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Compounding Disadvantage: The Effects of School and District Size on Student Achievement in West Virginia

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This investigation replicated a California study that reported substantial school- and district-size effects on achievement—effects that interacted with the socioeconomic status of the community (Friedkin & Necochea, 1988). Using a 1990 West Virginia data set, I found evidence of similar relationships, and in circumstances that differed sharply from those in the original study. Small schools facilitated the academic achievement of impoverished students, whereas large schools facilitated the academic achievement of affluent students. The difference in West Virginia was that impoverished students most often attended small schools. Implications are drawn for the development of future policy and for future research into effects of school and district size.

Introduction

Given the questionable warrant of large size with respect to both cognitive and noncognitive results (Fowler, 1992; Howley, 1994), closing small schools seems an unlikely way to improve rural schools. The strategy could even be counterproductive (Walberg & Fowler, 1987). West Virginia generally is both rural and poor, so the problematic character of consolidation might be expected to reveal itself quite dramatically in this state.

The issue of size in West Virginia is not confined by any means to *school* size, however. The next item on the consolidation agenda in West Virginia could be the creation of multi-county *districts,* at least in the view of a number of legislators and policymakers. In this study, I examine the relationship between (a) school and district size and (b) student achievement in West Virginia, interpreting the results in light of ongoing consolidation.

Background

Between 1987 and 1994, nearly 26% of West Virginia schools were closed; net closures—total closures minus newly opened schools—yielded a 20% reduction in the number of schools. In 1987, 1,002 regular schools operated in the state, 725 of which were located in rural areas or small towns. By 1994, 188 of these schools had closed and were replaced by 45 newly opened schools (National Center for Education Statistics, 1994, 1995). Statewide, 258 schools were closed and 63 were opened (for a 1994 net of 807 regular, operating schools). Although schools were closed in all locales, rural areas experienced proportionately more closures and proportionately fewer openings (relevant to 1987 as a base year). That is, schools were withdrawn from the countryside and consolidated in more densely populated places, typically the small and large towns that are commercial and administrative centers in the 55 counties of West Virginia.

Aside from the contestable rationale that rural school consolidation saves money (Streifel, Foldsey, & Holman, 1991; Schwinden & Brannon, 1993), the state also justified its consolidation efforts by pointing to the improved educational and social opportunities for students that consolidation putatively affords. Net population loss continues in West Virginia and this, too, served as a rationale.

Consolidation, however, was not argued as a tactic to stem the flow, but, in fact, as a way to help prepare students to encounter "the globally competitive economy of the 21st century" (in the approximate words of official discourse). That is, students were to be prepared to become eager outmigrators. Genuinely good, rural schools were definitely not what the consolidators had in view (cf. DeYoung & Howley, 1992; Sher, 1995).

Relevant Literature

While the literature on school size is quite large—the ERIC database indexes some 450 resources related to the

This study is based on my doctoral dissertation in educational administration at West Virginia University. Richard Hartnett (West Virginia University) chaired the committee; other members were Paul Leary (West Virginia Graduate College), Eddy Pendarvis, Linda Spatig, and Ermel Stepp (all from Marshall University). An extended version of this article appeared in the electronic journal *Education Policy Analysis Archives* (http://seamonkey.ed.asu.edu/epaa/v3n18.html), and was entitled "The Matthew Principle: A West Virginia Replication?"

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topic—the empirical literature is much smaller, particularly in regard to the relationship between size and student achievement. Below, I further narrow the focus by considering the limited body of work related to the hypothesis that the effects of size depend on the socioeconomic status (SES) of the school or district—i.e., that the effect of size and SES is an interactive one.

Size interacting with SES. Jonathan Sher has often noted that good schools come in all sizes (e.g., Sher, 1986). One extension of this observation might be to say that what makes a good school, with respect to its size, is that "it depends." Some condition, or constellation of conditions, might interact with size to produce advantages or disadvantages that make a school of any particular size better or worse. If a condition interacts systematically to exert such influence, one could begin to speak of the way in which those conditions regulate the effects of size. And if policy were so manipulated as to facilitate certain effects but not others, then one could begin to speak of the way in which size effects were distributed, for good or ill, among students and families in communities served by schools of different size.

Such insights inform the interaction hypothesis of size, first examined formally in a 1988 study by William Friedkin and Juan Necochea (Friedkin & Necochea, 1988). That study is widely cited, but it had not been replicated until the present study.

Briefly, Friedkin and Necochea found that SES regulated the effects of school and district size. In their California study, larger size was associated with positive effects for increasingly affluent students. Smaller size, by contrast, was associated with positive effects for increasingly impoverished students. The difficulty for state-level policymakers concerned with school size is that, with such an interaction, optimum sizes cannot be prescribed to be everywhere the same because, in fact, they are everywhere different (cf. Lee & Smith, 1996, for a quite different perspective).

Earlier studies anticipated the interaction hypothesis that Friedkin and Necochea (1988) formally confirmed. For example, in his analysis of setting, school size, and college-entry scores (ACT), Baird (1969) found an interaction between size and setting: Larger size benefitted students in urban and suburban areas, whereas no corresponding effect was found for rural areas or small towns.

Bidwell and Kasarda, in their 1975 study of school district organization and student achievement, took the view that educational inputs such as school size influenced achievement indirectly. They proposed a view that Friedkin and Necochea later adopted, namely that an educational "system," such as a school or a district, confronts inevitable constraints and facilitators of its goals (principally student achievement). The ability of a system to minimize the effects of constraints and maximize the effects of advantages accounts for how well it achieves its goals. This is the nexus of "it depends." Aggregate SES is a familiar proxy for the constellation of constraints and facilitators that afflict and endow schools and districts (cf. Bidwell & Kasarda, 1975), and that is the role that Friedkin and Necochea ascribed to it in their 1988 study.

Friedkin and Necochea employed a regression model comprising size, SES, and the product of size and SES—an interaction term—as three independent variables. Student achievement served as the dependent variable, and data were drawn from the 1983-1984 academic year for the 3rd, 6th, 8th and 12th grades. School system size was measured as number of pupils enrolled in a particular grade at both the school and district level, and SES was measured through teacher reports of parent occupation (3rd and 6th grades) and through student reports of parent educational attainment (8th and 12th grades). A basic skills composite from the California Assessment Program was employed as the achievement criterion.

The proportion of achievement variance accounted for by the independent variables was similar across all equations, varying from a low of 27% to a high of 46% and increasing with grade level. Of particular relevance to the present discussion, both size and the interaction between size and SES were significant in all equations.

Friedkin and Necochea reported "effect sizes" to communicate the independent impact of size on achievement. These effect sizes were derived using the technique of partial differentiation, with SES held constant during differentiation. The partial derivative thus calculated yields the rate of achievement change per unit of size at a particular level of SES. The significant interaction of size and SES is illustrated by the authors' finding that the effect sizes among the lowest SES communities were *negative* and roughly twice the magnitude of the *positive* effect sizes for the highest SES communities. For example, the grade 12 school-level effect size at the lowest SES level was -.31, whereas a value of +.16 was obtained at the highest level of SES. This indicates that in schools serving very poor communities, each standard deviation (*SD*) increase in school size corresponded roughly to a 1/3 of a *SD* decrease in student achievement. Among the most affluent communities, in contrast, achievement *increased* with school size about 1/6 of a *SD* of achievement for every *SD* increment in school size.

From the findings of Friedkin and Necochea (1988), then, large schools would appear to compound the afflictions of the already afflicted, whereas they deliver modest benefits to the already blessed. Conversely, small schools mitigate the disadvantages confronted by impoverished students.

In our examination of the interaction hypothesis, Gary Huang and I (Huang & Howley, 1993) tried to develop further work along the lines of Friedkin and Necochea's closing recommendation:

> Finally, and most important to confident claims in this field, future work might include measures of the intervening conditions that presumably link variations in system size to various performance outcomes. (Friedkin and Necochea, 1988, p. 248)

In retrospect, I believe we were misled by this recommendation. Consequently, I engaged in a more critical reading of relevant work.

Key to this different reading of the literature is an appreciation of the distinction among three views of size: (a) size as a footnote to a study of school effectiveness, (b) size as a container for effective processes, and (c) size as a structural variable. In major studies of school effectiveness (e.g., Newmann & Wehlage, 1995) small size is frequently cited as a minor correlate of global school effectiveness. (Small size, it is true, is being cited more and more frequently in this capacity.) Size, in any case, has not traditionally served as a central object of scrutiny in the determination of school effectiveness.

But small school size may also be understood as a context for what are actually generic processes associated with small-scale organization (socialization, role density, and so forth). Haller and Monk (1988) refer to such concerns as the "soft side" of educational reform. Size may be the significant context for such studies, but, again, it is not the main object of investigation.

Finally, size may be considered as a structural phenomenon in its own right. Studies that examine size in this fashion have long been common in the field of business administration (e.g., Evers, Bohlen, & Warren, 1976; Goodling & Wagner, 1985). This view takes size as a durable and functionally salient feature of organizations, not as a footnote to or container of processes of inherently greater interest. Although the negligible correlation between size and achievement has led many educational researchers to dismiss size as an ineffectual consideration, the interaction line of evidence provides clear indications that size, indeed, may be a significant structural condition of schools and school districts.

In our Alaskan study (Huang & Howley, 1993), however, Gary and I took the second approach to size—container of interesting processes—though we did not at the time conceive of it in this way. We wanted to see whether an interaction effect would persist after controlling for three domains of background variables: school resources, school climate, and student academic background. In fact, a small interaction was evident after imposing such controls. We did not test for the effect without controls since we had not firmly grasped the structural significance of size. It was also very clear that small schools in Alaska were serving disadvantaged students well; small size muted the negative relationship of low SES and achievement, but did not overcome it. This is important information for Alaskans to know, since many small village schools serve largely Native communities in that state.

Our study suggested, moreover, that school resource and climate variables, together with academic-specific background variables, may well encompass the opportunities more regularly realized by small than by large schools on behalf of their disadvantaged students. This does not necessarily mean such opportunities can be easily realized in "schools-within-schools" or "house plans," though we did not warn against this possible misreading because, again, we had not appreciated the role of size as a structural condition.

In view of (a) size as a meaningful structural feature of schooling, (b) a better appreciation of the significance of the California study (Friedkin & Necochea, 1988), and (c) a sense of the antecedents of the interaction hypothesis, further study seemed warranted. Emerging circumstances in West Virginia, where school closures began in earnest in 1990 (as part of a consolidation plan), provided an appropriate context for the present study. Rural advocates have long argued the harm done to rural areas by consolidation. Here was an opportunity to launch a systematic investigation of an evolving and very compelling real-world dilemma.

Method

The method of the present study paralleled that of Friedkin and Necochea (1988). Because the universe of schools and districts at each grade level is much smaller in West Virginia than in California, I did not conduct separate analyses for rural and nonrural sectors (as Friedkin & Necochea did). As noted above, however, consolidation is very much a rural issue in West Virginia and many small rural schools were actually closed.

Units of analysis. Following Friedkin and Necochea (1988), I took both schools and districts as the unit of analysis. Subjects of this study included (a) the universe of West Virginia schools with a third grade, a sixth grade, a ninth grade, or an eleventh grade and, at the district level, (b) the universe of West Virginia districts.

Variables. Size was defined as enrollment per grade level either by school or by district (depending on the unit of analysis), a choice that controlled for the variability of grade span configuration between schools in the school-level analyses. SES[1] was defined as free and reduced-price

[1]The available SES measures are less than satisfactory. Free and reduced-price meal rates are the only school-level option in West Virginia. They appear to overestimate affluence at the secondary level. The alternative (attainment) SES measure is not available at the school level, but may be a more comprehensive measure, so far as one can infer from a comparison of the results of using both measures (meal subsidies and attainment) in the district-level analyses.

meal rates (school- and district-level analyses). For district-level analyses, an alternative measure of SES was employed: the percentage of adults with educational attainment less than grade 12. Finally, student achievement was assessed by means of the Comprehensive Test of Basic Skills (CTBS), which was administered to all children in West Virginia not enrolled in special education, as part of the regular state testing program. As in the original study, the interaction variable was the product of size and SES.

Data sources. Size and meal-subsidy data were extracted from the 1990 information reported in the *Common Core of Data* (National Center for Education Statistics [NCES], 1994). Educational attainment data were obtained from the NCES *School District Data Book* (NCES, 1995). A staff member of the West Virginia SEA furnished the CTBS data.

Analyses. Key to the hypothesis of Friedkin and Necochea is the assertion that the simple correlation between school or district size and achievement is negligible. Simple correlations, therefore, were calculated to assess this assumption in the West Virginia circumstance. To examine the possible interaction of school or district size and SES in influencing student achievement in West Virginia, I regressed student achievement on the independent variables using backward elimination (at each of the four grade levels and for both school- and district-level analyses). I began with the model specified by Friedkin and Necochea:

$$\text{ACHIEVEMENT} = \text{SIZE} + \text{SES} + (\text{SIZE} \times \text{SES})$$

For any regression equation with at least a significant interaction term remaining in the equation, an effect size—again, for the effect of school or district size on student achievement—was calculated for selected levels across the SES scale. As indicated above, these effect sizes illustrate the interaction of size and SES and, in any case, serve to translate the findings into a more easily interpretable form. All analyses at the district level were based on 54 of the state's 55 counties.[2]

Results

Simple correlations between size and achievement were not statistically significant in 7 of the 8 analyses. The only significant correlation ($r = .11$) surfaced in the third grade analysis (where n was the largest). Thus, the bivariate relationship between size and achievement was negligible, as expected. With this assumption confirmed, regression analyses were conducted as previously described. The statistically significant variables that survived the backward elimination procedure are presented in Tables 1 and 2 (school- and district-level analyses, respectively).

Table 1
Regression Results: Statistically Significant Effects for School-Level Analyses

Grade Level	Variables in the Equation	b	$SE\ b$	β
3[a]	free/reduced lunch	-66.47	3.61	-.37
6[b]	free/reduced lunch	-25.28	2.84	-.37
	interaction term	- .094	.04	-.10
9[c]	free/reduced lunch	-15.97	4.01	-.28
	interaction term	- .072	.03	-.15
11[d]	grade 11 enrollment	.026	.01	.33
	interaction term	- .084	.04	-.21

[a]$n = 628$; $R^2 = .14$ ($p < .05$); outliers removed (grade 3 enrollment > 140).
[b]$n = 508$; $R^2 = .17$ ($p < .05$); outliers removed (grade 6 enrollment > 382).
[c]$n = 196$; $R^2 = .13$ ($p < .05$); no outliers identified.
[d]$n = 106$; $R^2 = .09$ ($p < .05$); no outliers identified.

Tables 1 and 2 demonstrate that, contrary to the negligible simple correlation between size and achievement, size does appear to influence achievement: through its interaction with SES. Indeed, the interaction term was significant in 3 of the 4 school-level analyses and in all district- level analyses. Further, results at both levels of analysis reveal increasing interaction effects with grade (from -.10 to -.21 at the school level, and from roughly -.65 to -1.55 at the district level). Also, whereas R^2 *decreases* with grade level in the school-level analyses, it consistently increases in the district-level analyses where educational attainment was employed as the alternative measure of SES.

Tables 3 and 4 present the effect sizes computed from the standardized partial derivative. Overall, these results indicate a pattern of interaction between size and SES consistent with the results of Friedkin and Necochea (1988). That is, large schools and districts are associated with the lower achievement of impoverished students and higher achievement for the more affluent. This pattern is least pronounced in the lower grades and most pronounced at the higher grades.

Though the school-level interaction term is statistically significant in all equations except grade 3, there are differences between Tables 3 and 4 in the patterns of effect sizes. That is, negative effects appear in the school-level analyses only at grade 11, whereas negative effects appear consistently across grades in the district-level analyses. These

[2] The state's largest district was identified as the sole outlier, the removal of which created a more normal distribution for variables in the analysis.

Table 2
Regression Results: Statistically Significant Effects for District-Level Analyses (N = 54)

Grade Level	Variables in the Equation	*b*	*SE b*	β
3[a,c]	grade 3 enrollment	+.018	.009	+ .65
	interaction term	-.001	.000	- .64
3[b,d]	grade 3 enrollment	+.024	.009	+ .86
	interaction term	-.001	.000	- .86
6[a,e]	grade 6 enrollment	+.018	.006	+ .90
	interaction term	-.001	.000	- .96
6[b,f]	grade 6 enrollment	+.021	.006	+1.05
	interaction term	-.001	.000	-1.12
9[a,g]	grade 9 enrollment	+.031	.007	+1.16
	interaction term	-.001	.000	-1.44
9[b,h]	grade 9 enrollment	+.032	.007	+1.21
	interaction term	-.001	.000	-1.49
11[a,i]	grade 11 enrollment	+.029	.008	+1.10
	interaction term	-.001	.000	-1.24
11[b,j]	grade 11 enrollment	+.039	.007	+1.45
	interaction term	-.001	.000	-1.62

Note. Standardized regression coefficients (β) greater than 1.00 may reflect high correlations among the independent variables, which resulted from the inclusion of the interaction term and the two variables it comprised.
[a]SES variable: Percentage of students receiving free or reduced-price lunch.
[b]SES variable: Percentage of adults with educational attainment under grade 12.
[c]$R^2 = .08$ ($p = .12$)
[d]$R^2 = .13$ ($p < .05$)
[e]$R^2 = .15$ ($p < .05$)
[f]$R^2 = .20$ ($p < .01$)
[g]$R^2 = .36$ ($p < .001$)
[h]$R^2 = .37$ ($p < .001$)
[i]$R^2 = .27$ ($p < .001$)

differences can be traced to differences between the school-level and district-level regression analyses regarding which variables survived the method of backward elimination. As we see in Table 1, SES was included and size excluded for grades 6 and 9. For grade 11, however, SES was excluded but size included; this latter pattern characterized all district-level analyses, as well (Table 2).

The influence of variable inclusion/exclusion on the effect sizes is evident most particularly in Table 3, where the effect of size on achievement at the upper levels of SES approximates zero for grades 6 and 9. As SES decreases for grades 6 and 9 (the relevant grade levels for this pattern of significant variables), negative effects of size emerge.

Observe the different pattern in the grade 11 results. For grade 11, with a direct effect of size and an interaction of size and SES, the combined effects of size on achievement are moderately positive for the most affluent and more strongly negative for the most impoverished.

This pattern, which conforms to the findings of Friedkin and Necochea (1988), is more evident still in the district-level analyses. The range of effect sizes (from highest to lowest SES) vary from a modest .10 (for grade 3 in the school analyses) to a substantial 4.49 (for grade 11 in the county-level analyses). That is, these data suggest a disparity in student achievement, due to school or district size, anywhere from 1/10 of a *SD* to 5 1/2 *SD*s.

The other notable pattern to observe is the increase, in both Tables 3 and 4, of the range of effect sizes at each grade level as grade level increases. With each increase in grade level, there is a concomitant increase in the distance between (a) the value of the effect size for the most affluent district (low value of SES variable) and (b) the value of the effect size for the most impoverished district (high value of SES variable). This pattern is suggestive of a possibly cumulative effect of size. Although the design of the present study does not permit a formal test of this suggestion, the pattern is consistent with the literature: The achievement gap among the most and least disadvantaged has been shown to widen as students progress through school (e.g., Oakes, 1985).

Discussion

This study confirms that school or district size interacts with SES to influence student achievement in West Virginia. The pattern of effect sizes is clear and uniform at the district level, with positive effect sizes accruing to high-SES districts and negative effect sizes accruing to low-SES districts. The magnitude of difference in the effect sizes between lowest- and highest-SES districts is about 2:1, similar to that reported by Friedkin and Necochea (1988).

The pattern of effect sizes is less clear at the school level, possibly due to the character of the SES variable (subsidized meal rates). At the school level for grades 6 and 9, the effect sizes were increasingly negative as SES values declined. The pattern for grade 11, however, was the same as for the district-level analyses: positive effect sizes among high-SES schools and negative effect sizes among low-SES schools.

The achievement data used in this study were drawn from 1990. Since that time, West Virginia has closed nearly

Table 3
School-Level Effect Sizes: The Effect of Size on Achievement at Varying Levels of SES

	Free and Reduced Lunch Rate									
Grade	5%	15%	25%	35%	45%	55%	65%	75%	85%	95%
6[a]	-.01	-.02	-.03	-.03	-.05	-.06	-.07	-.08	-.09	-.11
9[b]	-.03	-.09	-.15	-.20	-.26	-.32	-.37	-.43	-.50	-.56
11[c]	+.28	+.17	+.06	-.04	-.15	-.26	-.37	-.48	-.58	-.69

Note. Effect size equations are based on the following equation $es = (a + cy)(S_x/S_z)$, where *a* denotes the unstandardized (*b*) regression coefficient for size, *c* denotes the regression coefficient for the interaction of size and SES, and *y* denotes the value of SES. S_x/S_z denotes the ratio of size and achievement standard deviations. Only at grade 11 was there a significant effect of size (in addition to the interaction between size and SES), which accounts for this difference between the grade 6 and 9 equations versus that for grade 11.
[a]$es = (-.094y)(21.73/18.33)$
[b]$es = (-.072y)(78.23/9.64)$
[c]$es = (.026 - .084y)(112.24/8.75)$
[j]$es = (.03862 - .001327y)(234.27/6.23)$

26% of the schools. The schools that were particularly targeted for closure were small schools. A subsidiary analysis (not reported here) showed that the schools actually closed were located in more impoverished communities than those that remained open, whereas the 1990 achievement of those schools was nearly equal to achievement in the schools that remained open. Closures were more likely—and new-school openings, less likely—in rural areas. Educational services can, in a sense, be understood as becoming more centralized in West Virginia in small and large towns (the likely administrative seats of the related rural areas).

Recommendations

This study contributes additional support to the interaction line of evidence regarding the effects of school and district size on student achievement. Smaller schools and districts seem to hold particular benefits for educating relatively impoverished students. But larger schools and districts seem to hold particular benefits for educating relatively affluent students. This situation would seem to present a conundrum to policymakers accustomed to thinking that there is an optimal school size. Haller and Monk (1988) regard the idea of optimal size as misleading and manipulative, contrary to the research activity of others (e.g., Lee & Smith, 1996).

Surprisingly, the evidence of this study suggests that West Virginia's small schools, on the eve of the closure of many of them, were doing a respectable job: They nearly eliminated the negative relationship between poverty and academic achievement in grades 6 and 9 on average. Policymakers should expect to pay a little extra for a small miracle.

Rather than imposing arbitrary "economies of scale" standards, policymakers ought to adjust the size of schools to prevailing, relevant circumstances. Both this West Virginia study and the California study on which it was modeled suggest that aggregate SES is a workable proxy for those relevant circumstances. But in even simpler terms, policymakers would be well advised to maintain small schools and districts that serve impoverished rural communities. In the cases where educational quality is deficient in such schools and districts, professional and organizational development and staff changes would seem a better starting point for improvement efforts than closures and consolidations. If a small school or district serving an impoverished community is a seemingly intractable problem, closure and consolidation will provide only the appearance of a solution. Closure and consolidation are not likely to provide a more responsive experience for the affected students or families. In light of the line of evidence to which this study contributes, school closures and consolidations would seem to be ill-advised and desperate measures in impoverished communities.

Another recommendation concerns "school-within-schools" and "house plans" as strategies to blunt the negative effects of large size for impoverished students. Meier (1995) regards such schemes as ill-conceived. The results of the present study provide further evidence that size is a structurally significant influence, and that this influence is not easily simulated in the absence of the structure itself.

However, much more needs to be understood about the relationship of school and district size to context. Ad-

Table 4
District-Level Effect Sizes: The Effect of Size on Achievement at Varying Levels of SES

	Rate of Socioeconomic Status Variable									
Grade	5%	15%	25%	35%	45%	55%	65%	75%	85%	95%
3[a,c]	+.56	+.37	+.18	.00	-.19	-.38	-.57	-.76	-.94	-1.13
3[b,d]	+.73	+.46	+.20	-.08	-.35	-.62	-.89	-1.16	-1.43	-1.70
6[a,e]	+.77	+.50	+.22	-.05	-.32	-.59	-.86	-1.13	-1.40	-1.67
6[b,f]	+.89	+.55	+.22	-.11	-.44	-.78	-1.11	-1.44	-1.78	-2.11
9[a,g]	+.96	+.56	+.15	-.25	-.66	-1.07	-1.47	-1.88	-2.28	-2.69
9[b,h]	+1.00	+.56	+.13	-.31	-.74	-1.18	-1.61	-2.05	-2.48	-2.92
11[a,i]	+.92	+.56	+.20	-.17	-.52	-.89	-1.25	-1.61	-1.97	-2.33
11[b,j]	+1.20	+.70	+.20	-.29	-.79	-.1.29	-1.79	-2.29	-2.79	-3.29

Note. Effect size equations are based on the following equation $es = (a + cy)(S_x/S_z)$, where *a* denotes the unstandardized (*b*) regression coefficient for size, *c* denotes the regression coefficient for the interaction of size and SES, and *y* denotes the value of SES. S_x/S_z denotes the ratio of size and achievement standard deviations.
[a]SES variable: Percentage of students receiving free or reduced-price lunch.
[b]SES variable: Percentage of adults with educational attainment under grade 12.
[c]$es = (.01804 - .000519y)(264.29/7.30)$
[d]$es = (.02386 - .000745y)(264.29/7.30)$
[e]$es = (.01770 - .000532y)(264.39/5.19)$
[f]$es = (.02066 - .000653y)(264.39/5.19)$
[g]$es = (.03103 - .001079y)(263.46/7.00)$
[h]$es = (.03225 - .001155y)(263.46/7.00)$
[i]$es = (.02921 - .000960y)(234.27/6.23)$

ditional replications of the Friedkin and Necochea model are needed, especially with state-level data sets. This study, whose patterns derive from quite different local realities as compared to the California study, may suggest that studies with state-level data (e.g., Huang & Howley, 1993) are more relevant to the issue than national studies. The contextual differences between states may be such as to obscure the relevant relationship, such as size interacting with SES, when aggregated to the national level. If the effects of size depend on context, national studies are more likely to overlook contextually relevant circumstances than are studies specific to the various states.

Additional work needs to be done in West Virginia (and, no doubt, elsewhere as well) to construct a more robust measure of SES for use in school- and district-level analyses such as those conducted here. The availability of such a measure, for instance, might have provided a clearer view of the nature of the interaction of size and SES at the school level.

Finally, researchers and practitioners must recognize that small size is no magic bullet. In particular, small size does not seem to facilitate the achievement of affluent students, and small size is by itself unlikely to eliminate or reverse the negative effects of poverty.

Size relationships are more complex than is generally acknowledged by educators. The relationships among district size, school size, class size, and perhaps some notion of "personal" size—which one might call psychological or social space—have yet to be conceptualized. The underlying gestalt would have to relate organizational scale (district, school, class, personal) to the purposes of schooling. Large scale served society well for a time, processing students for an industrial workplace. But in the post-industrial world emerging since 1970, observers of sharply varying commitments have claimed that the purposes of schooling are changing or that they must change. Since real change is structural (i.e., durable and functionally salient), a desire to make the best of whatever changes are afoot necessarily involves issues of organizational scale.

References

Baird, L. (1969). Big school, small school: A critical examination of the hypothesis. *Journal of Educational Psychology*, *60*, 253-260.

Bidwell, C., & Kasarda, J. (1975). School district organization and student achievement. *American Sociological Review, 40*, 55-70.

DeYoung, A., & Howley, C. (1992). The political economy of rural school consolidation. *Peabody Journal of Education, 67*(4), 63-89.

Evers, F., Bohlen, J., & Warren, R. (1976). The relationships of selected size and structure indicators in economic organizations. *Administrative Science Quarterly, 21*, 326-342.

Fowler, W. (1992, April). *What do we know about school size? What should we know?* Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA. (ERIC Document Reproduction Service No. ED 347 675)

Friedkin, N., & Necochea, J. (1988). School system size and performance: A contingency perspective. *Educational Evaluation and Policy Analysis, 10*, 237-249.

Goodling, R., & Wagner, J. (1985). A meta-analytic review of the relationship between size and performance: The productivity and efficiency of organizations and their subunits. *Administrative Science Quarterly, 30*, 462- 481.

Haller, E., & Monk, D. (1988). New reforms, old reforms, and the consolidation of small rural schools. *Educational Administration Quarterly, 24*, 470-483.

Howley, C. (1994). *The academic effectiveness of small-scale schooling: An update.* Charleston, WV: ERIC Clearinghouse on Rural Education and Small Schools. (ERIC Document Reproduction Service No. ED 372 897)

Howley, C., & Huang, G. (1991). *Extracurricular participation and achievement: School size as possible mediator of SES influence among individual students.* (Unpublished paper, Appalachia Educational Laboratory, Charleston, WV). (ERIC Document Reproduction Service No. ED 336 247)

Huang, G., & Howley, C. (1993). Mitigating disadvantage: Effects of small-scale schooling on student achievement in Alaska. *Journal of Research in Rural Education, 9*, 137-149.

Lee, V., & Smith, J. (1996, April). *School size and student learning: What size high school works best?* Paper presented at the annual meeting of the American Educational Research Association, New York, NY.

Meier, D. (1995). *The power of their ideas: Lessons for America from a small school in Harlem.* Boston: Beacon Press.

National Center for Education Statistics. (1994). *Common Core of Data* [CD-ROM database]. Washington, DC: Author.

National Center for Education Statistics. (1995a). *Common Core of Data* [Early Release Data for West Virginia]. Available: gopher://gopher.ed.gov:10000/11/data/elesec/studies-ccd/ccdschagn/ccdschool.

National Center for Education Statistics. (1995b). *School district data book* [CD-ROM]. Washington, DC: Author.

Newmann, F., & Wehlage, G. (1995). *Successful school restructuring.* Madison, WI: Center on Organization and Restructuring of Schools.

Oakes, J. (1985). *Keeping track: How schools structure inequality.* New Haven, CT: Yale University.

Schwinden, T., & Brannon, L. (1993). *School reorganization in Montana: A time for decision.* Helena, MT: Montana School Boards Association.

Sher, J. (1995). *The Annenberg Rural Challenge.* Chapel Hill, NC: Author.

Sher, J. (1986). *Heavy meddle: A critique of the North Carolina Department of Public Instruction's plan to mandate school district mergers throughout the state.* Raleigh, NC: North Carolina School Boards Association. (ERIC Document Reproduction Service No. ED 270 245)

Streifel, J., Foldsey, G., & Holman, D. (1991). The financial effects of consolidation. *Journal of Research in Rural Education, 7*(2), 13-20.

Walberg, H., & Fowler, W. (1987). Expenditure and size efficiencies of public school districts. *Educational Researcher, 16*(7), 5-13.