

CHAPTER 2

KEEPING THE PEACE IN OUR SCHOOLS: A SIMULTANEOUS EQUATION MODEL OF SCHOOL DISCIPLINE PROGRAMS

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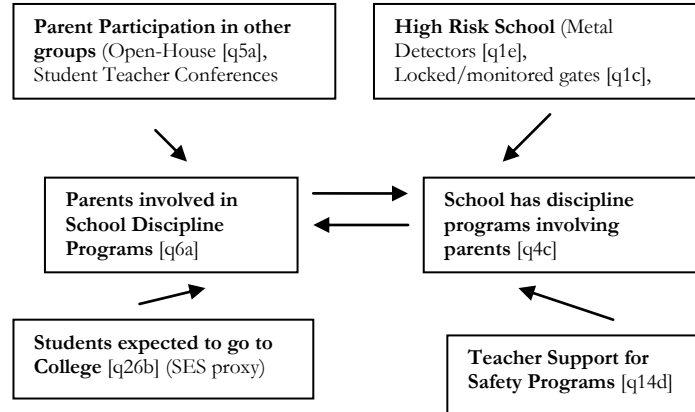
INTRODUCTION

Parent involvement in schools is essential not only for effective learning but for effective school discipline (Walker, 1994). Yet research suggests a two-way causal relationship, similar to economic supply and demand, between school parental program provision and parental involvement (Eccles and Harold 1993; Bauch and Goldring, 1995; U.S. Department of Health and Human Services, 2004). Provision and involvement are, in turn, linked to other exogenous factors. On the parent side, participation in other school programs (Hoover-Dempsey et al., 1987) and socioeconomic status of parents (Becker and Epstein, 1982) are associated with parental involvement in school discipline programs. On the school side, the likelihood that the school is located in a high crime area (Ward, 1998) and teacher support for school policies (National Center for Education Statistics, 2000) are linked to provision of school discipline programs involving parents by schools. Using a Two-Stage Least Squares (2SLS) model, this paper explores the two-way causal relationship, or mutual influence, of school discipline programs and parent involvement in them.

Likely to the chagrin of teachers, administrators, and education policy-makers, this paper did not find evidence that the provision of school discipline programs involving parents has a statistically significant relationship to parent program participation in such programs. This finding may not be surprising in light of a body of educational research that shows that family factors often have an even more powerful

relationship than do school factors to what generally are considered positive measures, indicators, or outcomes of education.

Causal Model



DATA DESCRIPTION

The data used to explore the relationships among these factors come from the 2003–2004 School Survey on Crime and Safety (SSCS) conducted by the National Center for Education Statistics (NCES). The survey contained questions on topics ranging from parent involvement in schools to frequency of crime and violence. In early 2004, the survey was sent by NCES to a stratified sample of administrators and principals of 3,473 public primary and secondary schools throughout the U.S. In the end, 2772 responses were received, a response rate of 75%. The endogenous variables in this paper reflect whether or not parent groups were involved in school’s efforts to promote safe, disciplined, drug free schools (Q6a)(1=yes; 2=no) and whether the school has a program that helps maintain school discipline (Q4c)(1=yes; two=no). The exogenous variables reflect the following: the percentage of students who had a parent or guardian participating in open-house or back-to-school night

¹ Note that in some instances, several variables have been combined in one variable “box”. I.e. locked/ monitored gates are put together in the box “high risk school”.

(5a) (1=0-25%;2=26-50%; 3=51-75%; 4=76-100%; 5= School does not offer); the percentage of students who had a parent or guardian participating in regularly scheduled parent-teacher conferences (5b)(same categories as 5a) ; socioeconomic status accounted for by a proxy: percentage of students likely to go to college after high school (26b); whether access to school grounds was controlled during school hours (1=yes; 2=no); whether the school required visitors to pass through metal detectors (1=yes; 2=no).

Verbatim Questions from NCES 2003–2004 Survey

1. During the 2003–2004 school year, was it a practice of your school to do the following? (If your school changed its practices during the school year, please answer regarding your most recent practice. Check one response on each line.)

c. Control access to school grounds during school hours (e.g., locked or monitored gates) ☐ 1 Yes ☐ 2 No

e. Require visitors to pass through metal detectors ☐ 1 Yes ☐ 2 No

4. Which of the following does your school do to involve or help parents? (Check one response on each line.)c. Have a program that involves parents at school helping to maintain school discipline ☐ 1Yes ☐ 2No

5. What is your best estimate of the percentage of students who had at least one parent or guardian participating in the following events during the 2003–2004 school year?

(Check one response on each line)

a. Open house or back-to-school night ☐ 1 0-25%☐ 2 26–50%☐ 3 51–75%☐ 4 76–100%

☐ 5 School does not offer

b. Regularly scheduled parent-teacher

conferences ☐ 1 0–25%☐ 2 26–50%☐ 3 51–75%☐ 4 76–100%☐ 5 School does

not offer

6. Were any of the following community and outside groups involved in your school's efforts to promote safe, disciplined, and drug-free schools? (Check one response on each line.)a. Parent Groups ☐ 1 Yes ☐ 2 No

14. To what extent did the following factors limit your school's efforts to reduce or prevent crime? (Check one response on each line.)d. Lack of teacher support for school policies ☐ 1

Limit in Major Way ☐ 2 Limit in Minor Way ☐ 3 Does not Limit

26. What is your best estimate of the percentage of your current students who are the following? b. Likely to go to college after high school _____%

30. How would you describe the crime level in the area where your school is located?

(Check only one response.)

☐ 1 High level of crime

☐ 2 Moderate level of crime

☐ 3 Low level of crime

Hypothesis

Although it has been suggested that the provision of programs involving parents has a relationship to parent group involvement in school discipline programs (Eccles and Harold 1993; Bauch and Goldring, 1995; U.S. Department of Health and Human Services, 2004), once the former variable is instrumented and all exogenous variables are controlled for, there is no statistically significant effect.

Brief Discussion of Frequencies

73% of school administrators reported that their schools had parent groups involved in efforts to promote safe, disciplined, and drug-free schools (*parinvolv* variable). 80% reported having programs involving parents maintain school discipline (*involveparen*). Most schools' students had at least one parent attending an open-house or back-to-school night (*parenophsebackschl2*, "26%–100% of students" combined response options accounting for > 89% of responses) and parent teacher conferences (*par3teach2*, "26–100% of students" combined response options accounting for > 82% of responses). Reported percent of students likely to attend college after high school (*percencoll*) appeared normally distributed, around 50%, while peaking at each fifth percentile. At 38% of schools, access to school grounds was reported controlled (*lockmongate*). Under 2% of schools required visitors to pass through metal detectors (*metdetect*). 75% of schools were reported to be located in an area with a low level of crime (*crimeschool=2*). 75% also reported that lack of teacher support *does not* limit the school's efforts to reduce or prevent crime (*lackteachsup*).

As expected, the endogenous variable *parinvoh* was noticeably correlated with *involveparen*, *parenophsebkcschl2*, *par3teach2*, and *percencoll* ($r=.13, -.15, -.08, -.12$). The endogenous variable *invohparen* was noticeably correlated with *metdetect*, *lockmongate*, *crimeschool*, and weakly correlated with *lackteachsup* ($r=.11, .16, .05$).

Assumptions to Identify and Estimate Models

“Identification” is a precondition for the application of 2SLS to equations in simultaneous systems; a structural equation is identified only when enough of the system’s predetermined variables are omitted from the equation in question to allow that equation to be distinguished from all others in the system (Studenmund, 2006). There are two conditions that need to be satisfied: the Rank Condition and the Order Condition.

Following Studenmund (2006, p. 497), I here note and simply assume the Rank Condition is satisfied in the present research.² The Order Condition requires that the number of predetermined (exogenous plus lagged endogenous) variables in the simultaneous system is greater than or equal to the number of slope coefficients in the equation of interest (Studenmund, 2006 p. 498). Put another way, the Order Condition requires that the number of exogenous/predetermined variables excluded from an equation must be greater than or equal to the number of endogenous variables on the right hand side of the equation. The two following equations/models (1.1 and 1.2) would allow for the application of 2SLS because the number of exogenous variables excluded (4 and 3 respectively) is greater than the number of endogenous variables on the right hand side of each equation (1 in each case).

OLS Regression Mis-specified for *parinvoh*³

In the first equation (Model 1.1), the first endogenous variable, *parinvoh*, is regressed on all variables that theory proposes it has a causal relationship with (see causal flow model at beginning

² Studenmund notes that most researchers examine just the order condition, that the Rank Condition is covered in “advanced econometric text[s]” (p.497).

³ Although logistic regression would be the preferable method for the models specified in this paper, as these models use dichotomous dependent variables, the assumption is made here that the results using such a model would not differ greatly.

of paper) in order to contrast these results with the 2SLS model for *parinvolv*, which will be specified later.

OLS Regression Mis-specified for involyparen

In Model 1.2, the second endogenous variable, *involyparen*, is regressed on all variables that theory proposes it has a causal relationship with, again, in order to contrast these results with the 2SLS model that will be specified later.

The results of Model 1.1 and 1.2 will be discussed in comparison with the 2–Stage Least Squares Model at the end of the paper. However, briefly, it is noted that we find that in each equation, only two predictor variables, *par3teach2* and *lackteachsup*, are not significantly related to the endogenous variables, controlling for the exogenous variables and the other endogenous variable in the model.

First Stage/Reduced-Form Regression for parinvolv

In Models 2.1 and 2.2, the endogenous variables are individually regressed on all the exogenous variables. Reduced-form equations such as these yield coefficients called impact multipliers. The reduced form is used because 1) it does not violate the third classical assumption, 2) impact multipliers can be usefully interpreted, and 3) they can assist in estimating simultaneous equations (Studenmund, 2006, p. 480).

Structural Equation for parinvolv: Two-Stage Least Squares

Because the OLS models created are biased in the estimation of simultaneous equations, they violate the third of the classical assumptions of OLS (Studenmund, 2006, p. 485), which says that the error term of all predictor variables is not correlated (p.89)—in the following equations, instrumental variables are substituted for the endogenous variables where they are predictor variables.

Table 1: parinvolv

Variables	OLS	2SLS	Difference between 2SLS and OLS
<i>parenophsebckschl2</i>	- .0491791*	-.048762*	0.0004
<i>par3teach2</i>	-.002745	-.0024824	0.0003
<i>percencoll</i>	-	-.0018771*	0.0000

	.0018517*		
<i>involhparen</i>	.1485193*	.1733923	(became non-significant) 0.0249
<i>Constant</i>	.4013701*	.3154305*	-0.0859

Table 2: *involhparen*

Variables	OLS	2SLS	Difference between OLS and 2SLS
<i>metdetect</i>	.2530451*	.2649499*	0.0119
<i>lockmongate</i>	.1031166*	.096855*	-0.0063
<i>crimeschool</i>	.0704089*	.0742088*	0.0038
<i>lackteachsup</i>	.0145914	.0160828	0.0015
<i>parinvolv</i>	.1195559*	.2530543*	0.1335
<i>Constant</i>	.3154312*	.2624915*	-0.0529

In the first table above, controlling for the other independent variables in the respective equations, a positive change in category of parents or guardians attending open-house or back-to-school night (*parenophsebkcschl2*:0–25% to 25–50% etc.) is associated with a .05 (OLS and 2SLS) greater probability that parents of the school are reported to be involved in school discipline programs (*parinvolv*). The percent of students expecting to attend college (*percencoll*) is associated with a .002 greater likelihood that parents are reported to be involved in school discipline programs (*parinvolv*). There is one difference in the statistical significance of the coefficients between the misspecified OLS models and the two-stage least squares models: *Involhparen* is not a statistically significant predictor of *parinvolv* when *involhparen* is instrumented, as *involveparen* was in the misspecified OLS model.

In the second table, we find that visitors reported being required to pass through a metal detector (*metdetect*) is associated with a .3 (both OLS and 2SLS) greater probability that schools is reported to have parent groups involved in student discipline (*involhparen*). School gates being locked (*lockmongate*) is associated with a .1 greater probability that the school has discipline programs involving parents (*involhparen*). A change of one category in the level of crime (*crimeschool*) is associated with a (.07) greater likelihood that the school is

reported to have safety programs involving parents (*involhparen*). Parent involvement (*parinvolh*) is associated with a .2, and .3 (OLS and 2SLS respectively) greater likelihood that the school is reported to have a school discipline program involving parents (*involhparen*).

Hausman Specification Test⁴

Rejecting the null hypothesis would provide evidence that the 2SLS model is the better model, that there is “added value” from using 2SLS; the Hausman test, if its null-hypothesis is rejected, indicates there probably is no simultaneity bias (X causes Y, Y causes X at the same time). However, in both of these Hausman test cases, the null hypothesis cannot be rejected ($p=.8$, $p=.16>.05$). Thus, the Hausman test does not provide evidence that the 2SLS models are the better models.

CONCLUSION

Once parent involvement in school discipline programs is instrumented, there is no statistically significant effect on the likelihood that schools will offer school safety programs. Despite this result, the Hausman test provides no evidence that the 2SLS is a better model. However, because 2SLS theoretically should be the superior model, and because there is the risk of committing a type I error and overstating the results by relying on the mis-specified OLS model, 2SLS is used here as the model of choice for reporting the following conclusion: Confirming the original hypothesis of this paper, yet likely to the chagrin of teachers, administrators, and education policy-makers, there is no evidence in this analysis that the provision of school discipline programs involving parents has a statistically significant relationship to parent participation in such programs. Yet this finding is in line with a body of educational research (Coleman, 1966; Heyneman and Loxley, 1983; Lareau, 2000) that shows that family factors often have a powerful relationship – often an even more powerful relationship than do school factors – to what are generally considered positive measures, indicators, or outcomes of education.

⁴ A Durbin-Wu Hausman test would have been attempted but could not be found in the copy/version of Stata being used.

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