MARTIN SCHOOL OF PUBLIC POLICY AND ADMINISTRATION

Does the Mentors & Meals After School Program Have An Effect on Student Grades?

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Executive Summary

While technology continues to progress and the United States continues to be considered one of the most privately wealthy nations in the world, the education gap for African American and Hispanic students continues to be a concern for teachers, school administrators, state and local politicians, and all who study public education policy. School districts persistently look for ways to improve student achievement in traditional as well as non-traditional ways, while aligning with state and local education goals and staying within budget.

This study examines a new mentoring model for middle school students. The program, Mentors & Meals (M&Ms), was the result of a conversation with a middle school principal and a high school vice-principal in a rural-suburban school district in Woodford County, Kentucky regarding how to academically assist under-served and at-risk teens during the most behaviorally risky time of day. After that conversation and by the end of the same school year, Mentors & Meals ran an 8-week pilot program in which results indicated the model appeared to have achieved some success in improving student outcomes based on overall GPA change. The next school year, M&Ms became a full- fledged non-profit program whose mission is to enhance academic achievement in middle school students utilizing high school and college mentors along with adult volunteers. This capstone will analyze grades of student participants from September, 2013 to May, 2016 against a control group of students who did not participate in the M&Ms program.

The intent of the study is to evaluate grade change in four core subject areas controlling for attendance, behavior, grade in school, free or reduced price lunch status, gender, ethnicity and tenure (participation) in year 1, 2 and 3. In the four core subject areas studied, two methods of linear regression found statistically significant improvement in Language Arts in the first year and one method showed Social Studies gains at year 3. There were no gains in Math or Science.

Introduction

In both the African American and the Hispanic populations, the standard of living difference between minorities and Caucasians still exists, with minority children having a lower level of school readiness at the start of kindergarten (Stanford CEPA, NCES). In 1960 the Coleman Report claimed that families are a much bigger influence than school quality on student achievement. This is too easily misinterpreted as the notion that "schools don't make a difference" and there continues to be misunderstandings about the achievement gap which clouds public discussion and viable solutions to the problem (Rothstein, 2004). Students' social and economic family characteristics are obviously a strong influence on the individual student's relative average achievement in a wide range of skills that schools should produce, not only basic math and literacy, but also the ability to reason and create an appreciation of history, science, art, music, good citizenship, self-discipline, and communication skills (Rothstein, 2004).

After school enrichment programs have been developed in the United States to reduce or ameliorate the conditions of race and low income level on a variety of social and academic outcomes (Blue 2004, Hanushek 1979, Grossman and Rhodes 1998). An estimated 5 million American youth are currently involved in school and community based volunteer mentoring programs, including more than 100,000 through Big Brothers, Big Sisters of America (Grossman and Tierney,1998). In central Kentucky, the United Way of the Bluegrass serves 7,500 youth through early childhood programs and another 2,500 in after-school programs (UWBG,2015). A key aim of the No Child Left Behind Act (NCLB, 2001) was to give parents of students in low-performing schools, new educational options. Out-of-school programs were transformed through federal, state and local programs (Zimmer, 2010).

In five programs evaluated by Freedman (1993), the quality of mentoring relationships were identified as "primary", those having a high degree of attachment, trust, and enjoyment

while "secondary relationships" had similar characteristics as primary but in less developed form. "Non-significant relationships" were identified as pairings marked by distrust and distance (Freedman, 1993). Successful mentoring relationships fall into the primary and secondary categories with goals of the mentoring relationship being clear and within the mentor's power to achieve (Flaxman, 1988).

Use of terms such as "mentoring" and "advocacy" give the impression that these are well defined approaches which effectively increase students' motivation and achievement in school, remove barriers to student progress in school and community, and help students refrain from self-destructive or illegal actions (McPartland, 1991). This is not always easy to measure.

Mentoring programs should be evaluated for both their process and impact; however only a few studies have been completed (Flaxman, 1988). Possible reasons for the lack of research are that most program administrators would rather use money and staff resources to provide more services than to complete an evaluation, many programs have not been in operation very long, and potential outcomes are difficult to quantify. Research has focused more on the process of mentoring, especially the formation of mentoring relationships more so than the impact of the mentoring on outcomes (McPartland, 1991).

Policy Issue and Research Question

Much has been written about the achievement gap; why it occurs, who is most at risk and how it impacts education policy, classroom curriculum and school finance reform. This paper will evaluate 3 years of data collected from the after school mentoring program, Mentors & Meals in Versailles, Kentucky to analyze whether this mentoring model affects the academic outcome of students who are in the education gap in a positive way. The change in percentage grade achievement for students in the 4th quarter grading period compared to grades in the 1st

quarter grading period are evaluated in the four core subject areas of Language Arts, Math, Science and Social Studies for students who attended the after school program versus a data set of middle school students in the same time period, in the same school district, who did not participate in the Mentors & Meals program. Control data was provided by the Woodford County School District and contained percentage grade achievement in Quarter 1 and Quarter 4 for de-identified students in the 6th through 8th grade in the 4 core subject areas, student grade in school, free and reduced price lunch status, gender, and ethnicity.

Regression of the whole sample and regression using propensity score matching methods were used to control for attendance, award points (discussed later), grade in school, free or reduced lunch status, gender, ethnicity, and tenure (how many years the student stayed in the program). The primary research question is: Does the Mentors & Meals after school program affect student grades?

Using the more stringent propensity score matching model, the analysis shows statistically significant improvement in Language Arts in tenure 1. There were no statistically significant gains observed in Social Studies, Math or Science. Using the whole control sample in regression, there were statistically significant gains in Language Arts in Tenure 1 and Tenure 3 and gains in Social Studies grade achievement in Tenure 3 versus the untreated control. This paper will discuss implications for future implementation and evaluation of this mentoring model which is designed to assist middle school students in the gap.

Mentoring and Academic Achievement

Research that has been done to evaluate the impact of mentoring on academic achievement of at-risk middle school youth shows conflicting results. A longitudinal study of 220 elementary school students found that those with mentors completed more years of

education, with females completing more years of education with mentors than without (18.1 years vs 14.9) and males completing 17.8 years compared to 15.8. A major limitation of this study was that the participants were mostly middle class and would not be defined as a minority at risk population (Thompson and Kelly-Vance, 2001). In other studies, the effect of mentoring on grade point average also showed conflicting results. McPartland and Nettles (1991) found significant improvement, while Slicker and Palmer did not (Blue, 2004).

In an evaluation of two out of school programs in the Pittsburgh Public Schools, analysis of a large, urban school district with over 33,000 students in more than 80 schools with a 57% African American population, found less than 25% of eligible students participated in the available out-of-school time services provided (Zimmer, 2010). Students who did participate in Supplemental Education Services (SES) experienced achievement gains in math but no effect in reading and those who participated in Education Assistance Programs (EAP) experienced small gains in both math and reading. The most significant gains in math and reading were in students who participated in both the SES and EAP programs (Zimmer, 2010).

The Mentors & Meals Program

This research will focus on the after school program, Mentors & Meals, to quantify whether and to what extent this mentoring program has an effect on academic achievement for middle school students.

In 2011 the Mentors & Meals program was offered to all students in the 6th grade at Woodford County Middle School. This was done so there would be no "stigma" attached to the M&Ms program. Middle school students can be particularly influenced by anything that labels them as "not smart" or as being "low income" (Crosnoe, 2009). In focus group discussions with parents regarding after school tutoring, Zimmer (2010) found that parents were concerned "there

may be a social stigma associated with their student being tutored at the middle and high school level".

The M&Ms Program Director visited all ten of the 6th grade homeroom classes at Woodford County Middle School and talked to students about the program for five minutes. Enrollment forms were sent home to every 6th grade student with their 3rd Nine Week report card. As a result, 40 out of 300 students participated in the pilot program during the 4th Nine Week Grading period in March to May, 2011 One result of the pilot was that 37 out of 40 student participants showed improvement in their overall Grade Point Average in the 4th quarter in which they participated in M&Ms compared to the 3rd quarter (where they did not). In the second year of the program, previously enrolled 6th graders were given priority to re-enroll, with additional openings filled by guidance counselor referrals, based primarily on academic and/or financial need.

This data examines the effects of all students enrolled in the M&Ms program from 2013-2016 compared to a group of students in the same grades, in the same school district, who never attended the M&Ms program.

Students attending M&Ms receive an after school snack, an hour of homework help from a mentor in which the student to mentor ratio is 2:1 or 1:1. M&Ms is an inter-generational mentoring program with high school, college student, adult and senior mentors recruited to participate as volunteers or interns in the program. Most of the mentors are volunteers who receive community and volunteer service for their time. They are college-bound high school students looking to fulfill their service requirement for National Honor Society, Beta Club or Key Club or they come to gain leadership experience to put on their college applications or job resumes. A smaller portion of mentors are made up of college student interns from Midway or the University of Kentucky who receive paid work study hours by providing tutoring/mentoring

services at M&Ms. Additionally, there are five high school interns per semester. High school interns must apply for the position and have prior volunteer experience at M&Ms to be considered. High school and college student mentors are required to maintain at least a 3.2 grade point average in order to be a mentor at M&Ms. Adults with interest in mentoring Middle School students are also engaged in this volunteer experience as are seniors through the United Way of the Bluegrass Retired Service Volunteer Program (RSVP) or Trailblazer programs. This study did not control for the different ages, skills or experience level of the mentors.

After one hour of homework-help time at M&Ms, students can choose to continue working on homework or attend a 30 minute group activity including gym time on Monday, STEM (Science, Technology, Engineering and Math) on Tuesday, guest speakers on Wednesday and opportunities to read out loud to Reading Therapy Dogs on Thursdays. This is followed by a hot, home-cooked meal prior to a parent or guardian arriving to pick up their student. The students are expected to bring their homework and agenda book, conduct themselves with good behavior, and are coached in homework and study skills with the expectation they will work toward achieving a "C" (70%) or better in their four core subjects; Language Arts, Math, Science and Social Studies. The mentoring relationships are set up to be both "secondary", with consistent adult leaders greeting the students and directing the program day, as well as "primary" relationships in which local high school students, college interns and adult volunteers develop a relationship of trust and enjoyment as they work with the students.

Research Design:

Data Collection:

For this study, primary data were collected in three consecutive school year periods from September, 2013 to May, 2016. Percentage grade in Language Arts, Math, Science and Social

Studies were recorded and maintained in a data base from Quarter 1 to Quarter 4 for all participants. Also if the same student remained in M&Ms in consecutive years, their "tenure" was tracked in years 1, 2 and 3.

The control data were obtained from the Woodford County School District and contained 3 consecutive years with de-identified students who did not attend the Mentors & Meals program. We were able to check for overlap using the Service Set Identifier (SSID) numbers and remove any student from the control group if their data was already captured in the treatment group. Initially, a total of **236** student observations are included in the treated group and **2,594** in the control group with regressions run on this group. After propensity score matching, the number of total observations dropped to **347,** which reduces the sample size, but focuses the estimation on relevant observations**.** This will be discussed further under research methods.

Table 1:
Number of students in treatment group before and after propensity score matching (PSM)

M&Ms before PSM	236
Total Obs	2,784
M&Ms after PSM	236
Total Obs	347

Students who entered the program through self-referral or guidance counselor referral and attended at least one day or more of the M&Ms program are considered treated. If a student enrolled but did not attend at least one day of the M&M program, they were considered "untreated" and moved into the control group. This was the case in 20 observations. Since these 20 students had a similar motivation to enroll, they could have been placed in an "intent to treat"

group which could serve as a control. Unfortunately, there were not enough observations to make meaningful conclusions about the difference between the enrollees who actually participated verses those who did not.

Most students in the treatment group are either academically at risk with grades below the district average and/or financially at risk if the student qualifies for the free or reduced lunch program, however, there are some middle school students who self-refer or come into the program as a result of a sibling being involved in the program in years prior.

Table 2 contains the demographic information of the students and families involved in the study during the 2013-2016 period. The treated group prior to the propensity score matching had a much higher minority population than the control with 50% Hispanic, 42% Caucasian and 8% African American students compared to the control which more accurately reflects the ethnic configuration of Woodford County consisting of 13% Hispanic, 83% Caucasian and 4% African American students. The control group had an equal percentage of students in all 3 grades while the treated group had a higher percentage of sixth graders attending (39%), which was slightly higher than the percentage of seventh graders (35%) and both groups were higher than eighth grade attendees (26%). Both male and female students participate in the program equally. There was a significantly higher percentage of students in the free or reduced lunch category for the treatment group (69%) than in the control (42%).

Additional data were able to be collected for the treated group which was not available for the controls. **Table 3** indicates 32% of students in the treated group live with a single parent, 41% live with two biological parents, 16% live with one step parent and 11% live with a grandparent or guardian.

Table 2:
Demographic Characteristics of Control vs Treated

Variable	All	%	Control	%	Treated	%
Ethnicity						
African American	125	4	107	4	18	8
Caucasian	2265	80	2167	83	98	42
Hispanic	445	16	327	13	118	50
Total	2835	100	2601	100	234	100
Student Grade in School						
6th	949	33	856	33	93	39
7th	972	34	890	34	82	35
8th	915	32	854	32	61	26
Free or Reduced Price Lunch						
No	1241	44	1515	58	72	31
Yes	1587	56	1084	42	157	69
Gender						
Male	1401	51	1316	51	117	50
Female	1433	49	1285	49	119	50

In **Table 4,** it is worth noting that in this data set, only 57% of the primary caregivers obtained a high school degree or equivalent and approximately 8% have some education beyond high school. In the United States, 81% Caucasian and 76% Hispanic individuals complete a high school degree and the number of adults completing a bachelor's degree or higher has risen to 34% (NCES, 2014). In the state of Kentucky, 83% have a high school degree and 22% have a bachelor's degree or higher (Census, 2015), so the population of primary caregivers of Mentors & Meals students can be considered less educated than the national and state averages.

Table 3:
Student Lives With

	#	%
Single Parent	76	32.2
Both Biological Parents	97	41.1
One Biological/One Step	38	16.1
Grandparent/Guardian	22	9.3
Missing	3	1.3
Total	236	100.0

Table 4:
Summary of Primary Parent Education

	Treated #	Treated%	State %	Nation %
High School Graduate	136	57.6	83.5	81
College Degree	43	8.2	21.8	34
Unknown	22	9.3	-	-

Additional Explanatory Variables

Table 5 contains data regarding the average total days of attendance in the program and the variation in award points earned. The maximum days of attendance were 113 which corresponds to the M&Ms program being offered 30 weeks for approximately 4 days/week (removing holidays or bad weather days) with a mean attendance of 43 days, indicating that the average student attends more than one day per week.

There is a measure of behavior contained within the variable, "Award Points". In this program, students can earn a total of 3 award points each day. They earn one point for bringing their agenda book with assignments written in it, one point for engaging in a respectful manner with their mentor, and one point for cleaning up their area. Students can earn up to 12 points per week by attending 4 days and earning all 3 of their award points per day. At every 12 point interval, students earn an incentive reward. The awards start small with candy or gum and go up in value to earn school supplies or M&M-themed water bottles, t-shirts and sweatshirt hoodies as points accumulate. The mean score for award points divided by the number of student observations gives an average of 2.3 points per student, indicating students are achieving at least 2 of the 3 behavioral components considered to be necessary for successful involvement in the program.

In addition, the student's grade percentage is recorded for the four core subject areas of Language Arts, Math, Social Studies and Science starting with grades in Quarter 1 (grades prior

to students attending) through the end of Quarter 4 using information from the "Infinite Campus" data information system. This analysis looks at the change in grades in each subject from Quarter 1 to Quarter 4. As part of the enrollment process, parents give permission for the program to have access to their students' Infinite Campus username and password for program and research purposes.

Table 5:
Summary of days attended and award points

Variable	Obs	Mean	Std Dev	Min	Max
Total Days Attended	236	43.2	30.9	1	113
Award Points	193	83.5	60.7	0	257

Table 6: *Summary of student % grade at Quarter 1*

Language Arts- Control	2557	82.6%	10.8	12	100
Language Arts- Treated	215	75.8%	12.5	33	97
Math- Control	2517	84.2%	11.9	24	100
Math- Treated	216	78.2%	12.0	36	100
Science- Control	2567	86.4%	9.9	20	100
Science- Treated	215	80.4%	12.7	24	100
Soc Studies- Control	2568	83.0%	9.71	29	100
Soc Studies- Treated	216	77.5%	10.88	43	100

Third party waivers with the school system also allow the M&Ms program to communicate with the teachers and school administrators on individual student information as needed. The percentage grade achieved in Quarter 1 in the treatment group is approximately 6% lower verses the grade achieved in Quarter 1 for the control in all four subjects.

Research Method:

A majority of students enroll in the M&Ms program with a start date in early October, just prior to the beginning of the 2nd Nine Week Grading Period. Quarter 1 grades reflect student achievement prior to treatment. For the purposes of this study, Quarter 4 grades (after treatment) in Language Arts, Math, Science and Social Studies were compared to Quarter 1 grades (before treatment) in the same subjects to analyze the difference in grade change for students who attended the M&Ms program compared to those who did not while controlling for all variables (listed in Table 5.) Students are encouraged to attend M&Ms at least one and up to four days per week throughout the school year (excluding holidays and school in-service days). Since the program is completely free but optional for students, there are some students who enter and leave the program at different points throughout the school year.

In this model, all students who attended at least one day of the M&Ms program are considered "treated" compared to a control group of de-identified middle school students who never attended the M&Ms program. Students who enrolled in the program but did not attend a single day were moved to the "untreated" group. In the future, this group could be moved to an "intent to treat" arm of the study, but at present the number of observations that fit this category is simply too small. Also, students who were treated in one year but dropped out of the program were considered to be treated in Tenure 1 (year 1) but not treated in subsequent years.

In order to match the students in the treatment group more closely with the control, propensity score matching was employed, to ensure that the treatment and control groups were as similar as possible in measured dimensions. The following process was followed for each of the four core subject areas:

1. A probit was run in STATA to regress the explanatory variables ethnicity, free and reduced price lunch, quarter 1 grade in the subject and gender on "treatment".

2. Students were matched to their "closest neighbor" in the control group based on the propensity scores obtained above, indicating that their ethnicity, free and reduced price lunch status, quarter 1 grade in the subject and gender were similar.

3. These closest matches became the control group for the regression analysis, described below.

Linear Regression:

The following linear regression model was used:

$$\mathbf{Y_i = \beta_0 + \beta_1 Tenure_1 + \beta_2 Tenure_2 + \beta_3 Tenure_3 + \beta_4 Attend_4 + \beta_5 AwardAll_5 + \beta_6 Grade7_6 +}$$

$$\mathbf{B_7 Grade8_7 + \beta_8 FRPL_8 + \beta_9 Female_9 + \beta_{10} African_{10} + \beta_{11} Hispanic_{11} + \varepsilon_i}$$

Where $\mathbf{Y_i}$ is the grade achievement of student i controlling for student i's tenure in year 1, 2 and 3, attendance, award points, grade in school, free or reduced price lunch status, gender, and binary variables for ethnicity plus a random error term.

Results:

Initially, regression analysis models looking at grade change in the four core subject areas were run against days of attendance and behavior (as measured by award points) and a variety of the other explanatory variables, but this was not indicating any statistically significant effects on grade change for the treated group. Also the regression was run using a dichotomous variable for treatment (1= yes or 0= no), but treatment and tenure become perfectly multi-collinear since everyone with any level of tenure is also treated. Since tenure, by definition, is able to capture the treatment group, regressions were run again with tenure, allowing the model to capture any potential effects from the length of treatment. Propensity score matching reduces the sample size from 2,742 to 347, but is supposed to focus the estimation on relevant observations. The

coefficients reflect the difference in grade improvement that these students have over the untreated group who never attended the program.

Running the regression analysis above, the results in **Table 7** indicate that students in the Mentors & Meals program had a statistically significant improvement in their Language Arts percentage of grade achievement at a 95% confidence level. In other words, first-year students in the treatment group had an improvement in Language Arts from the 1st quarter to the 4th quarter of 4.75% compared to similar controls. There were no statistically significant changes in Math, Science or Social Studies.

Running the regression analysis without Propensity Score Matching and using the full sample of 2,742 observations, the results (**Table 8**) indicate a statistically significant improvement of 6.08% in Language Arts grade in Tenure 1 at the 99% confidence level, an improvement of 3.85% in Tenure 3, and a statistically significant improvement of 4.74% in Social Studies in Tenure 3. The two methods are both statistically sound methods of data analysis. The method of program analysis may be dictated by the program itself, the grantor, or the preferred method used by a particular academic institution or department.

Findings and Conclusions:

There are certainly many reasons to develop a non-profit like M&Ms besides improving grades. Simply providing a safe place for young teens to gather in the after-school hours from

Table 7: *Regression with Propensity Score Matched Control*

VARIABLES	Language Arts	Math	Science	Social Studies
tenure 1	4.749**	-2.418	0.535	-2.777
	(2.304)	(2.290)	(2.424)	(1.895)
	0.0401	*0.292*	*0.825*	*0.144*
tenure 2	0.444	-2.859	-3.667	-1.978
	(2.422)	(2.542)	(2.924)	(1.927)
	0.855	*0.262*	*0.211*	*0.305*
tenure 3	2.188	4.531	-7.146*	2.316
	(2.850)	(3.781)	(3.938)	(2.186)
	0.443	*0.232*	*0.0705*	*0.290*
attend	-0.0391	0.0194	0.0263	0.00197
	(0.0561)	(0.0418)	(0.0470)	(0.0339)
	0.486	*0.643*	*0.576*	*0.954*
award	-0.00338	0.00958	-0.0267	0.0111
	(0.0244)	(0.0178)	(0.0227)	(0.0158)
	0.890	*0.590*	*0.239*	*0.482*
grade7	0.873	-2.144	3.968*	-1.182
	(1.874)	(1.767)	(2.042)	(1.467)
	0.642	*0.226*	*0.0528*	*0.421*
grade8	-1.822	-0.290	1.915	-0.267
	(2.121)	(1.912)	(2.068)	(1.643)
	0.391	*0.879*	*0.355*	*0.871*
frpl	3.548**	1.070	-2.559	-0.835
	(1.589)	(1.402)	(1.600)	(1.188)
	0.0262	*0.446*	*0.111*	*0.483*
female	-0.196	-1.250	3.791**	-1.166
	(1.496)	(1.354)	(1.570)	(1.096)
	0.896	*0.356*	*0.0163*	*0.288*
African	-3.811	0.733	-0.148	-1.774
	(2.649)	(2.694)	(2.356)	(2.372)
	0.151	*0.786*	*0.950*	*0.455*
Hispanic	-2.394	-0.708	-0.800	-0.981
	(1.575)	(1.455)	(1.697)	(1.111)
	0.129	*0.627*	*0.637*	*0.378*
Constant	0.783	3.327	-0.287	4.270***
	(2.110)	(2.131)	(2.225)	(1.637)
	0.711	*0.119*	*0.897*	*0.00950*
Observations	339	340	347	346
R-squared	0.055	0.040	0.060	0.033

Robust standard errors in parentheses
P value in italics *** p<0.01, ** p<0.05, * p<0.1

Table 8: *Regression with Treated and Full Sample Control*

VARIABLES	Language Arts	Math	Science	Social Studies
tenure 1	6.079***	-1.135	2.897	-0.0688
	(1.940)	(2.069)	(2.147)	(1.688)
	0.00175	*0.583*	*0.177*	*0.967*
tenure 2	2.294	-2.254	0.573	1.276
	(1.902)	(2.125)	(2.505)	(1.571)
	0.228	*0.289*	*0.819*	*0.417*
tenure 3	3.845*	5.074	-3.702	4.741***
	(2.238)	(3.503)	(3.625)	(1.729)
	0.0859	*0.148*	*0.307*	*0.00615*
attend	-0.0387	0.0222	0.0335	0.000203
	(0.0536)	(0.0406)	(0.0434)	(0.0319)
	0.470	*0.585*	*0.440*	*0.995*
award	-0.00632	0.00614	-0.0306	0.00892
	(0.0231)	(0.0170)	(0.0207)	(0.0148)
	0.784	*0.719*	*0.140*	*0.548*
grade7	0.114	-1.263***	0.972**	-2.346***
	(0.497)	(0.472)	(0.491)	(0.431)
	0.818	*0.00746*	*0.0478*	*5.68e-08*
grade8	-2.333***	0.328	0.130	-0.683
	(0.478)	(0.525)	(0.487)	(0.470)
	1.14e-06	*0.532*	*0.790*	*0.147*
frpl	1.823***	-0.300	-2.703***	-0.627
	(0.494)	(0.477)	(0.471)	(0.417)
	0.000227	*0.529*	*1.08e-08*	*0.133*
female	-0.306	0.383	1.787***	0.242
	(0.405)	(0.406)	(0.416)	(0.359)
	0.449	*0.346*	*1.84e-05*	*0.500*
african	-1.150	0.644	0.0523	-0.990
	(1.140)	(1.101)	(1.062)	(1.052)
	0.313	*0.559*	*0.961*	*0.347*
hispanic	-2.088***	0.223	-0.570	-0.372
	(0.716)	(0.750)	(0.753)	(0.621)
	0.00355	*0.766*	*0.449*	*0.549*
Constant	0.760*	1.589***	-0.818**	0.975**
	(0.403)	(0.420)	(0.400)	(0.385)
	0.0592	*0.000160*	*0.0408*	*0.0115*
Observations	2,731	2,693	2,741	2,742
R-squared	0.026	0.010	0.029	0.017

(Robust standard errors in parentheses)
P value in italics *** p<0.01, ** p<0.05, * p<0.1

3:00- 6:00 p.m. has been proven to reduce risky behaviors like alcohol use, drug use, or sexual activity (Afterschool Alliance,2009). The fact that M&Ms provides a snack and a hot meal provides assistance for students with food insecurity. Those who have food available but no parent at home may also benefit, as students at M&Ms are communicating with others around a table instead of eating alone in front of a television or computer screen. Some students attend M&Ms because they have a group to identify with at the program they don't have at school. There are many social services reasons for developing an after school program, however, the stated goal of M&Ms is to "enhance academic achievement". The "Future Implications" section will look at these findings from a Researcher, Executive Director and Program Director standpoint

Overall, the Mentors & Meals after school program had a statistically significant effect on Language Arts with students attending in their first year of participation in the M&Ms program under a very rigorous analysis method. Students, especially those for whom English is their second language, are given attention in the small group mentoring environment at M&Ms and appear to benefit from this type of model compared to controls. An almost 5% improvement in grade could bring a student from a mid-D (65%) to a passing grade of C (70%) or from a starting score of 75% (the mean grade in the untreated group) to a B (80%) using a 100 point grading scale.

Rita Pierson, a professional educator since 1972 and leader of professional development seminars for thousands of educators said during a recent *Ted Talk*; "Kids learn best from people they like" (Pierson, 2013) and in this case, the high school, college and adult mentors are providing the primary relationships that come with a high degree of attachment, trust, and enjoyment as mentioned in the beginning of this capstone.

Limitations

As with many studies involving student achievement, a major limitation comes from selection bias and lack of randomization of participants to the Mentors & Meals program. As noted, in the first year of the program, all 6th grade students were informed of the opportunity to participate, but what was it about those first 40 who chose treatment? In order to quantify the effect that comes from only the treatment and not from other, unobservable characteristics (i.e. parent motivation, student motivation) a study would need to choose students on a completely random basis. Since the goal of the program is to help students in the education gap, this may not be feasible until the program gets to the point of having a waiting list. In the future, students randomly chosen to participate from a waiting list would constitute a more randomized sample of observations.

As mentioned earlier in the paper, there were 20 observations in which the student had enrolled but did not attend a single day of the program. Unfortunately, there was little data collected on these students because the program did not have the student's infinite campus username and password, so these students were moved to the control group. The information for username and password is now requested on the enrollment form and it may be possible to include these students as an "intent to treat" arm in the future.

The lack of controlling for mentee and mentor relationship is another distinct area for improvement. There are many different mentors with different skills, experiences and personalities. Establishing some measurement for the effect of mentors on students as well as the affect the M&Ms program has on the mentor could be of some value to the program and opportunity for additional research.

The quantity and quality of data is always a limitation. The more relevant data that can be collected and the higher the quality of that data, the better. Especially using the propensity

score matching method, more observations are better and as the program grows, there will be more observations to add to the treatment group.

The choice of using student grade change in each subject rather than standardized test scores as the dependent variable could be considered a limitation. On one hand, standardized test scores are the "gold standard" and provide some measure of consistency while grades are more subjective and can vary by subject, teacher, grade, personality, and student interest. On the other hand, this mentoring program is designed to help students with academic achievement which is somewhat defined by the M&Ms program as improvement in grades, homework completion and the development of study skills or habits the student will carry with them to high school and beyond. Under this umbrella, measuring the improvement in grades per subject and in grades over time in program make some sense.

Future Implications/Recommendations:

From A Researcher's Perspective

Data collection is both cumbersome and time consuming. If the Mentors & Meals program is to grow and expand into other counties with additional sites sharing similar information, it will be critical to implement a software program that is able to collect and manage data from multiple sites in order to securely add large amounts of information to the data base which has already been started for this capstone. Adding MAPs, KPREP and other standardized test scores to the data collection would also be helpful. Obtaining both a higher quantity and additional measurements of academic achievement will strengthen analysis in the future.

Tracking Mentor and Intern effects- finding a way to collect and analyze mentor effectiveness as well as the effect of the Mentors & Meals program on the mentors themselves- would be useful and could be the subject of another capstone project for an intern in the future.

In the current model, mentor hours are collected and their overall grade point averages are recorded. Since Mentors can choose to contribute as many or as few hours as they are able, it is often difficult to track the exact mentor to mentee interaction. In addition, the mentors often switch which students they are responsible to mentor on a weekly basis. The longer a mentor is with the program, the more students with whom they have the opportunity to interact. The paid interns are more consistent, often dedicating 50-100 hours per semester, so that might be the group in which to start tracking an intern/student interaction. The adult volunteers are also more consistent about the day of the week they come to do their mentoring, so it would be possible to track the mentor-mentee relationships for the Interns and the Adult volunteers initially and then roll it out to include other mentors. The M&Ms program has obtained a license to use the software "Salesforce" which can be configured to meet the needs of this particular program and would be able to include a way to manage these variables if identified, measured and tracked. It is my suggestion that Mentors & Meals implement this program sooner rather than later.

To answer the question of randomization, the program could do two things. First, it is my recommendation that the program start a waiting list by enrolling students earlier, at the end of 5th grade, instead of waiting until the beginning of the 6th grade year. This would increase the number of students who wish to be treated. Second, based on the number of slots available, students on the waiting list could be randomly selected to participate. Data could be collected for both those who were selected and those who were not selected and, if evaluated equally, the two groups would be a more randomized sample and less subject to selection bias. This also means, however, that the program director would need to advise and ensure all enrollees sign off on allowing the program to have access to infinite campus information for research purposes whether their student is selected or not selected to participate in the M&Ms program.

From a Program Director Perspective

One of the early observations in the study is that the primary care giver of the Mentors & Meals students are less educated than the percentages for the state and the nation. This may be an opportunity area for the program in the future. While again difficult to assess, it is my recommendation that the program involve the primary care giver in their student's participation in both M&Ms and school activities. While this may be easy to say, it is more difficult to achieve. Educating the primary parent on the importance of education and the benefits to the student, and ultimately the family, could have powerful outcomes if the program could find a way to implement and measure it.

The Science subject area showed no improvement. M&Ms has a collaborative relationship with Newton's Attic to provide STEM services once per week. It is recommended that the M&Ms program interact more frequently with the middle school Science department and find additional ways the STEM program could correspond more closely with the school district and the state's Science curriculum and goals.

From an Executive Director Perspective

The results of this preliminary data may be a positive message to the Staff, Board of Directors and volunteer base. While we qualitatively observe the strong relationship-building component between mentors and students and understand the importance of keeping students in a safe, drug and alcohol-free environment from 3:00-6:00 p.m, the results of this report indicate the program is showing some improvement in academic achievement in at least one or two of the four subject areas in a rigorous evaluation of treatment versus controls. There is always room for

improvement by collecting additional data, a higher number of observations, and analyzing the cost/benefit of the program in the future.

From a fundraising perspective, these data provide not just a qualitative but also a quantitative aspect to Mentors & Meals which may enhance future local, state and federal grant opportunities. Both the rigorous regression analysis with propensity score matching and regression analysis with the full control sample concludes there are positive gains in Language Arts controlling for all other factors for students who are in the education gap. With a high number of Hispanic students, this is positive news and indicates the program is achieving the goal of enhancing academic achievement in middle school students through mentoring in Language Arts as early as the first year.

In conclusion, this Capstone analysis has added another perspective to the body of evidence regarding after school programs and provided an analytical approach towards assessing the effect of the Mentors & Meals program on student grades.

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