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Why some public high schools are more successful in preventing dropout: The critical role of school size

Turner, Kenneth Roland, Ed.D.

Harvard University, 1991

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WHY SOME PUBLIC HIGH SCHOOLS ARE MORE SUCCESSFUL IN PREVENTING DROPOUT: THE CRITICAL ROLE OF SCHOOL SIZE

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Kenneth R. Turner

A Thesis Presented to the Faculty of the Graduate School of Education of Harvard University in Partial Fulfillment of the Requirements for the Degree of Doctor of Education.

1991

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Looking back on this thesis, it is easy to see how various people have influenced my thinking. There are a few I would like to thank. First, I owe a debt of gratitude to my parents. Of the many valuable lessons I learned from them, two stand out: first, no one is entitled to a particular starting place in life; and second, schools can make a difference in the lives of children - especially the lives of children whose futures seem most uncertain. The story of my own father's success is testament to the power of schools to change lives. In many respects, this thesis is rooted in that belief.

Special thanks go to my committee, without whose support and guidance this thesis would surely not have been possible. I am grateful to Susan Moore Johnson, a trusted critic who first guided me toward the topic and, later, sensitively encouraged me to "remember what's real." More often than not, on matters of substance, it was Susan's insight into schools, her thoughtful probing and her careful questioning that grounded me. Without doubt, she helped sharpen my understanding of the issues. I am indebted to Dick Murnane, whose intellectual honesty, tireless pursuit of academic excellence, and keen eye for the details that can make or break policy helped keep my work on track. It was Dick who encouraged me to squeeze as much as possible from the data and then express it in language that would be accessible to a wider audience. I am especially indebted to John Willett, who, from the outset, believed in me and my ability to tackle a study of national scope. A selfless advisor, superlative teacher, and patient

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listener, John helped me realize the promise that was in me, and, for that, I will always be grateful. At every turn, John has proved to be compassionate and, at the same time, demanding. Over the course of these three years, John's energy, drive, and perfectionist streak came to be the standard by which I judged my own effort.

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ABSTRACT

This thesis is an empirical investigation of factors related to student dropout. It addresses the question: Which school characteristics help explain the variation in dropout rates among comprehensive public high schools? Using hierarchical linear modeling (*HLM*) to re-analyze large-scale nationally representative data on White, Hispanic, and Black students and schools, this study examines the linkage between two phenomena: the decisions that educators make about how to structure high schools and the decisions that students make to drop out.

This study finds that, after adjusting for the background characteristics of students and their classmates, students tend to drop out less from schools that have fewer enrolled students, more collegial staff relations, and less directive principal leadership. Moreover, while there is a tendency for schools that display these characteristics to have a positive effect on all students, their salutary effect is greatest upon minority students.

While the largest school effects found were associated with student enrollment, cooperation, and principals' leadership, this study determined that to a lesser degree dropout is also related to tracking and teacher collaboration. Students tend to drop out less when schools rely less on tracking and when teachers spend more minutes each week collaborating on matters related to instruction. The academic expectations that teachers held of students was not found to be an important predictor of dropout.

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In three respects the average make-up of students attending a school was found to affect the dropout rate for individuals within a school: (a) when the socio-economic status of students attending a school is higher, dropout tends to be lower; (b) when the students who attend a school are more academically prepared, dropout tends to be lower; and (c) when the students in a school are more frequently in trouble with the law, suspended, or tardy, dropout appears to be greater.

The findings from this study suggest that changes in the organization of high schools will have the most benefit for those who need them most, namely youngsters of color and accent, those who typically are least wellserved by the system of public education in this country.

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CHAPTER ONE

INTRODUCTION

Who drops out of comprehensive public high schools? How many leave? Why do they go? Are there school characteristics that account for student dropout? If so, what can schools do to improve the chance that students will graduate on time? This study addresses these questions and seeks to explain why some schools enjoy uncommon success in minimizing dropout while other schools fail to graduate nearly half their students.¹

This study begins with the proposition that any high school's claim to success must take into account its dropout rate.² As we shall see, this study of Black, Hispanic, and White students ends with the conclusion that students, in general, are less likely to slip through the cracks and drop out from smaller schools that have more cooperative adult relations and less directive principal leadership. Moreover, while there is a tendency for schools that display these characteristics to have a positive impact on all students, their salutary effect is greatest upon minority students. This suggests that changes in the organization of high schools will have the most benefit for those who need them most, namely youngsters of color and accent, those who typically are least well-served by the system of public education in this country.

Recently, much has been made in the popular press of the public schools' inability to educate children. Between 1972 and 1982, for instance, the school dropout rate increased nearly five percent, from 23.8 percent to 28.7 percent.³ Today, it is estimated that, nationwide, one of four students

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who enroll in ninth grade drops out before high school graduation.⁴ Unfortunately, the future holds little promise of immediate improvement. One year from now, 11 percent fewer high school seniors are projected to graduate than graduated last year.⁵

The notion that schools are failing to educate all children has not only been voiced by the popular press, however. Scholars, too, have charged that those entering the labor force are less prepared today for the challenges and rigors of the workplace than their predecessors were a decade ago.⁶ There is widespread agreement that the transition from school to work is difficult for many young people today, but especially for those high school dropouts who lack the skills necessary to compete.⁷ It is the coupling of these two trends, a shrinking national labor force that is increasingly ill-equipped to meet the changing demands of the workplace, that serves as a grim reminder of the urgency of the dropout problem.⁸

Add to this the growing international competition for global markets and the importance of the problem is writ large. In order for the U.S. to compete internationally, it must capitalize on all its intellectual resources. However, to do so, educators must improve what some have called schools' "holding power."⁹

The costs to the individual dropout are well known -- over the course of a lifetime, the average, non-college-bound, male high school graduate may expect to earn \$266,000 more than his counterpart without a high school degree.¹⁰ But victims and costs are not limited to individuals; society at-large also suffers as a result of the exodus of dropouts from our nation's schools.¹¹ By one estimate, this year's class of high school dropouts will cost

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the country \$296 billion in lost earnings and forgone taxes over the course of their lifetimes.¹²

It is widely accepted that, among other factors, a student's ethnicity, gender, socio-economic background, and academic preparation can help explain a dropout decision. While this study does not dispute these facts, to stop at this point is to tell only half of the story; to stop here might lead one to mistakenly surmise that students or their families are exclusively or primarily responsible for the dropout problem. Stopping at this point reinforces the notion that "the family is somehow the principal determinant of whether or not a child will do well in school . . . Such a belief has the effect of absolving educators of their professional responsibility to be instructionally effective."¹³ Research that has sought to identify characteristics of dropouts has discounted the influence of schools on students' stay-or-leave decisions. This line of inquiry has been myopic insofar as it has located the problem exclusively within the individual. Moreover, in the past, the findings of such studies have not easily led to policy prescriptions because student background characteristics lie beyond the control of schools. Finally, analysis that stops at this point leaves open the question; Does it make a difference which school a child attends? And, as this study shall demonstrate, from the standpoint of dropouts the answer is an emphatic "Yes."

So, although this study confirms that a student's ethnicity, gender, academic preparation, and social and economic background do help explain a dropout decision, it is at this point that the current study departs from most other studies of student dropout. Because it focuses on the

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characteristics and behavior of both <u>students</u> and <u>schools</u>, this study stands to improve our understanding of the dropout phenomena. Examining the linkage between two sorts of phenomena, the decisions that educators make when structuring high schools and the decisions that students make to drop out, the current study demonstrates how the policies of schools influence the dropout decisions of students after taking into account the background characteristics of students and their classmates.

Undoubtedly, some may debate the wisdom of generalizing across organizations as diverse as high schools. Although "there is a sameness about schools just as there is a sameness about post offices or hospitals," beneath this veneer public high schools in this country do vary considerably in their organization and operation.¹⁴ Moreover, this variation is certainly understandable in view of the fact that schools serve children and communities with widely varying needs, interests, resources, talents, and problems. Yet, despite this, I submit that there are patterns within this variation that help explain dropout. Identifying these patterns and seeking to understand the mechanisms that underlie their connection to student attrition can lead to reduced dropout.

Consider several examples of this variation. First, some schools enroll thousands of students while in others students number only in the hundreds. Second, in some schools policy dictates that students be grouped by ability for instruction while in others tracking is less in evidence. Third, in some schools teachers' time is structured to allow them to collaborate while in other schools that is not the case. In situations like these, the policy decisions of educators can have profound consequences for students on the

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margin. Findings from this study will show that, in part, student dropout is a by-product of the organizational structure of schools.

First and foremost, this study concludes that school size plays a critical role in determining the dropout rate in public high schools. Because size has a substantial effect on dropout, it follows that making large schools smaller by reducing total enrollment can help sustain student engagement and decrease attrition. Moreover, the considerable direct effect of size on dropout also supports the argument advanced by some that dividing schools into smaller, semi-autonomous units (ie., schools-within-schools) may lead to reduced student dropout.¹⁵

Secondly, this study suggests that staff cooperation also affects dropout. That is, more collegial relationships among staff appear to promote a greater sense of place, community, and connection that can lead to decreased student dropout.

Finally, there are indications that principal leadership may also influence dropout. In other words, when principals exert less directive leadership, dropout tends to be lower. With less directive leadership may come a shift in the locus of decision-making within a school resulting in wider staff participation in governance and greater teacher autonomy. Less directive principal leadership may thereby lead to an enhanced sense of personal responsibility among staff for individual student success. By broadening the sense of personal accountability for individual student success, less directive principal leadership may improve the odds that more students will stay to graduation. In sum, these three steps - smaller school

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size, greater staff cooperation, and less directive principal leadership - can aid schools in addressing the dropout problem.

The story does not end there, however. There are indications that greater collegiality and less directive principal leadership are the result of smaller school size. In other words, small settings create the kind of environment that allows other conditions to arise, namely greater cooperation and less directive leadership. In smaller settings, because it is easier for staff to work together to the benefit of students, the link between student and school is less tenuous and fragile. In small schools, due to their scale, the unique needs of students on the margin elicit a more flexible response from staff members who enjoy the greater autonomy resulting from less directive principal leadership. And, in small schools, students in jeopardy of dropping out are known by name rather than by number. As a result, they are nourished by the personal attention that comes from dealing with people rather than bureaucracy.

This study demonstrates that the benefits of small school size are greater for non-White than White students. In larger settings, the pupilteacher ratio tends to soar, teachers typically do not have time to learn and attend to the unique needs of individual students, and it becomes increasingly difficult for teachers to know students as individuals. As a result, those who lose are the poor and non-White, the linguisticallydifferent and disadvantaged, namely, those with the greatest need for personal attention. And unfortunately, the problem often is compounded by the predisposition among students in these categories to see themselves as "ineligible for success."¹⁶

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While some of the inferences set forth in this study are bounded and conditional, I have elected to emphasize those that are sturdy and more robust. Through the analysis, certain dominant recurring themes emerged; they quickly became familiar and later proved to be fundamentally stable even after taking into account group membership (e.g., gender and race) and school-type (e.g., socio-economic status of the school, etc.). As we shall see there is no single story here; by contrast many stories might potentially be told. Concentrating on major themes and their variations maintained the technical integrity of the analysis and also helped bring coherence to the story. For this reason, findings that lacked face validity or robustness, while reported, were deemphasized. In similar fashion, when reasonable doubt existed about the extent to which a particular indicator measured what it purported to measure, less importance was attached to it.

Chapter Two locates the subject of high school dropouts in a broader context and illustrates how different bodies of research inform the current study. In particular, this chapter describes the literature on dropouts, on school factors related to dropout, and on a portion of what is popularly known as the "effective schools" research. In greater depth, this chapter examines how the research on dropouts intersects with what is known about school size, tracking, staff coooperation, and teacher collaboration. Then, two particular components of the effective schools research, namely principal leadership and teachers' expectations of students, are considered. Finally, one dropout study in particular is examined. It is this study by Bryk and Thum that provides the framework and point of departure for the present study.

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In Chapter Three key terms are defined, sample data are described, research questions are listed, problems inherent in the analysis of multilevel data are detailed, and analytic methodology is broadly outlined. This chapter also illustrates how *HLM*, the primary analytic tool used in this study, may overcome problems that researchers conducting "school effect" studies such as this one have traditionally faced in the past. In addition, Chapter Three also outlines a priori expectations that gave rise to this study. More specifically, in this chapter I hypothesize that, after adjusting for the background characteristics of students and schools, lower dropout rates will be associated with schools that enroll fewer students, rely less on tracking, are led by more directive principals, report greater cooperation among staff, and indicate there is greater collaboration among teachers.

Chapter Four presents the primary findings related to school effects. In particular, it highlights the prominent role that school enrollment, cooperative adult relations and principal leadership all play in determining student dropout. Relying on a series of fitted plots, this chapter describes how the influence of size, cooperation, and leadership on dropout varies depending on both racial group membership and the background characteristics of the student-body at a school.

Chapter Five presents implications and discussion. A word of caution is in order with respect to causal claims that are made in this final chapter. Because non-experimental data were analyzed in this observational study, I am generally reluctant to speculate about the possibility of causal links between the structures, policies, and practices of schools and the propensity of students who inhabit them to drop out. However, it should be

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acknowledged that, to the extent that this study demonstrates an association between school policies on the one hand and student decisions to leave school early on the other, it gives credence to the claim that altering the organization of schools will lead to reduced dropout. And given the nationally representative dataset that was used for this study, some speculation is warranted and justifiable. However, while in Chapters One through Four I do comment on the relevancy of my findings to the arguments various scholars have advanced, drawing - in every case - a clear distinction between statistical inferences and intellectual inferences, it is only in the final chapter that causality is ascribed.

Appendix A describes in greater detail the construction of variables, the rationale behind my analytic strategy, and the mathematical notation used in this study. Finally, Appendix B presents a more detailed accounting of the results of analyses leading up to, and including, the final model. In a series of tables, Appendix B displays the taxonomy of hierarchical linear models that were estimated. In accompanying text, the parameter estimates that are reported in these tables are interpreted. Attention in this appendix is also devoted to secondary findings involving the relationship between student dropout and tracking, teacher collaboration, and teachers' expectations of students.

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1 Ernest L. Boyer, *High School: A Report on Secondary Education in America*, (New York: Harper and Row, 1983, p. 21), John Chubb, "Making Schools Better: Choice and Educational Improvement," p. 5

2 Considerable controversy surrounds the actual definition of "high school dropout." Depending on how the term is defined, empirical estimates of the rate may differ widely, sometimes "by as much as a factor of five," according to the U.S. Census Bureau. Existing measures that are often used to describe dropout rates include [1] the "graduation ratio," or the ratio of high school graduates in a given school year to the estimated number of seventeen-year-old persons at the start of that school year; [2] the "cohort graduation rate," or a comparison of the number of persons in the 9th grade to the number of high school graduates 4 years late; [3] the "dropout pool," or an estimate of the proportion of persons of a given age who are not in high school; and [4] an estimate (similar to the cohort graduation rate) based on longitudinal data that takes into account how many persons drop out and stay out, how may return to high school, how many receive alternative high school certification, and how many never drop out at all. Of these four dropout definitions, the last is most precise, for the following reasons. The "graduation ratio" definition of dropout fails to take into account those seventeen-year-old persons who may be enrolled in a grade below 12th grade; who may either have graduated or dropped out prior to their 17th birthday; who may have dropped out but then received an alternative high school degree (i.e., GED); or who may later return later to school and receive a degree (i.e., stopouts). The "cohort graduation rate" definition of dropout does not take into account thos who leave school prior to 9th grade. The "dropout pool" definition of dropout ignores those persons who receive alternative certification via GED or night classes, for instance. Definition [4] above, though most expensive, most closely approximates the true dropout rate. It is this definition that is used in the current study. Robert Kominski, "What is the National High School Dropout Rate?," Unpublished paper, U.S. Census Bureau, Population Division, March, 1989, pp. 1-5. See also Patricia A. Williams, "Standardizing School Dropout Measures," Center for Policy Research in Education, Research Report Series RR-003, New Brunswick, 1987, pp. 1-11. See also Mary J. Frase, "Dropout Rates in the United States: 1988," National Center for Education Statistics, Washington, D.C., 1989, p. ix-xi, 11-12, 22). Writing for the U.S. Government, Frase defines dropout using the terms "event rate, status rate, and cohort rate."

³ Kominski reports dropout rates for the years 1971 to 1985 based on the number of high school graduates compared to the number of 9th grade students four years prior (he reasons that dropout rates are the complement of graduation rates). Kominski's 9th grade enrollment figures were based upon data from October Current Population Surveys, 1967-1981. Statistics on graduates were drawn from the U.S. Department of Education's Digest of Education Statistics. See Robert Kominski, "What is the National High School Dropout Rate?," Unpublished paper, U.S. Census Bureau, Population Division, March, 1989, pp. 20. Reporting on the

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change in the dropout rate for the same 1972-1982 period, Howe reports a "five-andone-half percent increase." See Harold Howe II, "Giving Equity a Chance in the Excellence Game" in *NASSP Bulletin*, September 1984, p. 80

On May 3, 1989 Education Week reported that the U.S. Secretary of Education had announced the latest figures on the national high school graduation rate - 71.1% of students graduate from high school. This reinforces a national trend – the U.S. high school graduation rate reached a plateau in the mid-1960s after climbing steadily for nearly two-thirds of a century. See also Gary G. Wehlage and Robert A. Rutter, "Dropping Out: How Much Do Schools Contribute to the Problem?," in School Dropouts: Patterns and Policies, (ed.) Gary Natriello (New York: Teachers College Press, 1987, p. 70) See also National Alliance of Business, "Employment Policies: Looking to the Year 2000," (Washington, D.C.: National Alliance of Business, 1986, p. 2) See also Harold L. Hodgkinson, All One System: Demographics of Education, Kindergarten through Graduate School, (Washington, D.C.: Institute for Educational Leadership, 1985, p. 13) See also Lucie Isenhart and Sue Bechard, "Dropout Prevention," ECS Survey of State Initiatives for Youth At Risk, (Denver: Education Commission of the States, 1987, p. 1), See also Chester E. Finn, Jr., "The High School Dropout Puzzle," The Public Interest, No. 87, spring 1987, p. 5

⁵ "The number of high school graduates from public and private schools is expected to decrease from 2.8 million in 1988-89 to 2.5 million in 1991-92." National Center for Education Statistics, *Projections of Education Statistics to 2000*, (Washington, D.C.: U.S. Department of Education: OERI, December, 1989, p. 5 and p. 51)

6 Richard J. Murnane and Frank Levy, "Testing the 'Mismatch Hypothesis:' Birth Patterns, Education, and the Occupational Structure," (Unpublished grant proposal, 1989).

According to Hamilton, the public school system "does not provide a smooth and rewarding path from school to career for the majority of young people who do not enter higher education . . . The modal transition from school to career for noncollege males in the United States includes a floundering period of two or more years working at low-level jobs in the secondary labor market, interspersed with periods of unemployment." Stephen F. Hamilton, "Raising Standards and Reducing Dropout Rates," *Teachers College Record*, Spring, 1986, pp. 418.

⁸ National Alliance of Business, "Employment Policies: Looking to the Year 2000," (Washington, D.C.: National Alliance of Business, 1986, p. 18)

⁹ Gary G. Wehlage and Robert A. Rutter, "Dropping Out: How Much Do Schools Contribute to the Problem?," in *School Dropouts: Patterns and Policies*, (ed.) Gary Natriello (New York: Teachers College Press, 1987, p. 72)

¹⁰ James S. Catterall, "On the Social Costs of Dropping Out of School," (Stanford: Center for Educational Research at Stanford, 1985, p. 11) The differential for females was about a fifth less, or about \$199,000. These numbers refer to 1981 dollars. From a human capital standpoint, these estimates assume that if dropouts stayed to graduation they would acquire the same average level of skill as non-

-11-

dropouts. Due to the substantial controversy this particular point generates among economists, it is likely these figures represent more speculation than fact. Also see Dougherty, V., "The First Step: Understanding the Data," (Denver: Education Commission of the States, 1987, p. 3)

¹¹ "Dropping out is associated with an array of individual and social costs. For the individual, failure to complete high school is associated with limited occupational and economic prospects, disenfrachisement from sociey and its institutions and substantial loss of personal income over his or her lifetime. For society, premature school-leaving is associated with increased expenditures for government assistance to individual and families, higher rates of crime, and maintenance of costly programs for purposes such as employment and training." Steinberg, L., P. L. Blinde, and K. S. Chan "Dropping Out Among Language Minority Youth" in *Review of Educational Research*, 54 (1984): 113-134

¹² James S. Catterall, "On the Social Costs of Dropping Out of School," (Stanford: Center for Educational Research at Stanford, 1985, p. 24)

¹³ Ronald Edmonds, "Effective Schools for the Urban Poor," in *Educational Leadership*, October, 1979, p. 21

14 Reference to "sameness" is drawn from John I. Goodlad, A Place Called School: Prospects for the Future, (New York: McGraw Hill, 1984, p. 264). In addition, Boyer has remarked; "Every high school is unique; still America's high schools have much in common. The vast majority call themselves 'comprehensive.' They offer under one roof (or several roofs) an academic program for those going on to college, a vocational program for those preparing for jobs, and a general studies program for those still unclear about their goals." Ernest L. Boyer, High School: A Report on Secondary Education in America, (New York: Harper and Row, 1983, p. 20)

15 However, given the design of this study, it is impossible to determine this conclusively.

¹⁶ The phrase "eligible for success" is attributed to Dr. Peter Osario and was cited by Dr. Thomas Windham during a conversation in July, 1989, in Boulder, Colorado.

CHAPTER TWO

BACKGROUND AND CONTEXT

Education, beyond all other devices of human origin, is the great equalizer of the conditions of men -- the balance wheel of the social machinery.

Horace Mann Report to the Massachusetts State Board of Education, 1848

Our progress as a social order [is measured] by our willingness to advance the equity interests of the least among us . . . Inequity in American education derives first and foremost from our failure to educate the children of the poor.¹

Ronald Edmonds "Effective Schools for the Urban Poor," Educational Leadership, 1979

The rising number of school dropouts is the single most dramatic indicator of the degree to which schools are failing children. National Coalition of Advocates for Children Barriers to Excellence: Our Children At Risk, 1985

Equal opportunity and equity should not only mean the right to be included in the system, but the right to stay in the system and be provided the appropriate conditions for learning. Bastian, Fruchter, Gittell, Greer, and Haskins Choosing Equality: The Case for Democratic Schooling, 1986

We call them at-risk. They are the children who, because of the color of their skin, the accent of their speech, the instability of their home, the impoverishment of their families, or the schools they attend, find the deck stacked against them. For them, schools may represent their "only valid passport" from a life of poverty and adversity.² Yet many of our schools are failing those most in need of a boost in life. Though the goal of schools is "to see to it that each individual gets an opportunity to escape from the limitations of the social group in which he was born,"³ because of their organization schools routinely do a poor job of "holding all clientele"

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equally well.^{4, 5} From the perspective of dropouts, Mann's balance wheel is out of alignment.

Of course, we have come a long way since 1908 when Charles William Eliot urged school teachers "to sort pupils by their evident or probable destinies."⁶ Today conventional wisdom suggests a different obligation. "For equality of opportunity to become real, education must enable and encourage children to become more than they thought they could be . . . to empower them to choose, in fact, an improbable destiny."⁷ But in order to accomplish this, schools must improve their ability to educate children with limited "life chances"⁸ and, in the words of Bastian, that means honoring their right to "stay in the system."⁹

For better or worse, Americans often gauge the success of their public schools by their ability to graduate students. But some students, simply by dint of their birth, find the road to graduation steeper, the challenge greater, their life chances fewer; for them a graduation march can be a faint and distant call. For others, though, endowed with different characteristics, the path to successful graduation is far more certain.

However, common sense tells us that high school graduation is not preordained by birth; schools play an important role in determining whether students graduate or not, and schools' success rates vary widely. From some schools nearly all students graduate; from others less than fifty percent do. Certain schools – because of their organization -- are equipped to meet the challenge of educating students of different abilities, talents, and means. In part, as a consequence of their structure, these schools seem better able to graduate even those students most at-risk of dropping out. By

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contrast, other schools -- because they are put together in ways that make them seem less hospitable -- contribute to students' decisions to leave school prematurely.

This study begins with the premise that for schools to be judged effective they must "assure students successful access to the next level of schooling."¹⁰ Moreover, this access should be generally available to all pupils and not only a select few; schools that fail to graduate half their students should be judged as critically as hospitals that kill half their patients.¹¹ This study sets out to determine how high schools should be organized if they wish to minimize student dropout and hence be judged effective.

What is it about some schools that prompts students to drop out, and what is it about other schools that prompts students to stay to graduation? And where can educators interested in high school reform turn for assistance with the dropout problem? One answer may lie in the literature on school size, tracking, and staff collaboration; other promising signs may be found in the effective schools research.¹²

In this chapter, previous research that has been conducted on dropouts themselves is addressed first. Following that, literature that describes how student dropout is related to such school factors as enrollment or size, staff cooperation, and tracking is discussed. Before closing, this chapter considers how the effective schools research dealing with leadership and teachers' expectations of students intersects with the research on dropouts. Finally, throughout the chapter, a priori expectations about the

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hypothesized relationship between dropout and predictors of interest are periodically outlined.

Research on Dropouts

Though many researchers have speculated about the factors that account for early school-leaving, most have focused on the personal characteristics of students. As a result, educators are now better able to identify students at-risk of dropping out of school. In particular, Hispanic, American Indian, and Black students and students of lower socio-economic status are more likely to drop out.¹³ Students who come from single parent homes are almost twice as likely to drop out as students who come from homes with two parents present.¹⁴ Students who frequently switch schools (e.g., those who attend more than four schools during their school career) are more prone to drop out.¹⁵ And early-leavers tend to exhibit lower grades, depressed test scores, higher absenteeism, and more discipline problems than students who do not drop out of high school.¹⁶

But, because this research suggests that students and their families are primarily to blame for the dropout problem, this line of inquiry is limited. Others have pointed out the implicit danger of such a view and have argued that to blame the victims is to shirk responsibility; "The effect of such research may well be to give schools an excuse for their lack of success with the dropout" write Wehlage and Rutter.¹⁷ Edmonds writes, "[My] thesis is that all children are eminently educable and that the behavior of the school is critical in determining the quality of that education."¹⁸

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Despite the obvious shortcomings of such research, to date most investigations into the dropout phenomenon have located the problem predominantly within the individual or the family, not within schools. The relationship between organizational features of high schools and student decisions to drop out has attracted scant attention. In this country, only Wehlage and Rutter and Bryk and Thum have described the relationship between school structure and student decisions to drop out.¹⁹ And aside from Bryk and Thum's exploratory study, until now no one in this country using a nationally representative sample has undertaken a quantitative study of the relationship between policies that secondary schools can adopt and student decisions to drop out.

Thus, while most would agree that more and better support for families that are at-risk would benefit children in danger of dropping out, because Americans are far more willing to alter school rather than family policies, it makes sense to identify how schools might be changed to help support children in jeopardy of dropping out.

Research on School Factors Related to Dropout

For two reasons, any effort to explain student attrition must take into account school characteristics that potentially contribute to the problem.²⁰ First, early termination of schooling is surely not solely attributable to the background characteristics of students or their families; instead a decision to drop out likely results from an interaction between student and school. For even though background characteristics of students of students and their families

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explain a large share of the variation in the probability of dropping out, considerable variation continues to exist from school to school after controlling for the background characteristics of students.²¹ Second, if there are school factors related to dropping out that, unlike student characteristics, lie within the control of policymakers and practitioners, then perhaps schools themselves can develop effective mechanisms for reducing the chance that students will drop out.

How do schools contribute to the dropout problem? We know that "schools are . . . different in the somewhat elusive qualities making up their ambience -- the ways students and teachers relate to one another, the school's orientation to academic concerns, the degree to which students are caught up in peer-group interests other than academic."²² In addition, some organizational features that distinguish one school from another may make a difference in minimizing the dropout rate. In particular, Rutter's work entitled *Fifteen Thousand Hours* and the work of Wehlage *et al.* represent major currents in this research stream. Rutter *et al.* concluded that school structure can make a difference when it comes to student behavior and educational attainment:

Our investigation clearly showed that variations in outcome were systematically and strongly associated with the characteristics of schools as social institutions. *Even after taking into account differences in intake*, secondary schools varied markedly with respect to their pupils' behaviour, attendance, exam success and delinquency. [Our findings suggest] that children benefit from attending schools which set good standards, where the teachers provide good models of behaviour, where they are praised and given responsibility, where the general conditions are good and where the lessons are well conducted. This pattern of findings suggests that there is a group influence resulting from the ethos of

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the school as a social institution. These results carry the strong implication that secondary schools do have an important influence on their pupils' behaviour and attainments.²³

The findings of Wehlage *et al.* suggest that the following four conditions decrease the likelihood of dropping out: a school culture embracing an extended role for teachers, a sense among staff of personal responsibility for student success, a high degree of collegiality and self-governance among staff, and sufficient autonomy to enable teachers to engage in educational entrepreneurship.²⁴ Rumberger reported that "the propensity to drop out is undoubtedly related to a number of underlying factors," primarily race, sex, and family background, but also differences in school organization.²⁵ So, while educational researchers have shed some light on the way schools contribute to the dropout problem, still the reservoir of knowledge about the subject remains decidedly shallow.

Fortunately, the search for answers to the dropout problem does not end here. Educators looking for ways to minimize student dropout have found promise in the literature about the effects of school size, staff cooperation, and tracking on student attrition. I address each in turn.

School size: A host of scholars caution against the debilitating effect that large school size can have upon youngsters. The research on school size suggests that as enrollment grows, so does bureaucracy, alientation, estrangement, and the subsequent chance of dropout. It is said that bureaucracy begins when it no longer is possible to know the names of at least half the people in the organization.²⁶ By this yardstick, the organization of many of our nation's high schools could be classified as

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bureaucratic. To the extent that the label fits, as many have recently suggested it does, one would expect to find high schools relying on bureaucratic methods of management and control (e.g., hierarchies, rulebound, specialization of task, etc.) that can lead to the depersonalization that many educators warn is anathema to students on the brink of dropping out.²⁷ Among others, Sizer speaks to this point; he contends that sustaining student engagement with school depends on what he calls "personalization." He cautions that; "the larger and more complex the hierarchy . . . the more poorly served students [are]." In this same vein he continues, "the trend today is toward greater centralization and thus ever greater scale."²⁸ In response to this trend, Sizer argues that we must treat students as individuals. He questions the wisdom of larger schools where the tendency toward standardization is so much greater than in smaller schools. In larger schools students more easily become passive spectators; in smaller schools it is easier to be an active participant. For this reason Sizer recommends decreasing the scale of schools through what he calls a "schoolwithin-a-school" arrangement.²⁹

Echoing Sizer, Lightfoot writes that "people are more likely to feel a sense of community in small institutions." Continuing, the author describes the preeminent importance of students' "sense of belonging, their view that their individual actions make a difference to the life of the school, and their sense of being visible and accounted for." When describing two high schools, each with more than 2,000 students, Lightfoot remarks; "it was difficult for students to feel a sense of belonging and visibility." However, by contrast, she writes that; "the alternative school within Brookline High

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('The School Within a School') that chooses its one hundred students, feels very much like a community. 'This feels more like home than home!' claimed one enthusiastic junior." Affirming Sizer, Lightfoot reasons that "large schools need to find ways of creating smaller communities within them - places of attachment for subgroups of students," otherwise students will lack a sense of place at school.³⁰

In similar fashion and for similar reasons, Johnson cautions against larger schools. "In good schools . . . schools-within-schools" would arise, Johnson writes.³¹

Goodlad, too, has recommended breaking high schools into smaller units. Offering some historical perspective, Goodlad writes, "Conant suggested that a high school with 100 graduating seniors would be sufficiently large to facilitate his recommended curriculum . . . Community leaders will argue, understandably, that little can be done to create small senior high schools, given existing facilities. Here is where creative reorganization can achieve at least some of the advantages of smaller schools. The idea of creating schools within schools is not new."³² Later he observed that "it is not impossible to have a good large school; it simply is more difficult."³³

On this subject, Natriello has observed that "small schools of 300-400 students . . . are viewed as having fewer disorders, higher achievement, higher rates of student participation in extracurricular activities, and feelings of satisfaction with school life. . . Small schools are more personalized or less anonymous, have a more homogeneous student body, have more flexible schedules, and have smaller classes."³⁴

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Howe has written that pupils are more likely to remain anonymous in a larger institution. In larger schools students may feel like they are being treated like a number. By contrast, in smaller schools students may be known by name, connections may be made, and students may feel that they are a part of a community and that adults genuinely care about them.³⁵

There are other indications that high school size appears to be associated with efficacy. Gregory and Smith contend that the sense of community, characteristic of small high schools, may counteract the alienation and isolation that typify larger schools and contribute to high student dropout rates.³⁶ The work of Bryk and Driscoll supports this conclusion.³⁷ In this same vein, Sarason writes that

consolidation of high schools has given rise to considerable controversy. On the one hand, its supporters claim that students benefit through better and more varied curriculums, better classifications, better facilities, especially in such subjects as science and music, contact with better teachers, opportunities to participate in better and more varied extracurricular activities, wider social opportunities and experiences and more regular attendance as a result of being, in some cases, transported door to door . . . On the other hand, the opponents of consolidation claim that students lose through increased breaks in their education, loss of contact with local teachers who know the community and the families as well, spending time on commuting which might be spent with greater profit on other activities, and fewer oppportunities to participate in the control of their school.³⁸

Others point out that large schools typically offer a "less personalized environment, [and] the anonymity and inflexibility of large schools can be difficult for many students. Interactions with adults in the school are more formal and fragmented, [especially] at a time in their lives when they need consistent attention from adults." By contrast, "small schools can offer

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personal relationships [with adults] that are more supportive than those found in large high schools."³⁹

All this suggests that one would expect to find lower dropout rates in schools with fewer enrolled students.

Cooperation, collaboration, and collegiality: Cipollone maintains that collegiality may influence dropout because

for students, the implications of such working relationships are great. With teachers and staff working together, there is more of a chance that students can find, on a given day, the support to help them ride out a particular storm. When this happens, allegiances are fostered, not only with individuals, but with the school. School can become a place where 'somebody cares' and turn into a more viable option than the world outside.⁴⁰

Sarason writes that "although a school is one of the most densely populated settings on earth, 'teaching is a lonely profession.' It is not the loneliness of solitude but a feeling compounded of isolation, frustration, and the pressure to appear competent to handle any and all problems. It is a sense of loneliness that gnaws, debilitates, feeds on itself, and frequently leads to a sense of stagnation."⁴¹ By extension, one might add, it is a loneliness that can erode student engagement and result in increased student dropout.

Rosenholtz and Kyle argue that students on the verge of dropping out may benefit when teachers collaborate and share the "fund" of knowledge that they accumulate over time. "In the most effective schools teachers collaborate . . . In collaborative settings, teachers believe in the importance of continuous improvement and they view that improvement as a collective

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rather than solo undertaking . . . Because collaborative conditions give rise to greater experimentation, and greater experimentation results in better teaching, the rewards of teaching are increased. Specifically, teachers who collaborate come to believe that difficult students are capable of learning and that they as teachers can reach these students."⁴²

As mentioned, Wehlage and Rutter demonstrate that schools that minimize attrition in part do so by creating a supportive community in which students feel they belong to the school and adults care about them.

Sizer points out that "after home, school is the most dominant institution in an adolescent's life."⁴³ He argues that adolescents are more prone to exit school early when it leaves them without a feeling of community, of belonging. In one form or another, others, including Little, Bryk and Driscoll, Johnson, and Comer have accentuated the importance of collegiality, collaboration, and cooperation and their implications for dropouts.⁴⁴ The theme running through this literature is that cooperation can lead to a friendly, nurturing, supportive environment where teachers are more likely to communicate with each other about student progress. When students sense that they are valued, validated, affirmed, and cared for by adults, they tend to drop out less.

All this suggests that one would expect to find lower dropout rates in schools with more cooperative staff relations.

Tracking: Rosenbaum points out that the "two most common forms of tracking have been grouping by ability and grouping by curriculum."⁴⁵ The type of tracking I am measuring deals with grouping by curriculum or what

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others have called "curricular placement."⁴⁶ From the standpoint of dropouts, the literature on the corrosive effects of tracking is well documented. The College Board describes how,

a multilayered tracking system can lead to . . . despair among kids on the bottom level . . . There is, for example, a strong correlation between curriculum track and the factors of socio-economic status and parental education. Sophomores who reported that they were assigned to a curriculum tended to be minorities from low socioeconomic status background with parents who have not completed high school. These students are most often assigned to the general curriculum. Three-fifths of the students whose parents were college graduates were enrolled in the academic program; only 22 percent of those whose parents did not complete high school were enrolled in the academic program. Three-fifths of students from high socio-economic status families reported being in the academic (as opposed to general or vocational) program; only one-fifth of students from low socio-economic status families were enrolled in the academic program.⁴⁷

Persell reports that "tracking appears to reduce the self-esteem of many students . . . Tracking may socialize the children exposed to it so that those in lower tracks come to feel that they deserve less from life."⁴⁸ Moses writes that "young people feel the need to be as similar to their peers as possible. Separating adolescents from their peers . . . aggravates the anxiety that accompanies adolescents' development" and thus can lead to increased dropout.⁴⁹ Corroborating what others, including Oakes, have found, he continues, "Differentiating students (e.g., tracking or streaming) harms those who are disadvantaged or placed in the lower track."⁵⁰ Sizer points out that "adolescents . . . are largely tracked by social class and gender" and that those in lower tracks tend to drop out at higher rates.⁵¹ Moreover, research conducted in the public schools in Cambridge, Massachusetts indicates that

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once a student enters a particular track the chances are slim that a change will be made later.⁵²

Taken as a whole this research leads to the expectation that dropout may be greater in schools that rely more heavily on tracking.

Effective Schools Research

Over the last ten years, the body of literature on effective schools has helped educators understand how student achievement can be promoted in elementary schools. Encouraged by these signs, a variety of these effective schools strategies have recently been introduced in high schools. More than half the nation's school districts report that they have implemented, or are planning to implement, one or more of the effective school strategies, and almost 40 percent of urban high schools now report they already have done so.⁵³

Yet, despite the fact that the effective schools research has helped educators understand how to promote student achievement in elementary schools, little is known about the impact of such measures on high schools in general and on the high school dropout rate in particular. When school effectiveness programs are transferred from elementary schools and applied to high schools, what effect will they have on the chance that students will drop out? There appears to be no clear answer to this question.

Although previous research on dropouts has sought to identify who actually drops out of high school, just knowing how many, and which, students drop out is not enough; there is a compelling need to understand

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how schools contribute to the dropout problem. To the potential dropout, do effective schools strategies, like vigorous leadership by the principal, make high schools more or less hospitable places for students on the margin? How do effective schools strategies influence the attrition rate in U.S. public high schools, and which strategies make a difference in sustaining student engagement? If adopting effective schools strategies, like directive leadership by the principal and high expectations by staff of students, change schools in ways that have important consequences for potential dropouts, then learning more about these mechanisms may lead to policies and programs that better capitalize on our nation's human talent. On the other hand, if it turns out that vigorous leadership by the principal and higher expectations by teachers "raises the high jump bar" in the same way that increased graduation requirements have, then these strategies may influence the stay-or-leave decisions of students on the margin in a similar way, thus "pushing or forcing them out" of the system.⁵⁴ To the extent that this scenario proves true, it may call into question the wisdom of applying these strategies without also providing adequate countervailing mechanisms that support students on the verge of dropping out.

I begin this review of previous research on effective schools by showing how the work of Coleman *et al.* and Jencks *et al.* set the stage for the effective schools movement. By defining equality of opportunity as a function of equality of outputs, the studies by Coleman and Jencks helped to shift researchers' attention from input indicators of quality to output indicators of quality. This survey of the literature on effective schools ends with a description of Edmonds' contribution to the research base. This does

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not constitute an exhaustive survey of the effective schools' literature. Instead, this section highlights portions of the literature that directly inform this study. In particular, it focuses on two organizational aspects of high schools that seem to make a difference in reducing the likelihood of dropping out, namely principals' leadership and teachers' expectations of students.⁵⁵

Roughly 20 years ago two documents were published that set the stage for the effective schools movement. The first, *Equality of Educational Opportunity*, and the second, *Inequality: A Reassessment of the Effect of Family and Schooling in America*, redefined the dialog about the purpose of American education and the effect of schools on student achievement. Asking whether schools make a difference, both concluded that, in the main, schools' influence on achievement paled in comparison to the influence of home and family.⁵⁶ In other words, "the home is more important than the school."⁵⁷

However, Coleman's study is noteworthy for a second reason, namely because it left an indelible impression on the collective consciousness of the American public by supporting the notion of equality of opportunity based on equality of outcome. Affirming the spirit of Dewey, Coleman argued that the measure of a school's success was in its ability to free children from the constraints of their social origin.⁵⁸

Challenged by the finding that "schools are not very important in determining student achievement," Edmonds and others conducted a series of studies of less-advantaged, urban elementary schools where low-income and minority children succeeded at levels equal to, or greater than, their

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more advantaged peers.⁵⁹ One of the more important contributions of the effective schools research to the development of schools, as we now know them, was the fresh focus it brought to the school reform discussion. Assembling a set of indicators that allowed educators to identify schools more likely to demonstrate high achievement, the effective schools researchers renewed educators' faith in the ability of schools to make a difference in student achievement. Out of the effective schools research emerged five elements associated with higher than anticipated student achievement:

- Vigorous, directive instructional leadership from the principal
- Teachers' expectations that all students can learn
- An emphasis on basics
- A safe positive and orderly school climate
- Frequent assessment of student performance.⁶⁰

These attributes of the effective elementary school, first reported by Weber but popularized by Edmonds, later came to be closely identified with the effective schools movement.⁶¹ Of these five, only the first two (leadership by the principal and the academic expectations teachers have of students) are included in this investigation. The other three were excluded, primarily due to weakly-worded items on the survey instrument that made it impossible to be certain what was actually being measured.

In recent years, high school educators on the lookout for ways to stem the flow of dropouts from schools have increasingly turned to the effective schools research. Reports indicate a growing trend in this direction; more than half of the nation's school districts have implemented, or are planning

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to adopt, strategies based on effective schools research. However, while recent high school reform initiatives have used the effective schools research as a beacon, there are indications that the rationale for doing so is suspect. Despite evidence that effective school strategies exert a positive influence on student achievement at the <u>elementary</u> level, there is an absence of proof that these strategies are successful in affecting <u>high school</u> outcomes.

Clearly elementary and secondary schools differ greatly in character, and important dissimilarities distinguish the two types of schools. Secondary schools tend to group students into vocational, general, and academic tracks; they tend to be more content-oriented than child-oriented; and there tends to be a wide range of scheduling choices available to students. By contrast, elementary schools tend not to group students into vocational, general, and academic tracks; they tend to be more child-oriented than content oriented; and there tends to be a narrow range of scheduling choices available to students. As a result, the climates of secondary and elementary schools are disparate.⁶² Consequently, many of the lessons from the effective schools research that apply to elementary schools may not neatly transfer to secondary schools. At the same time, however, there are indications that some aspects of effective school practices do appear to apply to high schools. For instance, "the principal's influence over classroom management," a measure of instructional leadership, appears to be an important predictor of student achievement in high school.63

Moreover, though findings from the effective schools research are useful to elementary educators interested in promoting <u>achievement</u>, to

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secondary educators interested in minimizing <u>attrition</u>, there is reason to question whether the findings may be universally adopted as a template for high school reform. When one views the effective schools research from the perspective of dropout, there are grounds for debating the extent to which the findings may be generalized. On the basis of both design and substance, one could question whether findings from this research can or should be applied to high schools. From the aspect of design, for instance, (1) the research measured status not change; (2) it relied on non-randomly drawn samples with the contingent likelihood of selection effects; and (3) it emphasized outliers, or those schools at the extremes of the achievement distribution thereby overlooking important information from the large number of schools in the average range. From a substantive standpoint, (1) the effective schools research dealt almost exclusively with urban elementary schools; and (2) it investigated achievement not dropping out. This suggests that, although the effective schools research did indicate that some school structures are related to student achievement, caution should be used in generalizing findings from effective schools research beyond urban elementary schools. And, at least one important issue remains unresolved, that is, whether students in schools employing effective school strategies drop out at lower rates than students in schools that do not.

The current study is designed to shed light on these issues by exploring the relationship between student dropout and two factors identified by the effective schools research, teachers' expectations and principals' leadership.

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Academic expectations that teachers have of students: School is a place "where students receive important daily messages about their competence and worth from the adults who are charged with serving them." In describing the influence that a school's "culture of expectations" can have on students, the College Entrance Examination Board writes that "school is where children test early messages regarding winners and losers."64 Persell describes how "teachers are more likely to hold negative expectations for lower-class and minority children than for middle-class and white children."⁶⁵ Various authors including Raudenbush have documented the influence of student characteristics on teacher expectations. "Class background, as well as race [determine] teachers' perceptions of and behaviors toward children. Teachers often adjust educational goals, teach different material, and reward or punish behavior differently by class as well as race."66 Moore and Davenport write that "students at risk are disproportionately concentrated in schools . . . [that] characteristically exhibit low levels of expectations for their students."⁶⁷ Some have illustrated how "teacher expectations are affected by tracking which [is itself] biased against lower-class and minority children. Given the less powerful position of lower-class and minority children in society, they appear to be more influenced [than upper-class and white children] by teacher expectations."⁶⁸ Finally, others state that "expectancy as a belief or prediction of children's success or failure has a real effect on how they do."⁶⁹ In sum, this research supports the speculation that dropout will be lower when teachers' expectations of students' abilities are higher.

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Leadership: In this country, the research base describing the effect of high school leadership on student dropout is remarkably thin. A comprehensive review of the literature on high school organization and its effect on students reports that,

Issues of leadership [as they pertain to dropout] are especially complex in secondary schools because of [the problems that] larger school size and diverse academic purposes often present in a single school. How the leadership function is actually addressed at this level has been little studied. Most of the recent research [on principal leadership] has focused on instructional leadership in elementary school. But high schools are larger, more complex organizations [than elementary schools] . . . Further, others [besides the principal], such as the department head or 'master teacher,' may share the leadership function within a high school.⁷⁰

Nevertheless, despite an absence of research investigating the effect of high school leadership on student dropout, there is a considerable body of work linking strong principal leadership both to student achievement and effective school functioning.⁷¹ Much of this research has emphasized the key role that principals play in shaping the goals of a school and focusing teachers on a common sense of mission. This line of inquiry has focused on the community aspects of schools, and, as a result, it "tends to emphasize the cultural dimensions of administration, the importance of personal actions of the school head, and how these influence the relations within the institution."⁷² A second view of principal leadership also emerges, however. This view casts principal leadership in bureaucratic terms and stresses the "managerial aspects of administration concentrating on rules,"

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policies and procedures, rather than situations, personalities, and an historically accrued set of norms and understandings."⁷³

Exploring how leadership influences dropout, recent research by Cipollone suggests that principals are an "important factor" in determining the success a school experiences in minimizing student dropout. Where the rate of dropout was lower than expected, Cipollone reports that principals "had a vision of making their school a better place for students."⁷⁴ In this regard, Goodlad also describes how school effectiveness may be traced to principal leadership.⁷⁵ In sum, this leads to the hypothesis that dropout rates will be lower when principal leadership is more vigorous.

In the following chapter issues related to design and research are presented and discussed. Key terms are defined, sample data are described, research questions are listed, and the analytic methodology is briefly outlined. Finally, Chapter Three describes how the methodology used in this study resolves problems that may arise in the analysis of multi-level data.

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¹ "Education in this context refers to acquisition of those skills that assure pupils successful access to the next level of schooling." Ronald Edmonds, "Effective Schools for the Urban Poor" in *Educational Leadership*, Vol. 37, No. 1, p. 15.

2 Quotation attributed to President Lyndon Baines Johnson upon the 1965 signing of the Elementary and Secondary Education Act, from B. D. Stickney and L. R. Marcus, "Education and the Disadvantaged 20 Years Later," *Phi Delta Kappan*, 1985

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3 John Dewey, Democracy and Education (New York: Free Press, 1966, p.

⁴ When referring to "organization" I mean: (1) grouping and tracking practices which may institutionalize a set of lower expectations for disadvantaged students and deprive them of more able teachers and more challenging coursework; (2) curriculum and instruction practices which, because of their fragmented nature and abstract material, may fail to provide students with the problem-solving skills required by the workplace; and (3) school management practices which may ossify bureaucratic, top-down decision-making and discount the legitimacy of more decentralized approaches to school-site management. Education Commission of the States, "Access to Knowledge: Removing School Barriers to Learning" (Denver: Education Commission of the States, 1988, p. 7)

⁵ Arthur G. Powell, Eleanor Farrar, and David K. Cohen, *The Shopping Mall High School: Winners and Losers in the Educational Marketplace* (Boston: Houghton Mifflin, 1985, p. 253), See also Harold Howe II, "Giving Equity a Chance in the Excellence Game," in *NASSP Bulletin*, September 1984, p. 80

⁶ Charles W. Eliot, "Industrial Education as an Essential Factor in Our Natinoal Prosperity, (Cambridge: Harvard University, 1908, p. 12-13) Also see Marvin Lazerson and W. Norton Grubb, eds. *American Education and Vocationalism*. (New York: Teachers College Press, 1974.)

⁷ Patricia A. Graham, "Schools: Cacophony about Practice, Silence about Purpose." *Daedalus* 113, no. 4 (Fall 1984): 29-57

⁸ William Julius Wilson, The Truly Disadvantaged: The Inner City, the Underclass and Public Policy, (Chicago: University of Chicago Press, 1987, p. 115-116)

⁹ Ann Bastian, Norm Fruchter, Marilyn Gittell, Colin Greer, and Kenneth Haskins, *Choosing Equality: The Case for Democratic Schooling*, (Philadephia: Temple University Press, 1986, p. 30)

10 Ronald Edmonds, "Effective Schools for the Urban Poor," *Educational Leadership*, Vol. 37, No. 1, p. 15.

¹¹ Harold Howe II, "Giving Equity a Chance in the Excellence Game," in *NASSP Bulletin*, September 1984, p. 80-81

¹² Hereafter, when referring to effective schools, these terms will be used interchangeably: school effectiveness programs, effective school strategies; effective school measures; effective school initiatives; and effective school programs. All derive from effective schools research, a body of literature based primarily on studies of less advantaged, urban elementary schools where low-income and minority children succeed at levels equal to or greater than their more advantaged peers. All refer to school-based initiatives designed to improve the academic achievement of students by improving school characteristics associated with high student achievement. For the purpose of this study, I have narrowed effective school strategies to include the following: (1) strong leadership; (2) emphasis on basics and higher-order thinking skills; (3) safe and orderly environment; (4) the expectation that all children can learn; and (5) frequent monitoring of student performance.

¹³ By contrast, findings from the current study will show that once one adjusts for the socio-economic status of students and their classmates, Hispanic and Black students are less likely than their White counterparts to drop out. However, as page 149 in Appendix B points out, Hispanic and Black students are more likely than their White counterparts to drop out, once one does not control for socioeconomic status of students and their classmates.

¹⁴ Mary J. Frase, "Dropout Rates in the United States: 1988" (Washington, D.C.: National Center for Education Statistics, 1989, page xi-xii)

¹⁵ Ridge Hammons and Miles Olson, *NASSP Bulletin*, (September, 1988) For students, Hammons and Olson found that within-district, non-promotional transfer was the single most powerful predictor of dropping out for both sexes and all ethnic groups. They found that "stability seems a very important factor in educational success, even more important than reading or math achievement test scores." As reported by Gerald W. Bracey, "Moving Around and Dropping Out," *Phi Delta Kappan*, January, 1989, p. 407

16 Studies include Bachman, G., Green, S., and Wirtanen, I., Youth in Transition: Dropping Out - Problem or Symptom? (Vol. 3, Ann Arbor: University of Michigan Institute for Social Research, 1971), Children's Defense Fund, Children Out of School in America, (Cambridge: Children's Defense Fund, 1974), Rumberger, R., "Dropping Out of High School: The Influence of Race, Sex, and Family Background," American Educational Research Journal, (20, p. 199-220, 1983), Pallas, A., The Determinants of High School Dropouts, (Unpublished doctoral dissertation, Baltimore: Johns Hopkins University, 1984), Coombs, J. and Cooley, W., "Dropouts in High School and After High School, American Educational Research Journal, (5, p. 343-364, 1986), Ekstrom, R., Goertz, M., Pollack, J., and Rock, D., "Who Drops Out of High School and Why? Findings from a National Study," In Gary Natriello (Ed.), School Dropouts: Patterns and Policies, (New York: Teachers College Press, 1986), National Center for Education Statistics, Projections of Education Statistics to 2000, (Washington, D.C.: U.S. Department of Education: OERI, December, 1989), Harold L. Hodgkinson, All One System: Demographics of Education, Kindergarten through Graduate School, (Washington, D.C.: Institute for Educational Leadership, 1985, p. 11)

¹⁷ Gary G. Wehlage and Robert A. Rutter, "Dropping Out: How Much Do Schools Contribute to the Problem?," in *School Dropouts: Patterns and Policies*, ed. Gary Natriello (New York: Teachers College Press, 1987, p. 72)

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¹⁸ Ronald Edmonds, "Effective Schools for the Urban Poor" in *Educational Leadership*, Vol. 37, No. 1, p. 17. In this same vein, Persell writes, "Educational structures and practices most often take their toll on . . . minority or lower-class students . . . The explanations for school failure which are offered invariably blame the child. Individual characteristics of children may of course contribute, but the potential role of educational systems for educational outcomes must always be considered. The part schools play cannot be understood fully without considering how education is related to social inequality." Caroline Hodges Persell, *Education and Inequality: The Roots and Results of Stratification in America's Schools*, (London: Free Press, 1977, p. 152)

¹⁹ Gary G. Wehlage and Robert A. Rutter, "Dropping Out: How Much Do Schools Contribute to the Problem?," in *School Dropouts: Patterns and Policies*, ed. Gary Natriello (New York: Teachers College Press, 1987). Anthony S. Bryk and Yeow Meng Thum, "The Effects of High School Organization on Dropping Out: An Exploratory Investigation," *American Educational Research Journal*, Fall 1989, Vol. 26, No. 3, p. 353-383.

²⁰ In this context, "school characteristics" include curriculum, climate, and staffing patterns.

21 Russell W. Rumberger, "Dropping Out of High School: The Influence of Race, Sex, and Family Background," *American Educational Research Journal*, Vol. 20, No. 2, Summer 1983, p. 201-203)

22 John I. Goodlad, A Place Called School: Prospects for the Future (New York: McGraw Hill, 1984, p. 247)

²³ Michael Rutter, Barbara Maughan, Peter Mortimore, and Janet Ouston, *Fifteen Thousand Hours: Secondary Schools and Their Effects on Children*, (Cambridge: Harvard University Press, 1979, p. 204-205)

²⁴ Gary G. Wehlage and Robert A. Rutter, "Dropping Out: How Much Do Schools Contribute to the Problem?," in *School Dropouts: Patterns and Policies*, ed. Gary Nattriello (New York: Teachers College Press, 1987)

²⁵ Russell W. Rumberger, "Dropping Out of High School: The Influence of Race, Sex, and Family Background," *American Educational Research Journal*, Vol. 20, No. 2, Summer 1983, p. 210-211)

²⁶ Remark attributed to Michael Lipsky, in a January 1988 conversation at the Harvard Graduate School of Education

²⁷ Susan Moore Johnson, *Teachers At Work: Achieving Success in Our Schools*, (New York: Basic Books, 1990, p. 111-114) and John E. Chubb and Terry M. Moe, *Politics, Markets, and America's Schools* (Washington, D.C.: Brookings Institution, 1990, p. 104-105, 143-144, 160)

²⁸ Theodore R. Sizer, Horace's Compromise: The Dilemma of the American High School, (Boston: Houghton Mifflin, 1984, p. 67, 209, 234-235)

²⁹ Theodore R. Sizer, Horace's Compromise: The Dilemma of the American High School, (Boston: Houghton Mifflin, 1984, p. 67, 119, 165, 234-235)

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³⁰ Sara Lawrence Lightfoot, *The Good High School: Portraits of Character* and Culture, (New York: Basic Books, 1983, p. 348)

³¹ Susan Moore Johnson, Teachers At Work: Achieving Success in Our Schools, (New York: Basic Books, 1990, p. 330)

³² John I. Goodlad, A Place Called School: Prospects for the Future (New York: McGraw Hill, 1984, p. 310)

³³ John I. Goodlad, A Place Called School: Prospects for the Future (New York: McGraw Hill, 1984, p. 309, 319)

34 Edward McDill, Gary Natriello, and Aaron M. Pallas, "A Population at Risk: Potential Consequences of Tougher School Standards for Student Dropouts," in *School Dropouts: Patterns and Policies*, ed. Gary Natriello (New York: Teachers College Press, 1987, p. 125)

³⁵ Harold Howe II, "Giving Equity a Chance in the Excellence Game" in *NASSP Bulletin*, September 1984, p. 85

³⁶ Thomas B. Gregory and Gerald R. Smith, *High Schools as Communities*, (Bloomington: Phi Delta Kappan Educational Foundation, 1987, p. 132-133, p. 141)

³⁷ Anthony S. Bryk and Mary E. Driscoll, "High School as Community: Contextual Influences and Consequences for Students and Teachers," (Madison: Wisconsin Center for Education Research, 1988, p. 28-33)

³⁸ Seymour Sarason, The Culture of School and the Problem of Change, (Boston: Allyn and Bacon, 1982, p. 129) In this passage Sarason is largely describing the findings from a previous study by Roger G. Barker and Paul V. Gump, entitled Big School, Small School: High School Size and Student Behavior, (Stanford: Stanford University Press, 1964)

³⁹ College Entrance Examination Board, "Keeping the Options Open: Interim Report of the Commission on Precollege Guidance and Counseling," Harold Howe II (ed.), (New York: CEEB, 1986, p. 7, 23)

⁴⁰ Anthony Cipollone, "Trying to Beat the Odds; A Study of Comprehensive High Schools and At-Risk Students," (Unpublished dissertation, Harvard Graduate School of Education, 1990, p. 132)

⁴¹ Seymour Sarason, The Culture of School and the Problem of Change, (Boston: Allyn and Bacon, 1982, p. 276)

⁴² Susan J. Rosenholtz and Susan J. Kyle "Teacher Isolation: Barrier to Professionalism" in *American Educator*, Winter 1984, (p. 14-15)

43 Theodore R. Sizer, Horace's Compromise: The Dilemma of the American High School, (Boston: Houghton Mifflin, 1984, p. 51)

⁴⁴ Susan Moore Johnson, Teachers At Work: Achieving Success in Our Schools, (New York: Basic Books, 1990, p. 89, 92-94, 101-102), Theodore R. Sizer, Horace's Compromise: The Dilemma of the American High School, (Boston: Houghton Mifflin, 1984, p. 51), James P. Comer, Maggie's American Dream: The Life and Times of a Black Family, (New York: NAL Books, 1988), Anthony S. Bryk and Mary Erina Driscoll, "The High School as Community: Contextual Influences and Consequences for Students and Teachers," (Unpublished paper, Madison:

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National Center on Effective Secondary Schools, 1988), and Judith Warren Little, "Teacher Isolation: Barrier to Professionalism," *American Educator*, (Winter, 1984, p. 10-15)

⁴⁵ James E. Rosenbaum, "Social Implications of Educational Grouping" in *Review of Research in Education*, Volume 8, 1980, (eds.) David C. Berliner, p. 362

⁴⁶ The College Entrance Examination Board, "Keeping the Options Open: Interim Report of the Commission on Precollege Guidance and Counseling," Harold Howe II (ed.), (New York: CEEB, 1986, p. 8)

⁴⁷ The College Entrance Examination Board, "Keeping the Options Open: Interim Report of the Commission on Precollege Guidance and Counseling," Harold Howe II (ed.), (New York: CEEB, 1986, p. 25, 27)

⁴⁸ Caroline Hodges Persell, Education and Inequality: The Roots and Results of Stratification in America's Schools, (London: Free Press, 1977, p. 98)

⁴⁹ Robert P. Moses *et al.*, "The Algebra Project: Organizing in the Spirit of Ella, *Harvard Educational Review*, (Volume 59, Number 4, 1989, p. 427)

⁵⁰ Robert P. Moses *et al.*, "The Algebra Project: Organizing in the Spirit of Ella, *Harvard Educational Review*, (Volume 59, Number 4, 1989, p 441)

⁵¹ Theodore R. Sizer, Horace's Compromise: The Dilemma of the American High School, (Boston: Houghton Mifflin, 1984, p. 220)

⁵² Conversation with Robert Peterkin, Superintendent of Schools in Milwaukee Wisconsin, February, 1990

⁵³ According to a recent Government Accounting Office report, "[a]bout 41 percent or 6,500 of the nation's school districts had effective schools programs in operation in approximately 38,000 elementary and secondary schools during school year 1987-88... Over half of these had effective schools programs that were first implementred during school years 1986-97 or 1987-88. An additional 17 percent or about 2,600 of the nation's districts have plans to implement effective schools programs during school years 1988-89 or 1989-90." Government Accounting Office. "Effective Schools Programs: Their Extent and Characteristics," (Washington, D.C.: September, 1989, p. 2)

⁵⁴ The phrase "raises the high jump bar" has been attributed to former Commissioner of Education for Massachusetts, John Lawson, who used it in this context; in essence he said that if people are having trouble getting over a bar set at four feet, what good does it do to raise the bar to four feet nine inches? The more sensible thing to do, he suggested, was to coach them on their technique, help them with their motivation. The notion that increasing graduation requirements "pushes" or "forces" students out has been described by numerous writers, including: Edward McDill, Gary Natriello, and Aaron M. Pallas, "A Population at Risk: Potential Consequences of Tougher School Standards for Student Dropouts," in *School Dropouts: Patterns and Policies*, ed. Gary Natriello (New York: Teachers College Press, 1987, p. 135-181); Stephen F. Hamilton, "Raising Standards and Reducing Dropout Rates" in *School Dropouts: Patterns and Policies*, (ed.) Gary Natriello (New York: Teachers College Press, 1987, p. 410-429); James S. Catterall, "Standards and School Dropouts: A National Study of Tests Required for High

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School Graduation, Journal of Education, (Volume 98, No. 1, November, 1989, p. 1-34); Harold Howe II, "Giving Equity a Chance in the Excellence Game" in NASSP Bulletin, September 1984, p. 84; The College Entrance Examination Board, "Keeping the Options Open: Interim Report of the Commission on Precollege Guidance and Counseling," Harold Howe II (ed.), (New York: CEEB, 1986, p. 8, 29); and Gary Orfield and Carole Ashkinaze *et al.*, "The Closing Door: Conservative Policy and Shrinking Black Opportunity in Metropolitan Atlanta," (Chicago: University of Chicago Press, 1989, p. 3)

⁵⁵ Throughout this section, I loosely define "school effectiveness" in terms of higher than expected average student achievement.

56 Dubbed the Coleman Report, Equality of Educational Opportunity was noteworthy for the controversy it engendered. In particular, the conclusion commonly drawn from the study was that a child's educational attainment was largely independent of the schooling a child received and that family and peers were considerably more important in determining a child's achievement than were school resources. (Eric A. Hanushek, "The Impact of Differential Expenditures on School Performance," Educational Researcher, Vol. 18, No. 4, May 1989, p. 45) But though popularly believed that the study's real conclusion was that "schools don't matter, families do," others have pointed out that the analytic techniques and data used by Coleman et. al did not support this conclusion. (Richard J. Murnane, "Comparisons of Private and Public Schools: What Can We Learn?," Private Education: Studies in Choice and Public Policy, (New York: Oxford University Press, 1986, p. 161) and Richard J. Murnane, "Evidence, Analysis, and Unanswered Questions," Harvard Educational Review, Vol. 51, No. 4, November 1981, p. 484) Jencks, reanalyzing the Coleman's data as well as other statistical evidence, reported that "equalizing the quality of high schools would reduce cognitive inequality by one percent or less." Jencks, C., Smith, M., Acland, H., Bane, M., Cohen, D., Gintis, H., Heyns, B., and Michelson, S., Inequality: A Reassessment of the Effects of Family and Schooling in America, (New York: Basic Books, 1972)

⁵⁷ Stephen P. Heyneman and William A. Loxley, "The Effect of Primary School Quality on Academic Achievement across Twenty-nine High- and Low-Income Countries," in *American Journal of Sociology* 88, No. 6 (1983): 1162-1194

⁵⁸ Coleman, J., Campbell, E., Hobson, C., McPartland, J., Mood, A., Weinfeld, F., and York, R., *Equality of Educational Opportunity* (Washington D.C.: U.S. Government Printing Office, 1966)

⁵⁹ Eric A. Hanushek, "The Impact of Differential Expenditures on School Performance," *Educational Researcher*, Vol. 18, No. 4, May 1989, p. 45

⁶⁰ Ronald Edmonds, "Effective Schools for the Urban Poor," *Educational Leadership*, Vol. 37, No. 1, p. 20-23.

61 G. Weber, Inner-City Children Can Be Taught to Read: Four Successful Schools (Washington, D.C.: Council for Basic Education, 1971), Ronald Edmonds, "Effective Schools for the Urban Poor," Educational Leadership, Vol. 37, No. 1, p. 16-17, p. 22) Edmonds, R. and Frederickson, J., Search for Effective Schools: The Identification and Analysis of City Schools that are Instructionally Effective for Poor

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Children, (Cambridge: Harvard University Center for Urban Studies, 1978), Using the Coleman data, Edmonds and Frederickson discovered that although studentlevel characteristics (especially social class) are strongly related to student achievement, some school-level factors do predict school effectiveness. Among others, these factors include heterogenous grouping of students, parent involvement in schools, and students' educational aspirations.

⁶² Neufeld *et al.* reported that these dissimilarities erode our ability to transfer research findings from elementary schools to secondary schools. Barbara Neufeld, Eleanor Farrar, and Matthew B. Miles, "A Review of the Effective Schools Literature: the Message for Secondary Schools," (Washington D.C.: Unpublished paper solicited by the National Commission on Excellence in Education, 1983)

63 William A. Firestone and Robert E. Herriot, "Effective Schools: Do Elementary Prescriptions Fit Secondary Schools?," (Philadelphia: Research for Better Schools, 1982, p. 6)

64 College Entrance Examination Board, "Keeping the Options Open: Interim Report of the Commission on Precollege Guidance and Counseling," Harold Howe II (Ed.), (New York: CEEB, 1986, p. 6, 24)

65 Caroline Hodges Persell, Education and Inequality: The Roots and Results of Stratification in America's Schools, (London: Free Press, 1977, p. 132)

⁶⁶ Stephen W. Raudenbush, "Utilizing Controversy as a Source of Hypotheses for Meta-Analysis: The Case of Teacher Expectancy's Effect on Pupil IQ," in *Evaluation Studies Review Annual*, ed. Richard J. Light, 1983. The classic study in the field is Robert Rosenthal and Lenore Jacobson, *Pygmalion in the Classroom* (New York: Holt, Reinhardt, and Winston, 1968)

⁶⁷ Donald R. Moore and Suzanne Davenport, "School Choice: The New Improved Sorting Machine" in Boyd and Walberg, (eds.), *Choice in Education: Issues and Politics* (in press) 1989 (p. 2)

68 Caroline Hodges Persell, Education and Inequality: The Roots and Results of Stratification in America's Schools, (London: Free Press, 1977, p. 132)

⁶⁹ National Coalition of Advocates for Children, Barriers to Excellence: Our Children At Risk, Marion Wright Edelman and Harold Howe II (eds.), p. 6

70 Anthony S. Bryk, Valerie Lee, and Julia Smith, "High School Organization and its Effects on Teachers and Students," *Choice and Control in American Education, Volume 1*, (London: Falmer Press, 1990, p. 202). See also W. Firestone and R. Herriot, "Effective Schools: Do Elementary Prescriptions Fit Secondary Schools?" (Philadelphia: Research for Better Schools, 1982). See also S. Purkey and M. Smith, "Effective Schools: A Review," Elementary School Journal, (Vol. 83, 1983).

71 J. Meyer, "The Effects of Education as an Institution," American Journal of Sociology, Vol. 83, No. 1, pp. 55-77, (1977). J. Meyer, W. Scott and T. Deal, "Institutional and Technical Sources of Organizational Structure: Explaining the Structure of Educational Organizations," Organizational Environments: Ritual and Rationality, J. Meyer and W. Scott (Eds.) (Beverly Hills: Sage, 1983). W. Firestone and B. Wilson, "Using Bureaucratic and Cultural Linkages to Improve Instruction:

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72 Anthony S. Bryk, Valerie Lee, and Julia Smith, "High School Organization and its Effects on Teachers and Students," *Choice and Control in American Education, Volume 1*, (London: Falmer Press, 1990, p. 172).

73 Anthony S. Bryk, Valerie Lee, and Julia Smith, "High School Organization and its Effects on Teachers and Students," *Choice and Control in American Education, Volume 1*, (London: Falmer Press, 1990, p. 172).

⁷⁴ Anthony Cipollone, "Trying to Beat the Odds: A Study of Comprehensive High Schools and At-Risk Students," (Unpublished dissertation, Harvard Graduate School of Education, 1990, p. 54, 133)

75 John I. Goodlad, A Place Called School: Prospects for the Future (New York: McGraw Hill, 1984)

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CHAPTER THREE

DESIGN AND RESEARCH ISSUES

The purpose of this school effects study is to identify generalizable characteristics of high schools that seem to be effective in reducing student dropout. To that end this study follows in the footsteps of Bryk and Thum by specifying a series of models that use differences in student characteristics, demographic characteristics of the school community, and selective organizational features of high schools to predict student dropout. This chapter first describes how the work of Bryk and Thum paved the way for the current study, and second, this chapter sets the stage for the findings that follow in the next chapter.

In the ensuing pages of this chapter key terms are defined, sample data are described, research questions are listed, the Bryk and Thum study is discussed, and the analytic methodology is broadly outlined. The final section on methodology is presented in parts. It begins by identifying a priori expectations about the hypothesized relationships between dropout and size, cooperation, leadership, tracking, collaboration, and teacher expectations. Then, problems inherent in the analysis of multi-level data are detailed. Finally, the chapter closes by describing how *HLM*, the primary analytic tool used for this study, resolves the problems that researchers conducting school effects studies have traditionally faced in the past.

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Definition of Terms

Though "school-leaving" is the event of interest to me, youth leave school in a variety of ways: some graduate; others drop out only to return later; some leave but go on later to earn a General Educational Development certificate (GED); some transfer; some die; and some leave and neither graduate from high school nor earn alternative high school certification. For the purpose of this study I classify as "dropouts" those who, by the cohort's anticipated high school graduation date (1982), had not graduated and were no longer in school. I will treat student dropout, the foremost event of interest, as my outcome variable.¹

Description of the Data

In conducting the analyses of this study, I made use of a publiclyavailable, nationally-representative data-set, *High School and Beyond*, and a supplement to it called the *Administrator and Teacher Survey* file. The *High School and Beyond* data-set comprises longitudinal data drawn from a stratified national probability sample of about 58,000 high school students (a sophomore cohort of 30,030 students and a senior cohort of 28,240 students) who attended 1,015 public and private high schools in 1980.² Conducted by the National Opinion Research Center for the National Center for Education Statistics, the *High School and Beyond* study provides school information on administrative practices, policy, curriculum, and requirements as well as data on the educational, occupational, family, and social experiences of students.³ The primary sources of data for this study were student

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questionnaires, scholastic achievement tests designed especially for the High School and Beyond study and school questionnaires completed by principals.⁴ The High School and Beyond study systematically sampled and surveyed individuals over a six year time period; the study first collected data in the spring of 1980 from sophomores and seniors and then resurveyed subsamples of these two cohorts three times, in 1982, 1984 and 1986.⁵ The first follow-up collected data from 30,000 individuals who were sophomores in 1980 and almost 12,000 individuals who were seniors in 1980; in addition, about 2,000 individuals from the sophomore cohort who had dropped out of school by 1982 were resurveyed.⁶ A similar approach was taken for the second and third follow-ups, the only exception being that a subsample of each cohort were surveyed. So, for instance, 14,825 of the 30,030 students who were originally surveyed as sophomores in 1980 were resampled in the second and third follow-ups. As a result, the High School and Beyond study provides data on both high school dropouts and graduates.

The High School and Beyond study constitutes an appropriate source of data for this thesis. Given that most dropouts leave school during the high school years,⁷ and given recent evidence indicating that nearly half the reasons high school dropouts most frequently give to explain why they left school pertained to school-related issues,⁸ it makes sense to use the most complete source of nationally representative data that is available currently on both schools and dropouts, namely *High School and Beyond* and its supplement, the *Administrator and Teacher Survey* file.⁹

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Although the *High School and Beyond* study provides data on both 1980 sophomores and 1980 seniors, I used the 1980 sophomore cohort exclusively. There were two reasons for doing so. First and most importantly, data on the sophomore cohort provide access to a larger pool of dropouts than the senior cohort. Second, base year and first follow-up data on the sophomore cohort provide information on a critical time in students' high school careers, the period between tenth grade (spring, 1980) and the cohort's anticipated graduation date (spring, 1982). Because over 50 percent of dropouts leave school during their sophomore, junior or senior years of high school, data collected during this period provide a valuable window on the stay-or-leave decisions of dropouts.¹⁰ Investigating the 1980 sophomore cohort allowed me to consider important educational choices made by these individuals during their high school years, thus leading to a more complete understanding of the high school experience and its impact on students.¹¹

Initially, I planned to use data from the second and third follow-up (1984 and 1986) which would have enabled me to include in the analyses the large number of individuals who evidently are "stopping out" of high school only to return later.¹² Moreover, I originally classified as dropouts those who, by 1986 (four years after the cohort's anticipated high school graduation date), had not graduated and were no longer in school. However, after taking into account those who left school but returned at a later date,¹³ I discovered that less than five percent of the sophomores initially sampled in 1980 could still be accurately classified as dropouts in 1986.¹⁴ Due to the small number of dropouts left in the sample, there was

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insufficient variation to support an *HLM* analysis. Consequently, this finding prompted a more restrictive definition, namely one that classified as "dropout" only those individuals who left school during the high school years.

The Administrator and Teacher Survey file includes survey data collected from roughly half of the original 1,015 schools in the High School and Beyond study. Conducted under the aegis of the National Center for Education Statistics, the Administrator and Teacher Survey file substantially increases the amount of data available on the characteristics of High School and Beyond schools. Sampling staff in 457 schools, the Administrator and Teacher Survey file provides measures of "staff goals, school climates, school leadership, and other processes that the effective schools literature indicates are important in achieving the objective of effective education."¹⁵ Surveying 402 high school principals, 10,370 teachers, 400 heads of high school guidance departments, as well as vocational educational directors and community service coordinators, the questionnaires collected information on such factors as school goals, pedagogic practices, staff attitudes, planning processes, and special programs designed to produce educational excellence.¹⁶ The Administrator and Teacher Survey data was structured to conform to the High School and Beyond data so that researchers could link the two files.¹⁷

Via school identification codes, I linked the data on schools provided by the *Administrator and Teacher Survey* file with the data on students provided by the *High School and Beyond* study. However, it is important to point out that data for the *Administrator and Teacher Survey* file were

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collected in the spring of 1984, or two years after the anticipated graduation date of the 1980 sophomore cohort. Undoubtedly, from a design standpoint, it would have been preferable if the Administrator and Teacher Survey data describing schools had been collected while the 1980 sophomore cohort was still in school -- namely between 1980 and 1982. While this did not happen, I maintain that it makes sense to conduct a study linking the Administrator and Teacher Survey data and the High School and Beyond data.¹⁸ For if it can be shown that schools change slowly, then the relationship between a student outcome like dropping out and school variables in the Administrator and Teacher Survey may not have changed substantially between 1982 and 1984. In order to test this conjecture that "schools change slowly," I used a strategy adopted by Bryk and Driscoll whereby I analyzed selected items from the Administrator and Teacher Survey that asked respondents to assess the extent to which change had occurred in their schools between 1982 and 1984. I then culled from the sample 226 schools that had changed somewhat in the period between 1982 and 1984, leaving only 251 schools that appear to "change slowly."¹⁹

Included in the 226 schools that were set aside were 19 in which a third or more of the faculty turned over between 1982 and 1984, six in which the educational climate changed substantially between 1982 and 1984, six in which 1982 student perceptions of the disciplinary climate differed from 1984 teacher perceptions, 61 schools that were not comprehensive high schools, 130 that were not public (e.g., private or alternative), three with fewer than six teachers, four for which school weights were not available, one that did not have a school identification number, 44 for which teacher data were not

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collected, and 12 that differed dramatically from the rest of the sample in their student composition (e.g., extremely wealthy or extremely poor). This culling process left data on 3,293 students, 6,195 teachers, and 251 comprehensive public high schools.

Of the final analytic student sample, 49 percent are female, seven percent characterized themselves as Hispanic, 16 percent Black, and 77 percent White. For the sample as a whole, 21 percent of those surveyed left high school between their sophomore and senior years and are identified as dropouts for the purpose of this study. Of the final student sample, 19.5 percent of White students, 25.5 percent of Black students, and 26.1 percent of Hispanic students dropped out. Moreover, 23.5 percent of males and 20.8 percent of females left school early.

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Research Questions

One central question drove this analysis: Which school characteristics help explain the variation in dropout rates among comprehensive public high schools? After adjusting for the background characteristics of students and schools, I address six more specific research questions. They are:

- 1. Does school size (SCHLSIZE) predict dropout? For instance, are larger schools more likely to report higher dropout rates?
- 2. Does tracking (TRACKING) predict dropout? For instance, are schools that group students for instruction into academic, general and vocational tracks more likely to report higher dropout rates than schools that do not?
- 3. Does the amount of time that teachers spend collaborating (COLLMIN) predict dropout? For instance, are schools in which teachers indicate they spend fewer minutes per week collaborating with colleagues on matters related to instruction more likely to report higher dropout rates?
- 4. Do teachers' expectations of students (CANLEARN) predict dropout? For instance, are schools in which teachers claim that many students are incapable of learning more likely to report higher dropout rates?
- 5. Do teachers' perceptions of principal leadership (LEADERSH) predict dropout? For instance, are schools in which teachers say that (a) the school goals are clear; (b) the principal sets building plans and priorities; and (c) the principal lets others know what is expected of them more likely to report lower dropout rates?
- 6. Do teachers' perceptions of staff cooperation (COLLCOOP) predict dropout? For instance, are schools in which teachers say that they (a) feel they can count on their colleagues for help anytime; (b) make a conscious effort to coordinate their efforts with other teachers; and (c) perceive that the school is run like a family more likely to report lower dropout rates?²⁰

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Bryk and Thum's Research

Following in the footsteps of Michael Rutter *et al.*, in 1989 Bryk and Thum conducted an exploratory study of the effects of school structure on dropping out. Among other things, Bryk and Thum determined that students are less likely to drop out from schools that emphasize academics, display less internal differentiation,²¹ and have an orderly environment.²² Their study is noteworthy because it was the first quantitative study of its kind using a nationally representative sample to consider how organizational features of schools predict student dropout.

Despite the innovative approach, however, Bryk and Thum's research was limited in two important respects. First, because they were primarily interested in comparing the performance of Catholic-sector schools to public-sector schools, they took a census of all 88 Catholic schools included in the *High School and Beyond* study and a random sample of 94 public schools. This sampling design reduced their chance of finding other effects that might exist within the public school sector alone. Second, Bryk and Thum did not take advantage of data available in the *Administrator and Teacher Survey* file, a supplemental file to the *High School and Beyond* study.²³ Instead they restricted themselves to the variables describing school characteristics available in *High School and Beyond*.²⁴

Assuming that the dropout phenomenon is attributable, at least in part, to the effects of both student-level and school-level variables, researchers attempting to determine the predictors of dropout behavior have historically encountered considerable methodological difficulties in

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doing so. For reasons that I describe later in this chapter, I, too, anticipated difficulty disentangling these effects using traditional statistical methods. The research of Bryk and Thum is particularly remarkable because it resolved these problems using a technique called Hierarchical Linear Modeling (*HLM*). This recently developed technique has substantially improved the ability of researchers to cope with effects at different levels (e.g., student level and school level), and hence it has enhanced the ability of investigators to answer their research questions. For this reason, I elected to use *HLM*. In addition, a variation of Bryk and Thum's final fitted model provided a starting point, or a "baseline," for my study.

Though I built directly on the work of Bryk and Thum, in two respects, my work differs from theirs. First, because my interest lies in public-sector schools, I used an exclusively public school sample thereby increasing the likelihood that I would uncover important public school sector effects not found by Bryk and Thum. Second, I used data available in the *Administrator and Teacher Survey* file that Bryk and Thum did not use. Investigating whether school-level factors substantially improve our ability to explain the dropout phenomenon, I tested, systematically, the impact of particular school characteristics on dropout.

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Analytic Procedure

Table 3.1 lists and describes the seven within-school and nine between-school variables used in the *HLM* analyses. These include a dichotomous student-level outcome, DROPOUT. In addition, there are three continuous student-level control predictors at the within-school level, SES, ACADEMBK, and ATRISK. The three remaining student-level control predictors are the dummy variables, GENDER, HISPANIC, and BLACK. At the between-school level, there are nine continuous variables. Three of these are school-level control variables; SCHLSES, SCHLACAD, and SCHLATRI. The remaining six school-level main effects at the betweenschool level are SCHLSIZE, TRACKING, COLLMIN, CANLEARN, LEADERSH, and COLLCOOP. Appendix A includes a more detailed description of the method by which these variables were constructed.

Level of analysis	Variable	Description
Within-school	DROPOUT	1 = Dropout 0 = Not dropout
	HISPANIC	1 = Hispanic 0 = Not Hispanic
	BLACK	1 = Black 0 = Not Black
	GENDER	1 = Male 2 = Female
	SES	Student socio-economic status, a composite of non-school social and economic factors of the home that generally indicates the level of wealth and support for education (e.g., income, educational level of parents, number of books in the home, etc).
	ACADEMBK	Student academic background, a composite of five variables that indicates whether the student (1) has college aspirations, (2) has taken remedial english, (3) has taken remedial math, (4) has ever repeated a grade, and (5) was read to in elementary years.
	ATRISK	Student "at riskness," a composite of eight variables that indicates whether the student exhibits characteristics typically associated with being at increased risk of dropping out. These include whether the student (1) has ever been suspended, (2) has ever cut class, (3) has seen disciplinary action, (4) has had trouble with the law, (5) is not satisfied with school, (6) gets poor grades in school, (7) is not interested in school, and (8) hates work.
Between-school	SCHLSES	School average of student-level SES.
	SCHLACAD	School average of student-level ACADEMBK.
	SCHLATRI	School average of student-level ATRISK.
	SCHLSIZE	Number of students enrolled in school.
	TRACKING	Measure of proportion of students in school who are grouped by curriculum for instruction.
	COLLMIN	Average number of minutes teachers in a school spend each month (on the average) collaborating on instruction.
	CANLEARN	Teachers' expectations of students, a measure that is derived from a single variable (with a six point scale) that asks teachers whether they believe many students are capable of learning the material at school.
	LEADERSH	Measure of principal leadership, a composite of four variables indicating whether teachers perceive that (1) school goals are clear, (2) principal sets plans and decides on priorities, (3) principal indicates what is expected, and (4) principal communicates vision to staff.
	COLLCOOP	Measure of collegiality or staff cooperation, a composite of four variables that indicates whether teachers perceive that (1) the school runs like a family, (2) staff cooperate, (3) efforts are coordinated, and (4) they can always count on help.

Table 3.1: Variable names, descriptions and level that variables appear in the HLM analyses.

I hypothesize that high schools vary in their size, tracking, expectations of students, principal leadership, staff cooperation, and teacher collaboration and that the way schools vary along these dimensions accounts for variation in dropout among these schools. More precisely, I hypothesize that, after adjusting for the background characteristics of students and schools, lower dropout will be associated with schools that enroll fewer students, rely less on tracking, are led by more directive principals, report greater cooperation among staff, and indicate there is greater collaboration among teachers. The hypothesized link between variation in these school characteristics and student dropout constitutes the central focus of this study.²⁵

In this school effects study, I examine relationships that occur at two levels, student and school. I model the effects of both individual student characteristics (effects within-a-school) and the collective influences of school policies and process on student decisions to drop out (effects betweenschools). Investigating whether school-level predictors influence dropout after the effects of student-level characteristics have been controlled involves the analysis of two-level data.²⁶ Until recently, researchers using conventional techniques to analyze multi-level data were limited in important ways by the statistical tools at their disposal. Primarily the issue is one of efficiency. Traditional linear modeling cannot efficiently estimate simultaneous within-a-school and between-school effects.

In this study, I depart from the conventional approach to multi-level school effects studies by resorting to a recently developed technique called Hierarchical Linear Modelling (*HLM*). This approach resolves problems that

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have commonly plagued researchers performing analyses on multi-level data. As I describe this technique in the following pages, I will (1) detail the problems involving units of analysis and aggregation bias that researchers doing multi-level data analyses routinely face; (2) specify how *HLM* overcomes these problems; and (3) explain why *HLM* is a superior technique and the appropriate analytic tool.

Prior to the development of HLM, the typical strategy in school effects studies was to perform analyses at only one level, either at the student level or at the school level, for instance. But for several reasons, adopting such a strategy in school effects studies can prove unsatisfactory. First, performing analyses only at the student level may overlook important, systematic variation between schools -- internal school policies that shape climate or curriculum, for example -- that may help explain students' stay-or-leave decisions.²⁷ Second, performing analyses only at the school level may not take into account important variation in student differences that naturally exists within schools -- variation in socio-economic status for instance that, once again, may help explain students' stay-or-leave decisions. Third, by adopting a single unit of analysis but then inferring relations at one level from analyses conducted at another level, researchers run the risk of crosslevel bias.²⁸ Cross-level inferences, as they are called, must be made with extreme caution. In referring to cross-level inferences, Brennan observed that in studies involving analyses at more than one level, "coefficients [differ] across levels, different variables [enter] models at different levels, and in most instances, aggregation [inflates] the estimated effects of background relative to the effects of measures of schooling and specific educational

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programs."²⁹ These complications erode researchers' confidence in the ability of traditional techniques to describe social behavior. Finally, adopting a single unit of analysis in school effects studies can be an unsatisfactory approach because linear models that consider only one level of variation are subject to aggregation bias. This often occurs if data are aggregated to the school level (ignoring within-school variation) or analyzed solely at the student level (ignoring school effects).³⁰ Though all of the problems cited are cause for concern, the issue of aggregation bias deserves particular attention because, if overlooked, there is a real chance that findings may be seriously flawed.

Aggregation bias may arise when individual characteristics behave differently within the school from the way they do when aggregated to the school level. In typical school effects studies, aggregation inflates the estimated effects of student background on outcomes and decreases the likelihood of identifying school characteristics and practices that are effective. These aggregation effects might occur in the following manner. Suppose that the quality of educational programs is differentially efficacious across schools because aspects of the community in which schools are located enable them to attract or implement higher quality educational programs. Furthermore, the background characteristics of the students entering the schools are linked to community characteristics. Not surprisingly, schools in wealthier communities tend to have more students coming from higher socio-economic backgrounds. If community locale determines the school a student attends, the school attended may serve as a

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proxy for community. Consequently, school influences both the background of its students and the quality of its educational programs.³¹

One solution to the problem of aggregation bias is to construct linked, statistical models, one for each level of analysis, student and school, for example. This strategy capitalizes on the unique contribution that information from both levels may simultaneously add to an explanation of student dropout behavior.³²

There are distinct advantages to this multi-level approach. Because a two-level strategy concurrently takes into account the multi-level features of educational settings (e.g., both within-school and between-school effects), it reflects reality more accurately and faithfully than a strategy that uses a single unit of analysis. Using a multi-level technique enables researchers to "tease out effects from a variety of sources so that they may learn something about the interface of individuals and the [schools] to which they belong."³³ Consequently, it is a more efficient and powerful way to explain the complex influence of group settings on individual behavior.³⁴ *HLM* takes this approach.

Whether the research interest be achievement or graduation, there seems to be a growing body of evidence for the power of multi-level modeling techniques to change the way we think about educational attainment and the comparative influence of homes and schools on that attainment. One has only to consider the results of Raudenbush and Bryk's reanalysis of the Coleman, Hoffer, and Kilgore study of public and private secondary schools to see how multi-level techniques can lead to results with dramatically different estimates of school effects.³⁵

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The approach adopted in this study called for simultaneously fitting pairs of linked hierarchical linear models to the data. These models are designed to (1) account for the effect of student characteristics on dropout; (2) measure the influence of school-level predictors on the relationship between student characteristics and dropout; and (3) avoid the bias that results from mixing levels of aggregation.³⁶

In Chapter Four that follows, I present the findings of this study, focusing on the prominent role that school enrollment plays in determining dropout. Discussion in Chapter Four centers around a series of graphic displays that are intended to illustrate the joint effect of both student and school characteristics on dropout.

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¹ The variable, DROPOUT, is a dichotomous variable that assumes the value of 1 at the student-level if an individual is a dropout and 0 if not. Following Bryk and Thum, however, I have treated DROPOUT as if it were continuous. Anthony S. Bryk and Yeow Meng Thum, "The Effects of High School Organization on Dropping Out: An Exploratory Investigation," *American Educational Research Journal*, Fall 1989, Vol. 26, No. 3, p. 16

² Ekstrom, R., Goertz, M., Pollack, J., and Rock, D., "Who Drops Out of High School and Why? Findings from a National Study," In Gary Natriello (ed.), *School Dropouts: Patterns and Policies*, (New York: Teachers College Press, 1986, p. 52-53)

³ Gary Natriello, Aaron M. Pallas, and Edward L. McDill, "Taking Stock," In Gary Natriello (ed.) *School Dropouts: Patterns and Policies*, (New York: Teachers College Press, 1986, p. 175)

4 Center for Education Statistics, High School and Beyond 1980 Sophomore Cohort Third Follow-Up (1986): Volume I, Data File User's Manual, p. 1-9

⁵ Gary Natriello, School Dropouts: Patterns and Policies, (New York: Teachers College Press, 1986p. 1-2, p. 6)

⁶ Ekstrom, R., Goertz, M., Pollack, J., and Rock, D., "Who Drops Out of High School and Why? Findings from a National Study," In Gary Natriello (Ed.), School Dropouts: Patterns and Policies, (New York: Teachers College Press, 1986, p. 52-53: also Center for Education Statistics, High School and Beyond 1980 Sophomore Cohort Third Follow-Up (1986) Volume I, p. 5

7 The statement, "most dropouts leave school during the high school years," does not acknowledge that for particular subgroups, notably Hispanic students, this may be less true. Research conducted by the U.S. Department of Education indicates that "Hispanic dropouts tend to have completed less schooling than other dropouts." Clearly the current study is limited because it does not take into account anyone who dropped out prior to spring of their sophomore year of high school. However, only recently has data been collected on a national scale that begins with an eighth grade cohort (NELS:88). Mary J. Frase, "Dropout Rates in the United States: 1988" (Washington, D.C.: National Center for Education Statistics, 1989, page 24)

⁸ These reasons included; "poor performance, disliked school, expelled or suspended, and school too dangerous." Russell W. Rumberger, "Dropping Out of High School: The Influence of Race, Sex, and Family Background," *American Educational Research Journal*, Vol. 20, No. 2, Summer 1983, p. 201)

⁹ National Center for Education Statistics, Annual Report on Dropout Rates in the United States: 1988, p. 22

10 National Center for Education Statistics, Annual Report on Dropout Rates in the United States: 1988, p. 22

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¹¹ Center for Education Statistics, High School and Beyond 1980 Sophomore Cohort Third Follow-Up (1986) Volume I, p. 2

¹² Gary Natriello, Aaron M. Pallas, and Edward L. McDill, "Taking Stock," In Gary Natriello (ed.) School Dropouts: Patterns and Policies, (New York: Teachers College Press, 1986, p. 173), See also Harold L. Hodgkinson, All One System: Demographics of Education, Kindergarten through Graduate School, (Washington, D.C.: Institute for Educational Leadership, 1985, p. 17)

¹³ "Those who left school but returned at a later data," might include those who received alternative certification via a GED. Although such persons might be considered to have graduated from high school, there is some evidence to suggest that their earnings may differ from those with a traditional high school diploma. Passmore writes, "For youths employed full-time and full-year... the typical GED recipient would have earned in 1985 about \$780 more than a youth without a GED or diploma, but \$1,340 less than a youth with a high school diploma. These differences in 1985 annual salary become substantial lifetime earnings differences if they persist over a youth's working life." David L. Passmore, "Employment of Young GED Recipients," *American Council on Education, GED Research Brief*, No. 14, September, 1987, p. 3.

¹⁴ It is worth noting that defining dropout as those who had not graduated and were not in school in 1982 matches the approach Bryk and Thum used in their 1989 study. It is also worth noting that before abandoning the originally proposed definition of dropout I discovered that while HISPANIC predicted dropout BLACK did not. After redefining dropout to match Bryk and Thum, however BLACK predicted dropout.

¹⁵ Office of Educational Research and Improvement, High School and Beyond Administrator and Teacher Survey (1984): Data file User's Manual, p. 1-2

¹⁶ Office of Educational Research and Improvement, High School and Beyond Administrator and Teacher Survey (1984): Data file User's Manual, p. 2, p. 7

¹⁷ Office of Educational Research and Improvement, High School and Beyond Administrator and Teacher Survey (1984): Data file User's Manual, p. 7

¹⁸ Others have conducted studies linking *High School and Beyond* data on the sophomore chohort and *Administrator and Teacher Survey* data on schools. Included in this group are Bryk and Driscoll and Chubb and Moe.

¹⁹ Office of Educational Research and Improvement, High School and Beyond Administrator and Teacher Survey (1984): Data file User's Manual, p. 4 and p. 8

²⁰ The phrasing of these questions suggests the hypothesized direction of the relationship between each of these six predictors and dropout.

²¹ According to Bryk and Thum, schools that display "less internal differentiation" tend to have a core curriculum, a common program of instruction, stronger normative environments. In contrast, schools that display "more internal differentiation" tend toward a "shopping mall" curriculum and weaker normative environments. Anthony S. Bryk and Yeow Meng Thum, "The Effects of High

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School Organization on Dropping Out: An Exploratory Investigation," American Educational Research Journal, Fall 1989, Vol. 26, No. 3, p. v and p. 3.

22 In particular, Bryk and Thum were interested in public-Catholic sector comparisons. In their study, they acknowledge the possibility that "selection effects." Murnane describes why "selection effects" (or bias due to the effects of selfselection) may pose a problem in studies like Bryk and Thum's that investigate public-private or public-Catholic sector schools. "We know that at least part of the difference in the average achievement of children in schools stems not from differences in school quality, but from differences in the family background of children. These differences arise from the way that children are assigned to schools. If students were randomly assigned to schools, the average characteristics of students in public and private [or Catholic] schools would be the same. In our society, however, parents choose their children's schools. Family income is an important determinant of this choice but not the only one. Among families with the same income, we would expect that those that make a substantial financial sacrifice to pay for private schools place a high value on education and prepare their children especially well for school. As a result of this at-home motivation and preparation, we would expect these children to have higher achievement test scores on average than children in public schools even if the quality of education provided by the two types of schools were the same . . . the challenge facing evaluators is to develop statistical methods to account for and separate out the effects of selection mechanisms so that the effectiveness of the programs can be accurately assessed. When evaluating the relative effectiveness of public and private schools, [problems arise when] selection mechanisms - those factors that influence which children attend which schools -- and educational programs are not analytically distinct." (Richard J. Murnane, "Evidence, Analysis, and Unanswered Questions," Harvard Educational Review, Vol. 51, No. 4, November 1981, p. 485-486)

23 Office of Educational Research and Improvement, High School and Beyond: Data file User's Manual, 1980, p. 2-7

²⁴ The High School and Beyond data that Bryk and Thum used were from the base year and the first follow-up (1980 and 1982)

²⁵ Robert T. Brennan, "A Question of Life and Death: Study of CPR Training Using the Hierarchical Linear Model," (Unpublished dissertation, Harvard Graduate School of Education, 1989, p. 40)

26 Leigh Burstein, "The Analysis of Multi-Level Data in Educational Research and Evaluation," *Review of Research in Education*, Vol. 8, 1980, p. 165, 189

²⁷ Leigh Burstein, "The Analysis of Multi-Level Data in Educational Research and Evaluation," *Review of Research in Education*, Vol. 8, 1980, p. 197

²⁸ Leigh Burstein, "The Analysis of Multi-Level Data in Educational Research and Evaluation," *Review of Research in Education*, Vol. 8, 1980, p. 169

²⁹ Leigh Burstein, "The Analysis of Multi-Level Data in Educational Research and Evaluation," *Review of Research in Education*, Vol. 8, 1980, p. 178-179

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30 Anthony S. Bryk, Stephen W. Raudenbush, Michael Seltzer, and Richard T. Congdon, Jr., An Introduction to HLM : Computer Program and User's Guide, Version 2.0, (1988, p. 3)

31 In the past, because "school effects studies used 'increments in proportion of variation explained' models, variation associated with background factors was typically estimated prior to estimating the incremental variation for schooling (e.g. Coleman et al. 1966) background factors appeared even more influential. This occurs because the common influence of background and schooling which, in part, arises from the spurious effects of community on both is then attributed strictly to background. This type of approach to school effects is "particularly susceptible to aggregation bias." As Burstein has explained, "the existence of substantial between-[school] variation in performance is insufficient to explain its origin. On the one hand, between-[school] differences in outcomes may be attributable to properties of the [schools] themselves or the processes within the [schools]. On the other hand, between-[school] differences in outcomes may be simply the result of the 'selection' rules which govern assignments to [schools]. The selection effects that might account for [school] differences can . . . occur 'naturally.' Local control and financing of education in the United States lead to 'natural' selection effects. These effects are a consequence of the relationship between community characteristics and the quality and motivation of the students available for schooling. High-wealth communities attract achievement-oriented families. At the same time, communities with highly educated families expect more from their children and their schools, and make larger personal investments of both time and money. Whatever the mechanism, the result is the same: schools differ in the mean backgrounds (entering ability, socioeconomic characteristics) of their students, And typically, these mean entering differences translate into between-school differences in outcomes, which may have little to do with the quality of the school's educational program. In [addition], substantive interpretations of school effects are risky when selection effects can explain between-[school] differences. However, there is an important caveat to this statement. It is virtually impossible to partition school effects into substantive and spurious effects (due to selection) when substantive and selection effects are correlated . . . The confounding of group membership and program quality is virtually endemic to nonexperimental educational research. This was the source of much of the methodological controversy surrounding the Coleman report's interpretations of the relative influences of school and home background." But the fact that the Coleman Report revealed any school effects is important to note. Leigh Burstein, "The Analysis of Multi-Level Data in Educational Research and Evaluation," Review of Research in Education, Vol. 8, 1980, p. 175-177, p. 197

³² Leigh Burstein, "The Analysis of Multi-Level Data in Educational Research and Evaluation," *Review of Research in Education*, Vol. 8, 1980, p. 189

³³ Leigh Burstein, "The Analysis of Multi-Level Data in Educational Research and Evaluation," *Review of Research in Education*, Vol. 8, 1980, p. 169

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³⁴ Leigh Burstein, "The Analysis of Multi-Level Data in Educational Research and Evaluation," *Review of Research in Education*, Vol. 8, 1980, p. 158 and p. 216

³⁵ Abby Rubin Riddell, "An Alternative Approach to the Study of School Effectiveness in Third World Countries" in *Comparative Education Review*, Vol. 33, No. 4, November 1989, p. 481-497

³⁶ Anthony S. Bryk and Yeow Meng Thum, "The Effects of High School Organization on Dropping Out: An Exploratory Investigation," *American Educational Research Journal*, Fall 1989, Vol. 26, No. 3, p. v and p. 8)

CHAPTER FOUR

PRIMARY FINDINGS

This chapter demonstrates that the dropout rate is lower when schools are smaller, when staff relationships are more collegial, and when principal leadership is less directive. Moreover, this chapter also shows that size influences dropout indirectly. Because small school size gives rise to other conditions, namely more collegial staff relationships and less directive principal leadership, that, in turn, lead to lower dropout, the total effect of size on dropout is greater than its direct effect alone. In addition, this chapter illustrates how these effects differ depending on the background characteristics of the school. In general, dropout is greater when students attending the school are poor, when they are less well prepared academically, or when they are more at risk (e.g., tardy, suspended, etc.). As well, this chapter documents how these effects differ by race. Thus, the effects on the dropout rate of school size, staff collegiality, and principal leadership are greater for minority students, especially those who are Black. Finally, this chapter shows that the principal's leadership style apparently differs depending on the racial composition of the student population. More precisely, large schools that Black students attend appear to be characterized by less directive principal leadership while large schools that White students attend are typified by more directive principal leadership.

Before proceeding, a few words of explanation are in order with respect to presentation. The results from this study fall into two categories, primary and secondary findings. Only the former, however, are reported in this

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chapter. Primary findings are those school effects that are of sufficient magnitude to warrant special attention; as mentioned, these include the effects on dropout of school size, staff cooperation, and principal leadership. The latter category of secondary findings are those results that are not practically significant due to their small magnitude; included are the effects on dropout of tracking,¹ teacher collaboration, and teachers' expectations of students.² These secondary findings are presented and discussed in Appendix B. In this study, pairs of linked hierarchical linear models were simultaneously fit.

As models grew in complexity, it became more difficult to interpret them simply. Consequently, for the sake of clarity, results from the *HLM* analyses are summarized both as plots of fitted relationships and in tables of fitted parameters. Only plots, however, appear in this chapter. A more detailed description of the analyses leading to the final model is provided in Appendix B. It is there that parameter estimates generated by the hierarchical linear models are reported in tables and then interpreted in text.

Caution should be exercised when interpreting the plots that follow in this chapter, however. Although a systematic set of analyses was conducted that led to a final model, the plots that are displayed are based solely on the final fitted model. While they contrast the dropout rates of schools that vary in their organization (e.g., large versus small, etc.), schools that are depicted serve as exemplars, or archetypes, that are representative of similar schools in the sample and, by extension, similar schools in the population. The predicted values that are used to construct these plots were computed from

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the final fitted hierarchical model that utilized all sample data, not just selected schools in the sample.

The plots portray the primary findings, that is, the fitted relationship between the outcome, dropout, and the predictors, school size, cooperation, and leadership. The expressed purpose of including these plots is to help create a more realistic picture of the joint effect of student and school characteristics on dropout.³ Unfortunately, when coefficients appear within a welter of numbers in a table, it is possible to misjudge the importance of particular variables. However, by showing graphically how effects at both the student- and school-level work in concert, plots can provide information on synergistic effects that sometimes may be difficult to glean from a table. As a result, plots help bring into sharper focus the impact that a variable such as school size has on the outcome and how the effect varies by race and class. Consequently, in a plot it becomes more apparent than it might from a table that student enrollment makes an enormous difference for those students who are poor and non-White.

These plots are presented in the following manner. First, in each figure three panels are displayed: one panel for individuals who are White; a second panel for those who are Hispanic; and a third representing students who are Black. For each figure, each of the three panels depicts the fitted relationship involving a between-school predictor (e.g., school size) and the outcome, dropout. In each panel, the vertical axis displays the outcome expressed as a percentage dropout rate.⁴ Expressing dropout in percentage terms corresponds to Tables B.4 to B.6 in Appendix B.

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Second, because gender and student-level socio-ecenomic status (SES) each proved to be related to dropout as a fixed effect across schools, the displays that follow depict fitted relationships for males of average SES. Appendix B describes in full detail the analyses that led to the decision to treat the effects of gender and student-level SES as stable across schools.

Third, to describe the magnitude of a school covariate's effect (e.g., average socio-economic status of students at a school, or SCHLSES) on the outcome, each of the three panels also display a pair of fitted lines, one corresponding to relatively high SCHLSES and the other comparatively low SCHLSES. Contrasting high and low SCHLSES in this way makes it possible to illustrate the difference in dropout between schools that, in the vernacular, are rich and poor.⁵ The "rich" schools in this case are those whose SCHLSES is greater than 75 percent of all schools; likewise "poor" schools are those whose SCHLSES is less than 75 percent of all schools.

Finally, a note of caution is in order. The lines that are used to display the fitted relationship between dropout and a between-school predictor do not extend to the full range of the observed data. For the purpose of illustration, I again refer in the following example to the between-school predictor, school size. Although descriptive statistics of the sample data show that students of all races attend schools of all sizes, in general White students attend smaller schools, Black students attend slightly larger schools on average, and Hispanic students attend even larger schools.⁶ In order to represent in graphic form this potentially important pattern in the sample data, separate plots were constructed for students who are White, Hispanic, and Black. Then, for each of these three groups, fitted lines were plotted from the 5th to the 95th

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percentiles of the SCHLSIZE distribution. Consequently, a plot of the between-school relationship involving dropout and school size for White students depicts fitted lines that extend from 329 to 2483, or the 5th and 95th percentiles of the SCHLSIZE distribution for White students. By contrast, the plot of the relationship between dropout and school size for Black students includes fitted lines that range from 445 to 2664 (5th and 95th percentiles for Black students). And in similar fashion, in the plot of the relationship between dropout and school size for Hispanic students the fitted lines range from 511 to 3400. This approach makes it possible to gauge how disparate the dropout rates tend to be in large schools with many students enrolled and small schools with very few students enrolled.⁷ Moreover, the large school/small school disparity in dropout for students who are White may then be compared graphically to those who are Hispanic or Black.

This approach was taken not just when dealing with school size but also when plotting the fitted relationship between dropout and cooperation as well as dropout and leadership. Finally in both text and plots, wherever possible, a meaningful metric (e.g., student enrollment figures instead of standard deviation units) was used to make it easier to understand a finding in practical terms.

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Influence of School Size on Dropout

Throughout the following discussion, it is presumed that the effects of cooperation, leadership, tracking, collaboration, and teacher expectations are held constant as are the background characteristics of students and schools. Consequently, the sole subject of discussion is the effect of school size on dropout that does not work indirectly through any other mechanism.

Figure 4.1 presents a graphic summary of the fitted relationship between dropout and school size for males,⁸ by the socio-economic status of the school and by race.⁹ Here, note that for all three groups the lines slope upwardly from left to right. Without ascribing causality, this suggests that dropout tends to be lower when fewer students are enrolled and higher when more are enrolled.

Figure 4.1: Fitted relationship between DROPOUT and SCHLSIZE for low and high values of school socio-economic status and for White, Hispanic and Black males



Figure 4.1 also shows that the impact of school size on student dropout varies across racial groups. In other words, the magnitude of the effect of school size on dropout differs by race in such a way that the salutary effect of smaller school size is slight for students who are White, greater for those who are Hispanic, and greatest for those who are Black. Comparing the three panels, note the difference in slopes; minority males are more likely than White males to be affected by the size of the school they attend. In the top panel it can be seen that among White males enrollment has only a slight effect on dropout; the evidence of this is the nearly horizontal nature of the sloping fitted lines in the top panel. By contrast, the middle panel illustrates a slightly more pronounced effect among Hispanic males; evidence is a pair of more-steeply sloping fitted lines. The bottom panel indicates that Black males may be far more sensitive to policy decisions that involve size than their Hispanic or White counterparts; here the fitted lines are more-steeply sloped than either of the two previous panels.¹⁰

Contrasting the dropout rates in "large" and "small" schools, there is about a four percent difference among White students, a 17 percent difference among Hispanic students, and a 20 percent difference among Black students. In such cases, the effect of size is two times greater for Hispanic than White males and three times greater for Black males.¹¹ Clearly, the pernicious effects of large school size are more severe for minority students, especially those who are Black.

Not only does the effect of size on dropout vary by race, it also depends in part on the background characteristics of fellow classmates. For each panel in Figure 4.1, the gap between the two fitted lines graphically displays the

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effect of school-SES on dropout. When the average socio-economic status of students attending a school is higher, dropout tends to be lower; however, the magnitude of this relationship is slightly greater for White and Hispanic males than for their Black counterparts. More precisely, when the students who attend a school tend to come from homes that are generally more supportive of education and wealthier (e.g., high on a combination of nonschool socio-economic factors that include income, educational level of parents, number of books in the home, etc.), dropout tends to be lower. Among White and Hispanic males the difference SES of a school makes is not quite twice what it is for Black males. Thus, among White students, for any given enrollment there is a seven percentage point difference between the dropout rates for "rich" and "poor" schools. The same is true of Hispanic students. However, among Black students, for any given school size there is a four percentage point difference between the dropout rates for "rich" and "poor" schools. As a result, the socio-economic background of fellow classmates makes less of a difference for students who are Black than it does for either their White or Hispanic counterparts.

Shifting attention from Figure 4.1 to Figure 4.2 reveals that the makeup of a school's student body also has another effect upon dropout; dropout tends to be higher among White and Black males when the students who attend a school are less academically prepared. "Less academically prepared" in this context means students who, on average, report that they have taken more remedial english or math, are more likely to have repeated a grade, have fewer college aspirations, and were less likely to have been read to during the elementary school years. Moving from top to bottom, the panels

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in Figure 4.2 generally mirror the pattern seen in Figure 4.1; that is, the fitted lines become more-steeply sloped. This indicates that school size appears to have the slightest effect upon White males and the greatest effect upon Black males.

Figure 4.2: Fitted relationship between DROPOUT and SCHLSIZE for low and high values of school academic background and for White, Hispanic and Black males



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Two aspects of Figure 4.2 stand out. First, Hispanic males - in marked contrast to their White and Black counterparts - tend to drop out more frequently from schools that enroll more academically prepared students. Second, the academic preparation of students attending a school makes far less of a difference to White males than to Hispanic and Black males; evidence is a pair of nearly overlapping fitted lines in the top panel of Figure 4.2.

There is yet another way in which the background of students in a school influences dropout. The next graphic, Figure 4.3, illustrates that dropout among White and Black males tends to be greater when their classmates are more frequently in trouble with the law, suspended, or tardy, that is, when they are more at risk. As in the previous figure, Hispanic males tend to stand out; in contrast to their White and Black counterparts, dropout among Hispanic males tends to be greater in schools that enroll students who are less at risk. The wider gap between the two fitted lines in the top panel suggests that White males are more sensitive than either Hispanic or Black males to the at risk backgrounds of their fellow students in a school. The varying slopes of the fitted lines in the three panels of Figure 4.3 indicate that, once again, size appears to have the greatest influence upon Black males and the least influence upon White males.

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Figure 4.3: Fitted relationship between DROPOUT and SCHLSIZE for low and high values of school atrisk and for White, Hispanic and Black males



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In summary, as hypothesized, Figures 4.1 to 4.3 indicate that dropout tends to be greater in schools that enroll more students, controlling for characteristics of students and their classmates and in schools of average cooperation, leadership, tracking, collaboration, and teacher expectation.¹² While school size affects dropout for all students, the effect is relatively small for students who are White, greater among students who are Hispanic, and greatest for those who are Black.

Making sense of Figures 4.1 to 4.3 leads back to a literature on school size that is replete with references to the linkage between scale and student engagement. Illustrating this point well in a portrait of a large high school, Lightfoot tells of students' sense of belonging as it relates to school size: "Students spoke of a faceless quality and a disconnection within the school that many attributed to its size . . . 'I can walk thorough these halls all day and not see anyone I know." Continuing she writes, "As schools get larger and the setting inevitably becomes more heavily populated, more of the students are less needed; they become superfluous, redundant." By contrast, "people are more likely to feel a sense of community in small institutions. The scale is important to members' feelings of belonging, visibility, and effectiveness." The writer describes students' "sense of belonging, their view that their individual actions make a difference to the life of the school, and their sense of being visible and accounted for. [A] massive student body, however, does inhibit individual encounters and institutional responsiveness, particularly in the places where students need focused personal attention . . . 'You feel invisible!' complains a disgusted senior."¹³ In this vein Johnson has written; "when large schools also have large student/teacher ratios, as most

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public schools do, the problems of anonymity and impersonal relationships increase exponentially . . . Furthermore, faculty will not assume the same level of personal responsiblility for students in large schools where sheer numbers make knowing every student an impossibility."¹⁴ Others have voiced similar concerns about the wisdom of larger schools where the tendency is toward depersonalization and anonymity. Sizer is instructive in this regard: "When schools are larger students may more easily become passive spectators. In smaller schools it is easier to be an active participant." Echoing this theme Natriello has written, "Of all the alterable characteristics of schools discussed in the different streams of literature, size of school . . . has been viewed 'as the most important condition affecting the structure of organizations' . . . Small schools of 300-400 students are more personalized or less anonymous, have more flexible schedules . . . and have smaller classes."¹⁵ Finally, Goodlad writes, "the characteristic 'large' appears to be consistently descriptive of the less satisfying schools [we studied] and consistently not descriptive of the more satisfying schools."¹⁶

At the same time that Figures 4.2 and 4.3 conform to expectations, in two important respects, this series of plots illustrates that Hispanic students seem to behave differently than their White and Black counterparts. Figures 4.2 and 4.3 illustrate that dropout among Hispanic males is greater in schools that enroll more academically prepared students and students who are less at risk. Although the data that were analyzed for this study do not provide any further clue to the underlying mechanisms that may account for this occurrence, one might speculate about the processes at work here.

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One of the more promising explanations of this phenomenon involves English language proficiency. If some Hispanic students are distinguished from their White and Black classmates either by a real or perceived deficiency related to language, then being surrounded by more academically oriented classmates may only heighten feelings of perceived inferiority. One writer has stated that "on the whole, young people feel the need to be as similar to their peers as possible." If, due to language differences, Hispanic students feel separated and different from their peers, this may, "aggravate the anxiety that accompanies [their] development."¹⁷ To the extent that Hispanic students with limited English proficiency feel anxious about school and out of place among their White and Black peers, they may feel less connected to the school community. Moreover, if schools that enroll more academically prepared students also have more White students and, consequently, fewer remedial or bilingual resources, then Hispanic students who require special language assistance in such schools may have to leave the regular classroom in order to receive the help they need. This, too, may exacerbate the feeling that "I am different and deficient" that may contribute to increased dropout. Alternatively, if one finds proportionally more Spanish-speaking students enrolled in schools that enroll less academically prepared students, then Hispanic students may consequently feel less "different" and more at ease around students who share not only their cultural heritage but also their limited English language facility. Moreover, if schools with less academically prepared students also have greater concentrations of Spanish-speaking students, then they may also have more remedial and bilingual resources. As a result, Hispanic students

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with special language or learning needs may not be as readily "pulled-out" for special assistance in such schools. Because this may help dispell feelings that "I am different and deficient," it may lead Hispanic students to identify more closely with the school community, and, thus, it may help decrease dropout.

In a related way, if the emphasis on competition is greater in schools that enroll more academically prepared students, then the greater pressure to succeed may lead Hispanic students who find themselves on the margin to drop out in disproportionate numbers. In this regard, some have advanced what has been called a "vacancy theory."¹⁸ Within a given school, the argument goes, there are a limited number of seats available in the more academically stimulating classes. As a result, an individual student's educational success or failure depends, to some extent, on the characteristics of the classmates with whom the student must compete.¹⁹ Where the competition is stiffer, the chance of failure is greater, all else being equal. "Failure," in this context, may mean lack of access to the limited number of seats in the more academically stimulating classes. And, if it is true that "success is the fuel of engagement," then "disengagement may be due to the intense fear of failure."²⁰ Thus, dropout may be greater for those Hispanic students who more frequently experience failure when competing with classmates who are better prepared academically. This suggests that racespecific policies may be appropriate. The remedy appropriate for Hispanic students may differ from the remedy suitable for White or Black students.

Setting aside issues of causality for a moment, Figures 4.1 to 4.3 suggest that organizing high schools so that they have fewer students will have the most benefit for those who need them most, namely youngsters of color and

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accent, or those who typically tend to be least well-served by the system of public education in this country. In view of the numerous obstacles that Hispanic and Black youngsters face (e.g., families under stress, poverty, homelessness, nutrition, etc.), the impact these organizational changes can have on their lives is considerable. The potential ameliorative effect of these changes should be underscored. Minority students stand to gain more than majority students from the implementation of these policies.

Influence of Staff Cooperation on Dropout

The next series of three figures graphically displays the fitted relationship between cooperation and dropout for males, by race and school covariates. Once again, each figure includes a panel for students who are White, a separate panel for students who are Hispanic, and a third for those who are Black. In different ways, each figure shows how the background of students in a school influences dropout. For instance, Figure 4.4 illustrates the effect of school-SES; Figure 4.5 shows the impact of school-academic background; and Figure 4.6 demonstrates the effect of school-atriskness. Consider first Figure 4.4.

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Figure 4.4: Fitted relationship between DROPOUT and COLLCOOP for low and high values of school socio-economic status and for White, Hispanic and Black males



Figure 4.4 presents a graphic summary of the fitted relationship between dropout and cooperation (or collegiality) for males, by the socioeconomic status of the school and by race. Observe that in all three panels the lines slope upwardly from left to right. Without ascribing causality, this suggests that dropout seems to depend on cooperative staff relations or the lack thereof. Across race, dropout tends to be less prevalent in schools where there is more staff cooperation. "Schools where there is more staff cooperation" refers to schools where teachers on average are more apt to report that they can count on other staff members for help, that the staff cooperate, that efforts are coordinated, and that the school runs like a family.

While in Figures 4.1 to 4.3 it was clearly apparent that the effect of size on dropout was different across race, in Figure 4.4 the contrast is not as dramatic. Contrasting the dropout rates in "more collegial" and "less collegial" schools,²¹ there is about a one percent difference among White students, a seven percent difference among Hispanic students, and a nine percent difference among Black students. Despite the smaller effect, this demonstrates the nominal influence that cooperation has on dropout among majority students. The nearly horizontal pair of fitted lines in the top panel in Figure 4.4 illustrates this. By contrast, the more steeply sloping fitted lines in the middle panel in Figure 4.4 indicate that the effect of cooperation on dropout appears to be substantially greater among Hispanic students. The bottom panel indicates that the effect of cooperation on dropout seems marginally greater among students who are Black than those who are Hispanic. In brief, the trend first seen in Figures 4.1 to 4.3 is again reflected in

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Figure 4.4. That is, the predictor's influence on dropout is smaller among students who are White, greater among those who are Hispanic, and greatest among individuals who are Black.

Figure 4.4 also illustrates that the effect of school-SES appears to differ across race. For all three racial groups, the gap between the pair of fitted lines in each panel suggests that when the socio-economic status of students attending a school is lower, dropout tends to be higher. The average socioeconomic status of students attending a school affects White students and Hispanic students more than Black students. The top two panels display gaps that are fairly large and equal in magnitude; hence school-SES appears to make a substantial difference in dropout for White and Hispanic students. By contrast, the gap between the two fitted lines in the bottom panel is smaller, indicating that school-SES seems to make less of a difference among students who are Black. This mirrors what was seen earlier in Figure 4.1.

The next display, Figure 4.5, illustrates the fitted relationship between dropout and cooperation for males, by the academic background of the school and by race. Note that in all three panels the lines slope upward from left to right again indicating that higher dropout tends to be associated with less cooperation. Note, too, that for all three racial groups, the gap between the pair of fitted lines in each panel suggests that dropout differs based on academic preparation. Dropout among White males and among Black males appears to be greater when the student body in a school tends to be less wellprepared academically. By contrast, however, dropout among Hispanic students is greater when students attending a school tend to be better prepared academically.

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Figure 4.5: Fitted relationship between DROPOUT and COLLCOOP for low and high values of school academic background and for White, Hispanic and Black males



Reflecting what was seen earlier in Figure 4.2, Figure 4.5 also illustrates that the average academic preparation of students at a school seems to have a greater effect on minority students. The small gap between the pair of fitted lines in the top panel indicates that, among those who are White, the average academic preparation of students attending a school has only a small effect on dropout. As expected, dropout among White students tends to be greater when classmates are less well prepared academically. The average academic background of students at a school has a similar, but greater, effect upon students who are Black. In marked contrast, however, to their White and Black counterparts, Hispanic males tend to drop out more frequently from schools that enroll more academically prepared students.

Figure 4.6 indicates that the background of other students in a school influences dropout in yet another way. Dropout among White males and Black males tends to be greater when classmates are more at risk, that is, when they are more frequently in trouble with the law, suspended, or tardy. Dropout among Hispanic students, on the other hand, tends to be greater when classmates display fewer at-risk characteristics. This is consistent with what was first seen in Figure 4.3.

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Figure 4.6: Fitted relationship between DROPOUT and COLLCOOP for low and high values of school atrisk and for White, Hispanic and Black males



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In summary, Figures 4.4 to 4.6 indicate that there appears to be a between-school relationship involving cooperation and dropout that is consistent with what is expected based on a reading of the literature. The literature identifies staff cooperation with more effective school functioning.²² Given this, it is anticipated that a more cooperative ethos might be associated with lower levels of student dropout.

Reflected in Figures 4.4 to 4.6 are two trends that emerged in earlier plots of the relationship between dropout and school size. First, it seems that minority student dropout may be impacted more than White student dropout by a school's collegial staff relations. Thus, although it seems true that, irrespective of race, dropout tends to be greater in schools typified by less collegial staff relations, this effect tends to be weak among students who are White, stronger among students who are Hispanic and strongest among those who are Black. As we shall see in the next series of fitted plots involving dropout and principal leadership, this pattern--that minority students are impacted more than White students--changes.

The second trend involves what may be thought of as an interaction between race and two of the school control variables--school academic background and school atrisk. Unlike White and Black students, dropout among Hispanic pupils appears greater in schools that enroll more academically prepared students and students who display fewer at-risk characteristics. Once again, this same theme, namely, that Hispanic students appear to respond differently to the influence of their classmates than either their White or Black counterparts, emerged earlier in Figures 4.1 to 4.3. In the

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next series of fitted plots depicting the relationship between dropout and leadership, we shall see that this pattern is repeated.

Before leaving the discussion of cooperation and moving to leadership, there is the issue of reciprocal causation to address. This is what might be called the chicken and egg question. Does increased cooperation decrease dropout or result from it? In other words, does x cause y or does y cause x? That is, one would like to think that as staff cooperation increases, dropout declines. However, it is equally possible that as dropout declines, staff finds it easier to cooperate. It is conceivable that causation could run in either direction. Regrettably, largely because this study is non-experimental, it sheds little light on this question.

Influence of Leadership on Dropout

The final series of plots graphically displays the fitted relationship between leadership and dropout for males, by race and school covariates. Following the format established in the preceding plots, in different ways each figure shows how the backgrounds of students in a school influence dropout. Consequently, Figure 4.7 depicts the effect of school-SES, Figure 4.8 illustrates the impact of school-academic background, and Figure 4.9 demonstrates the influence of school-atriskness. Moreover, each of the three figures includes a panel for students who are White, a second panel for those who are Hispanic, and a third for those who are Black.

In these figures, the primary focus of attention is on the main effect of leadership on dropout with special concern devoted to the direction of the

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relationship. Consideration is also given to the way in which the main effect differs by race.

Before engaging in discussion of Figures 4.7 to 4.9, it is important to note that the effect of school controls differs by race. More precisely, unlike either their White or Black peers, Hispanic pupils drop out more frequently in schools that enroll more academically prepared students and students who display fewer at-risk characteristics. However, because this effect has previously been discussed, it is only mentioned here in passing.

Consider Figure 4.7 showing the relationship between leadership and dropout for males, by race and school-SES.

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Figure 4.7: Fitted relationship between DROPOUT and LEADERSH for low and high values of school socio-economic status and for White, Hispanic and Black males



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In each of the three panels in Figure 4.7, the fitted lines that slope upwardly from left to right indicate that, across race, dropout tends to be greater in schools with more directive principal leadership. "Schools with more directive leadership" refers to schools where teachers, on average, are more apt to report that goals are clear and that the principal sets plans, decides on priorities, indicates what is expected, and communicates a vision to the staff. Moreover, the less-steeply sloped pair of fitted lines in the middle panel are evidence of a weaker relationship between leadership and dropout among Hispanic students. In other words, dropout decisions among Hispanic students appear to be less responsive to differences in principal leadership than are dropout decisions among either White or Black students. The fitted lines in the top and bottom panels have identical slopes suggesting that the effect of leadership on dropout is similar for students who are White and students who are Black. As in previous plots involving school-SES, across race dropout tends to be greater when school-SES is lower.

The next display, Figure 4.8, graphically illustrates the fitted relationship between leadership and dropout for males, by race and schoolacademic background. Once again, for all three panels the positive relationship between leadership and dropout is reflected in the upwardly sloping lines. And once again, the nearly horizontal pair of lines in the middle panel indicates a weaker relationship between dropout and leadership among Hispanic students. As in previous plots involving school-academic background, dropout among Hispanic students is greater when students attending the school are more academically prepared; in this regard Hispanic students differ from their counterparts.

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Figure 4.8: Fitted relationship between DROPOUT and LEADERSH for low and high values of school academic background and for White, Hispanic and Black males



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The final graphic, Figure 4.9, displays the fitted relationship between leadership and dropout for males, by race and what is called "school-atrisk." In all three panels the positive relationship between leadership and dropout is again reflected in the upwardly sloping lines. Hispanic students are distinguished from their counterparts in two regards: first, the slightly sloped lines in the middle panel provide evidence of a weaker relationship between dropout and leadership among Hispanic students; second, unlike their White or Black peers, dropout among Hispanic students is greater when students attending the school are more academically prepared.

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Figure 4.9: Fitted relationship between DROPOUT and LEADERSH for low and high values of school atrisk and for White, Hispanic and Black males



Contrary to expectation, Figures 4.7 to 4.9 illustrate that, irrespective of race, dropout is more prevalent in schools with more directive principal leadership. What might plausibly explain why the effect of principal leadership on dropout is not in the hypothesized direction? Several possibilities arise. One has to do with our assumptions about what leadership is actually measuring. In this regard, it may prove useful to review why it was originally thought that dropout would be lower in schools with strong principal leadership. To review, "strong principal leadership" refers to schools where the principal sets plans and decides on priorities; the principal indicates to staff what is expected of them; the principal communicates a vision to the staff; and where teachers perceive that school goals are clear.

With respect to leadership, the working hypothesis this study started with stated that, because a portion of the effective schools literature emphasizes the prominent role that strong principals play in helping to promote student achievement, it stands to reason that vigorous leadership may derivatively also have a positive influence on dropout. Causality aside, if higher than expected average student achievement is the result of directive principal leadership, then, the reasoning goes, students may be more engaged not only with their schoolwork but with the school community itself, and their sense of belonging or "membership" may consequently be higher.²³ Students who are more engaged with their work and the school community may be less prone to drop out.

The finding that vigorous principal leadership gives rise to greater dropout prompts careful reexamination of this working hypothesis. How can one reconcile the possibility that vigorous principal leadership may

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concomitantly result both in higher student achievement and greater student dropout?²⁴ And more importantly, from the ethical standpoint, how tolerant should a society be of a situation whereby excellence in the form of achievement seems to come at the expense of access to schooling especially for the poor and non-White?

It is tempting to think that strong leadership is somehow good. Given the weight of evidence from the effective schools research, there seems to be ample justification for such a normative judgment. However, it is quite possible that vigorous leadership by a principal, as it is conceptualized in this study, could also indicate the presence of an autocratic leader. One might think of this as the "Joe Clark" syndrome, the "my way or the highway" leadership mode. Although the staff of a school may have agreed, albeit reluctantly, to accept the goal that a domineering principal has imposed, it is possible that the goal may not be the "right" goal, at least from the standpoint of students on the brink of dropping out. If a vigorous, authoritarian leader like Joe Clark believes that the solution to a school's ills is to exclude "problem kids," then strong leadership can lead to greater dropout.²⁵

While these possibilities may help explain why the effect of principal leadership on student dropout is not in the hypothesized direction, other rival hypotheses are possible. One such hypothesis involves the error associated with self-reported data on teacher perceptions. Even though teachers report goal consensus within their school, there is the chance that teachers only <u>think</u> consensus has been achieved. Asked to identify and rank the goals of their school, far less consensus may actually be found to exist than

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is perceived to exist. Independent analyses of these same data from the Administrator and Teacher Survey file lend support to this possibility.²⁶

The same reciprocal causation argument that was advanced with regard to cooperation - namely that causation could run in either direction may also be made about principal leadership. That is, one might think that as leadership becomes less directive, dropout declines. However, is it not equally possible that as dropout declines, so, too, does the need for directive leadership? As with cooperation, it is difficult to reach any definitive answer to this question, given the non-experimental nature of this study.

In summary, the magnitude and direction of this effect lend support to an emerging view of effective principal leadership that emphasizes the facilitating role of school leaders. More and more, the prevailing wisdom is that "strong leaders" are supportive principals who share decision-making. Increasingly, the claim that strong leadership means being in control is under challenge, with many viewing it as dysfunctional.

Indirect Effects of School Size on the Dropout Rate

The message this study delivers is a troubling one. Whether a student leaves high school with a diploma is profoundly affected by the characteristics of the school itself. Bigger schools beget higher dropout rates, especially for poor students of color and accent. Moreover, students who might otherwise be inclined to stay in school tend to leave in disproportionate numbers when the school has an uncooperative staff or a directive principal. Again, this is particularly the case for those who are Hispanic or Black.

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However, as distressing as these findings are, they are not surprising. In many respects, they may reinforce what others, including Wehlage and Rutter, have recently reported.²⁷ Referring to small school size as the key structural characteristic that leads to more collegial staff relations and greater shared governance, Wehlage and Rutter argue that the greater teacher autonomy that is possible in small settings can help mobilize student engagement and result in lower dropout rates. Small schools play a prominent role in minimizing dropout by making it possible for a teacher to relate to a student as an individual, they maintain. In turn, as a teacher comes to know a student better, the teacher's stake in that student's success grows. This greater sense of personal accountability for an individual student's success is a crucial ingredient, they argue, in reducing dropout.²⁸

To determine whether the findings from the current study support the claims of Wehlage and Rutter, I reestimated the final model after deleting cooperation and leadership. As a result, the magnitude of the effect that school size has on dropout increased by one third. This increase provided modest, although not compelling, evidence that enrollment influences dropout indirectly through the mechanism of cooperation and leadership. Hence, it seemed to support the theory advanced by Wehlage and Rutter.

Probing further, I explored whether school size helped explain staff cooperation or principal leadership.²⁹ Results of this investigation indicated that there is a relationship between school size, staff cooperation, and principal leadership; moreover, this relationship differs by race. Dropout among White students may be higher when schools are larger because large school size hinders cooperation among staff and gives rise to <u>more directive</u>

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principal leadership.³⁰ By contrast, dropout among Black students may be higher when schools are larger because, in part, large school size hampers collegiality among staff and results in <u>less directive</u> principal leadership.³¹ In sum, this investigation did support the claims of Wehlage and Rutter.

What, then, might explain why the styles of principal leadership in large high schools vary based on the racial composition of the students attending the school? Although it is speculative, the answer to this question may have less to do with racial composition and more to do with the substantial differences between large urban high schools and large suburban high schools. First, schools attended primarily by pupils who are Black are different in several important respects from schools attended predominantly by White students. Black students attend larger schools than their White counterparts, in general. Moreover, most Black students attend urban schools.³² Large urban high schools are more difficult to administer not only because they are larger, but because they enroll a disproportionate number of disadvantaged youngsters (e.g., poor, linguistically-different, etc.). "Politically it is more difficult to finance [and administer urban] schools when you are dealing with children from disadvantaged backgrounds because the rest of the community isn't always eager to come up with the extra dollars" reports one urban administrator.³³ Because the problems are so much more complex in a large urban high school, the job of principal can be more daunting than it is in suburbs where it is simply easier to administer. As a result, because the principal in an urban high school may be perceived by teachers to have less influence over what transpires, leadership may be viewed as less directive.

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In Chapter Five, the final chapter, attention is devoted to exploring the mechanisms that might explain why dropout tends to be higher when schools are larger, relationships are less collegial, and principals are more directive. Within Chaper Five, I speculate how smaller school size, more collegial relationships, and wider shared leadership work in tandem to the benefit of students on the margin, and I hypothesize about the causal linkage between leadership, achievement, and dropout.

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² Effects uncovered may not point in the hypothesized direction.

³ In the fitted plots the same approach is taken in both text and in the plots. That is, I have elected to plot the between-school relationship between size and dropout for schools ranging from very large to very small. Hence, in the distribution of all schools by enrollment, the "very large" and "very small" schools depicted in the plots fall two standard deviations above and two standard deviations below the sample mean. Moreover, in the case of SCHLSIZE, I have converted the standardized values into a more meaningful metric; namely number of students.

⁴ In computing the predicted values that were used to create the plots of fitted relationships depicted in Figures 4.1 to 4.9, coefficients were multiplied by 100. In this manner, probabilities have been expressed as percentages.

⁵ In the fitted plots the upper and lower quartiles are used instead of standard deviations. In other words, in the case of SCHLSES, the school whose average SES is very "rich" would be one whose SCHLSES is greater than 75% of all schools; alternatively, school would the school whose average SES is very "poor" would be one whose SCHLSES is lower than 75% of all schools. Consequently, in the distribution of all schools by average SES, these two schools would fall one quartile from the mean. As a result, the description of the effects of school controls on dropout that appears in text does not exactly match what appears in the fitted plots; nonetheless, the underlying relationships are the same.

Distribution of SCHLSIZE by race:

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White students	mean=1286	median =1245
Black students	mean=1492	median =1342
Hispanic students	mean=1596	median =1443

⁷ "Large" in this context refers to schools that rank in the 95th percentile according to student enrollment. For White students that means 2483 pupils, for Black students that translates into 2664 pupils, and for Hispanic students that comes to 3400 pupils. "Small" in this case refers to schools that rank in the 5th percentile according to student enrollment. For White students that means 329 students, for Black students that translates into 445 students, and for Hispanic students that comes to 511 pupils.

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¹ "Tracking" as it is used to here refers to curriculum grouping as opposed to ability grouping. Following Bryk and Thum this variable is a "measure of the proportional allocation of students across the academic P_A , the general P_G , and the vocational P_V tracks. Formally, TRACKING = $P_A(1-P_A) + P_G(1-P_G) + P_V(1-P_V)$. TRACKING takes on a maximum when students are equally dispersed among the three tracks and a minimum of zero when students are all concentrated in a single track." Anthony S. Bryk and Yeow Meng Thum, "The Effects of High School Organization on Dropping Out: An Exploratory Investigation," *American Educational Research Journal*, Fall 1989, Vol. 26, No. 3, p. 374)

⁸ The standardized variable SCHLSIZE has been converted into a more meaningful metric.

⁹ For ease of interpretation, only males are displayed both in Figure 4.1 and all succeeding figures. Because the effect of gender is fixed, a parallel display of females mirrors what is graphically presented for males. The only difference is that, across race, the chance of dropout is slightly greater for females than males.

¹⁰ Caution is urged when interpreting because this may, in part, be an artifact of sample size and stability of estimates.

¹¹ For White males, this represents a change of 1%; for Hispanic males a change of 2%; and for Black males a change of 3%.

¹² Throughout the discussion in this section on SCHLSIZE, it is assumed that the effects of all other "question variables" (COLLCOOP, LEADERSH, TRACKING, COLLMIN, and CANLEARN) have been controlled.

¹³ Sara Lawrence Lightfoot, The Good High School: Portraits of Character and Culture, (New York: Basic Books, 1983)

¹⁴ Susan Moore Johnson, *Teachers At Work: Achieving Success in Our Schools*, (New York: Basic Books, 1990)

¹⁵ Edward McDill, Gary Natriello, and Aaron M. Pallas, "A Population at Risk: Potential Consequences of Tougher School Standards for Student Dropouts," in *School Dropouts: Patterns and Policies*, ed. Gary Natriello (New York: Teachers College Press, 1987)

¹⁶ John I. Goodlad, A Place Called School: Prospects for the Future (New York: McGraw Hill, 1984)

¹⁷ Robert P. Moses *et al.*, "The Algebra Project: Organizing in the Spirit of Ella, *Harvard Educational Review*, (Volume 59, Number 4, 1989)

¹⁸ A. B. Sorenson, "The Organizational Differentiation of Students in Schools as an Opportunity Structure," *The Social Organization of Schools*, M. Hallinger (Ed.), (New York: Plenum Press, 1987, p. 103-129).

¹⁹ Anthony S. Bryk, Valerie Lee, and Julia Smith, "High School Organization and its Effects on Teachers and Students," *Choice and Control in American Education, Volume 1*, (London: Falmer Press, 1990, p. 151).

²⁰ Theodore R. Sizer, Horace's Compromise: The Dilemma of the American High School, (Boston: Houghton Mifflin, 1984)

²¹ "More collegial" in this context refers to schools that rank in the 95th percentile according to cooperative staff relations. By contrast, "less collegial" refers to schools that rank in the 5th percentile of the COLLCOOP distribution.

²² Susan Moore Johnson, *Teachers At Work: Achieving Success in Our Schools*, New York: Basic Books, 1990, (p. 48, 148-179, 326, 331). Anthony Cipollone, "Trying to Beat the Odds; A Study of Comprehensive High Schools and At-Risk Students," (Unpublished disseration, Harvard Graduate School of Education, 1990, p. 122-132). Anthony S. Bryk and Mary E. Driscoll, "High School as Community: Contextual Influences and Consequences for Students and Teachers," (Madison: Wisconsin Center for Education Research, 1988, p. 1-35)

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²³ "Membership" is a term used by Wehlage and Rutter *et alia*, *Reducing the Risk: Schools as Communities of Support*, (New York: Falmer Press, 1989)

²⁴ One possible explanation, of course, is that average school achievement is higher because those who drop out tend to score lower on tests that measure achievement.

²⁵ However, at this juncture this is entirely speculative given that the data used for this study do not indicate how teachers' responses map onto actual school conditions.

²⁶ Analyses were conducted by Anne Chase, Harvard University Graduate School of Education, winter, 1990.

²⁷ Gary Wehlage, Michael Rutter et al., Reducing the Risk: Schools as Communities of Support, (Madison: CPRE, 1989, p. 134-150).

28 Others make a similar argument. Bryk and Thum, for instance, suggest that small school size is an enabling condition that, once established, makes it more likely that other conditions will arise, namely a greater sense of community and more shared decision-making. As a result, the institution may more flexibly respond to the needs of at-risk youth, thus leading to reduced dropout rates. See Anthony S. Bryk and Yeow Meng Thum, "The Effects of High School Organization on Dropping Out: An Exploratory Investigation," *American Educational Research Journal*, Fall 1989, Vol. 26, No. 3, p. 25-26. See also Anthony S. Bryk, Valerie Lee, and Julia Smith, "High School Organization and its Effects on Teachers and Students," *Choice and Control in American Education, Volume 1*, (London: Falmer Press, 1990, p. 135-226).

29 These subsequent analyses relied on ordinary least squares regression. At first, the analyses were conducted at the school-level only. This approach did not support the working hypothesis of Wehlage and Rutter's suggesting that size influenced dropout indirectly through cooperation and leadership. Given the possibility that school sample weights might make a difference in the results, a second set of analyses was performed both with and without school sample weights. Weighting did not alter the findings in any important respect. Then, thinking that the HLM analyses may differ from these OLS results because HLM weights withinschool estimates according to the precision of the estimates, a third set of analyses that weighted the least squares regression on the basis of number of students in a school was conducted. The rationale for doing so was that, all things being equal, schools with more students should yield more precise within-school estimates. Regressions relying on this form of weighting also did not alter the results in any important way. Neither cooperation nor leadership still did not explain school size. This led to a fourth set of anlayses conducted at the student-level but incorporating data from the school-level. Thinking that the relationship between size, cooperation, and leadership might differ by race, size was modelled as a function of cooperation and leadership, by race. Results of this set of analyses bore some relation to the theory of Wehlage and Rutter.

³⁰ Modelling size (at the student-level) as a function of cooperation and leadership yielded the following results for students who are White. $R^2 = 2.9\%$

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Coefficient of COLLCOOP = -.11 (*t*-statistic=-5.119, p-value=.0001) Coefficient of LEADERSH = .18 (*t*-statistic = 8.732, p-value=.0001) The standard errors reported here are untrustworthy.

³¹ Modelling size (at the student-level) as a function of cooperation and leadership yielded the following results for students who are Black. $R^2 = 3.9\%$

Coefficient of COLLCOOP = -.14 (t-statistic= -2.988, p-value=.0029)

Coefficient of LEADERSH = -.10 (*t*-statistic = -1.843, p-value=.06591) The standard errors reported here are untrustworthy.

³² In preliminary results, demographers analyzing 1990 U.S. census data have found that less than 25 percent of the nation's Blacks live in suburbs. Moreover 30 percent of the nation's Blacks live in neighborhoods that are at least 90 percent Black. *Education Week*, Vol. X, No. 24, May 15, 1991, p. 15.

³³ Remark attributed by *Education Week* to George Daniel, superintendent of schools in Somerset County, N.J. *Education Week* writes that, according to Daniels, "in large urban high schools, there are far more regulations [to deal with], more paperwork, and more documentation in terms of funding.' In addition to meeting mandates requiring bilingual education, [urban school administrators] must 'comply with regulations requiring smaller classes for disadvantaged students, [regulations] that either double or triple the cost of teacher salaries." *Education Week*, Vol. X, No. 24, May 15, 1991, p. 16.

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CHAPTER FIVE

CONCLUSIONS AND IMPLICATIONS

The twofold message this study delivers is this: first, from the standpoint of dropout it does make a difference which school a child attends; and second, there are steps educators can take to reduce the student dropout rate. This study provides evidence that the student dropout rate is systematically related to the policies and practices over which schools do have control, and, as such, it leads to the conclusion that "we know enough to act."¹

Clearly, just "holding" students should not be the goal of schools. But when schools fail to captivate, students may feel exit is their only voice. The solution should not have to be exit. Students should not have to "vote with their feet."² Schools can be organized in ways that make them attractive to all students.

Having shown that size plays a critical role in the organization of schools, the challenge is now to evaluate whether the burdens of large school size outweigh the benefits. In this regard, one argument that is often made in support of increased school size is that larger schools are more cost efficient because they capitalize on economies of scale. "It is argued that financial savings accrue as core costs are spread over a larger pupil base. In theory, these savings create marginal resources which can then be applied to strengthening a school's academic offerings."³ However, as this study has helped demonstrate, this argument has its limitations. The consequences that result from larger school size, namely the increasing isolation of

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students, particularly those of color, can lead to disengagement and subsequently greater dropout. In addition, larger school size also contributes to less collegiality among staff and, for the most part, to less vigorous principal leadership.

The question is then, can educators have it all? Can schools be organized in such a fashion that they capitalize on the benefits of economies of scale that accrue to larger schools and still overcome the tendency toward depersonalization and anonymity so characteristic of large high schools? As schools grow in size, so too does the importance of support mechanisms for those most at risk of becoming casualties. Though it is speculative, the answer may well lie in schools-within-schools.

The preferred arrangement is to have bigness and smallness - a broad education program with supportive social arrangements. Small high schools [should] expand their education offerings . . . by using off-campus sites or mobile classrooms or part-time professionals to provide a research experience for all students. Large high schools [should] organize themselves into smaller units - 'schools-within-a-school' - to establish a more cohesive, more supportive social setting for all students. It is difficult to say when a school is too big, the point where school-within-a-school should be introduced. However, schools enrolling 1,500 to 2,000 students are good candidates for reorganization into smaller units of several hundered each.⁴

Even if policy that is dictated from above specifies large enrollment, it is still possible to arrange a school-within-a-school either vertically or horizontally. Moreover, there are other strategies that may prove fruitful in reducing dropout. For instance, creative approaches to block scheduling (along the lines of the approaches used at Colorado College and Masconomet

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Regional School District) may help create an enhanced sense of community that can be effective in minimizing dropout.⁵

Small school size creates the kind of school environment that students find more hospitable. In particular, small size gives rise to more cooperative staff relationships. When teachers' relationships are marked by collegiality, they are more likely to find their work satisfying. When connections exist between teachers, the network of support for students is likely to be tighter.

Three recommendations result from this study. Making large schools smaller either by reducing total enrollment or by dividing them into smaller, semi-autonomous units can help sustain student engagement and decrease student attrition. Organizing personnel more along the lines of teams and providing frequent opportunities for staff to work together can promote a greater sense of place, community, and connection that generally leads to decreased student dropout. Finally, less directive principal leadership can help broaden staff participation in governance, expand teacher autonomy, and increase teachers' stake in student success, thereby decreasing dropout. These three steps - smaller school size, greater staff cooperation, and less directive principal leadership - can aid schools in addressing the dropout problem.

When deciding whether to adopt these recommendations, policymakers and practitioners are forced to address several moral questions. How responsible are schools to students on the margin? Can we tolerate the increased dropout rate that results from larger school size knowing it will affect different races and classes unequally? The underlying, driving

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concern, of course, is that "this country's school system faces the danger of becoming two systems rather than one. One system leads to opportunity through advanced education and interesting careers; the other is for secondlevel citizens, and it imposes limits, operates on reduced expectations, and manages to discourage and fail more children than it serves well."⁶

At their best, schools may operate as pumps providing impetus, helping youngsters move on in their educational career. Unfortunately, at their worst, schools can operate as sieves, screening out individuals, impeding the progress. Too frequently, it seems, access is sacrificed on the altar of excellence. "From society's standpoint, schools are expected to give top priority to the educational-intellectual development of children . . . That value has no coequal."⁷ But the question is, are schools structured in such a way that all students are eligible for success (or at least successful graduation), or just a few? When an interest in maximizing achievement collides with an interest in maximizing access, sadly, those who lose are those most in need of a boost in life, namely those on the margin. Those "most likely to get caught in the bind are those with the greatest learning and school adjustment needs. These are likely to be low-income and minority students."⁸

Clearly, in the end, schools must commit to dual purposes (1) academic excellence and (2) improved holding power. "The quality of an educational institution must be judged on its holding power, not just on assessments of its graduates."⁹ But there is hope. Schools-within-schools blossom. Shared leadership holds great promise. And, increasingly,

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educators are acknowledging the dividends that accrue to students from greater collegiality.

¹ Andrew Hahn and Jacqueline Danzberger with Bernard Lefkowitz, "Dropouts in America - Enough is Known for Action: A Report for Policymakers and Grantmakers," (Washington, D.C.: Institute for Educational Leadership, 1987)

2 Lawrence A. Cremin, *Popular Education and its Discontents*, (New York: Harper and Row, 1990, p. 19)

³ Anthony S. Bryk, Valerie Lee, and Julia Smith, "High School Organization and its Effects on Teachers and Students," *Choice and Control in American Education, Volume 1*, (London: Falmer Press, 1990, p. 143-144).

4 Ernest L. Boyer, High School: A Report on Secondary Education in America, (New York: Harper and Row, 1983, p. 235)

⁵ Harold Howe II, "Giving Equity a Chance in the Excellence Game," *NASSP Bulletin*, September, 1984, p. 83

⁶ College Entrance Examination Board, "Keeping the Options Open: Interim Report of the Commission on Precollege Guidance and Counseling," Harold Howe II (ed.), (New York: CEEB, 1986, p. 29)

⁷ Seymour Sarason, The Culture of School and the Problem of Change, (Boston: Allyn and Bacon, 1982, p. 265)

⁸ College Entrance Examination Board, "Keeping the Options Open: Interim Report of the Commission on Precollege Guidance and Counseling," Harold Howe II (ed.), (New York: CEEB, 1986, p. 29)

⁹ John I. Goodlad, A Place Called School: Prospects for the Future (New York: McGraw Hill, 1984)

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APPENDIX A

ANALYTIC PROCEDURE

As an adjunct to Chapter Three, this appendix provides a fuller explanation of the way in which variables were constructed. It also describes the analytic strategy and the mathematical notation used in this study. Finally, this appendix summarizes how the Empirical Bayes estimation procedure used by *HLM* helps overcome the problem of imprecise withinschool parameter estimates.

Following Bryk and Thum, I standardized all continuous predictor variables to a mean of zero and a standard deviation of one. Consequently, the magnitude of the parameter estimates resulting from the *HLM* analyses may be directly compared as effect sizes. Moreover, where reasonable to do so (e.g., with school size), coefficients may also be interpreted in a cardinal fashion. In addition, in order to condition the data prior to *HLM* analysis, all school-level variables were centered around their respective grand means, and within-school continuous variables were centered around their respective school means. In part, this helped make the substantive discussion more meaningful, but more importantly, without centering, problems result during *HLM* analyses (e.g., singularities in the within-level variance-covariance matrix).¹ Currently, centering seems to be the only way to resolve these problems.

Earlier in Chapter Three, Table 3.1 listed and described the seven within-school and nine between-school variables used in the *HLM* analyses. These include a dichotomous student-level outcome, DROPOUT. In

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addition, three continuous student-level control predictors at the withinschool level are included. These variables, SES, ACADEMBK, and ATRISK, were standardized (mean of zero and a standard deviation of one) and then centered on their respective school means. The three remaining studentlevel control predictors are the dummy variables, GENDER, HISPANIC, and BLACK. At the between-school level, there are nine continuous variables all of which have been standardized at the school level and centered (mean of zero and standard deviation of one). Three of these are school-level control variables; SCHLSES, SCHLACAD, and SCHLATRI. The remaining six school-level main effects at the between level are SCHLSIZE, TRACKING, COLLMIN, CANLEARN, LEADERSH, and COLLCOOP. Table A.1 that follows lists the continuous variables, indicates the level they appear in the *HLM* analyses, and describes how each was standardized and centered.

Level of analysis	Variable	Description of way continuous variable was standardized and centered
Within-school	SES ACADEMBK ATRISK	Standardized and then centered on respective school means.
Between-school	SCHLSES SCHLACAD SCHLATRI SCHLSIZE TRACKING COLLMIN CANLEARN LEADERSH COLLCCOP	Standardized and then centered on their grand means.

Table A.1: Names of continuous variables, level that variables appear in the *HLM* analyses, and how each was standardized and centered.

Analytic Strategy

The outcome in this study, dropout, is expressed as a function of a linear combination of a set of independent variables, some that describe students and others that describe schools. This study leads to a final model-pair that measures and tests whether school-level predictors influence dropout after the effects of student-level characteristics have been controlled.² In arriving at the final model-pair, I fitted a nested taxonomy of such models starting with model-pairs that included predictors describing student characteristics and moving onto model-pairs that included predictor (or set of predictors) was added in systematic fashion to a model-pair designated as the baseline in the previous level.³

I started with the premise that, within schools, there is a relationship between dropout and particular student-level control predictors like gender, race, socio-economic status (SES), academic preparation, and at-riskness, but that this relationship varies school-to-school. My analytic strategy was first to predict dropout using these student-level control predictors. Then, at the between-school level, I considered the relationship between average schooladjusted dropout and selected school background characteristics like the average academic preparation of students attending a school. Next, having controlled for student and school covariates at the between-school level, I included my "question variables" (size, tracking, collaboration, cooperation, teacher expectancy, and leadership) as predictors in the between-school

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model. In this manner I was able able to identify policy-amenable school characteristics that seem to be effective in minimizing dropout.

Mathematical Notation

In what follows, I illustrate the concept of using a pair of linked within- and between-school models to represent the relationship between student dropout and predictor variables.

I begin by formulating a within-school model that specifies the relationship between a student-level characteristic and the outcome of interest. For the purpose of illustration, I limit myself to a single studentlevel predictor. The form of the equation for each school is as follows,⁴

$$y_{ij} = \beta_{0j} + \beta_{1j} X_{ij} + R_{ij}$$
^[1]

where:

- y_{ij} is the observed value of dropout for the *i*th person in the *j*th school and can take on the value of either 0 or 1;
- (2) X_{ij} represents the unique values of individual *i* in school *j* for the given student-level characteristic, X;
- (3) R_{ij} is student-level residual, or that part of y_{ij} that is unexplained by X_{ij}; and
- (4) β_{0j} and β_{1j} are within-school regression parameters (for intercept and slope respectively) that represent the relationship between dropout and predictor X in school j.⁵

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In this study, one parameter in particular, namely the intercept, β_{0j} , is of special interest. Because the outcome dropout is dichotomous and because values for each continuous predictor in the within-school model are centered about their respective within-school mean, the intercept for a particular school represents the average dropout rate for that school, controlling for the effects of the included student-level predictors.⁶ If these intercept parameters differ across schools, then schools differ in their respective rates of dropout. This would indicate that some schools are more "effective" than others, at least when it comes to minimizing student dropout. In this way, the intercept parameters represent school excellence.

Also of interest however are school-by-school differences in the slope parameters, or β_{1j} . Within a given school, *j*, this parameter represents the relationship between a particular student characteristic and dropout. So, for instance, if the predictor happens to be student-level socio-economic status (SES), then the slope parameter represents the within-school relationship between student SES and dropout. In this example, to the extent that the slope parameters are found to differ across schools, it indicates that in certain schools the effect of student SES on dropout is greater, while in other schools, it is less. This would indicate that some schools are more equitable than others, at least when it comes to minimizing the effect of SES on dropout. In this way, the slope parameters represent school egalitarianism, or equity.⁷

Once a model has been specified to represent the within-school relationship between dropout and background characteristics of students, it then becomes feasible to consider between-school questions:

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- (a) How much do the average dropout rates vary across schools? Put differently, how variable are school intercept parameters (β_{0j}) across schools?
- (b) Across schools, does the relationship between student background characteristics and dropout differ? Or, how variable are the slope parameters (β_{1j}) across schools?

These two questions give rise to the first pair of between-school models that can be evaluated. The answer to the first question is given by the following <u>unconditional</u> between-school model for the intercept parameters:

$$\beta_{0j} = \gamma_{00} + u_{0j} \tag{2}$$

where

- (1) γ_{00} is the average dropout rate across all schools in the population;
- (2) u_{0j} is the school-level residual effect on dropout rate associated with school j.

Here, in the simplest of between-school models, the within-school intercept parameters are expressed in terms of their deviation around the population grand mean value for intercept; that is, these parameters "vary across schools as a function of a grand mean and a random error."⁸

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The answer to the second of the two questions posed above is given by the following <u>unconditional</u> between-school model for the slope parameters:

$$\beta_{1j} = \gamma_{10} + u_{1j} \tag{3}$$

where

- (1) γ_{10} is the average regression slope across all schools in the population;
- (2) u_{1j} is the school-level residual effect on the slope associated with school j.

In Equation [3], the slope parameters are expressed in terms of their deviation around the population grand mean value for slope.

Because the residuals u_{0j} and u_{1j} vary across schools, they have population between-school variances and covariances given by,⁹

$$\operatorname{Var} \begin{bmatrix} u_{0j} \\ u_{1j} \end{bmatrix} = \begin{bmatrix} \tau_{00} & \tau_{01} \\ \tau_{10} & \tau_{11} \end{bmatrix}$$

Moreover, because Equations [2] and [3] are unconditional models, the τ parameters represent the variances and covariances of <u>true</u> within-school intercept and slope across schools.

The next step in this *HLM* analysis is to test to determine first, whether the variance across schools in intercept parameters is different from zero, and second, whether the slope parameters vary across schools. For the former, the hypothesis under test is H_0 : Var (τ_{00}) = 0.¹⁰ For the latter, the

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hypothesis being tested is H_0 : Var $(\tau_{11}) = 0.11$ If these hypotheses are rejected, then there is "explainable" variance in the parameters across schools and two additional questions may then be posed:

- (a) What is it about the way that schools are organized that explains why their average dropout rates vary? Put differently, is the betweenschool variability in school intercept parameters (β_{0j}) related to particular policies and practices of schools?
- (b) Why is the relationship between student background characteristics and dropout stronger in some schools and weaker in others? Or, can the between-school variability in the slope parameters (β_{1j}) be predicted by particular school policies and practices?

From these questions arise two different <u>conditional</u> between-school models; one for the intercept parameters and the other for the slope parameters. First, I represent between-school variation in the intercept parameters as a function of a school-level characteristic, *Z*:

$$\beta_{0j} = \gamma_{00} + \gamma_{01} Z_j + u_{0j} \tag{4}$$

where, because values of Z_i are centered on the grand mean,

- (1) γ_{00} is the average dropout rate across all schools in the population;
- (2) *y*₀₁ is the regression parameter describing the between-school effects of Z on the within-school intercepts;
- (3) Z_j represents the value of school-level predictor Z in school _j (centered on the grand mean across schools); and
- (4) u_{0j} is a school-level residual describing that part of the within-school intercept, β_{0j}, that is not attributable to Z.

Then, to determine whether the variability in the relationship between dropout and the student-level predictor *X* is a function of the policies and practices of schools, I pose a <u>conditional</u> between-school model for slope:

$$\beta_{1j} = \gamma_{10} + \gamma_{11} Z_j + u_{1j}$$
[5]

where, because values of Z_j are centered on the grand mean,

- (1) γ_{10} is the average value of β_{0i} across all schools in the population;
- (2)

 *γ*₁₁ is the regression parameter describing the between-school effect of

 Z on the within-school slope;
- (3) Z_j represents the values of the school-level predictor Z in school j;
 and
- (4) u_{1j} is a school-level residual describing that part of the within-school slope, β_{1j}, that is not explainable by Z.

By estimating η_1 in Equation [4] and $\eta_1 I$ in Equation [5], I can answer Questions (a) and (b) from page 122. Thus, if η_1 is different from zero, then between-school predictor Z is associated with between-school variation in average school dropout. In other words, if the between-school predictor Z happens to represent school size (SCHLSIZE), a non-zero relationship would indicate that the number of students enrolled helps explain why schools vary in their average dropout rates. Likewise, if the between-school predictor Z happens to represent collaboration (COLLMIN), a non-zero relationship would indicate that the amount of time teachers spend collaborating helps explain why schools vary in their average dropout rates. In similar fashion, I can determine whether between-school variation in average school dropout is associated with leadership (LEADERSH), tracking (TRACKING), cooperation (COLLCOOP), and teachers' expectations of

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students (CANLEARN). This permits me to answer each of the research questions listed on page 50 of Chapter Three.

Considering Question (b) from page 122, should I find that γ_{11} is different from zero, then between-school predictor Z is associated with between-school variation in the relationship between dropout and studentlevel predictor X. In other words, if the student-level predictor happens to represent pupil socio-economic status (SES) and if the between-school predictor Z happens to represent school size (SCHLSIZE), then a non-zero relationship would indicate that the number of students enrolled helps explain some of the variability in the relationship between student-level SES and dropout across schools. In likewise manner, I can consider whether the remaining "question variables" (collaboration, leadership, tracking, cooperation, and teachers' expectations of students) help explain systematically varying between-school slope parameters.¹²

Frequently in the past, investigators conducting school effects studies have been hampered by imprecise estimates. In part, this imprecision may result from small samples within schools. I would anticipate that such imprecision may arise in this study because, for some schools in the sample, data on as few as seven students are available. For these schools, a β_j estimate may be imprecise and the reliability of the estimate will be correspondingly low. The algorithm used by *HLM* to obtain estimates of the parameters in Equations [1] to [5], Empirical Bayes estimation, helps resolve this problem by giving more weight in the between-school analyses to those within-school intercepts and slopes that are more precise.¹³ In the process of Empirical Bayes estimation, "strength is borrowed" from the more precise

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estimates for other schools in the sample. As a result, the less reliable β_j estimate for the school with little student data will be discounted and hence the estimate will be "shrunk' toward the grand mean."¹⁴ The extent to which estimates are "shrunk" depends on the relative precision of the estimates involved; in the case of perfectly reliable estimates no shrinking takes place at all.¹⁵

Finally, a caveat is in order. Although logit (or probit) models are more appropriate for representing within-school relationships that include dichotomous dependent variables, *HLM* does not permit logistic withinschool models. In this study, a linear within-school model is used to represent dichotomous dropout as a function of predictors. This, then, constitutes a hierarchical extension of the linear probability model.¹⁶ ¹ Ita G. G. Kreft *et al.*, "Comparing Four Different Statistical Packages for Hierarchical Linear Regression: GENMOD, HLM, ML2, and VARCL," (Unpublished technical paper - CSE Technical Report 311, UCLA Center for Research on Evaluation, Standards, and Student Testing, February, 1990, p. 78, 86-89, 90, 100)

² The analyses conducted in this study involve sample weights. Once a final model was estimated, the weights were removed and results were compared.

³ James J. Kemple, "The Career Patterns of Black Teachers: Evidence from North Carolina," (Unpublished dissertation, Harvard Graduate School of Educationa, 1990, p. 133)

4 Stephen W. Raudenbush and Anthony S. Bryk, "Methodological Advances in Analyzying the Effects of Schools and Classrooms on Student Learning" in *Review of Research in Education*, 1988-1989, Volume 15 (p. 434)

⁵ Stephen W. Raudenbush and Anthony S. Bryk, "A Hierarchical Model for Studying School Effects" in *Sociology of Education*, 1986, Volumne 59 (p. 3)

6 This demonstrates how student-level data are centered around a school mean.

7 The preceding discussion on the application of *HLM* to investigations involving school excellence and equity is addressed by Raudenbush and Bryk. Besides estimating parameter variance, the *HLM* method "enables estimation of the covariation among the betas, that is, 'parameter covariance' that can be of substantive interest. For example, in applications of *HLM* to school effects problems, estimated parameter variances and covariances provide the basis for a maximum likelihood estimate of the correlation between 'excellence' (the mean level of achievement) with 'equity' as measured by the regression coefficients for minority status, social class, and academic background." Stephen W. Raudenbush and Anthony S. Bryk, "Methodological Advances in Analyzying the Effects of Schools and Classrooms on Student Learning" in *Review of Research in Education*, 1988-1989, Volume 15 (p. 436), See also Stephen W. Raudenbush, "The Logic of Hierarchical Linear Models," (Revised April 9, 1990, in press, p. 3)

⁸ Stephen W. Raudenbush, "The Logic of Hierarchical Linear Models," (Revised April 9, 1990, in press, p. 1-8). This demonstrates how school-level data are centered around a sample grand mean. For further clarification and justification for centering student-level data on school mean and school-level data on grand mean, see Stephen W. Raudenbush, "Centering' Predictors in Multilevel Analysis: Choices and Consequences," in *Multi-Level Modeling Newsletter*, Volume 1, Number 2, May, 1989, p. 10-12

⁹ Stephen W. Raudenbush, "The Logic of Hierarchical Linear Models," (Revised April 9, 1990, in press, p. 13).

¹⁰ Stephen W. Raudenbush, "The Logic of Hierarchical Linear Models," (Revised April 9, 1990, in press, p. 14-15).

11 Stephen W. Raudenbush, "The Logic of Hierarchical Linear Models," (Revised April 9, 1990, in press, p. 14-15).

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¹² See Burstein *et al.* when they refer to "systematically varying slopes (SVS)." Leigh Burstein, Kyung-sung Kim, and Ginetter Delandshere, "Multilevel Investigations of Systematically Varying Slopes: Issues, Alternatives, and Consequences," (ed.) R. Darrel Bock, *Multilevel Analysis of Educational Data*, (New York: Academic Press, 1989, p. 237)

13 Anthony S. Bryk, Stephen W. Raudenbush, Michael Seltzer, and Richard T. Congdon, Jr., An Introduction to HLM : Computer Program and User's Guide, Version 2.0, (1988, p. 7). Stephen W. Raudenbush and Anthony S. Bryk, "Empirical Bayes Meta-Analysis," Journal of Educational Statistics, Summer 1985, Volumne 10, Number 2 (p. 76)

¹⁴ "Borrowing strength" is a phrase attributed to John Tukey. Henry I. Braun, "Empirical Bayes Methods," (ed.) R. Darrel Bock, *Multilevel Analysis of Educational Data*, (New York: Academic Press, 1989, p. 21 and p. 49). Stephen W. Raudenbush and Anthony S. Bryk, "Empirical Bayes Meta-Analysis," *Journal of Educational Statistics*, Summer 1985, Volumne 10, Number 2 (p. 86-87).

¹⁵ Stephen W. Raudenbush and Anthony S. Bryk, "Empirical Bayes Meta-Analysis," *Journal of Educational Statistics*, Summer 1985, Volumne 10, Number 2 (p. 87). Henry I. Braun, "Empirical Bayes Methods," (ed.) R. Darrel Bock, *Multilevel Analysis of Educational Data*, (New York: Academic Press, 1989, p. 21).

¹⁶ Ita G. G. Kreft *et al.*, "Comparing Four Different Statistical Packages for Hierarchical Linear Regression: GENMOD, HLM, ML2, and VARCL," (Unpublished technical paper - CSE Technical Report 311, UCLA Center for Research on Evaluation, Standards, and Student Testing, February, 1990, p. 73-74). R. Stiratelli, N. Laird, and J.H. Ware, "Random Effects Models for Serial Observations with Binary Responses," *Biometrika*, 40, 1984, p. 961-967); G.Y. Wong and W.M. Mason, "The Hierarchical Logistic Regression Model for Multilevel Analysis," *Journal of the American Statistical Association*, 80, 1986, p. 513-524). Yeow Meng Thum, "Two-stage Models for Dichotomous Response Data," (Paper presented at the AERA Annual Meeting, Washington, D.C., 1987). Anthony S. Bryk and Yeow Meng Thum, "The Effects of High School Organization on Dropping Out: An Exploratory Investigation," *American Educational Research Journal*, Fall 1989, Vol. 26, No. 3, p. 16). Henry I. Braun, "Empirical Bayes Methods," (ed.) R. Darrel Bock, *Multilevel Analysis of Educational Data*, (New York: Academic Press, 1989, p. 43).

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APPENDIX B

ANALYSES AND SECONDARY FINDINGS

This appendix describes the final fitted model and how it was derived. Predictors that are included in the hierarchical linear models are reported in tables and the direction and relative magnitudes of the estimated coefficients are interpreted in terms of per standard deviation difference in the outcome, dropout. In conclusion, this appendix presents a discussion of the secondary findings related to the effect on dropout of tracking, collaboration, and teachers' expectations.

In stepwise fashion in this appendix, I address the three areas of focus for my research, first, how the background characteristics of students (e.g., race, gender, etc.) are associated with dropping out; second, how the background characteristics of schools (e.g., average socio-economic status of students attending the school, proportion of students enrolled who display "at-risk" characteristics, etc.) are associated with dropping out, and; third, whether dropping out is associated with six different policy-amenable school characteristics.¹ These six include number of students enrolled, proportion of students who are tracked or grouped by ability for instruction, minutes of teacher collaboration per week, extent of staff cooperation, principal leadership, and teachers' expectations of student ability to learn.

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Student-Level Analysis

Following Bryk and Thum, analysis began by investigating the withinschool relationship between selected student characteristics and dropout. Table B.1 displays the estimated correlation coefficients between student-level dropout and SES, GENDER, ACADEMBK, ATRISK, HISPANIC, and BLACK.

Variable	Estimated correl	Estimated correlation with DROPOL	
	This study	Bryk & Thum	
SES	205*	156	
GENDER	066*	030	
ACADEMBK	131*	097	
ATRISK	.384*	.220	
HISPANIC	.036*	.050	
BLACK	.049*	.035	

Table B.1: Estimated correlations of student-level variables with DROPOUT (n= 3,293). Comparison of findings from this study with findings from Bryk and Thum (1989)

p < .04

Comparing the two columns of estimated correlations in Table B.1 reveals marked similarities. First, the signs of the estimated correlation coefficients in each column match. Thus, both studies suggest that dropout appears more likely for students (a) of color; (b) with lower social and economic status; (c) who are less well-prepared academically; (d) who find themselves more at-risk; and (e) who are female. All of these effects are in the expected direction.² Second, for both columns, the correlations between dropout and GENDER, HISPANIC, and BLACK are small; the size of the effects that academic preparation (ACADEMBK) and socio-economic status

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(SES) have on dropout are slightly greater; and the effect of ATRISK on dropout is the strongest. None of the estimated correlations are large or even moderate, however. Finally, with the exception of HISPANIC, the magnitude of the coefficients estimated by Bryk and Thum, though smaller, roughly approximate those derived in the current study.

In this study, the first step in answering the research questions is to posit a within-school model that represents the outcome, dropout, as a function of the six student-level predictors. Each predictor variable in the model represents a different student background characteristic (SES, GENDER, HISPANIC, BLACK, ACADEMBK, and ATRISK). With no predictors at the between-school level, this model is termed the <u>unconditional</u> between-school model.

In additional models, I test whether the effect of each predictor on dropout varies "explainably" across schools or whether the effect can be "fixed" to a common slope across schools.³ Where it proved possible to "fix" a within-school effect without sacrificing goodness-of-fit, it was done so.⁴ Otherwise the effect was permitted to vary across schools (be "random").⁵ Table B.2 summarizes the outcome of this process and shows that there is explainable between-school variation in the within-school parameters associated with HISPANIC, BLACK, ACADEMBK, and ATRISK, but not SES or GENDER.⁶

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Table B.2: Comparison of student-level models of dropout. Fit determined using decrement to Chi-square. Each model includes the outcome DROPOUT, as well as the predictors SES, GENDER, HISPANIC, BLACK, ACADEMBK, and ATRISK (n = 3,293 students).

Mdi	Description	Compare	# Estimated Parameters	Deviance Statistic	χ^2 statistic Δ Deviance	p-value	df
	All predictors rando	n	29	2743.76			
ł	Fix SES	li to i	22	2750.26	6.50	.500	7
1	Fix GENDER	ill to I	22	2751.77	8.01	.343	7
N	Fix HISPANIC	IV to I	22	2768.81	25.05	.001	7
٧	Fix ACADEMBK	V to I	22	2767.43	23.67	.0016	7
VI	Fix ATRISK	VI to I	22	2793.63	49.87	.00001	7
VII	Fix BLACK	VII to I	22	2774.03	30.27	.0002	7
VIII	Fix SES & GENDER	VIII to I	16	2756.91	13.15	.447	13

Note: Convergence achieved for all models (stopvalue for maximum likelihood estimation = .00005).

Comparing the fit of Model II to the fit of Model I, there is no significant decline in the goodness-of-fit after fixing SES (χ^2 statistic = 6.50, p = .5, df = 7). The relatively minor change in deviance statistic per degree of freedom from Model I to Model II suggests that the null hypothesis of no explainable between-school variance in true slope parameter for student SES cannot be rejected. Thus, because the within-school relationship between dropout and the socio-economic status of students appears relatively stable across schools, I specify a reduced within-school model that estimates a common regression slope for SES across all schools.

The same is true of the within-school relationship between dropout and GENDER; comparing the fit of Model III to the fit of Model I, there is no significant decline in the goodness-of-fit after "fixing" GENDER (χ^2 statistic = 8.01, p = .343, df = 7). Again the null hypothesis is not rejected. Hence, across

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schools a common within-school parameter should be estimated for GENDER.

By contrast, the within-school relationship between dropout and each of the four remaining student-level predictors (ACADEMBK, ATRISK, HISPANIC, and BLACK) appears to vary substantially across schools. In each case, the null hypothesis is rejected at the .05 level and each is subsequently treated as a "random" effect.

The last entry in Table B.2 (Model VIII) specifies an optimallyconstrained within-school model with "fixed" effects for SES and GENDER and "random" effects for ACADEMBK, ATRISK, HISPANIC, and BLACK. Comparing the fit of Model VIII to the fit of Model I, there is no significant decline in goodness-of-fit (χ^2 statistic = 13.15, p = .447, df = 13). Having confirmed that Model VIII coefficients provide the "best linear unbiased estimators of the population regression coefficients," I conclude that this model shall serve as the foundation for subsequent model-building.⁷

It is useful to know the degree to which characteristics of schools may help explain student dropout. Estimating the within- and between-school variance in outcome provides some idea of the extent to which school-level factors may account for dropout. Determining the proportion of withinversus between-school variance (sometimes called "partitioning the variance") is accomplished in the following fashion. First, a within-school model is specified that includes a dependent variable, y_{ij} , or dropout for student *i* in school *j*, an intercept, β_{0j} , or in this case school mean dropout, plus R_{ij} , the residual:⁸

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$$y_{ij} = \beta_{0j} + R_{ij}$$

where the R_{ij} have a population within-school variance of σ^2 .

Next, at the between-school level, "each school's intercept, β_{0j} , is represented as a function of the overall grand mean, γ_{00} , plus a residual, u_{0j} ."⁹

$$\beta_{0i} = \gamma_{00} + u_{0i}$$

where the u_{0i} have a population between-school variance of τ .

Applying this approach to the sample data, σ^2 equals 11.75 and τ^{Λ} equals .785 for a total observed variance in dropout of 12.535. Thus the share of the total variance in dropout that is explainable between schools is 6.3 percent of the total variance. Although this suggests the variation in dropout is largely explainable at the within-school level, it may also be deflated artificially by the dichotomous nature of the outcome variable.

Before shifting attention to school-level analysis, a word of explanation is in order with respect to parameters at the student level that are modeled as outcomes at the school level. Because I am primarily interested in explaining dropout I am modeling within-school intercept across schools. However, my model fitting may potentially be improved by simultaneously modeling the within-school parameters associated with ACADEMBK, ATRISK, HISPANIC, and BLACK as a function of predictors across schools. Detecting and accounting for any portion of the systematic variation that is associated with these random effects can help improve model specification and reduce residual variance. Moreover, from a substantive point of view, the differentiating effects of ACADEMBK, ATRISK, HISPANIC, and BLACK may

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prove interesting if they draw attention to what might be thought of as interactions between the characteristics of students and the characteristics of schools. For example, school policies and practices that predict the HISPANIC within-school parameter may differ from those that predict the BLACK within-school parameter. As we shall see, this turns out to be the case.

School-Level Analysis

Adjusting for background characteristics of schools: Having adopted Model VIII as a baseline within-school model, attention turns to constructing a between-school model that takes into account the effect of school background characteristics on dropout. However, prior to fitting models that include school-level predictors, bivariate relationships were explored. Table B.3 displays the estimated correlation coefficients between dropout (aggregated to school-level) and nine school-level predictors. It also contrasts estimates from the current study with estimates from the work of Bryk and Thum.

Table B.3:	stimated correlations of school-level ariables with DROPOUT aggregated the school-level (n= 251 schools).			
	Comparison of findings from this study with findings from Bryk and Thum (1989).			

	Estimated correlation with DROPOUT			
Variable	This study	Bryk & Thum		
SCHLSES	205*	156		
SCHLACAD	131*	097		
SCHLATRI	.384*	.220		
SCHLSIZE	.036*	.050		
TRACKING	.175*			
CANLEARN	299*			
COLLCOOP	062			
COLLMIN	059			
LEADERSH	.041			

* p<.005

The first three predictors in Table B.3 constitute what might be thought of as school controls. For each school in the sample, these may be considered

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to be the average socio-economic background of students (SCHLSES), the average academic preparation of students (SCHLACAD), and the average "at riskness" of students (SCHLATRI). For each of these three school controls, the signs of the estimated coefficients from the two columns correspond. Following a pattern first established in Table B.1, the school control coefficients from the Bryk and Thum study are smaller in magnitude when compared to those derived in this study. Note that, for both columns, the weakest relationship is between dropout rate and SCHLACAD and the strongest is between dropout and SCHLATRI; none however is strong or even moderate in strength. All three do, however, point in the hypothesized direction. In brief, both studies suggest that for a particular school the dropout rate seems to be greater when students in the school on average (a) have a lower socio-economic status; (b) are less well prepared academically; and (c) are more at-risk.

The next six rows of Table B.3 provide a preliminary look at the relationship between dropout rate and the question variables in this study. The first of these, SCHLSIZE, like the previous three school covariates was one of the variables included by Bryk and Thum in their 1989 study; the final five entries in Table B.3 were not.¹⁰

It is at this point that the present study departs from the work of Bryk and Thum. Table B.3 indicates that dropout is greater in schools (a) that enroll more students; (b) that rely more on ability grouping; (c) where teachers are less likely to report that students are capable of learning; (d) where teachers are less likely to perceive that the staff cooperates, efforts are coordinated, they can always count on help, and the school runs like a family;

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(e) where teachers report spending less time collaborating on matters related to instruction; and (f) where teachers perceive that goals are clear, the principal plans and sets priorities, the principal's vision is communicated, and the principal indicates what is expected of teachers. For all but the last of these (LEADERSH), the between-school relationships are as hypothesized; however it should be noted that the estimated coefficients for COLLCOOP, COLLMIN, and LEADERSH are not significantly different from zero at the .05 level. The variable DROPOUT is modestly correlated with CANLEARN, less so with TRACKING, and only weakly with SCHLSIZE.

In light of the preliminary evidence from Table B.3 suggesting that school-level dropout rate may be affected by the average make-up of students who attend a school, the next step is to specify a between-school model that takes this into account. Table B.4 summarizes the results of such a model that includes three school covariates: the average socio-economic background (SCHLSES), academic preparation (SCHLACAD), and at-riskness (SCHLATRI) of students attending a school. Predictors with *t*-ratios that did not exceed 2.0 were excluded and a reduced model was reestimated. It is this more constrained model that appears in Table B.4.

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Table B.4: Model IX - a between-school model of school dropout that includes school controls. Except where noted, for all reported estimates the *t*-ratio of coefficient to standard error exceeds 2.0. Coefficients and corresponding standard errors have been multipled by 100 to reduce the number of decimal places and allow interpretation as percentages rather than proportions. (n = 3,293 students and 251 schools)

	М	Modeling Intercept †	Modeling Slopes (differentiating effects) ††					
		BASE Dropout Rate	ACADEMBK	ATRISK	HISPANIC	BLACK		
Descrip	Variables	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)		
School Controls	INTERCEPT SCHLSES SCHLACAD SCHLATRI	15.990 (.347) -4.313 (.157) -1.524 (.125) 4.596 (.148)	-22.961 (.669) -7.750 (.702) 11.785 (.637) -6.193 (.693)	62.379 (.624) -4.719 (.646) 4.169 (.635)	.471 (.618) ^{###} 5.897 (.601) -7.035 (.586)	-1.533 (.530) 3.173 (.434) -3.843 (.527) -1.815 (.501)		
	% ΔR ² (or ΔT) Proportion of varian in true dropout rate across schools that is explained	ce 35.9%	7.6%	1.3%	8.1%	13.0%		

(...) Estimates are unreported because the t-ratio of coefficient/S.E. is less than 2.0. This model was developed by taking the subset of variables that had t-ratio's of at least 2.0. Variables with t-ratio's that did not exceed 2.0 were deleted and a reduced model was reestimated.

f In this column the coefficient of INTERCEPT represents the mean estimated percentage dropout among White students in schools of average SCHLSES, SCHLACAD, and SCHLATRI. Each of the remaining coefficients in this column indicates the difference in the estimated percentage of students who drop out that is associated with a one standard deviation difference in the predictor, all other things being equal.

In this column, for HISPANIC and BLACK, the coefficient of INTERCEPT represents the mean difference (when compared to Whites) in the estimated percentage of students who drop out that is associated with minority status in schools of average SCHLSES, SCHLACAD, and SCHLATRI.

This parameter estimate is reported in order to show the effect of HISPANIC; however, the tratio of coefficient/S.E. is substantially less than 2.0 (p=.446).

Note: Convergence achieved (stopvalue for maximum likelihood estimation = .00005). The variable, HISPANIC, is an indicator or dummy variable that assumes the value of 1 if a student is a Hispanic and 0 if not. The dummy, BLACK, assumes the value of 1 if a student is a Black and 0 if not. The coefficient for the "fixed" effect of student-level SES is -8.436 (SE = .177). The coefficient for the "fixed" effect of student-level SES is -8.436 (SE = .177). The coefficient for the "fixed" effect of student-level SES is -8.436 (SE = .177).

Interpreting the sign and magnitude of the coefficients in Table B.4 requires reviewing how the data were initially prepared. Recall that studentand school-level variables were both standardized and centered. More precisely, first all continuous predictors at the student-level were standardized with a mean of zero and standard deviation of one. Then for each of these variables, data were centered around the mean value for their respective schools. At the school level, data on teacher perceptions were first

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aggregated, then variables were standardized and centered around the school sample grand means.

Variables were standardized and centered, primarily because it helps resolve computational problems inherent in *HLM*. In particular, difficulties can arise when the "covariance of the OLS intercept and slope" is zero. This can lead to singularities in the variance-covariance matrix of the withinschool parameter estimates. In addition, problems may also crop up when the continuous variables being used in an *HLM* analysis have disparate ranges. Standardizing and centering mitigates these problems.¹¹

Table B.4 reveals that, holding constant the background characteristics of students (SES, GENDER, ACADMEBK, and ATRISK), in schools of average SCHLSES, SCHLACAD, and SCHLATRI, the estimated dropout rate is nearly 16 percent among White students and slightly lower among Black students (\approx 14.5 percent).¹² In this model, the estimated dropout rate for Hispanic students is 16.5 percent although statistically this cannot be distinguished from the estimated rate for White students. The preceding discussion was predicated on the assumption that the relatively large effects of ACADEMBK (-22.961) and ATRISK (62.379) on DROPOUT were held constant. In other words, these centered variables are set to zero in order to represent students of average academic preparation and at-riskness. Henceforth, when findings are interpreted, it will always be assumed that the effects of ACADEMBK and ATRISK are controlled.

Briefly, in three respects the average make-up of students attending a school affects the dropout rate for individuals within a school. First, when the socio-economic status of students attending a school is higher, the

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dropout rate tends to be lower. Second, when the students who attend a school are more academically prepared, the dropout rate tends to be lower. Third, when the students in a school are more frequently in trouble with the law, suspended, or tardy, the dropout rate appears to be greater. As we shall see later in a display of fitted plots, with only a few exceptions (notably involving Hispanic students), this holds true across race.

Relative to the <u>unconditional</u> between-school model which fixes the effect of SES and GENDER (Model VIII), the model displayed in Table B.4 (Model IX) accounts for 35.9 percent of the remaining explainable variance in average dropout. This proportional reduction in Tau was based upon a change from .785 to .503 in the estimated variance of the true intercept. Moreover, between one and 13 percent of the variation in the respective within-school parameters associated with ACADEMBK, ATRISK, HISPANIC, and BLACK is explained. These changes are detailed more thoroughly later in this appendix.

Adding "Question Variables" to the Model: Having established a betweenschool model that includes school covariates, attention turns to the influence of the question variables on dropout. Table B.5 displays six different models, each including a single main effect. For each model, a single main effect was added to a model that already controlled for the background characteristics of students and schools. For Models X-XV the main effect predicts betweenschool variation in intercept. For all but Model XI, the main effect also predicts the within-school parameter associated with HISPANIC. And for all but Models XI and XII, the main effect predicts the within-school parameter

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associated with BLACK. Moreover, when modeling BASE dropout rate, for each of the models reported in Table B.5 the signs of the coefficients of the school control variables (SCHLSES, SCHLACAD, and SCHLATRI) remain unchanged from Table B.4.

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Table B.5: Comparison of school-level models of dropout. Each model has been adjusted for student-level SES, GENDER, ACADEMBK, ATRISK, HISPANIC, and BLACK. Each model introduces a different predictor to a model that includes school-level SES (SCHLSES), academic background (SCHLACAD), and at-riskness (SCHLATRI). Coefficients and corresponding standard errors have been multipled by 100 so that interpretation is as percentages rather than proportions. (n = 3,293 students and 251 schools)

			Modeling Intercept	Modeling Slopes (differentiating effects)			
			BASE Dropout Rate	ACADEMBK	ATRISK	HISPANIC	BLACK
Md	Predictor Descrip.	Variables	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)
X	School size	INTERCEP SCHLSES SCHLACAD SCHLATRI SCHLSIZE	17.195 (.361) -5.355 (.171) -1.021 (.130) 4.428 (.149) 2.497 (.176)	-18.834 (.784) -10.016 (.741) 13.065 (.652) -6.812 (.693) 7.700 (.789)	63.618 (.731) -5.413 (.676) 4.041 (.634) 2.157 (.705)	567 (.651) [†] 6.158 (.597) -6.256 (.591) 2.727 (.591)	-1.537 (.540) 2.576 (.451) -3.989 (.521) -1.956 (.494) 4.367 (.523)
XI	Teacher expectation that students can learn	INTERCEPT SCHLSES SCHLACAD SCHLATRI CANLEARN	16.078 (.349) -3.879 (.167) -1.211 (.129) 4.345 (.151) -4.688 (.512)	-22.749 (.695) -7.606 (.767) 11.717 (.655) -5.993 (.702) 	61.335 (.641) -6.563 (.700) 4.615 (.640) 17.359 (2.192)	990 (.621) [†] 5.788 (.624) -6.734 (.591) 	-2.356 (.542) 3.527 (.495) -3.668 (.543) -1.460 (.497)
XII	Tracking	INTERCEPT SCHLSES SCHLACAD SCHLATRI TRACKING	16.032 (.348) -3.981 (.163) -1.712 (.127) 4.520 (.149) .828 (.129)	-22.850 (.678) -7.290 (.730) 11.427 (.643) -5.979 (.696) 	61.889 (.629) -6.026 (.662) 4.541 (.639) -5.844 (.595)	624 (.623) [†] 6.142 (.607) -7.155 (.592) 1.975 (.676)	-1.762 (.534) 3.034 (.455) -3.591 (.532) -1.930 (.509)
XIII	Teacher perceptions of principal leadership	INTERCEPT SCHLSES SCHLACAD SCHLATRI LEADERSH	16.637 (.347) -4.625 (.156) -1.113 (.126) 4.666 (.146) 5.183 (.245)	-22.403 (.682) -7.883 (.707) 12.145 (.647) -6.163 (.698) 5.474 (1.169)	63.009 (.636) -4.675 (.644) 4.465 (.633) 5.633 (1.099)	1.355 (.616) 5.377 (.600) -7.142 (.585) -5.496 (1.158)	-2.518 (.550) 3.634 (.439) -4.357 (.534) -1.875 (.503) -2.314 (.983)
XIV	Average minutes per week teachers report that they collaborate on instruction	INTERCEPT SCHLSES SCHLACAD SCHLATRI COLLMIN	16.400 (.352) -4.930 (.169) -1.403 (.126) 4.608 (.148) 3.411 (.407)	22.997 (.706) -7.524 (.756) 11.555 (.640) -6.326 (.696) 	62.164 (.652) -4.294 (.688) 4.045 (.637) -3.338 (1.743) ^{††}	083 (.642) [†] 5.292 (.608) -6.782 (.588) 7.201 (1.665)	-2.065 (.533) 3.081 (.468) -4.450 (.536) -1.260 (.512) 2.902 (1.387)
xv	Teacher perceptions of staff cooperation	INTERCEPT SCHLSES SCHLACAD SCHLATRI COLLCOOP	15.811 (.347) - -4.318 (.158) -1.564 (.125) 4.672 (.148) 2.209 (.291) -	22.978 (.668) -8.141 (.701) 12.226 (.641) -6.645 (.694) 14.375 (1.379)	62.458 (.625) -4.946 (.647) 3.915 (.637) -5.038 (1.285)	.278 (.626) [†] 6.150 (.602) -7.496 (.585) -10.085 (1.314)	-1.287 (.530) 3.003 (.435) -3.677 (.527) -1.937 (.499) -6.417 (1.032)

(...) Although these terms were included in the model, the parameter estimates are unreported because the tratio of coefficient/S.E. is less than 2.0.

These parameter estimates are reported in order to show effect of HISPANIC; however, the t-ratio of coefficient/S.E. is substantially less than 2.0.

The t-ratio of coefficient/S.E. approximates 2.0 (+statistic = -1.916, p-value = .055).

Note: Convergence achieved for all models (stopvalue for maximum likelihood estimation = .00005). The variable, HISPANIC, is an indicator or dummy variable that assumes the value of 1 if a student is a Hispanic and 0 if not. The dummy, BLACK, assumes the value of 1 if a student is a Black and 0 if not.

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The final step in this *HLM* analysis is to fit a between-school model that includes important terms from all previous models. Both the magnitude and strength of the between-school relationship were considered when deciding whether or not to include a term in the final composite dropout model. With just two exceptions, only terms for which the *t*-ratio of coefficient to standard error exceeded 2.0 were included. Some variables that were important predictors of dropout when they were introduced into a model that included only school-control variables at the between level no longer remained important when joined by other predictors in a composite model; as a result they were excluded and the model was reestimated. Goodness-of-fit was determined by assessing the improvement in proportion of variance explained.

The results from Model XVI, the final fitted model, are presented in Table B.6 and then interpreted in text.

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Table B.6: Model XVI - Composite dropout model after adjusting for student-level characteristics (except in two cases, for all reported estimates the *t*-ratio of coefficient to standard error exceeds 2.0). Coefficients and corresponding standard errors have been multiplied by 100 to allow interpretation in terms of percentages rather than proportions. (n = 3,293 students and 251 schools)

		Modeling Intercept [†]		Modeling Slopes (differentiating effects)**				
	-	BASE Dropout Rate	ACADEMBK	ATRISK	HISPANIC	BLACK		
Descrip	Variables	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)	Coeff (S.E.)		
Main Effects	INTERCEPT SCHLSIZE LEADERSH COLLCOOP TRACKING COLLMIN CANLEARN	17.114 (.363) 1.382 (.191) 2.612 (.151) 412 (.143) .600 (.131) .483 (.146)	-18.262 (.799) 6.120 (.818) 7.710 (.740) -9.899 (.690)	63.820 (.744) 3.289 (.792) 6.749 (.686) -6.129 (.635) -5.525 (.628) -1.005. (.649) <i>111</i> 7.061 (.687)	444 (.657) ^{‡‡} 2.867 (.608) -1.823 (.660) -1.916 (.610)	-2.210 (.547) 5.080 (.526) -2.543 (.428)		
Schooi Controis	SCHLSES SCHLACAD SCHLATRI $\% \Delta R^2$ (or ΔT) Proportion of vari in true dropout ra across schools th	-5.253 (.183) 906 (.133) 4.477 (.148) ance ate	-10.156 (.747) 14.284 (.672) -6.789 (.699)	-9.477 (.787) 4.689 (.641)	5.800 (.602) -6.697 (.593)	2.256 (.455) -4.203 (.525) -1.953 (.495)		
	is explained	3.2 %	(negative) [‡]	.05%	6.0%	9.7%		

Although theoretically impossible, negative values may be due to an idiosyncrasy of the HLM program itself whereby HLM often fails to produce a positive definite Tau matrix. When simple models are fit, the ANOVA-type procedure that HLM uses to generate EM starting values for σ² and T will more reliably produce a positive definite Tau matrix; however, when more complex models are fit negative elements of the Tau matrix are set to zero by default. In part, this may account for the negative values seen here (refer to the "Fixtau" routine in defile - see HLM Manual, p. 44). There is one other possible explanation. While more explainable variance (Tau associated with ACADMEBK) has been accounted for by the previous model (that included only student and school controls) than this more constrained model, in this final reduced model it may be the case that variance that had previously been explained by the slope of of academic background (ACADEMBK) has been soaked up by one of the other random effects (e.g., HISPANIC, BLACK, or ATRISK).

This parameter estimate is reported in order to show the effect of HISPANIC; however, the tratio of coefficient/S.E. is substantially less than 2.0 (p≃.499).

f In this column, the coefficient of INTERCEPT represents the mean estimated percentage dropout among White students in schools of average size, leadership, cooperation, tracking, collaboration, and teacher expectations, holding constant the background characteristics of students and schools. Each of the remaining coefficients in this column indicates the difference in the estimated percentage of students who drop out that is associated with a one standard deviation difference in the predictor, all other things being equal.

th In this column, for HISPANIC and BLACK, the coefficient of INTERCEPT represents the mean difference (when compared to Whites) in the estimated percentage of students who drop out that is associated with minority status in schools of average size, leadership, cooperation, tracking, collaboration, and teacher expectations, holding constant the background characteristics of students and schools.

The #ratio of coefficient/S.E. is -1.55 (p=.12)

Note: Convergence achieved (stopvalue for maximum likelihood estimation = .00005). The variable, HISPANIC, is an indicator or dummy variable that assumes the value of 1 if a student is a Hispanic and 0 if not. The dummy, BLACK, assumes the value of 1 if a student is a Black and 0 if not. The coefficient for the "fixed" effect of student-level SES is -8.436 (SE = .177). The coefficient for the "fixed" effect of student-level SES is -8.436 (SE = .177). The coefficient for the "fixed" effect of student-level SES is -8.436 (SE = .177).

Before engaging in a detailed discussion of Model XVI, it may be useful to consider, in a general way, what each estimated parameter represents. The

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first column of figures specifies a between-school model for the within-school intercept, or BASE dropout rate. It is this model that represents the effects for students who are White. Each of the four remaining columns specifies a between-school model for the within-school parameter associated with one of the random effects, in this case students' academic background (ACADEMBK), at-riskness (ATRISK), and ethnicity (HISPANIC and BLACK).

In the first column in Table B.6, the first row presents the betweenschool intercept, or the mean estimated rate of dropout among White students in schools of average size, leadership, cooperation, tracking, collaboration, and expectations, holding constant the background characteristics of students and schools. The average dropout rate among White students is 17.1 percent.

The coefficient of each remaining continuous predictor in the first column represents the difference in estimated percentage dropout among White students that is associated with a one standard deviation difference in the predictor. So, for instance, a one unit difference in school size (SCHLSIZE) is associated with a difference of 1.382 in the estimated percentage of students who drop out, such that White students from larger schools tend to drop out at higher rates, all else being equal.¹³ In other words, in two schools that differ only in their enrollment - one of average size (1286) and the other of below average size (603) - the difference in the estimated dropout rate for White students amounts to 1.382 percentage points.

The last two columns display the differentiating effects of ethnicity (HISPANIC and BLACK). The first row reports the coefficient of INTERCEPT, or the mean estimated difference in the dropout rate associated with minority

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status in schools of average size, leadership, cooperation, tracking, collaboration, and teachers' expectations, holding constant the background characteristics of students and schools. So, the estimated dropout percentage among Black students is 2.21 less than among White students, and the estimated dropout percentage among Hispanic students is .44 less than among Whites, holding constant student and school effects. In other words, the estimated dropout rate among Hispanic students is 16.7 percent and among Black students is 14.9 percent, controlling for school size, leadership, cooperation, tracking, collaboration, and expectations, as well as the background characteristics of students and schools.¹⁴

Each of the remaining coefficients in the HISPANIC and BLACK columns indicates the minority-White difference in the estimated dropout percentages that is associated with a one standard deviation difference in the predictor, again all other things being equal. Thus, the last column reveals that a one unit difference in school size (SCHLSIZE) is associated with a difference in Black-White percentages of 5.08. In other words, for each standard deviation difference in school size Black students tend to drop out at a rate that is about five percent greater than for White students, all else being equal.

With this as a grounding, attention is devoted in this next section to the fixed within-school effects of student socio-economic status and gender on dropout. Second, the differentiating effects related to ethnicity are considered. Third, the between-school effect of school controls on dropout are addressed. And finally the fitted between-school relationship involving dropout and

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each of the main effects is detailed; namely, school size, cooperation, leadership, tracking, collaboration, and teachers' expectations.

Fixed effects: The student-level control variable, SES, is related to dropping out as a fixed effect across schools and its sign is in the anticipated direction. Holding constant other student and school effects, a one standard deviation difference in student SES is associated with an 8.44 difference in the percentage of students dropping out. As expected, students from lower socioeconomic strata appear to drop out at higher rates.

Table B.6 also indicates that the student-level variable, GENDER, is related to dropping out as a fixed effect across schools but its sign is not in the anticipated direction. Higher estimated dropout rates are associated with female status. More precisely, holding constant the background characteristics of students and their classmates and in schools of average size, leadership, cooperation, tracking, collaboration, and teachers' expectations, the mean estimated percentage dropout rates for females and males differ by 2.57.¹⁵ Although this finding is consistent with what others have found,¹⁶ still it is somewhat puzzling given the preponderance of evidence in the literature to the contrary.¹⁷

The possibility exists that this finding may be an artifact of the interrelationship between DROPOUT, GENDER, and ATRISK. Earlier Table B.1 indicated that the association between dropout and ATRISK, (r = .384, p \leq .04), was the greatest found at the student-level. The estimated correlation between GENDER and ATRISK is -.148 (p \leq .0001).¹⁸ This suggests that males are more likely than females to exhibit characteristics typically associated with

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being at-risk, namely suspension, lower grades, disciplinary action, trouble with the law, and absenteeism. Because those who are at-risk appear to drop out more frequently and those who are male tend to be more at-risk, GENDER may be a proxy for ATRISK and may consequently share or account for much of the same variation in dropout as ATRISK. If so, then removing ATRISK from the model may change the sign of the coefficent for GENDER.

To determine whether this was the case, student-level ATRISK was deleted and the final model was reestimated. As a result, the sign of GENDER changed and the predicted dropout rates for male and female students were substantially altered. Without taking ATRISK into account but holding all else constant, the mean estimated percentage dropout rate for males and females differed by 3.98 (sign now negative). This suggests that when ATRISK is not taken into account, lower dropout rates tend to be associated with females status. Consequently, it seems that GENDER and ATRISK explain a considerable portion of the same variation in dropout, and their effects may be somewhat confounded. In part, this may account for this puzzling finding.

Differentiating effects related to ethnicity: Table B.6 reveals that the estimated dropout rate is highest among White students, slightly lower among Hispanic students, and lowest among Black students, holding constant the background characteristics of students and schools as well as the effects of school size, tracking, leadership, cooperation, collaboration, and teachers' expectations. The average adjusted dropout rate is 17.1 percent among White students, 16.7 percent among Hispanic students, and 14.9 percent among Black students.¹⁹

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A plausible explanation for this apparently anomalous finding may be that it stems, in part, from the inter-relationship between dropout, socioeconomic status, and ethnicity. The estimated correlation coefficient of HISPANIC with student-level SES is -.114 (p=.0001); for BLACK, it is -.198 (p=.0001). These correlations indicate that lower student socio-economic status is associated with minority status. Largely because children of color also tend to be poor and those who are poor tend to drop out disproportionately, race may be a proxy for SES. Consequently, HISPANIC and BLACK may share or account for much of the same variation in dropout as SES.

To investigate this possibility, both student- and school-level SES were deleted and the final model was reestimated. As a result, the predicted dropout rates for White, Hispanic, and Black students were substantially altered. Without taking either student- or school-level SES into account but holding constant all else, the average adjusted dropout rate was 15.2 percent among White students, 17.3 percent among Hispanic students, and 15.9 percent among Black students. As a result, because race and SES do appear to account for much of the same variation in dropout, it seems their effects are overlapping and thus to some degree confounded.

Effect of school background characteristics on dropout: Model XVI in Table B.6 reflects a trend that was first seen earlier in Table B.4, namely, that holding constant student and school covariates and the effects of school size, cooperation, leadership, tracking, collaboration, and teachers' expectations, the effects of SCHLSES and SCHLATRI on BASE dropout rate are roughly of

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the same magnitude (-5.253 and 4.477 respectively) and are substantially greater than the effect of SCHLACAD on BASE dropout rate (-.906). Moreover, these effects on BASE dropout rate are in the anticipated direction. Thus, a one standard deviation difference in SCHLSES is associated with a difference of 5.253 in the estimated percentage of White students who drop out, such that the rate appears lower when the socio-economic status of students attending a school is higher. A one standard deviation difference in SCHLATRI is associated with a difference of 4.477 in the estimated percentage of White students who drop out, such that the rate appears lower when the rate appears lower when the students who attend a school are more academically prepared. And a one standard deviation difference in SCHLACAD is associated with a difference of .906 in the estimated percentage of White students who drop out, such that the rate appears lower when the students who drop out, such that the rate appears lower when the students who drop out, such that the rate appears lower when the students who drop out, such that the rate appears lower when the students who drop out, such that the rate appears lower when the students in a school are less frequently in trouble with the law, suspended, dissatisfied with school, or prone to poor grades.

By contrast, the effect of SCHLACAD (-4.203) on the dropout among Black students is nearly twice that of SCHLSES (2.256) and SCHLATRI (-1.953). For both White and Black students, the effect of SCHLACAD points in the same direction. However, when predicting dropout among Black students, the signs for the coefficients of SCHLSES (positive) and SCHLATRI (negative) are different than the signs of the coefficients for White students.

For Hispanic students, SCHLSES is not an important predictor in this model, but the effects of SCHLACAD (5.800) and SCHLATRI (-6.697) appear greater than for either White or Black students. In Model XVI displayed in

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Table B.6, the signs of the coefficients for SCHLACAD and SCHLATRI differ for Hispanic and White students.

Relationship between dropout and each main effect: As hypothesized, Table B.6 indicates that dropout tends to be greater in schools that enroll more students, controlling for student and school covariates and in schools of average cooperation, leadership, tracking, collaboration, and teachers' expectations.²⁰ While for all students the sign of the SCHLSIZE coefficient is positive, the effect is relatively small for students who are White (1.382), greater among students who are Hispanic (2.867), and greatest for those who are Black (5.080).

Among White students, controlling for the influence of the background characteristics of students and schools, a one unit difference in school size is associated with difference of 1.382 in the estimated percentage of students dropping out, such that higher dropout rates are associated with larger schools.²¹

Among Hispanic students, a one unit difference in school size is associated with a difference in estimated Hispanic-White dropout percentage of 2.867. In other words, for each standard deviation difference in school size, Hispanic students tend to drop out at a rate that is about three percentage points greater than for White students, all else being equal.

Among Black students, a one unit difference in school size is associated with a difference in estimated Black-White dropout percentage of 5.080. That is, for each standard deviation difference in school size, the Black student

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dropout rate is five percentage points greater than the rate of White students, all else being equal.

Given that the effective schools literature identifies vigorous principal leadership with higher student achievement, one might anticipate that directive leadership might also be associated with student dropout. Although there appears to be a relationship between leadership and dropout, contrary to expectation, Model XVI indicates that dropout tends to be greater in schools where there is more directive principal leadership. "Schools where there is more directive leadership" refers to schools where teachers on average are more apt to report that the principal sets plans, decides on priorities, indicates what is expected, and communicates a vision to the staff and that school goals are clear. Moreover, while for White students the sign of the LEADERSH coefficient is positive, the effect of LEADERSH on the within-school parameter associated with HISPANIC is negative and LEADERSH does not predict the within-school parameter associated with BLACK.

Among White students, controlling for the influence of the background characteristics of students and schools a one unit difference in LEADERSH is associated with a difference of .518 in the estimated percentage of students dropping out, such that higher dropout rates are predicted for schools with more directive principal leadership -- this after controlling for the influence of the background characteristics of students and schools and in schools of average size, cooperation, tracking, collaboration, and teachers' expectations.²²

Among Hispanic students, a one unit difference in leadership is associated with a difference in estimated Hispanic-White dropout percentage

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of 1.823, again holding constant student and school covariates and in schools of average size, cooperation, tracking, collaboration, and teachers' expectations. In other words, for each standard deviation difference in leadership, the Hispanic student dropout rate is nearly two percentage points greater than the White student dropout rate, all else being equal.

The literature identifies staff cooperation with more effective school functioning.²³ Given this, it is anticipated that a more cooperative ethos might be associated with lower levels of student dropout. Model XVI in Table B.6 indicates that there appears to be a between-school relationship involving cooperation and dropout that is consistent with what is expected based on a reading of the literature. In other words, among all students, dropout tends to be less prevalent in schools where there is more staff cooperation. "Schools where there is more staff cooperation" refers to schools where teachers on average are more apt to report that they can count on other staff members for help, that the staff cooperate, that efforts are coordinated, and that the school runs like a family. Moreover, while for all students the sign of the COLLCOOP coefficient is negative, the effect is smallest for students who are White (-.412), greater among students who are Hispanic (-1.916), and greatest for those who are Black (-2.543).

Among White students, a one standard deviation difference in cooperation is associated with a difference of .412 in the estimated percentage of students dropping out, such that lower dropout rates are predicted for schools with more cooperative environments - this after controlling for the influence of the background characteristics of students and schools and in schools of average size, leadership, tracking, collaboration, and expectations.²⁴

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Among Hispanic students, a one unit difference in COLLCOOP is associated with a difference in estimated Hispanic-White dropout percentage of 1.916, holding constant student and school covariates. In other words, for each standard deviation difference in cooperation, the Hispanic student dropout rate is nearly two percentage points greater than the White student dropout rate, all else being equal.

Among Black students, a one unit difference in COLLCOOP is associated with a difference in estimated Black-White dropout percentage of 2.543, all else being equal. In other words, for each standard deviation difference in cooperation, the Black student dropout rate is roughly two and a half percentage points greater than the White student dropout rate, all else being equal.

Secondary Findings

Tracking: Much is written about the invidious effects of tracking on particular subgroups of the student population, most notably children of color and accent and those who are poor. Sizer argues: "[We] stereotype adolescents. In spite of the rhetoric to the contrary, they [adolescents] are largely tracked by social class and gender."²⁵ Joining this refrain, Moses has written that "differentiating students (e.g., tracking) harms those who are disadvantaged or placed in the lower track."²⁶ Johnson informs us that tracking students "often leads to a schoolwide system that is both impersonal and inflexible." And often, Johnson continues, the rationale teachers give for tracking has more to do with "instructional efficiency" than anything else.

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"Tracking was the accommodation they [teachers] made to a school organization that requires batch processing of learners."²⁷ Finally, the work of Oakes documents how tracking has the effect of denying students access to knowledge, especially those who are less advantaged.²⁸

As hypothesized, Table B.6 shows that higher values of dropout are predicted for schools that rely more heavily on tracking, all other things being equal.²⁹ However, when compared to the effects of school size, leadership and cooperation on dropout, the effect of tracking is relatively small. Model XVI indicates that a one standard deviation difference in tracking is associated with a difference of .600 in the estimated percentage of students dropping out. There are no differentiating effects of ethnicity. That is, there is no effect of TRACKING on the within-school parameter associated with either BLACK or HISPANIC. As a result, the predicted effect of TRACKING is the same for all students.

It is curious that the effects of tracking are not greater, especially in light of the disturbing literature that details the invidious distinctions of tracking. Rosenbaum is instructive in this regard. He points out:

What is most distinctive about curriculum grouping is that individuals are classified in terms of their career futures . . . curriculum grouping is formed by grouping students according to their projected future destinies; whether they plan to attend college; to pursue a vocation in a trade, in agriculture, or in homemaking; or to receive what the schools call a 'general' curriculum . . . it involves predictions about an individual's abilities, values, goals, and aspirations in the distant future, and it involves assumptions and inferences about college admissions and labor markets in the future . . . The significance of such decisions is enormous. Apart from its curriculum consequences, any decision affecting future social options is a momentous event . . . Traditionally, our society has been wary of making invidious social distinctions among children based

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on their social origins, but curriculum grouping, in defining children in terms of their future social statuses, seems to create a risk that invidious social distinctions will arise . . . American ideals demand that our institutions avoid making invidious social distinctions and this particularly applies to our schools.³⁰

In this regard, Hamilton speaks of the costs of grouping "to those in the lower tracks." He goes on to say that "it is the association of school performance with subsequent income and prestige that renders differentiation invidious."³¹

Of course, it may be that tracking actually does influence dropout, but it is just not picked up the way I have conceptualized it in this study. It is still possible that tracking in the form of ability grouping (as opposed to curricular placement) may be more strongly related to dropout. Unfortunately, given the design of this study, that lies beyond my reach.

Minutes of collaboration: A survey of the literature reveals that more effective school functioning is associated with more collaborative environments.³² Given this, it might be expected that greater teacher collaboration would also have a salutary effect on student dropout. Table B.6 indicates that collaboration appears to have a small effect on dropout. However, contrary to a priori expectations, dropout tends to be greater in schools where teachers, on average, report they spend more time each week collaborating on matters related to instruction.

Model XVI shows that, in general, dropout for all students tends to be greater in schools where there is more teacher collaboration. More precisely, a one standard deviation difference in teacher collaboration is associated with

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a difference of .483 in the estimated percentage of students dropping out, such that higher dropout rates are predicted in schools where there is more collaboration - this after controlling for the influence of the background characteristics of students and schools and in schools of average size, cooperation, leadership, tracking, and teachers' expectations.³³ There are no differentiating effects of ethnicity. That is, there is no effect of COLLMIN on the within-school parameter associated with either BLACK or HISPANIC. As a result, the predicted effect of COLLMIN is the same for all students.

What might explain why the effects of collaboration are not in the anticipated direction? Although I offer no compelling explanation for this finding, others have suggested that:³⁴

The swapping of 'war' stories . . . is sometimes the closest school faculties come to professional conversation. Yet it is not a helpful substitute for teacher problem-solving. While teachers' 'experience swapping' about problem students produces sympathy and social support among faculty members, and may make teachers feel less alone, it does little to end teachers' isolation from professional knowledge. Experience swapping carries with it no remedies, no implications, no recommendations for change. In fact, experience swapping sometimes produces the belief that there is nothing that can be done about these problem students. Complaints about students that are unaccompanied by possible remedial action convey a lack of certainty that anything can or should be done. Indeed, the offer of only sympathy about coping with difficult students may reinforce teachers for acts of not teaching. That is, the absence of hope often causes teachers to abdicate responsibility, with problem students sometimes relegated to the back of the classroom and given busy-work to prevent their potential disruption of other students. By supporting negative patterns of student-teacher interaction, then, experience swapping by colleagues may ultimately worsen an already difficult situation.³⁵

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If the only form of collaboration teachers know is the "swapping of 'war' stories" then it follows that as collaboration grows, then "problem students" may increasingly find themselves estranged from teachers.

Teachers' expectations of students: Levin attributes the failure of many disadvantaged children to "lower teacher expectation."³⁶ Leading a chorus of those who agree, Sizer says that "too few adults really believe that poor kids or minority kids can make it."³⁷

Although earlier, Table B.5 revealed that CANLEARN was an important predictor of dropout when it was the only main effect added to a model that controlled for student and school covariates, Model XVI suggests that when once CANLEARN is added to a model along with other main effects, the *t*-ratio of coefficient/S.E. declines precipitously. As a result, while the finding from an earlier model (XI) was consistent with the expectation that dropout tended to be greater in schools with lower teacher expectations of students (that is, in schools where teachers on average tend to be less apt to report that they believe students are capable of learning the material), Table B.6 indicates that CANLEARN is no longer an important predictor of BASE dropout rate in the composite model. Thus, the academic expectations teachers have of students does not predict dropout. Nevertheless, CANLEARN remains in the model as a predictor of the ATRISK slope.

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Variance Explained

Figure B.1 illustrates graphically that Model XVI accounts for 39.1 percent of the explainable between-school variance in true dropout rate. In brief, students' background characteristics have a greater influence on dropout than either the characteristics of the student body attending the school or the policies and practices of the school itself. A substantial proportion (\approx 94 percent) of the within-school variation in dropout can be considered error variation. Of the true explainable between-school variation that remains, about a third (\approx 36 percent) may be attributable to the differences between schools in the average make-up of their student bodies. However, these factors lie largely beyond the control of policymakers.³⁸ So while much of the variation in student dropout may be traced to differences that exist within each individual school or to the make-up of the student body at-large, in this study 3.2 percent of explainable, true variation in between-school dropout rate can be attributed to alterable characteristics of schools (e.g., size, cooperation, leadership, etc.).³⁹





Total variance (12.535)

Total percentage of explainable between-school variance accounted for (39.1%)

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¹ Though it would be desireable to be able to distinguish if and how particular subgroups of students (e.g., at-risk students) are treated differently within particular schools, the *High School and Beyond* Study does not provide data that would permit such an analysis. Consequently, though it is important to consider the variation in program design and delivery that is likely to exist within schools, that lies beyond the scope of this study.

² Anthony S. Bryk and Yeow Meng Thum, "The Effects of High School Organization on Dropping Out: An Exploratory Investigation," *American Educational Research Journal*, Fall 1989, Vol. 26, No. 3, p. 360

³ "Slope," as it appears in this paragraph, is a commonly-used *HLM* term. Anthony S. Bryk and Yeow Meng Thum, "The Effects of High School Organization on Dropping Out: An Exploratory Investigation," *American Educational Research Journal*, Fall 1989, Vol. 26, No. 3, p. 12 and 18.

4 In *HLM* goodness-of-fit is most reliably assessed using the deviance statistic. According to McCullagh and Nelder, "The deviance function is most directly useful... for comparing two nested models. For instance, we may wish to test whether the addition of a further covariate significantly improves the fit. Let H_0 denote the model under test and H_A the extended model containing an additional covariate. The corresponding fitted values are denoted by \hat{u}_0 and \hat{u}_A respectively. The reduction in deviance

 $D(y; \hat{u}_0) - D(y; \hat{u}_A) = 2l(\hat{u}_A; y) - 2l(\hat{u}_0; y)$

is identical to the likelihood-ratio statistic for testing H_0 against H_A . This statistic is distributed approximately like χ^2 independently of \hat{u} under [the] assumption [that the observations are distributed independently according to the binomial distribution], provided that . . . n is large." According to the authors, "It is convenient to express the log likelihood in terms of the mean-value parameter \hat{u} rather than the canonical parameter θ . The discrepancy of a fit is proportional to twice the difference between the maximum log likelihood achievable and that achieved by the model under investigation." P. McCullagh and J.A. Nelder, *Generalized Linear Models*, (London: Chapman and Hall, 1989, p. 33, 119)

⁵ According to Bryk and Thum "This is analogous to the homogeneity of regression assumption in analysis of covariance." Anthony S. Bryk and Yeow Meng Thum, "The Effects of High School Organization on Dropping Out: An Exploratory Investigation," *American Educational Research Journal*, Fall 1989, Vol. 26, No. 3, p. 363.

⁶ While the term "slope" as it is referred to here is a commonly-used *HLM* term, confusion over the exact meaning of the word may easily arise, especially when it pertains to a dummy predictor variable. In traditional regression analysis, dummy predictor variables are thought of as "intercept shifters," not "slope shifters" (See Johnson, Johnson, and Buse). For instance, in classical regression, the

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coefficient of a dummy predictor indicates how the effect of a predictor on the outcome varies across different categories. Thus, if the dummy predictor happens to be BLACK, and WHITE is the omitted category, the coefficient of BLACK is interpreted as the average Black-White difference in the outcome. In this sense, the coefficient of the dummy always represents a shift in the intercept. In conventional regression analysis, a dummy predictor is only thought of as a slope shifter if it is combined with a continuous predictor to form an interaction variable. With HLM, the general analytic approach is somewhat different. Rather than fitting a single between-school model that includes a dummy predictor (as in traditional regression), HLM actually estimates a separate between-school equation for each within-school coefficient of the dummy predictor, each with its own set of intercept and slope parameters. Thus, using the same White-Black example, there is a model for the within-school coefficient of White and another model for the within-school coefficient of Black, each with its own set of parameter estimates for intercept and slope. Aaron C. Johnson, Jr., Marvin B. Johnson, and Rueben C. Buse, Econometrics: Basic and Applied, (New York: MacMillan Publishing, 1987, p. 193)

⁷ Aaron C. Johnson, Jr., Marvin B. Johnson, and Rueben C. Buse, Econometrics: Basic and Applied, (New York: MacMillan Publishing, 1987, p. 51)

⁸ Stephen W. Raudenbush, "The Logic of Hierarchical Linear Models," (Revised April 9, 1990, in press, p. 6). Note that σ^2 refers to the within-school variance.

9 Stephen W. Raudenbush, "The Logic of Hierarchical Linear Models," (Revised April 9, 1990, in press, p. 7). Note that γ represents the grand mean.

¹⁰ In an exploratory way, Bryk and Thum did investigate tracking in their 1989 study; however, tracking was never included in the models they constructed. Anthony S. Bryk and Yeow Meng Thum, "The Effects of High School Organization on Dropping Out: An Exploratory Investigation," *American Educational Research Journal*, Fall 1989, Vol. 26, No. 3, p. 374).

¹¹ According to Bryk *et al.*, "Centering induces some favorable conditioning in the data" that can help resolve problems that can crop up when the "covariance of the OLS intercept and slope" is zero. Anthony S. Bryk, Stephen W. Raudenbush, Michael Seltzer, and Richard T. Congdon, Jr., *An Introduction to HLM : Computer Program and User's Guide, Version 2.0*, (1988, p. 20). According to Kreft *et al.*, "*HLM* refuses to perform at least some functions if a within-group cross product matrix is singular." Ita G. G. Kreft *et al.*, "Comparing Four Different Statistical Packages for Hierarchical Linear Regression: GENMOD, HLM, ML2, and VARCL," (Unpublished technical paper - CSE Technical Report 311, UCLA Center for Research on Evaluation, Standards, and Student Testing, February, 1990, p. 43, 71, 78, 86-88).

¹² While dropout is dichotomous at the student-level (taking on the values of 0 and 1), at the school-level it represents school dropout rate and is expressed in percentage terms. This explains why the coefficients and standard errors that appear in Table B.4 (and henceforth) have been multiplied by 100.

¹³ The phrase, "all else being equal," refers to the fact that all other continuous predictors in the model are held constant.

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¹⁴ In Model XVI, as in all but one previous model (Model XIII), the estimated dropout rate for Hispanic students cannot - from a statistical standpoint be distinguished from the estimated rate for White students. In part, this may be due to the relatively small size of the Hispanic sample.

¹⁵ The variable, GENDER, is an indicator or dummy variable that assumes the value of 2 if a student is female and 1 if not. This variable was coded in this fashion to coincide with the High School and Beyond study, where GENDER was originally coded this way.

¹⁶ This group includes: Bryk and Thum, 1989; Cipollone, 1990; Bachman, Green, and Wirtanen, 1971; Neill, 1979; Masters, 1969; Rumberger, 1983; Shaw, 1982; and Borus and Carpenter, 1984. These studies generally reported higher rates of dropout among female, single heads of households.

17 U.S. Department of Commerce, Bureau of the Census, School Enrollment - Social and Economic Characteristics of Students: October 1981, Current Population Reports, Series P-20, No. 373, (Washington, D.C. Government Printing Office, 1982). Ruth B. Ekstrom, Margaret E. Goertz, Judith M. Pollack, and Donald A. Rock, "Who Drops Out of High School and Why? Findings from a National Study," in School Dropouts: Patterns and Policies, ed. Gary Natriello (New York: Teachers College Press, 1987, p. 54-55, 62-63). Edward McDill, Gary Natriello, and Aaron M. Pallas, "A Population at Risk: Potential Consequences of Tougher School Standards for Student Dropouts," in School Dropouts: Patterns and Policies, ed. Gary Natriello (New York: Teachers College Press, 1987, p. 110). Floyd M. Hammack, "Large School Systems' Dropout Reports: An Analysis of Definitions, Procedures, and Findings," in School Dropouts: Patterns and Policies, ed. Gary Natriello (New York: Teachers College Press, 1987, p. 34).

¹⁸ This finding however is consistent with what others who have analyzed these *High School and Beyond* data have found, notably Bryk and Thum (1989) and Ekstrom et al. (1986, p. 62).

¹⁹ In Model XVI, as in all but one previous model (Model XIII), the estimated dropout rate for Hispanic students cannot - from a statistical standpoint be distinguished from the estimated rate for White students. In part, this may be due to the relatively small size of the Hispanic sample.

²⁰ Throughout the discussion in this section on SCHLSIZE, it is assumed that the effects of all other "question variables" (COLLCOOP, LEADERSH, TRACKING, COLLMIN, and CANLEARN) have been controlled.

²¹ Henceforth, a "one unit difference" means a difference of one standard deviation.

²² Throughout the discussion in this section on LEADERSH, it is assumed that the effects of all other "question variables" (SCHLSIZE, COLLCOOP, TRACKING, COLLMIN, and CANLEARN) have been controlled.

²³ Susan Moore Johnson, *Teachers At Work: Achieving Success in Our Schools*, New York: Basic Books, 1990, (p. 48, 148-179, 326, 331). Anthony Cipollone, "Trying to Beat the Odds; A Study of Comprehensive High Schools and At-Risk Students," (Unpublished dissertaion, Harvard Graduate School of Education, 1990, p.

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122-132). Anthony S. Bryk and Mary E. Driscoll, "High School as Community: Contextual Influences and Consequences for Students and Teachers," (Madison: Wisconsin Center for Education Research, 1988, p. 1-35)

²⁴ Throughout the discussion in this section on COLLCOOP, it is assumed that the effects of all other "question variables" (SCHLSIZE, LEADERSH, TRACKING, COLLMIN, and CANLEARN) have been controlled.

²⁵ Theodore R. Sizer, Horace's Compromise: The Dilemma of the American High School, (Boston: Houghton Mifflin, 1984)

26 Robert P. Moses *et al.*, "The Algebra Project: Organizing in the Spirit of Ella, *Harvard Educational Review*, (Volume 59, Number 4, 1989)

²⁷ Susan Moore Johnson, *Teachers At Work: Achieving Success in Our Schools*, New York: Basic Books, 1990)

²⁸ Jeannie Oakes *et al., Keeping Track: How Schools Structure Inequality,* (New Haven: Yale University Press, 1985) and Jeannie Oakes, "Multiplying Inequalities: The Effects of Race, Social Class, and Tracking on Opportunities to Learn Mathematics and Science," (Santa Monica: RAND Corporation, 1990)

²⁹ Throughout the discussion in this section on TRACKING, it is assumed that the effects of all other "question variables" (SCHLSIZE, LEADERSH, COLLCOOP, COLLMIN, and CANLEARN) have been controlled.

³⁰ James E. Rosenbaum, "Social Implications of Educational Grouping" in *Review of Research in Education*, Volume 8, 1980, (eds.) David C. Berliner, p. 375

³¹ Stephen F. Hamilton, "Raising Standards and Reducing Dropout Rates" in *School Dropouts: Patterns and Policies*, (ed.) Gary Natriello (New York: Teachers College Press, 1987, p. 420)

³² Susan Moore Johnson, *Teachers At Work: Achieving Success in Our Schools*, New York: Basic Books, 1990, (p. 48, 148-179, 326, 331). Anthony Cipollone, "Trying to Beat the Odds; A Study of Comprehensive High Schools and At-Risk Students," (Unpublished disseration, Harvard Graduate School of Education, 1990, p. 122-132). Anthony S. Bryk and Mary E. Driscoll, "High School as Community: Contextual Influences and Consequences for Students and Teachers," (Madison: Wisconsin Center for Education Research, 1988, p. 1-35). Judith Warren Little, "Norms of Collegiality and Experimentation: Workplace Conditions of School Success," *American Educational Research Journal*, Vol. 19, No. 3, 1982, p. 338-339). Susan J. Rosenholtz, "Effective Schools: Interpreting the Evidence," *American Journal of Education*, Vol. 93, No. 3, 1985, p. 365).

³³ Throughout the discussion in this section on COLLMIN, it is assumed that the effects of all other "question variables" (SCHLSIZE, LEADERSH, COLLCOOP, TRACKING, and CANLEARN) have been controlled.

³⁴ The wording of the questionnaire item from which data were drawn for this variable does not help explain this anomalous finding. The exact wording of the item on the *Administrator and Teacher Survey* is "Since the beginning of the current school year, how much time per month (on the average) have you spent meeting with other teachers on lesson planning, curriculum development, guidance and counseling, evaluation of programs, or other collaborative work related to

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instruction?" Oliver Moles (Ed.), High School and Beyond, Administrator and Teacher Survey (1984) Data file User's Manual, Office of Research, Office of Educational Research and Improvement (U.S. Department of Education, 1988, p. 7.53).

35 Susan J. Rosenholtz and Susan J. Kyle "Teacher Isolation: Barrier to Professionalism" in *American Educator*, winter 1984, (p 10-15)

³⁶ Henry Levin, (Stanford University)

³⁷ Theodore R. Sizer, Horace's Compromise: The Dilemma of the American High School, (Boston: Houghton Mifflin, 1984)

³⁸ To the extent that changing the attendance boundaries of a school may alter the average socio-economic status of the student population at the school, then these "school control variables" (e.g., school-SES, school at-risk, and school academic background) may actually lie within the control of policymakers. See *Education Week* (Vol. X, No. 34, May 15, 1991, p. 15-16) for an example of the way in which school boundaries may be altered to adjust the SES of a school.

³⁹ It is likely that 3.2 percent represents a lower bound. Adding "question variables" (e.g., size, cooperation, leadership, etc.) to the model before school control variables (e.g., school-SES, school at-risk, etc.) accounted for 6.1 percent of the true, explainable between-school variation in dropout.

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