The Effects of School Size on Parental Involvement and Social Capital: Evidence from the ELS:2002

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1. Introduction

Recent state and Federal policies designed to improve American public schools have generally focused on introducing standards (e.g., No Child Left Behind) or choice (e.g., charter schools and vouchers). However, another increasingly prominent approach to reform has emphasized the possible benefits of creating smaller schools as well as small, focused learning communities within schools, particularly at the high school level (e.g., Toosi, 2006). Interestingly, the growing national interest in the small-schools movement has largely been catalyzed by private foundations (most notably, the Bill and Melinda Gates Foundation) rather than by explicit state and Federal action (Lewis 2004, Vander Ark 2002). Regardless, this reform agenda has brought renewed attention to a long-standing research literature that has examined the effects of school size on the organizational character and performance of schools.

A central focus of this literature has been on how school size influences both costs and student outcomes (e.g., test scores and educational attainment). However, this literature has also emphasized how school size may change the nature of educationally relevant social interactions among students, teachers, and administrators. In particular, the apparent consensus in this literature is that the increased formalization of interactions in larger schools harms school quality by fostering alienation and a loss of organizational focus among students and staff (Lee, Bryk, and Smith 1993; Royal and Rossi 1997). However, there appears to be little corresponding evidence on how school size influences patterns of parental involvement in schools. This is somewhat surprising in light of the fact that constructive parental engagement with schools is widely seen as an important determinant of school quality (Lee, Bryk, and Smith 1993).

Furthermore, the effects of school size on parents may also matter for an important reason that is wholly unrelated to the direct objectives of schools. Public schools are often viewed as vital community institutions that can deepen social networks and promote a variety of welfare-enhancing social norms (e.g., trust and reciprocity). The role of public schools in promoting this broad group of outcomes, which researchers currently group under the heading “social capital”, has important implications both for the optimal design of schools as well as for the proper division between the public and

private sectors.[1] The size of a public school, for example, could quite conceivably influence the amount of social capital within its community through its effects on parental interactions.

In this study, we present new empirical evidence on whether the size of public high schools influences measures of parental involvement and social capital. This analysis is based on nationally representative data from the base-year of the recent Education Longitudinal Study of 2002 (ELS:2002). In addition to examining novel outcome measures based on recent data, our study also engages a substantive methodological concern. Any inferences about the causal effects of school size are likely to be complicated by the fact that the unobservable traits that influence a parent's pattern of civic engagement (e.g., the enjoyment a parent derives from interacting with others) may also influence the size of the public school they choose. The conventional approach to addressing this concern would be to exploit a plausible natural experiment that influenced school size.[2] However, in the absence of a compelling experiment, we adopt an approach developed in a recent study by Altonji, Elder, and Taber (2005) on the effects of Catholic schools (hereafter referred to as AET). Following AET, we attempt to establish bounds on the causal effects of school size by using the differences in observed traits across parents connected to smaller and larger schools as a guide to the size and direction of their potentially confounding unobserved traits. The organization of the paper is as follows. Section 2 provides brief discussions of the school-size literature and the possible relationships between school size and the engagement of parents. Section 3 discusses the ELS:2002 data. In section 4, we present our baseline, multivariate analysis of these data while section 5 presents the results of our bounding exercise. Section 6 concludes.

2. School Size and Parents

Questions about the appropriate size of American public schools are far from new. In particular, the late 19th and most of the 20th century witnessed a purposeful and

[1] For example, in a recent study, Fischel (2002) argues voters consistently reject voucher plans because they recognize that local public schools promote the development of community-specific social capital.
[2] For example, a recent study by Kuziemko (2006) on the achievement consequences of school size exploited the variation in school size generated by school openings, closing and mergers in Indiana.

aggressive consolidation movement, which increased school sizes. This stunning reorganization of American education reflected a Progressive-Era impulse towards "scientific" management by experts. Tyack (1974) characterizes the "administrative progressives" who promoted consolidation as business and professional elites who wanted to have the organization of schools emulate that of the modern business corporation and to delegate almost total administrative power to an expert superintendent and staff. These reformers saw in small, locally controlled schools "only corruption, parochialism, and vestiges of an outmoded village mentality" (Tyack 1974, page 127).

A more explicit argument made in favor of larger schools was that it would improve school quality by facilitating a more diverse and targeted curriculum. For example, James B. Conant, a former President of Harvard University, wrote an influential report (Conant 1959) that advocated the elimination of small, high schools, which were characterized as unable to offer a sufficiently comprehensive curriculum. Similarly, proponents of larger schools alleged that considerable cost savings would accrue from capturing economies of scale in school administration and facilities.

However, the current research literature indicates that the size of many larger public schools has pejorative consequences. In particular, recent reviews suggest that high schools of 600 to 900 students balance economies of size with the negative consequences of larger schools (e.g., Irmsher 1997, Andrews, Duncombe, and Yinger 2002).[3] Some commentators (e.g., Meier 1996) argue that the distinct advantages of smaller, autonomous schools are rooted in their governance, student-faculty relations, parental involvement, and accountability. In particular, drawing on basic sociological theory (e.g., Weber 1947), Lee, Bryk, and Smith (1993) argue that the increased formalization of larger schools can harm group cohesion and create static roles that promote alienation and attenuate organizational focus. A number of empirical studies (e.g., Bryk and Driscoll 1998, Lee and Loeb 2000, Crosno, Johnson and Elder 2004) have reported supporting evidence indicating that larger schools alienate teachers and students from educational goals.

[3] The average enrollment of regular, public high schools during the 2002-03 school year was 813 students (Table 94, 2004 Digest of Education Statistics).

However, there is relatively little evidence that examines how the size of public schools influences the prevalence and character of parental involvement.[4] Similarly, though local public schools are often viewed as vital community institutions, we know of no empirical evidence that assesses whether smaller schools are more effective in this role.[5] However, anecdotal descriptions of the local opposition to forced school closures, which often stressed concerns about civic identity and social cohesion, suggest that this was the case. For example, in describing the forced closure of a Maine school, E.B. White (1971) wrote: "The closing of our high school caused an acute pain in the hearts of most of the townfolk, to whom the building was a symbol of their own cultural life and a place where one's loyalty was real, lasting, and sustaining." Similarly, in discussing anthropological evidence that community schools integrated people into social networks, civic and cultural life, Tyack (1974) writes "thus, they became institutions valued in themselves, quite apart from the goal of teaching students certain skills and knowledge."

Contemporary scholars would describe the social cohesion, trust, and civic engagement ostensibly promoted by smaller schools and districts as examples of "social capital." The concept of social capital has achieved a wide currency across the social sciences since it was first introduced by Loury (1977). The definitions used by researchers vary somewhat but, in general, social capital refers to social norms (e.g., trust) and social networks, which are thought to provide strong complements to a variety of important social and economic outcomes.[6] One of the most prominent topics in the recent literature on social capital is the evidence it has been in decline in the U.S. The influential work of Robert Putnam (1995, 2000) suggests that these declines are due to the isolating effects of television and the aging of the "civic" generations born between 1910 and 1940.[7] One prominent type of evidence for the decline in social capital is the decline of membership in local Parent-Teacher Associations (Putnam 2000, page 55).

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[4] For example, Griffin (1998) presents evidence that larger elementary schools are associated with lower levels of parental involvement. However, these inferences are based on only one suburban school district.

[5] However, Fischel (2002, Table 1) presents a cross-state regression (n=48), which indicates that an index of "social capital" is lower in states where more students are in "big" school districts.

[6] See Durlauf and Fafchamps (2004) for a comprehensive and critical review of the theoretical and empirical literature on social capital.

[7] A recent study by Costas and Kahn (2003) suggest that the declines in social capital are overstated and that much of the decline since 1970 is due to increases in female labor force participation and to growing income inequality.

Should we expect larger public schools to discourage the involvement of parents in groups like the PTA or reduce other types of social capital? Such an expectation would be consistent with some of the seminal, theoretical work on public goods. For example, Buchanan (1965) argued that voluntary compliance with behavioral sanctions and the provision of public goods like social capital is more likely in small communities than in large ones. Similarly, Olson (1965) hypothesized a negative relationship between group size and the voluntary provision of public goods.[8] On the other hand, larger schools could conceivably increase the social capital in their communities by promoting expanded social networks and amplifying the rewards and sanctions for community engagement. Similarly, an expansion of social networks could also attenuate distrust of others. Ultimately, the effects of school size on social capital should be viewed as an empirical question.

3. Education Longitudinal Study of 2002 (ELS:2002)

The ELS:2002 is the most recent in a series of nationally representative, longitudinal studies of secondary-school students sponsored by the National Center for Education Statistics (NCES). The target for the baseline sample in ELS:2002 consisted of high school sophomores in the spring of 2002. The sample design for ELS:2002 reflected a two-stage selection process (U.S. Department of Education 2004). In the first stage, schools were selected with probabilities proportional to their size and within strata defined by Census region, urbanicity and the control of the school (i.e., public, Catholic, other private). Within participating schools, approximately 26 sophomores were selected within strata defined by race and ethnicity (U.S. Department of Education 2004). This procedure over-sampled private schools and students who were Asian or Hispanic.

The base-year respondents consisted of 15,362 high school sophomores from 752 schools. In addition to surveying students, ELS:2002 gathered information from a number of other sources including school records, teachers, parents, and administrators. The parent survey elicited a variety of information about the student's family background. However, it also included a variety of questions, which are discussed in

[8] However, Sandler (1992) notes that this relationship depends on a number of modeling assumptions (e.g., the utility function, the technology of the public good supply, and the nature of strategic interactions).

more detail below, about the parents' interactions and engagement with their school and their community. Initially, the parent survey, which was available in both English and Spanish, was mailed to the student's home with instructions that it should be completed by the parent or guardian who was most familiar with the student's educational experiences. Follow-up requests allowed parents to respond to either a written questionnaire or a computer-assisted telephone interview (CATI).

Our analytical sample consists of 10,480 individual-level respondents. The reduction in sample size reflects the exclusion of private and Catholic schools (i.e., over 3,323 observations), public schools with unusual grade spans (i.e., those that did not begin with the 9th or 10th grade, 1,470 cases), and students who had completed 9th grade in a foreign country (89 cases).

Our measures of school size are based on an enrollment question from the survey of school administrators. In particular, we rely on the administrator's report about the 10th grade enrollment rather than total school enrollment because the latter question was not included on an abbreviated questionnaire to which some administrators responded. However, the reported grade-level enrollments correspond quite closely to the school-level reports. The question about grade 10 enrollments allowed respondents to choose from 7 categories (see Table 1). In some specifications, our measures of school size are dummy variables representing each of these categorical responses. However, in other specifications, our measure is a "small-school" dummy variable, which is equal to one for schools where the administrator reported 10th grade enrollment of 199 students or fewer. This small-school indicator effectively identifies schools with fewer than 600 to 800 students. This margin is of interest given the prior evidence suggesting that schools with these enrollments are optimally sized.

Our dependent variables reflect parents' responses to 4 questions about their involvement in their child's high school as well as 7 other questions related to social capital (Table 1). More specifically, the first two parental-involvement questions involved whether the parent (or their spouse/partner) attended or belonged to the school's parent-teacher organization (PTO). The remaining two parental-involvement questions addressed more intensive involvement with the school (i.e., taking part in PTO activities and volunteering at the school).

The first social-capital question asked whether the parent belonged to any neighborhood or religious organizations with other parents from the child's school. The second social-capital variable is based on the parent's knowledge of 3 of their child's close friends and their parents. Specifically, the parent questionnaire inquired for each of the 3 close friends of the student whether the parent knew the friend, the friend's mother, and the friend's father (yes=1, no=0). We summed the three binary responses (1=yes) for each of the three friends and then averaged the variables across friends to create a measure that varies from 0 to 3.

The next four social-capital variables are binary responses to questions about the parent of a child's friend giving advice about teachers and courses, giving and receiving favors from such a parent, and whether such a parent supervised an educational outing or field trip. The final social-capital variable directly captures the responding parent's perception of their community. More specifically, it identifies whether the parent feels that they are part of a neighborhood or community or that it is "just a place to live."

It should be noted that each of these 11 variables are available for approximately 8,000 of the respondents in the analytical sample (see Table 1). The reduction in sample size reflects both the unwillingness of some parents to complete the survey and, to a lesser extent, the fact that some schools were unwilling to provide home addresses for some or all of the sampled students (U.S. Department of Education 2004). To assess whether the patterns of non-response to each question varied with school size, we examined auxiliary regressions in which a dummy variable for a missing response to a particular question was the dependent variable.[9] Our results suggest that, conditional on our other controls, non-response is unrelated to school size for 9 of our 11 dependent variables. However, it should be noted that smaller schools were 1 percentage point more likely to have non-responders to the questions about volunteering in school and about getting advice about teachers and courses from the parents of a student's friends.

Our analysis exploits as controls the detailed variables that are available in ELS:2002 on the observable traits of students, parents, families, and their high schools. Our most parsimonious set of controls simply includes 11 dummy variables for interactions between each school's Census region and its urbanicity (i.e., urban,

[9] The econometric specification is described in more detail in the next section.

suburban, and rural) where suburban-Northeast is the omitted category. However, in our "middle" specification, we introduce a broad array of controls for observables at the student, family, and school level, which could be reasonably viewed as exogenous. These include separate demographic controls for the student and the reporting parent (i.e., race-ethnicity, gender, age, and English as a native language). Other variables in this group reflect the educational attainment of the parent, the marital structure of the student's family, family size (i.e., number of dependents and its square), labor-force status of the parent (i.e., full-time, part-time, not working), and family income (linear, quadratic, and cubic terms along with a dummy variable for top-coded income).

This group also includes 9 separate variables which identify (on a scale of 1 to 4) the amount of the time the parent spends with the child in various, non-school activities (e.g., talking, attending religious services, concerts, sporting events, etc.). At the parent level, we also included interactions of educational attainment with gender and with native-language status. School-level controls include a dummy variable indicating whether the school begins at grade 9 and linear and quadratic terms for the percent of the school's students on free or reduced-price lunch.

In our third and most saturated specification, we added controls for other student-level outcomes that are more likely to be viewed as possibly endogenous with respect to school size and quality. These include dummy variables for whether the student ever repeated a grade, whether the student has learning, physical or emotional disabilities, and whether the student is considered to have a behavior problem at school. This group also includes linear and quadratic terms for the number of times the student switched schools (exclusive of grade promotions). We also include interaction terms between the dummy variables for grade repetition and behavioral problems and various student and parent-level traits (i.e., student's gender, parent's gender, parent's educational attainment, race, and native-language status). Finally, it should be noted that we also set the values of all the variables described here to zero when missing and included separate dummy variables that identified whether each variable was missing among our control variables.

4. Baseline results

The main concern in estimating the causal impact of school size involves the non-random sorting of students across schools. The notion that parents "vote with their feet" in response to the quality of local public schools is well documented. The concern this raises in this context is that the unobserved characteristics associated with school selection may also be associated with outcomes such as parental involvement or community attachment. The presence of such omitted variables may lead to inconsistent parameter estimates of the school size effect.

The following set of equations formalizes this intuition:

$$y_{ij} = \alpha\left(small_j\right) + X_{ij}\gamma + e_{ij} \tag{1.1}$$

$$small_j = X_{ij}\beta + u_{ij} \tag{1.2}$$

Here i indexes parents and j indexes schools. Most empirical studies of school size estimate single-equation models that resemble equation (1.1). In these studies, the identifying assumption is that $corr\left(e,u \mid X\right) = 0$. Researchers typically hope that the vector of control variables, X, is sufficiently detailed that the assumption is largely correct.

In our analysis, we start by following this standard practice in the literature. The tables below present estimates from weighted estimates that reflect the sampling design in the ELS. The standard errors shown account for arbitrary correlation within schools. Unless otherwise noted, the estimates presented come from OLS models. In the case of binary outcome variables, probit estimates yield comparable results and so OLS estimates are presented for ease of interpretation. In section 5, we conduct additional analyses to bound the potential selection bias following the strategy outlined in AET.

Before examining the impact of school size, it is useful to explore the characteristics of students who attend small schools. To explore the relationship between a set of covariates and attendance at a small school, we regress a binary indicator for schools with fewer than 800 students on the controls described above. The results are presented in Table 2. Column 1 includes a set of mutually exclusive indicators for region-urbanicity, where suburban schools in the Northeast are the omitted category. Roughly 23 percent of students in the suburban Northeast attend high schools with fewer

than 800 students. Students in urban districts, regardless of region, are substantially less likely to attend high schools with fewer than 800 students. For example, the coefficient of -0.16 on urban*northeast indicates that 16 percentage point fewer students, or only 6 percent of students overall, in the urban northeast attend small high schools. In contrast, students in the rural Midwest are 43 percentage points more likely to attend small schools. The r-squared shown on the bottom row indicates that region and urbanicity controls explain roughly 13 percent of the variation in small school attendance. Column 2 includes a variety of other student, school and parent characteristics. Interesting, the r-squared statistic for this column of 0.19 indicates that the addition of this extensive list of very detailed covariates only accounts for an additional 6 percentage points of the variation.

While no obvious patterns merge, several things are worth noting. Asian and Hispanic students are somewhat less likely than their peers to attend small schools. Similarly, students whose parents attended some college are somewhat less likely to attend small schools compared to children whose parents have both more as well as less education. Column 3 adds a small set of potentially endogenous variables, which do not have an appreciable impact on the likelihood of attending a small school.

Table 3 presents the main results for parental involvement. We will focus the discussion on the middle column for each outcome, but it is worth noticing that the inclusion of the potentially endogenous student behavior and other variables in the final column for each outcome does not change our school size estimates noticeably. Looking across the four outcomes, several interesting patterns emerge. To begin, it appears that parents are *more* likely to be belong to a PTA when their children attend larger schools – specifically, those with more than 1600 students. This counterintuitive result may reflect the fact that PTAs are more formal and highly organized institutions in larger schools that are better able to recruit parents to belong.

Despite the higher membership rates in larger schools, parents whose children attend larger high school report they are *less* likely to take part in PTA activities or volunteer in the school. For example, parents whose children attend schools with 400-800 students are 8 percentage points, or nearly 25 percent, less likely to volunteer in the school when compared with parents whose children attend schools with fewer than 400

students. Hence, it appears that small schools may not enhance formal membership, but do increase involvement of a more intensive type.

There is some indication that parent involvement declines even more as school size increases. For example, parents in schools with over 2,200 students are 11 percentage points less likely to volunteer relative to those in the smallest schools (i.e., <400 students). While the magnitude of some of the difference in point estimates between moderately and extremely large schools are not trivial, the estimates for most categorical school size indicators above 400 students are not statistically different from each other.

Table 4 presents the main results for the social capital outcomes. Mirroring the parent involvement results, we see that school size is negatively associated with social capital among parents. Specifically, parents whose children attend larger high schools are less likely to report that they belong to other organizations with other parents from the school, are less likely to report knowing the parents of the child's friends or that these parents ever gave them advice or supervised their own children on a fieldtrip. Moreover, those parents whose children attend larger high schools are roughly 6-11 percentage points (7-13 percent) less likely to report that they feel connected to their community, relative to parents whose children attend schools with fewer than 400 students.

In general, these results are highly statistically significant. However, the effect sizes vary across the outcome measures. For example, the estimated effect of a larger school on the probability of belonging to a neighborhood or religious organization with another parent is approximately 20 percent of the mean in the control group. However, parents whose children attend schools with over 2800 students have knowledge of their child's friend's parents that is one-third of a standard deviation lower than parents whose children attend schools with fewer than 400 students. Finally, while there is some indication that the negative effects increase with school size, the difference between schools school categories above 400 students are not statistically significant.

As one interprets the results in Tables 3 and 4, it is important to keep in mind that the vast majority of small high schools (i.e., those with fewer than 800 students) are located in rural areas, and very few small, public high schools reside in urban areas. Recall that the results in Table 2 indicated that only about 6 percent of students in urban

areas attended high schools with fewer than 800 students. This means that the small school effects discussed above are likely to be driven by rural and, to a lesser extent, suburban schools. Yet the policy interest currently surrounding small schools seems to have focused overwhelmingly on poor urban districts. For this reason, Tables 5 and 6 report results of school size effects that focus solely on a sample of urban schools.

The results in Tables 5 and 6 are from specifications that condition on the full set of controls. These results indicate that the beneficial effects of smaller schools on parental involvement and social capital appear to be almost exclusively concentrated in rural and, to a lesser extent, suburban communities. However, the apparent absence of school-size effects for urban communities should be interpreted with caution. For example, it may be that there are circumstances in urban communities that attenuate the benefits of smaller schools. However, the relative lack of variation in the sizes of urban high-schools and the implied lack of statistical power should also be noted, particularly in light of our unrestrictive representation of the school-size categories (i.e., six distinct dummy variables). For example, even in urban communities, smaller high schools appear to increase the probabilities of taking part in PTA activities and in belonging to other organizations with parents.[10]

5. Selection on observables

The estimates above suggest that school size has modest effects on parent involvement and social capital, with smaller schools generating higher levels of both outcomes. It is still the case, however, that selection on unobservables may be present, leading us to misestimate the impact of school size. In the absence of a randomized experiment or other source of exogenous variation in school size, one can never be certain to have eliminated all omitted variables. In recent work, however, Altonji, Elder and Taber (2005) have developed a strategy for examining the extent of selection on unobservables using information on the selection on observables (hereafter referred to as AET).

The basic intuition is that the degree of selection on observables can serve as a guide to the extent to which there may be selection on unobservables. Recall that the

[10] In these two cases, F-tests indicate that the six school-size variables are jointly significant determinants.

potential selection bias stems from the fact that the unobserved components of equations (1.1) and (1.2) may be correlated. Hence, one can determine the extent of the bias under various assumptions regarding $\rho = corr(e,u)$. More importantly, AET develop a model whereby, under a set of explicit assumptions, the maximum possible correlation is calculated as

$$0 \leq \rho \leq \frac{Cov(X'\beta, X'\gamma)}{Var(X'\gamma)}. \tag{1.3}$$

There are three key assumptions underlying this model: (1) the observable covariates, X, are chosen at random from the full set of factors that determine the outcome, y; (2) the number of observable and unobservable factors are large; (3) the part of the outcome variable that is related to the observables has the same relationship with the endogenous variable as the part of the outcome that is related to the unobservables. While these are strong assumptions that will not be met fully in any empirical application, AET provide a compelling case that these assumptions are at least as plausible as the standard assumptions underlying regression analysis.

Tables 7 and 8 present the results of an AET-inspired bounding exercise for the relationship between school size and our outcomes. To simplify the analysis and presentation, we consider a single school size indicator that takes on a value of one for all schools with fewer than 800 students. We choose 800 since it coincides with the optimal high school size discussed in some of the prior literature, although as the results from Tables 3 and 4 suggest, our results are not particularly sensitive to choosing another cutoff for our definition of small schools. Moreover, to facilitate the comparison between our baseline estimates and the bounding exercise, we estimate unweighted OLS regressions that make no adjustment for heteroskedasticity. This does not change the results in any meaningful way (comparison tables available upon request).

Table 7 presents the first set of results from this bounding. The top row presents unconditional OLS estimates of the effect of having a child attend a school with fewer than 800 students. These bivariate regression results present a baseline for comparison with the estimates in row 2, which include both region-urbanicity indicators and the set of parent and child characteristics included in the middle specifications in Tables 3 and 4. A comparison of the estimates in rows 1 and 2 allows one to gauge the direction and

magnitude of selection on observables. Finally, for the sake of parsimony, we present a limited set of outcome variables.

An examination of the top two rows reveals several patterns. First, small schools appear to have modest but positive effects on parental involvement and social capital. Second, the naïve OLS estimates appear to be biased upward for the social capital outcomes, but biased downward for most of the parent involvement measures. That is, the unconditional small school estimates appear to *understate* the positive effect of small schools on parent involvement. Third, selection on observables is modest for most outcomes, and quite small for several outcomes, including whether parents take part in PTA activities or volunteer at the school. The maximum potential correlation under the AET assumptions also relatively modest, reflecting the limited degree of observable selection. The correlations range from nearly zero in the case of taking part in PTA activities to 0.19 for knowledge of other parents.

Despite the relatively small degree of selection on observables, however, the range of estimates shown in the bottom two rows is relatively large. For example, if one assumes the maximum potential selection on unobservables, the impact of small schools on parent attendance at PTA meetings would be roughly 23 percentage points, which is very large compared with the baseline control group mean of 33 percent, despite the fact that the "preferred" single-equation OLS model suggests zero effect. Even the very small maximum correlation of 0.039 for volunteering would imply a zero effect relative to the positive and significant single-equation OLS estimate.

The primary reason for this is that the available covariates explain a relatively small fraction of the variation in our outcome measures. The r-squared terms shown in row 5, for example, range from 0.09 to 0.19. Given the same degree of correlation with the unobservables, the higher the R-squared, the lower the selection bias in the outcome equation. The intuition for this result is that the large degree of residual variation means that a relatively small degree of selection can have large effects on the coefficient estimates.

Table 8 conducts a similar exercise, but takes region and urbanicity as given so that we only consider the selection on observables that comes from the inclusion of student and parent covariates. The assumption here is that region and urban location are

not "choice" variables on the part of parents, but rather reflect a set of structural factors that, once conditioned upon, should not further influence the analysis. In practice, we accomplish this be regressing the outcome and the small school indicator on the full set of region-urbanicity indicators and then using the residuals from these regressions as the new outcome and endogenous variables respectively. Note that considering region and urbanicity separately from the other covariates may change the direction as well as the size of implied selection on observables.

Several interesting results stand out. First, we see that the direction as well as the magnitude has changed from what was presented in Table 7. For the outcomes volunteering and belong to non-PTA organizations with other parents from the school, the implied bias in OLS has switched from upward to downward. This indicates that the observable parent and child covariates in our model that are associated with attending a small school are also associated with greater participation in these activities, once we control for region-urbanicity. It is also interesting to note that the magnitude of the maximum correlation changes in very different ways across outcomes. For some outcomes, like attendance at PTA meetings, the maximum correlation has declined (in absolute magnitude), which reflects the fact that the region-urbanicity controls were the more important observables in the model of this outcome. On the other hand, the correlation for volunteering has increased in absolute magnitude. As the formula in equation (1.3) indicates, the change in correlation is due both to the selection on observables that occurs (represented in the numerator) as well as the variance in the observed variance of the observable part of the outcome (as represented in the denominator).

Considering the estimates for the maximum potential correlation in Table 8, we see that in general the bounds are tighter if one assumes region and urbanicity not choice variables, and thus implicitly only allows for selection on unobservables that mirrors selection on observables that is driven by parent and student characteristics. Nonetheless, the range of potential "true effects" reflected in the bounds in Table 8 is substantial in some cases.

Given the direction of the implied bias and the results from our bounding exercise, it seems likely that small schools have a positive impact on the more intensive

aspects of parental involvement. It is less clear whether school size has any true impact on social capital. If one is willing to consider region and urbanicity as exogenous, then it seems safe to conclude the smaller schools result in a greater connectedness to one's community.

6. Discussion

The fundamental argument made by proponents of the small-school movement is that autonomous and appropriately sized schools are more effective at promoting student achievement. In particular, the extant literature on school size suggests that small schools are better because of their effects on the engagement and social interactions of students and staff. The results presented in this study both support and extend this conventional wisdom by suggesting that another dimension of the small-school advantage is due to their beneficial effects on parental involvement. More specifically, the results presented here suggest that smaller high schools are more effective at influencing the probability that parent volunteer at the school.

However, the results presented here also suggest that the benefits of smaller schools extend beyond the conventional definitions of school quality. More specifically, this study's results also suggest that smaller schools are more effective at promoting some measures of social capital (e.g., knowledge of other parents and community identification). The policy relevance of this evidence turns in part on the widely held view that social capital provides a vital complement to economic advancement. In particular, this suggests smaller schools can benefit at-risk communities in ways that extend beyond the schoolhouse door.

However, there are substantive caveats to these conclusions. In particular, the literature on school size appears to have paid relatively little attention to the thorny problem of identifying the causal effects of smaller schools. This perennial empirical problem is exacerbated in this setting by the general lack of compelling natural experiments. With respect to some of our results, we have tentatively expressed more confidence in a causal interpretation by relying on the evidence from bounding exercises that rely on the how the selection into small schools relates to the selection into other observables that influence parental involvement and social capital. However, more

definitive evidence on the true effects of small schools is likely to emerge from currently ongoing randomized experiments. Our results suggest that a fruitful direction for this future research will be to consider how small schools influence the engagement of parents both in and outside their children's schools.

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Table 1 – Summary Statistics, ELS:2002

	Obs	Weight	Mean	Std.Dev.	Min	Max
Dependent Variables						
Belong to PTA	8248	2243330	0.231	0.422	0	1
Attend PTA meetings	8256	2244583	0.327	0.469	0	1
Take part in PTA activities	8202	2229776	0.251	0.434	0	1
Act as a volunteer at the school	8197	2227603	0.249	0.433	0	1
Belong to other org. with parents from school	8268	2245101	0.284	0.451	0	1
Parent knowledge about children friends' parents	7823	2135952	2.327	0.674	0	3
Friends' parent gave advice	8183	2230105	0.302	0.459	0	1
Friends' parent did favor	8169	2223621	0.638	0.481	0	1
Friends' parent received favor	8148	2218686	0.691	0.462	0	1
Friend's parent supervised on field trip	8132	2216536	0.307	0.461	0	1
Connectedness in community	8279	2252742	0.754	0.431	0	1
Independent Variables						
Whether a small school (enrollment<800)	10480	2823254	0.164	0.370	0	1
School enrollment 1-399	10480	2823254	0.043	0.204	0	1
School enrollment 400-799	10480	2823254	0.120	0.325	0	1
School enrollment 800-1199	10480	2823254	0.171	0.376	0	1
School enrollment 1200-1599	10480	2823254	0.190	0.393	0	1
School enrollment 1600-2199	10480	2823254	0.235	0.424	0	1
School enrollment 2200-2799	10480	2823254	0.139	0.345	0	1
School enrollment >2800	10480	2823254	0.102	0.302	0	1
Control variables						
Parent Charactersitics						
Urban West	10480	2823254	0.081	0.273	0	1
Urban South	10480	2823254	0.105	0.307	0	1
Urban Northeast	10480	2823254	0.036	0.187	0	1
Urban Midwest	10480	2823254	0.064	0.244	0	1
Rural West	10480	2823254	0.025	0.156	0	1
Rural South	10480	2823254	0.085	0.279	0	1
Rural Northeast	10480	2823254	0.028	0.165	0	1
Rural Midwest	10480	2823254	0.037	0.189	0	1
Suburb West	10480	2823254	0.135	0.341	0	1
Suburb South	10480	2823254	0.157	0.364	0	1
Suburb Northeast	10480	2823254	0.111	0.315	0	1
Suburb Midwest	10480	2823254	0.135	0.342	0	1
Female=1	9129	2453759	0.819	0.385	0	1
White=1	9001	2416339	0.635	0.482	0	1
Asian=1	9001	2416339	0.042	0.200	0	1
Black=1	9001	2416339	0.146	0.353	0	1
Hispanic=1	9001	2416339	0.154	0.361	0	1
Other race=1	9001	2416339	0.024	0.154	0	1
Parent Age	8977	2419640	43.872	6.385	32	72
High school and below	10480	2823254	0.279	0.448	0	1

Some college	10480	2823254	0.360	0.480	0	1
Bachelor and above	10480	2823254	0.361	0.480	0	1
Married=1	9081	2440093	0.718	0.450	0	1
Marriage-like=1	9081	2440093	0.043	0.203	0	1
Widowed=1	9081	2440093	0.024	0.153	0	1
Separated=1	9081	2440093	0.040	0.196	0	1
Divorced=1	9081	2440093	0.129	0.335	0	1
Never married=1	9081	2440093	0.046	0.210	0	1
Work full time=1	9054	2437077	0.634	0.482	0	1
Work part time=1	9054	2437077	0.141	0.348	0	1
Never work=1	9054	2437077	0.225	0.418	0	1
Family income	10480	2823254	57880	44143	0	200000
English native lang.=1	8789	2394627	0.855	0.352	0	1
Number of Dependents	8399	2285773	2.683	1.357	0	8
Attended concerts/plays/movies with 10th grader	8317	2263097	2.831	0.960	1	4
Attended sports events outside with 10th grader	8332	2265583	2.562	1.101	1	4
Attended religious services with 10th grader	8306	2260372	2.938	1.136	1	4
Attended family social functions with 10th grader	8343	2269785	3.344	0.800	1	4
Took day trips/vacations with 10th grader	8346	2270922	3.114	0.838	1	4
Worked on hobby/played sports with 10th grader	8321	2265641	2.832	0.994	1	4
Went shopping with 10th grader	8347	2270381	3.360	0.722	1	4
Went to restaurants with 10th grader	8335	2267271	3.391	0.683	1	4
Spent time talking with 10th grader	8340	2269842	3.667	0.552	1	4
Did something else fun with 10th grader	8334	2269138	3.393	0.700	1	4
Times changed schools	8323	2261636	1.259	1.508	0	5
Student Characteristics						
Age	10442	2812396	16.475	0.627	15	19
Female=1	10480	2823254	0.492	0.500	0	1
Repeat grade=1	8362	2272761	0.131	0.338	0	1
Disabled=1	8365	2275118	0.124	0.330	0	1
Behavior problem=1	8388	2280935	0.081	0.273	0	1
White=1	10480	2823254	0.585	0.493	0	1
Asian=1	10480	2823254	0.040	0.197	0	1
Black=1	10480	2823254	0.151	0.358	0	1
Hispanic=1	10480	2823254	0.172	0.377	0	1
Other race=1	10480	2823254	0.051	0.221	0	1
English native lang.=1	10195	2752570	0.857	0.350	0	1
School Characteristics						
Grade starts at 9	10480	2823254	0.943	0.232	0	1
Grade starts at 10	10480	2823254	0.057	0.232	0	1
Percentage students on free lunch	9528	2564425	27.559	23.942	2.5	88

Notes: This extract is based on high-school sophomores in the spring of 2002 who attended public schools whose lowest grade was 9th or 10th and who did not complete 9th grade in a foreign county.

Table 2 Determinants of small-school attendance

	Dependent variable: Children in a small school less than 800=1		
urban_west	-0.232***	-0.251***	-0.248***
	(0.067)	(0.067)	(0.067)
urban_south	-0.154**	-0.201***	-0.201***
	(0.074)	(0.072)	(0.071)
urban_northeast	-0.162*	-0.211***	-0.211***
	(0.085)	(0.08)	(0.08)
urban_midwest	-0.192***	-0.255***	-0.254***
	(0.074)	(0.075)	(0.075)
rural_west	0.033	0.013	0.013
	(0.16)	(0.143)	(0.143)
rural_south	0.113	0.071	0.071
	(0.096)	(0.093)	(0.093)
rural_northeast	-0.062	-0.068	-0.067
	(0.131)	(0.125)	(0.125)
rural_midwest	0.433***	0.398***	0.398***
	(0.135)	(0.128)	(0.128)
suburb_west	-0.124	-0.136*	-0.135*
	(0.079)	(0.076)	(0.075)
suburb_south	-0.059	-0.115	-0.115
	(0.079)	(0.075)	(0.075)
suburb_midwest	-0.105	-0.113	-0.113
	(0.079)	(0.078)	(0.078)
female		0.01	0.000
		(0.022)	(0.022)
asian		-0.048*	-0.047*
		(0.026)	(0.027)
black		-0.019	-0.018
		(0.022)	(0.024)
hispanic		-0.028	-0.028
		(0.023)	(0.023)
othrace		0.021	0.021
		(0.045)	(0.045)
parage		-0.001	-0.001
		(0.001)	(0.001)
sc		-0.035*	-0.034*
		(0.02)	(0.02)
ba		-0.004	-0.005
		(0.018)	(0.018)
married		0.022	0.021
		(0.018)	(0.018)
marriedlike		0.008	0.012
		(0.021)	(0.021)
widowed		0.024	0.026
		(0.035)	(0.034)
separated		-0.026	-0.026

		(0.026)	(0.026)
divorced		0.003	0.004
		(0.022)	(0.022)
fulltime		0.013	0.012
		(0.012)	(0.012)
nowork		0.012	0.014
		(0.015)	(0.015)
income		0.000	0.000
		(0.000)	(0.000)
income2		0.000	0.000
		(0.000)	(0.000)
income3		0.000	0.000
		(0.000)	(0.000)
topinc		-0.073	-0.072
		(0.079)	(0.08)
english		0.018	0.016
		(0.032)	(0.033)
depend		-0.020**	-0.020**
		(0.009)	(0.009)
depend2		0.002	0.002
		(0.001)	(0.001)
byp57c		0.001	0.001
		(0.006)	(0.006)
byp57d		0.013***	0.013***
		(0.004)	(0.004)
byp57e		0.005	0.005
		(0.005)	(0.005)
byp57f		-0.004	-0.004
		(0.006)	(0.006)
byp57g		0	0.001
		(0.006)	(0.006)
byp57h		0.003	0.003
		(0.005)	(0.005)
byp57i		-0.011	-0.01
		(0.007)	(0.007)
byp57j		0.006	0.005
		(0.007)	(0.007)
byp57k		-0.007	-0.009
		(0.008)	(0.008)
byp57l		0.007	0.008
		(0.007)	(0.007)
ss_age		0.01	0.008
		(0.008)	(0.008)
ss_female		0.016*	0.019**
		(0.009)	(0.009)
ss_asian		-0.068***	-0.068***
		(0.026)	(0.026)
ss_black		-0.022	-0.023

		(0.024)	(0.024)
ss_hispanic		-0.071***	-0.070***
		(0.017)	(0.017)
ss_othrace		0.004	0.005
		(0.027)	(0.027)
ss_english		0.025**	0.025**
		(0.013)	(0.012)
sch_9		0.036	0.037
		(0.044)	(0.044)
pct_fl		0.002	0.002
		(0.002)	(0.002)
pct_fl2		0.000	0.000
		(0.000)	(0.000)
female_sc		0.000	0.006
		(0.022)	(0.022)
female_ba		0.003	0.012
		(0.021)	(0.021)
female_eng		-0.009	-0.017
		(0.021)	(0.021)
sc_eng		0.03	0.034
		(0.026)	(0.025)
ba_eng		-0.021	-0.018
		(0.023)	(0.022)
chngsch			-0.016**
			(0.008)
chngsch2			0.003*
			(0.002)
ss_repeat			0.001
			(0.037)
ss_disable			-0.028**
			(0.013)
ss_behvprob			-0.079*
			(0.043)
ss_female_behv			-0.043
			(0.034)
ss_female_repeat			-0.015
			(0.023)
ii_female_ss_repeat			0.027
			(0.028)
ii_female_ss_behvprob			0.078**
			(0.037)
ii_sc_ss_repeat			-0.070***
			(0.026)
ii_sc_ss_behvprob			0.017
			(0.038)
ii_ba_ss_repeat			-0.053
			(0.033)
ii_ba_ss_behvprob			0.024

			(0.034)
ii_black_ss_repeat			-0.02
			(0.033)
ii_black_ss_behvprob			0.024
			(0.042)
ii_english_ss_repeat			0.061**
			(0.026)
ii_english_ss_behvprob			0.012
			(0.031)
Observations	10480	10480	10480
R-squared	0.13	0.18	0.19

Notes: Standard errors, adjusted for school-level clustering, are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 3 - Estimated effects of school size on parental involvement

	Belong to PTA				Attend PTA meetings				Take part in PTA activities				Act as a volunteer at the school		
School enrollment 400-799	0.034	-0.11	-0.006		-0.019	-0.032	-0.031		-0.025	-0.054*	-0.54*		-0.053	-0.082**	-0.081**
	(0.031)	(0.028)	(0.028)		(0.027)	(0.025)	(0.026)		(0.030)	(0.028)	(0.028)		(0.032)	(0.027)	(0.027)
School enrollment 800-1199	0.056*	-0.003	0.002		-0.013	-0.020	-0.018		-0.045	-0.070**	-0.069**		-0.042	-0.076**	-0.074**
	(0.033)	(0.026)	(0.026)		(0.024)	(0.023)	(0.023)		(0.030)	(0.027)	(0.027)		(0.032)	(0.026)	(0.026)
School enrollment 1200-1599	0.113**	0.034	0.039		-0.033	-0.048*	-0.044*		-0.032	-0.061**	-0.059		-0.062*	-0.102**	-0.097**
	(0.037)	(0.031)	(0.031)		(0.026)	(0.024)	(0.025)		(0.030)	(0.028)	(0.028)		(0.034)	(0.027)	(0.027)
School enrollment 1600-2199	0.137**	0.046	0.049*		-0.056**	-0.065**	-0.063**		-0.057**	-0.094**	-0.094**		-0.046	-0.099**	-0.098**
	(0.034)	(0.029)	(0.029)		(0.024)	(0.024)	(0.024)		(0.028)	(0.026)	(0.027)		(0.032)	(0.027)	(0.026)
School enrollment 2200-2799	0.159**	0.077**	0.082**		0.034	0.005	0.007		-0.046	-0.084**	-0.083**		-0.079**	-0.117**	-0.114**
	(0.045)	(0.034)	().034)		(0.030)	(0.028)	(0.029)		(0.031)	(0.028)	(0.028)		(0.040)	(0.031)	(0.030)
School enrollment >2800	0.110**	0.055*	0.058*		0.039	-0.006	-0.005		-0.083**	-0.115**	-0.114**		-0.097**	-0.113**	-0.110**
	(0.038)	(0.032)	(0.032)		(0.033)	(0.029)	(0.029)		(0.030)	(0.030)	(0.030)		(0.037)	(0.013)	(0.031)
P value for F stats.	0.0005	0.0567	0.0561		0.0056	0.0156	0.0168		0.074	0.0047	0.0044		0.1828	0.0074	0.0078
Control group mean and std. dev.	0.134 (0.341)				0.300 (0.459)				0.293 (0.456)				0.322 (0.468)		
Observations	8248	8248	8248		8256	8256	8256		8202	8202	8202		8197	8197	8197
R-squared	0.0304	0.1667	0.1736		0.0231	0.1091	0.1149		0.005	0.1164	0.1221		0.0119	0.1349	0.1436

Notes: Standard errors, adjusted for school-level clustering, are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 4 – Estimated effects of school size on social capital

Panel A													
	Belong to other org. with parents from school			Parent knowledge about children friends' parents			Friends' parent gave advice			Friends' parent did favor		
School enrollment 400-799	-0.025	-0.061**	-0.060**	-0.069	-0.106**	-0.093**	-0.025	-0.049*	-0.048*	0.024	-0.008	-0.007
	(0.035)	(0.027)	(0.026)	(0.043)	(0.041)	(0.040)	(0.031)	(0.028)	(0.028)	(0.031)	(0.026)	(0.026)
School enrollment 800-1199	-0.015	-0.056**	-0.055**	-0.094**	-0.123**	-0.108**	0.012	-0.035	-0.036	0.033	-0.001	-0.000
	(0.033)	(0.025)	(0.024)	(0.045)	(0.041)	(0.040)	(0.029)	(0.026)	(0.027)	(0.030)	(0.025)	(0.025)
School enrollment 1200-1599	-0.024	-0.069**	-0.064**	-0.161**	-0.198**	-0.184**	-0.050*	-0.083**	-0.082**	-0.009	-0.050*	-0.048*
	(0.033)	(0.025)	(0.025)	(0.045)	(0.044)	(0.043)	(0.029)	(0.027)	(0.027)	(0.032)	(0.027)	(0.027)
School enrollment 1600-2199	0.010	-0.061**	-0/060	-0.137**	-0.187**	-0.175**	-0.022	-0.071**	-0.072**	0.043	-0.022	-0.022
	(0.035)	(0.026)	(0.026)	(0.045)	(0.042)	(0.041)	(0.029)	(0.026)	(0.026)	(0.030)	(0.025)	(0.025)
School enrollment 2200-2799	-0.023	-0.067**	-0.065**	-0.138**	-0.175**	-0.164**	-0.056*	-0.088**	-0.089**	0.015	-0.017	-0.016
	(0.041)	(0.030)	(0.030)	(0.049)	(0.046)	(0.045)	(0.030)	(0.027)	(0.028)	(0.033)	(0.028)	(0.029)
School enrollment >2800	-0.073*	-0.093**	-0.090**	-0.163**	-0.184**	-0.168**	-0.079**	-0.104**	-0.102**	-0.007	-0.010	-0.007
	(0.038)	(0.028)	(0.028)	(0.051)	(0.051)	(0.051)	(0.031)	(0.028)	(0.028)	(0.038)	(0.030)	(0.031)
P value for F stats.	0.1412	0.0637	0.0921	0.0056	0.0001	0.0002	0.0468	0.0015	0.0023	0.28	0.2131	0.2467
Control group mean and std. dev.	0.323 (0.468)			2.474 (0.577)			0.335 (0.472)			0.647 (0.478)		
Observations	8268	8268	8268	7823	7823	7823	8183	8183	8183	8169	8169	8169
R-squared	0.0155	0.1988	0.2098	0.0136	0.1211	0.1404	0.0069	0.0885	0.0948	0.0114	0.1222	0.1284

Notes: Standard errors, adjusted for school-level clustering, are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 4 – Estimated effects of school size on social capital (continued)

Panel B										
	Friends' parent received favor				Friend's parent supervised on field trip				Connectedness in community	
School enrollment 400-799	0.015	-0.012	-0.010		-0.067**	-0.079**	-0.074**		-0.047*	-0.065**	-0.064**
	(0.031)	(0.027)	(0.027)		(0.029)	(0.027)	(0.027)		(0.047)	(0.024)	(0.023)
School enrollment 800-1199	0.018	-0.012	-0.011		-0.081**	-0.083**	-0.078**		-0.065**	-0.087**	-0.084**
	(0.031)	(0.027)	(0.027)		(0.029)	(0.027)	(0.027)		(0.026)	(0.024)	(0.023)
School enrollment 1200-1599	0.009	-0.026	-0.023		-0.110**	-0.119**	-0.113**		-0.075**	-0.093**	-0.090**
	(0.033)	(0.030)	(0.030)		(0.029)	(0.027)	(0.027)		(0.027)	(0.026)	(0.025)
School enrollment 1600-2199	0.042	-0.016	-0.015		-0.116**	-0.128**	-0.123**		-0.051*	-0.088**	-0.088**
	(0.030)	(0.027)	(0.027)		(0.029)	(0.027)	(0.027)		(0.026)	(0.026)	(0.025)
School enrollment 2200-2799	0.011	-0.010	-0.007		-0.140**	-0.147**	-0.141**		-0.098**	-0.113**	-0.112**
	(0.033)	(0.029)	(0.029)		(0.031)	(0.031)	(0.031)		(0.029)	(0.029)	(0.028)
School enrollment >2800	-0.020	-0.008	-0.004		-0.143**	-0.148**	-0.141**		-0.106**	-0.092**	-0.090**
	(0.041)	(0.035)	(0.035)		(0.031)	(0.031)	(0.031)		(0.032)	(0.031)	(0.030)
P value for F stats.	0.4625	0.9825	0.9862		0.000	0.000	0.0000		0.0110	0.0066	0.0072
Control group mean and std. dev.	0.698 (0.460)				0.394 (0.489)				0.832 (0.374)		
Observations	8148	8148	8148		8132	8132	8132		8279	8279	8279
R-squared	0.0101	0.1302	0.1354		0.0088	0.0647	0.0699		0.0186	0.12	0.1347

Notes: Standard errors, adjusted for school-level clustering, are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 5 – Estimated effects of school size on parental involvement by urbanicity

	Belong to PTA			Attend PTA meetings			Take part in PTA activities			Act as a volunteer at the school		
	Urban	Suburb	Rural	Urban	Suburb	Rural	Urban	Suburb	Rural	Urban	Suburb	Rural
School enrollment 400-799	0.061	0.036	-0.078**	0.005	-0.052	-0.020	0.009	0.002	-0.081**	0.058	-0.081***	-0.081**
	(0.087)	(0.053)	(0.033)	(0.080)	(0.041)	(0.039)	(0.081)	(0.067)	(0.035)	(0.110)	(0.025)	(0.037)
School enrollment 800-1199	-0.021	0.036	-0.054	-0.013	-0.024	-0.031	-0.030	-0.004	-0.131***	0.021	-0.046**	-0.146***
	(0.070)	(0.048)	(0.038)	(0.078)	(0.037)	(0.035)	(0.073)	(0.066)	(0.038)	(0.073)	(0.022)	(0.042)
School enrollment 1200-1599	-0.009	0.087	-0.067	0.034	-0.074*	-0.069*	0.029	-0.015	-0.133***	-0.021	-0.070***	-0.130***
	(0.072)	(0.053)	(0.043)	(0.083)	(0.038)	(0.035)	(0.074)	(0.067)	(0.034)	(0.073)	(0.025)	(0.044)
School enrollment 1600-2199	-0.041	0.093*	0.045	-0.060	-0.073*	-0.058	-0.067	-0.027	-0.137***	0.003	-0.082***	-0.146***
	(0.066)	(0.050)	(0.064)	(0.076)	(0.038)	(0.038)	(0.072)	(0.066)	(0.036)	(0.070)	(0.024)	(0.049)
School enrollment 2200-2799	0.013	0.116**	0.130*	0.022	-0.007	0.028	-0.051	-0.020	-0.126**	-0.038	-0.088***	-0.090
	(0.063)	(0.058)	(0.074)	(0.081)	(0.041)	(0.061)	(0.074)	(0.068)	(0.051)	(0.070)	(0.029)	(0.071)
School enrollment >2800	0.008	0.085	0.042	0.060	-0.057	-0.038	-0.056	-0.081	-0.139***	-0.026	-0.108***	-0.085
	(0.064)	(0.058)	(0.044)	(0.073)	(0.045)	(0.039)	(0.074)	(0.070)	(0.041)	(0.071)	(0.028)	(0.087)
P value for F stats.	.5539	.1620	.0235	.0442	.0645	.4505	.0377	.3369	.0020	.5454	.0024	.0188
Observations	2168	4443	1637	2173	4446	1637	2150	4420	1632	2161	4415	1621
R-squared	0.22	0.17	0.27	0.16	0.11	0.16	0.16	0.13	0.19	0.18	0.15	0.19

Notes: Standard errors, adjusted for school-level clustering, are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 6 – Estimated effects of school size on social capital by urbanicity

Panel A													
	Belong to other org. with parents from school				Parent knowledge about children friends' parents				Friends' parent gave advice				Friends' parent did favor		
	Urban	Suburb	Rural		Urban	Suburb	Rural		Urban	Suburb	Rural		Urban	Suburb	Rural
School enrollment 400-799	-0.153**	-0.003	-0.072*		-0.006	-0.085	-0.091*		-0.156	-0.051	-0.014		0.031	0.064**	-0.019
	(0.059)	(0.047)	(0.037)		(0.193)	(0.062)	(0.054)		(0.100)	(0.050)	(0.039)		(0.079)	(0.031)	(0.035)
School enrollment 800-1199	-0.049	-0.004	-0.099***		0.167	-0.092	-0.174***		-0.099	-0.037	0.024		0.034	0.078***	-0.024
	(0.058)	(0.044)	(0.037)		(0.175)	(0.062)	(0.056)		(0.071)	(0.049)	(0.046)		(0.060)	(0.029)	(0.037)
School enrollment 1200-1599	-0.053	-0.020	-0.083**		0.042	-0.173***	-0.217***		-0.117	-0.078	-0.109**		-0.014	0.034	-0.100**
	(0.060)	(0.043)	(0.041)		(0.174)	(0.065)	(0.063)		(0.075)	(0.050)	(0.046)		(0.067)	(0.032)	(0.045)
School enrollment 1600-2199	-0.029	-0.019	-0.106**		0.134	-0.203***	-0.193***		-0.134*	-0.053	-0.058		0.046	0.039	-0.014
	(0.056)	(0.045)	(0.052)		(0.169)	(0.065)	(0.064)		(0.075)	(0.050)	(0.048)		(0.064)	(0.030)	(0.035)
School enrollment 2200-2799	-0.049	-0.030	-0.044		0.141	-0.178***	-0.267***		-0.160**	-0.076	-0.084**		0.032	0.052	-0.008
	(0.056)	(0.051)	(0.053)		(0.165)	(0.067)	(0.070)		(0.073)	(0.052)	(0.042)		(0.060)	(0.036)	(0.046)
School enrollment >2800	-0.027	-0.080	-0.150***		0.232	-0.242***	-0.296***		-0.131*	-0.116**	-0.087		0.083	0.043	-0.067
	(0.051)	(0.049)	(0.044)		(0.176)	(0.075)	(0.066)		(0.071)	(0.051)	(0.060)		(0.058)	(0.039)	(0.056)
P value for F stats.	.0249	.2924	.0371		.0789	.0003	.0001		.4318	.0610	.1021		.2944	.1595	.2049
Observations	2168	4455	1645		1998	4246	1579		2130	4412	1641		2126	4407	1636
R-squared	0.23	0.21	0.26		0.17	0.15	0.21		0.12	0.10	0.14		0.16	0.13	0.17

Notes: Standard errors, adjusted for school-level clustering, are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 6 – Estimated effects of school size on social capital (continued)

Panel B										
	Friends' parent received favor				Friend's parent supervised on field trip				Connectedness in community	
	Urban	Suburb	Rural		Urban	Suburb	Rural		Urban	Suburb	Rural
School enrollment 400-799	0.084	0.016	0.001		0.002	-0.021	-0.080**		-0.001	-0.028	-0.057*
	(0.100)	(0.025)	(0.036)		(0.073)	(0.061)	(0.032)		(0.068)	(0.038)	(0.029)
School enrollment 800-1199	0.117	0.017	-0.024		0.014	-0.023	-0.084**		0.049	-0.052	-0.111***
	(0.092)	(0.025)	(0.039)		(0.070)	(0.060)	(0.038)		(0.058)	(0.037)	(0.031)
School enrollment 1200-1599	0.076	0.015	-0.056		-0.000	-0.046	-0.158***		0.031	-0.043	-0.158***
	(0.091)	(0.028)	(0.046)		(0.076)	(0.059)	(0.040)		(0.066)	(0.038)	(0.039)
School enrollment 1600-2199	0.111	0.013	-0.007		0.025	-0.078	-0.132***		0.016	-0.047	-0.111**
	(0.089)	(0.026)	(0.042)		(0.070)	(0.060)	(0.046)		(0.062)	(0.038)	(0.044)
School enrollment 2200-2799	0.111	0.030	-0.019		-0.013	-0.094	-0.156*		-0.044	-0.028	-0.234***
	(0.088)	(0.029)	(0.035)		(0.074)	(0.063)	(0.080)		(0.059)	(0.041)	(0.043)
School enrollment >2800	0.152	0.022	-0.134**		0.032	-0.108*	-0.240***		-0.013	-0.030	-0.178***
	(0.093)	(0.037)	(0.063)		(0.067)	(0.063)	(0.063)		(0.062)	(0.045)	(0.038)
P value for F stats.	.4915	.9759	.2520		.9176	.0316	.0004		.2865	.7323	.0001
Observations	2125	4394	1629		2125	4381	1626		2168	4468	1643
R-squared	0.17	0.14	0.18		0.10	0.08	0.13		0.14	0.14	0.19

Notes: Standard errors, adjusted for school-level clustering, are reported in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 7: Sensitivity of Small School Estimates to Various Assumptions Regarding the Degree of Selection on Unobservables

	Attend PTA Meetings	Take part in PTA activities	Act as volunteer at the school	Belong to other org. with parents from school	Parent knows parents of child's friends	Perceived connectedness to the community
Small school estimate (<800 students) with no controls (bivariate regression)	-0.025 (0.018)	0.041** (0.012)	0.050** (0.013)	0.028** (0.013)	0.127** (0.021)	0.067** (0.012)
Small school estimate region-urbanicity indicators and parent and student controls	0.007 (0.014)	0.042** (0.013)	0.043** (0.13)	0.016 (0.013)	0.075** (0.021)	0.040** (0.013)
Implied direction of bias	Downward	Downward	Upward	Upward	Upward	Upward
$\max \rho = corr(e,u)$	-0.169	-0.006	0.039	0.053	0.191	0.153
R-squared from regression of outcome on all covariates	0.11	0.12	0.13	0.20	0.13	0.12
Control group mean (s.d.)	0.331 (0.470)	0.246 (0.430)	0.243 (0.429)	0.280 (0.449)	2.308 (0.683)	0.745 (0.436)
Small school estimate assuming:						
$\rho = 0.5 * \max \rho$	0.116** (0.014)	0.045** (0.013)	0.020 (0.013)	-0.015 (0.013)	-0.104** (0.021)	-0.050 (0.131)
$\rho = \max \rho$	0.228** (0.014)	0.048** (0.013)	-0.002 (0.013)	-0.046** (0.013)	-0.289** (0.021)	-0.142** (0.013)

Notes: In all models, small schools are defined as those with fewer than 800 students. In order to facilitate comparison with the bounding exercise, all estimates in this table are based on unweighted regressions with standard errors that have not be adjusted to account for heteroskedasticity. Weighting the estimates introduces only minor changes in the small school estimate. Weighted estimates available from the authors upon request. The student and parent controls included in the models above are those from the middle specifications in Tables 3 and 4. The maximum correlation is calculated using the formulas outlined in Altonji et al. (2005) and is described in the text. ** = significant at the 5 percent level, * = significant at the 10 percent level.

Table 8: Sensitivity of Small School Estimates to Various Assumptions Regarding the Degree of Selection on Unobservables

	Attend PTA Meetings	Take part in PTA activities	Act as volunteer at the school	Belong to other org. with parents from school	Parent knows parents of child's friends	Perceived connectedness to the community
Small school estimate (<800 students) with region-urbanicity controls	0.004 (0.014)	0.038** (0.013)	0.032** (0.013)	0.002 (0.013)	0.087** (0.021)	0.041** (0.013)
Small school estimate region-urbanicity indicators and parent and student controls	0.007 (0.014)	0.042** (0.013)	0.043** (0.13)	0.016 (0.013)	0.075** (0.021)	0.040** (0.013)
Implied direction of bias	Downward	Downward	Downward	Downward	Upward	Upward
$\max \rho = corr(e,u)$	-0.035	-0.044	-0.101	-0.104	0.067	0.003
R-squared from regression of outcome on all covariates	0.11	0.12	0.13	0.20	0.13	0.12
Control group mean (s.d.)	0.331 (0.470)	0.246 (0.430)	0.243 (0.429)	0.280 (0.449)	2.308 (0.683)	0.745 (0.436)
Small school estimate assuming:						
$\rho = 0.5 * \max \rho$	0.030** (0.014)	0.069** (0.013)	0.101** (0.013)	0.076** (0.013)	0.013 (0.021)	0.039** (0.013)
$\rho = \max \rho$	0.053** (0.014)	0.095** (0.013)	0.160** (0.013)	0.136** (0.013)	-0.050** (0.021)	0.037** (0.013)

Notes: In all models, small schools are defined as those with fewer than 800 students. In order to facilitate comparison with the bounding exercise, all estimates in this table are based on unweighted regressions with standard errors that have not be adjusted to account for heteroskedasticity. Weighting the estimates introduces only minor changes in the small school estimate. Weighted estimates available from the authors upon request. The student and parent controls included in the models above are those from the middle specifications in Tables 3 and 4. The maximum correlation is calculated using the formulas outlined in Altonji et al. (2005) and is described in the text. ** = significant at the 5 percent level, * = significant at the 10 percent level.