The Effect of Parental Involvement in

Parent Teacher Groups on Student Achievement

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Abstract

Using a production function approach we analyze the marginal effects of parent teacher groups (PTG's) on mathematical achievement of fifth graders in Florida. First, we hypothesize that there is a positive and significant effect on student achievement of having any kind of PTG. Second, we hypothesize that there is no significant difference among types of PTG's on student achievement. Finally, we consider the effect of the extent of membership in PTG's on student achievement. We hypothesize that, controlling for student population, higher PTA membership is associated with higher student achievement. We find support for all three of our hypotheses and discuss relevant policy implications.

Introduction

Parental involvement in the educational process has received a growing amount of attention since the publication of the famous "Coleman Report" (Coleman et al., 1966) in which family and peer effects were found to be more important than school effects in explaining educational outcomes. While this report spawned a host of subsequent investigations demonstrating that school effects (especially teachers) are also important (see Hanushek, 1986 for a summary), the importance of parental involvement in the

educational achievement of students remains an important research question. In this current endeavor, we investigate a particular type of parental involvement—involvement in parent-teacher groups (PTG's)—to test three different research hypotheses.[1]

First, we wish to test whether PTG's can have a positive influence on student achievement. Using a data set for elementary schools in Florida, we find support for our hypothesis that having any kind of PTG is associated with higher mathematics achievement scores of fifth graders in Florida. Next, we wish to investigate whether the type of PTG (PTA vs. PTO vs. Alternative) matters. We find no significant difference among PTG types on mathematical achievement. This is an important finding since (a) trends in PTG membership suggest a growing preference for PTO's vs. PTA's and (b) the financial impact on local schools may differ significantly based on organizational type. Results presented here suggest that the trend towards (less expensive) PTO's and Alternative organizations may be justified. Finally, we test whether the extent of PTG membership is positively associated with student achievement. Due to data limitations, we are only able to estimate the effect of PTA membership on student achievement. We find that higher PTA membership is in fact associated with higher student achievement.

Background

Following Muller and Kerbow (1993), there are three main areas or “contexts” in which parental involvement takes place: (a) at home (Yap and Enoki, 1995; White, 1982; Lee, 1993; Zellman and Waterman, 1998; Fehrmann et al., 1987), (b) in the community (Coleman, 1987; Jaggia and Kelley-Hawke, 1999; Muller and Kerbow, 1993) and (c) in

the school (Stevenson and Baker, 1987; Epstein, 1992, Epstein and Dauber,1991; Muller and Kerbow, 1993). From a policy perspective, parental involvement in the school is perhaps the most important area for analysis since this can be controlled *directly* (as opposed to indirectly through parental involvement in the home) by educators and administrators (see Feuerstein, 2000).

Parental involvement in schools can occur in a variety of ways. Among these are (a) volunteering directly in the classroom, (b) attending or participating in children's activities at school and (c) participating in a PTG. Empirical support for the effect of parental involvement in these three areas is mixed. Stevenson and Baker (1987, p. 1350), using a sample of 179 teachers and children, test the effect of parental involvement in "activities of the school such as PTO and parent-teacher conferences" on student achievement. They find that parental involvement is associated with higher student achievement. Using a sample of 42 elementary schools in a "large suburban area," Griffith (1996) also finds support for the effect of parental involvement on student achievement. Hara and Burke (1998) conclude that parental involvement can positively affect student achievement in inner-city schools.

However, recent research by Okpala and colleagues (2001) finds no significant relationship between the number of parental volunteer hours and fourth grade mathematics achievement. At the middle school level, research using the 1988 NELS data on eighth grade middle school children is suggestive that PTG attendance of parents is associated with higher student achievement (Muller, 1993; Desimone, 1999; Sui-Chu and Willms, 1996). However, two of these studies (Muller, 1993; Sui-Chu and Willms, 1996) cast doubt on the overall robustness of these findings. Further, these studies are

conducted on students who are less than one year away from entering high school. In sum, given the paucity of research on elementary school students (and parents), we believe the overall effectiveness of parental involvement in elementary schools remains an open research question.

In this current endeavor, we wish to analyze the effect of parental involvement through PTG's on student achievement of fifth grade students in Florida. Our approach has several advantages. First, the use of school-level data has been shown to be an effective approach to measure parental involvement on achievement (see Griffith, 1996). Second, we use data on elementary school students since research indicates that parental involvement is most prevalent (Griffith, 1998; Ramirez, 2001) and effective (e.g., Miedel and Reynolds, 2000) among younger (elementary and pre-elementary school) students. Third, the use of statewide data is considerably more robust than previous county-level (Okpala et al., 2001) and school district-level (Griffith, 1996) analyses. Further, Florida is the fourth most populous state in the U.S. and contains an ethnically diverse population.

Since prior research (see Garcia-Vazquez et al., 1997) has suggested that English language proficiency can influence reading and writing achievement scores, and given that Florida's student population contains significant numbers of non-native English speakers, we chose to follow Okpala et al. (2001) and focus on mathematics achievement scores. Where data for both mathematics and reading achievement are available, prior research by Sui-Chu and Willms (1996) suggests that mathematics and reading achievement results are highly correlated and, if anything, the effect of parental

involvement on mathematics achievement scores may be smaller than for reading achievement.

Research Questions

By collecting data on PTA's, PTO's and Alternative organizations in the state, and combining these with school-level data on the mathematics portion of the Florida Comprehensive Achievement Test (FCAT), we are able to address the following three research questions. First, we attempt to replicate previous research in this area by testing whether having any kind of PTG will affect student achievement on standardized mathematics scores of fifth graders. Based on previous research in this area our first hypothesis is that having a PTG of any kind positively affects fifth grade mathematics achievement scores (H1).

Second, in the course of our investigation we identified and collected data for three basic types of PTG's: PTA's, PTO's and Alternative organizations. Here, we give a brief description of each organizational type. The National Congress of Parents Teachers (PTA) is a 105-year-old organization headquartered in Chicago that enjoys a status level and name recognition (a registered trademark) unequaled by any other parent-school group. Members of PTA's pay dues to the national and state organizations. While the state portion varies by state (e.g., $1.25 per parent in Florida, $2.50 in Iowa, $3.00 in Connecticut, etc.) each member currently pays an additional $1.75 to the national PTA organization. According to Sullivan (2000), the average PTA remits $750 to its state and national organizations. In return, members may receive benefits in the form of

governmental lobbying, conferences, training, publications and other forms of assistance (see www.pta.org and www.floridapta.org).

Parent teacher organizations (PTO's) are independent, generally school-level, organizations that have no hierarchical umbrella organizations at the state and national level and thus all membership dues are distributed locally. According to Fischer (2000),

> PTO's focus almost exclusively on the needs of their individual schools. The money earned from their bake sales, spaghetti dinners and other fundraisers builds school playgrounds, buys classroom books and sponsors teacher-appreciation luncheons. There is little school-to-school coordination of PTO events and every dollar they raise stays at their home school.

In economic terms, PTO's "free-ride" on the efforts of the state and national PTA lobbyists, since the benefits accrued by these lobbyists are conferred upon all schools, regardless of PTA membership status. In addition, some parent groups are opposed to the political stances taken by the national PTA, which has been characterized as pro-union and anti-school-choice (Haar, 1997). This opposition has fueled the trend towards PTO's and away from PTA's.

Other PTG's which we refer to as "Alternative" organizations include Parent Teacher Student Associations (PTSA's), Student Advisory Councils (SAC's) and the like. These are similar to PTO's in that they are organized locally, but differ somewhat in their organizational approaches, with some choosing to incorporate more student input.

Although prior research in this area has treated PTG's as homogeneous, we wished to investigate whether a particular organizational type of PTG (i.e. PTA vs. PTO vs. Alternative) conferred any special advantages in terms of student achievement, since these organizational types are somewhat distinct. However, our *a priori* assumption is

that we do not expect any major difference among these organizational types on student achievement. Thus, our second hypothesis is that the organizational type of PTG does not significantly alter fifth grade mathematics achievement scores (H2).

Nevertheless, as noted above, the social cost implications are clearly non-neutral. If PTG's are not effective inputs into the educational process then—since they have a positive cost—continued efforts to support these endeavors may be socially inefficient. Further, if more-costly organizations such as PTA's are not as effective—or even equally as effective—as PTO's and Alternative organizations, then this approach to parental involvement may be inefficient.

Finally, we wish to consider the effect of the extent of PTG membership on student achievement. Since the first research question is an "all or none" approach to this question, we wish to investigate whether the effect is continuous. Put differently, PTG membership levels may proxy the level of parental involvement in this type of organization. However, we were only able to acquire reliable membership data on PTA's, since PTO's and Alternative organizations are decentralized and do not report membership data to one centralized body. Thus, due to data limitations, we consider only the case for PTA's. Our third hypothesis is that controlling for school size, larger PTA membership positively affects fifth grade mathematics achievement scores (H3).

Our findings presented below are supportive of these three hypotheses. The rest of this paper proceeds as follows. In the next section, we discuss the empirical model used to test these three hypotheses. Then we discuss the data sources used in this analysis. The next section contains descriptive statistics and regression results, followed by the conclusion.

Empirical Model

We follow closely the educational production function approach used by Coleman et al. (1966), Hanushek (1979), Manahan (1983), Okpala et al. (2001) and many others. This method allows us to compare the effectiveness among all educational inputs including the PTG variables of interest as well as controls for parental income, student characteristics, school characteristics, and regional indicators in the "production" of educational "output" (achievement).

We estimate a semilog functional form using ordinary least squares (OLS). The dependent variable for our statistical analysis is a measure of student achievement approximated by the log-mean FCAT math score (LMSCORE) for fifth graders attending public elementary schools in Florida. The relevant independent variables are grouped into the following categories: parental background, student characteristics, school characteristics and a regional indicator variable. Parental background variables include: PTA membership (PTA_MR), dummy variables[2] for PTA (PTA_D), PTO (PTO_D) and Alternative (ALT_D) PTG membership, membership in any PTG (PTG_D) and the proportion of free-lunch eligible students (FLE_R).

Student characteristics variables include: absenteeism rates (ABS_R), incidents of crime and violence (CRIME), proportion of Black students (BLACK_R), percentage of students with limited English proficiency (LEP_P), percentage of students with disabilities (DISAB_P), and degree of mobility of students (MOB_P). The degree of mobility of students is defined as the rate at which students move into or out of the school

population during the school year, shown as a percentage. It is calculated by dividing (a) the total number of new entries, reentries, and withdrawals during the 180-day school year by (b) the total number of students who were enrolled at the start of the school year. School characteristics variables include: per pupil expenditures (EXPEND_PU), percentage of support staff (STAFF_P), total number of support staff (STAFF_T), pupil teacher ratio (PT_R), and average number of years of teacher experience (EXPER_Y).

Regional dummy variables were defined for the northwestern part of the state, the northeastern region, the central region, and the southern region (SOUTH_D). The latter two regions of the state of Florida are very diverse and include about 75% of the schools. We use a similar grouping of counties as those found in regional studies. (The list of counties in each group is available from the authors upon request.) In different estimations the southern region was the only one showing significant differences. Therefore, the others were not included in the results. We used several interaction terms in the estimations, including the parent teacher group indicator variable and the free-lunch eligibility ratio (PTG_FLER), mobility percent and absenteeism ratio (MOB_ABS), expenditures per pupil and free lunch eligibility ratio (EXPEND_FLE), and an interaction of pupil-teacher ratio and school support staff percent (PTR_STAFF). Interaction terms capture control variable effects on achievement as a function of other variables. For instance, the interaction of the parent teacher group indicator and the free lunch eligibility ratio provides the analyst with a measure of the effect of PTG membership on achievement, as a function of the free-lunch eligibility ratio.

Data Sources

The data used in this study were collected from different sources and cover the academic year 1997-1998. School characteristics data were obtained from the Florida Department of Education (FDOE) report on school indicators.[3] Data on race information, pupil-teacher ratios, and free-lunch eligibility and number of students were obtained from a national data set referred to as the Common Core of Data (CCD) produced by the National Center for Educational Statistics at the U.S. Department of Education. The CCD data set provides information on public schools and school districts in the United States. A different data set from the FDOE provided information on the 1999 FCAT mean score for fifth graders in all curriculum groups.

Membership rates for PTA were collected from the PTA regional office and then superimposed onto the FDOE data. The rest of the schools were contacted by telephone interviews to determine if they had a PTO or Alternative form of PTG. Since some FDOE variables are missing, the regression results for "all" observations actually include only 1434 schools. PTA participation rates were available for 906 schools.

Results

Descriptive Statistics

Table 1 shows descriptive statistics on the input variables for the 1434 elementary schools included in the regression analysis. The average mean FCAT score for the

sample is 302, ranging from a low of 225 to a high of 368. Among the 906 schools for which there are PTA data reported, the mean PTA participation rate (PTA_MR) is approximately 0.35, with a maximum of 1.53, or about 15 PTA members for every ten students. Approximately two-thirds of the schools had a PTA, while slightly less than one in four (0.27) had a PTO and less than one in 20 (0.03) had an Alternative PTG. The mean free-lunch eligibility ratio is 0.54 (ranging from zero to 1.0).

Among the student characteristics variables, an average of nearly eight percent of students were absent for more than 21 days. There was a mean of 24.95 incidents of crime or violence (ranging from 0 to 635) per school. The mean proportion of Black students was slightly more than one in four (0.27) and ranged from 0 to 1.0. On average, slightly more than seven percent of students had limited English proficiency (ranging from 0 to 61.8). Approximately 15 percent were disabled or special education students. From 1996 to 1997, the mean mobility percentage was 36.99.

For school characteristics variables, the mean per-pupil expenditure was $4,226 (ranging from $2364 to $8536). On average, there were 70.57 school support staff members per school, which corresponds to 3.38 percent of the total student population. The mean pupil-to-teacher ratio was 18.07 (ranging from 10 to 37.5). The average number of years of teaching experience was 12.21 (ranging from 1.6 to 22.8 years). One-third (0.33) of the schools were classified as being in the southern region of the state.

[Table 1 about here]

Since prior research (e.g., Sui-Chu and Willms, 1996) has shown a positive correlation between socioeconomic status and parental involvement, we wished to investigate whether PTA participation rates varied by socioeconomic status. In order to

explore this, we cross-tabulated free-lunch eligibility (as a proxy for income) with PTA participation rates. Results presented in Table 2—in which the range of both variables is divided equally into thirds—are suggestive that higher PTA participation rates occur in more affluent schools.

[Table 2 about here]

Table 3 shows average FCAT mathematics scores by type of PTG. A cursory comparison of mean student achievement scores by organizational type indicates that Alternative organizations were associated with higher mean achievement scores (311) than PTO's (303), which, in turn, were slightly higher than PTA's (301). These means were all higher than those for schools that had no PTG of any kind (292). Without controlling for additional effects on achievement, these results provide an indication that average achievement among schools may differ. T-tests performed on these groups revealed significant differences between each organizational type and the "No PTG organization" schools. The t-ratios for the differences between PTA, PTO, and Alternative organizations with no PTG are 2.81, 3.38, and 4.05, respectively (Table 4). In the next section, we control for other relevant factors affecting achievement, using a multivariate approach.

[Table 3 about here]

[Table 4 about here]

Regression Results

Four regression models are presented in Table 5. Model 1 includes all (1434) observations and disaggregates the PTG dummy variable into three categories—PTA_D, PTO_D, and ALT_D. (The reference category is having no PTG of any type.) Model 2 is the restricted version of Model 1. It includes a generic "PTG" dummy (PTG_D) variable that includes schools which have any kind of parent teacher group. The reference or omitted category in this model is the same as in Model 1.

We use Model 2 to test H1, namely does having a PTG of any kind positively impact student achievement? Results indicate that this is the case, even when controlling for a large number of other factors.[4] Since this is a semilog model specification, the coefficients are easily transformed to marginal values. Thus, we can interpret the coefficient for this composite variable (0.057) as having any type of PTG will increase the mean fifth grade mathematics score by nearly six percent. This positive effect is in line with findings from previous investigations (Stevenson and Baker, 1987; Griffith, 1996; Muller, 1993; Sui-Chu and Willms, 1996; Desimone, 1999). Two other parental background variables are also significant. The interactions of free-lunch eligibility with both PTG membership and per pupil expenditure are negative and significant. The inclusion of this interaction effect helps to test whether the "PTG effect" on achievement varies across different demographic characteristics. Since the coefficient for PTG_FLE is -0.08, this interaction term reduces the "PTG effect" of 0.057 by -0.08 times the FLE_R. In other words, very high free-lunch eligibility ratios (FLE_R > 0.71) can crowd out the

positive effect on student achievement of having a PTG. Similarly, the negative (-0.00002) coefficient for EXPEND_FLE interaction suggests that higher free-lunch eligibility ratios decrease the positive effect on student achievement of expenditures. These findings are consistent with previous investigations (e.g., Baker, 2001; Cooper and Cohn, 1997; Dewey et al., 2000; and Mayer, 1997, Ch. 4) that have found a negative relationship between income and achievement.

Among the student characteristics variables, higher proportions of Blacks, limited English-proficiency, and disabled students were associated with lower mean scores. Even though student mobility by itself did not appear to be significant, when interacted with absenteeism rates, the effect was negative and significant. Thus, having high mobility coupled with high absenteeism rates, may reduce mean scores. Higher levels of crime and violence were associated with lower mean scores. This is an expected result since acts of crime and violence serve as a disruption to learning, or may divert precious resources away from learning and towards safety.

Comparing results for the school characteristics variables, higher levels of teacher experience and per pupil expenditures also exerted a positive effect. These results tend to contradict the prevailing view by Hanushek (1981, 1986) and others that there is little or no measurable relationship between school inputs (including spending per pupil) and achievement, and are in line with more recent investigations by Dewey et al. (2000), Hedges et al. (1994) and Ferguson (1991) that do find a positive relationship. Further, as Hedges and colleagues point out, the fact that component effects (here, pupil-teacher ratio) may not be significant while spending per pupil is, confirms the notion that resources may be important, but local needs and applications may differ. The southern

regional dummy was negative, indicating that schools in the southern region of the state were associated with lower mean scores. Since South Florida schools are more likely to be in larger, urban and more ethnically-diverse areas than the rest of the state, perhaps there are other "big city" factors at work that are not being controlled for in these models that are associated with lower scores.

Models 1 and 2 were used to test H2. Results in Model 1 suggest that there is a positive and significant effect on achievement of each of the three organizational types, but none of the coefficients (ranging from 0.056 for the PTO dummy to 0.058 for the Alternative and PTA dummies) differ greatly from the coefficient for having any kind of PTG (0.057) in Model 2. Thus, the significant differences in mean achievement scores by PTG type presented in Tables 3 and 4 disappear when controlling for a number of other factors. Based on these results, we are unable to reject H2, namely, that there is no difference in student achievement based on organizational type. In other words, there does not appear to be any one particular type of organizational structure that confers special advantages on student achievement.

Models 3 and 4 include only those observations (906) for which data were reported about the extent of PTA membership. We are able to observe the effect on the other coefficients in the model (Model 3) when we include the PTA_MR variable (Model 4). (Due to data limitations, we are limited to analyzing this question with only the PTA organizational type.) Results in Model 4 are suggestive that higher PTA membership rates have a positive effect on mean student achievement. These results support H3, namely that higher PTA membership is associated with higher mean student achievement. Perhaps PTA membership is a proxy for "influence" or "impact," with

larger PTA's having a greater positive impact on student achievement. The effects of the other variables in the model are similar to those in Model 2.

Comparing Models 3 and 4, we find that including the PTA membership variable in Model 4 reduces the absolute value of the FLE_R coefficient from -0.139 to -0.12. These results are suggestive that getting more parents involved in PTA may reduce the negative "poverty" effect on achievement (though the effect is small). Perhaps higher PTA membership confers an advantage to students in schools—whether from increased coordination among parents, increased interaction and communication between parents and teachers, or increased school resources generated by PTA's. However, we acknowledge that there may be other factors at work. For example, perhaps PTA membership rates are correlated with a third factor (say parental interest in education or school's interest in education) not explicitly controlled for in this analysis.

[Table 5 about here]

Conclusion

This paper has attempted to analyze the impact of parental involvement in PTG's on student achievement. Prior research has demonstrated support for the impact of PTG's on student achievement. However, notwithstanding the evidence suggesting that parental impact on learning appears to be strongest at the younger ages, there has been a paucity of investigations using elementary school data. We attempt to remedy that by using data on fifth grade students in the state of Florida. Using a production function approach, we

test three hypotheses. First, based on research from previous investigations, we hypothesize that the relationship between having a PTG (of any kind) and mean student achievement is positive. Results presented in Table 5, Model 2 support this hypothesis.

Second, we hypothesize that there should be no significant difference among the three different organizational types of PTG's that were part of this sample (PTA's, PTO's and Alternative organizations). A cursory comparison of mean student achievement scores by organizational type indicated that schools with Alternative organizations had a higher mean achievement scores than schools with PTA's or PTO's, which were, in turn, higher than schools without any kind of PTG. However, after these were placed in a multiple regression (Model 1) in which we controlled for a number of other parental background, student and school characteristics variables, there appeared to be no significant difference among the organizational types. The marginal impact on student achievement by organizational type ranged from an increase of 5.6 percent for PTO's to a 5.8 percent increase for both PTA and Alternative organizational types. The marginal impact for the PTG dummy variable in Model 2 was 5.7 percent.

That each of these types of educational "inputs" (organizational types) is associated with essentially the same marginal variation in "output" (student achievement) has an important policy implication, namely, that a socially efficient solution would involve choosing the least-costly form of PTG. Clearly, the more costly PTA organizational form—which requires a rather substantial amount of payment to the federal and state organizations—is not justified on the basis of findings presented here. However, we urge caution in interpretation of these results since we were unable to control for all inputs into the educational production function, especially other forms of

parental involvement that may also be important. Further, it is possible that parents may derive some "consumption value" from paying dues to an organization that lobbies for children's causes.

Third, we investigate the hypothesis of whether the extent of PTG influence may also positively impact student achievement. Due to data limitations, we focus on PTA membership. We find that higher levels of PTA membership are associated with higher fifth grade mathematics achievement scores. An implication of this is that schools wanting to improve student achievement may do so by encouraging larger PTG membership. Further, the coefficient for free-lunch eligibility ratio became less negative when controlling for extent of PTA membership, suggesting that PTA membership may in fact mediate the negative "poverty effect." Investigations that fail to control for this non-income parental background effect may exaggerate the role that parental income has on student achievement. However, due to limitations of the data, we admit that we wer unable to determine whether this "membership" effect is actually a proxy for "participation," active participation" or something else such as parental and/or school administrators' interest in education (Feuerstein, 2000).

While previous research has attempted to explain motivations for (broadly-defined) parental involvement (see Dwyer and Hecht, 1992; Watkins, 1997; Zellman and Waterman, 1998; Griffith, 1998), future research endeavors should focus on motivations for PTG formation and involvement in order to shed light on issues presented here. As such, these results still leave some questions about the relationship between PTG's and achievement. Is there something inherent about PTG membership itself that is important? Perhaps the organization itself contributes positively to the learning

environment. Or, are other factors such as parental values about education, parental motivation and human capital, access to teachers, etc., which may be correlated with PTG membership, more important? Further, do children of parents with PTG membership perform better than those children whose parents do not have PTG membership? Is PTG membership correlated with active parental involvement in other areas? What other characteristics (e.g., membership tenure) are associated with each particular type of PTG? The results presented here suggest that future research endeavors that address these questions may be fruitful. In particular, future research efforts that attempt to capture some of the true costs and benefits of PTG by organizational type are warranted.

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Endnotes

1. We choose to avoid the common usage of Parent Teacher Organization (PTO) in a generic sense to distinguish it from the two other organizational types—PTA's that are official members of the National Congress of Parents Teachers and Alternative organizations such as a Parent-Teacher-Student Organization, Student Advisory Councils, etc. Thus, we define PTG as referring to any type of organizational structure—PTA, PTO or Alternative.

2. An indicator or dummy variable is a binary variable that usually takes the value of 1 if a characteristic is present and 0 if it is not. For instance, if a school has a PTA organization, the variable PTA_D = 1, otherwise, PTA_D = 0.

3. Florida Department of Education, Florida School Indicators Report, produced by the Education Information & Accountability Services. Latest update: November 2000.

4. The results of this test should be analyzed with caution due to the small number of cases in which there was no PTG of any kind.

Table 1. Descriptive Statistics

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
Parental Background						
PTA_MR	PTA membership rate	906	0.35	0.25	0.001	1.527
PTA_D	PTA membership indicator 0, 1	1434	0.68	0.47	0	1
PTO_D	PTO membership indicator 0, 1	1434	0.27	0.44	0	1
ALT_D	Alternative PTG indicator 0, 1	1434	0.02	0.15	0	1
PTG_D	Any PTG membership indicator 0, 1	1434	0.97	0.17	0	1
FLE_R	Free lunch eligibility ratio (0-1)	1434	0.54	0.24	0	1
PTG_FLE	Interaction: PTG x FLE_R	1434	0.52	0.26	0	1
Student Characteristics						
FCAT	FCAT scores	1434	301.56	21.66	225	368
ABS_R	Absent more than 21 days (%)	1434	7.65	3.48	0.3	31.3
MOB_ABS	Interaction MOB_P x ABS_R	1434	312.37	400.45	4.36	12602.16
CRIME	Crime-Violence: total (#)	1434	24.95	46.85	0	635
BLACK_R	Proportion of Black students	1434	0.27	0.26	0	1
LEP_P	Limited English proficient (%)	1434	7.42	10.04	0	61.8
DISAB_P	Students with disabilities (%)	1434	15.43	6.19	2.3	100
MOB_P	Mobility (%)	1434	36.99	23.24	3.9	608.8
School Characteristics						
EXPEND_PU	Per pupil expenditures: regular ($)	1434	4226.28	804.22	2364	8536
EXPEND_FLE	Interaction: EXPEND_PU x FLE_R	1434	2400.58	1379.20	0	7796.04
STAFF_P	School staff: support (%)	1434	3.38	1.39	0.75	10.45
STAFF_T	School staff: total (#)	1434	70.57	20.00	11	154
PT_R	Pupil teacher ratio	1434	18.07	2.41	10	37.5
PTR_STAFF	Interaction: PT_R X STAFF_T	1434	59.32	21.03	11.55	167.03
EXPER_Y	Teachers' average years of experience	1434	12.21	3.19	1.6	22.8
Regional Dummy						
SOUTH_D	Southern region indicator 0, 1	1434	0.33	0.47	0	1

Table 2. Cross-Tabulation of PTA Participation Rate by Income Proxy (Free Lunch Eligibility Ratio)

Income Proxy	Low PTA Participation	Medium PTA Participation	Medium PTA Participation
Low-Level Income	260	10	0
Medium-Level Income	555	106	16
High-Level Income	235	145	107
Totals	**1050**	**261**	**123**

Note: Both variables are divided into three levels based on the range (e.g., Low PTA Participation includes the number of observations in the bottom one-third of the range of that variable, Medium PTA Participation in the 33 – 66 percent range, etc.).

Table 3. Math FCAT Scores, by Type of PTG

Type of organization	N	Mean	Std Dev	Minimum	Maximum
PTA	975	301.02	22.46	225	368
PTO	388	303.26	19.64	244	349
Alternative organization	36	311.33	18.68	268	369
No PTG	45	291.78	20.11	249	335

Table 4. T-tests for Differences in Mean Mathematics Scores by Organizational Type

Difference	Value	t-ratio
PTA – No PTG	9.25	2.81
PTO – No PTG	11.48	3.38
Alternative Organization – No PTG	19.56	4.05

Table 5. Regression Results

Variable	Label	Estimates (t-ratios)			
		Model 1	**Model 2**	**Model 3**	**Model 4**
Intercept		5.73[a] (310.0)	5.73[a] (310.5)	5.799[a] (262.7)	5.783[a] (250.3)
Parental Background					
PTG_D	Any PTG membership indicator 0, 1		0.057[a] (3.89)		
PTA_D	PTA membership indicator 0, 1	0.058[a] (3.93)			
PTO_D	PTO membership indicator 0, 1	0.056[a] (3.76)			
ALT_D	Alternative PTG indicator 0, 1	0.058[a] (3.51)			
PTG_FLE	Interaction: PTG X FLE_R	-0.08[a] (-3.93)	-0.08[a] (-3.92)		
PTA_MR	PTA membership rate				0.017[b] (2.21)
FLE_R	Free lunch eligibility ratio (0-1)			-0.139[a] (-4.19)	-0.12[a] (-3.55)
EXPEND_FLE	Interaction: EXPEND_PU X FLE_R	-0.00002[a] (-4.41)	-0.00002[a] (-4.41)	-0.00001 (1.38)	-0.00001 (-1.59)
Student Characteristics					
BLACK_R	Proportion of Black students	-0.069[a] (-9.86)	-0.068[a] (-9.89)	-0.071[a] (-8.04)	-0.071[a] (-8.1)
LEP_P	Limited English proficient (%)	-0.0005[a] (-3.22)	-0.0005[a] (-3.13)	-0.0004[b] (-2.16)	-0.0004[b] (-2.27)
DISAB_P	Students with disabilities (%)	-0.0016[a] (-7.22)	-0.0016[a] (-7.23)	-0.0015[a] (-5.63)	-0.0015[a] (-5.42)
MOB_P	Mobility (%)	-0.00002 (-0.20)	-0.00017 (-0.14)		
MOB_ABS	Interaction MOB_P X ABS_R	-0.000012[c] (-1.82)	-0.000012[b] (-1.85)	-0.000006[c] (-1.86)	-0.000006[c] (-1.85)
CRIME	Crime-Violence: total (#)	-0.00013[a] (-5.17)	-0.00013[a] (-5.15)	-0.000086[a] (-2.73)	-0.00008[a] (-2.67)
School Characteristics					
PT_R	Pupil teacher ratio	-0.00072 (-1.20)	-0.0001 (-1.24)		
EXPER_Y	Teachers' average years of experience	0.00072[b] (1.96)	0.0007[b] (2.03)	0.0011[b] (2.22)	0.00095[c] (1.93)
EXPEND_PU	Per pupil expenditures: regular ($)	0.000017[a] (4.45)	0.00002[a] (4.47)	0.000012[b] (2.13)	0.000014[b] (2.24)
PTR_STAFF	Interaction: PT_R X STAFF_T	0.0001 (1.37)	0.00002 (1.24)	0.00007 (0.85)	0.0001 (1.20)
Regional Dummy					
SOUTH_D	Southern region indicator 0, 1	-0.013[a] (-3.80)	-0.013[a] (-3.85)	-0.021[a] (-5.35)	-0.018[a] (-4.53)
Observations		1434	1434	906	906
Adjusted R-square		0.6749	0.6752	0.703	0.704
F		186.9	207.8	195.4	180.3

[a, b, c] Significant at the one, five, and ten percent level, respectively.