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Parental Education Levels and Their Effect on First Year Retention and Grade Point Ratio

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PARENTAL EDUCATION LEVELS AND THEIR EFFECT ON FIRST YEAR RETENTION AND GRADE POINT RATIO

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ABSTRACT

Background/Problem: Education is an important factor in economic success. This research explores how relevant parental education is to their children's education by studying first year college retention as well as first year cumulative grade point ratio. Purpose: By what probability is retention increased on average if a mother or father becomes a high school graduate or a college graduate? Also, by what amount is grade point ratio affected if a mother or father becomes a high school graduate or a college graduate?

Design and Methods: A random sample of 844 students who filled out the FAFSA at a southern public university is chosen for the study, after which the summary statistics are analyzed. Following, given that retention is a binary variable, a probit regression is taken to measure significance in relationship to retention. Also, a robust multiple regression analysis is run to measure the effects of GPR. Tests are also done to see if choosing a certain inter-institutional college has a significantly different effect on retention and GPR, as well as tests of joint significance of differing levels of parental education on retention and GPR.

Results: The first set of regressions on retention proved to show significance of parental education, significant at the alpha = .01 level. The mother's education level in correlation to retention appeared to be a greater probability effect. The second set regressions on GPR proved similar results-parental education is significant at the alpha = .01 level. On GPR, the father's education appeared to be the greater effect.

Conclusions: Parental education is a significant determinant to college attainment of a freshman student.

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INTRODUCTION

Microeconomic studies have frequently uncovered large returns to advancing in human capital by receiving a college degree. The rates of return range from 5% to 15 % on an annualized basis (Altonji, 1993). While some of the returns to college may actually involve a return to innate ability (Heckman & Vytlacil, 2001), many studies suggest that there is a substantial positive return to a college education.

A number of sources for this apparently unrealized return have been suggested, including credit constraints (Card, 2001), complementaries between higher education and primary education (Heckman & Carneiro, 2002), and asymmetric information (Hiller, 1997). In this research, I explore the role of parental education in college achievement. I ask: are students with parents with higher levels of education more likely to achieve in and complete their first year in college, ceteris paribus?

Parental educational status may be important for a number of reasons. First, ability and IQ may be heritable, leading both parents and children of high IQ to achieve greater in college. In my control variables, I will include SAT scores, which are a measure of ability, to examine this effect specifically. Second, other skills and abilities such as a higher propensity for hard work or emotional stability, which contribute to educational success, may be transmitted from parents to children, either culturally or genetically. Thirdly, highly educated parents may better understand the returns to human capital (especially the non-monetary returns; (Elias, 2006)), and so many support and encourage their children more to continue their education. Fourth, asymmetric

information exists in higher education (Hiller, 1997), with the most common resource to a college student is often his parents.

Empirically, I examine the role of parental education using a random sample of 844 students at a southern public land grant institution that entered college in the fall of 2005. I focus on two measures of achievement: (a) grade point average in the first year courses; and (b) successful completion of the first year and retention into the second year.

My focus on the first year of college is supported by Kroc et. al. (1995) in their findings that retention is a strong predictor of 6-year graduation, even more so than other formulaic graduation predictors such as predicted GPR.

While my sample foes not include all the students in the same cohort, it does seem to be highly representative, as is seen in Table I, the mean SAT total is 1214 for the sample and the retention rate is 89.9%. For the entire cohort of 2005 entering students at the same institution, the SAT mean is 1225, which is not significantly different from 1214, the retention rate is rounded down to 89%, which is nearly perfectly matched to the sample.

In the following section, I review previous literature on the role of parental education in college achievement. Section 3 describes my data sources and methods, Section 4 presents empirical results and Section 5 concludes the research.

LITERATURE REVIEW

There has been ample research on the attainment of first-generation higher education students. Between 1992 and 2000, 22 percent of enrolled students in postsecondary colleges and universities had parents who were not college graduates. Achievement for those was not high, as approximately 43 percent of enrolled first generation students left without a degree by 2000 compared with 20 percent for other students (NCES, 2005).

Lohfink and Paulsen(2005) and McCarron and Inkele (2006) helped form the theoretical and empirical basis for studying the retention of students with parents of differing levels of postsecondary education. Lohfink and Paulsen sampled 1167 "first-generation" and 3017 "continuing generation" students and tested for persistence. Data was derived from the Beginning Postsecondary Longitudinal Survey. Within their research, "first-generation" was identified by students whose parents had no type or quantity of postsecondary education, while "continuing-generation" students were identified by students with at least one parent who had some type or quantity of postsecondary education. Multiple indicators of best fit were applied in this model. Importantly noted, Lohfink and Paulsen's research was conducted to determine the persistence of students at four year institutions. As indicated in the model of this persistence research, it was determined that 76.5% of first-generation students persisted, while their continuing-generation counterparts retained 82.17%. It was also determined that for each $10,000 increase family income indicated a 2.0% increase in probability of

retention. A one unit increase in GPA lead to a 12.8% increase in retention, while a $1,000 increase in grant aid resulted in a 2.7% increase in retention.

Choy (2001) found that first-generation students are over-represented among disadvantaged groups by race, gender, income.

Cultural and social capital are defined as knowledge of the campus environment and campus values, access to human and financial resources, and familiarity with terminology and the general functioning of a higher educational setting (McConnell, 2000; McDonough 1997). The lack of social and cultural capital among students whose parents did not attend college may create an asymmetric information barrier, contributing to a general sense of "culture shock," (Inman & Mayes, 1999). It is likely that when these first-generation students enter college, they experience incongruence between their family and their educational endeavors (Hsiao, 1992).

Parental involvement is defined by Trusty (1998) as a parent's involvement in a given students educational and intellectual growth, as well as a support for a students extracurricular activities. Trusty found through a national sample that student-reported home based influence most strongly predicted high levels of educational success. Hossler et al (1999) found through a longitudinal study that there are differences in the influences of achievement and aspiration.

McCarron and Inkeles (2006) found that parental involvement measured as "respondent perception of the importance of good grades" was clearly a strong predictor of success and first year retention. These results point to a positive relationship between parental involvement and education success.

Chavalier (2004) found that each additional year of schooling while living with their parents leads to a 4 to 8 percent increase in probability in staying after leaving their parents. Also, Chavalier found that parental schooling did not show significant differences on the child's educational development, however, when sex of the children was factored, the same sex parent was found to have significant impact on educational attainment.

Blanden and Gregg (2004) found strong evidence between the relationship of family income and educational attainment and has strengthened through time. The study suggests that a 1/3 decrease in income from the mean reduces educational attainment by up to 4%. These results infer that income inequality relates to that of educational inequality. Chavalier and Lanot (2002) supports this in their findings that students from lower income families are less likely to invest in an education, however, they counter to say that the family characteristics play a more dynamic role than does family income.

DATA SOURCES AND METHODS

This study used data directly from an institutional database at Clemson University, a public land-grant university in South Carolina, focusing on students in the entering fall 2005 cohort. The data is comprised of students who filled out the federal financial aid form (FAFSA) which contains data on mothers and father's education level, as well as family income, need, and family size. Of 1141 students, I was forced to exclude 297 students who did not provide information on these factors, although as I showed earlier that selection does not seem to be an important problem. I then constructed a binary variable for retention equal to 1 if the student re-enrolled in fall 2006, and 0 otherwise. I also analyzed three categories of independent variables: educational, financial, and sociological factors. The most important of the educational factors is inter-institutional college choice: in which of the five different colleges of the university did the student enroll[1]? I also have data of each student SAT verbal and SAT math scores which I combined for a total SAT score. Financial factors include family income. Finally, sociological factors include father's education level and mother's education level. I categorized those educational levels into a "college graduate" variable and a "non-college grad" variable.

1) College of Art, Architecture and History, the College of Agriculture, Forestry, and Life Sciences, the College of Engineering and Science (which also includes Mathematics), the College of Business and Behavioral Sciences (which also includes Psychology and Sociology), and the College of Health, Education, and Human Development.

I will examine the effects of these variables on two outcomes: (a) the retention variable, discussed above; and (b) the student's freshman year GPR. For the retention variable, I will employ a probit regression in the following form.

$$RETENTION = \Phi(\beta_0 + \beta_1 MOTHEDHIGH + \beta_2 MOTHEDCOL + \beta_3 FATHEDHIGH + \beta_4 FATHEDCOL + \beta_5 MOTH2FATH2 + \beta_6 MOTH3FATH2 + \beta_7 MOTH2FATH3 + \beta_8 MOTH3FATH3 + \beta_9 AAH + \beta_{10} CAFLS + \beta_{11} CES + \beta_{12} COBBS + \beta_{13} HEHD + B_{14} l(FAM\_INC) + \beta_{15} SAT + \varepsilon)$$

where Φ is the Gaussian cdf.

For the GPR analysis, I will employ a weighted least squares regression of the following form:

$$CUM\_GPR = \beta_0 + \beta_1 MOTHEDHIGH + \beta_2 MOTHEDCOL + \beta_3 FATHEDHIGH + \beta_4 FATHEDCOL + \beta_5 MOTH2FATH2 + \beta_6 MOTH3FATH2 + \beta_7 MOTH2FATH3 + \beta_8 MOTH3FATH3 + \beta_9 AAH + \beta_{10} CAFLS + \beta_{11} CES + \beta_{12} COBBS + \beta_{13} HEHD + B_{14} l(FAM\_INC) + \beta_{15} SAT + \varepsilon$$

The definition of each of these variables can be found in the appendix in reference one.

Stata 9.2 was used to implement these regressions. For the least squares regression, the standard errors were corrected for heteroskedasticity using the Huber-White correction. Summary statistics on the sample can be seen in Table I

Table I. Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Retention	844	0.899289	0.301124	0	1
Cum GPR	844	2.892974	0.838831	0.07	4
MOTHEDHIGH	844	0.315166	0.464857	0	1
MOTHEDCOL	844	0.638626	0.480684	0	1
FATHEDHIGH	844	0.315166	0.464857	0	1
FATHEDCOL	844	0.630322	0.483001	0	1
moth2fath2	844	0.186019	0.389353	0	1
moth2fath3	844	0.11019	0.313312	0	1
moth3fath2	844	0.113744	0.317688	0	1
moth3fath3	844	0.507109	0.500246	0	1
AAH	844	0.152844	0.36005	0	1
CAFLS	844	0.214455	0.410687	0	1
COBBS	844	0.373223	0.483947	0	1
CES	844	0.149289	0.356585	0	1
HEHD	844	0.11019	0.313312	0	1
fam_inc	844	69339.6	37567.2	500	236000
SAT	844	1215.533	124.0377	730	1570

Table II. Probit Regression on Retention with differing Independent Variables

Independent Variables	[1]	[2]	[3]	[4]	[5]	[6]
MOTHEDCOL	.1041333*** (.0237953)		.0874825*** (.0235899)		.0716536*** (.0250649)	-.008602 (.0609042)
FATHEDCOL		.0842973*** (.0232137)		.0651432*** (.0232299)	.033698 (.0235859)	.0013976 (.0726785)
Moth2fath2						Dropped
Moth2fath3						.0068841 (.0716472)
Moth3fath2						.0465319 (.0439897)
Moth3fath3						.1077833 (.100555)
AAH			Dropped	Dropped	Dropped	Dropped
CAFLS			-.0738858* .0469708	-.0755251* (.047505)	-.0721611* (.0466362)	-.0659577 (.0457947)
COBBS			-.0398986 (.0365778)	-.0448816 (.0373561)	-.039349 (.0363761)	-.0371455 (.0360063)
CES			-.0478826 (.0492635)	-.0519297 (.0504065)	-.0478723 (.0491609)	-.0490044 (.0493304)
HEHD			-.0172774 (.0476076)	-.0265489 (.0503109)	-.0198474 (.0481073)	-.0172275 (.0471237)
Lfam_inc			.0272292** (.0127469)	.0316753 (.012939)	.025092 (.0128389)	.0242824* (.0128231)
SAT			.0000581 (.0000799)	.0000241 (.0000823)	.0000349 (.0000809)	.0000234 (.000081)
R^2	0.0404	0.0269	0.0593	0.0463	0.0633	0.0673
***, **, and * represent significance at the 1%, 5%, and 10% levels respectively						
Coefficients are marginal effects evaluated at the means, with the exception of the dummy variables, which are discrete effects as the explanatory variable changes from zero to one. Standard errors are in parenthesis.						

Table III. Test for Significant Differentiation of College Choice on Retention

College	X_1^2	Prob> X_1^2
CAFLS-COBBS	0.75	0.3863
CAFLS-CES	.20	0.6547
CAFLS-HEHD	1.32	0.2510
COBBS-CES	.06	0.8022
COBBS-HEHD	.32	0.5704
CES-HEHD	.47	0.4949
***, **, and * represent significance at the 1%, 5%, and 10% levels respectively		

The results of Table II which focus on the probability of retention, appear in six columns, representing six different regressions. In column 1, I simply compare retention rates for student's whose mothers completed college to all other students. Mothedhigh is dropped to properly identify this because there are not enough high school drop-outs at Clemson to be able to test both against the rest of the population within the data. A student whose mother graduated college is 10.41% more likely to retain into the second year. This factor is also found to be significant at the alpha = .01 level.

In column 2, the same test is conducted for the father: a student whose father graduated college is 8.42% more likely to retain. This effect is found to be significant at the alpha = .01level. The r-squares in these regressions are both very small, resulting in 0.0404 and 0.0269 respectively. This indicates that 4.04% of the variance within the data is explained testing the mother's education level of college, while 2.69% of the data is explained by a father who graduated college. The effect of a mother graduating college seems to be a greater effect, yielding a higher R-square and having a larger coefficient, yielding a 2% greater likelihood to retain, however, these effects do not appear to be significantly different from each other. As explained by Chavalier (2004), this effect

could likely explain a greater population of females in the data sample, being influenced by their same sex parent. It also could be that the maternal impact is greater on a student of Clemson University.

Column 3 replicates the analysis of column 1, but indicates controls for inter-institutional college choice, family income, and SAT score. The same college is dropped to look at the probability effects of college choice against the first college. Also, mothedhigh is dropped for the same reasons it is dropped in the previous models. A student whose mother graduated from college is 8.74% more likely to retain into the second year than the rest of the population. It is notable that family income is also in this model: there is a 2.72% greater likelihood to retain with a 10% increase in family income. The r-square in this model is slightly larger when adding covariates, explaining 5.93% of the variance in the data.

Column 4 replicates column 2, but again adds the same covariates as seen in column 3. With these controls added, a student whose father graduated college is 6.51% more likely to retain than his classmates of different parental education. The r-square is less than that of column 3, explaining 4.63% of variance within the data set. A mother graduating from college is seen to be more important than that of a father doing the same, yielding a difference of 2.23% likelihood. Again, it is not clear that this is a significant difference. Family income is not found to be significant to its relationship to retention as it was in the previous model.

In column 5, both mother's and father's education level of college are included in the regression, again controlling for inter-institutional college choice, family income, and

SAT score. In this model, a student whose mother graduated college is 7.16% more likely than everyone else, which is 3.8% more likely than that of a student whose father graduated college. The coefficient for mothedcol is fond to be significant at the alpha = .01 level, while fathedcol is not found to be significant.While controlling for ability bias, SAT is found to be significant at the alpha = .05 level. The R-square in column 5 is also small, with a yield of 6.33% of the data explained within the model.

In column 6, I added interaction variables between mother's and father's education to see whether having two educated parents differs substantially from having just one. No variables are found to be significant with the exception of family income, although mothedcol and moth3fath2 and moth3fath3 are jointly significant, indicating again the importance of mother's education on retention. This model is not a likely best fit model of explaining the probability of success depending on parental education.

In Table II, all of the colleges are tested for significant differences. AAH is dropped for the testing due to perfect co linearity. None of the colleges are found to be significantly different, therefore inter-institutional college choice will not play a significant role when testing differing levels of parental education.

To summarize the results of the six regressions and the tests for joint significance- after adding a series of covariates, the results are ultimately the same- parental education equal to a college graduate yields a higher probability of student retention. In particular, it seems the mother's education level is crucial. Some of the covariates are found to be significant; however, the results of parental education mostly remain the same

Table IV. Robust Regression on Grade Point Ratio with differing Independent Variables

Independent Variables	[1]	[2]	[3]	[4]	[5]	[6]
MOTHEDHIGH	Dropped		Dropped		Dropped	Dropped
MOTHEDCOL	.25386*** (.0619517)		.1487383*** (.0575134)		.0708995 (.0669633)	-.1874099 (.2045601)
FATHEDHIGH		Dropped		Dropped	Dropped	Dropped
FATHEDCOL		.4075889*** (.0613025)		.2173643*** (.0566157)	.1873056*** (.0664585)	.0700869 (.2786953)
Moth2fath2						Dropped
Moth2fath3						.1092873 (.2864938)
Moth3fath2						.2753527 (.2141357)
Moth3fath3						.3742556 (.3419978)
AAH			Dropped	Dropped	Dropped	Dropped
CAFLS			-.3133542*** (.0849016)	-.3061095*** (.0846709)	-.3049685*** (.0846695)	-.3000849*** (.0846001)
COBBS			-.4082573*** (.0720765)	-.4075751*** (.071479)	-.4037005*** (.0717879)	-.3992357*** (.0719263)
CES			-.1479767*** (.0874781)	-.1502818* (.0865767)	-.1488041* (.0869966)	-.1489047* (.0867941)
HEHD			.1150452* (.0933437)	.1024511 (.0922094)	.1061056 (.0922724)	.1097743 (.0934086)
Lfam_inc			.0862576** (.0445148)	.0795233* (.0422031)	.0732029* (.0430295)	.0712636* (.0431873)
SAT			.0027831*** (.0002183)	.0026568*** (.0002157)	.002667*** (.0002164)	.0026415*** (.0002175)
R^2	0.0212	0.0551	0.2367	0.2442	0.2455	0.2475
***, **, and * represent significance at the 1%, 5%, and 10% levels respectively						
Coefficients are marginal effects evaluated at the means, with the exception of the dummy variables, which are discrete effects as the explanatory variable changes from zero to one. Standard errors are in parenthesis.						

Table V. Test for Significant Differentiation of College Choice on Grade Point Ratio

College	F(1, 826)	Prob>F
CAFLS-COBBS	1.80	0.1801
CAFLS-CES*	2.92	0.0878
CAFLS-HEHD***	19.53	0.000
COBBS-CES***	10.71	0.0011
COBBS-HEHD***	37.59	0.000
CES-HEHD***	7.10	0.0079
***, **, and * represent significance at the 1%, 5%, and 10% levels respectively		

The results of Table IV are presented similarly to those in table II-in six columns, representing six different regressions taken to identify potential results. In column 1, a test was done to identify the effect of a student whose mother graduated college against everyone else. Mothedhigh is again dropped to properly identify this because there are not enough high school drop-outs at Clemson to be able to test both against the rest of the population within the data. As a result, a student whose mother graduated college sees a .2539 grade point increase in GPR. This factor is also found to be significant at the alpha = .01 level.

The same test is conducted for the father in column 2, in which fathedcol is run on the effect of the rest of the population within the data set. As a result, a student whose father graduated college is likely to see .4075 grade points higher than the rest of the population. This effect is found to be significant at the alpha = .01 level. The r-squares in these regressions are both very small, resulting in 0.0212 and 0.0551 respectively. This indicates that 2.12% of the variance within the data is explained testing the mother's education level of college, while 5.51% of the data is explained by a father who graduated college. The effect of a father graduating college seems to be a greater effect,

yielding a higher R-square and having a larger coefficient, yielding a .153 greater increase in GPR. This is likely because the father's college experience transmits into a greater influence in making better grades to be successful.

Column 3, replicates the analysis in column 1, but controls for inter-institutional college choice, family income, and SAT score. The same college is dropped to look at the probability effects of college choice against the first college. Also, mothedhigh is dropped for the same reasons it is dropped in the previous models. A student whose mother graduated from college has a .148 grade point increase. A very important item of note within this model is that controlling for family income is significant on the effect of mother's education level. A student whose mother finished college with a 10% increase in income can expect to return a .086 grade point increase. Also, each inter-institutional college choice is found to be significant on the effect of GPR. SAT, used to control for ability bias, is also as one would predict statistically significant. The r-square in this model is much larger when adding covariates, explaining 23.67% of the variance in the data.

In column 4, a similar regression is taken to column 3, testing for a student whose father graduated from college, adding the same covariates as seen in the previous column. With these controls added, a student whose father graduated college can expect a .2173 grade point ratio increase. The r-square is greater than that of column 3, explaining 24.42% of variance within the data set. A father graduating from college again is seen to be more important than that of a father doing the same, yielding a difference of .0693 grade points. Family income is again found to be significant to its relationship to

retention as it was in the previous model. Also, CAFLS, COBBS are found to be significant at the alpha = .01 level, while CES is significant at the alpha = .1 level. SAT again is significant at the alpha = .01, as can be expected due to its high correlation to ability measures such as that of the dependent variable, GPR.

In column 5, both mother's and father's education level = college are included in the regression, again controlling for inter-institutional college choice, family income, and SAT score. In this model, the GPR for a student whose mother graduated college is increased .0708 more likely than everyone else, which is less than half of the increase of the father's education effect, yielding a .1873 GPR increase. The coefficient for mothedcol is not found to be significant, while fathedcol is found to be significant at the alpha = .01. Again in this model, mothedhigh and fathedhigh are dropped to obtain a true effect of parental education. While controlling for ability bias, SAT is found to be significant at the alpha = .05 level. The R-square in column 5 yielded a .2445, which is not much greater than that of column 4. These regressions are all supporting that father's education has a greater effect on a student's GPR.

In column 6, all relevant variables were included with mothedhigh and fathedhigh as well as AAH are dropped from the model due to co linearity. No parental education variables are found to be significant with the exception of family income.

This model similar to that in Table II, column 6 not a likely best fit model of explaining the probability of success depending on parental education.

In Table V, all colleges are found to be significantly different from each other except the first test in the table of CAFLS against COBBS. In this series of regressions

against GPR, inter-institutional college choice is found to be a good covariate for the determinant of the effect of parental education on GPR.

To summarize the results of the six regressions and the tests for joint significance- after adding a series of covariates, the results are ultimately the same- parental education equal to a college graduate yields a greater increase in GPR than does the rest of the population. Some of the covariates are found to be significant, however, the results of parental education mostly remain the same.

CONCLUSION

In this paper, I have investigated the potential effects of parental education on retention and grade point ratio. The findings from each test produced different results.

Having a more definitive understanding of the gaps in retention or persistence could lead to better implemented policies and programs targeted towards promotion of the success of first-generation students (Lohfink & Paulsen, 2005). After testing differing levels of parental education, it can now be determined that a student whose mother and father graduated from college offers a much greater likelihood to retain. The interesting thing to point out is that the mother's education appeared to be more important to the likelihood of a student staying in college. Ultimately, many universities consider retention as a very important part of success; therefore, identifying and placing a policy emphasis on those whose mother's parents did not attend college may prove to be effective.

Grade point ratio differed in its relationship with parental education, as it is found that the father's education plays a greater role in the effect of GPR. This may be important to investigate for grants and scholarships within the institution in which a certain GPR needs to be maintained.

There were a few problems with this research, mostly concerning the data. If I had a greater sample of parents who dropped out of high school, I would have been able to include parents who graduated from high school in the model and made a comparative look at the differing effects. The ultimate result of this research concludes that parental

education does play a significant role in educational attainment in two different crucial variables.

APPENDIX

RETENTION = A binary variable =1 if retained and 0 if otherwise

CUM_GPR = a number between 0 and 4 representing the cumulative grade point ratio at the end of the first full year

AAH = A binary variable =1 for students who major choice falls in the college of Architecture, Arts, and Humanities and 0 otherwise

CAFLS = A binary variable = 1 for students who major choice falls in the college of Agriculture, Forestry and Life Sciences and 0 otherwise

CES = A binary variable = 1 for students who major choice falls in the college of Engineering and Science and 0 otherwise

COBBS = A binary variable = 1 for students who major choice falls in the college of Business and Behavioral Science and 0 otherwise

HEHD = A binary variable = 1 for students who major choice falls in the college of Health, Education and Human Development and 0 otherwise

FATHEDHIGH = A binary variable = 1 for a student whose father level of education is high school and 0 otherwise

FATHEDCOL = A binary variable = 1 for a student whose father's level of education is college and 0 otherwise

MOTHEDHIGH = A binary variable = 1 for a student whose mother's level of education is high school and 0 otherwise

MOTHEDCOL = A binary variable = 1 for a student whose mother's level of education is college and 0 otherwise

MOTH2FATH2 = A binary variable = 1 for a student whose father's level of education is high school and mother's level of education is high school and 0 otherwise

MOTH3FATH2 = A binary variable = 1 for a student whose father's level of education is high school and mother's level of education is college and 0 otherwise

MOTH2FATH3 = A binary variable = 1 for a student whose father's level of education is college and mother's level of education is high school and 0 otherwise

MOTH3FATH3 = A binary variable = 1 for a student whose father's level of education is college and mother's level of education is college and 0 otherwise

l(FAM_INC) = A log expression for family income

SAT = An assessment of verbal and mathematical ability scored between 400 and 1600.

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