DOCUMENT RESUME

ED 346 617 EA 024 070

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TITLE Effects of School Restructuring on the Achievement and Engagement of Middle-Grade Students.
INSTITUTION Center on Organization and Restructuring of Schools, Madison, WI.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE Jun 92
CONTRACT R117Q00005-92
NOTE 59p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Academic Achievement; *Decentralization; Grade 8; Grouping (Instructional Purposes); Junior High Schools; Middle Schools; *School Organization; *School Restructuring; Student Motivation; *Student School Relationship
IDENTIFIERS Middle School Students

ABSTRACT

This study examined the impact of attending restructured schools on the achievement and engagement of young adolescents. The restructuring movement is placed within the conceptual framework that favors the development of more communally organized schools, as opposed to the largely bureaucratic model of most American schools. Using a subsample of data from the base year of the National Longitudinal Study of 1988 (NELS:88), including 8,845 eighth graders in 377 public, Catholic, and independent middle-grade schools, the effects of school restructuring on student achievement, engagement with academic work, and the extent of at-risk behaviors are examined. The construct of restructuring is captured as less departmentalization, more heterogeneous grouping, more team teaching, and a composite index of restructuring. The study makes use of multilevel analytic models and includes statistical controls for characteristics of students and schools. Findings indicate that restructuring has modest but positive effects on both achievement and engagement and contributes to a more equitable distribution of these outcomes among students from different social backgrounds. Students attending schools with fewer eighth-grade peers also demonstrate more academic engagement and a more equitable distribution of achievement. Eight tables and 18 technical notes are included. Appendices include tables of hierarchical linear models. (98 references) (LMI)

EFFECTS OF SCHOOL RESTRUCTURING ON THE ACHIEVEMENT AND ENGAGEMENT OF MIDDLE-GRADE STUDENTS

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June 1992

Final Deliverable to OERI

This paper was prepared for the Center on Organization and Restructuring of Schools, supported by the U.S. Department of Education, Office of Educational Research and Improvement (Grant No. R117Q00005-92) and by the Wisconsin Center for Education Research, School of Education, University of Wisconsin-Madison. The opinions expressed in this publication are those of the authors and do not necessarily reflect the views of the supporting agencies. We wish to thank Fred Newmann, Brian Rowan, and Douglas MacIver for helpful comments on an earlier draft of this article. Address all correspondence to Professor Valerie E. Lee, School of Education, University of Michigan, Ann Arbor, Michigan 48109.

Abstract

The study reported here investigates the impact of attending restructured schools on the achievement and engagement of young adolescents. We place the movement toward restructuring students' schooling experiences within a conceptual framework favoring the development of more communally organized schools, and away from the largely bureaucratic model which guides the organization of most American schools. Using a subsample of data from the base year of the National Longitudinal Study of 1988 (NELS:88), including 8,845 8th graders in 377 public, Catholic, and independent middle-grade schools, the study examines the effects of school restructuring on student achievement, engagement with academic work, and the extent of at-risk behaviors. The construct of restructuring in middle-grade schools is captured as (a) less departmentalization, (b) more heterogeneous grouping, (c) more team teaching, and (e) a composite index of restructuring. The study makes use of multilevel analytic methods and includes statistical controls for characteristics of students and schools. Results provide empirical support for modest but positive effects of restructuring on both achievement and engagement, as well as an association between school restructuring and a more equitable distribution of these outcomes among students from differing social backgrounds. Students attending schools with fewer 8th grade peers also demonstrate more academic engagement and a more equitable distribution of achievement.

Effects of School Restructuring on the Achievement and Engagement of Middle-Grade Students

"School restructuring" is the newest item in a list of educational reform efforts in recent years, joining such movements as "back to basics," "effective schools," "community control," "cultural literacy," and another contemporary thrust, "parental choice." While these phrases are meant to marshal public support for reform efforts, the words are ambiguous enough to have different meanings to a broad spectrum of the American public. The call to "restructure" as a way to reform America's schools certainly implies that something quite fundamental needs to be fixed. But what does restructuring really mean? What changes are called for? What are changes in a school's structure meant to accomplish?

Driven by concerns for economic competitiveness, improved equity, and increased educational excellence, the call for changes in the structure of American schools have come from prominent and public sources (for example, Carnegie Council on Adolescent Development, 1989; Carnegie Foundation for the Advancement of Teaching, 1988; Carnegie Task Force on Teaching as a Profession, 1986; National Commission on Excellence in Education, 1983). While the calls are widespread, it is unclear whether their recommendations -- if implemented -- could achieve extended and lasting improvement. Elmore (1990) points out that fundamental changes in teaching and learning seldom, if ever, reach the broader educational system, but instead tend to become locked into islands of exemplary schooling. Further, while various communities have adopted a variety of plans, there is no evidence, positive or negative, that such efforts have made much difference to students attending those schools.

Even though the interest in structural reform has been directed to all levels of schooling, concern over education for young adolescents (ages 10-15) has increased in recent years. Psychologists point to this time period -- encompassing puberty, value formation, and social group identification, as well as marked shifts in learning -- as a critical stage in human development (Ausubel & Ausubel, 1966; Bronfenbrenner, 1977; Cohen & Frank, 1975; Dusek, 1987; Hill, 1980; Lipsitz, 1984). Focusing on schools which serve students in this age range, the Carnegie Council on Adolescent Development (1989:12-13) argues that such schools:

> ... have the potential to make a tremendous impact on the development of their students -- for better or for worse -- yet they have been largely ignored in the recent surge of educational reform.

While educational reform is needed at all levels of schooling, it may have particularly telling consequences for schools that serve early adolescents. Moreover, the *form* of stuctural change in schooling for students in this age group is important. Calls for school reform for young adolescents are in a particular direction: toward small learning communities, a core academic program followed by all students, eliminating tracking, and empowering teachers to make decisions about their students (Carnegie Council on Adolescent Development, 1989). This set of changes is consistent with suggestions favoring changes in school organization which move away from bureaucracy toward a more communal organizational structure (Bryk, Lee, & Smith, 1990; Lee, Bryk, & Smith, in press; Newmann, 1991).

Using the framework of contrasting schools as communities or bureaucracies, this study explores the effects of restructuring in a large and nationally representative sample of schools which enroll early adolescents (8th graders, in particular). We systematically define the policies and practices included in our measures of restructuring, and discuss how they occur in the nation's middle-grade schools. Using these measures of school restructuring, we explore the effects on students who attend middle-grade schools which employ a variety of these organizational structures, focusing on student achievement, engagement, and equity.

Background

Overview of Middle-Grade Schooling

Two distinct and recognizably different types of school organizations, namely "elementary" and "secondary," dominate the American educational scene. Elementary schools are typically small, teach basic skills in different subjects to the same group of students in a single classroom (often by the same teacher), and emphasize an intimate social environment. In contrast, high schools are usually large, teach specialized skills in different subjects in different settings by different teachers and to students of differing abilities and interests, and operate on a more impersonal and bureaucratic social level (Firestone & Herriot, 1982). Between these two organizational extremes, there is a transitional stage which in

this paper is referred to as "middle-grade schooling."[1] The function served by middle-grade schooling is to provide learning experiences for young adolescents to help them make a successful transition into more advanced levels of schooling and, generally, into adolescent and adult roles.

The concept of a separate organization for middle-grade schooling was developed first in Denmark in response to a Higher Education Act passed in 1903 (Popper, 1967). The ideology behind it was to better prepare students for the rigor of high school learning while still maintaining the structure of social closeness found in elementary schools. Its primary goal was to encourage larger numbers of elementary school students to remain in school (Ayres, 1909; Popper, 1967; Weet, 1916). More than seventy years later, student retention continues to be an important goal. The Carnegie Task Force on Education of Young Adolescents 1989:8) states that, "Middle grade schools -- junior high, intermediate, and middle schools -- are potentially society's most powerful force to recapture millions of youth adrift..." The focus of middle-grade schooling, even given some variation in the span of grades included in such schools, is to provide relevant learning experiences for young adolescents, encouraging both improved achievement and greater engagement in the activities and experiences the school offers.

For most of this century, the most common approach to improving middle-grade schooling has been to alter *who* attends the school. The typical method for accomplishing this goal has been to alter the grade span of the school (cf, Ayres, 1909; Blyth & Karnes, 1981; Briggs, 1927; Conant, 1960; Popper, 1967; Romano, Georgiady, & Heald, 1973). Much of the research on middle-grade schooling structures focuses on the ideal combination of grade levels to affect optimal outcomes for students (Blyth, Hill, & Smyth, 1981; Eccles, Lord, & Midgley, 1991; Epstein, 1990; Kohut, 1976). These studies suffer, however, from a marked lack of diversity in their student sample (largely white and middle class). Further, there is little evidence that a school's grade span operates independently of its other structural characteristics to influence substantively its students' learning experiences.

Currently in the United States, there are about 30 different grade spans in schools which enroll seventh graders (Epstein, 1990). Based on evidence about middle-grade schools gathered in a large survey by the Johns Hopkins University Center for Research on Elementary and Middle Schools, Epstein (1990) argues that although schooling practices are somewhat related to grade span, the critical change needed to generate effective

middle-grade schooling is to focus on altering *what* happens to students in school, rather than altering *who* it happens to.

School Structure: Communities and Bureaucracies

Two sociological models characterize the study of schools as formal organizations, which contrast the different dynamics and organizational agendas they take on (Bidwell, 1965; Bryk et al., 1990; Lee et al., in press). The first, a rational-bureaucratic model,[2] focuses on formal functions and specialized tasks, with teachers and students interacting in roles which are affectively neutral, rule-governed, and differentiated by status. The second, a communal model, emphasizes the social relationships within schools, minimizing role differentiation and emphasizing a common ethos governed by informal social interaction and consensus.

Alienation. Much of the educational reform in the first part of this century was guided by the goals which characterize the rational-bureaucratic model. Through depersonalization, standardization, and increased efficiency, schools were to become the "one best system" which was more accessible to larger numbers of students with more diverse backgrounds (Tyack, 1974). One result of changes toward the larger, more efficient, and more differentiated comprehensive high schools is the alienation of considerable numbers of students (Newmann, 1981). Alienation in this case is defined by the dynamics of normlessness and estrangement (Merton, 1949; Seeman, 1959, 1975). It refers to both the sense that the ideals governing school life and academic activity are not consistently followed in the school, and also that these ideals have little value for the actual experiences of students (Newmann, 1981). Alienation increases as students feel less commitment to the rules governing their academic behavior, and find themselves distanced from the persons formulating and espousing those norms (teachers and principals). They find themselves typically outside of or at odds with the goals of the school (Etzioni, 1968; Lee et al., in press; Odetola et al., 1972).

Curriculum differentiation. Further, the differentiation of functions and increased emphasis on classification for instruction in bureaucratically organized schools magnifies the variation in achievement between students of different social backgrounds (Bryk & Lee, in press; Bryk et al., 1990; Lee & Bryk, 1989). The large body of research on tracking has been consistent in finding that less advantaged students receive less

rigorous instruction in non-academic curricular tracks, indicating that such academic differentiation results in increasing social stratification in achievement (Oakes, 1985; Rosenbaum, 1976; Shafer & Olexa, 1971). Less academically differentiated school environments, such as those found in Catholic high schools, have been shown to reduce social stratification in academic outcomes (Bryk & Lee, in press; Lee & Bryk, 1989).

The growing body of research comparing the effects of alternative school organizational forms on their students -- particularly contrasting bureaucratic and communal structures -- suggests that schools organized as communities induce advantages primarily in the areas of the commitment of teachers and engagement of students (Bryk & Driscoll, 1988; Bryk & Lee, in press). It seems reasonable that students' engagement in (or, at the least, lack of alienation from) the academic life of their schools is at least a facilitating factor, or maybe even a requirement, for increasing achievement. In short, school organization matters, and certain forms seem to work better than others.

Restructuring Schools

One of the recent efforts to reform and improve schooling has focused on making changes to the structure of the school, hence the term *restructuring*. The primary technical work of a school is grounded in the social and organizational structure in which it operates. A school's *social* structure refers to those enduring, orderly, and patterned relationships between different members (such as student to teacher, teacher to teacher, teacher to principal, and student to student). The school's *organizational* structure refers primarily to the specialization of tasks, the routinization of procedures, and the management of technical complexity involved in getting the major work accomplished -- i.e., instructing students.

Reforming the structure of a school can occur on any of three main dimensions (Elmore, 1990; Newmann, 1991). First, concern over how academic subject matter is taught focuses attention on changing the ways teaching and learning occur -- the core technology of schooling (see, for example, Carnegie Council on Adolescent Development, 1989; Carnegie Foundation for the Advancement of Teaching, 1988; McPartland, Coldiron, & Braddock, 1987; Newmann & Thompson, 1987). Second, interest in shifting power toward the schools and specifically toward those involved in instruction encourages changes in the professionalism of teachers and administrators, including

working conditions and collegial interactions (see, for example, Carnegie Task Force on Teaching as a Profession, 1986; Levin, 1991; Lichtenstein, McLaughlin, & Knudsen, 1991; Reyes, 1990). Finally, concern about the accountability of educators to parents and to the greater public focuses on changes in the governance structure of schools, and how power is distributed between school administrators, their clients, and/or their political constituents (see, for example, Clune, 1987; Hess, 1991; National Governors' Association, 1991).

The primary focus of this study is on the elements of school restructuring directed at the technical core of schooling, i.e., changes in the way teaching and learning occur. Using this focus, we endorse the argument that the work involved in teaching and learning is socially constructed by interactions between teachers, between teachers and students, and between teachers and administrators (Rowan, 1990). As this concern over the technical core of schooling shifts to emphasize more organic, less formalized or bureaucratic forms, the structure of classroom instruction must shift as well. The substantial number of specific elements of restructuring we consider in this study may be organized into two larger domains of reform, each of which has generated a considerable volume of research about learning in schools. These reform domains include (a) changing the organization of instruction in classrooms (i.e., who is taught what?) and (b) changing how teachers are organized to deliver that instruction (i.e., who does what teaching?). While our review of this literature is mostly restricted to research in middle-grade schools, where research at this level is limited or non-existent we substitute secondary-level research.

Restructuring instructional organization. Schools are responsible for the process through which students gain access to courses. A substantial body of research demonstrates how, and whether, schools group students for instruction has a profound impact on their achievement and engagement with school. At every school grade and in every school, the reality that not all students perform the same way on the same activities at the same time must be confronted. The problem of constructing learning experiences which are most appropriate to students at their particular levels has been considered a priority of middle-grade schools ever since Hall (1905) wrote about learning in early adolescence.[3]

The single most common response to this difficulty -- grouping students homogeneously by ability -- while logical and efficient, is also wrought

with problems. As suggested above, it is well established that tracking and course-taking in high school are the most powerful predictors of academic achievement, surpassing the effects of family background (see, for example, Braddock, 1990; Gamoran, 1987; Lee & Bryk, 1988; Oakes, 1985). Curriculum differentiation, where students are grouped homogeneously by ability, contributes to strikingly negative consequences for students in the lower tracks, in both achievement and attitudes toward learning (Anderson & Barr, 1990; Braddock, 1990; Hoffer, 1991; Page, 1990; Schafer & Olexa, 1971). Research findings also show consistently that ability grouping and tracking increase the disparity in achievement over time for students from different social and racial/ethnic backgrounds (Braddock, 1990; Hanson, 1990; Lee & Bryk, 1988; Oakes, 1985). The Carnegie Council on Adolescent Development (1989:49) describes tracking or ability grouping in middle-grade schools as "one of the most divisive and damaging school practices in existence."

In response to growing concern over the endemic practice of homogeneous grouping, schools have started to develop alternative methods of delivering instruction. Such alternative structures as cooperative learning, which presumes heterogeneous ability levels in grouped instruction, have demonstrated some success in both increasing student achievement and improving social relations between students (Newmann & Thompson, 1987; Slavin, 1985, 1988). However, little empirical research has explored the effects of reducing or eliminating homogeneous grouping entirely for students in those schools.

Restructuring the division of instruction. Another structural change in the academic organization of schools centers on their departmental structure. A small body of research has emerged which examines departmental functioning (e.g., Johnson, 1990). Very little research has investigated the results of reducing the rigid structure of secondary-school academic departments on the outcomes of schooling for either students or teachers, although the speculation is that such academic specialization in strong departments may compete with the school for the loyalty of teachers and students. It is clear that departmentalization is the bureaucratic norm in middle and secondary schools (Wilson & Herriot, 1989). Academic departments represent the locus of decisionmaking about course offerings, assignment of students to classes, and who teaches which classes (Bryk et al., 1990). While it is clear that departmental affiliation is important to teachers' professional identity, such curricular segmentation may also have an

alienating effect on students. A strongly related topic is the division of teachers' labor, which is typically more specialized in larger schools (Bidwell & Quiroz, 1991). The specialization of teachers' expertise, which is manifested through stronger departmental structures, is an important component of the bureaucratization of secondary schooling.

Some research examines the departmental structure of middle-grade schools. McPartland (1991) suggests that reducing the departmentalization of schools at this level may result in conflicting outcomes. While breaking down "walls" between departments tends to improve the social learning community between teachers and students, such changes may lower levels of expertise and preparation teachers bring to the subject matter they teach. This idea of a trade-off between the interpersonal relations and subject matter expertise was also demonstrated in his earlier small-scale work (McPartland, 1987; 1990). Equally important, the negative consequences of middle-grade schools' rigid departmental structure appear most severe for students in the most disadvantaged groups, compounding the effects of homogeneous grouping (Becker, 1987; McPartland, 1991). While research on the effects of departmentalization in middle-grade and secondary schools is sparce and not strongly empirical, the results here favor less formal divisions of labor in teaching.

Restructuring teacher collaboration around instruction. Bidwell (1965) describes the technical core of secondary schooling as largely bureaucratic, emphasizing rationalized activities, uniform products, and formalized roles tied to a division of labor in teaching (i.e., departments). The extent to which authority operates through centralized and dominative, rather than decentralized and collegial, mechanisms further works to emphasize a mechanistic control structure in schools (Rowan, 1990). Research on high school organization implies that both teachers and students benefit from a shift away from this type of structure toward more communal, organic forms (see Bryk et al., 1990, for a review of this literature).

The findings of the research on departmentalization discussed above may also be seen as an element of a general set of findings supporting less formal divisions of labor in schools. Another facet of school restructuring focusing on reducing the formal divisions in schools involves collaboration among teachers from different disciplines. There is strong interest in increasing collaboration through interdisciplinary teaming in middle-grade schools as an alternative structure for teaching. The Carnegie Council on

Adolescent Development (1989) argues that increasing the collaboration of teachers around their students' learning reduces classroom discipline problems and helps foster a sense of community between teachers and students. Increasing collaboration among teachers over the technical work of learning was found to also increase students' engagement in academic tasks, to help clarify learning goals, and to lead ultimately to higher achievement (Arhar, Johnston, & Marke, 1989).

MacIver and Epstein (1991) see interdisciplinary teaming as one element of what they call "responsive practices" in middle-grade schools. They warn that it is the form and intensity of implementation of these practices that counts, not just instituting the practice. Implementation is dependent on the school's support for the practice (e.g., providing common planning time for teacher teams). It may be that the effects of rigid departmentalization in middle-grade schools are attenuated by teachers from different specializations interacting with students as teams, although McPartland (1991) did not find the effects to be of sufficient magnitude to eliminate the negative impact of departmentalization.

Two recent studies (Lee, Dedrick, & Smith, 1991; Raudenbush, Rowan, and Cheong, 1991) provide empirical support for a relationship between staff collaboration in high schools and teachers' feelings of efficacy and satisfaction. There is some empirical support that such benefits for teachers translate to increased learning for students (Ashton & Webb, 1986; Rosenholtz, 1989), which would suggest an indirect relationship between teacher collaboration and student outcomes. For the most part, however, the research supporting the benefits for students and teachers from increased collaboration is anecdotal, specific to one setting and one set of circumstances.

Grade size, school size, and grade organization. As mentioned above, the major historical thrust in restructuring the educational experiences of early adolescents has been in the age/grade levels which are included in the schools these students attend. While most public school *students* attend schools which include only the middle grades (i.e., grades 6 through 9), the distribution of *schools* is more varied. Almost a third of public schools enrolling 7th graders also include elementary grades, and another fourth of schools with 7th graders include secondary grades (MacIver & Epstein, 1991). If private schools had been included in that survey of almost 2,000 schools enrolling 7th graders, the proportions of schools

serving *only* early adolescents would be even smaller. The grade organization of a school is related to location (with rural schools likely to include more grades), to sector (with private middle-grade schools also much more likely to enroll elementary and/or secondary grade students), and to size (smaller schools, especially private schools, enroll students from more grade levels).

Curiously, current writing about school restructuring does not direct attention to group size (school size, grade size, or class size) as an element in the reform efforts, although organizational size has always been seen as an important structural feature of schools. There is no absence of research on the effects of school size, particularly for secondary schools. In general, those studies have concluded that while economies of scale may afford diversity in academic offerings, the preponderance of findings favor smaller schools (see Bryk et al., 1990, for a review of the research). Among the most important findings from this research is the effect of size on educational equity, with larger schools characterized by social stratification in learning opportunities and academic outcomes (Garbarino, 1980; Lee & Bryk, 1989) and by heightened alienation (Newmann, 1981).

The effects of grade size have not been subjected to empirical scrutiny, although this structural parameter is particularly relevant to middle-grade schooling. Quite simply, in schools which enroll a restricted number of grades, the enrollment in each grade would be considerably larger than in middle-grade schools which include either elementary or secondary grades. Grade size may, therefore, serve as a proxy for grade organization. In addition, grade size may serve as a proxy for school size when comparing schools which enroll only early adolescents.

Focus of the Research

Although there is renewed interest in school structural reform (i.e., restructuring), attention to the effects of variation in the organizational forms of schools (especially their social organization) has been common among sociologists of education for at least two decades. Research on these topics, especially in middle-grade schools, has been hampered, however, for at least three reasons. First, the actual structure of American schools at all levels has been quite homogeneous for most of this century (i.e., little variability in the independent variable of interest). Second, attention to the organization of schooling for young adolescents has been

swamped by a greater interest in the distinctly different forms of elementary and secondary schools (i.e., where do middle-grade schools fit in this spectrum?). Third, empirical research which aims to evaluate how variations in school organization affect students has suffered from some misconceptualization of the questions to be investigated, combined with a lack of statistical methods to properly accomplish the task (e.g., does a given organizational form affect all students identically in a single school?).

Data and statistical needs. This type of research requires analytic samples which are large enough (in terms of both schools and students) to capture variability in the existing structure of schools and the potential effects of such variability on students. To examine these questions for young adolescents, of course, means that the extensive data needed for such investigations must be collected in schools targeted at the middle grades. Such research also requires the use of statistical methodology which accomodates data in the hierarchical form implied by such questions. It is fortunate that appropriate data on middle-grade students have recently become available, including an auxiliary source of data on the organization of these schools. Also fortunate is the recent development of new methods to analyze hierarchically structured data and to address the type of research questions we pursue here.

Research hypotheses. We hypothesize that students attending middle-grade schools where their educational experiences are more restructured will be positively affected in several domains. While is is reasonable to explore these effects on student learning (hence, we investigate achievement as an outcome), we suggest that attending restructured schools should also influence students' engagement with schooling. In particular, we hypothesize that students enrolled in restructured schools are more engaged with their academic work and are less likely to engage in behaviors which put them at risk of school failure or dropping out. We know that both achievement and engagement are related to students' social background. Therefore, we hypothesize that besides raising the general *levels* of achievement and engagement, restructured schools will also demonstrate a more socially equitable *distribution* of these outcomes among their students.

The major focus of our investigations is on the traditional elements of school restructuring identified in the literature as fostering less differentiated school experiences -- grouping practices to increase hetereoge-

neity, less departmentalization, and more collaboration among teachers. However, we expand somewhat the concept of restructuring, in the context of middle-grade schooling, to include some investigation of the effects of grade size. We hypothesize that grade size has a negative effect on student achievement and engagement. Moreover, we expect that larger grade size is also associated with increased social stratification in these outcomes.

Method

Sample and Data

The sample for this study was drawn from the base year of the National Education Longitudinal Study of 1988 (NELS:88), a general-purpose study of the educational status and progress of about 25,000 8th grade students enrolled in 1,035 American middle-grade schools, sponsored by the National Center for Education Statistics (Ingels et al., 1990). The sub-sample employed here includes all students enrolled in the full NELS:88 sample of Catholic (n=84) and independent (n=60) schools, and a random sub-sample of public (233 out of 761) schools.[4] We employed two data filters in selecting our analytic sample, including: (1) those schools with at least 10 sampled students; and (2) those students who had data from all NELS data sources (students, schools, parents, and teachers). This resulted in a sub-sample of 8,845 students in 377 schools, averaging 23.5 students per school. Because the original NELS sampling design called for certain schools and students to be oversampled (particularly private schools and schools with high concentrations of Hispanic and Asian students), the design weights for schools supplied with the NELS:88 data have been employed for all analyses.[5]

Measures

Measures of school restructuring. Schools may decide to restructure the educational experiences of their students along many dimensions, and these dimensions are likely to vary with the grade level of the students. As stated, we have chosen our measures of restructuring to be consistent with a model of less differentiated student experiences. We focus on four features of restructuring in middle-grade schools: (a) a reduced (or eliminated) departmental structure; (b) heterogeneously grouped instruc-

tion; (c) team teaching; and (e) a general index of restructuring constructed as a composite of 16 available measures of restructuring mentioned in the literature on this topic.[6] The rationale for grouping variables to create these measures (and the outcomes described below) was based on both theoretical and statistical grounds. That is, we first attempted to combine variables which we hypothesized might go together on the basis of theory. Using numerous correlation matrices and factor analyses, we tested our original hypotheses. The final measures included here proved to be satisfactorily related, and in every case they represent the most favorable statistical combinations. Details of the construction and psychometric properties of all measures are presented in Figure 1. These details include the individual NELS items from which each measure was constructed, the proportion of sampled schools evidencing each individual restructuring measure, and the descriptive properties of the outcome and control measures included in the analyses in this paper.

Insert Figure 1 about here

The three sub-measures of restructuring, which were constructed from principal-components factor analyses of school-level variables which loaded together, were constructed as z-score variables (mean = 0, standard deviation [sd] = 1). The *reduced departmental structure* measure contains two elements: whether the school is fully or partially departmentalized and whether 8th graders in the school see fewer than 5 teachers per day. The variable is coded so that less (or no) departmentalization and exposure to fewer teachers receive a higher rating. These two measures are highly correlated (r = .55). The *heterogeneous grouping* measure, coded so that less grouping by ability receives a higher value, contains three components: principals' reports on whether or not schools group their classes by ability; whether schools have more than 40% of their students in ungrouped classes; and a report from the principal that 8th graders keep the same classmates for all classes. Reliability is modest (alpha = .49).

The *team teaching* measure contains four yes/no items reported by principals about their schools: the use of flexible time scheduling, whether 8th graders are subject to team teaching, whether the school schedules common planning time for faculty in the same department, and whether interdisciplinary teachers share the same students. Reliability is adequate but

not strong (alpha = .65). The *restructuring index* is a sum of 16 dummy-coded measures of restructuring, some of which are components of the sub-measures of restrcturing just described. The restructuring index score represents the proportion of the 16 individual restructuring components each school possesses. Reliability, while modest (r = .54), is higher for the composite than if any individual component is removed.

Student outcomes. Both the empirical literature and the current theoretical work on school restructuring suggest that the effects on students of this experience might extend beyond academics to includes measures of student engagement. We have, therefore, evaluated these effects on a broad array of outcomes. First, *academic achievement* is a composite score combining tests of reading and mathematics, standardized to a mean of 50 and sd of 10 on the entire NELS sample. Reliability is high (alpha for the reading and mathematics components are, respectively, .84 and .91).

We have investigated two measures of engagement, each of which was created from a principal-components factor analysis and then created as a z-score. First, we constructed a composite of five measures of students' *engagement in academic work* (frequency of coming to class with appropriate supplies, books, and homework; time per week spent on homework, and whether the student feels bored in school [reversed]). Reliability is adequate but modest (alpha = .64). Second, we formed a composite measuring the frequency of seven *at-risk behaviors* (student being sent to the school office for misbehavior, parents receiving warnings about behavior, getting into fights, being seen by others as a troublemaker, non-excused absences, skipping class, and coming late to school). Reliability is adequate (alpha = .71). As suggested in the literature, engagement and achievement are also related.[7] Full details on these measures are provided in Figure 1.

Control measures. Our multivariate analyses include two sets of statistical controls, on students and schools. *Demographic characteristics of students* include socioeconomic status, or SES (standardized at mean = 0, sd = 1); whether or not the student is minority [Hispanic or Black] (coded 1 = minority, 0 = non-minority); gender (1 = female, 0 = male), and a standardized measure of students' academic background (as a proxy for initial ability). The latter measure contains (a) self-reports of the student's grades since 6th grade, and (b) whether the student ever repeated a grade [reversed]. This measure is also on a z-score scale. Controls for the *demographic and structural characteristics of the schools* include school

average SES; minority concentration (coded 1 if the school enrolls more than 40% minority students, 0 otherwise); sector (public, Catholic, or independent governance structure); the enrollment of the 8th grade as a proxy for school size and/or grade grouping;[8] and the standard deviation of achievement (a measure of the academic homogeneity of the study body).

Descriptive Differences Between the Sectors

As the focus of this paper is on school organization and structure, our initial investigations examined the characteristics of schools and students separately for the public, Catholic, and independent sectors. These descriptive differences are presented in Table 1. Group mean differences for students and schools in the three sectors were tested with one-way analyses of variance.

Insert Table 1 about here

Student outcomes. Compared to their public school counterparts, students in the two types of private schools performed favorably on all three outcomes, with Catholic school students typically scoring between those in independent and public schools. On the composite achievement measure, independent school students scored over 1 sd above those in public schools, with Catholic school students scoring about 1/3 sd above those in public schools. Although differences are slightly less marked for engagement in academic work, again independent school students engaged in more activites than those in public schools (difference of .7 sd), with Catholic school students between the other two groups (.3 sd above public school students). A slightly different pattern shows Catholic school students the least likely, and public school students the most likely, to engage in behaviors which put them at risk. All of these differences are statistically significant, most below the .001 probability level.

Student background. Of course, these outcome differences are likely to be related to the demographic characteristics of students who attend the three types of schools. Very large differences in SES (about 1.2 sd) existed
between students in independent and public schools, with Catholic school students again between the two groups. It should be noted that Catholic school students' SES was closer to those in public than in independent

schools.[9] This same trend in minority status is especially noteworthy. While public schools enrolled the highest proportions of minority students (27%), the proportion in Catholic schools was close to that figure (21%). Independent schools, however, enroll many fewer minority students (10%). On the measure of academic background, students in Catholic and independent schools scored about .3 sd above those in public schools. On average, students attending the two types of private schools were rather close to each other in terms of academic background. Gender distributions among sectors were not significantly different, although independent schools enrolled somewhat fewer girls.

School demographics. Unsurprisingly, demographic measures of schools are representative of student distributions, with very large differences in the expected direction on average school SES. While the proportions of schools with minority concentrations over 40% were roughly equal for public and Catholic schools (about 20% of schools in both sectors), very few independent schools (6%) had high minority enrollments. Differences in the size of 8th grades in the three sectors were quite striking. While almost all Catholic schools were K-8 (i.e., elementary) schools, the majority of public schools were classified as either middle schools or junior high schools -- that is, they enroll only middle-grade students. Independent schools, on the other hand, came in a variety of grade-groupings, with K-12 schools not uncommon. For that reason, the average 8th grade size in both types of private schools was quite small compared to the public schools 8th graders attend. Besides the reported differences in students' academic achievement reported above, a potentially confounding factor in evaluating the effects of school restructuring (especially of heterogeneous grouping) was the academic homogeneity of the school population. We have captured this phenomenon with a measure of the standard deviation of achievement in each school. Sector differences showed independent schools the most homogeneous, compared to either Catholic or public middle-grade schools.

School restructuring. On the measures of restructuring we chose to investigate, it is clear that schools in the three sectors were rather different. There was, however, no consistent pattern across the several measures of restructuring. In general, Catholic schools were somewhat more likely to evidence characteristics of restructuring, and this was especially true for two specific submeasures. Catholic schools were considerably more likely to be less or non- (as opposed to completely) departmentalized,

and they were quite likely to use team teaching. Both types of private schools were also more likely than public schools to offer some proportion of their core courses in heterogeneously grouped classes.

From the descriptive information presented in Table 1, it is clear that in order to evaluate the unique effects of school restructuring on student achievement and engagement, we must consider the potential confounding of results from two sources: (a) characteristics of students and (b) demographic and structural characteristics of the schools they attend. Equally important, the analyses must be structured to take into account the hierarchical nature of the NELS database (with students grouped in schools) and of our research questions (school organizational effects on student behavior and performance). We now turn to what we consider the proper statistical approach to such an analysis.

Analytic Approach

Testing school effects. The questions examined in this analysis fall into a category of investigations identified as "school effects research." In this type of research, we wish to test questions about how differences between schools -- their policies and practices -- influence the development and behaviors and students who attend them. In addition to school averages of the outcomes considered here, in this approach it is also useful to investigate the effects of school practices and policies on the *distribution* of these outcomes across different types of students attending the same schools. While the theory underlying this type of investigation is thoroughly explained elsewhere (Bryk & Raudenbush, 1992; Lee & Bryk, 1989), here we briefly explain the application of HLM in the present situation.

Within-school models. A simple form of Hierarchical Linear Models (HLM) used here consists of two equations, a within- and a between-school model. Some of the parameters estimated in the within-school model become outcomes to be explained in between-school equations. One within-school model investigates the achievement of student i in school j, Y_{ij}, as a function of student background characteristics, X_{ij}'s (the X-variables considered here are SES, minority status, gender, and academic background), and random error, R_{ij}:

$$Y_{ij} = \beta_{j0} + \beta_{j1}X_{ij1} + \beta_{j2}X_{ij2} + \ldots + \beta_{jk}X_{ijk} + R_{ij}$$

The $ß_{jk}$ regression coefficients are structural relations occurring within school j that indicate how achievement in each school is distributed across the measured student characteristics. In the HLM models investigated here, we are particularly interested in two ß parameters:

$ß_{0j}$ - the average achievement for students in school j; and
$ß_{1j}$ - the relationship between SES and achievement in school j. We refer to this as the SES-achievement slope.

While the other ß parameters (i.e., distributional effects) were also estimated in our HLM analyses, we were not interested in modeling these parameters as functions of structural parameters. As such, the other within-school controls (minority status, gender, and academic background) are *fixed* in our HLM models.[10]

Between-school models. In the second set of equations, we model these ß parameters, adjusted for student characteristics, as functions of school-level parameters (W-variables). We estimate four between-school models for each outcome, individually estimating the effects of each restructuring component on the outcomes ($ß_0$ and $ß_1$ for each outcome). For each model, we also adjust for the potentially confounding effects of school structure and demographics. A typical between-school model is as follows:

$$ß_{jk} = \gamma_{0k} + \gamma_{1k}W_{1j} + \gamma_{2k}W_{2j} + \cdots + \gamma_{pk}W_{pj} + U_{jk} + e_{jk}.$$

The parameters of interest here are the effects associated with the school factors measuring restructuring, W_{1j} -- the γ_{pk} coefficients. Since the error terms in this equation are complex, conventional linear model techniques may not be used. However, recent developments in statistical theory and computation, available through the HLM software, make this estimation possible. Briefly, the total variance in each outcome is partitioned into two components: parameter and error variance. It is only effects on the *parameter variance* which are estimated in HLM. This is an important development, since it is only variability in the structural parameters, $Var(ß_{jk})$, which can be explained by school factors. In general, previous efforts to estimate school effects with ordinary least squares regression

have systematically underestimated school effects for this reason.

Results

Bivariate Relationships Between Model Variables

Is restructuring related to school characteristics? It is clear from the mean differences shown in Table 1 that the elements of school restructuring investigated in this paper differ among public, Catholic, and independent schools, with private schools more likely to evidence these characteristics. However, the demographic and structural characteristics of the schools in the three sectors also differ, with more advantaged students in private schools. Are the apparent sector differences favoring restructuring in private schools simply an artifact of their favorable demographic conditions? To answer this question, we have begun by investigating bivariate relationships between restructuring and school demographics. Table 2-A presents zero-order correlations between these two sets of variables.

.....

Insert Table 2 about here

.....

A few other patterns are evident. Several sub-measures of restructuring were moderately strongly, but negatively, related to 8th grade size.[11] In general, schools with smaller 8th grades were more likely to be restructured. Relationships with size were strongest for semi-departmentalization and heterogeneous grouping ($r > -.4$ in both cases). There was little relationship of size with team teaching, however ($r < -.1$). Two restructuring measures -- the composite index and heterogeneous grouping -- were significantly and negatively related to academic hetereogeneity (i.e. the standard deviation of achievement in each school). This association is reasonable, suggesting that hetereogeneous grouping is more common (and certainly simpler) in more homogeneous schools. There were inconsistent associations between restructuring and school SES. Average SES was unrelated to the restructuring index and to semi-departmentalization. Schools using team teaching enrolled students of somewhat higher SES ($r = .14$), however, and such schools were also somewhat less likely to use heterogeneous grouping ($r = -.15$). There was no relationship between school racial concentration and restructuring.

Are student outcomes related to demographic characteristics? Table 2-B

displays zero-order correlations between the four outcome measures and student background characteristics. Academic achievement was strongly and positively associated with SES and academic background ($r > .4$ in both cases), and moderately and negatively associated with minority status ($r = -.33$). Achievement was unrelated to gender. Academic engagement was somewhat higher for students of higher SES, stronger academic background, and for females (r between .1 and .2). Minority students were somewhat less likely to be academically engaged ($r = -.07$). Reflecting the same pattern as academic engagement, females and students of stronger academic background engageed in fewer at-risk behaviors ($r > -.2$ in both cases), as did students of higher SES ($r = -.14$), , while minority students engaged in somewhat more ($r = .10$). The strongest relationships were with achievement (with the exception of gender).

The correlations in Table 2, coupled with the means displayed in Table 1, suggest that in order to evaluate the net effect of school restructuring on student outcomes, it is necessary to control for the academic and demographic characteristics of students, as well as the demographic and structural characteristics of the schools they attend. As stated earlier, in order to accurately estimate these effects, the use of multi-level modeling techniques is also in order.

Preliminary Hierarchical Linear Models

Unconditional HLM models. The first step in multilevel modeling, prior to the introduction of statistical controls, is the partitioning of the total variability in each outcome into its within-school and between-school components. The effects of school restructuring may be evaluated only on the proportion of variability in the outcomes which exists between schools. Table 3 displays these results.

Insert Table 3 about here

For each of the three outcomes, while the proportion of the total variability found between schools (in HLM terminology, the *intra-class correlation*) was modest, it was large enough to proceed with further analysis. Those proportions varied across the outcomes, however. The highest proportion (.33) of between-school variance was for achievement; for academic engagement, the proportion was more modest (.11); the

proportion of the total variance in at-risk behaviors was lower (.06).[12] Significance testing of the between-school variability of each outcome suggested, however, that it was appropriate to model each outcome hierarchically. HLM estimates of the reliability of these measures followed the same pattern. That is, achievement was the most reliable measure (.91); academic engagement was adequately reliable (.71); and the measure of at-risk behaviors was marginally reliable (.57).[13] These results suggest that we are in the best position to find restrucuring effects on achievement, but efforts to evaluate school-level effects on at-risk behaviors may be constrained by less optimal psychometric properties of that dependent variable.

Within-school models. The series of models presented in Table 4 estimate within-school parameters for each outcome. In order to make comparisons across the four outcomes, each was transformed to a standardized z-score variable, as were the continuous variables used as within-school controls (i.e., SES and academic background). As suggested earlier, we are examining two ß parameters in each model as random effects (i.e., they are allowed to vary across schools): (1) the adjusted means on each outcome ($ß_{0j}$), and (2) the slope of SES on each outcome ($ß_{1j}$). Other within-school variables (minority status, gender, and academic background) are treated as fixed effects. That is, while they are taken into account in estimating the random effects, relationships of those variables with each outcome are not examined as random-variable functions of school-level variables.

Insert Table 4 about here

As suggested by the correlations shown in Table 2, the academic and social background characteristics of 8th graders were strongly related to the outcomes of interest in this study (see Table 4). SES was significantly and positively related to achievement and academic engagement, and was negatively related to at-risk behaviors. Minority students achieveed below their white counterparts, but engaged in more at-risk behaviors. Minority and white students were similar in academic engagement, once SES and academic background were taken into account. Eighth-grade girls wee more engaged in academics and are demonstrated fewer at-risk behaviors than their male counterparts. There was no gender difference in achievement.

Students' academic background was positively and strongly associated with achievement and academic engagement, and students with a strong academic background engaged in fewer at-risk behaviors.

HLM estimates of between-school variance in these outcomes have diminished slightly from the unconditional models displayed in Table 3, but are still adequate to proceed. Because the reliability of the parameter estimates of slopes is quite modest, the variance in the slope of SES on these outcomes was also modest. However, the between-school variability in SES slopes differed significantly between schools for two of the three outcomes (i.e., not for the SES/engagement slope).

Full HLM School-Level Models

Model structure. In several ways, the final analyses in this study are complex. First, in this study we are evaluating the effects of restructuring on six different outcomes; not only the school means of achievement and the two measures of engagement, but also the slope of SES on each outcome. These slopes measure the distribution of these outcomes among students of differing SES in each school. As such, we would expect that desirable characteristics of restructuring would demonstrate simultaneously two sets of relationships:

- o Restructuring is positively related to school mean achievement and academic engagement, and negatively related to at-risk behaviors; and
- o Restructuring is negatively related to the SES slopes on achievement and academic engagement (demonstrating an equitable distribution of these outcomes across students of differing levels of SES within each school). Since the effect of SES on at-risk behaviors is negative (see Table 4), a desirable (i.e., more equitable) relationship on this slope would be positive.

Second, the term "school restucturing" has several components. Not only are we evaluating the effects of a general index of restructuring, but also three separate sub-measures: reduced departmentalization, heterogeneous grouping, and team teaching. Since we would expect the various aspects of restructuring to affect the outcomes differently, we must evaluate the effects of each measure of school restructuring separately on each of the 6 outcomes (3 school means and 3 slopes) described above.

Third, it is possible that the effects of restructuring on the outcomes are confounded by other demographic and structural characteristics of schools. As discussed above, these include school average SES, minority concentration, sector, 8th grade size, and academic heterogeneity. Our estimates of the effects of restructuring include these school controls.

Given the number and complexity of sub-models, we have organized the presentation of results as follows. Analyses on the three outcomes are presented in separate tables (Tables 5-7), with the two related sub-outcomes -- school mean and SES slope -- combined in a single table. Effects of the four measures of restructuring are also evaluated separately -- first the composite, and then each sub-measure. While all analyses include adjust- ment for the within-school variables described in Table 4 (i.e., SES, minority status, gender, and academic background) and the between-school varibles described above, the estimated effects of these variables are not presented in our tables. For readers interested in the effects of school-level controls, the full school-level models are presented in the Appendices 1-3. As the full-model effects of student-level controls were very similar to those shown in Table 4, we have not included these in the Appendices.

Restructuring effects on achievement. Using the structure described above, the effects of school restructuring on student achievement, estimated with HLM, are presented in Table 5. The social class differentiation effect (i.e., the SES-achievement slope) was positive and significant ($p < .001$) in each model, indicating that higher-SES students also scored higher on achievement tests. Considering the effect of the composite index (Table 5-A), it is clear that this measure of restructuring was unrelated to either school average achievement or the SES slope. As we "unpack" the composite, however, we see in the analysis shown in Table 5-B, that reduced departmentalization had the desired pattern of effects. That is, schools with less rigid departmental structures evidenced both higher achievement (.08, $p < .01$) and less social differentiation (-.07, $p < .001$).

Insert Table 5 about here

A somewhat different picture emerges for heterogeneous grouping (Table 5-C). While this measure was unrelated to school average achievement, the desired (negative) effect on the SES/achievement slope was evident. That

is, in schools that practice heterogeneous grouping, achievement is distributed more equitably across students from different social-class backgrounds (-.04, $p < .15$). Considering team teaching (Table 5-D), while this type of restructuring was associated with higher achievement (.06, $p < .05$), team teaching was unrelated to the equitable distribution of achievement within schools.

Restructuring effects on academic engagement. Results for academic engagement and its association with restructuring are displayed in Table 6. As was the case for achievement, SES wass positively and significantly associated with this engagement outcome in each model. This means that across all schools, students with higher SES are more academically engaged. In general, restructuring effects on academic engagement were modest. However, all statistically significant effects were in the hypothesized direction. Students were significantly more engaged with their academic work in more restructured schools (i.e., those with higher ratings on composite restructuring index -- Table 6-A -- .04, $p < .01$). However, none of the sub-measures of restructuring was associated with mean differences in academic engagement. Schools with more team teaching (Table 6-D) were those with less social differentiation in engagement, especially once other school characteristics are taken into account (-.06, $p < .05$).

Insert Table 6 about here

Restructuring effects on at-risk behaviors. The models evaluating the effects of restructuring on at-risk behaviors, shown in Table 7, demonstrate that restructuring was again only modestly related to this measure of student engagement. Moreover, the few statistically significant relationships here were not in the hypothesized direction. For example, in schools with less rigid departmentalization (Table 8-B) and with more team teaching (Table 8-D), there were *higher levels* of at-risk behaviors, once characteristics of students and schools were taken into account (effects of .11 [$p < .001$] and .10 [$p < .01$], respectively). In addition, schools which practiced team teaching (Table 8-D) appeared to evoke *more* social differentiation of this outcome (-.06, $p < .05$). Recall that this outcome varied only modestly between schools (Table 4) and was only marginally reliable (Table 3), which might explain the most effects see in Table 7.

Insert Table 7 about here

Effects of grade size. From the full HLM models investigating the effects of the composite index of restructuring on our three outcome measures (Appendices 1-3), we have isolated the results of grade size on these outcomes in Table 8. As before, these results take into account the full set of statistical controls for student background, school demographics, academic homogeneity, and sector. In addition, results are adjusted for the general level of restructuring of each school.[14] As such, the effect of 8th grade size on each outcome is net of the full set of factors included in these HLM models.

Insert Table 8 about here

Grade size was negatively related to average levels of academic engagement (-.06, $p < .01$). Equally important, schools with larger 8th grades evidenced increased social stratification in achievement (.05, $p < .01$). At-risk behaviors were unrelated to 8th grade size.[15] We suggested earlier that 8th grade size was likely to serve as a simultaneous proxy for a school's grade organization and for school size. These results suggest, therefore, that schools which serve only early adolescents (i.e., middle schools or junior high schools), especially large schools of this type, have effects exactly opposite to what we have suggested is optimal for restructuring. That is, schools with larger 8th grades have less engaged students, and achievement is more differentiated by social class than schools where there are fewer students in the 8th grade.

Other school effects. As stated, the full HLM models for these analyses, which include the coefficients for each school-level control variable in our models, and from which we have culled the results presented in Tables 5-8, are included in Appendices 1-3. While some effects in the full reporting of these analyses are meaningful and interesting in the context of a full examination of school organizational effects, we have chosen not to engage in an extended discussion of them here, as our purpose is to explore school restructuring. We include these results in appendices so that interested readers may examine the full analytic models within which these restructuring effects were evaluated.

A few comments are in order, nevertheless. Earlier research which

compared Catholic and public high schools (Lee & Bryk, 1988; 1989) found students attending Catholic schools to evidence both higher achievement and a more socially equalizing distribution of that achievement. In general, the results presented here did not show such benefits for Catholic 8th graders in achievement, although these students showed fewer at-risk behaviors and a more socially equalized distribution of academic engagement. Two reasons for this pattern of differing results seem plausible. First, the 8th grade in Catholic schools is generally included in the elementary school, while earlier research focused on secondary schools.[16] Second (and more important in our opinion), the full HLM models include statistical controls for factors shown in other research to *explain* the Catholic school effects -- especially smaller size, less grouping by ability, and less rigid depart- mental structure. As shown in Table 1, these features are more prevalent in Catholic than either public or independent middle-grade schools.

The pattern of independent school effects is generally similar to Catholic schools, with two exceptions: independent school students showed higher levels of both academic engagement and at-risk behaviors. Schools with high concentrations of minority students and those which evidenced considerable academic diversity (tapped by the SD of achievement variable) showed some common effects. In general, such schools showed lower average achievement and more at-risk behaviors. Academic diversity was also related to a more disequalizing distribution of achievement by SES, which seems logical if unfortunate.

Discussion

Summary of Findings

We conclude that the pattern of effects for school restructuring demonstrated in this study offer general support for our hypotheses. Although the magnitude of effects is generally modest,[17] the elements of restructuring investigated here are positively and significantly associated with the academic achievement and engagement with schooling of American 8th graders. As important, attending restructured middle-grade schools generally appears to equalize these outcomes among students from different social-class backgrounds. These results take into account the academic and social differences among students in each school, the social context and

other structural features of their schools, and also the hierarchical nature of the relationships of interest here. For academic achievement, students attending schools which encourage team teaching evidence higher achievement. An important finding of this study concerns the academic organization of schools which restructure how students are matched to coursework. Less grouping by ability and a less rigid departmental structure appear to equalize achievement by student social class, although such organizational structures are generally unrelated to average achievement across schools.

The effects of school restructuring on student engagement are less straightforward. Students attending schools that evidence more elements of restructuring (from the global index measure) are more engaged in their academic work, but this is not the case for the other measure of engagement employed in this study -- at-risk behaviors. The restructuring index is unrelated to the social distribution of engagement (although there is strong evidence that socially advantaged students are more engaged). Students attending schools that are less departmentalized and where teaching is conducted in teams engage in more at-risk behaviors. The restucturing of the schools' academic organization (semi-departmentaliza-

tion, heterogeneous grouping) is generally unrelated to academic engagement, either average levels or the social distribution of this outcome. We must conclude that while school restructuring may positively affect academic engagement, it may also be more prevalent in schools with higher levels of at-risk behaviors.

Results for grade size generally confirm our hypotheses, as well. We conclude that the very common practice of structuring public schools attended by early adolescents to restrict their enrollments to only to middle grades (and, consequently to have more students in these grades) has negative consequences on both engagement and achievement. Not only are students in schools with larger 8th grades less engaged in the academic aspects of schooling, but also the practice appears to increase *how* achievement is distributed across students from different social class backgrounds. In terms of the social distribution of achievement, schools with large 8th grades are more differentiating institutions. We believe that 8th grade size is acting as a proxy for two structural aspects of middle- grade schools -- their grade organization and their overall size. These results lead us to conclude that early adolescents fare better in

schools where this age group is not isolated. More generally, these results suggest that students of this age are likely to demonstrate higher achievement and more engagement with academics in smaller schools.

Implication of These Findings

A full evaluation of the effects on students of attending schools which structure their instructional activities in ways that vary from the organizational norm would certainly benefit from information not available to us from a national survey. In particular, we are not sure whether the sample of students in schools which report that they engage in practices like heterogeneous grouping or team teaching actually experience instruction in this way. Even if students experience such restructured teaching, we are not sure of the level of implementation of these practices. For example, are teachers who teach as teams given time to plan the integration of such activities (or if they are provided time, how much do they actually integrate their teaching)? In schools we have identified as practicing heterogeneous grouping, are students still grouped by ability in the curricular areas assessed on the NELS composite achievement measure (i.e., math and reading)? In schools which are identified as less rigidly departmentalized, does this imply that teachers are less qualified to teach the subjects they are assigned? It is clear that more intense investigation of a smaller number of schools and classes, particularly focusing on schools which identify themselves as highly restructured, would add considerably to our knowledge of the effects of restructuring.[18]

The comparative effects of the composite restructuring index and the sub-measures of restructuring show that, in general, the composite has fewer effects than the sub measures (which have some conceptual rationale). We suggest that a substantive conclusion for this is that a simple summing of *numbers* of elements of restructuring is not a reasonable way for schools to approach the task. That is, *which* student experiences are restructured is more important than *how many* are.

The measures of restructuring employed here are admittedly imprecise and, in some cases, exhibit psychometric properties that are far from optimal. These limitations certainly attenuate the relationships of interest to this study. The set of dependent measures we have chosen is also incomplete. We suggest, therefore, that the effects shown here should be seen as lower bounds for the actual relationships between restructuring

and student outcomes, which gives the findings of this study particular importance. Although the magnitude of effects is modest, the pattern of effects demonstrated here is rather consistent -- students attending restructured schools generally benefit by that experience. As important, this type of restructuring seems to induce a more socially equitable distribution of achievement and engagement.

The reform movement toward restructured schools is not advocating change for the sake of change in American schools. The particular aspects of restructuring aimed at changing students' experiences are in a particular direction: to give the experience of learning more meaning for the learner, to create less differented learning experiences (especially by ability), to emphasize the quality compared to the quantity of products, to integrate learning experiences across disciplines, to loosen the hierarical barriers between adult and student members of the school community, to involve students in the evaluation of their learning. A major intellectual force stimulating this reform was laid by Sizer (1984:215), who states:

> The temptation in every school will be to more toward orderly standardization: such is the instinct, it seems of Americans, so used as we are to depending on structure. Good schools will have to resist this appeal of standardization: *the particular needs of each student should be the only measure of how a school gets on with its business*. (emphasis added)

As we suggested at the outset, we ground the conceptual force behind school restructuring in the fundamental distinction between two models of schooling -- rational-bureaucratic and personal-communal -- articulated by Bidwell (1965) but drawing on more fundamental sociological concepts laid out by Weber (1924) and Waller (1932). It is clear that the American educational enterprise has leaned quite far in the direction of the rational-bureaucratic model, where schools as formal organizations are appropriately characterized in terms of a division of adult labor into specialized tasks, with rule-driven social interactions, limited discretion for individuals, and authority defined by roles and rules. In contrast, the communal perspective sees schools as "small societies" typified by a minimal division of adult labor, informal social relations, and attachment to a shared value system. While the latter perspective is more common in small schools, elementary schools, and private schools, the zenith of the bureaucratic model is the modern comprehensive public high school. It is unfortunate, in our view, that the development of middle-grade schooling

has followed the bureaucratic model and emulated the comprehensive high school in it organizational character.

Over the last decade, weaknesses in the bureaucratization of schooling have been exposed, and there has been renewed interest in the importance of social interactions and less differentiated experiences for students and teachers in schools. In our view, the restructuring movement should be viewed in this context. This paper is not an appropriate venue to elaborate on this trend, which we discuss in some detail elsewhere (Bryk et al., 1990; Lee et al., in press). Suffice it to say that there is some empirical evidence to support the notion that bureaucratization induces alienation and disengagement in students and teachers, and that communal school organization has the opposite effect (Bryk & Driscoll, 1988; Bryk & Lee, in press; Firestone & Rosenblum, 1988).

In sum, the results presented in this paper lend some empirical support to the movement to restructure the schools attended by early adolescents. In general, change in schools which makes them less like comprehensive high schools, and more like "small societies" are in order. Students attending schools which are less bureaucratically structured demonstrate somewhat higher achievement and more engagement. The distribution of these outcomes is somewhat more equitable in such schools. As well as such common thrusts of the restructuring reform movement as less tracking and ability grouping, more team teaching, and a less segmented curriculum in terms of academic departments, the paper also provides some empirical support for altering the education of young adolescents away from grouping them in schools with large numbers of 8th graders (i.e., schools devoted exclusively to the middle grades), so that students of this age interact with peers other than those of their own age.

Technical Notes

1. The phrase "middle-grade schooling" used here identifies any schools which encompasses grades 7 and 8, possibly also 6 and/ or 9. Such schools may be identified in the literature as "junior high schools," "middle schools," "elementary schools" or "comprehensive schools," depending on the grade span. The concept of "middle grade schooling" is intended to include all of these structural types.

2. In our combination of rational functions with bureaucratic operations, we follow Bidwell's (1965) distinctions, although in other organizational literature focusing on organization in industry, those characteristics are considered separate (Udy, 1959).

3. Stevenson and Stigler (1992) suggest that this focus on individual differences as an organizing force in schools is not characteristics of the educational establishment in Asian countries, however.

4. The sample of public schools was reduced in order to accomodate the version of Hierarchical Linear Modeling (HLM) which is currently available on the University of Michigan's mainframe computer.

5. Because of the sampling down of public schools, school-level design weights were adjusted to weight up the public school sample. This involves multiplying the design weights by the inverse of the probability of the schools being sampled. Since our sample includes 233 of 761 public schools from the full NELS:88 sample which fit our criteria, the public school design weights were multiplied by 3.27 (761/233). As all Catholic and independent schools were retained, design weights for these schools were unchanged. Student-level design weights were employed only for computing means for student outcomes and background characteristics presented in Table 1, and were not employed in the HLM analyses in the paper.

6. The source of most of the measures of restructuring is a separate data file collected on NELS:88 schools by researchers at the Center for Research on Effective Schooling for Disadvantaged Students at the Johns Hopkins University (Epstein, McPartland & MacIver, 1991). The data are in a public-use data file available from the National Center for Education Statistics.

7. Achievement is significantly correlated with academic engagement ($r = .27$) and at-risk behaviors ($r = -.25$). The two measures of engagement are also significantly correlated ($r = -.29$).

8. As suggested earlier, middle-grade schools come in many configurations (e.g., K-8, K-12, 6-8, 7-9, and almost all other imaginable grade groupings). The configuration of the school determines, in large part, the size of the 8th grade. In several analyses we sought to determine whether the enrollment of the entire school or the enrollment in the 8th grade was more influential on student outcomes. We selected 8th grade enrollment as a more revealing measure of "size." We admit that this also acts as a proxy for the grade configuration of the school.

9. Catholic schools enrolling 8th graders are, in very large part, elementary (K-8) schools. The schools at this level are considerably less selective than Catholic high schools (Bryk & Lee, in press). A typical Catholic elementary school enrolls all students who apply, and tuitions in Catholic elementary schools are quite low in comparison to Catholic high schools.

10. Our initial HLM investigations modeled the minority gap, gender gap, and academic background slopes as random variables to be influenced by school restructuring. While these effects are statistically significant, we found that there was no pattern of their systematic variation across schools (i.e., the variability between schools on these effects did not vary significantly between schools). For that reason, we did not model these as outcomes in school-level analyses and constrained them from varying between schools.

11. Correlations of .5 or greater are considered large; .3-.5 of medium strength, .1-.3 small, and less than .1 trivial (Rosenthal & Rosnow, 1984, p.360).

12. In fact, the proportion of variability in achievement between schools (.33) is higher than in earlier studies which have investigated this with other data (e.g., Jencks et al., 1972; Lee & Bryk, 1989). While this could be attributable to either more reliable tests or to more between-school stratification in achievement at the middle-school level of for this 1988 cohort of students, we cannot separate the several potential causes. It is, however, noteworthy that this proportion is so high.

13. Reliabilities estimated under HLM are not the same as the classic estimate of Cronbach's alpha. While both, in theory, are estimates of the degree to which the observed score of a variable measures the "true score", they are estimated quite differently. Cronbach's alpha is an estimate of internal consistency for composite variables, while the HLM reliability is a function of variability in means across groups (schools, in this case) and the within-group sample size. (Bryk and Raudenbush, 1992).

14. Adjusting for the restructuring index is likely to diminish the effect of grade size, since these two variables are more than modestly correlated (Table 2-A, $r = -.31$, $p < .001$).

15. We hypothesized that the effect of 8th grade size on these outcomes might be non-linear. In particular, we re-estimated our final models including both a linear and quadratic term in the analyses. In no case was the quadratic term significant, leading to the conclusion that the observed effects of 8th grade size are linear.

16. While Catholic high schools are somewhat selective in terms of admissions (and more so in terms of self-selection), Catholic elementary schools are not. There is evidence that less able, motivated, and advantaged students leave the Catholic sector at the end of 8th grade -- for both academic and financial reasons (see Chapter 7 in Bryk & Lee, in press, for considerable detail on this transition point).

17. It is not surprising that effects on achievement are stronger than those on engagement, given the substantial difference in the reliability of those outcomes. Moreover, the modest reliabilities of the restructuring measures have surely attenuated our results. For this reason, the results from this study may be seen as a lower bound for the actual effects of restructuring on achievement and engagement, in our opinion.

18. Just this type of investigation is a major undertaking of the OERI-funded Center on Organization and Restructuring of Schools at the University of Wisconsin, which has also sponsored this study.

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Figure 1: Summary of Variables Used in Analysis

Dependent Measures

o *Achievement*
+ BYTXCOMP - Composite of Reading test and Math test scores. Alpha: Reading Test=.84, Mathematics Test=.91

o *Academic Engagement*
Standardized Factor-Score using principle components factor analysis:
+ BYS78A -- how often come to class without pencil or paper (recoded to: 0=usually... 3 = never)
+ BYS78B -- how often come to class without books (recoded to: 0=usually... 3 = never)
+ BYS78C -- how often come to class without homework (recoded to: 0=usually... 3 = never)
+ BYHOMEWK - how many hours per week student spends doing homework
+ BYS73 - ever feel bored in school (recoded to: 0=always...3=never)
Eigenvalue=2.06; Percent of Variance Explained=41.2%; Alpha=.64

o *At-Risk Behaviors*
Standardized Factor-Score using principle components factor analysis. Factor Eigenvalue=2.75; Percent of Variance Explained=39.3%; Alpha=.71. Components:
+ BYS55A -- sent to office for misbehaving (coded: 0=never ; 1=once or twice; 2=more than twice)
+ BYS55E -- parents received warning about my behavior in school (coded: 0=never; 1=once or twice; 2=more than twice)
+ BYS55F -- got into a fight with another student (coded: 0=never; 1=once or twice; 2=more than twice)
+ BYS56E -- students in class see me as a trouble-maker (coded: 0=never 1=somewhat 2=very much)
+ BYS75 - how often miss school other than illness (recoded to: 0=none; 1.5=1 or 2 days; 3.5=3 or 4 days; 7.5=5-10 days; 12=more than 10 days)
+ BYS76 -- how often cut or skip class (coded: 0=never; 1=less then 1 a week; 2=at least 1 a week; 3 = daily)
+ BYS77 -- how often come to class late (recoded to:0=none; 1.5=1 or 2 days; 3.5=3 or 4 days; 7.5=5-10 days; 12=more than 10 days)

Measures of School Restructuring

o *Restructuring Index*
A sum of 16 measures, composed of:
+ NOGRPCLS - SCHOOL HAS NO GROUPED ACADEMIC CLASSES (1 = yes; 0 = no)
1 = 164 schools, 16.8%
We first summed the number of classes for which the principal stated used homogeneous grouping was used for 8th graders. We then formed a dummy variable such that schools which had 0 total homogeneous classes were 1, others 0.
+ STNTGRP - SCHOOL HAS GT 40% SAMPLED STUDENTS IN NO GROUPED ACADEMIC CLASSES (1 = yes; 0 = no)
1 = 106 schools, 10.6%

We first summed the number of subjects in which the student stated he or she was not grouped (4 possible). We then formed a dummy variable such that students who had 4 total "not grouped" classes were 1, others 0. We then aggregated this measure to the school level, giving the percent of sampled students in each school who were respectively "not grouped" in all courses. Finally, we made a dummy coded variable, identifying schools which have 40% or more of the sampled students in non-grouped classes.

+ HES23H2 - SCHOOL PRESENTLY HAS FLEXIBLE TIME SCHEDULING (1 = yes; 0 = no)

1 = 191 schools, 21.4%

This measure comes directly from the Hopkins Enhancement Survey.

+ HES23S2 - SCHOOL PRESENTLY HAS SCHOOLS WITHIN SCHOOLS (1 = yes; 0 = no)

1 = 122 schools, 13.8%

This measure comes directly from the Hopkins Enhancement Survey.

+ TEAMTCH - 8TH GRADE USES TEAM TEACHING (1 = yes; 0 = no)

1 = 319 schools, 40.2%

This measure comes from 2 items in the Hopkins Enhancement Survey, one referring to interdepartmental team teaching and the other to departmental team teaching. Schools which report either of these in use for 8th graders were coded 1, other schools coded 0.

+ HES23K2 - STUDENTS IN SCHOOL HAVE SAME HOMEROOM/TEACHER ALL MIDDLE GRADE YEARS (1 = yes; 0 = no)

1 = 217 schools, 24.2%

This measure comes directly from the Hopkins Enhancement Survey. There were no items referring to other types of teachers maintained for more than 1 year.

+ HES23I2 - SCHOOL PRESENTLY HAS SCHEDULED COMMON PLANNING TIME FOR DEPT. MEMBERS (1 = yes; 0 = no)

1 = 323 schools, 36.3%

This measure comes directly from the Hopkins Enhancement Survey.

+ HES23U2 - SCHOOL PRESENTLY HAS A STAFF DEVELOPMENT PROGRAM (1 = yes; 0 = no)

1 = 421 schools, 57.4%

This measure comes directly from the Hopkins Enhancement Survey.

+ SEMIDEPT - SCHOOL IS NON- OR SEMI-DEPARTMENTALIZED (1 = yes; 0 = no)

1 = 112 schools, 11.5%

This measure is recoded from three measures from the Hopkins Enhancement Survey. The first is a report from the principal on whether the 8th grade is predominantly deparmentalized (different teacher for each class), self-contained (same teacher for all subjects), or semi-departmentalized (different teacher for some subjects). The second was a report from the principal about whether the school had formal departments with their own chairs. The third measure taps the number of teachers the average student has (taking out schools which have team teaching), such that students with 3 or fewer teachers per day were considered in semi-departmentalized schools for 8th graders. To be coded "1" on the final variable, schools had to be coded self-contained or semi-departmentalized on the first measure, have no formal departments from the second measure, and average 3 or fewer teachers on the third. The final measures thus compares non- or semi-departmentalized schools to those with more formalized departmental structures.

+ HES36A - BY POLICY, THIS SCHOOL DOES NOT RETAIN 8TH GRADERS (1 = yes; 0 = no)
  1 = 91 schools, 12.1%
  This measure comes directly from the Hopkins Enhancement Survey.
+ HES23G2 - INTERDISCIPLINARY TEACHERS SHARE THE SAME STUDENTS (1 = yes; 0 = no)
  1 = 372 schools, 51.2%
  This measure comes directly from the Hopkins Enhancement Survey.
+ KPSMMATE - 8TH GRADERS KEEP THE SAME CLASSMATES FOR ALL CLASSES (1= yes; 0 = no)
  1 = 176 schools, 18.1%
  This measure comes from the Hopkins Enhancement Survey, recoded from HES6C. Students who keep the same classmates for all classes are coded "1", those who change for some or all classes are coded "0".
+ HES23M2 - STUDENTS FROM DIFFERENT GRADE LEVELS ARE IN THE SAME CLASSROOM (1 = yes; 0 = no)
  1 = 330 schools, 36.8%
  This measure comes directly from the Hopkins Enhancement Survey.
+ HES23L2 - 8TH GRADE CLASSES ARE ORGANIZED FOR COOPERATIVE LEARNING (1 = yes; 0 = no)
  1 = 225 schools, 30.9%
  This measure comes directly from the Hopkins Enhancement Survey.
+ HES2302 - 8TH GRADERS HAVE EXPLORATORY CLASSES (1 = yes; 0 = no)
  1 = 449 schools, 50.1%
  This measure comes directly from the Hopkins Enhancement Survey.
+ SPCPROJ - 8TH GRADERS DO SPECIAL PROJECTS AS REGULAR PART OF THEIR CURRICULUM (1 = yes; 0 = no)
  1 = 463 schools, 64.3%
  This measure combines two items from the Hopkins Enhancement Survey, measuring if the 8th graders regularly do special projects in English/Social Studies or in Math/Science. The recoding for this variable codes schools which have special projects in any subject as "1", other schools as "0".
  All the 16 indices are dummy-coded variables. The operative theory here is that restructured schools have a higher portion of these indices. Thus, the mean for a school reflects the proportion of indices the school has. The variable "RSTRCTD" was made with the mean operator in SPSSX to accomodate missing data. The item alpha is .54, which is higher than the alpha computed for any single item deleted. On average, schools have roughly a quarter of these indices, ranging from 0 to 89%.

Submeasures of Restructuring (taken from the 16 items given above)

o *Reduced Departmentalization*
  Mean of:
  + SEMIDEPT - SCHOOL IS SEMI-DEPARTMENTALIZED
  + LOTCHRS - 8TH GRADERS HAVE FEWER THAN 5 TEACHERS A DAY

o *Heterogeneous Grouping*
  Standardized Factor-Score using principle components factor analysis:
  + NOGRPCLS - SCHOOL HAS NO GROUPED ACADEMIC CLASSES (Principal's report)

+ STNTGRP - SCHOOL HAS GT 40% SAMPLED STUDENTS IN NO GROUPED ACAD. CLASS
+ KPSMMATE - 8TH GRADERS KEEP THE SAME CLASSMATES FOR ALL CLASSES
Factor Eigenvalue=1.62; Percent of Variance Explained=54.2%; Alpha=.49

o *Team Teaching*
Standardized Factor-Score using principle components factor analysis:
+ HES23H2 - SCHOOL HAS FLEXIBLE TIME SCHEDULING
+ TEAMTCH - 8TH GRADE USES TEAM TEACHING
+ HES23I2 - SCHOOL HAS SCHEDULED COMMON PLANNING TIME FOR DEPT. MEMBERS
+ HES23G2 - INTERDISCIPLINARY TEACHERS SHARE THE SAME STUDENTS
Factor Eigenvalue=1.65; Percent of Variance Explained=55.0%; Alpha=.65

Control Variables

Student Background

o *Socioeconomic Status*
BYSES -- socio-economic status composite

o *Minority Status*
RACE -- student race (recoded to: 0=white or Asian; 1=Black, Hispanic, or Native American)

o *Gender*
BYS12 -- student gender (recoded to: 0=male; 1=female)

o *Academic Background*
Average of:
BYGRADS -- composite of self-reported grades for science, math, English, and social science
BYP44 - parent report of whether student was ever held back (recoded to: 0=yes; 1=no)

School Demographics

o *Average Socioeconomic Status*
BYSES -- socio-economic status composite, aggregated to the school level

o *Minority Concentration*
RACE -- student race (recoded to: 0=white or Asian; 1=Black, Hispanic, or Native American), aggregated to the school level, and recoded to a dichotomous variable (recoded to: 1=40% or more, 0=less than 40% minority)

o *Standard Deviation of Achievement*
We aggregated the NELS:88 composite achievement measure BYTXCOMP using the standard deviation operator in SPSSX to the school level. This process generated the standard deviation of

achievement across all sampled students per school for each school.

- *Sector*

  There are four levels of "school sector" measured: public, Catholic, independent, and other priviate schools from the G8CTRLP variable on the NELS:88 privileged data tape. We dropped schools and students attending private schools from these analyses, but made dummy-coded measures of Catholic and independent schools, using public schools as the comparison group.

- *Size*

  We have focused on the size of the 8th grade, (G8ENROL), given on the NELS:88 privileged data file (the actual count of students in the 8th grade). As the distribution of this variable was positively skewed, we transformed the variable (natural logarithm) and restandardized it to mean = 0 , sd = 1.

Table 1: **Means of Model Variables Broken Down by School Sector**

	Public Schools	Catholic Schools	Independent Schools	F-Statistic for Group Differences[b]
Number of students[a]	5282	2082	1481	
Number of schools[a]	233	84	60	
Students per school[a]	22.8	24.8	24.7	
Student Outcomes				
Academic achievement[c]	49.60	53.00	60.60	190.6***
Actively engaged in academic work[d]	-.09	.23	.62	107.4***
Involved in at-risk behaviors[d]	.05	-.18	-.13	36.0***
Student Background				
Socio-economic status[d]	-.11	.24	1.07	378.7***
Minority status (%)	.27	.21	.10	23.3***
Academic background[d]	-.07	.22	.26	62.3***
Female (%)	.50	.52	.46	1.4
School Demographics				
Average SES	-.29	.11	.94	69.8***
Schools with more than 40% minority (%)	.21	.17	.06	0.6
Size of 8th grade	136.34	28.48	46.55	110.0***
Av. standard deviation of achievement	8.53	8.16	6.48	7.1**
School Restructuring				
Restructuring Index	.35	.43	.35	7.4**
% Semi-departmentalized schools	.41	.73	.05	13.7***
Instruction is grouped heterogeneously (%)	.32	.53	.47	6.3**
School uses team teaching (%)	.51	.76	.09	11.7***

* p < .05; ** p < .01; *** p < .001

[a]Sample sizes are unweighted.

[b]Group mean differences tested with one-way ANOVA. Degrees of freedom of the F-statistics for the student-level variables are (2, 7042); for the school-level variables, (2, 374).

[c]Mean = 50, sd = 10 on entire student sample.

[d]Standardized to mean = 0 and sd = 1.

Table 2: **Correlations Between Model Variables for Schools and Students**

A. *Correlations Between Restructuring Measures and School Demographics* (n=377)

	School Demographics			
	Average SES	Minority Concentration	Size of 8th Grade	Average SD Achievem't
School Restructuring				
Restructuring index	-.02	.08	-.31***	-.14**
Semi-departmentalized school	-.06	.00	-.44***	-.07
Instruction is grouped heterogeneously	-.15**	.05	-.48***	-.11*
School uses team teaching	.14**	-.01	-.08*	.04

B. *Correlations Between Student Background and Student Outcomes (n=8845)*

	Student Background			
	SES	Minority Status	Academic Background	Female
Student Outcomes				
Academic achievement	.45***	-.33***	.43***	.02
Actively engaged in academic work	.15***	-.07**	.19***	.11**
Involved in at-risk behaviors	-.14***	.10**	-.28***	-.21***

* p < .05; ** p < .01; *** p < .001

Table 3: **Summary Statistics From Fully Unconditional HLM Model for Each Outcome**

	Outcome		
	Achievement	Academic Engagement	At-Risk Behaviors
Variance within schools[a]	.66	.88	.94
Variance between schools[b]	.33***	.11***	.06***
Reliability	.91	.71	.57
Proportion of total variability between schools[c]	.33	.11	.06

* $p < .05$; ** $p < .01$; *** $p < .001$

[a]This is the tau statistic in HLM terminology.
[b]This is the sigma-squared statistic in HLM terminology.
[c]Because the outcomes were computed as standardized (z-score) variables, this proportion is identical to the variance between schools (sigma-squared).

Table 4: **HLM Within-School Models for Each Outcome**

	Outcome		
	Achievement	Academic Engagement	At-Risk Behaviors
Parameters			
School average	-.08	-.16	.16
SES slope	.18***	.06***	-.09***
Female differential[a]	.01	.19***	-.37***
Minority differential[a]	-.36***	-.06	.18***
Academic background[a] slope	.34***	.15***	-.22***
Between-school variance of school average	.22***	.10***	.05***
Between-school variance of SES slope	.02***	.001	.02***

* p < .05; ** p < .01; *** p < .001

[a]These variables have been constrained from varying randomly between schools. Rather, these effects represent pooled within-school effects.

Table 5: **Final HLM Models of Effects of Restructuring on Achievement**

A. *Effects of Composite Measure of Restructuring*

	Gamma Coefficients[a]
Average achievement	.10
Restructuring index effect	.01
SES-achievement slope	.18***
Restructuring index effect	.003

B. *Effects of Reduced Departmentalization*

	Gamma Coefficients[a]
Average achievement	.08
Reduced departmental effect	.08**
SES-achievement slope	.19***
Reduced departmental effect	-.07**

C. *Effects of Heterogeneous Grouping*

	Gamma Coefficients[a]
Average achievement	.09
No grouping effect	.02
SES-achievement slope	.19***
No grouping effect	-.04~

D. *Effects of Team Teaching*

	Gamma Coefficients[a]
Average achievement	.08
Team teaching effect	.06*
SES-achievement slope	.18***
Team teaching effect	-.01

~ $p < .15$; * $p < .05$; ** $p < .01$; *** $p < .001$

[a]Within-school models are adjusted for academic background, minority status, and gender. Between-school adjustments include average SES, minority concentration, sector, 8th grade size, and the standard deviation of achievement in each school.

Table 6: **Final HLM Models of Effects of Restructuring on Academic Engagement**

A. *Effects of Composite Measure of Restructuring*

	Gamma Coefficients[a]
Average academic engagement	.18
Restructuring index effect	.04**
SES-engagement slope	.08***
Restructuring index effect	-.01

B. *Effects of Reduced Departmentalization*

	Gamma Coefficients[a]
Average academic engagement	-.17
Reduced departmental effect	-.04
SES-engagement slope	.06*
Reduced departmental effect	.03

C. *Effects of Heterogeneous Grouping*

	Gamma Coefficients[a]
Average academic engagement	-.17
No grouping effect	.04
SES-engagement slope	.09***
No grouping effect	-.02

D. *Effects of Team Teaching*

	Gamma Coefficients[a]
Average academic engagement	-.17
Team teaching effect	.06-
SES-engagement slope	.05*
Team teaching effect	-.06*

- $p < .15$; * $p < .05$; ** $p < .01$; *** $p < .001$

[a]Within-school models are adjusted for academic background, minority status, and gender. Between-school adjustments include average SES, minority concentration, sector, 8th grade size, and the standard deviation of achievement in each school.

Table 7: **Final HLM Models of Effects of Restructuring on At-Risk Behaviors**

A. *Effects of Composite Measure of Restructuring*

	Gamma Coefficients[a]
Average at-risk behaviors	.15
Restructuring index effect	.01
SES/at risk slope	-.07***
Restructuring index effect	.002

B. *Effects of Reduced Departmentalization*

	Gamma Coefficients[a]
Average at-risk behaviors	.12
Reduced departmental effect	.11***
SES/at-risk slope	-.08***
Reduced departmental effect	-.003

C. *Effects of Heterogeneous Grouping*

	Gamma Coefficients[a]
Average at-risk behaviors	.16
No grouping effect	.06-
SES/at-risk slope	-.07*
No grouping effect	.01

D. *Effects of Team Teaching*

	Gamma Coefficients[a]
Average at-risk behaviors	.12
Team teaching effect	.10**
SES/at-risk slope	-.05
Team teaching effect	-.08*

- $p < .15$; * $p < .05$; ** $p < .01$; *** $p < .001$

[a]Within-school models are adjusted for academic background, minority status, and gender. Between-school adjustments include average SES, minority concentration, sector, 8th grade size, and the standard deviation of achievement in each school.

Table 8: **Final HLM Model: Effect of 8th Grade Size on Student Outcomes**

Outcome	Effect of 8th Grade Size[a]
Achievement	.04~
SES-achievement slope	.05**
Academic engagement	-.06**
SES-engagement slope	-.01
At-risk behaviors	.01
SES/at-risk slope	.00

~ p < .15; * p < .05; ** p < .01; *** p < .001

[a]HLM models identical to those in Tables 5-7, including controls for student background (SES, minority status, gender, academic background), school demographics and structure (average SES, minority concentration, sector, and homogeneity of achievement), and school restructuring (composite restructuring index). Full models are displayed in the Appendix.

Appendix 1: **Full HLM Models of Effects of School Characteristics on Achievement**

A. Effects of School Characteristics with Restructuring Index

	Coefficient		Coefficient
Average school achievement	.10	**SES-achievement slope**	.18***
Restructuring index	.01	Restructuring index	.003
Average SES	.38***	Average SES	-.01
Size of 8th grade	-.04~	Size of 8th grade	.05**
Catholic	-.10*	Catholic	.08~
Independent private	-.07	Independent	.07
Minority concentration	-.15***	Minority concentration	-.08*
SD of achievement	-.04*	SD of achievement	.12***

B. Effects of School Characteristics with Reduced Departmentalization

	Coefficient		Coefficient
Average school achievement	.08	**SES-achievement slope**	.19***
Reduced departmental effect	.08**	Reduced dept'l effect	-.07**
Average SES	.38***	Average SES	-.01
Size of 8th grade	-.03~	Size of 8th grade	.04**
Catholic	-.12*	Catholic	.09*
Independent	-.05	Independent	.05
Minority concentration	-.17***	Minority concentration	-.08*
SD of achievement	-.04*	SD of achievement	.12***

C. Effects of School Characteristics with Heterogeneous Grouping

	Coefficient		Coefficient
Average school achievement	.09	**SES-achievement slope**	.19***
No grouping effect	.02	No grouping effect	-.04~
Average SES	.38***	Average SES	-.02
Size of 8th grade	-.03~	Size of 8th grade	.04*
Catholic	-.10*	Catholic	.08~
Independent	-.06	Independent	.08~
Minority concentration	-.15***	Minority concentration	-.08*
SD of achievement	-.04*	SD of achievement	.12***

D. Effects of School Characteristics with Team Teaching

	Coefficient		Coefficient
Average school achievement	.08	**SES-achievement slope**	.18***
Team teaching effect	.06*	Team teaching effect	-.01
Average SES	.37***	Average SES	-.01
Size of 8th grade	-.04*	Size of 8th grade	.05**
Catholic	-.11*	Catholic	.08~
Independent	-.07	Independent	.07
Minority concentration	-.15***	Minority concentration	-.08*
SD of achievement	-.04*	SD of achievement	.12***

Appendix 2: **Full HLM Models of Effects of School Characteristics on Academic Engagement**

A. Effects of School Characteristics with Restructuring Index

	Coefficient		Coefficient
Average academic engagement	-.17	**SES-engagement slope**	.06*
Restructuring index	-.04**	Restructuring index	.03
Average SES	.13***	Average SES	-.01
Size of 8th grade	-.08*	Size of 8th grade	-.01
Catholic	-.09~	Catholic	-.11*
Independent private	.25~	Independent	-.06
Minority concentration	.05	Minority concentration	.02
SD of achievement	-.05	SD of achievement	.01

B. Effects of School Characteristics with Reduced Departmentalization

	Coefficient		Coefficient
Average academic engagement	-.17	**SES-engagement slope**	.09***
Reduced departmental effect	.04	Reduced dept'l effect	-.02
Average SES	.13***	Average SES	-.01
Size of 8th grade	-.08*	Size of 8th grade	-.01
Catholic	.09~	Catholic	-.10*
Independent	.24~	Independent	-.09
Minority concentration	.05	Minority concentration	-.01
SD of achievement	-.01	SD of achievement	-.01

C. Effects of School Characteristics with Heterogeneous Grouping

	Coefficient		Coefficient
Average academic engagement	-.17	**SES-engagement slope**	.09***
No grouping effect	.04	No grouping effect	-.02
Average SES	.13***	Average SES	-.01
Size of 8th grade	-.08**	Size of 8th grade	-.01
Catholic	.09~	Catholic	-.10*
Independent	.24*	Independent	-.09
Minority concentration	.05	Minority concentration	.01
SD of achievement	-.01	SD of achievement	.01

D. Effects of School Characteristics with Team Teaching

	Coefficient		Coefficient
Average academic engagement	-.17	**SES-engagement slope**	.05**
Team teaching effect	.06~	Team teaching effect	-.06*
Average SES	.13***	Average SES	-.01
Size of 8th grade	-.07**	Size of 8th grade	-.01
Catholic	-.09~	Catholic	-.10*
Independent	.27*	Independent	-.09
Minority concentration	.05	Minority concentration	.01
SD of achievement	-.01	SD of achievement	.01

Appendix 3: **Full HLM Models of Effects of School Characteristics on At-Risk Behaviors**

A. Effects of School Characteristics with Restructuring Index

	Coefficient		Coefficient
Average at-risk behaviors	.15	**SES-at risk slope**	-.07***
Restructuring index	.01	Restructuring index	.002
Average SES	-.03	Average SES	.07*
Size of 8th grade	-.01	Size of 8th grade	-.001
Catholic	-.02*	Catholic	.02
Independent private	.12	Independent	-.07
Minority concentration	.12*	Minority concentration	.04
SD of achievement	.07**	SD of achievement	-.02

B. Effects of School Characteristics with Reduced Departmentalization

	Coefficient		Coefficient
Average at-risk behaviors	-.12	**SES-at risk slope**	-.08***
Reduced departmental effect	.11***	Reduced dept'l effect	-.003
Average SES	-.03	Average SES	.07*
Size of 8th grade	.02	Size of 8th grade	-.001
Catholic	-.15**	Catholic	.03
Independent	.15	Independent	-.07
Minority concentration	.11*	Minority concentration	.04
SD of achievement	.07**	SD of achievement	-.02

C. Effects of School Characteristics with Heterogeneous Grouping

	Coefficient		Coefficient
Average at-risk behaviors	.16	**SES-at risk slope**	-.07*
No grouping effect	.06~	No grouping effect	.01*
Average SES	-.03	Average SES	.07*
Size of 8th grade	.02	Size of 8th grade	-.001
Catholic	-.12*	Catholic	.02
Independent	.14	Independent	-.07
Minority concentration	.12*	Minority concentration	.04
SD of achievement	.07**	SD of achievement	-.03

D. Effects of School Characteristics with Team Teaching

	Coefficient		Coefficient
Average at-risk behaviors	.12	**SES-at risk slope**	-.05
Team teaching effect	.10**	Team teaching effect	-.08*
Average SES	-.04	Average SES	-.07*
Size of 8th grade	.01	Size of 8th grade	-.001
Catholic	-.03**	Catholic	.03
Independent	.11	Independent	-.06
Minority concentration	.12*	Minority concentration	.04
SD of achievement	.06**	SD of achievement	.03