally, by quantifying the full cost of after school programs, the study enables non-cash investments in after school programs to be considered in the ROI metric. One final key outcome from the study is the "Out-of-School Time Cost Calculator," which is an online calculator tool developed by the Wallace Foundation using cost estimates from the study. The tool allows for reasonable estimation of costs of high-quality after school programs by location, population served and size of the program.

Methodology

While the ultimate goal of this paper is to determine the best method for quantifying the ROI of after school programming, performing a study enabling the full calculation of ROI was not feasible. Instead, this study was designed and performed with the goal of gaining a firm understanding of how to quantify the **benefits received** from after school programming. With this knowledge and an understanding of full costs as discussed in the previous section, the ROI of an after-school program may be estimated. In this section, the data sources and multiple regression method utilized will be discussed in depth.

Data Collection

The National Center for Education Statistics (NCES) is responsible for collecting, analyzing and publishing data related to education in the United States and other countries. One of the many studies the NCES is responsible for is the Early Childhood Longitudinal Study (ECLS). The ECLS is a series of longitudinal studies that follow children's paths over a period of several years, providing data on children's status at birth and points after; the transition to non-parental care such as daycare, pre-k, and school and children's experiences inside and outside the classroom ("Early Childhood Longitudinal Program"). The ECLS-K study is a study that ran from 1998-2007 and focused on children's school experiences from kindergarten through the eighth grade. The children in the study came from diverse backgrounds and school across the country. Information on the children's cognitive, social, emotional and physical development was provided by the children themselves, parents, teachers and schools through direct assessments of children, parent interviews and teacher and school questionnaires. Every effort was made to include children of all types, as all materials were available in Spanish for ESL families, and translators were utilized when possible. If a child had special needs, questionnaires were filled out by their special needs educator or education provider.

The ECLS-K study collected thousands of data points from the over 21,000 participants during the study over 7 rounds. Only variables collected during the spring term of the kindergarten, first grade, third grade, fifth grade and eight grade years were utilized for this study. For this study, independent variables included demographic data such as gender, race, child disability status, type of family (2 parent household, siblings), poverty status and school type (public or private) were collected each year. In addition, in the kindergarten, first, third and fifth grade year, after-school program attendance was included. In third grade, additional measures related to reading or math support provided at the after-school programs were also included. For the eighth-grade year, instead of recording attendance at after school programming, attendance at specific programming options (such as sports, drama, school clubs or outside groups) was recorded and used as a proxy for after school programming. Finally, in both the third and eighth grade, student participation in tutoring for math and reading were measured and included in the study.

For all periods, the participants' highest reading proficiency level mastered (RPF) and highest math proficiency level mastered (MPF) were recorded and utilized to measure academic success. Tables 4 and 5 below shows each level and the corresponding expected skills as provided in the NCES online database ("NCES ECLS-K").

Reading Proficiency Levels	
RPF Level	**Skills**
0	Non-mastery of the lowest proficiency level
1	Letter recognition
2	Beginning sounds
3	Ending sounds
4	Sight words
5	Comprehension of words in context
6	Literal inference
7	Extrapolation
8	Evaluation
9	Evaluating nonfiction
10	Evaluating complex syntax

Table 4

Math Proficiency Levels	
MPF Level	**Skills**
0	Non-mastery of the lowest proficiency level
1	Number and shape
2	Relative size
3	Ordinality, sequence
4	Addition/subtraction
5	Multiplication/division
6	Place value
7	Rate and measurement
8	Fractions
9	Area and volume

Table 5

Additional independent variables attempting to gauge emotional stability were utilized for the purpose of this study. For the kindergarten and first grade years, parent opinions on their child's social skills were included. For the kindergarten, first, third and fifth grade years, teacher measures of a child's self-control and likelihood to externalize problem behaviors were also included. In eight grade the only non-academic independent variable included was whether the child had been suspended from school during the year.

Statistical Methods

The full data file from the NCES was extremely large. The online codebook tool provided on the NCES website allowed for the selection and downloading of only the variables of interest for the study. Once the data set was downloaded, the data was cleaned. Only individuals with observations for each variable of interest in a period (kindergarten, first grade, etc.) were studied, with any individuals missing an observation being removed from the data set. Students dropped out of the study as time progressed, so as students got older, less students were included in the sample. After cleaning the data of any non-responses and accounting for students who dropped out of the study, there were 13,391 students included in the kindergarten regression

models. By first grade, the sample size decreased to 11,971 students. The following year sample sizes are as follows: 3rd grade – 9,126 students, 5th grade – 8,822 students, and 8th grade - 7,185 students.

Multiple regression models were utilized to determine if a significant relationship existed between attending an after-school program and each dependent variable studied. The effect of demographic data on regression results was controlled for by including each demographic variable in every regression. Regression models were run for reading and math proficiency level each year, social skills in the kindergarten and first grade years, self-control and likelihood of externalizing problem behaviors in the kindergarten through 5th grade years, and suspension in the 8th grade year.

For the independent variables, certain conventions were used to code the data into the dataset. For gender, an input of 1 means male, while an input of 0 means female. For each race listed, a 1 was coded if the child was that race, with a zero coded for all other races. For all other variables, an input of 1 means the variable being measured was present. For example, if a child attended public school, a "1" was coded into the data set for Public School. The variables "Female" and "White" (race) were left out of regression models to avoid perfect collinearity. The unit of comparison would be the student who had 0's for each independent variable measured. In terms of the Kindergarten dataset, this would be a white, female, private school student with no disabilities from a single parent household living above the poverty with no siblings and who did not attend an after-school program.

Findings

In all, 21 multiple regressions were performed on the data set. The following section will begin with the output of the regressions and will finish with commentary on the significance of the results. Finally, limitations of this study will be discussed in depth, along with ideas for future studies.

Results

Tables 6 through 10 below summarize the results by grade level. Charts 1 through 6 below provide some detail around the predicted academic benefit of attending after-school programming for each year such a benefit was received. Charts were not provided for the fifth and eighth grade years, because after-school program attendance was either not significantly related to the academic measures (5th grade) or program attendance was not recorded (8th grade).

Kindergarten

	Reading Proficiency Level		Math Proficiency Level		Self-Control		Externalizing Problem Behavior		Social Skills	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
R Square	0.1081898	N/A	0.1270703	N/A	0.0877318	N/A	0.1036968	N/A	0.0249251	N/A
Significance F	N/A	0	N/A	0	N/A	9.6186E-257	N/A	0	N/A	9.16529E-66
Intercept	2.8595112	0	2.9474385	0	3.1976575	0	1.644875	0	3.5324334	0
Gender	-0.210389	1.56596E-24	0.0170448	0.294029444	-0.206281	3.09028E-87	0.2498239	3.1752E-122	-0.087121	4.75682E-23
Black	-0.27034	2.97716E-16	-0.425814	3.56278E-59	-0.201562	1.26377E-33	0.173564	1.27484E-24	-0.041419	0.003414347
Hispanic	-0.243442	3.47647E-15	-0.419195	2.54689E-65	-0.043868	0.00480181	0.008751	0.580014865	-0.060627	4.60956E-06
Asian	0.4183243	2.55427E-17	0.0073742	0.8501297	0.0945566	0.000142372	-0.157607	4.57213E-10	-0.185328	2.0069E-18
Other Race	-0.231902	2.88911E-07	-0.311187	3.38598E-18	-0.114233	5.19486E-07	0.1078236	3.16951E-06	-0.075508	9.5504E-05
Disability	-0.335884	3.76989E-30	-0.278068	7.24804E-33	-0.120523	3.96657E-16	0.1022974	1.06585E-11	-0.072122	9.97849E-09
2 Parent HH	0.218105	7.17156E-15	0.1267013	1.07095E-08	0.0907694	1.24752E-10	-0.085016	3.08639E-09	0.0225616	0.059880832
Siblings	-0.081125	0.004016089	0.0368205	0.098675261	0.1276798	2.71738E-19	-0.154549	1.21821E-26	-0.009517	0.430556162
Poverty	-0.457235	1.23241E-51	-0.387631	5.32604E-59	-0.118031	7.57466E-15	0.1109424	6.56347E-13	-0.087213	1.4105E-11
Public School	-0.346632	7.84228E-43	-0.240774	1.72879E-33	0.0220184	0.082464043	-0.013304	0.302063855	-0.009405	0.383065372
After-School Program	0.1569907	3.70586E-09	0.1304481	5.80877E-10	-0.135811	4.60784E-24	0.2018344	2.794E-49	0.0146773	0.1976833

Table 6

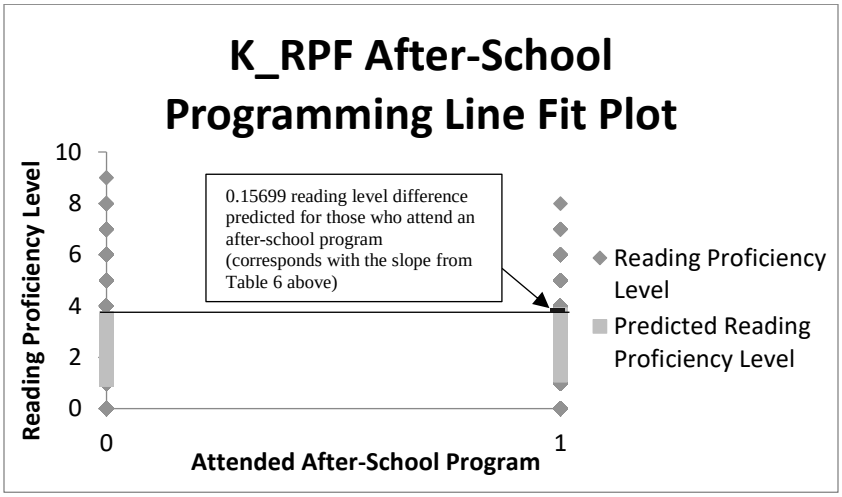


Chart 1

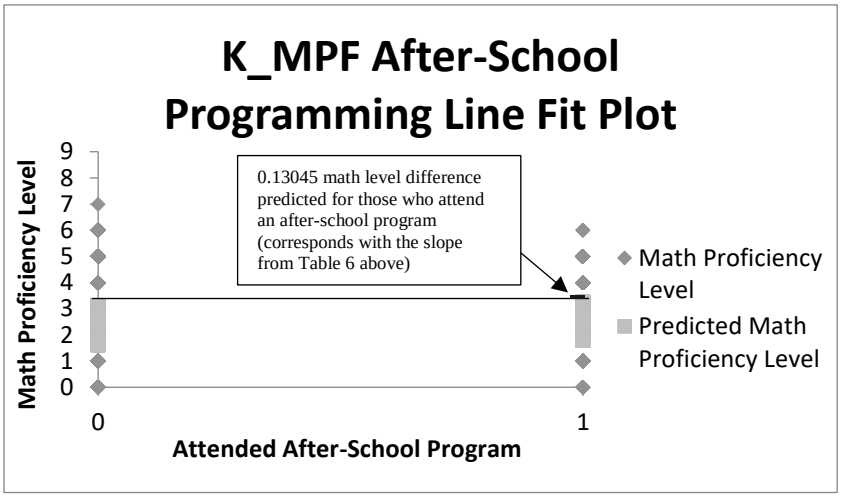


Chart 2

First Grade										
	Reading Proficiency Level		Math Proficiency Level		Self-Control		Externalizing Problem Behavior		Social Skills	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
R Square	0.1179581	N/A	0.110726	N/A	0.0837634	N/A	0.1034694	N/A	0.0408647	N/A
Significance F	N/A	0	N/A	0	N/A	1.8158E-217	N/A	1.6201E-273	N/A	4.8582E-100
Intercept	4.8397289	0	4.1856645	0	3.2021447	0	1.6154012	0	3.5508628	0
Gender	-0.202911	5.0407E-22	0.0936657	1.00548E-08	-0.207236	1.36971E-81	0.244414	5.9884E-109	-0.088719	1.29387E-20
Black	-0.316802	1.87745E-19	-0.433332	3.17066E-56	-0.162348	1.7626E-19	0.1656282	1.14263E-19	-0.029802	0.060742241
Hispanic	-0.310134	1.41074E-22	-0.341443	2.39031E-43	-0.027296	0.092231051	-0.03318	0.043730032	-0.133954	1.1653E-20
Asian	0.219135	5.41103E-06	-0.114327	0.002289201	0.1141317	3.72884E-06	-0.111184	8.97058E-06	-0.25162	1.37322E-30
Other Race	-0.25879	2.90044E-08	-0.367021	5.83713E-24	-0.12107	4.00558E-07	0.0963177	7.06251E-05	-0.045959	0.029631406
Disability	-0.439311	4.19666E-51	-0.351383	7.40512E-54	-0.14769	4.2116E-23	0.1806671	9.23491E-33	-0.095012	5.92592E-13
2 Parent HH	0.1648464	2.58514E-08	0.0428243	0.062940256	0.0931859	7.98403E-10	-0.095118	6.37961E-10	0.0135596	0.311957894
Siblings	-0.01246	0.68061081	0.0783602	0.000881431	0.0966231	4.69869E-10	-0.132638	3.77561E-17	-0.003844	0.779313597
Poverty	-0.543783	2.58225E-64	-0.362943	6.23314E-48	-0.137394	4.74398E-17	0.1042826	3.36411E-10	-0.120799	7.56986E-17
Public School	-0.275284	1.40917E-26	-0.12682	2.51358E-10	0.0364818	0.005648348	0.0015414	0.908254631	-0.033646	0.003928464
After-School Program	0.1039342	0.000338549	0.1014616	6.95567E-06	-0.10877	2.51289E-13	0.1719599	5.12994E-30	-0.00576	0.6611238

Table 7

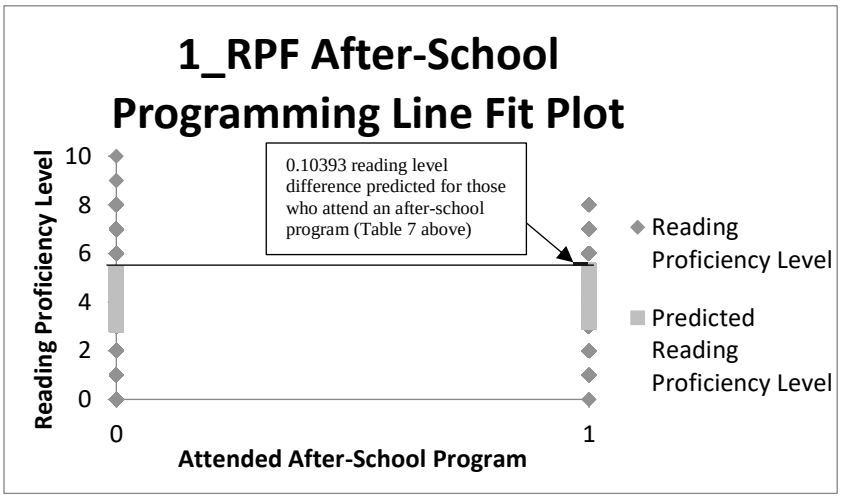


Chart 3

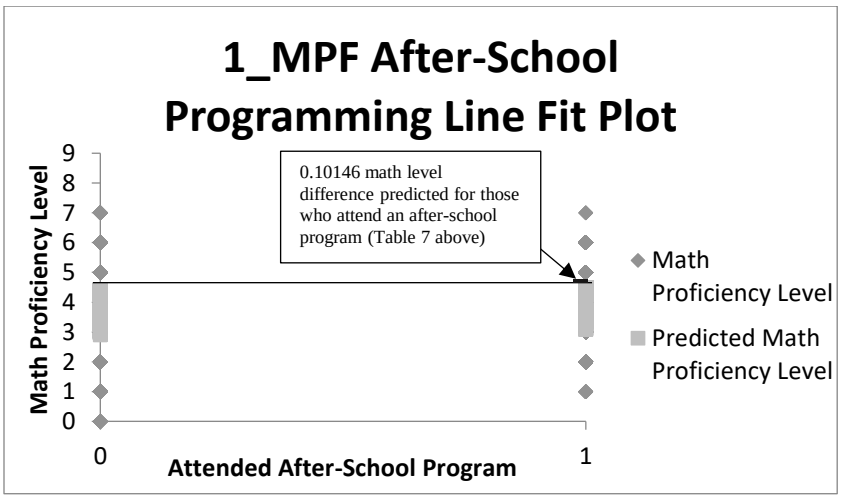


Chart 4

Third Grade								
	Reading Proficiency Level		Math Proficiency Level		Self-Control		Externalizing Problem Behavior	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
R Square	0.1866098	N/A	0.1548538	N/A	0.0965615	N/A	0.1127729	N/A
Significance F	N/A	0	N/A	0	N/A	1.0854E-187	N/A	4.4988E-223
Intercept	7.195418	0	5.6053076	0	3.3208295	0	1.5762672	0
Gender	-0.203971	6.10708E-18	0.2612704	1.49705E-32	-0.219884	1.18223E-72	0.2500312	6.1319E-99
Black	-0.582204	4.25454E-43	-0.673267	1.85608E-65	-0.230026	2.12384E-26	0.2510287	4.56598E-33
Hispanic	-0.511111	2.04862E-47	-0.362553	1.70685E-28	-0.015465	0.390451883	0.0161101	0.355260847
Asian	-0.191061	0.000399804	-0.002388	0.961986413	0.1701329	7.92908E-10	-0.202929	3.6876E-14
Other Race	-0.497192	3.22339E-20	-0.39254	4.69713E-15	-0.075668	0.006126339	0.0445392	0.095439099
Disability	-0.188473	2.41881E-12	-0.153321	8.26809E-10	-0.096719	2.27349E-12	0.0927727	3.5289E-12
2 Parent HH	0.0749416	0.021767769	0.0779401	0.010200413	0.0795505	2.03847E-06	-0.095118	4.45156E-09
Siblings	-0.021786	0.532970058	0.0427726	0.187551516	0.0876126	1.01405E-06	-0.085923	7.25458E-07
Poverty	-0.641452	2.09511E-73	-0.427537	5.45095E-39	-0.106275	3.50853E-09	0.0757394	1.35395E-05
Public School	-0.259847	9.1601E-19	-0.07427	0.006389186	-0.039411	0.008729127	0.0418433	0.004013554
After-School Program	0.1056157	0.007524869	0.1109589	0.002503677	-0.04938	0.014763108	0.0681228	0.000510621
Reading Help at ASP	0.0159819	0.827580905	0.077133	0.257760235	-0.030065	0.424060077	0.0157371	0.665454918
Math Help at ASP	-0.088458	0.237003892	-0.124839	0.072393534	-0.042327	0.269600469	0.0455618	0.21946191
Reading Tutor	-0.719197	3.85516E-51	-0.477175	4.37154E-27	-0.078825	0.001212661	0.0312409	0.184982694
Math Tutor	-0.097768	0.079772022	-0.335182	1.04756E-10	-0.063814	0.025678741	0.0843143	0.002321418

Table 8

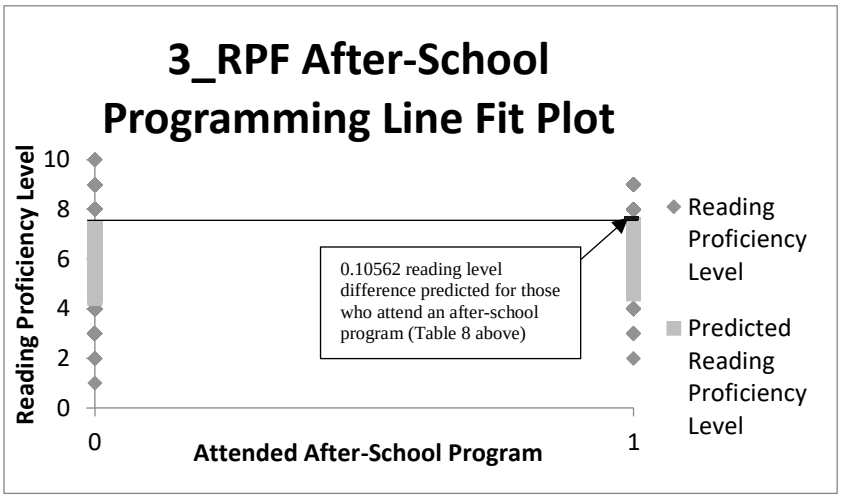


Chart 5

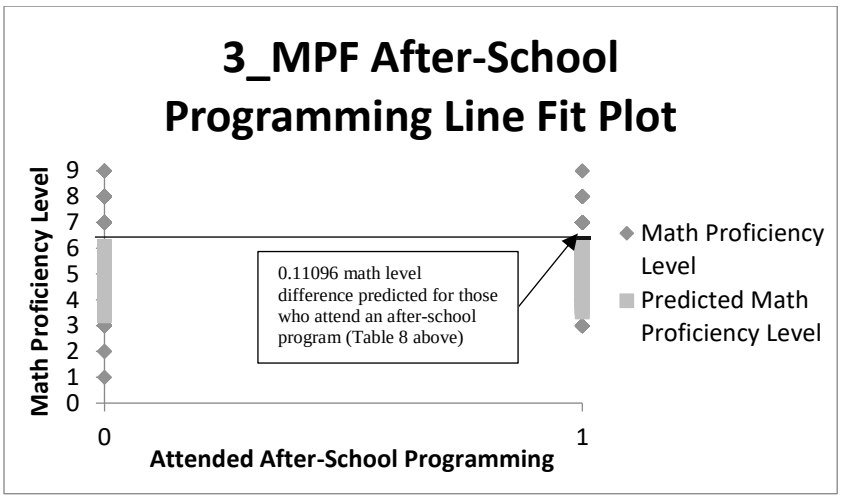


Chart 6

Fifth Grade								
	Reading Proficiency Level		Math Proficiency Level		Self-Control		Externalizing Problem Behavior	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
R Square	0.1648465	N/A	0.1752235	N/A	0.1071077	N/A	0.1181595	N/A
Significance F	N/A	0	N/A	0	N/A	3.8729E-207	N/A	8.9695E-231
Intercept	7.771847	0	6.4700104	0	3.3194814	0	1.5356336	0
Gender	-0.146403	1.31052E-11	0.3294768	2.14793E-48	-0.218509	4.14947E-73	0.2428751	1.90475E-96
Black	-0.541327	1.2522E-43	-0.727768	1.32289E-71	-0.212938	6.15965E-23	0.233943	2.16964E-29
Hispanic	-0.48387	3.30938E-56	-0.412637	9.28393E-39	-0.02112	0.210121208	-0.00243	0.88078225
Asian	-0.231444	3.22853E-07	0.1141997	0.014978789	0.1760633	2.36437E-12	-0.161745	2.1065E-11
Other Race	-0.409928	7.28463E-17	-0.307973	1.44701E-09	-0.056207	0.038602621	0.0516084	0.048280725
Disability	-0.516452	2.4093E-65	-0.590688	7.87711E-79	-0.244877	1.50761E-48	0.2217392	2.66855E-43
2 Parent HH	0.0544587	0.058674213	0.1094633	0.000248324	0.047268	0.003062063	-0.071867	2.86445E-06
Siblings	-0.03063	0.332213821	0.0767442	0.019141291	0.0981647	2.0923E-08	-0.076708	5.23479E-06
Poverty	-0.53441	2.98222E-65	-0.50554	9.21017E-55	-0.118355	6.56836E-12	0.0770114	3.32766E-06
Public School	-0.23926	9.07414E-18	-0.121501	2.53909E-05	0.0056375	0.714459508	0.0229173	0.121981146
After-School Program	0.0247355	0.475187536	0.0861198	0.016516326	-0.071838	0.000182795	0.0680973	0.000225821

Table 9

Eighth Grade						
	Reading Proficiency Level		Math Proficiency Level		Suspended	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
R Square	0.2164935	N/A	0.2208671	N/A	0.0871274	N/A
Significance F	N/A	0	N/A	0	N/A	7.613E-129
Intercept	8.4752524	0	7.219609	0	0.0305221	0.073164726
Gender	-0.051864	0.044185403	0.3087408	6.69206E-31	0.0924006	4.71835E-33
Black	-0.51556	1.13664E-27	-0.591248	9.87573E-34	0.1533729	1.33697E-27
Hispanic	-0.438625	8.72226E-34	-0.351677	3.93317E-21	0.0117905	0.271838567
Asian	0.1445819	0.012961694	0.3065441	3.34636E-07	-0.040135	0.020582397
Other Race	-0.247542	2.37616E-05	-0.238903	7.69627E-05	0.0602188	0.000556526
Disability	-0.370333	7.56247E-24	-0.474251	1.02905E-35	0.0886076	5.60932E-16
2 Parent HH	0.0459506	0.172568082	0.0956805	0.005917751	-0.041618	3.40103E-05
Siblings	0.0151636	0.661325958	0.0980283	0.006064133	-0.005065	0.623247304
Poverty	-0.551343	1.10075E-44	-0.486775	2.675E-33	0.0350422	0.002595734
Public School	-0.333292	1.36861E-22	-0.089015	0.011095291	0.0761109	6.0187E-14
Reading Tutor	-0.639701	2.71133E-48	-0.445629	4.18684E-23	0.0023431	0.856454338
Math Tutor	-0.195645	4.03201E-09	-0.50268	5.0647E-48	0.0331923	0.00079909
Sports	-0.065684	0.013775779	0.024238	0.378257726	-0.007395	0.351849613
Drama	0.2481352	6.78413E-21	0.2350975	6.97532E-18	-0.012299	0.117603138
Clubs	0.1266158	3.98522E-06	0.1631666	8.49025E-09	-0.024721	0.002493804
Other Groups	0.0617896	0.022986941	0.0818	0.003533267	-0.005154	0.524277289

Table 10

Each table shows all the key data from the regressions performed at a single grade level. For example, table 6 corresponds with all regressions performed on the sample of children with all data present in kindergarten. Each dependent variable tested can be found in the second row. On the left is a list of relevant statistics (R Square and Significance F), the y-intercept of the regression line, and each of the independent variables included in the model. For the purposes of this study, if a variable's p-value was found to be less than 0.01, the variable was considered statistically significant. Any coefficients found to be not statistically significant using this benchmark are highlighted in grey.

Significance

As determined by comparing the Significance F of each regression to a level of significance of 0.01, all 21 of the multiple regression models above are statistically significant. However, in 5 of the regression models for kindergarten through 5th grade (Kindergarten – Social Skills, 1st Grade – Social Skills, 3rd Grade – Self-Control, 5th Grade – Reading and Math Proficiency Levels) the variable of interest, after school programming, is not statistically significant. For eight graders, participation in sports is not a significant predictor of any of the dependent variables (RPF, MPF or Suspensions. Participation in a Drama program is not a significant predictor of Suspensions, and participation in any Outside Programs (such as 4-H) is not a significant predictor of neither Reading Proficiency nor Suspensions. Participation in school-based clubs is the only out-of-school activity that significantly predicted all 3 dependent variables for 8th graders.

An additional statistic to note is the R Square for each regression model. R Square generally describes the percentage of variation in a dependent variable that can be explained by the regression model. For example, as shown in Table 6, the R Square of the RPF regression is

0.1081898. This means that roughly 10.8% of the variation in Kindergarten Reading Proficiency Level can be explained by the regression model (which includes gender, race, family type, child disability, type of school and after school program attendance). The Coefficient on the "intercept" term corresponds to the y-intercept of the linear regression, and the Coefficient on each variable corresponds to the slope of that variable. As an example, Chart 1 above depicts the relationship between attending after-school programming and Kindergarten Reading Proficiency Level. As shown in Table 6, the slope of after-school program attendance is roughly 0.156699. This means that a kindergarten student who attended an after-school program was predicted to score 0.157 levels higher than a kindergarten student who did not attend an after-school program, all else equal.

None of the above models have particularly high R Square values, although to some extent, R Square values tended to get larger as the students moved to higher grade levels. Additionally, R Square values for the dependent variables attempting to quantify emotional control and stability were consistently lower than their academic counterparts. This is likely due to the element of subjectivity being introduced into the emotional stability measures. For this reason, further analysis will focus on the academic dependent variables only.

From Kindergarten to 3rd grade, attending an after-school program was a statistically significant, positive predictor of reading and math proficiency levels for students, as shown in Tables 6 through 8 above. Students who attended an after-school program earned reading or math proficiency at levels ranging from 0.1-0.15 higher than their peers. It is important to note that there are only 10 reading proficiency levels and 9 math proficiency levels. At any given grade level, students generally fall within a range of 2-4 proficiency levels. For example, 11,910 of the 13,391 Kindergarten students included in the regression models read at a level between 1 and 4. This means that, although 0.1 seems like a very small number, in terms of reading or math proficiency level it can make a large impact. The below charts, Chart 7-16, depict this "banding" for each year of the study.

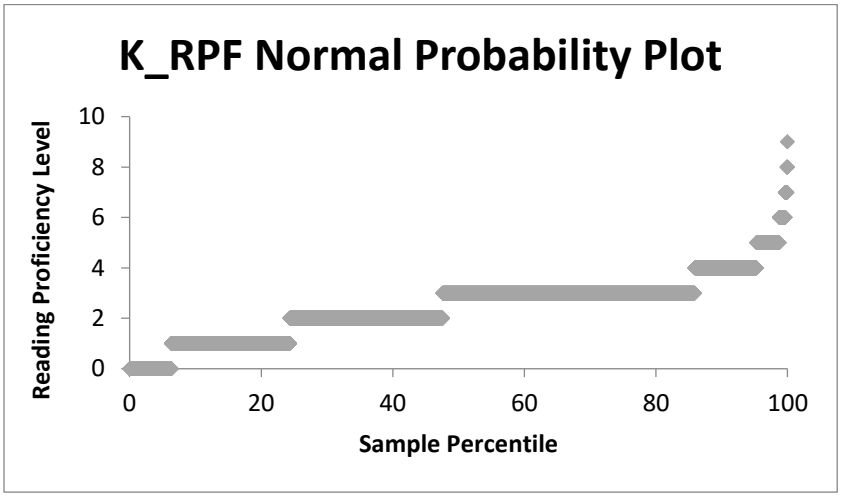


Chart 7

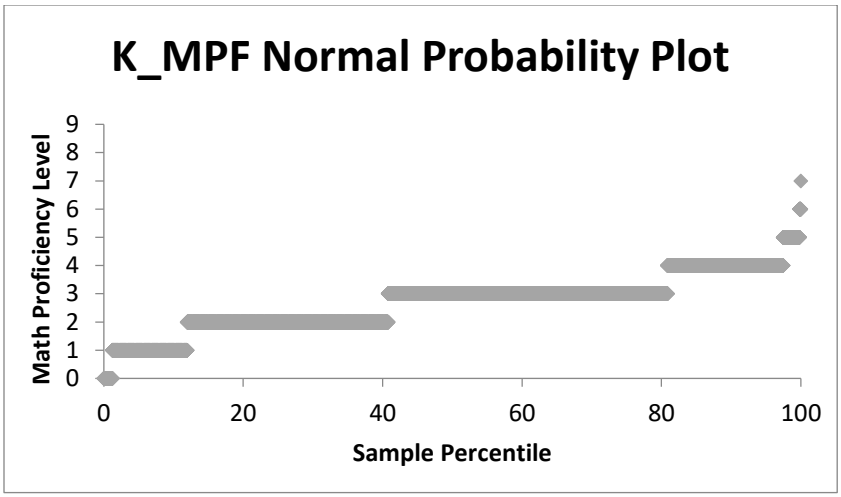


Chart 8

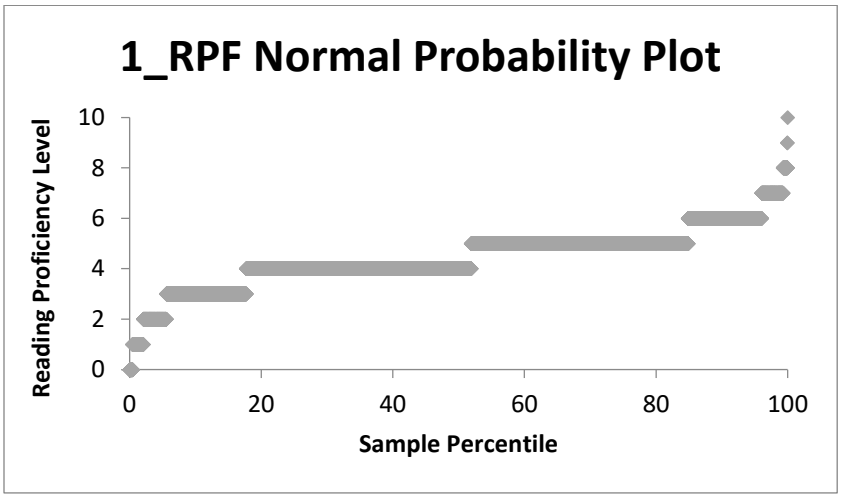


Chart 9

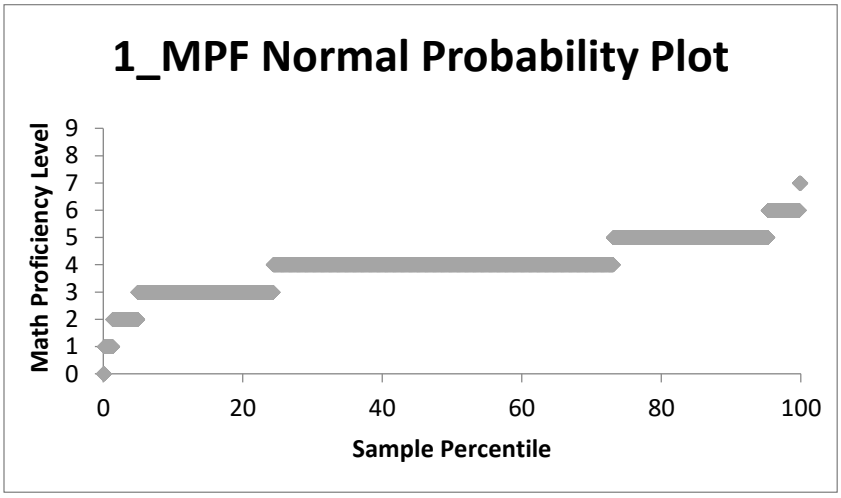
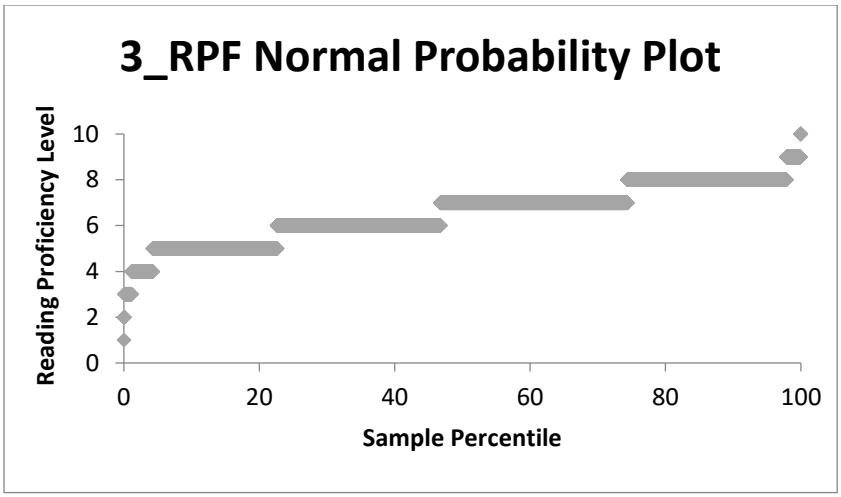


Chart 10



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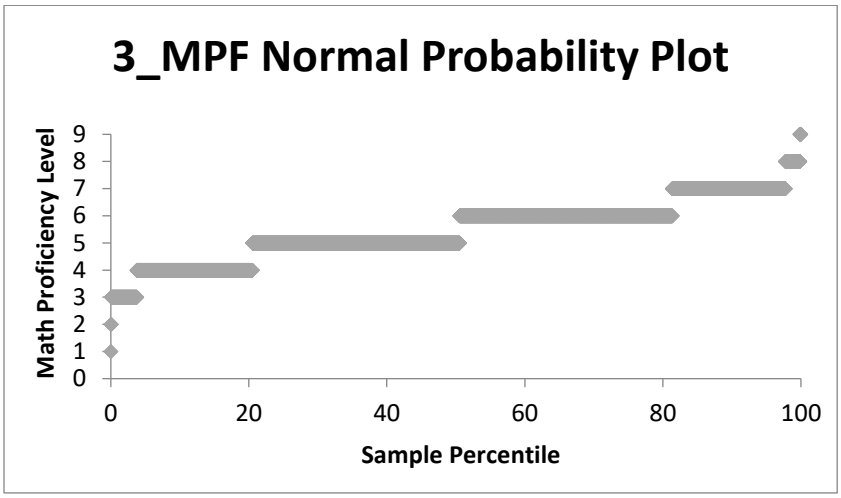

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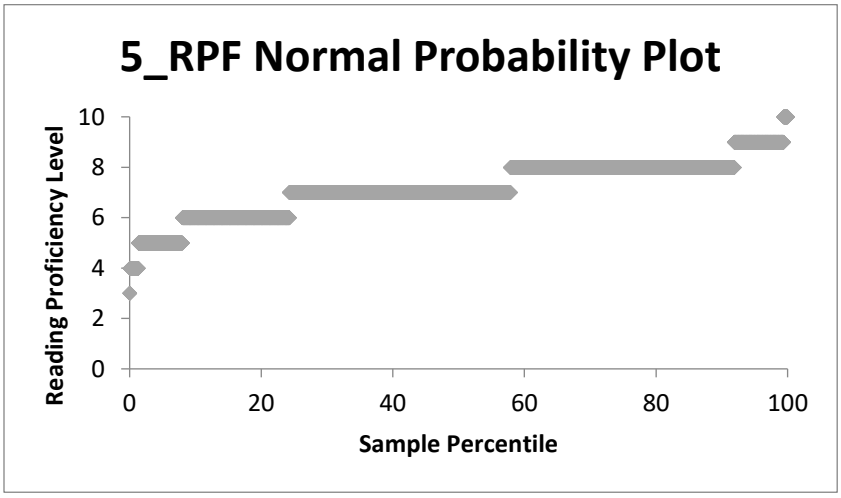

Chart 13

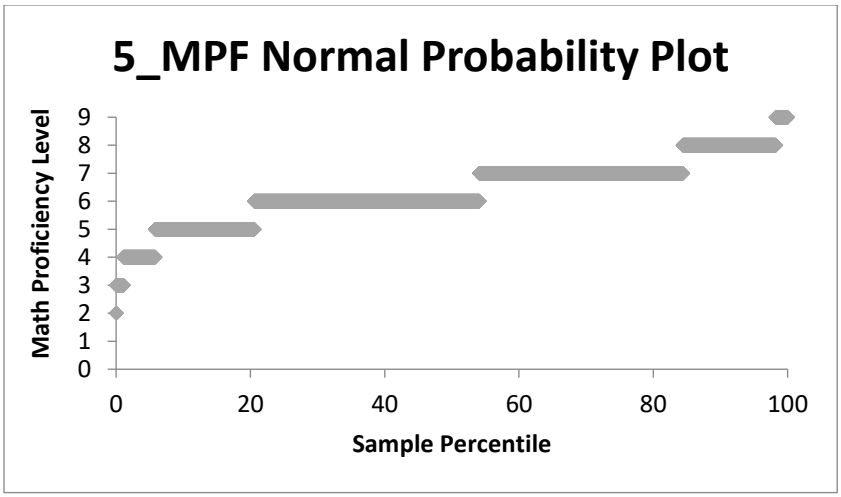

Chart 14

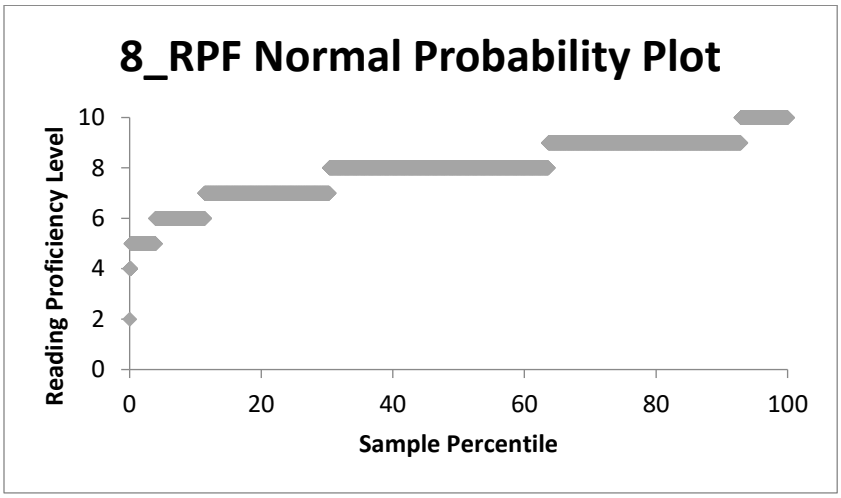

Chart 15

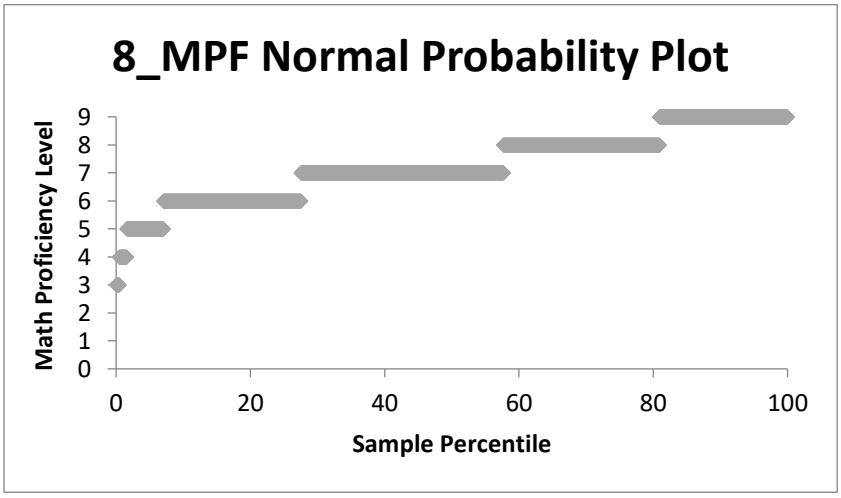

Chart 16

As shown in Table 9 above, while after school programming made a statistically significant positive impact on academic success for the first three years studied, in fifth grade it was no longer a statistically significant predictor (although for MPF, it was at a 0.05 significance level). This was an interesting and unexpected finding. One potential reason for this could be that a very small number of students, roughly 980, actually participated in after-school programming in the 5th grade. This is less relevant in context, however. Only 1,260 students participated in after school programming in the 3rd grade. The decrease in after-school program participation follows fairly closely with the decrease in overall sample size over the same period. Finally, for eighth graders there was no true measure of after- school program participation, only various clubs or extracurricular activities that were assumed to take the place of traditional after-school programs. Participation in school-based clubs was the only independent variable that significantly predicted all three independent variables and had a strong positive relationship with both RPF and MPF along with a slight reduction in likelihood of suspension.

Limitations

This study clearly has many shortcomings. The first and most important is the quality of the data. While utilizing the data the NCES had already collected was invaluable in terms of completing this study, the data collected was not ideal for this type of study. For example, in the literature review, program quality was discussed repeatedly as crucial for student outcomes. High quality after school programming consistently yielded better results than no after school programming or programs of lesser quality. Unfortunately, the NCES data didn't measure program quality. For the third-grade year, the study recorded whether there was reading or math help at the after-school program a child attended, however neither of those measures were statistically significant and neither are true proxies for program quality. Additionally, although the study participants were representative of the United States, very few participants attended after-school programs. The highest number of after-school program participants was recorded in the kindergarten sample, and even then fewer than 20% of the kindergartners participated. In an ideal study, the number would be much closer to 50/50 participants to non-participants.

Additional issues with the data collected in the study include the Reading Proficiency Level (RPF) and Math Proficiency Level (MPF) scores. Since these numbers were scaled from 0-10 and 0-9 respectively, less variation in the dependent variable was possible (there were only 10 or 11 possible outcomes). This meant that the regression line appeared very flat, and likely amplified the effect of outliers, as shown in the Normality Plots (Charts 7-16 above). Also, the measures of social skills, self-control and externalizing problem behaviors were all very subjective. Although assessing emotional well-being should be a part of any after-school study, the subjectivity of these measures was extremely high because they were recorded from parent and teacher surveys. Even with scales provided to help normalize parent and teacher opinions, there was likely a great deal of subjectivity in recording these results, which led to much higher variability in the model.

Finally, the ultimate goal of this project was to provide a framework for quantifying the Return on Investment (ROI) of after-school programming. Although this study allowed for some degree of quantifying benefits received from after-school programs, there was no way to quantify the investment in these programs. The study did not record enough (any) information about the after-school programs to make any reasonable estimates about program cost. This means that the

true ROI calculation of additional benefit received divided by investment, or additional costs necessary to obtain the benefit, was not possible.

Future Studies

In the future, a long-term study from kindergarten to high school and even beyond would be interesting to consider. Ideally, many outcomes related to both individual participants and society at large would be included. For example, while the NCES data measured immediate outcomes for students in reading and math, it would be interesting to see if children who participated in after-school programs were more likely to graduate from high school or college. What types of jobs did these students earn as adults? Were they more or less likely to become incarcerated at adulthood? Did a program being high-quality influence any of these statistics? If an after-school program had a small parent fee, would outcomes improve for students (does having "skin in the game" make students/parents try harder)? Additionally, did children participating in after-school programming enable both parents to work? Or allow a single parent to work more hours? In that case, the additional benefit received by society would include that parent's additional productivity and income tax paid. Also, if enabling a second parent to work pulled a family out of poverty, would the benefit to the family outweigh the cost of funding the after-school program slot for the child?

The set-up of a future study would also be very important. In this study, quantifying the ROI of after-school programming was impossible, because there was no way to determine program cost. A future study focused solely on after-school programming data, should tie student outcomes to specific programs. This will enable the calculation of ROI and will also allow for comparison of ROI across all variations of after-school programs.

Conclusion

As discussed in this paper, Return on Investment (ROI) is comprised of two parts. Broadly speaking, the numerator is the total additional benefits received through an investment, while the denominator is the total costs required to obtain said additional benefits. For this thesis, a series of multiple regressions were run with the intent of quantifying the academic and emotional benefits received by students participating in after-school programming. Data from the NCES's ECLS-K study was used, with key measures including reading and math proficiency levels, social skills, self-control, likelihood of externalizing problem behaviors, after-school program attendance and a variety of demographic measures. Data was collected in the kindergarten, first, third, fifth and eighth grade years of participating students. A total of 21 multiple regressions were performed on the dataset, with several dependent variables being predicted for each year of the study. For all years, the emotional well-being measures could not accurately be predicted by the regression models, due at least in part to the subjectivity of the data collected. For the kindergarten through third grade years, however, after-school program participation was found to have a statistically significant positive benefit on student's academic performance as measured by reading and math proficiency levels. This relationship did not exist in the fifth-grade dataset, and the study did not collect a specific enough after-school program measure to accurately predict for the eighth-grade year.

While this study was a good first step in fully quantifying the ROI of after-school programming, there is still much to explore in future studies. As mentioned throughout the paper,

the dataset used had many shortcomings which reduced the accuracy of the multiple regression models. Many measures of economic, emotional, societal and long-term benefits were not included in the dataset and therefore could not be quantified. In addition, the design of the study made quantifying the return on investment impossible, as there was no way to quantify the costs associated with the after-school programs students in the dataset attended.

However difficult it may be to collect the data and run an ideal experiment, it is worth it. By fully quantifying the Return on Investment of after-school programming (or any other cause of interest) on a program-by-program basis **and** on a macro scale, smart decisions can be made when allocating scarce resources such as taxpayer dollars, private donations and volunteers' time.

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