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Demography as Destiny: The Role of Parental Involvement and Mathematics Course Taking Patterns among 9th Grade Students

Kate M. Degner
University of Iowa

This study uses data from the National Center of Education Statistics (NCES) High School Longitudinal Study of 2009 (HLS:09). Parent responses to the Parent Involvement survey, given as part of the NCES study were considered, along with their child's socio-economic status (SES) and self-reported level of mathematics course enrollment during their ninth grade year of high school. The purpose of this study is to identify parent behaviors that result in their child enrolling in upper level mathematics coursework in high school, regardless of SES. Seven, two-factor ANOVA tests were conducted to determine interaction effects between types of parent behaviors and level of ninth grade mathematics course enrollment. The interaction effect between Child Activities and SES was found to be significant. The main effect of SES, as well as school choice, Parent Involvement (School), Parent Involvement (Home), and Child Activities were also found to be significant. The main effect of a student's SES was significant, in terms of level of ninth grade mathematics course enrollment. The findings from this study suggest that when students from lower SES background are grouped homogenously in a school related setting and out of school experiences, the level of mathematics course enrollment is lower in comparison to their middle and upper class counterparts. The findings from the study are also consistent with previous studies, noting the profound effect SES has on a child's schooling experience.

Keywords: mathematics, education, course taking, SES, parent involvement

Parent involvement in a child's school experience can influence both the quality and length of a child's schooling. Success in school depends on a family's involvement in preparing their children for the beginning of formal education and the extended involvement of parents once formal schooling begins. Inversely, parents of school children also must depend on schools to provide their students with a quality education and give them the tools to be successful after formal K–12 schooling is complete (Lareau, 2004).

Numerous studies have been conducted on the ways parents become involved in the school-lives of their children (Lareau, 2002, 2004; Lareau & Cox, 2011; McFarland & Rodan, 2009; Payne, 2005; Reigle-Crumb & Grodsky, 2010) and the implications of such involvement. Many of these same studies have found that while most parents are involved in the school-lives of their children, parents from higher socio-economic status (SES) backgrounds and those with more education tend to employ more effective methods of involvement in the school-lives of their students, as measured in grades in school, track placement, course selection, and persistence toward high school graduation. These all lead to a more meaningful educational experience for their children, in terms of both long and short term achievement effects as well as positive social experiences with teachers and other school personnel within their child's school experience.

Payne (2005) and Lareau and Cox (2011) explain

the connection between parent involvement and demography, as it relates to the school experience of their children. Payne (2005) focuses on the "hidden rules" of the middle class that parents and students must be able to employ in order to effectively work within the confines of the public school. Payne (2005) defines hidden rules as the rules families are expected to play by in the institution of school. That is, school personnel expect that conversations will be conducted in the formal register (Joos, 1967) of speech. Additionally, the school expects to converse with parents and students in what she calls an "adult voice", that is being able to negotiate with other adults in the school building without providing value judgments or becoming emotional. In general, Payne (2005) asserts that because parents and students from lower SES backgrounds tend not to understand how to play within the rules of the school they have less success navigating the school system, which in turn means less success in school.

Lareau and Cox (2011) classify the importance of parental involvement in the institution of schooling in global and case-specific ways. When parents participate in their child's schooling globally, they understand the education system as a whole. For example, parents understand that enrolling their students in the highest tracks available, regardless of the academic area or grade level will likely produce larger dividends at the end of the child's school career. Parents also interact with their child's school in case-specific ways, including coming in to a teacher's classroom to discuss a specific incident at school that the parent thinks needs more attention. Lareau and Cox (2011) find that middle class families tend to possess more global and case-specific knowledge about their child's school and academic performance, than their working and lower class counterparts. They are able to use this knowledge to "untie knots" in their child's school experience. Through personal correspondence with Professor Lareau (October 17, 2011), she points out that the act of parents untying knots for their children in one case when dealing with the school may or may not have an impact on the overall educational outcome of their students. However, it is knowing when to untie these knots and the succession of intervention that ultimately differentiates the way middle class parents influence their child's school experience, compared to working and lower SES parents.

Crosnoe, Mistry, and Elder (2002) found that parents from economically disadvantaged backgrounds tend to be more pessimistic about the chances that their children will be able to attend college in the future. They found that this sense of pessimism tended to enter into conversations about schooling, sending the message to students that regardless of their course taking decisions or academic performance, they would not be able to attend college or do well in school because of their SES background or other life experiences. Battin-Pearson et al. (2000) found that parents tended to convey the message to their children that their experience in school would be like their own. Hill et al. (2004) also determined that children from lower SES backgrounds were more likely to model their parents' lower levels of educational attainment. In many cases, low SES families have not experienced the benefits of earning a quality education, both during their K–12 schooling experience and after high school, thus making it harder for them to portray or understand the importance of a quality education to their children. In contrast, the parents in Tyson's (2011) study largely blamed their lack of academic success on themselves instead of the school. Similarly, Payne (2005) finds that even when parents try to convey a positive message about school and the possibility of upward mobility, they lack the resources to make this a reality for their children.

Mathematics Course Taking and Parental Involvement

Many national studies highlight the importance of mathematics course-taking in high school as it relates to persistence toward degree attainment in college, future salary potential, and high school achievement (Adelman, 2006; Sadler & Tai, 2007). Students enrolling in advanced coursework (that is coursework beyond the Algebra II level), are more likely to both attend and finish college, more likely to enroll in a selective four-year university (Riegle-Crumb & Grodky, 2010), and more likely to have high educational goals for themselves and take more rigorous classes in high school regardless of subject area. (Oztuk & Singh, 2006; Schornick, 2010). Because mathematics course selection is so strongly correlated to these aspects of post-secondary success, the disparity between low SES and middle and upper class student course-taking patterns is especially alarming. It appears as though students are selecting out of these courses, and by doing so they are selecting themselves out of key opportunities for post-secondary success.

Lee and Burkam (2005) used a large national dataset-the ECLS-K (NCES, 2000) to examine the relationship between SES and mathematics achievement at the beginning of a child's formal schooling career. They found that nearly one fifth of the total variance in mathematics achievement in kindergarten is explained by a family's SES. According to their study, a student's SES accounts for the largest variance in mathematics achievement among kindergarten students, even after types of parent involvement are considered.

The disparity in student course selection is perhaps the most notable in advanced mathematics course taking among students. Caro, McDonald, and Willms (2009) found that while an achievement gap exists between the upper quartile and lower quartile of students, according to SES, this difference doubles in mathematics achievement by age 12 (about halfway through their formal K–12 schooling) and continues to widen until graduation. This difference in mathematics achievement

likely becomes more pronounced because of exposure opportunities to advanced mathematics course-work, peer group influences, and because of student attitudes toward schooling, and advanced mathematics course taking.

Children who have parents involved in course taking decisions about secondary mathematics classes tend to have children who enroll in a higher level of mathematics coursework, compared to children who are left to make course taking decisions on their own (Brantlinger, 2003). Crosnoe and Schneider (2010) found that discussions about mathematics course taking in high school occurred less frequently among students, teachers, and parents when children were from lower SES backgrounds. Brantlinger (2003), Crosnoe and Schneider (2010), and Tyson (2011) assert lower level course enrollment among students from low SES backgrounds is a result of parents from these backgrounds being less involved in the school lives of their children.

Purpose of the Study

The purpose of this study is to identify factors that may explain the enrollment patterns in mathematics curriculum tracks, especially as they affect children from lower SES settings. This study used data obtained from the 2009 High School Longitudinal Study (HSLS:09) (Ingels et al., 2011) to identify parent behaviors that correlate with enrollment in upper level mathematics courses. The specific activities these parents engage in are identified as parental involvement. The hypothesis is that parents, whose parenting behaviors can be characterized as pro-school, what Lareau (2004) and Cheadle and Amato (2011) call Concerted Cultivation, will be more likely to have children who enroll in upper level mathematics course work at the beginning of their high school career, regardless of SES. Additionally, the study asked whether, middle and upper class parents are more likely to engage in certain forms of parental involvement, thus offering an explanation for their particular higher enrollment in upper level mathematics courses.

The research questions for this study are:

1. What relationship does parental involvement have with the mathematics course-taking decisions of school children?
2. Are middle and upper class parents more involved in school than their lower and working class counterparts?
3. Is there a profile of characteristics to a particular form of parental involvement that explain the mathematics course taking decisions of school children?

Research Instrument

The survey used for this study was designed by the National Center for Education Statistics. Public access data was used for this study. Four different groups of people participated in the data collection of the overall HSLS:09, including ninth grade students, school counselors or administrators, school mathematics, science, and English teachers, and parents of the 9th grade students selected for the study. Because the focus of this study is on parental involvement, only survey responses from the Parent Involvement section of the Parent Questionnaire were considered. These survey results were matched with their child's responses for their ninth grade course-taking patterns. Of the 28 parent responses on the Parent Involvement section of the questionnaire 12 were tested for reliability. Only those questions not included in previous NCES studies and questions whose responses were not anticipated to have changed over the course of three months were tested for test-retest reliability. Eight of the 12 questions were at or above the reliability threshold of 85%. Four of the items included in the parent questionnaire had reliability between 65% and 85% (Ingles et al., 2010).

Information about the student's 9th grade mathematics course enrollment was reported by the students on the student survey. Students were instructed to select all the mathematics courses they were enrolled in during ninth grade using the following options; Algebra I, Geometry, Algebra II, Trigonometry, Review/Remedial Mathematics, Integrated Math I, Statistics, Integrated Math II, Pre-Algebra, Analytic Geometry, Advanced Mathematics, no mathematics course enrollment, and other.

All information collected about each student, including all survey responses and test scores were aggregated at the student level and reported out by the NCES according to assigned student identification numbers (Ingles et al., 2011).

Sample

Students were selected to participate in this study through a 2-stage identification process. First, 1,889 schools were selected from a stratified random sample of school districts in the United States. The strata for this first stage of selection were defined by the cross section of three variables; school type (public, private-Catholic, private-other), region (Northeast, Midwest, South, West), and locale (city, suburban, town, rural). Then, students from each of the identified schools were randomly selected for participation in the study. This process resulted in 25,206 students who participated in the study (Ingles et al., 2011).

Parents who completed the questionnaire were selected because their students had been identified to participate in the study. Only one parent completed a survey for each student. Parents chose which parent would complete the questionnaire. The instructions to the parents indicated that the parent who was most involved in their ninth grader's schooling should complete the survey. Of the 25,205 eligible parents, 16,995; 67.5%, of parents completed the parent questionnaire for their ninth grade child. Non-response bias tests were run to by NCES, the results of the tests found that the non-response

bias for the parent questionnaire were negligible (Ingles et al., 2011).

Procedure

A two-factor design was used to measure the influence of parental involvement on mathematics course taking. The use of a two-factor design controlled for a student's SES and accounted for the variety of parent responses on the surveys. For this study, the main interest was in the interaction effects between parent activities and SES of survey participants. This study also considered the main effects of Factor A (parent activities). Previous research indicates that there is a strong main effect of Factor B (SES).

The NCES reported participant's SES levels as quintiles. The students in the lowest quintile were assigned an SES score of 1, middle low = 2, middle = 3, middle high = 4, high = 5.

Because of the widely noted "Catholic school effect," (Borman & Dowling, 2010; Coleman, 1987; Willms, 2003) all student and parent responses from children who attended Catholic and private schools in ninth grade were omitted. A total of 3,933 surveys were omitted because they were from private or Catholic schools. Small public schools, or rural public schools were included as part of the dataset.

The "Catholic school effect," speaks to the limited number of courses offered in a school setting, thus eliminating the number of tracks available to students in high school. Additionally the Catholic school effect notes the impact that a close knit community of parents, students, and teachers can have on students from backgrounds with parents who are not involved in the lives of their children. Because the focus of this project is to try to identify parent behaviors that lead to higher level mathematics course enrollment it seemed that both of these factors associated with Catholic school attendance would not accurately portray the influence that parents have over mathematics course-taking in this setting.

Surveys of students who did not indicate their ninth grade mathematics course placement and surveys of students whose parents either did not complete any part of the parent questionnaire or who completed parts of the parent questionnaire, but did not complete the Parent Involvement section or only completed part of the section were also omitted. Partially completed parent questionnaires were omitted because the NCES did not recommend imputing data for any variables measured in the Parent Questionnaire part of the survey (Ingles et al., 2011).

The sample of research participants totaled 21,445; 16% of the total sample consisted of the lowest quintile SES background, 17.3% were from the low middle quintile, 19.7% from the middle quintile, 21.2% were from the middle high quintile, and 25.7% were from the highest SES quintile. After omitting the surveys described above, there were 10,968 study participants. About 18.3% of this sample made up the lowest SES quintile, 18.4% were from the lower middle quintile, 18% from the middle quintile, 18.8% from the middle high quintile, and 25.6% of the student participants were from the highest quintile.

Mathematics course-taking patterns were divided into 3 categories; standard, midlevel, rigorous. Each level was assigned a value of 1 – 3. Standard level course taking = 1, midlevel = 2, and rigorous = 3. These levels are defined by Nord et al. (2011) as follows; a student in the standard mathematics track has earned three credits in mathematics throughout their high school career, but none of the credits earned are past Geometry. The midlevel course-taking pattern includes Geometry and Algebra II course taking, as well as earning at least three credits in mathematics. Rigorous course taking is defined as enrolling in one other mathematics course, beyond Geometry and Algebra II, as well as earning at least three credits in mathematics. McClure (1997) makes the distinction that years of mathematics course taking should not be the only determining factor when considering the level of course taking. Since schools offer a variety of mathematics courses, it is possible for students to take four years of mathematics classes and still not enroll in any class beyond Geometry. Kelly (2007) also makes note of this phenomenon as a way schools have responded to increased Carnegie Unit requirements for graduation in mathematics.

Nord et al. (2011) defined these levels of mathematics course-taking as a way to classify a student's academic level at the end of their high school career. Because this study only had access to freshman year course enrollment, freshman-level courses were used to classify students according to where their entrance in the mathematics pipeline might take them. Since the majority of states require three Carnegie Units in mathematics for graduation, a student's starting mathematics placement was used and then a likely placement in mathematics at the end of three years of mathematics course taking was projected.

For the purposes of this study students enrolled in Pre-Algebra, Remedial/Review Mathematics, or Other as freshman were considered to be at the standard level of mathematics course-taking; students starting in Algebra or Integrated Mathematics I enrolled in a mid-level course-taking pattern, and those students enrolled in Geometry, Algebra II, Integrated Mathematics II, Advanced Mathematics, Statistics, or Analytic Geometry were considered to be taking mathematics at the rigorous level as freshman. Students who reported not being enrolled in a mathematics course at all during their freshman year were assigned a value of zero. Some students reported that they were enrolled in more than one mathematics course during the fall of their freshman year. Students enrolling in more than one course were assigned the value associated with the most advanced course reported.

Additional descriptive statistics were also used in order to describe specific parent behaviors that may result in upper level mathematics course enrollment as freshmen. This study looked at the mean and standard deviation for all parent behaviors listed among the 7 survey questions. For these statistics, average course

Table 1
Description of 2-Factor ANOVA Categories and Variables

Name of Variable	**Survey Question**	**Responses**	**Category for ANOVA**
School Choice	Is your child's school assigned or chosen?	Assigned, Chosen Assigned, but would have chosen	0 = Assigned 1 = Chosen & Assigned, but would have chosen
Parent Participation (School)	Since the beginning of this school year have you or other adults in your household . . . Attended a general school mtg? Attended PTO mtg? Gone to P/T conference? Attended class event? Volunteered at school? Participated in fundraising? Met w/school counselor?	Yes, No	0 = 0 – 1 "yes" 1 = 2 – 4 "yes" 2 = 5 – 7 "yes"
Frequency of Hmwk Help	During this school yr, about how many days/wk do you or another adult in your household help w/hmwk? Would you say . . .	Never, <1, 1 – 2, 3 – 4, 5 or more	0 = Never, <1 1 = 1 – 4 2 = 5 or more
Confidence in Hmwk Help	How confident do you feel about your ability to help w/the hmwk this year in math?	Very confident, somewhat confident, not at all confident	0 = Not 1 = Some 2 = Very
Gender	In general, how would you compare males and females in math?	Females are much better, females are somewhat better, females and males are the same, males are somewhat better, males are much better	0 = Females some/much 1 = Same 2 = Males some/much
Child Activities	During the last 12 months, has [your child] participated in any of the following activities outside of school?	Arts Organized sports Religious studies Scouting/Club Academic instruction Math/science camp Another camp None of these	0 = None – 1 1 = 2 – 4 2 = 5 – 7
Parent Activities (Home)	During the last 12 months, which of the following activities have you or another family member done with [your child]?	Visited museum/zoo Computer Fixed something Attended science fair Helped w/ science fair project Discuss STEM issues Visited a library Attend live show None of these	0 = None – 1 1 = 2 – 4 2 = 5 – 8

Table 2
Two-factor ANOVA for Child Activities with Mathematics Course Enrollment and SES Background

Source	Sum of Squares	d.f.	Mean Square	F	Sig.
SES Quintiles	526.301	4	131.575	171.690	.000
Child's Activities	24.103	2	12.052	15.726	.000
SES by Child's Activities	14.143	8	1.768	2.307	.018
Error	8374.696	10928	.766		

enrollment for all combined SES backgrounds were calculated. A t-test was used to identify means that were statistically significant.

An alpha level of .05 was used to test for significance. With an alpha level of .05 and a sample size of 10,968 the power of the ANOVA is 81% (Statistical Power Calculator, 2010). Typically any statistical test with power greater than 80% is acceptable (Gatti & Harwell, 1998). The purpose of this study is to find parent behaviors that may lead to persistence in upper level mathematics course enrollment in high school. By allowing the alpha level to be more liberal, the two-factor tests are more sensitive to finding potential parent behaviors that may lead to higher-level mathematics course enrollment. This may indicate areas for further study, related to parent involvement and mathematics course taking.

Parent responses to seven questions on the Parent Involvement Survey were the variables in this study. Table 1 identifies the seven variables tested as well as the categories used in the two-factor ANOVA. A complete questionnaire is included in the Appendix.

The variables Parent Participation (School), Parent Participation (Home), and Child Activities are the categories used by Cheadle and Amato (2011) in their use of ECLS data to analyze the idea of Concerted Cultivation (Lareau, 2004). However, Cheadle and Amato (2011) divide Concerted Cultivation into three components, Parent Participation, Child Activities, and Academic Resources. This study divides their term Parent Participation to distinguish between activities that parents participate in at home and at school. This distinction is reasonable because the national dataset that Cheadle and Amato (2011) used only asked about parent participation at school.

Results

Child Activities

The variable Child Activities was shown to significantly interact with mathematics course enrollment and SES background at the .05 level.

It seems that the frequency with which children engage in these types of activities plays out differently in terms of level of mathematics course taking with children from differing SES backgrounds. The means for this category indicate that the number of behaviors associated with involvement, may impact the mathematics enrollment levels of students in different ways across SES levels.

According to the collected data, as students from the middle low (SES 2), middle (SES 3), middle high (SES 4), and high (SES 5) backgrounds enroll with greater frequency in these child activities, the mean level of freshman mathematics course enrollment increases.

The simple main effects follow up to this test also indicate a significant difference in level of course enrollment between levels of frequency of Child Activity behaviors for quintiles two, four, and five of SES. For students from the middle-low and middle-high quintile of SES, the follow up test for simple main effects indicated that the difference in course level enrollment when students participate in 2 – 4 activities, or 5 – 7 activities, is significantly higher than the students in the same

Table 3
Simple Main Effects of Child Activity

SES Quintiles	Sum of Squares	d.f.	Mean Square	F	Sig.
1	1.919	2	.960	1.252	.286
2	11.071	2	5.535	7.223	.001
3	1.869	2	.934	1.219	.295
4	11.904	2	5.952	7.767	.000
5	11.483	2	5.742	7.492	.001

Table 4
Two-factor ANOVA for Child's Activities with respect to Parent Involvement

Source	Type I Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	564.547[a]	14	40.325	52.619	.000
Intercept	44781.757	1	44781.757	58434.961	.000
SES Quintiles	526.301	4	131.575	171.690	.000
Child's Activities	24.103	2	12.052	15.726	.000
SES Quintile * Child's Activities	14.143	8	1.768	2.307	.018
Error	8374.696	10928	.766		

Table 5
Two-factor ANOVA for Parent Involvement (Home)

Source	Type I Sum of Squares	Df	Mean Square	F	Sig.
SES Quintiles	526.301	4	131.575	171.100	.000
PI (Home)	5.625	2	2.813	3.657	.026
SES Quintile * PI (Home)	3.709	8	.464	.603	.776
Error	8403.607	10928	.769		

Table 6
Two-factor ANOVA for Homework Help

Source	Type I Sum of Squares	df	Mean Square	F	Sig.
SES Quintiles	526.301	4	131.575	172.195	.000
Hmwk Help	55.029	2	27.515	36.009	.000
SES Quintiles * Hmwk Help	7.746	8	.968	1.267	.256
Error	8350.167	10928	.764		

quintile who participated in 0 – 1 of these activities. For students in the highest quintile of SES the difference in course level enrollment is statistically significant when students participate in 2 – 4 and 5 – 7 activities, compared to students participating in 0 – 1 activities. Students in the highest quintile of SES who enroll in 5 – 7 activities, compared to 2 – 4 activities also enroll in a significantly higher level of mathematics coursework.

Main Effects

As expected the main effects of SES are significant. That is, there is a significant difference in level of mathematics course enrollment according to the SES quintiles used in this study. The average course enrollment level for a student from the lowest quintile was 1.70, while the average course enrollment level for a student from the highest quintile was 2.34. Recall that according to Bozick and Ingles (2008), the standard level of enrollment that is needed for college admittance and high school graduation in most states, is two.

The descriptive statistics for level of mathematics course enrollment indicate that as the mean level of course enrollment increases, the standard deviation for level of mathematics course enrollment decreases. That is, not only are children from higher SES backgrounds enrolling, on average, in a high level of mathematics coursework they are also doing so with less variability. This means that students from the highest SES quintile are enrolled in high-level mathematics classes, on average, and that there are fewer students in a substantially lower course placement track.

In many cases the main effects of parent behaviors were also significant. In particular the frequency with which children engaged in Child's Activities and Parent Involvement (Home) positively

Table 7
Frequency of Parent Behaviors by SES

Parent Behavior	SES Quintiles 1 and 2	SES Quintiles 3, 4, and 5
School Choice	42%	44%
Parent Involvement (School)	76%	88%
Homework Often	49%	38%
Child's Activities	47%	70%
Parent Involvement (Home)	88%	96%

Table 8
Average Level of Course Enrollment by Participation in Activities

Type of Activity/Activity	Yes	No
Parent Involvement (School)		
General School Mtg*	2.05	1.88
PTO Mtg	2.03	2.01
Attend P/T Conferences	2.01	2.02
Attend School Event*	2.09	1.88
School Volunteer*	2.14	1.98
School Fundraiser*	2.11	1.93
Mtg with a School Counselor*	1.98	2.04
Child's Activities		
Participation in the Arts*	2.14	1.96
Participation in Sports*	2.10	1.93
Religious Group*	2.05	1.99
Another Club/Scouting*	2.08	2.00
Attend Academic Program	2.04	2.02
Attend Math/Science Camp*	2.28	2.01
Attend Another Camp*	2.18	1.97
Parent Involvement (Home)		
Go to Museum/Zoo*	2.08	1.95
Working w/ Child Computer*	2.03	1.94
Built/Fixed Something	2.00	2.03
Attend School Science Fair*	2.11	2.00
Helped with a Science Project	2.00	2.03
Discussing STEM Issues*	2.07	1.92
Going to the Library*	2.04	1.97
Attending a Live Show*	2.10	1.90

*Activities with * are statistically significant*

influenced their child's course enrollment, as did whether or not parents selected their child's school.

The frequency with which parents helped their children with mathematics homework, however, had a significant negative impact on level of mathematics course enrollment, meaning the more often parents helped their children with homework, the lower the level of ninth grade mathematics course taking.

Frequency of Parent Behaviors

The second question addressed in this study is whether parents from middle and upper SES backgrounds engage in parental involvement more frequently. Previous research indicates that parents from middle and upper SES are involved in their children's schooling more frequently then those in lower SES settings (Crosnoe & Mistry, 2010; Gamoran, 2002; Kelly, 2004; Oakes, 2005;

Tyson, 2011). The data collected from this study are mostly in line with previous findings. To address this question of parent involvement frequency, parent responses from the lowest and middle low quintile were grouped together as were parent responses from the middle, middle high, and highest quintile. Then, proportions of the frequency with which parents indicated they participated in at least two activities from each category of parental involvement were compared.

The frequency with which parents from various SES backgrounds selected their child's school, does not seem to vary much, based on SES. The descriptive statistics indicated that students from the lowest quintile enroll in a higher level of mathematics coursework when their parents have selected their school. The benefits for children from upper level SES backgrounds were negligible. Although Parent Involvement (School) did not show a significant difference in level of mathematics course enrollment, parents from middle and upper level SES backgrounds tend to participate in Parent Involvement (School) more frequently.

Parents from lower income backgrounds indicated that they help their child more with mathematics homework, compared to parents from middle and upper class backgrounds. The data also indicate that students from lower income backgrounds tend to be enrolled in lower level mathematics courses when compared to their middle and upper class counterparts.

Profile of Parents Engaging in Parental Involvement

Although the specific activities parents engage in were not listed for the two-factor ANOVA as part of this study, descriptive statistics were used to try to identify the types of activities that might be the most beneficial for parents to participate in with their child. In other words, what are the specific behaviors (instead of the frequency of the types of behaviors) that result in a higher average mathematics course enrollment in freshman year mathematics class?

To analyze these data, this study looked at the average level of mathematics course taking for students/parents participating in the activities from the parent questionnaire. Many activities classified as Parent Participation either in the home or the school, as well as numerous Child Activities, resulted in statistically significant means, in terms of average level of course enrollment.

Discussion

This study sought to identify factors that may explain the enrollment patterns in mathematics curriculum tracks, especially as they affect children from lower SES settings. Although the findings of this study are mixed, various implications for schools and parents can be considered.

The interaction tests speak to the phenomenon of Concerted Cultivation (Cheadle & Amato, 2011; Lareau, 2004), in which Lareau argues that parents who understand the importance of social capital and the way it relates to their child's school experience carefully select their child's out of school experiences and purposefully interact with their child's school. The findings from this study support Lareau's (2002) claim that parents from higher income backgrounds may engage in these types of activities more frequently. This study also confirms the findings from Cheadle and Amato (2011). In fact, only 3% of parents from the lowest quintile of SES responded that they enrolled their child in 5 – 7 of these activities in the last year. In comparison, nearly 10% of the parents from the highest SES quintile indicated that they had enrolled their child in 5 – 7 of the Child's Activities in the past year. The mean levels of mathematics course enrollment also support Lareau's (2004) finding that among students from higher SES backgrounds, participation in these activities seems to positively impact their mathematics course enrollment decisions.

The results of the simple main effects test indicate that the various levels of participation in Parent Involvement (Home) activities become more important, in terms of course level enrollment among students in higher SES quintiles. In particular, the level of participation in activities results in a significant difference in level of mathematics course enrollment among the highest quintile of students for all three different activity levels.

The findings from this study may indicate that when parents from lower SES backgrounds understand the importance of selecting out of school experiences for their students, they are also able to positively impact course enrollment. It is possible that parents from lower SES backgrounds who understand the importance of enrolling their students in these types of out of school experiences have more social capital than other peers from their same economic background (as shown in the follow up test for the middle-low quintile). That is, even within social classes there is a type of social hierarchy, and parents who are able to navigate this hierarchy can make concerted cultivation work for them in the school lives of their children. Payne (2005) describes living in poverty as "the extend to which an individual does without resources." (p. 7). She identifies such resources using 8 different categories (financial, emotional, mental, spiritual, physical, support systems, relationships/role models, and knowledge of hidden rules). It is possible that those students from lower SES backgrounds are able to participate in such activities because they have more of these resources at their disposal, when compared to other school children from the same SES. For example, children in the middle low SES category may do without financial resources, but if they are still participating in such activities may have strong support systems or role models.

Although enrollment at the highest level of these types of activities seems to negatively impact the level of mathematics course enrollment for students from the

lowest SES backgrounds, the findings from this study indicate that some enrollment in these types of activities could still positively associate with mathematics course enrollment decisions of students from the lowest SES level. It is clear that when parents from the lowest SES quintile enroll their students in 2 – 4 of these types of activities the average course enrollment increases.

The significance of a child's participation in these activities has also been discussed explicitly by Entwisle, Alexander, and Olsen (1997, 2001) and Caro et al. (2009). They claim that a child's out of school experiences on the weekends and during school breaks play a bigger role in the widening of SES achievement gap, than does anything that happens during a child's K – 12 schooling experience. The types of experiences that Entwisle et al. (1997, 2001) and Caro et al. (2009) describe as being advantageous are also the experiences described in the Parent Involvement (Home) part of the HSLS:09 (Ingles et al., 2011).

Participation in these activities also speaks to the Catholic school effect described by Coleman (1987) and Willms (2003). Both Coleman (1987) and Willms (2003) assert that even when children are raised in a home in which the parents might not have much social capital, when the children are involved in a community of other supportive adults, those children are able to benefit from the social capital of other adults and children with whom they interact. The activities of participating in music, art, dance, or theater; organized sports lead by an adult; a religious youth group or organization; scouting or another club activity; academic instruction outside of the school; a math or science camp; or another camp all put children into meaningful contact with adults. Presumably, the adults leading each of these activities are interested in the lives of children and may be able to help fill the void for children who may not otherwise have interaction with adults who support the idea of doing well in school.

Additionally, by being involved in these activities, children are more likely to interact with other children who may be speaking with parents and teachers about post-secondary plans, and the importance of doing well in school. According to Walker (2006), when children have "near-peers" (friends or family members a little older then them), the "near-peers" can serve as an important support system, encouraging children to do well in school. In fact, in her analysis "near-peers" served as a replacement for parental encouragement for the mathematics achievement of students.

Akos, Lambie, Milsom, and Gilbert (2007) and Ryan (2001) highlight the importance of a child's friendships in terms of their course taking decisions. Akos et al. (2007) found that children are able to use their friends and their friend's beliefs about schooling and the importance of course selection as another source of social capital. Ryan (2001) also found that as students get older and move farther along in school, they tend to take academic cues from their friends, rather then from their parents, particularly if their friends seem to have more knowledge about the school experience. In this way, students from lower SES backgrounds who may otherwise be isolated socially in their school or neighborhood are given another way to interact with adults and students with varying educational experiences.

When parents involve their children in these types of activities they are also interacting with other adults who presumably value participation in out-of-school organized activities. This is another source of social capital not only for the children but also for the parents of children involved in the activities. Lareau and Cox (2011) outline the importance of "untying knots," for their children throughout their school experience. They describe this skill as something a parent acquires from speaking with other adults about school related issues, or by watching their parents do this for them during their school experience. Part of the reason Lareau and Cox (2011) and Epstein and Dauber (1997) argue that parents from lower SES backgrounds struggle with this is because they are not exposed to other adults who are engaging in this type of behavior. By having their children participate in organized activities with other children, such parents are also interacting with other adults from whom they may be able to take social cues about navigating their child's school experience.

These results also speak to the implications of school choice and the hyper segregation (Kozol, 1995) of poor students that results. Ravitch (2010) speaks to the power school choice programs have in re-segregating schools, both in terms of race and SES. Previous research (Coleman, 1987; Gamoran, 2000) finds that partitioning school experiences according to social class hurts students from low SES backgrounds, in terms of academic achievement, and does not have a large impact on students from high SES backgrounds either way. Given the fact that this study finds that children from the lowest SES quintile enroll in a higher level mathematics course during their freshman year when parents select the public school they attend, this study seems to indicate that heterogeneity among students in schools could benefit lower income students in terms of course enrollment.

Children from low SES backgrounds whose parents select their public school are presumably deciding not to send their child to the neighborhood public school (otherwise they would have indicated this choice on the parent survey). Often the neighborhoods children live in reflect their own SES. If parents from low-income backgrounds are selecting a different school for their children to attend, it is reasonable to assume that they are probably sending their child to a school with a different demographic from the one their child would be attending by default. This decision on behalf of the parents likely moved their child from a school with a higher amount of poverty to a lower poverty school. Although the course

enrollment means indicate that there may be more advantage to students from lower SES backgrounds, parents tend to select their child's school at about the same amount of frequency.

The data from this study also illustrate that forms of Parent Involvement (School) that are beneficial for middle and upper income parents are not necessarily beneficial to parents from low SES backgrounds. Lareau (2004) finds that both teachers of low-income students and parents of these same students are frustrated by they way these groups of adults work with each other. It seems that middle and upper class parents make forms of Parent Involvement (School) work for them by interacting with their peers in the workplace, through casual conversations with school personnel outside of the school day, or by following the example of their parents.

An interesting follow up to this study would be to examine the specific Parent Participation Home and School behaviors, as well as the Child Activities. This study has indicated specific parent and student behaviors that result in significant differences in level of mathematics course enrollment during a student's ninth grade year in high school. It would be meaningful to determine whether or not these activities pay out the same way for every level of SES, in terms of level of mathematics course taking. It would also be interesting to access the NCES follow-up data to this base year data collection to determine mathematics course taking patterns throughout the student's entire high school experience.

Additionally, the parent activities of frequency of homework help and confidence in homework help did not significantly interact with SES and level of mathematics course taking. Because both of these activities seem to be pro-school behaviors, it might be interesting to further explore this form of Parental Involvement and the implications it may have among older students.

Finally, the "Catholic School Effect" for small or rural public schools, as well as, charter schools has not been well established in research literature. It would be interesting and important to determine whether the effect observed by Coleman (1987) and Gamoran (2000) exist in these schools and to determine whether or not the "Catholic School Effect" still exists among parochial and non-parochial private schools.

Conclusion

Just as mathematics course taking has been described as" traveling along a trajectory" or "entering a pipeline", can a student's school experience be determined by their demographics before they even enter the schoolhouse doors? If one looks at the central tendencies, the answer to both of these questions seems to be yes. The problem of poverty is considerable and not even a social agency as large as public schools can equalize effects. Schools do yield meaningful individual success stories. The problem is that there just have not been enough of them.

This study only considered one small part of a child's K – 12 schooling experience, their freshman level mathematics course taking patterns and the predicted trajectory of the rest of their secondary mathematics experience. However, past research has shown that mathematics course taking is also related to college attendance and degree attainment and other indicators of post-secondary success such as employment status after both college and high school (Adelman, 2006; Sadler & Tai, 2007). Because mathematics course taking can be an indicator of so many other academic and social behaviors, not related to mathematics, measuring the level of mathematics course enrollment may indicate other important academic behaviors in high school and beyond.

The findings from this study indicate that the way parents interact with the school and other organizations on behalf of their child have an impact on the course enrollment level of their child. This study also finds that these parent behaviors affect children from differing SES backgrounds in various ways. In part there is not one single parent behavior that benefits all children at all times, in terms of level of mathematics course enrollment. However, regardless of SES there are particular behaviors that may benefit children's course taking enrollment levels in mathematics.

One of the main outcomes of this study, which has been confirmed in other bodies of research, is that the school works best for children when parents are adept at making it work for them. For parents from lower SES backgrounds, this may mean that when parents have the social savvy to select their child's school, they are giving them the largest benefit in terms of level of mathematics course enrollment.

Although particular parent behaviors were found to lift the mean mathematics course enrollment level for children according to their SES, there were not any parent behaviors engaged in by parents from the lowest quintile of SES that raised the mean level of course enrollment to equal any other quintile's mean course enrollment level. For certain quintiles (especially the middle, middle high, and highest), course enrollment means were fairly consistent, sometimes one mean was slightly higher than the other, indicating that once parents attained a certain level of income and job status, it was likely a function of their local and global knowledge (Lareau & Cox, 2011) of schooling, and their ability to secure an improved school experience for their child. Although Tyson (2011) found that parents from lower income backgrounds understand the importance of schooling, her findings and the statistics from this study indicate that they are unable to "crack the code" of ensuring that their child has a meaningful and rigorous school experience.

The disparity in mathematics course enrollment and effectiveness of parent behaviors points to the larger

problem of poverty as a whole. This study is detecting a "poverty problem" which is playing out as a "school problem." Poverty does present a problem in schools, but the misconception is that poverty is more of a problem with regards to schooling than it is in any other aspect of a child's life. The problem of deep, debilitating poverty in the United States is one that no government agency, on a large scale, has been able to effectively combat – the public school being among them. There is no single parent behavior that results in children enrolling in upper level mathematics course work. Rather, it is an accumulation of many parent behaviors, as well as a child's interaction with the community around them, that lead to course selection in middle and high school.

To find one parent behavior that leads to success for all students in the classroom is about as unlikely has finding one particular mathematics program (or leadership style, or class size, or style of teaching) that will result in all students achieving the same result in mathematics. However, the data in this study and in other studies are consistent in one aspect. When students from low SES backgrounds are able to interact with peers, teachers, parents, and other adults who have high expectations for achievement, they, in most cases, rise to the challenge and benefit from the normative influences that follow from those interactions.

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Appendix

Parent's Involvement Survey

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Next we have some questions about your involvement in [your 9th grader]'s school, education and [his/her] home life.

~~~~~~

Is [your 9th-grader's school] a regularly assigned school or a school that you chose?

- Assigned
- Chosen, or
- [your 9th grader] was assigned to [your 9th-grader's school], but you would have chosen it if you had a choice.

~~~~~~

Since the beginning of this school year (2009-2010), have you or other adults in your household...

attended a general school meeting such as an open house or a back-to-school night?
- Yes
- No

attended a meeting of the parent-teacher organization or association?
- Yes
- No

gone to a regularly scheduled parent-teacher conference with [your 9th grader]'s teacher?
- Yes
- No

attended a school or class event such as a play, dance, sports event or science fair because of [your 9th grader]?
- Yes
- No

served as a volunteer in [your 9th grader]'s classroom or elsewhere in the school?
- Yes
- No

participated in fundraising for the school?
- Yes
- No

met with a school counselor in person?
- Yes
- No

~~~~~~

During this school year, about how many days in an average week do you or another adult in your household help [your 9th grader] with homework? Would you say...

- never
- less than once a week
- 1 or 2 days a week
- 3 or 4 days a week or
- 5 or more days a week?

~~~~~~

How confident do you feel about your ability to help [your 9th grader] with the homework [he/she] has this year in each of the following subjects?
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Math
Very confident
Somewhat confident
Not at all confident
Science
Very confident
Somewhat confident
Not at all confident
English or language arts
Very confident
Somewhat confident
Not at all confident

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In general, how would you compare males and females in the following subjects?
Math
Females are much better
Females are somewhat better
Females and males are the same
Males are somewhat better
Males are much better
Science
Females are much better
Females are somewhat better
Females and males are the same
Males are somewhat better
Males are much better
English or language arts
Females are much better
Females are somewhat better
Females and males are the same
Males are somewhat better
Males are much better

~~~~~~

During the last 12 months, has [your 9th-grader] participated in any of the following activities outside of school?
(Check all that apply.)
Music, dance, art, or theater
Organized sports supervised by an adult
Religious youth group or religious instruction
Scouting or another group or club activity
Academic instruction outside of school such as from a Saturday Academy, learning center, personal tutor or summer school program
A math or science camp
Another camp
None of these

~~~~~~
~~~~~~

During the last 12 months, which of the following activities have you or another family member done with [your 9th grader]?
(Check all that apply.)

- Visited a zoo, planetarium, natural history museum, transportation museum, or a similar museum
- Worked or played on a computer together
- Built or fixed something such as a vehicle or appliance
- Attended a school science fair
- Helped [your 9th grader] with a school science fair project
- Discussed a program or article about math, science, or technology
- Visited a library
- Gone to a play, concert, or other live show
- None of these

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Author Notes
Kate M. Degner
Belin-Blank Center, University of Iowa
600 Blank Honors Center, University of Iowa
Iowa City, IA 52240
Katherine-degner@uiowa.edu

Kate Degner is the Administrator for Arts and Innovation at the Belin-Blank Center for Gifted Education and Talent Development at the University of Iowa. She earned her PhD in Curriculum and Supervision with an emphasis in mathematics education in 2012. Her research interests include STEM opportunities for students in small or rural schools, and the sociology of mathematics education.

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Mary Lou Fulton Teachers College • Arizona State University
PO Box 37100, Phoenix, AZ 85069, USA

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