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WHAT MAKES A DIFFERENCE? INFLUENCES ON OUTCOMES FOR STUDENTS WITH DISABILITIES

Prepared for:

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SRI Project P10656

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1. What Makes a Difference? Factors Related to Longitudinal Outcomes of Students with Disabilities

by Jose Blackorby and Mary Wagner

The early years of the 21st century have witnessed considerable change in American education. The No Child Left Behind Act of 2001 (NCLB) and the Individuals with Disabilities Education Improvement Act of 2004 (IDEA 2004) have created increasing expectations for educational productivity, as measured by students' performance on state accountability tests. Of particular significance is the inclusion of students with disabilities in these accountability systems for the first time. They are one of the subgroups that must reach proficiency targets if schools and school districts are to meet the requirements for adequate yearly progress (AYP). Although AYP criteria vary from state to state, regular increases in proficiency rates are expected to meet the goal of nearly all students being proficient by 2014. Previous reports from the Special Education Elementary Longitudinal Study (SEELS),[1] the National Longitudinal Transition Study-2 (NLTS2),[2] and other sources suggest that many students with disabilities currently function well below proficiency and will need to accelerate significantly their rate of learning to meet NCLB goals. Thus, it is important to identify for educators promising practices for students with disabilities as well as the correlates of positive growth to help American schools and their students meet the challenges they face.

Of course, it is not only the educational accountability system that requires information about what helps students succeed. For all young people, the time of transition from elementary school to high school is one of rapid physical, psychological, and cognitive development. Students face the challenges of increasing academic demands, expanding peer-oriented social networks, and developing independence from their families. Their ability to manage these tasks can have lifelong repercussions. The chances of academic and social adjustment failure are higher for students across the diverse spectrum of disabilities than for their peers in the general student population. Such failure can translate to

[1] SEELS is sponsored by the Office of Special Education Programs (OSEP) of the U.S. Department of Education and is being conducted by SRI International. SEELS includes a nationally representative sample of more than 11,000 students who were ages 6 through 12 and receiving special education in the first or higher grades on September 1, 1999.

[2] NLTS2 is sponsored by the National Center for Special Education Research of the U.S. Department of Education. More information about NLTS2 and downloadable reports from the study are available at www.nlts2.org.

underachievement at best and, potentially, to school dropout or poor postschool outcomes.[3]

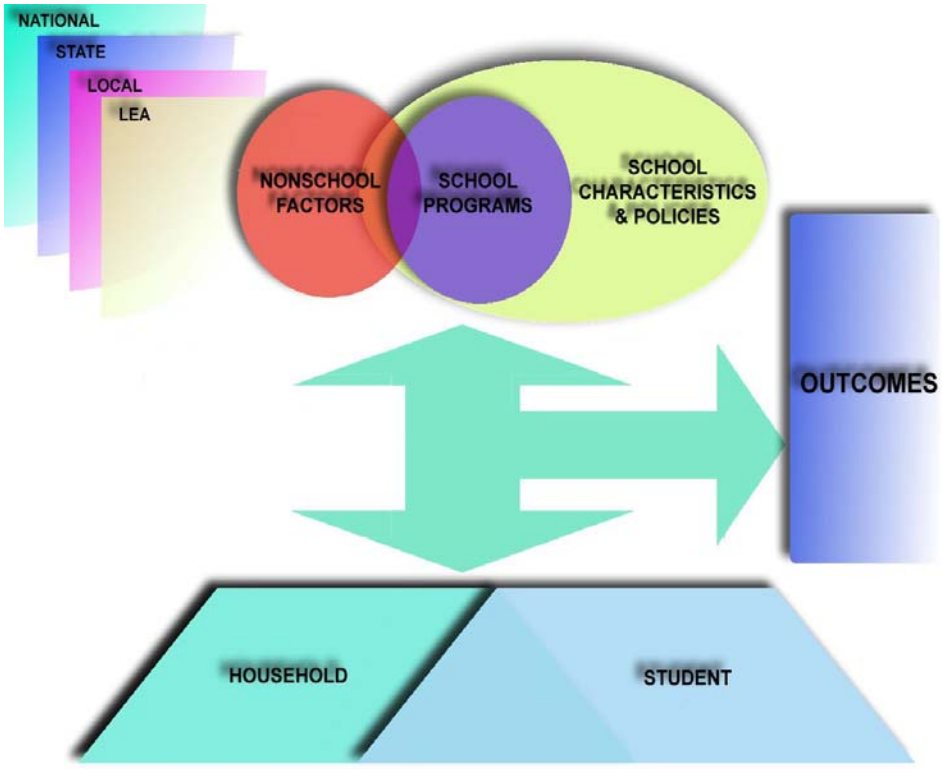
Recognizing the importance of these issues, the primary purposes of the SEELS longitudinal design were to (1) address changes in outcomes over time, and (2) identify combinations of student and household characteristics and manipulable program factors that relate to positive change. The design took into account the diversity of the population of students with disabilities and acknowledged that what works for one group of students may not work for another.

The SEELS project team has produced a series of reports that focus on identifying correlates for a variety of outcomes for the diverse population of students with disabilities. This report focuses on identifying factors related to both academic and social adjustment outcomes and to both the level of achievement of students with disabilities on those outcomes at the outset of the study (referred to as Wave 1) and to change in those outcomes over time. Factors investigated in this effort reflect the SEELS conceptual framework (Exhibit 1-1). Student-level factors include characteristics of students' disability and functioning, demographics, and social skills and behaviors. Household circumstances include household income and parents' expectations and support for their children's education. School program factors that are considered are (1) participation in general education, (2) instructional groupings, (3) students' involvement in instructional activities, (4) curriculum modification, (5) modified grading standards, (6) teacher competence, and (7) receipt of a variety of learning supports and accommodations.[4]

[3] Outcomes refer to important achievements of children and youth. Postsecondary outcomes are those achieved in the early years after high school, such as productive employment, postsecondary education, increasing independence. Outcomes during secondary school that are the focus of this report are academic achievements in reading and mathematics and positive social adjustment.

[4] See Exhibit 1-3 for a complete list of factors included in the SEELS analyses.

Exhibit 1-1
SEELS Conceptual Framework



Background

Since 2000, SEELS has contributed to the special education field's knowledge of the experiences of children with disabilities nationally while they are in elementary and middle school. Guided by its comprehensive conceptual framework, SEELS has collected data three times over 5 years on student and family characteristics; students' school programs, instruction, and accommodations; and a broad set of student outcome measures, including academic progress and social development. Students' parents have been interviewed by telephone, school staffs have completed mailed questionnaires, and students themselves have participated in repeated direct assessments of their reading and mathematics abilities and in-person interviews regarding their views of themselves and of school.

Drawing on these data resources, SEELS also has contributed to the body of knowledge related to the range of factors associated with differences in student performance and outcomes. Because SEELS includes a nationally representative sample of students with disabilities, it provides statistically reliable and generalizable estimates of children's experiences and factors related to variation in them both for children with disabilities as a group and for children in each of 12 federal special education disability categories.

Over the past several years, a series of SEELS reports[5] has documented the characteristics, experiences, and outcomes of elementary and middle school students with disabilities by using data from the two waves of data collected in 2000-01 and 2002.[6] Completion of Wave 3 in 2004[7] provides an opportunity to examine trends in outcomes over a longer period of time by comparing information reported in Wave 3 with the "baseline" information reported in Wave 1 for students for whom information is available for both waves. These data also provide a unique opportunity to focus on the factors related to growth in longitudinal outcomes, with a particular focus on those that are amenable to intervention (e.g., placement, instructional groups, curricular modifications). Therefore, this report addresses the following questions:

- To what extent did the academic and social adjustment outcomes of students with disabilities nationally change from 2000-01 to 2004?
- To what extent did outcomes and changes in them over time vary for students who differed in their individual and family characteristics, and their school programs and supports?
- To what extent do the independent and the combined effects of individual, family, school program, instructional, and support factors vary for students in different disability clusters and for different outcomes?

An Organizing Principle: Disability Clusters

As noted above, SEELS was designed to collect and report data that are representative of the population of students with disabilities in the SEELS age range nationally as a group, as well as of each special education disability category. This ability to disaggregate data by disability category makes SEELS unique, and most of the study's reports have presented data organized by this key variable. However, for this report, conducting its underlying descriptive and multivariate analyses by disability category was not practical. Instead, we employed a strategy used in the original National Longitudinal Transition Study

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[5] These reports include Wagner, Marder, et al., 2002; Wagner & Blackorby, 2002; Blackorby, Wagner, Cadwallader, et al., 2002; Wagner, Cadwallader, et al., 2002; Blackorby, Wagner, Cameto, Marder, et al., 2004; and Blackorby, Wagner, Cameto, Davies, et al., 2004. Reports can be found at www.seels.net.

[6] The first wave of data collection included (1) parent interviews in summer 2000, when students were ages 6 through 13, and (2) information about the students obtained from staff in the schools they attended in spring 2001, when students were ages 7 through 14 and in first through ninth grades or in ungraded programs. Wave 1 also included direct assessments of SEELS students' reading and mathematics achievements in 2001 and in-person interviews conducted with the students. Wave 2 was conducted in spring 2002, when students were ages 8 through 15; parents were interviewed again, surveys were conducted again with school staff, and students participated in assessments and in-person interviews for a second time.

[7] The third and final wave of data collection for SEELS was conducted in spring 2004, when students were ages 10 through 17; parents were interviewed again, surveys were conducted again with school staff, and students participated in assessments and in-person interviews for a third time.

(NLTS)[8] to combine students from different primary disability categories who share key disability characteristics into larger disability clusters. There are several reasons why we took this approach.

First, the analyses presented in this report draw on data from parents, teachers, and student assessments, each collected in 2000-01, 2002, and 2004. The multivariate analysis procedures used (see a subsequent section in this chapter for a description) require that individual students have data from all variables included in the analyses; otherwise, they are excluded from the analysis results. This is not a function of attrition, but rather of combining data from multiple sources and years. The formation of disability clusters provides a larger group of students so the loss of cases was less problematic than it would have been if smaller disability categories were used as the basic grouping for analyses. Second, several categories of students are of such low incidence (e.g., those with traumatic brain injuries) that separate statistical models could not be estimated for them at all. The use of disability clusters allows data for students in low-incidence categories to be included in the analyses reported here.

The disability cluster strategy, then, includes a larger number of potential students than a strategy that would employ disability categories and provides greater power to estimate statistical models. However, we recognize that the use of disability clusters also introduces some problems in interpreting the results, as in combining students with visual impairments and hearing impairments into a "sensory" cluster. Several steps were taken to check for potential problems. First, students in different primary disability categories who were included in the same cluster were compared with one another on a wide range of variables (see the accompanying methodological volume—Javitz, Blackorby, Wagner, McCracken, & Knokey, 2007—for the results of these comparisons) to identify factors on which they differ that should be controlled for in analyses. In addition, variables distinguishing the various disability categories that comprise each cluster were included in the multivariate analyses to control for disability-related differences in the multivariate models. Thus, relationships between other independent variables and outcomes can be interpreted as independent of the differences in disability categories among students in a particular cluster.

A student's primary disability category was first identified for SEELS at the beginning of the study, and each student remains in that original disability category for the purposes of sample weighting.[9] However, the additional data relating to disability and functioning that has been collected from school personnel and parents three times clearly document that student disability is not static; the primary disability category designation of some students has changed over time. Thus, for purposes of analyses in this report, we have assigned

[8] NLTS, the precursor to NLTS2, was conducted for OSEP from 1985 through 1993. A summary of findings is available at http://www.sri.com/policy/cehs/publications/dispub/nlts/nltssum.html

[9] The methodological volume that accompanies this report (Javitz, Blackorby, & Wagner, 2007) provides a detailed discussion of sample weighting procedures.

students to six *disability clusters* on the basis of information about their primary disability reported by school personnel in 2004. When those data were unavailable, we retained the category assignment specified on the original enrollment lists provided by school districts in 1999.[10] The disability clusters are composed of students who are similar in disability characteristics (e.g., vision and hearing are both sensory in nature). The disability clusters have been defined according to the logic described below, and Exhibit 1-2 shows for each cluster how students distribute across the special education primary disability categories to which sample members were assigned at the outset of the study.[11]

- **The high-incidence cluster** includes students whose disabilities affect primarily learning and/or communication. The cluster has been defined to include students with primary disability classifications of learning disability or speech/language impairment at the outset of study, or if more recent data are available, those who school personnel reported as having learning disabilities or speech/language impairments alone or in conjunction with designated other disabilities in 2004. More than half the students in this cluster (54%) are students whose initial primary category was learning disability, and 44% were initially designated as having a speech/language impairment; small numbers of students initially placed in the categories of other health impairment, autism, or traumatic brain injury are included as well because school personnel later identified them as primarily having a learning disability or speech/language impairment.
- **The cognitive cluster** consists of students whose disabilities are associated with significant limitations in cognition. The cluster includes students classified in the categories of mental retardation or traumatic brain injury at the outset of study or those who school personnel later reported to have one of these two disabilities alone or in conjunction with one other designated disability. More than three-fourths of students in this cluster have the initial primary disability designation of mental retardation (78%), but it also includes students who initially were in the categories of learning disability (10%), speech/language impairment (5%), emotional disturbance (2%), or other health impairment (2%), as well as small numbers of students with autism or traumatic brain injuries who later were identified as having mental retardation.

[10] Overall, 36% of students were assigned to clusters on the basis of their original disability category designation. Percentages ranged across clusters from 30% for the sensory cluster to 44% for the mild cluster.

[11] The methodological volume that accompanies this report (Javitz, Blackorby, & Wagner, 2007) specifies the logic for the creation of the disability clusters in more detail.

Exhibit 1-2
Original School/District Primary Disability Designation of Students Assigned to Disability Clusters

	Disability Cluster					
	High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
Percentage with initial primary disability classification of						
Learning disability	53.7	10.4	20.6			
Speech/language impairment	44.0	5.4	10.7	13.1		0.7
Mental retardation		78.5				
Emotional disturbance		2.3	59.5			
Hearing impairment				63.4		0.1
Visual impairment				23.5		0.3
Orthopedic impairment					40.5	
Other health impairment	2.2	1.9	8.9		59.4	
Autism	0.1	0.3	0.1			43.2
Traumatic brain injury	0.1	1.3	0.1		0.1	
Multiple disabilities						54.7
Deaf-blindness						1.0
Number[a]	2,651	1,664	1,354	2,232	1,590	2,012

[a] The sample sizes in Exhibit 1-2 indicate the number of students in each cluster, without regard to whether students also have data from the sources included in the analyses reported in later chapters. The methodological volume that accompanies this report (Javitz, Blackorby, & Wagner, 2007) indicates the number of students who have data for each factor included in multivariate analyses.

Sources: School district special education student roster, 1999; SEELS Wave 3 school program survey, 2004.

- **The behavior cluster** includes students whose disabilities affect behavior and/or social functioning. It includes students in the category of emotional disturbance at the outset of study and those who school personnel reported in 2004 had an emotional disturbance alone or in conjunction with another designated disability. Six of 10 students in this cluster were initially designated as having emotional disturbances. Students with learning disabilities (21%) or other health impairments (9%), and small numbers of students with autism or traumatic brain injuries who later were reported to have primarily behavior issues also are included.
- **The sensory cluster** is composed of students whose disabilities involve either a vision or a hearing limitation. It includes students whose primary disability at the outset of study was a visual or hearing impairment[12] and those for whom school personnel reported in 2004 a sensory disability alone or in conjunction with another designated disability. Almost two-thirds of students in the cluster (63%) were initially designated in the hearing

[12] As noted later in this chapter, the analysis strategy employed by SEELS distinguishes between youth with these two forms of sensory impairments in identifying relationships between other factors in the analyses and longitudinal outcomes.

impairment category, but sizable proportions of students with visual (24%) or speech/language impairments (13%) also are included.

- **The physical/health cluster** includes students with orthopedic impairments or other health impairments at the outset of study and those who school personnel reported in 2004 had such a disability alone or in conjunction with another designated disability. Not surprisingly, then, the cluster consists of almost entirely of students with orthopedic (40%) or other health impairments (59%), as well as small numbers of students with traumatic brain injuries that limit their physical functioning.
- **The severe cluster** includes students whose disabilities significantly affect multiple areas of functioning. The cluster includes students identified as having multiple disabilities or deaf-blindness at any point in the study and those initially included in the autism category who later were reported to have additional disabilities. More than half of the cluster (56%) consists of students with multiple disabilities; more than 4 in 10 (43%) have autism, and small numbers of students were designated initially as having speech/language, hearing, or visual impairments but later were reported to have additional disabilities.

The descriptive and multivariate results presented throughout this document are reported for these clusters.

As noted earlier, to ensure that the clusters do not inappropriately combine students who are substantially different in important ways, extensive analyses were conducted to examine their validity; they confirm the appropriateness of the clusters (see Javitz, Blackorby, & Wagner, 2007). Further, the multivariate analyses described below include dichotomous variables to control for the statistical contribution of a disability category to a cluster (e.g., analyses of the sensory cluster include a variable distinguishing those with a hearing from those with a visual impairment).

Describing Longitudinal Outcomes

As students approach high school, they are confronted with developmental challenges in multiple domains. In this report, we focus on the two domains that are of significant interest to policy and practice—academic performance and social adjustment—and we address several indicators in each domain.

Including a focus on *academic performance* is obvious, given that learning what is specified in academic content standards is the basis of day-to-day schooling; improving academic performance also is the focus of NCLB (Linn, Baker, & Betebenner, 2002) and other school accountability systems. We have included the following indicators of academic performance: (1) standardized test scores from research versions of the Woodcock-Johnson III (WJ III) subtests of reading comprehension and mathematics calculation (Woodcock, McGrew, & Mather, 2001), (2) oral reading fluency rates from a fourth-grade reading passage (Deno & Marston, 1987), and (3) grades given to students by their teachers.

The second outcome domain is *social adjustment.* Problems in this domain are of great concern to school personnel, to students with disabilities, and to students' families. Disruptive behaviors at school can be a distraction to learning for students with those behaviors and for students around them; poor social behavior also can isolate students at a time when the importance of peer relationships increases dramatically. Analyses include two indicators of social adjustment that highlight both positive and negative aspects of the domain: (1) students' membership in extracurricular school or community groups, and (2) the number of disciplinary actions in which they were involved during the prior school year.

Data on each academic and social adjustment indicator were collected for students from parents in 2000, 2002, and 2004 and from students and school staff in 2001, 2002, and 2004. Chapter 2 provides statistical summaries of students' performance on each of the outcome indicators and shows both the level of aggregate change (e.g., the extent to which average reading scores improved for students with disabilities overall), as well as the degree of fluctuation in the indicators for individual students (e.g., the proportion of students whose reading performance improved or declined over time). Thus, these data portray the variation in outcomes and changes over time in them that the subsequent statistical analyses seek to explain.

Descriptive and Multivariate Analyses

The SEELS conceptual framework suggests that student outcomes are the result of a complex combination of individual and household characteristics; parental expectations and support; and educational program, instruction, and accommodations factors. Specific variables in each of these areas were selected for inclusion in the analyses reported here on the basis of the research literature and/or the results of previous SEELS analyses. For each of these factors, simple descriptive statistics are provided to portray the relationships between a factor and the outcomes described above. They illustrate, for example, differences in academic and social adjustment outcomes for students with high social skills, as reported by parents, compared with those who had low ratings.

Although these results can be both interesting and informative, they are limited because many factors are intertwined with many other factors in contributing to an outcome. For this reason, we have conducted multivariate statistical analyses that simultaneously take into account other related factors to complement the descriptive findings. The objective of the multivariate analyses is to identify the individual and combined relationships between the independent variables and (1) the outcomes when they originally were measured in 2001, and (2) the growth in the outcomes observed between Waves 1 and 3. The multivariate analyses have used the growth application of Hierarchical Linear Modeling (HLM), with longitudinal student outcomes entered at level 1, and initial and time-varying factors entered at level 2. Thus, for each independent

variable, these analyses produce two estimates: (1) the estimated effect on Wave 1 values, and (2) the estimated effect on growth from Wave 1 to Wave 3.[13] These estimates show the magnitude and the direction of a relationship with a specific outcome that are related to change in the independent variable, statistically holding all other factors in the analysis constant. A complete list of individual, family, school program variables in the multivariate analyses is presented in Exhibit 1-3.[14]

Technical Notes: How to Read Results

We have sought to present the information in this report in an accessible format. The appendices present technical information related to data collection and summaries of analyses. In reading the body of the report, readers should keep the following in mind.

Descriptive Results

- **Descriptive results are weighted.** All the descriptive statistics for outcomes and independent variables presented in this report are weighted estimates of the national population of students receiving special education in the SEELS age range, as well as of each disability cluster.
- **Standard errors.** Percentages are accompanied by standard which describe the precision of the estimates. For example, a weighted estimated value of 50% and a standard error of 2 for a variable mean that the value for the total population, if it had been measured, would lie between 46% and 54% (i.e., $\pm 1.96 \times 2$ percentage points) with 95% confidence. In general, estimates based on small samples have larger standard errors and should be viewed cautiously.
- **Cross tabulation variables.** The descriptive look at outcomes examines the ways they vary with differences in students' social skills and classroom behaviors for students with disabilities overall and across disability clusters.

[13] Separate HLM models were estimated for students overall and for each cluster and each dependent variable, with outcome measures entered at level 1 and student and program measures entered at level 2. A total of 42 HLM models [six dependent measures × seven groups (i.e., students overall and six disability clusters)] were conducted. Specifications of models and complete results are reported in the *Methodological Volume in Support of the SEELS Comprehensive Report, What Makes a Difference? Influences on Outcomes for Students with Disabilities: SEELS Sampling, Data Collection, and Analysis Procedures* (Javitz, Blackorby, Wagner, McCracken, & Knokey, 2007) available at www.seels.net.

[14] Each factor is described more fully in the chapter that reports its relationships with outcomes.

Exhibit 1-3
Independent Variables and Data Sources Included in SEELS Multivariate Analyses of Wave 1 and Growth Measures

Variable	Source[a]
Individual characteristics and functioning	
Disability category	
Age	
African-American (vs. white)	P
Hispanic (vs. white)	P
Gender (male vs. female)	P, T
Has ADHD and takes psychotropic medications	P
Has ADHD and takes no psychotropic medications	P
Number of disabilities reported in school program survey	SP
Functional cognitive skills	P
Self-care skills	P
Social skills ratings	P
Student follows directions	T
Student makes friends easily	T
Student has low self-esteem	T
Student cooperates with peers	
Student completes homework on time	
Student persists in completing classroom tasks	T, P
School mobility other than grade level changes	P
Student absenteeism	T
Family characteristics	
Family involvement at home	P
Family involvement at school	P
Income	P
Expectations for postsecondary education	P
School program characteristics	
Number of social adjustment supports	P, T
Curriculum modification	T
Percentage of academic classes that child takes in general education setting	SP
Receipt of whole-class instruction	T
Receipt of small-group instruction	T
Receipt of individual instruction	T
Class size	T
Teacher competence in motivating students	T
Teacher competence in adapting materials	T
Teacher competence in teaching reading skills/language arts	T
Teacher competence in managing behaviors	T
Participation in general instructional activities	T
Participation in literature-reading activities	T
Participation in skill-building reading activities	T
The principal keeps good discipline at school	P
Accommodations and learning supports	
Has a tutor or aide	T
School good at meeting individual needs of child	P
More time in taking tests	T
Alternative tests/assessments	T
Modified grading standards	T
Slower-paced instruction	T
Shorter/different assignments	T
More frequent feedback	T
Reader/interpreter	T
Teacher aides	T
Peer tutor	T
Behavior management program	T
Learning strategies/study skills	T

[a] P=Parent interview; T=Teacher survey; SP=School program survey

Multivariate Modeling Results

As noted earlier, the analyses presented in this report, which are both multivariate and multilevel, measure the relationships between independent variables and both outcomes at Wave 1 and growth in an outcome over time. Thus, two estimates are calculated for each independent variable: (1) initial differences associated with the independent variable, and (2) differences in the rate of growth over time. Each estimate is presented as a reflection of the difference between two values on the independent variable (e.g., boys vs. girls for gender; 80% or more of academic classes in general education vs. less than 60%). In the case of the effect of participation in general education, results can be interpreted as follows: in 2001, significant effects comparing students who took 80% or more of their academic classes in general education with students who took fewer than 60% of their classes there are evident for most baseline measures and disability clusters, but general education participation does not relate significantly to growth in outcomes over time. For example, overall, greater inclusion in general education for academics is associated with higher test scores in reading and mathematics (by 2 W-score points), as well as greater oral reading fluency (by 5 words per minute), holding other factors constant. This pattern is consistent for students in the high-incidence, cognitive, behavior, and sensory clusters. In contrast, general education participation is related only to mathematics calculation for students in the physical/health and severe disability clusters. The only effects of general education participation on growth in outcomes over time were for oral reading fluency for these same two groups, although the relationships were in different directions.

Organization of the Report

This report begins with a description of the initial status of students at Wave 1 across the outcome measures and the longitudinal growth and fluctuations in them for students with disabilities as a whole and those in each disability cluster (Chapter 2). The next six chapters are organized by the domains of independent variables and show the bivariate and multivariate results that are associated with key variables in those domains. That is, individual chapters draw on all of the descriptive and multivariate analyses. This organization facilitates the comparison of factors that are most important for students in different clusters and for different outcome measures. Each chapter provides information about the distribution of independent variables across disability clusters, the bivariate relationship of the independent variable with outcomes, and the results of the multivariate analyses. These chapters examine the relationships of outcomes to key variables related to students':

- disability and functional skills (Chapter 3),
- demographic characteristics (Chapter 4),
- family income, expectations, and support (Chapter 5),

- social skills and classroom behaviors (Chapter 6),
- school placement and programs (Chapter 7), and
- accommodations and learning supports (Chapter 8).

Chapter 9 summarizes the results, highlighting the major findings across independent variables for students in each disability cluster and outcome area.

2. Longitudinal Outcomes of Students with Disabilities

by Jose Blackorby, Phyllis Levine, and Mary Wagner

More than ever before, America is demanding greater productivity from its educational system: high academic standards for all students, increasing levels of academic proficiency for more students, and higher graduation rates. Success in meeting these demands is viewed as critical if the nation is to meet the economic, social, and technological challenges it will face in this century. These expectations are codified in NCLB and IDEA 2004, which require that outcomes improve for all students, including those with disabilities.

SEELS has placed a high priority on measuring both outcomes and change in those outcomes over time and on identifying factors that relate to improvements in them. Reflecting those emphases, this chapter examines changes in selected outcomes of students with disabilities over a 3- or 4-year period.[1]

This report focuses on two outcome domains: academic performance and social adjustment. Below, we present data on aggregate change in these outcomes for students with disabilities as a group and by disability cluster. For each outcome, we also report individual-level fluctuation over time (i.e., the percentage of students whose performance went up or down over time) in each of these domains.

Academic Performance

As noted in Chapter 1, improved academic performance is the motivating force behind recent accountability reforms. However, limitations in academic achievement constitute the primary implication of disability for most students receiving special education services, and those limitations can constrain students' ability to succeed in school and in the workplace. SEELS, NLTS2, and state accountability tests indicate that most, although not all, students with disabilities perform well below grade-level proficiency in reading and mathematics. In the following sections, we describe how the academic performance of students with disabilities—measured by standardized test scores in reading and mathematics, oral reading fluency rates, and teacher-given grades—changed in the aggregate and fluctuated for individuals from 2001 to 2004.

[1] Because parent interviews were conducted in 2000, 2002, and 2004, the period analyzed for outcomes based on interview data is 4 years. School surveys and student assessments and interviews were administered in 2001, 2002, and 2004; thus, the period of change for outcomes from those sources is 3 years.

Reading and Mathematics Performance

Students with and without disabilities are increasingly assessed in core academic subjects using standardized achievement tests. Such tests are now considered the primary evidence of educational productivity and are linked to the accountability provisions of NCLB (Heubert & Hauser, 1999; Langenfeld, Thurlow, & Scott, 1997). States have different approved accountability testing programs under NCLB; therefore, states vary somewhat in the academic content addressed, technical characteristics, grades tested, and the definition of proficiency cut-points. Still, they all address the core areas of reading and mathematics. As a national study, SEELS could not rely on state tests because scores would be difficult to collect and problematic to pool across states. Therefore, SEELS has used research editions of Woodcock-Johnson III (WJ III) subtests (Woodcock, McGrew, & Mather, 2001) to conduct standardized assessments of reading and mathematics performance. The WJ III subtests, which are administered in one-to-one sessions with individual students, have excellent technical characteristics and current norms, and many school districts use them to assess students for eligibility for special education. Because the full subtests were prohibitively time-consuming for research, as opposed to diagnostic purposes, the WJ III developers derived shorter research versions specifically for use in SEELS. The fact that WJ III results can be reported in relation to general population norms enables us to describe the academic achievement of students with disabilities in comparison with that of peers without disabilities. Below, we discuss the longitudinal results of reading and mathematics assessments.

Reading comprehension. The ability to derive meaning from printed text clearly is among the most important skills that students acquire during their school careers. In early elementary school, students learn the basics of sound-symbol correspondence and phonics and are exposed to simple sentence structures. Over time, students encounter increasingly complex language structures and use reading skills to acquire academic knowledge and more general information and for entertainment. Moreover, processing and comprehending text efficiently is the academic skill area in which many American students, including students with disabilities, encounter difficulty. Indeed, Wave 1 analyses reveal diversity in performance, but generally poor reading comprehension among most students with disabilities, as measured on the WJ III subtest.

The WJ III passage comprehension subtest presents students with a series of fill-in-the-blank items that are ordinally ranked in difficulty. The least difficult items present a sentence in conjunction with a graphic representation, and students must provide the appropriate word to complete the sentence. The more difficult items are entirely text-based, address more technical topics, and require both greater vocabulary and the ability to make inferences from context. Students who perform well on this test have well-developed linguistic and cognitive skills, and the ability to notice and use textual information.

Exhibits 2-1A and B compare the passage comprehension test scores of students with disabilities in 2001 with those in 2004. The findings are presented as W-scores; this metric is an equal-interval scale that has desirable properties for modeling growth. The W-score also shows how students progress on an independent scale, rather than in reference to an external norm group of nondisabled students. A median W-score of 500 is approximately equal to the performance of a fourth-grade student in the general population.

The findings are presented in "box and whiskers plots." The boxes show the measure of central tendency, with the median being indicated by the line across the box, and the variability in the distribution (i.e., half of students fall in the shaded area of the box). The "whiskers" show the range of values of the quarter of students who fall above and the quarter who fall below the box. Stars above and below the whiskers are outliers. Thus, for example, the first set of plots in Exhibit 2-3A shows reading comprehension scores in 2001. The first plot, for students overall, shows that the median value, or halfway point in the scoring distribution, is 488, or a reading skill somewhat below the fourth-grade level. The highest and lowest values reached are marked by the ends of the "whiskers" and indicate a range from 404 to 534, with half of students scoring inside the box, between 469 and 494. The second set of plots show scores for 2004, and the third set of plots in Exhibit 2-1B shows the change over time. The first plot in that set, for example, shows that some students with disabilities overall gained more than 100 W-score points in reading comprehension over time, but some also lost more than 50 points, with the median change being an increase of 12 W-score points.

- The boxplots in Exhibit 2-1A show considerable diversity in students' passage comprehension W-scores within and across disability clusters in both 2001 and 2004. Median W-scores in passage comprehension in Wave 1 ranged from 462 for the cognitive disability cluster to 494 for the behavior disability cluster. In Wave 3, the median W-scores ranged from 477 for the cognitive cluster to 503 for the high- incidence, behavior, and physical/health clusters. The boxplots also show considerable variation in performance within clusters and overlapping ranges in scores across them.
- Students in the high-incidence, behavior, and physical/health disability clusters had the highest W-scores in both Waves 1 and 3.
- Students in the cognitive and severe disability clusters had both the lowest median W-scores and scores that were the most variable, as indicated by the height of the "boxes."
- The reading comprehension of students across the disability clusters improved over the 3-year period, with increases in median W-score points of 9 to 14 units. The similarity in the box plots in Exhibit 2-3B indicates no significant differences occurred in the amount of growth across disability clusters over time.

Exhibit 2-1A
WJ III Passage Comprehension (W-Scores), by Disability Cluster

Wave 1 **Wave 3**

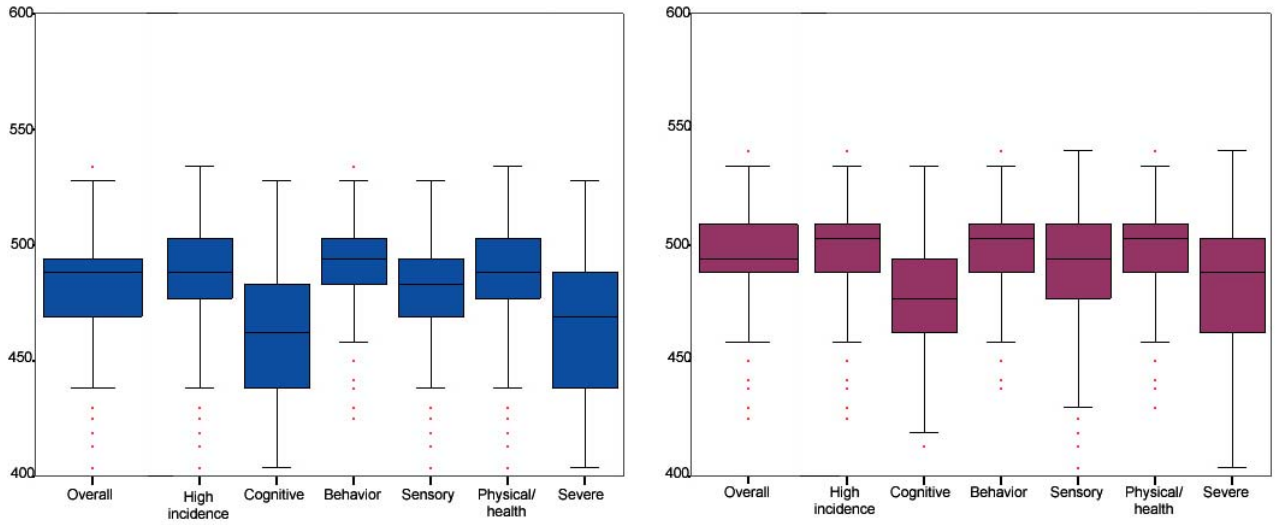
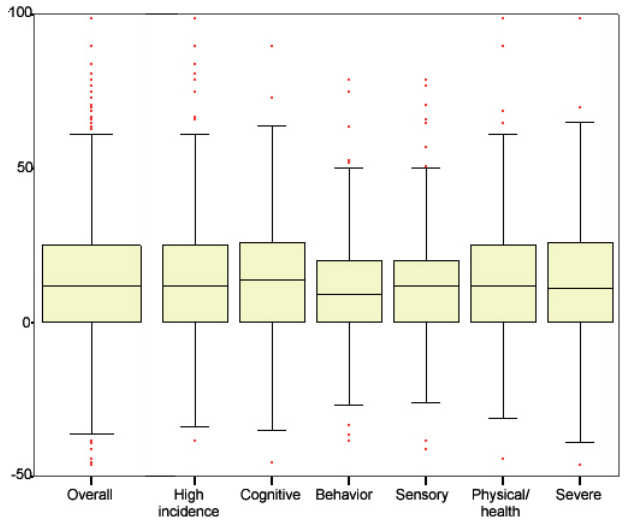


Exhibit 2-1B
Changes in Passage Comprehension Scores Between Waves 1 and 3



Sources: SEELS Waves 1 and 3 direct assessments, 2001 and 2004.

- It is important to note that some students in each disability cluster had reduced W-scores over the 3-year period, as indicated by the lower "whisker" extending below 0 in Exhibit 2-1B. About one-fourth of students in each cluster did not progress as far on the subtest in 2004 as they had in 2001.
- Finally, for students in each disability cluster, there are outliers present at the top and bottom ends of the scale.

Oral reading fluency. The National Reading Panel (NRP) highlighted the importance of increasing oral reading fluency rates as an important component of elementary school students' acquisition of reading skills (National Institute of Child Health and Human Development, 2000). Fluency is the ability to read orally with speed, accuracy, and proper expression, and is a major distinguishing feature between skilled and unskilled readers. Whereas skilled readers read words instantly without using conscious attention, the word reading of poor readers is inaccurate, slow, or both (Rack, Snowling, & Olson, 1992). Reading fluency has been linked to other measures of reading performance and is especially useful for monitoring student progress. Fluency is typically defined as the number of words read correctly in a minute (Fuchs, Fuchs, Hosp, & Jenkins, 2001; Fuchs, Fuchs, & Maxwell, 1988; Good, Simmons, & Kame'enui, 2001; Tindal & Marston, 1996). The SEELS oral reading fluency measure was taken from *Standard Reading Passages* (Deno & Marston, 1986); students completed a second-grade and a fourth-grade passage during each assessment. Exhibit 2-2A shows boxplots of oral reading fluency rates on the fourth-grade passage in 2001 and 2004 for students with disabilities overall and for those in each disability cluster;[2] Exhibit 2-2B shows their differences.

- Consistent with other measures of performance, the boxplots depicting Wave 1 and Wave 3 oral reading fluency rates illustrate a wide range of performance. In each cluster, the reading rates of a number of students suggest fluent, accurate reading. Many students also read so slowly and/or made so many errors that their ability to master grade-level content is questionable.
- The median oral reading fluency rate in Wave 1 for students overall was 79 words per minute. This rate is comparable to a fluency rate in the general population for fall testing of third-grade students.
- Rates ranged from 47 correct words per minute for students in the cognitive disability cluster to 105 words per minutes for students in the behavior disability cluster.

[2] The fourth-grade passage was selected for presentation and use in these analyses because it was closest to students' actual grade level by Wave 3.

Exhibit 2-2A
Oral Reading Fluency (Correct Words Read Per Minute), by Disability Cluster

Wave 1 **Wave 3**

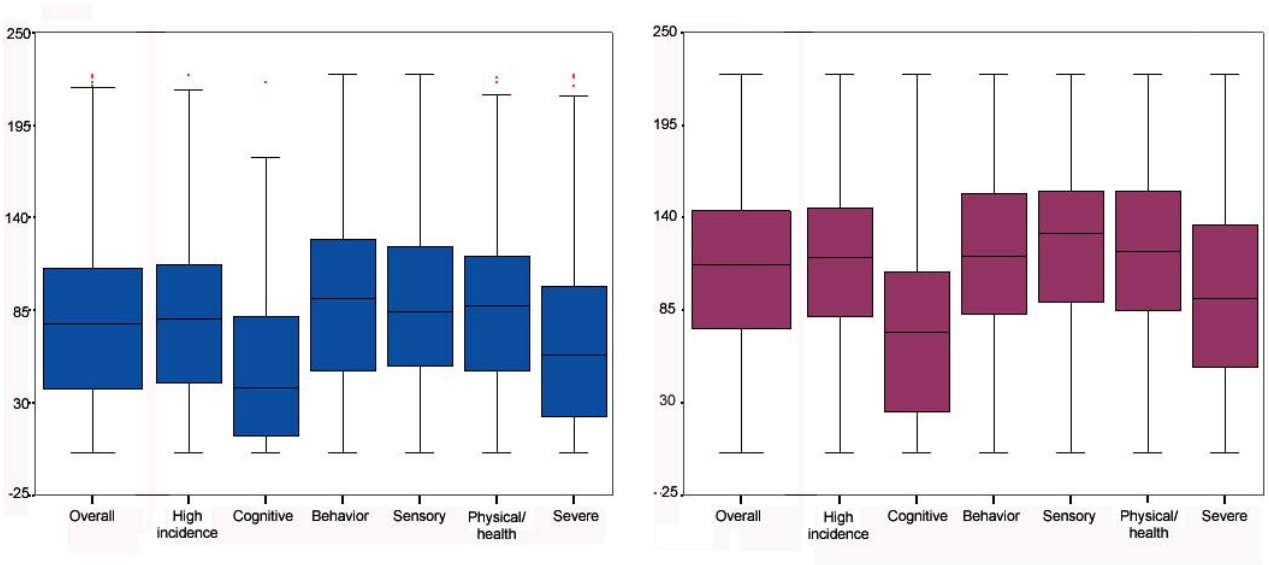
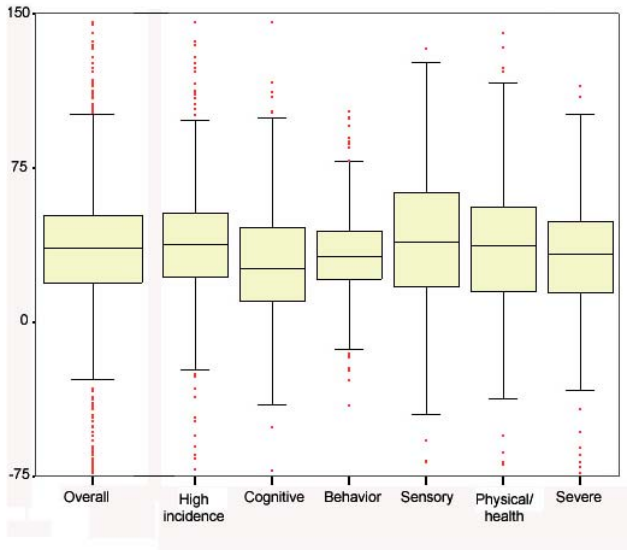


Exhibit 2-2B
Changes in Reading Rates Between Waves 1 and 3



Sources: SEELS Waves 1 and 3 direct assessments, 2001 and 2004.

- Students in the behavior and sensory disability clusters read most fluently in Wave 1. Three years later, these two clusters were joined by the physical/health and high-incidence disability clusters as those with the highest fluency rates.
- As they had in the passage comprehension subtest, students in the cognitive and severe disability clusters showed the poorest performance; they read more slowly than peers in other clusters in both waves.
- For students in all disability clusters, the reading fluency rates improved over the 3-year period. The median fluency rate for students with disabilities overall increased by 36 correct words read per minute; increases across clusters ranged from 26 words per minute for students in the cognitive disability cluster to 39 words per minute for students in the sensory disability cluster.
- Change in fluency was most variable among students in the sensory cluster and least variable among students in the behavior cluster, as indicated by the height of the "boxes" in Exhibit 2-2B.
- As with other outcome measures, some students in each disability cluster lost ground, reading more slowly in 2004 than they did in 2001.

Mathematics calculation. Mathematics has played a significant role in the American school curriculum, and its continued importance is reflected in its inclusion in academic content standards in all states. Although mathematics still receives less attention than reading, interest in it has been growing in recent years, following the publication of international comparison studies that suggest American school children do not fare well in comparison with their counterparts in Asia and Europe (Mullis, Martin, & Foy, 2005). The increased emphasis on mathematics also results from recognition of its role in an increasingly technical and international economy. Among students with disabilities, mathematics difficulties are less frequently the cause of referral to special education than are reading difficulties, but mathematics remains a problem for many. Previous SEELS results suggested that students in all disability categories performed better, on average, on mathematics than on reading measures, but that the majority still would be considered to be well below most state proficiency thresholds.

The WJ III mathematics calculation subtest measures students' computation skills, ranging in difficulty from elementary computations (e.g., simple addition) to calculus (e.g., function integration). Students are presented with a worksheet containing mathematics problems. An important characteristic of these problems is that notation signs signal the operation (e.g., a plus sign indicates addition) that is required to produce the correct result. If a student understands the notation, an item tests his/her ability to accurately perform the computation.

Exhibit 2-3A
WJ III Mathematics Calculation (W-Score), by Disability Cluster

Wave 1 **Wave 3**

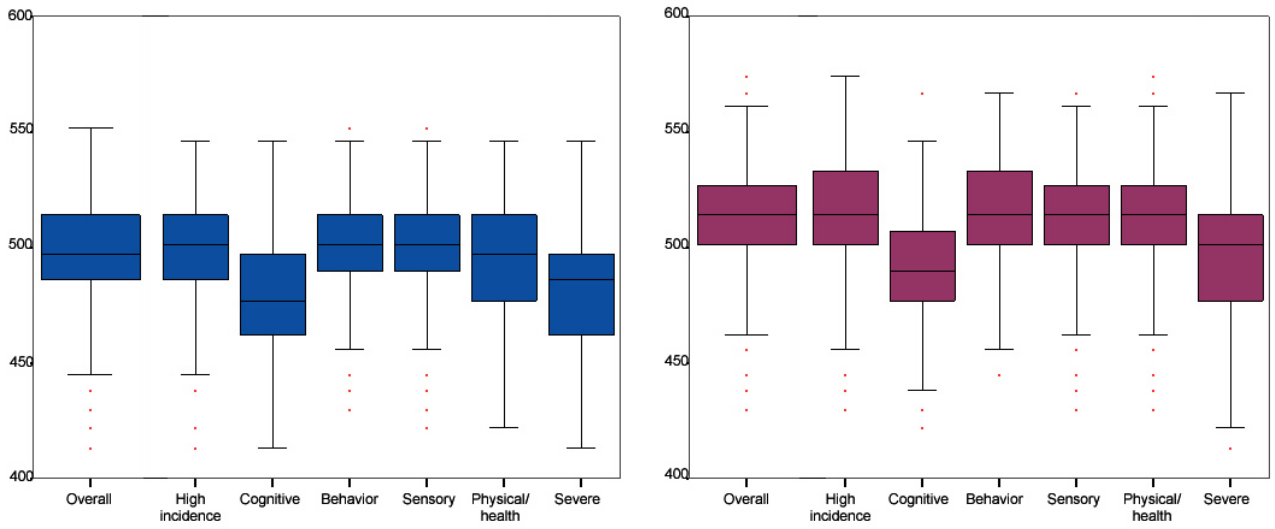
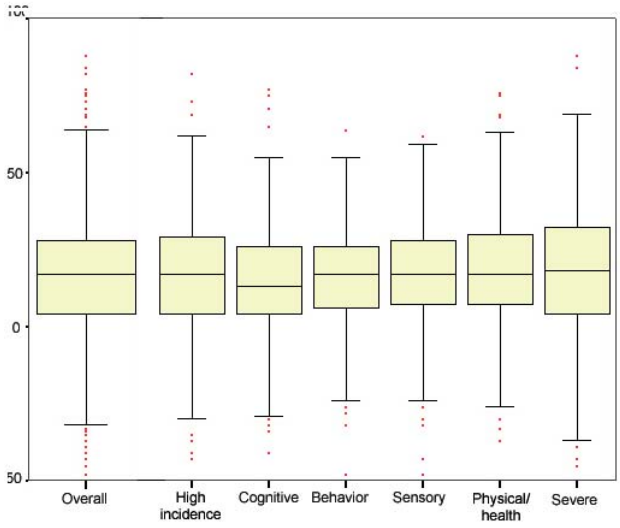


Exhibit 2-3B
Changes in Mathematics Calculation Scores Between Waves 1 and 3



Sources: SEELS Waves 1 and 3 direct assessments, 2001 and 2004.

Below, we compare the performance of students with disabilities in mathematics calculation in 2001 and 2004 (Exhibits 2-3A and B). The findings are presented in the metric of the W-score, with the median of 500 approximately equal to the performance of a fourth-grade student in the general population.

- The box plots in Exhibit 2-3A illustrate a pattern that is consistent with the measures of reading performance. Regardless of cluster, some students had W-scores that reflect grade level expectations related to mathematics calculations. Others had performance that was low relative to their grade level. The median mathematics calculation W-score for students overall was 497 in Wave 1 and 514 in Wave 3.
- Median W-scores in mathematics calculation in Wave 1 ranged from 477 for the cognitive cluster to 501 for the high-incidence, behavior, and sensory disability clusters. In Wave 3, the median W-score range went from 490 to 514 for these same groups of students. The boxplots also show considerable variation within clusters and overlap in score ranges across them.
- Students in the cognitive and severe disability clusters had both the lowest W-scores in calculation, as well as scores that were most variable at both Waves 1 and 3.
- The median mathematics calculation performance of students in all clusters improved over the 3-year period, with median increases of 13 to 18 W-score points. However, there were no differences in the amount of growth across disability clusters over time.
- Some students in each disability cluster lost ground in their mathematics calculation performance over the 3-year period.

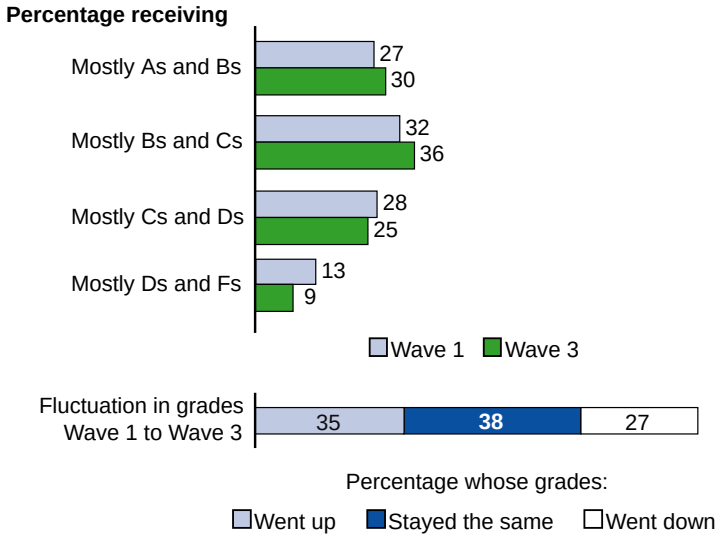
Students' Grades

As a measure of academic achievement, teacher-given grades have well-known limitations related to variations from teacher to teacher and even student to student in grading standards and criteria and to their general reliability. Nonetheless, teachers' evaluations of performance, as indicated by grades, represent a common metric of student performance that is tied to day-to-day teaching and learning. Grades communicate to students and parents information about students' mastery of course content and overall performance in class. When students reach secondary school, course grades become an important part of applications to postsecondary education. To assess grades, SEELS asked parents and teachers to report students' overall grades across their courses; responses were used to create a 4-point scale, presented in Exhibit 2-4.[3]

[3] If data were available from both school staff and parents, the responses from parents were used. If students did not receive letter grades, parents and school staff were asked to report whether students' work was "excellent," "above average," "average," "below average," or "failing." Excellent was equated with mostly As and Bs, above average with mostly Bs and Cs, average with mostly Cs and Ds, and below average or failing with mostly Ds and Fs.

- Overall, students with disabilities received higher course grades in Wave 3 than in Wave 1. About 59% of students earned mostly As and Bs, or Bs and Cs in Wave 1. This rate increased to 66% in Wave 3.
- Corresponding reductions in students receiving mostly Cs and Ds or mostly Ds and Fs were evident, decreasing from 41% to 34% over time.
- Although the trend for students as a group was toward higher grades, fluctuation in both the positive and negative directions is evident. Slightly more than one-quarter of students received lower grades in Wave 3 than in Wave 1, whereas approximately one-third of students received higher grades.

Exhibit 2-4
Grades Received in Waves 1 and 3 and Fluctuation Over Time

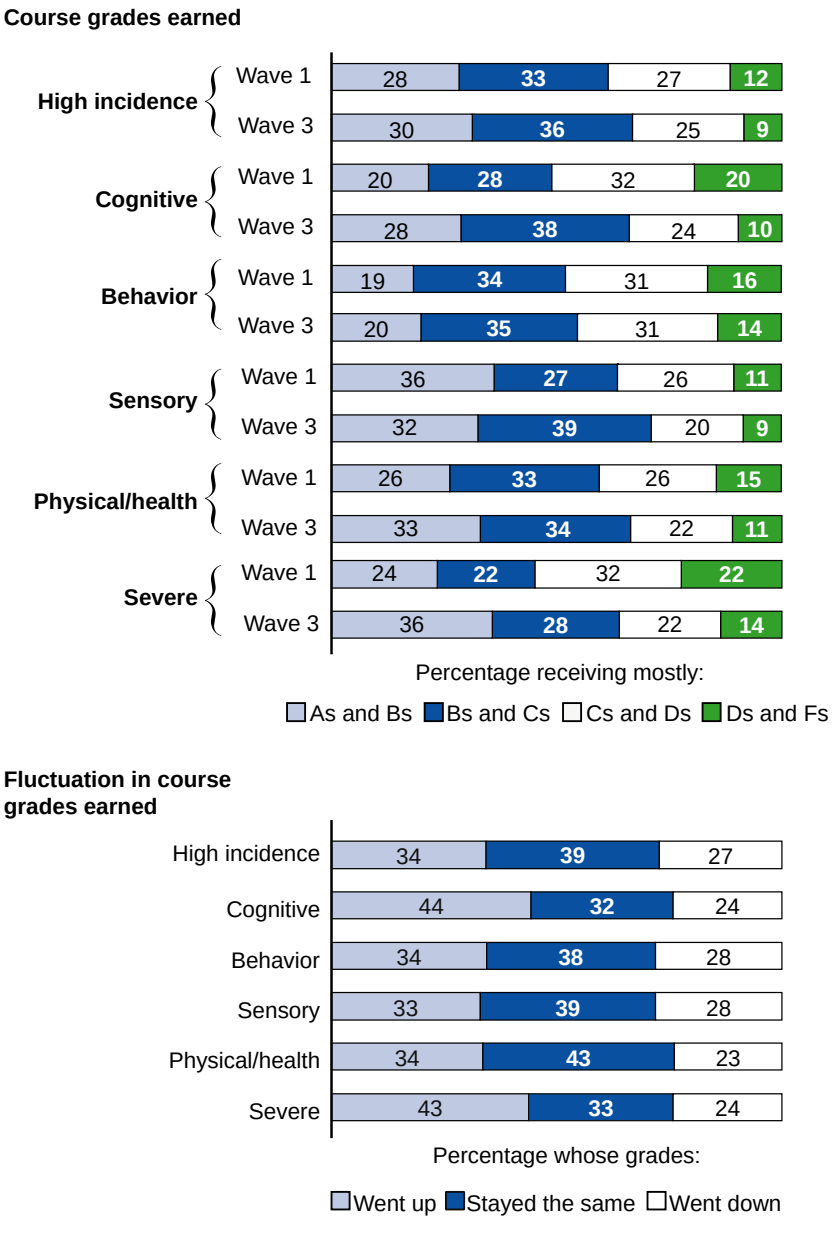


Sources: SEELS Waves 1 and 3 parent interviews, 2000 and 2004; school program questionnaires, 2001 and 2004.

- Analyses of aggregate change and individual fluctuation in grades by students' disability cluster (Exhibit 2-5) show that there are students in each cluster who received the highest grades and those who received the lowest. However, within each cluster and at both points in time, higher grades were more common than lower ones.
- Although an aggregate trend toward higher grades was evident for most students in disability clusters, the largest increases in grades of Bs and above were concentrated among students in the cognitive and severe disability clusters (18 percentage points each).
- In contrast, no changes took place between Waves 1 and 3 in the number of students in the behavior or physical/health disability clusters earning Bs and above.

- Fluctuations in individual students' grades over time mirror the aggregate changes inasmuch as more students in the cognitive and severe disability clusters received higher grades over time (44% and 43%) than in other clusters (33% and 34%). Across clusters, about equal proportions (23% to 28%) received lower grades in Wave 3 than in Wave 1.

Exhibit 2-5
Grades Received in Waves 1 and 3 and Fluctuation Over Time, by Disability Cluster



Sources: SEELS Waves 1 and 3 parent interviews, 2000 and 2004, and school program questionnaires, 2001 and 2004.

Social Adjustment

Although American schools primarily are held accountable for students' academic performance, they also play an important role in students' social development. School is where students engage in the important activities of learning not only academic knowledge, but also more generalized skills, such as problem solving, being on time, and following directions; and developing formative relationships with peers and adults. When students exhibit inappropriate behavior at school, the consequences can be powerful. Students' poor behavior at school can distract the students themselves and those around them from their learning tasks and generate negative feedback from adults and social rejection from peers.

Many students with disabilities encounter difficulties in one or more areas of social adjustment. Although these challenges are most acutely experienced by students whose diagnosed disabilities specifically involve behavior (i.e., emotional disturbance, attention deficit or attention deficit/hyperactivity disorder [ADD/ADHD], and autism), they represent challenges for students in other disability categories as well. SEELS has collected and reported on multiple domains of social adjustment, including exhibiting age- and environment-appropriate social behaviors, being socially integrated and gaining membership in organized extracurricular groups, and avoiding negative behaviors. For this report on longitudinal outcomes, we focus on social adjustment outside the classroom and on disciplinary actions received over a school year.

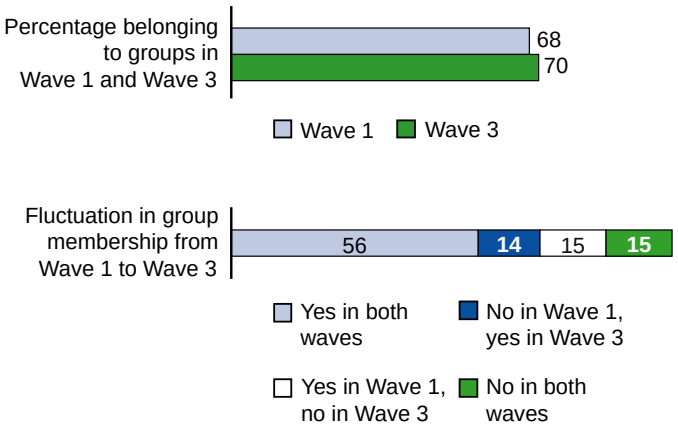
Social Adjustment Outside the Classroom

Although the classroom is an important setting for students, social activities outside the classroom also are crucial to their development. The lives of many children are substantially enriched by their participation in organized extracurricular groups, which are defined broadly to include adult-sanctioned organized activities that children do outside of the classroom, whether or not they are school-sponsored. The social, psychological, and educational benefits of extracurricular activities are well-known. Extracurricular participation has been shown to have a beneficial effect on academic performance (e.g., Camp, 1990; Marsh, 1992; Wagner, 1991a) and to diminish the likelihood of students dropping out of school (Mahoney & Cairns, 1997; Wagner1991b).

To understand the out-of-school social activities of students with disabilities, parents were asked whether their sons or daughters belong to any type of organized group. Below we describe how the social development of students with disabilities has changed from 2001 to 2004 (Exhibit 2-6).

- Overall, participation by students with disabilities in school or community groups was high (around 70%) and remained stable from Wave 1 to Wave 3. More than half of students belonged to school or community groups at both points in time.

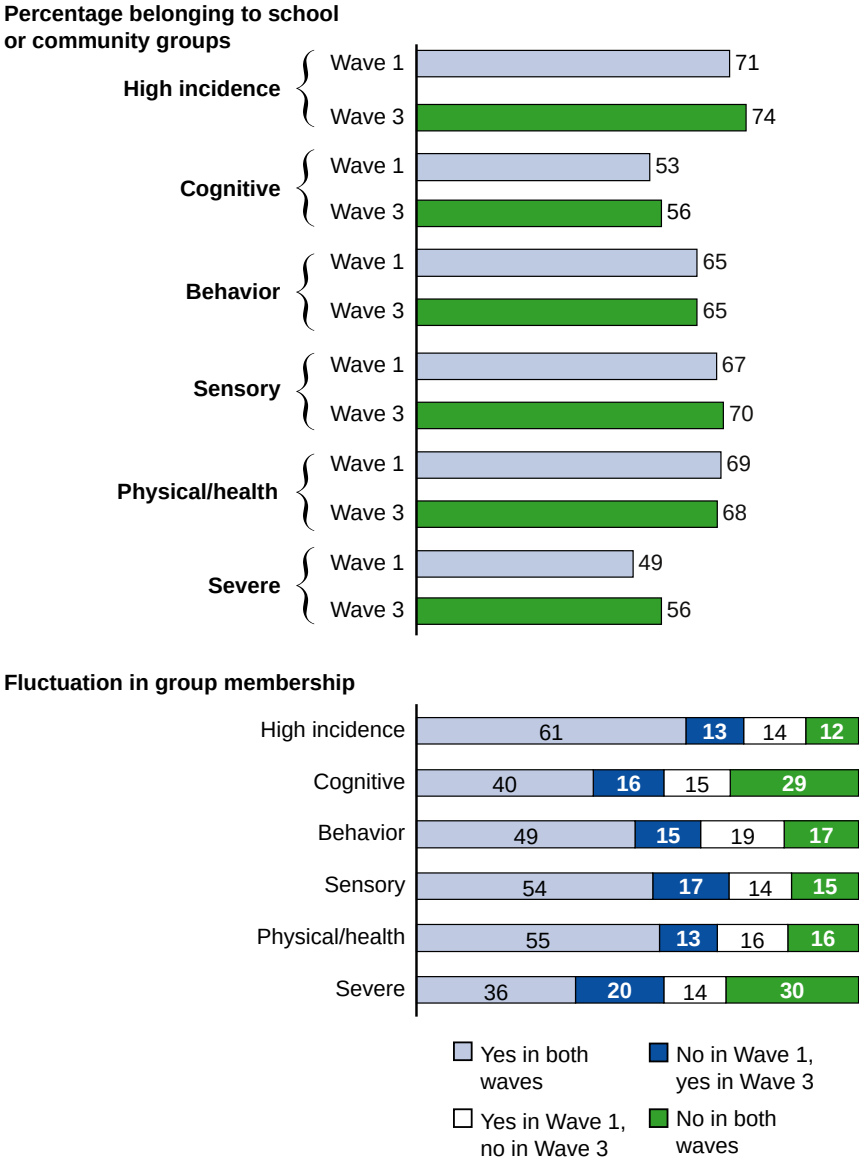
Exhibit 2-6
Group Membership in Waves 1 and 3 by Students with Disabilities and Fluctuation Over Time



Sources: SEELS Waves 1 and 3 parent interviews, 2000 and 2004.

- Few students (15%) belonged to groups in neither 2000 or 2004.
- About equal numbers of students (one in seven) joined groups as dropped their group memberships over time.
- Students in most disability clusters participated in groups at similar rates (between 65% and 74%) (Exhibit 2-7). Exceptions were those in the cognitive and severe clusters, who belonged to groups at lower rates, ranging from 49% to 56%.
- In the aggregate, membership in school or community groups was unchanged over time for students in all but the severe disability cluster. For that cluster, the group participation rate increased from 49% to 56%, but remained lower than participation for most other clusters.
- The majority of individual students, regardless of their disability cluster, also did not change their group membership status overtime; across clusters from 66% (students in the behavior and severe disability clusters) to 73% (students in the high incidence cluster) had the same participation status in 2004 as in 2000.
- Between 36% and 61% of students across disability clusters belonged to groups at both points in time, whereas between 12% and 30% belonged to groups at neither time.
- A consistent pattern of group membership over time was most apparent among students in the high-incidence cluster (61%) and least common for students in the severe cluster (36%).

Exhibit 2-7
Group Membership in Waves 1 and 3 and Fluctuation Over Time, by Disability Cluster



Sources: SEELS Waves 1 and 3 parent interviews, 2000 and 2004.

Disciplinary Actions at School

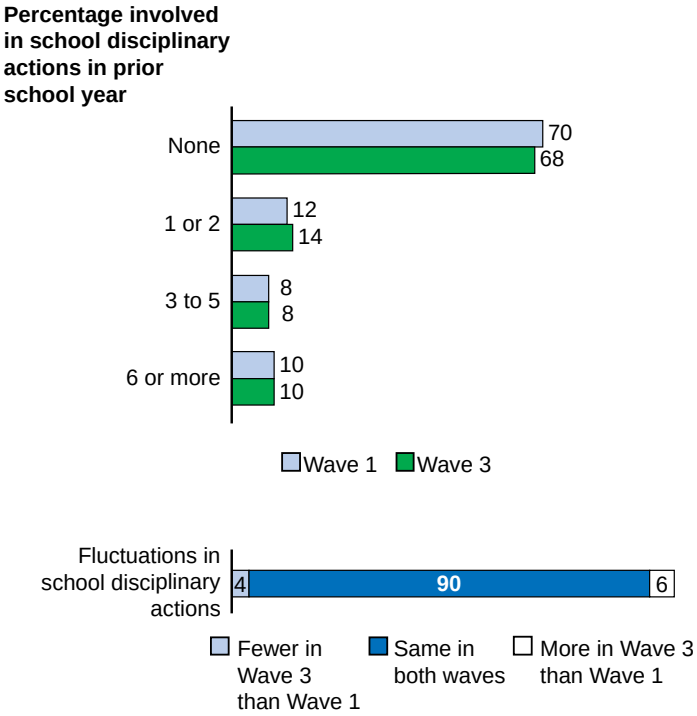
Like all organizations, schools have rules that govern conduct and behavior as well as procedures for disciplining those who break those rules. When events or behaviors are considered serious violations, schools sometimes use the mechanisms of “in-school” and “out-of-school” suspensions to seek improved behavior. For in-school suspensions, students typically are taken out their usual classroom routine for a period that can range from hours to days. Out-of-school suspensions require that a student not attend school for a specified period, which can last from days to a week or more. In cases of extreme violations, schools may

expel students. The behaviors that lead to these actions can represent low engagement in schooling and are linked to school dropout (Bock, Tapscott, & Shavner, 1998).

To assess the degree to which students with disabilities were involved in disciplinary incidents at school, items from the SEELS students' school program questionnaire regarding the number of in- and out-of-school suspensions, expulsions, and other disciplinary actions in which students had been involved during the prior school year were summed to create a total of the number of disciplinary actions for a school year.

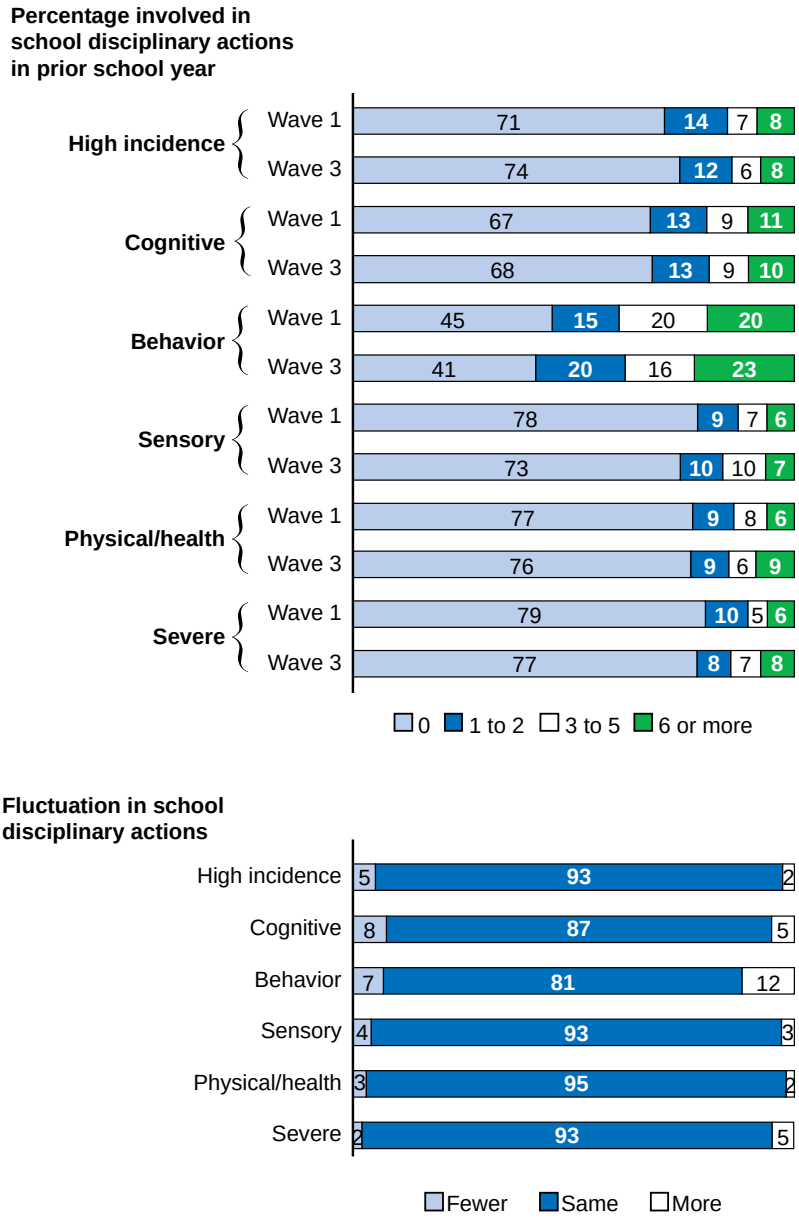
- The proportion of students with disabilities who had been subject to some kind of disciplinary action in the prior year was generally low (Exhibit 2-8). Seventy percent had been involved in no disciplinary incidents; all of the disciplinary incidents were concentrated among the remaining 30% of students.

Exhibit 2-8
Involvement in School Disciplinary Incidents by Students with Disabilities in Waves 1 and 3 and Fluctuation Over Time



Sources: SEELS Waves 1 and 3 school program questionnaires, 2001 and 2004.

Exhibit 2-9
Involvement in School Disciplinary Incidents and Fluctuation Over Time, by Disability Cluster



Sources: SEELS Waves 1 and 3 school program questionnaires, 2001 and 2004.

- The pattern of involvement in disciplinary incidents was consistent from Wave 1 to Wave 3. The majority of students with disabilities were not involved in any type of school disciplinary incident, whereas about one-tenth were involved in six or more such incidents in each school year.
- Additionally, relatively little fluctuation took place over time in individual students' involvement in disciplinary incidents. About 9 in 10 students were

involved in the same number of incidents in 2004 as in 2001. Six percent of students were involved in more disciplinary incidents in the later year.

- The rates at which students with disabilities were involved disciplinary incidents were quite comparable across disability clusters (Exhibit 2-9); from 68% to 80% of students with disabilities were not involved in such incidents at the two points in time, with one exception. Fewer students in the behavior disability cluster were not involved in disciplinary incidents (41% and 45%), and about 1 in 5 were reported to be involved in 6 or more incidents.
- Consistent with the trend for students with disabilities as a whole, there are few differences in the aggregate distribution of the number of disciplinary actions from Wave 1 to Wave 3.
- Similarly, few differences are observed across the disability clusters in fluctuations in involvement in disciplinary incidents by individual students over time, with students in the behavior disability cluster again being the exception. They had the largest proportion of students to receive more disciplinary action in 2004 than in 2001 (12%). However, for that disability cluster, as for others, the majority of students with disabilities did not change their pattern of involvement in disciplinary incidents over the years.

Summary

This chapter has summarized the degree of group- and individual-level change in the academic performance and social adjustment of students with disabilities from Wave 1 to Wave 3. Students' academic performances, as measured by W-scores on WJ III subtests, oral reading fluency, and grades generally advanced over time. However, the differences across disability clusters that were present in Wave 1 remained in Wave 3, and with the exception of grades, the performance of students with disabilities remained well below that of peers in the general population. That is, despite improvements in reading and mathematics performance, their performance in Wave 3 did not appreciably close the gap with the general population that was observed in Wave 1. Students' social adjustment was the most stable over time, with relatively little variation in group membership rates and only a small increase in the number of disciplinary incidents in which students were involved. In both outcome domains, some students went in the opposite direction of the overall trend, exhibiting a decline in performance. It is these patterns of change over time that the analyses reported in the following chapters seek to illuminate.

3. Relationships Between Disability-Related Characteristics and Longitudinal Outcomes

by Mary Wagner, Phyllis Levine, Jose Blackorby, and Anne-Marie Knokey

For more than 30 years, IDEA has been the legislative foundation for the provision of special education services to students who qualify on the basis of a disability. The specific number and definitions of disability categories have changed over time, yet the notion of identifying and categorizing primary disabilities remains an element of the law. In fact, one of the primary design requirements of SEELS was to generate estimates that would generalize to students in each of the 12 federal special education disability categories identified in the law. For as long as the categories have existed, debate has surrounded their usefulness in describing students, in delivering services to them, and especially in contributing to improved outcomes. Arguments both for and against the use of disability categories span many perspectives that have been important in the development of the special education field, including civil rights, philosophy (Christenson & Sherman, 1997), values (Skrtic, Sailor, & Gee, 1996), efficacy (Cuban, 1996; Fuchs & Fuchs, 1995; Gersten, Vaughn, Deshler, & Schiller, 1997), placement (Kauffman & Lloyd, 1995), assessment methods (Swanson, 1999), and the law (Kauffman, 1994).

Nonetheless, SEELS analyses have demonstrated that students in different disability categories do differ in terms of their characteristics, school programs, and outcomes. At the same time, these analyses have shown that disability status is not stable over time for all students. The disabilities of some students evolve so that it is appropriate to recategorized them as they age. Others exit the special education system entirely. Furthermore, there is broad agreement that a category label is of limited use without understanding students' actual functioning in important domains. SEELS results have shown that students with disabilities vary tremendously in their functioning, both within and across disability categories, and that student functioning contributes importantly to understanding variations in outcomes over and above what is explained by disability category alone.

This chapter examines the relationships between student disability characteristics, including the disability cluster to which students belong, the number of their disabilities and functional skills (i.e., functional cognitive skills, self-care skills)[1] and longitudinal academic and social adjustment outcomes for

[1] The factors discussed in this chapter have been selected from a larger set of disability-related characteristics that were included in the model because they have the strongest or most consistent relationships with outcome. Specifications of models and complete results are reported in the *Methodological Volume in Support of the SEELS Comprehensive Report, What Makes a Difference? Influences on Outcomes for Students with Disabilities: SEELS Sampling, Data Collection, and Analysis Procedures* (Javitz, Blackorby, Wagner, McCracken, & Knokey, 2007) available at www.seels.net.

students with disabilities overall and for the six disability clusters. Each section begins with a description of the variation in the number of disabilities reported for students and their functional skills across disability clusters, and is followed by a description of their statistical relationships with students' initial status on each outcome measure and to the observed rate of change in outcomes over time, controlling for other factors. The relationships reported are statistically significant to at least the $p < .05$ level.

Factors Expected to Be Associated with Outcomes

The aspects of students' disabilities and functioning discussed in this chapter are:

- the number of disabilities identified by schools,
- functional cognitive skills, and
- self-care skills.

Number of Disabilities Identified by Schools. As noted earlier, students who receive special education services do so because they meet the eligibility requirements of a specific disability category. Some students may have additional disabilities for which they may or may not receive services, but which may affect their ability to succeed in school. SEELS asked school staff to identify students' primary disabilities and secondary disabilities, if any. Respondents indicated a single primary disability category and as many secondary disabilities as appropriate. Although it cannot be equated with a disability severity measure, a sum of these primary and secondary disabilities was created to provide a measure of the number of functional challenges students faced.

Functional Cognitive Skills. The cognitive abilities that enable students to receive, organize, and process information are central to their likelihood of achieving success and progressing through the educational system, as well as for succeeding in the labor market. SEELS did not collect IQ or other cognitive functioning data directly from students. However, a functional cognitive skills scale was created using information provided by parents. They were asked to evaluate their children regarding four skills often used in daily activities—telling time on a clock with hands, reading and understanding common signs, counting change, and looking up telephone numbers and using the telephone. Parents reported how well their children performed these activities without help on a 4-point scale: "very well," "pretty well," "not very well," and "not at all well." Values for the four items were summed to create a scale that ranges from 0 to 16. This scale has demonstrated important differences across groups of students and been a significant predictor of a variety of outcomes (Blackorby, Chorost, Garza, & Guzman, 2004).

Self-Care Skills. As students age, they are expected to take increasing responsibility for meeting their physical and daily living needs. However, some disabilities can delay or circumvent the usual development of children's competencies and/or independence in different ways and to varying degrees. Limitations in the ability to carry out tasks of daily living can place stress and

burden on caregivers at home, and can require school staff to fill nontraditional roles in caring for noneducational needs of students; moreover, such limitations may impose learning challenges (Cameto, Levine, et al., 2003). To assess how well students with disabilities cared for their basic needs, their parents were asked to rate their children's abilities to feed and dress themselves without help. Abilities were measured on a 4-point scale: "very well," "pretty well," "not very well," "not at all well." Values were summed to create a scale that ranges from 0 to 8.

Distribution of Factors Across Disability Clusters

As would be expected, students in different disability clusters demonstrate markedly different disability-related characteristics and functional skills (see Exhibit 3-1).

Number of School-Identified Disabilities

- Overall, 57% of students with disabilities were reported by their schools or school districts in Wave 1 to have a single disability, and 15% were reported to have more than two.
- Students in the high-incidence cluster were the most likely to have a single disability, and few (8%) had more than two disabilities.
- Students in the cognitive, behavior, sensory, and physical/health disability clusters had similar proportions of students with a single disability identified by school personnel (36% to 42%); proportions with more than two disabilities ranged from 20% to 29%.
- Because the severe disability cluster includes a high proportion of students in the multiple disabilities category, it is not surprising that they have the lowest proportion of students with a single disability (23%) and the highest proportion with more than two disabilities (49%).

Functional Cognitive Skills

- Overall, one-quarter of students with disabilities had high functional cognitive skills in Wave 1, as reported by parents.
- Approximately the same proportions of students in the high-incidence, behavior, sensory, and physical/health disability clusters were reported to have high functional cognitive skills (22% to 29%); the proportion with parent ratings in the medium range varied somewhat more across the groups (35% to 49%).

- High functional cognitive skills were reported for relatively few students in the cognitive and severe disability clusters (7% and 9%, respectively), although they were not markedly different from students in other clusters in the proportion with functional cognitive skills in the medium range (53% and 47%).

Exhibit 3-1
Disability-Related Characteristics and Functional Skills in Wave 1, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Percentage reported by schools to have							
One disability	57	68	36	42	39	38	23
More than two disabilities	15	8	25	20	28	29	49
Percentage whose functional cognitive skills were							
High	25	28	7	27	22	29	9
Medium	39	35	53	43	49	44	47
Percentage whose self-care skills were							
High	75	84	57	64	70	51	32
Medium	23	16	37	34	27	39	53

Sources: SEELS Waves 1 and 3 school program questionnaires, 2001 and 2004; Wave 1 parent interview/survey, 2000.

Self-Care Skills

- Most students with disabilities overall (75%) had little or no trouble with self-care skills.
- More than 8 in 10 students (84%) in the high-incidence cluster were reported to have high self-care skills in Wave 1; the remaining students all had self-care skills in the medium range.
- In contrast, about one-third (32%) of students in the severe cluster were reported to have high self-care skills; they had the highest proportion of students with medium self-care skills (53%).

Academic Outcomes

SEELS analyses of factors pertaining to students' disability and functioning reveal several significant relationships with students' performance on reading and mathematics assessments, oral reading fluency, and grades, as discussed in the following sections.

Number of School-Identified Disabilities

Descriptive Findings (Exhibit 3-2)

- In general, students with more identified disabilities experienced less academic success than did peers with fewer. Regarding passage comprehension, for example, students with more disabilities had lower W-scores overall and for most disability clusters. The differences are greatest for students in the cognitive and severe disability clusters.
- This pattern extends to oral reading fluency, where having more disabilities is related to differences in reading rates as great as 30 words per minutes.
- Mathematics performance closely resembles the general trend for reading.
- In contrast, the grades given by teachers varied less for students who differed in their number of identified disabilities. Only among students in the sensory cluster were grades markedly lower for students with more identified disabilities.

Exhibit 3-2
Academic Outcomes Associated with the Number of Identified Disabilities, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension score[a]							
One disability	482.3	485.6	461.4	488.3	483.4	485.1	469.2
More than two disabilities	472.2	481.0	447.8	491.3	476.8	478.5	457.8
Oral reading fluency rate[b]							
One disability	74.8	75.9	51.2	88.9	91.1	82.4	74.6
More than two disabilities	53.4	52.6	30.3	79.7	61.4	56.0	53.6
Mathematics calculation score[a]							
One disability	496.7	499.4	479.6	500.4	500.9	495.1	483.8
More than two disabilities	485.9	491.2	467.1	497.3	491.7	484.9	475.9
Grade point average[c]							
One disability	2.7	2.7	2.6	2.5	3.0	2.9	2.6
More than two disabilities	2.4	2.3	2.3	2.5	2.3	2.6	2.4

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 teacher questionnaire, school program questionnaire, student direct assessment, 2001; parent interview/survey, 2000.

Multivariate Findings

- Multivariate analyses demonstrate that the presence of multiple disabilities continues to have a strong relationship to academic outcomes, other factors held constant. For students with disabilities overall, having more identified disabilities is associated with lower W-scores in passage comprehension and mathematics calculation (4 W-score points), lower rates of oral reading fluency (7 words per minute), and lower grades (0.1 points on a 4-point scale) in Wave 1. It also is related to lower rates of growth in reading fluency (4 correct words per minute) over time.
- Among students in the high-incidence cluster, having more identified disabilities is associated with reading 10 fewer correct words per minute in Wave 1, but not with the rate of growth over time.
- Students with sensory impairments resembled the population overall. Having more identified disabilities was associated with scores 6 W-score points lower in passage comprehension and 5 W-score points lower in mathematics calculation, as well as with lower rates of oral reading fluency (-13 correct words per minute).
- For students in the cognitive disability cluster, having more disabilities is not associated with differences in academic outcomes in Wave 1, but it is associated with a higher rate of growth over time in passage comprehension and mathematics calculation abilities (5 and 3 W-score points, respectively), but a lower rate of growth in grades (-.2 points on a 4-point scale).
- Among students in the behavior cluster, having more identified disabilities is associated with scoring 9 W-score points lower initially on mathematics calculation and a lower rate of growth in oral reading fluency (-14 correct words per minute).
- No significant relationships are apparent for either the physical/health or severe disability clusters, perhaps because the majority of students in these clusters had multiple disabilities identified by their schools.

Functional Cognitive Skills

Descriptive Findings (Exhibit 3-3)

- There is a consistent pattern of sizable differences between students with medium and high functional cognitive skills ratings on all academic measures and for students in all disability clusters.
- Regarding passage comprehension, for example, students with high functional cognitive skills had higher W-scores than those with medium skills, ranging from a difference of 15 W-score points for students in the sensory cluster to nearly 40 W-score points for those in the cognitive cluster.
- This pattern was especially evident in oral reading fluency for all disability clusters, where differences in functional cognitive skills are related to differences in reading rates as great as 54 correct words per minutes.

Exhibit 3-3
Academic Outcomes Associated with Functional Cognitive Skills, by Disability Cluster

	All disabilities	Disability Cluster: High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension score[a]							
High skills	495.0	495.0	492.8	498.4	490.6	494.1	485.1
Medium skills	471.7	476.8	453.5	477.7	475.6	475.3	457.2
Oral reading fluency rate[b]							
High skills	105.0	104.9	87.0	113.2	119.2	102.5	102.0
Medium skills	53.9	55.9	34.5	67.4	65.3	67.3	53.8
Mathematics calculation score[a]							
High skills	510.3	510.6	501.4	512.2	516.3	509.9	502.0
Medium skills	486.8	490.2	474.4	489.9	491.7	483.5	475.2
Grade point average[c]							
High skills	3.1	3.2	2.9	2.8	3.2	3.1	3.2
Medium skills	2.4	2.4	2.4	2.2	2.6	2.4	2.3

[a] W-score.
[b] Words read correctly per minute.
[c] On a scale of 0 to 4, with 4 = the highest A grade.
Sources: Wave 1 SEELS teacher questionnaire and student direct assessment, 2001; parent interview/survey, 2000.

- Mathematics performance also followed this general trend. Differences in functional cognitive skills scale are related to differences of 20 to 26 W-score points across disability clusters.
- Functional cognitive skills are related to teacher-given grades as well. Students in all disability clusters who had high functional cognitive skills received higher grades in Wave 1.

Multivariate Findings

- Multivariate results confirm that functional cognitive skills consistently relate to academic outcomes, independent of other differences between students, with a more consistent pattern of relationship apparent across measures and clusters for initial status in Wave 1 than for growth over time.
- For students overall, having high functional cognitive skills is associated with better W-scores in passage comprehension and mathematics calculation (7 points) as well as oral reading fluency rates (14 correct words per minute), and higher grades (.2 points on a 4-point scale).
- Over time, for students overall, having high functional cognitive skills is associated with higher rates of growth in mathematics calculation W-scores (2 points), but also with a lower rate of growth in grades (-.1 points).

- For students in the cognitive, sensory, and severe disability clusters, high cognitive skill scores are associated with more positive outcomes in Wave 1 on all measures, including 7 to 12 W-score points higher passage comprehension scores, 4 to 12 W-score points higher mathematics calculation scores, 8 to 30 more correct words per minute in oral reading fluency, and .2 or .3 points higher grade point average (on a 4-point scale).
- Having higher functional cognitive skills also is associated with higher reading and mathematics W-scores (9 and 6 points, respectively) for students in the high-incidence cluster in Wave 1 and with a higher oral reading fluency rate (8 correct words per minute).
- The behavior and physical/health clusters show no significant relationships with regard to reading in Wave 1, but those with higher functional cognitive skills had higher mathematics calculation W-scores (6 and 11 points, respectively), and grades (.4 and .2 points on a 4-point scale).
- Although having high functional cognitive skills is related to differences in initial status for many outcomes and disability clusters, it is related to the rate of growth in outcomes observed over time for fewer measures and clusters. For example, there are no significant relationships with growth in passage comprehension over time and for students with disabilities overall; only mathematics calculation W-scores and grades are related to differences in functional cognitive skills, although in opposite directions. Having higher skills ratings is associated with faster growth in mathematics calculation abilities, but a .1 point lower growth rate in grades.
- Among students in the high-incidence, cognitive, and sensory disability clusters, having high functional cognitive skills is associated with higher rates of growth on some measures—oral reading fluency for the high-incidence and cognitive disability clusters (4 and 6 correct words per minute, respectively), and mathematics calculation for the high-incidence and sensory disability clusters (3 W-score points for each).
- Students in the physical/health disability cluster show significant relationships with differences in functional cognitive skills that are inconsistent in direction; a lower rate of growth is apparent for oral reading fluency (-9 correct words per minute), whereas a higher rate is seen with regard to grades (.2 points on a 4-point scale).

Self-Care Skills

Descriptive Findings (Exhibit 3-4)

- In bivariate analyses, high self-care skills are related to higher academic performance for students overall and for some disability clusters. For example, relative to those with medium skills, students with high self-care skills had higher W-scores in passage comprehension, ranging from 22 points for students overall to 35 points for students in the cognitive disability cluster.

Exhibit 3-4
Academic Outcomes Associated with Self-Care Skills, by Disability Cluster

	All disabilities	Disability Cluster: High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension score[a]							
High skills	484.0	486.2	463.6	492.0	481.8	488.8	465.4
Medium skills	461.7	484.1	428.9	490.4	464.8	472.6	456.0
Oral reading fluency rate[b]							
High skills	79.7	81.0	53.3	94.5	87.3	89.1	66.9
Medium skills	66.2	59.2	29.4	86.6	73.1	61.0	68.1
Mathematics calculation score[a]							
High skills	498.2	500.1	480.8	502.2	501.3	499.8	482.7
Medium skills	487.7	501.8	484.2	496.2	495.8	486.2	475.7
Grade point average[c]							
High skills	2.8	2.8	2.6	2.6	3.0	2.8	2.6
Medium skills	2.2	3.0	2.0	2.3	2.2	2.4	2.0

[a] W-score.
[b] Words read correctly per minute.
[c] On a scale of 0 to 4, with 4 = the highest A grade.
Sources: SEELS Wave 1 teacher questionnaire and student direct assessment, 2001; parent interview/survey, 2000.

- High self-care skills also are related to higher rates of oral reading fluency for students in all but the severe disability cluster, ranging from 8 to 28 words per minute.
- Self-care skills scores demonstrate a weaker relationship with mathematics than with reading abilities. High self-care skills are related to higher mathematics performance for students overall and for those in the physical/health and severe disability clusters.
- Grades given by teachers are related to self-care skills, but only for some students. Students with high self-care skills overall and in the cognitive, sensory, and severe disability clusters received higher grades than peers with medium skills.

Multivariate Findings

- The significant relationships observed in the bivariate analyses are largely absent when other factors are accounted for in the analyses. Self-care skills are not significantly related to any outcomes in Wave 1 or to any differences in growth over time for students with disabilities overall or for those in the high-incidence, cognitive, or behavior disability clusters.

- Statistically significant relationships are primarily concentrated among students in the severe disability cluster. Controlling for other factors, students in this cluster with high self-care ratings had lower Wave 1 W-scores in passage comprehension and mathematics calculation (8 W-score points for each), and lower oral reading fluency rates (-22 correct words per minute), but a higher rate of growth in oral reading fluency over time (12 correct words per minute).
- Among students in the sensory and physical/health disability clusters, having high self-care skills is associated only with initial oral reading fluency, but in opposite directions for the two groups. Students in the sensory cluster with high self-care skills read 34 correct words per minute slower than those with medium skills, whereas students in the physical/health cluster with high self-care skills read 22 correct words per minute faster relative to peers with medium self-care skills.

Social Adjustment Outcomes

SEELS analyses demonstrate that factors pertaining to students' disability and functioning relate significantly to the likelihood that they belonged to school or community groups and to the number of disciplinary incidents they were involved in during a school year for some clusters of students.

Number of Identified Disabilities

Descriptive Findings (Exhibit 3-5)

- In bivariate analyses, the number of identified disabilities appears to be related to social as well as academic outcomes for students in most disability clusters. For example, among students overall and those in five of six disability clusters, students with more disabilities were less likely to belong to school or community groups. Students in the high-incidence cluster were the exception.
- The pattern with respect to the number of disciplinary actions in which students were involved over the course of a year is more variable. Having more disabilities is associated with more disciplinary actions for students overall and for those in the high-incidence, behavior, and sensory disability clusters.

Exhibit 3-5
Social Adjustment Outcomes Associated with the Number of Identified Disabilities, by Disability Cluster

	All disabilities	Disability Cluster: High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Percentage belonging to groups							
One disability	69	73	55	68	72	69	54
More than two disabilities	61	78	45	60	63	55	49
Number of disciplinary actions in prior school year							
One disability	1.6	1.3	1.6	3.6	1.0	1.4	1.3
More than two disabilities	2.1	2.0	1.9	4.2	2.1	1.2	1.0

Sources: SEELS Wave 1 school program questionnaire, 2001; parent interview/survey, 2000.

Multivariate Findings

- In statistical analyses in which other factors are held constant, virtually no significant relationships are identified between the number of disabilities schools reported students having and either initial status on social adjustment outcomes or growth over time.
- One exception is that, among students in the behavior disability cluster, having three identified disabilities is associated with less growth in the likelihood of belonging to school or community groups over time (-24 percentage points) relative to students with a single disability.
- Additionally, among students in the severe disability cluster, having more identified disabilities is related to a lower rate of growth in the number of disciplinary actions over time (-.5 incidents comparing students with three vs. one identified disability).

Functional Cognitive Skills

Descriptive Findings (Exhibit 3-6)

- Functional cognitive skills relate both to social outcomes and to academic outcomes. For example, students with high functional cognitive skills were more likely to belong to school or community groups than students with medium skill ratings. This relationship is consistent for all students and across disability clusters. It is greatest for students in the sensory and physical/health disability clusters.

Exhibit 3-6
Social Adjustment Outcomes Associated with Functional Cognitive Skills, by Disability Cluster

	All disabilities	Disability Cluster: High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
Average							
Percentage belonging to groups							
High skills	78	79	65	71	82	82	58
Medium skills	62	67	51	63	58	57	45
Number of disciplinary actions in prior school year							
High skills	1.3	0.9	1.3	4.5	0.6	1.4	1.9
Medium skills	1.5	1.3	1.7	3.0	1.6	0.9	0.9

Sources: SEELS Wave 1 school program questionnaire, 2001; parent interview/survey, 2000.

- The relationship between functional cognitive skills and disciplinary actions varies by disability cluster. High functional cognitive skill ratings are associated with involvement in fewer disciplinary incidents for students in the high-incidence, cognitive, and sensory disability clusters, but with more incidents for students in the behavior, physical/health, and severe clusters.

Multivariate Findings

- Multivariate analyses show that when other variables are held constant, the relationships between functional cognitive skills and social adjustment outcomes are less evident than they are in the descriptive findings. Only a small number of relationships are statistically significant.
- For students with disabilities as a whole and for those in the sensory disability cluster, having high functional cognitive skills rather than a medium skill rating is associated with a higher likelihood of belonging to school or community groups in Wave 1 by 5 and 10 percentage points, respectively.
- For students with sensory disabilities, having high functional cognitive skills is associated with involvement in more disciplinary actions (.5 incidents) initially. For students overall, having high skills is associated with a higher rate of growth in disciplinary actions (.2 incidents) over time.

Self-Care Skills

Descriptive Findings (Exhibit 3-7)

- From a descriptive perspective, self-care skills are related to social outcomes for most disability clusters. For example, among students overall and for most disability clusters, students with high self-care ratings were more likely to belong to school or community groups.

Exhibit 3-7
Social Adjustment Outcomes Associated with Self-Care Skills, by Disability Cluster

	All disabilities	Disability Cluster: High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Percentage belonging to groups							
Medium skills	36	91	25	28	28	43	31
High skills	70	72	59	67	75	76	54
Number of disciplinary actions							
Medium skills	0.5	0.0	0.2	5.8	0.2	0.1	0.4
High skills	1.4	1.2	1.6	3.3	1.3	1.6	1.3

Sources: SEELS Wave 1 school program questionnaire, 2001; parent interview/survey, 2000.

- On the other hand, high self-care ratings are associated with being involved in more disciplinary actions for each disability cluster, with the exception of students in the behavior cluster, for whom the reverse is true.

Multivariate Findings

- As was the case with academic outcomes, fewer statistically significant results for self-care skills are observed when other factors are considered in multivariate analyses.
- Students overall and in the sensory and severe disability clusters who have high self-care skills were more likely to belong to a school or community group in Wave 1 than those with medium skill ratings, by 16, 34, and 21 percentage points, respectively. However, students in the physical/health cluster with high self-care skills had a lower rate of growth in the likelihood of belonging to school or community groups over time (-19 percentage points).
- Having high self-care skills is associated in Wave 1 with involvement in more disciplinary incidents for students in the high-incidence (2 incidents), behavior (2 incidents), and physical/health disability clusters (1 incident), but is not related to growth in disciplinary actions over time for any group.

Summary

This chapter has examined the relationships between three disability-related characteristics and students' academic and social outcomes, both in Wave 1 and as they changed over time: the number of school-identified disabilities a student had and his or her levels of functional cognitive skills (e.g., reading signs, counting change) and self-care skills (i.e., dressing and feeding oneself independently).

In multivariate analyses that identify the independent relationships between these factors and outcomes, both the number of disabilities students had and their level of functional cognitive skills demonstrate a stronger and more consistent pattern of relationships with academic than with social adjustment outcomes. Students with disabilities as a whole who had more school-identified disabilities had significantly poorer academic outcomes on all measures in Wave 1, whereas variations in the number of disabilities do not relate to social adjustment outcomes. Those with higher functional cognitive skills had more positive outcomes on all academic measures, but also had a higher likelihood of belonging to school or community groups. In contrast, variations in self-care skills are unrelated to academic outcomes entirely; among the social adjustment outcomes, only the likelihood of group membership relates to variations in self-care skills.

The disability-related factors addressed in this chapter also have stronger relationships with variations in outcomes in Wave 1 than they do with changes in those outcomes over time. In contrast to the fairly consistent patterns noted above regarding Wave 1 outcomes, few relationships with growth in either academic or social adjustment outcomes are apparent. For students with disabilities as a whole, having higher functional cognitive skills relates to a higher rate of growth in mathematics calculation skills but also to a higher rate of growth in disciplinary actions and a lower rate of growth in grades. Having more identified disabilities relates to growth only in oral reading fluency, and the relationship is negative, whereas having higher self-care skills relates only to growth in the likelihood of group memberships (positively).

Additionally, the direction of relationships between some of the disability-related factors addressed in this chapter and outcomes is inconsistent across the outcomes. For example, having higher self-care skills has a positive relationship with the likelihood of students in some clusters belonging to groups, a generally positive outcome; however, the same factor also relates to the undesirable outcome of involvement in more disciplinary incidents at school.

Finally, the disability clusters differ markedly in the pattern of relationships, or lack of them, that they exhibit. For example, students in the cognitive, sensory, and severe disability clusters show consistent and strong positive relationships in Wave 1 between variations in functional cognitive skills and all measures of academic performance. In contrast, that factor does not relate to either measure of reading proficiency for students in the behavior or physical/health disability clusters, although it does relate to mathematics calculation skills and grades. Regarding social skills, students in the sensory disability cluster show positive relationships between the likelihood of belonging to groups and higher levels of both functional cognitive and self-care skills, whereas students in the cognitive disability cluster show no relationships at all between disability-related characteristics and social outcomes.

4. Relationships Between Demographic Characteristics and Longitudinal Outcomes

by Anne-Marie Knokey, Mary Wagner, and Jose Blackorby

The nature of a student's disability can be a powerful influence on his or her experiences, both in and out of school. However, other fundamental characteristics of children, in addition to whether they have disabilities, also help shape their development, relationships, experiences, and achievements. Three such characteristics and their relationships with academic and social outcomes are the focus of this chapter: age, gender, and racial/ethnic background.[1] For young people, age is a major determinant of development that influences both children's competence and their independence. Gender is a defining characteristic of human beings and has both obvious and subtle influences on the ways children develop. Racial/ethnic background can be associated with rich cultural traditions and patterns of relationships within families and communities that can generate important differences in values, perspectives, expectations, and practices regarding children.

The importance of understanding the demographic makeup of the population of students receiving special education is evident, as reflected in the significant policy and research attention to the topic. The growing diversity of the American school population presents both opportunities for, and challenges to, improving the results of schooling. Understanding the implications of demographic differences among students, including students with disabilities, is an important step toward improving the system that serves them.

This chapter begins with a description of the demographic characteristics of students with disabilities overall and those in each disability cluster. A description of the bivariate relationship between each demographic characteristic and students' academic outcomes follow. Each section then presents results of multivariate analyses that show the relationships of specific demographic characteristics to students' initial status in academic outcomes, as well as in the observed rate of change in those outcomes over time, while controlling for other disability, functional, demographic, and family and school factors. Bivariate and multivariate analysis results are then presented for social adjustment outcomes. A summary of key findings concludes the chapter.

[1] Children's birthdates, from which age is calculated, were reported by their school districts, as was racial/ethnic background for many children. Race/ethnicity also was reported by parents in telephone interviews, in addition to the gender of each child.

Distribution of Demographic Characteristics Across Disability Clusters

Exhibit 4-1 depicts the distribution of age, gender, and racial/ethnic background for students with disabilities overall and for those in each disability cluster.

Age. The elementary and middle school years is a time of tremendous change in the physical, cognitive, psychological, and social domains of development. Thus, understanding the age of students is especially important for understanding their experiences, which change over time, sometimes dramatically.

- From 12% to 18% of students with disabilities as a whole were in each of the single-year age cohorts from ages 8 through 13; percentages are smaller for the youngest and oldest groups (7% were ages 6 or 7 in 2000 and 3% were age 14).
- The percentage of students in each age category is fairly similar across disability clusters, with the widest range being among 12-year-olds (8 percentage points) and the smallest differences being for 14-year-olds (2 percentage points).

Exhibit 4-1
Demographic Characteristics, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
In 2000, percentage age							
6 or 7	7	7	8	5	9	6	10
8	12	12	11	9	16	13	16
9	15	16	14	13	16	13	16
10	16	17	16	17	14	15	16
11	18	19	17	19	19	18	17
12	17	17	19	19	12	20	14
13	12	11	12	15	12	12	9
14	3	1	3	3	2	3	2
Percentage male	67	67	57	80	60	67	72
Percentage							
White	63	64	54	65	62	69	59
African-American	19	17	33	22	16	17	24
Hispanic	14	15	10	10	16	11	13

Sources: Participating LEA rosters, 1999, and SEELS Wave 1 parent interview/survey, 2000.

Gender. Whereas the general population of elementary and middle school students is split about evenly between boys and girls,[2] two-thirds of students receiving special education in the SEELS age-range were boys.

- The majority of students in each disability clusters were male.
- The largest discrepancy from the gender distribution in the general population is among students in the behavior cluster, among whom 80% were boys. In addition, 72% of students in the severe disability cluster were boys, with the percentage of boys within the remaining disability clusters ranging from 57% to 67%.

Race/ethnicity. A comprehensive report on minority participation in special and gifted education (National Research Council, 2002) documents a wide range of personal, social, and environmental factors that research has shown to be linked to a higher rate of disability among minority and low-income children, suggesting the complex intertwining of these factors among students with disabilities. Exhibit 4-1 shows the percentage of white, African-American, and Hispanic students with disabilities overall and in each disability cluster.

- White students constituted the majority (63%) of students represented in SEELS. African-American and Hispanic students represented 19% and 14% of the population of students with disabilities, respectively.
- The distribution of race/ethnicity across the disability clusters is similar, with the exception of students in the cognitive cluster, which had fewer white students and more African-American students than students with disabilities overall.

Academic Outcomes

SEELS analyses of demographic factors reveal several significant relationships with students' performance on reading and mathematics assessments, oral reading fluency, and grades, as discussed in the following sections.

Age

Descriptive Findings (Exhibit 4-2)

- For students with disabilities overall, on the three measures of reading and mathematics ability, being older is associated with greater proficiency, as would be expected. However, both 9- and 12-year-olds with disabilities had passage comprehension scores that were somewhat below the average for fourth graders in the general population (475 and 487 for students with disabilities, respectively, vs. 500 for the general population). Higher passage comprehension scores are apparent for 12-year-olds than for 9-year-olds in all but the sensory cluster.

[2] In October 1999, when the SEELS sample was selected, males made up approximately 51% of elementary and middle school students (U.S. Census Bureau, 1999).

Exhibit 4-2
Academic Outcomes Associated with Age, by Disability Cluster

	All disabilities	Disability Cluster: High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
Average							
Passage comprehension score[a] for age							
9	475.1	480.1	442.6	478.5	480.2	477.2	456.0
12	487.3	489.7	465.5	493.6	486.5	491.8	473.9
Oral reading fluency rate[b] for age							
9	72.0	78.1	24.5	64.7	79.1	74.1	53.0
12	85.0	83.7	57.6	109.1	104.4	97.0	89.2
Mathematics calculation score[a] for age							
9	490.0	494.0	461.6	490.7	491.3	487.4	472.0
12	505.0	507.0	486.0	506.8	510.6	506.5	501.0
Grade point average[c]							
9	2.7	2.8	2.3	2.5	2.8	2.6	2.4
12	2.8	2.8	2.7	2.5	3.1	2.8	2.8

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 school program questionnaire and student direct assessment, 2001, and parent interview/survey, 2000.

- Performance in oral reading fluency generally mirrors the results for passage comprehension; 12-year-olds read more quickly than their younger peers among students with disabilities overall and in all but the high-incidence and physical/health clusters. The largest difference in oral reading fluency rates between 9- and 12-year-olds is among students in the cognitive, behavior, and severe clusters (33, 44, and 36 correct words per minute, respectively).
- Consistent with the accumulation of knowledge and skills that comes with 3 additional years of study, 12-year-old students in each disability cluster demonstrated higher average performance in mathematics calculation than 9-year-olds. The performance advantage ranged from 13 W-score points for students in the high-incidence disability cluster to 29 W-score points for students in the severe cluster.
- Teacher-given grades do not appear to be systematically related to variations in age for students with disabilities overall; however, there are significant differences favoring 12-year-olds in the cognitive, sensory, and severe disability clusters.

Multivariate Findings[3]

- Overall, older students with disabilities had substantially better scores in Wave 1 on all academic performance measures than younger peers, controlling for other differences between them. More positive outcomes include 16 and 22 more W-score points on passage comprehension and mathematics calculation, respectively, 29 more correct words per minute on oral reading fluency, and .4 more points on a 4-point scale for grades.
- On the other hand, older students exhibited lower rates of growth over time on all academic outcome measures than did their younger peers (i.e., 5 and 6 W-score points lower growth in passage comprehension and mathematics calculation; 8 fewer correct words per minute; and .2 points lower growth in grades).
- In the Wave 1 data collection, the higher initial W-scores in passage comprehension and mathematics calculation demonstrated by older students was consistent in direction and magnitude for all six disability clusters. Differences ranged from 11 to 19 W-score points in passage comprehension and from 17 to 24 W-score points in mathematics calculation.
- Just as consistently, older students had lower rates of growth in both reading and mathematics. For students overall and for students in each disability cluster, differences in rates of growth ranged from -5 to -8 W-score points in passage comprehension and from -4 to -8 points in mathematics calculation.
- A similar pattern is evident for oral reading fluency rates. A significant advantage is apparent for older students in five of the six disability clusters (excluding the severe cluster). The differences are sizable, ranging from 26 to 39 more words read correctly per minute initially than younger peers, controlling for other factors.
- In contrast, over time, older students had a lower rate of growth in oral reading fluency in the high-incidence, cognitive, behavior, and sensory disability clusters (9 or 10 fewer correct words per minute) relative to their younger peers.
- Older students in all but the high-incidence cluster initially received higher grades than younger students. However, older students in the high-incidence, sensory, and severe disability clusters had lower average rates of growth in grades than their younger peers (.2 or .3 points on a 4-point scale).

[3] Specifications of models and complete results are reported in the *Methodological Volume in Support of the SEELS Comprehensive Report, What Makes a Difference? Influences on Outcomes for Students with Disabilities: SEELS Sampling, Data Collection, and Analysis Procedures* (Javitz, Blackorby, Wagner, McCracken, & Knokey, 2007) available at www.seels.net.

Gender

Descriptive Findings (Exhibit 4-3)

- In descriptive analyses, few differences are evident between boys and girls in passage comprehension, oral reading fluency, mathematics calculation, or grades.

Exhibit 4-3
Academic Outcomes Associated with Gender, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension score[a] for							
Boys	482.6	485.3	459.6	488.9	479.6	484.7	465.8
Girls	481.6	486.3	461.4	488.7	482.8	485.3	454.1
Oral reading fluency rate[b] for							
Boys	74.8	74.8	48.0	90.0	81.7	84.1	70.6
Girls	79.7	85.8	47.5	89.2	96.7	83.4	47.4
Mathematics calculation score[a] for							
Boys	497.3	499.1	480.7	500.5	500.0	496.8	484.7
Girls	495.5	499.6	477.4	500.1	499.7	494.0	469.8
Grade point average[c] for							
Boys	2.7	2.8	2.5	2.5	2.7	2.7	2.5
Girls	2.8	2.8	2.6	2.6	3.1	2.8	2.4

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 school program questionnaire and student direct assessment, 2001, and parent interview/survey, 2000.

- One exception is that the oral reading fluency rates of boys and girls differed. For example, girls in the sensory cluster read 15 correct words per minute more than boys. This pattern was reversed for students in the severe cluster, in which boys read 24 more correct words per minute.
- Although mathematics performance was comparable for boys and girls overall and for most disability clusters, boys in the severe cluster out-scored girls by 15 W-score points in Wave 1.

Multivariate Findings

- Multivariate analyses, which include the influence of other factors in addition to gender, show that, with a few exceptions, gender is unrelated to academic outcomes when other factors are taken into account.
- For example, no significant relationships are noted between gender and passage comprehension or grades in Wave 1 or growth in mathematics calculation scores or grades over time.
- In contrast, for all students with disabilities and students in the high-incidence cluster, boys with disabilities had mathematics calculation scores that were 3 and 5 W-score points, respectively, higher than girls in Wave 1.
- However, boys in the sensory cluster read an average of 17 correct words per minute slower than girls, and among students overall as well as in the cognitive and behavior disability clusters, boys exhibited a pattern of slower growth in reading fluency relative to girls (-3 to -7 correct words per minute).
- Controlling for other factors, boys in the behavior disability cluster showed a higher rate of growth over time on passage comprehension than did girls.

Race/Ethnicity

Descriptive Findings (Exhibit 4-4)

- White students overall had a mean passage comprehension score of 485 W score points, which was higher than that for their African-American (475) or Hispanic (477) peers. This pattern extends to students in the high-incidence, behavior, physical/health, and severe disability clusters, but is not apparent for students in the cognitive cluster. The largest discrepancy between African-American and white students is 10 points for students in the high-incidence and severe disability clusters.
- A similar pattern of results is observed for oral reading fluency rates. Overall, white students read 14 to 17 correct words per minute faster than African-American or Hispanic peers. This pattern applied to all but the cognitive and severe disability clusters, in which fluency rates were comparable between white and African-American students.
- In mathematics, differences across racial/ethnic categories are less pronounced, with some exceptions. Hispanic students in the cognitive disability cluster had higher W-scores than African-American or white peers. In contrast, in the sensory disability cluster, the relationship was reversed, and Hispanic students averaged lower scores than peers in the other two categories.
- There are no statistically significant differences in the grades given by teachers to different racial/ethnic groups, either for students overall or for any of the disability clusters.

Multivariate Findings

- Multivariate analyses of the relationships between race/ethnicity and academic outcomes, while including other factors in the analysis, show few significant relationships and no consistent pattern across clusters.
- For example, comparing African-American and white students, there are no significant relationships in Wave 1 for students with disabilities overall on any academic measure, nor are there any relationships with growth overtime for any group, with the exception of a lower rate of growth in passage comprehension for African-American relative to white students in the cognitive disability cluster (-5 correct words read per minute).
- Differences are noted in Wave 1 regarding African-American students in the physical/health cluster, who scored 9 W-score points lower on passage comprehension than did their white peers, controlling for other factors.

Exhibit 4-4
Academic Outcomes Associated with Race/Ethnicity, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension score[a] for students who were							
White	485.0	488.7	460.0	490.4	483.7	487.0	465.0
African-American	475.2	478.3	461.5	487.1	484.2	481.0	455.4
Hispanic	477.2	479.1	460.3	476.3	468.1	473.7	459.6
Oral reading fluency rates[b] for students who were							
White	81.3	83.4	47.6	94.0	99.2	87.2	51.7
African-American	64.4	65.5	51.4	81.7	73.4	71.4	51.7
Hispanic	67.1	68.7	34.0	68.7	61.2	79.4	48.3
Mathematics calculation scores[a] for students who were							
White	498.1	500.7	478.2	502.0	503.1	496.5	480.6
African-American	491.7	494.3	479.5	497.9	499.6	494.3	481.4
Hispanic	495.7	497.2	488.0	489.0	491.8	488.7	481.2
Grade point average[c] for students who were							
White	2.8	2.9	2.5	2.6	2.9	2.7	2.4
African-American	2.5	2.5	2.6	2.5	2.7	2.7	2.6
Hispanic	2.7	2.8	2.5	2.5	3.0	2.8	2.7

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 school program questionnaire and student direct assessment, 2001, and parent interview/survey, 2000.

However, African-American students in the high-incidence cluster read 14 correct words per minute faster than their white peers, and those in the sensory cluster had higher grades (.3 points on a 4-point scale).

- Significant relationships are observed for a few of the academic performance outcomes for Hispanic students. Overall, Hispanic students initially had better grades than their white peers, as did those in the sensory disability cluster (.2 and .3 points, respectively). Hispanic students in the high-incidence and sensory disability clusters scored 6 and 7 W-score points lower on passage comprehension tests, respectively, than their white peers, consistent with the descriptive results for these two disability clusters. In mathematics calculation, Hispanic students in the cognitive cluster scored initially higher than white peers by 8 W-score points, controlling for other factors, which also is consistent with the descriptive findings.
- Over time, relative to white students, a lower rate of growth in passage comprehension is apparent for Hispanic students in the behavior cluster (-9 W-score points), and Hispanic students in the severe disability cluster had a lower rate of growth in oral reading fluency (-9 correct words per minute).

Social Adjustment Outcomes

In addition to relationships to academic outcomes, SEELS analyses of demographic factors demonstrate several significant relationships with two social adjustment outcomes: the likelihood that students belong to an extracurricular school or community group, and the number of disciplinary incidents in which students were involved in the preceding school year, as discussed in the following sections.

Age

Descriptive Findings (Exhibit 4-5)

- Although there is no difference among students with disabilities as a whole, among students in the cognitive and physical/health disability clusters, older students were more likely to belong to school or community groups than younger peers.
- Overall, older students were the recipients of more numerous disciplinary actions than their younger peers (2.5 vs. 0.9). A similar pattern is evident for students in the high-incidence and cognitive disability clusters. Further, students of both ages in the behavior disability cluster were more likely to be involved in disciplinary actions than their peers.

Exhibit 4-5
Social Adjustment Outcomes Associated with Age, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Percentage belonging to groups of those age							
9	68	74	44	62	63	56	52
12	71	74	64	66	68	73	59
Number of disciplinary actions in prior year for those age							
9	0.9	0.7	0.9	2.3	0.6	0.6	0.6
12	2.5	2.3	3.0	3.8	1.6	2.5	1.7

Sources: SEELS Wave 1 school program questionnaire, 2001, and parent interview/survey, 2000.

Multivariate Findings

- Multivariate analyses of the relationships between age and social adjustment outcomes when other variables are included in the analyses generally are consistent with the bivariate analysis results.
- Relationships with disciplinary actions are more numerous than with group memberships, both with regard to status in Wave 1 and growth over time. For students with disabilities overall and those in the high-incidence, physical/ health, and severe disability clusters, older students were involved in from 1 to 2 more disciplinary incidents than younger students, independent of other differences between them. However, for students overall and those in the behavior, physical/health, and severe disability clusters, older students had a lower rate of growth in disciplinary incidents (from -1 to -2 incidents) than younger students.
- Only in the high-incidence disability cluster were older students more likely to belong to groups than their younger peers, controlling for other factors. Age does not relate to growth in the likelihood of group memberships over time either for students with disabilities as a whole or for those in any disability cluster.

Gender

Descriptive Findings (Exhibit 4-6)

- In bivariate analyses, gender is unrelated to the rate at which students belonged to school or community groups for most students, with the exception of students in the sensory and severe disability clusters. In both of these groups, boys were more likely than girls to belong to school or community groups, by 9 and 7 percentage points, respectively.

Exhibit 4-6
Social Adjustment Outcomes Associated with Gender, by Disability Cluster

	All disabilities	Disability Cluster: High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Percentage belonging to groups							
Boys	69	73	52	64	71	68	51
Girls	65	69	54	68	62	70	44
Number disciplinary actions in prior year							
Boys	1.9	1.6	2.0	3.9	1.5	1.8	1.5
Girls	0.7	0.5	1.2	2.1	0.7	0.5	0.4

Sources: SEELS Wave 1 school program questionnaire, 2001, and parent interview/survey, 2000.

- Girls were involved in fewer disciplinary incidents than their male peers. This difference ranged from 0.8 to 2.8 actions, with the greatest discrepancy observed among boys and girls in the behavior disability cluster.

Multivariate Findings

- When multiple factors are included in the analyses, relatively few relationships between gender and social outcomes are statistically significant.
- For example, boys in the severe disability cluster were less likely than girls to belong to a school or community group in Wave 1 by 20 percentage points, which stands in contrast to the descriptive findings summarized above. Further, for students in the cognitive disability cluster, boys experienced less growth in the rate of belonging to groups over time than did girls (-18 percentage points).
- The consistent relationships in bivariate analyses between gender and disciplinary actions are less evident in a multivariate context. Only for students overall and for those in the sensory disability cluster were boys initially involved in more disciplinary actions than girls, controlling for other factors. There are no significant relationships between gender and the rate of growth in the number of disciplinary incidents.

Race/Ethnicity

Descriptive Findings (Exhibit 4-7)

- In bivariate analyses, the rate of belonging to a school or community group was higher among white students with disabilities relative to their African-American peers. This was true for students overall and for students in all disability clusters except the cognitive cluster.

- Hispanic students belonged to school or community groups at lower rates than both white and African-American students. This is apparent for all subgroups.
- Racial/ethnic groups also differed in the number of disciplinary incidents in which they were involved in a year. Overall and for students in all disability clusters, African-American students were subject to more disciplinary actions than were white students. These differences ranged from 1 to 2 additional instances per school year.
- African-American students in the cognitive, sensory, and physical/health disability clusters were involved in more disciplinary actions than Hispanic students.

Exhibit 4-7
Social Adjustment Outcomes Associated with Race/Ethnicity, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
Average							
Percentage belonging to groups among students who were							
White	75	79	56	70	75	75	53
African-American	62	67	56	57	64	65	48
Hispanic	45	47	27	49	36	40	39
Number of disciplinary actions in the prior school year among students who were							
White	1.2	0.9	1.6	3.3	1.0	0.8	1.1
African-American	2.4	1.9	2.2	5.1	2.4	3.0	1.6
Hispanic	1.8	2.0	0.4	2.8	0.6	0.5	1.3

Sources: SEELS Wave 1 school program questionnaire, 2001, and parent interview/survey, 2000.

Multivariate Findings

- The differences between African-American and white students with disabilities in the likelihood of belonging to groups that are evident in bivariate relationships are absent when other differences between students are controlled for in multivariate analyses. There are no significant relationships for students with disabilities overall or for those in any disability cluster with regard to group membership rates in Wave 1 or growth in them over time.
- Regarding involvement in disciplinary actions, African-American students in the sensory disability cluster were involved in fewer disciplinary incidents initially, compared with their white peers. However, over time, African-American students in the high-incidence and cognitive disability clusters had higher rates of growth in disciplinary actions relative to white students with disabilities.

- A consistent pattern of differences between Hispanic and white students is evident, in that Hispanic students initially were less likely to belong to school or community groups than white students, controlling for other factors. This relationship is apparent among students with disabilities overall, as well as among those in the high-incidence, behavior, sensory, and physical/health disability clusters; differences ranged from 15 percentage points among students in the high-incidence disability cluster to 51 percentage points for those in the physical/health cluster.
- Over time, Hispanic students in the physical/health disability cluster had a higher rate of growth in the likelihood of belonging to groups, compared with their white peers, by 59 percentage points, whereas Hispanic students in the severe cluster were less likely to belong to groups over time by 27 percentage points.
- Hispanic students also had lower initial levels of disciplinary actions than white students among those in the cognitive and sensory disability clusters (3 and 1 incident, respectively). However, over time, Hispanic students in the cognitive disability cluster had a greater rate of growth in disciplinary actions (1 incident), controlling for other factors.

Summary

This chapter has examined the relationships between students' age, gender, and racial/ethnic background and their academic performance and social adjustment.

Of the demographic characteristics considered, age has by far the strongest and most consistent relationship with student outcomes, particularly academic performance measures, both in the descriptive summaries and the multivariate analyses. In Wave 1, for most disability clusters, older students out-performed their younger peers in terms of academic performance, reflecting the greater skill levels and academic content acquired as students progress through the grades. Relationships that appear in descriptive analyses are maintained when multiple factors are held constant, as in the case of significantly higher mathematics calculation scores for older students vs. younger peers for students with disabilities as a whole and for those in each disability cluster. However, despite their greater initial levels of academic skill, the rate of growth of older students in key outcome areas leveled off over time and frequently was slower that that of their younger peers.

In contrast, there are few gender differences in academic outcomes in either descriptive or multivariate analyses. Exceptions are that, overall and in the high-incidence disability cluster, boys had stronger mathematics calculation skills than girls, but boys in some clusters had lower oral reading rates and/or lower rates of growth over time in that measure.

Descriptive analyses of relationships between academic outcomes and students' racial/ethnic backgrounds suggest an academic advantage for white

students with disabilities relative to both African-American and Hispanic peers on standardized measures of reading and mathematics abilities, although not grades. However, most of the differences between African-American and white students are not sustained in multivariate analyses when other factors, such as household income, are considered. For example, in the bivariate summaries the oral reading fluency rates of white children with disabilities differed from their African-American and Hispanic peers, particularly for students in the high-incidence, sensory, and physical/health clusters. Similar findings emerged for passage comprehension and mathematics calculation. However, the multivariate analyses found few consistent patterns related to race/ethnicity.

Across the board, fewer significant relationships are apparent between the demographic characteristics examined and the two social adjustment outcomes examined in SEELS than the academic performance measures. One exception is that Hispanic students in four of the six disability cluster were considerably less likely to belong to school or community groups than white students in both the descriptive and multivariate findings. The bivariate summaries also show that African-American students were involved in more disciplinary incidents than white students, with differences being particularly strong among students in the behavior disability cluster, but these differences are not observed in the multivariate analyses.

These findings demonstrate that differences in demographic characteristics certainly contribute to understanding variations in students' academic and social adjustment outcomes. However, descriptive differences frequently are not maintained when a range of factors are considered, demonstrating that they frequently are confounded with other aspects of students and their experiences.

5. Relationships Between Family Economics and Support and Longitudinal Outcomes *by Jose Blackorby, Mary Wagner, Anne-Marie Knokey, and Phyllis Levine*

The involvement and support families provide for their children's educational success has been integral to best practices and the legal underpinnings of special education policy since the passage of P.L. 94-142, and for good reason. Children spend much of their time in the family environment, which provides needed psychological and physical guidance as they grow up. Family-related factors that have been found to relate to children's learning and school performance include socioeconomic status, an established daily family routine that supports learning, monitoring of out-of-school activities, modeling of learning activities, and high and realistic expectations for achievement (Chavkin, 1993; Epstein, 1987, 1996; Hess & Halloway, 1984; Thorkildsen & Stein, 1998). Positive outcomes associated with family involvement in and support for education include: better grades and test scores (Clark, 1983), more consistent attendance (National Middle School Association, 2000) and homework completion (Epstein, Simon, & Salinas, 1997), more positive attitudes and behavior (Epstein, 1987), and increased probabilities of high school completion (Rumberger, Ghatak, Poulas, Ritter, & Dornbusch, 1990) and enrollment in postsecondary education (Eagle, 1989).

Family factors may be even more important for students with disabilities (Council for Exceptional Children, 2001). In fact, previous SEELS reports have documented relatively high levels of parental involvement and support, as well as significant statistical relationships with a number of important academic and social outcomes (Blackorby et al., 2004; Newman & Davies, 2004; Newman, Wagner, & Guzman, 2002).

This chapter examines the relationships that families' household income, expectations for educational attainment, and supports provided to students at home and school have with longitudinal outcomes in the academic and social adjustment domains for students in the six disability clusters. First, we describe variation in these family characteristics and supports for students with disabilities overall and by disability cluster. Then, for each factor, there is a description of the bivariate and multivariate relationships with students' initial status on academic outcome measures and with the rate of growth in those outcomes over time, while controlling for other factors. Similar descriptive and multivariate analysis results are then presented for social adjustment outcomes.[1]

[1] The complete set of factors included in the multivariate analyses is described in Chapter 1. Specifications of models and complete results are reported in the *Methodological Volume in Support of the SEELS Comprehensive Report, What Makes a Difference? Influences on Outcomes for Students with Disabilities: SEELS Sampling, Data Collection, and Analysis Procedures* (Javitz, Blackorby, Wagner, McCracken, & Knokey, 2007) available at www.seels.net.

Factors Expected to Be Associated with Outcomes

This chapter focuses on three aspects of students' household context that could be associated in important ways with their academic performance and social adjustment:

- the economic status of their households, as indicated by annual household income,
- parents' expectations for children's postsecondary education,
- the support families provide at home for their children's education, and
- family involvement at their children's school.

Economic status. Household income, a central component of economic status, is related to a wide range of outcomes for children and youth, both in and outside of school. For young children, being from a low-income household is associated with a greater likelihood of poor health and development poor performance in school, and a variety of poor outcomes in adolescence (Duncan & Brooks-Gunn, 1997; Lewit, Terman, & Behrman, 1997). Furthermore, poverty has been a persistent problem in American society, one that affects students with disabilities disproportionately in comparison with their general education peers (Marder & Wagner, 2002). Household income was ascertained in telephone interviews with parents, who were asked to report "the total income of all persons in your household in the last tax year, including salaries or other earnings, money from public assistance, retirement, and so on, for all household members, before taxes." Respondents were read a list of income categories and asked to indicate which best described their total household income.

Parents' expectations for students' educational attainment. Often, clear, consistent, and high expectations for students' learning and academic performance are related to achievement for students with and without disabilities (e.g., Thorkildsen & Stein, 1998, Wagner, Blackorby, Cameto, & Newman, 1993). Previous SEELS reports have shown relatively high levels of parent expectations. In fact, more than three-fourths of students with disabilities represented in SEELS were expected "definitely" or "probably" to go on to postsecondary education after high school, and previous Wave 1 SEELS analyses suggested significant relationships between parental expectations and several academic and social outcomes (Blackorby, Chorost, Garza, & Guzman, 2004; Newman & Davies, 2004). For this reason, parents' expectations were included in the statistical analyses of student outcomes. SEELS measured parental expectations for several aspects of students' education and life attainment; for the analyses described here, parental expectations for students enrolling in postsecondary education was selected as an indicator of expected educational attainment. Parents were asked in telephone interviews, "how likely do you think it is that [name of child] will attend school after high school? Do you think he/she definitely will, probably will, probably won't, or definitely won't?"

Family support for education provided at home. Family support for learning and school can be demonstrated in a variety of home activities, including (1) conversations about daily classroom events, projects, homework assignments, and field trips, which signal that education is valued (Balli, Demo, & Wedman, 1998); (2) reading to children at home, which improves their literacy skills (National Center for Education Statistics, 1998); and (3) helping students with their homework. Such support can improve the quality of students' academic work and their attitudes toward school (Epstein, Simon, & Salinas, 1997). To include the level of family support for education at home in the SEELS statistical analyses, parents were asked to report the frequency with which they engaged in the three education support behaviors at home mentioned above; responses were used to create a 9-point scale, and students were grouped as to whether their level of family support for education at home was high (8 or 9 points), medium (5 through 7 points), or low (0 through 4 points).

Family involvement at school. Families also support their children's education through direct contact and involvement at school, attendance at events, volunteering, and participation in meetings. In SEELS, family involvement at school was assessed by summing parents' reports on a 4-point scale of the frequency with which they: "attended a general school meeting," "attended a school or class event," or "volunteered at school." A scale was created by summing these values, and students were grouped as to whether their family support at school was high (8 through 12), medium (5 through 7), or low (0 through 4). This variable was significantly and positively related to higher grades and group membership in SEELS Wave 1 analyses (Blackorby et al., 2004; Sumi, Marder, & Wagner, 2004).

Distribution of Factors Across Disability Clusters

Exhibit 5-1depicts the distribution of students across disability clusters on the family income and support factors described in this chapter.

Household Income

- Approximately equal proportions of students with disabilities overall lived in households earning $20,000 or less or more than $50,000 annually (31% and 30%, respectively).
- The percentage of students from households earning more than $50,000 ranges from 13% to 35% across disability clusters. Students in the physical/health and severe disability clusters were more likely to live in households in the higher income category than were their peers in the cognitive and behavior clusters.
- There is somewhat less variation across disability clusters in the low-income category. Approximately the same proportions of students in the high-incidence, sensory, physical/health, and severe disability clusters lived in households with incomes of $20,000 or less (24% to 29%).

Exhibit 5-1
Household Income and Family Support, by Disability Cluster

	All disabilities	Disability Cluster: High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Percentage with household income							
More than $50,000	31	26	13	20	27	35	30
$20,000 or less	30	28	47	38	29	24	27
Percentage expected to attend school after high school[a]							
Definitely will	32	37	14	20	38	33	16
Probably will not	19	14	36	28	17	21	29
Percentage whose reported level of family support for education at home was[b]							
High	77	81	61	73	84	77	54
Low	5	2	14	7	5	7	25
Percentage whose reported level of family involvement at school was[b]							
High	13	14	6	10	11	16	11
Low	61	57	78	73	60	52	66

[a] The categories “probably will” and “definitely won’t” are omitted from the table.

[b] The category “medium” is omitted from the table.

Source: SEELS Wave 1 parent interview, 2000.

- In contrast, students in the cognitive and behavior disability clusters were more likely than students in other clusters to live in households with annual incomes of less than $20,000 (47% and 38%, respectively).

Parents’ Expectations for Students’ Educational Attainment

- Parents of 32% of students with disabilities overall expected their children with disabilities definitely to continue their education after high school. Parents of 19% of students doubted they would pursue further education.
- Parents of students in the high-incidence, sensory, and physical health disability clusters were most likely to expect their children definitely to attend some type of postsecondary school (33% to 38%).
- Parents of students in the cognitive, behavior, and severe disability clusters were less likely to report that their children would attend school beyond high school. Parents of 14% to 20% of these students, respectively, indicated that their children definitely would attend, whereas 28% to 36% reported that they probably would not do so.

Family Support for Education Provided at Home

- Among students with disabilities overall, a high level of support at home was much more common than a low level (77% vs. 5%).
- The level of parental support at home was relatively high among students in the high-incidence, behavior, sensory, and physical/health disability clusters, ranging from 73% to 84%.
- Smaller proportions of students in the cognitive and severe disability clusters had high levels of family support for education at home (61% and 54%) and correspondingly low levels of support (14% and 25%, respectively).

Family Involvement at School

- Compared with support provided at home, family involvement at school was less common overall. Parents provided high levels of involvement at school for 13% of students, whereas low levels of involvement were provided for 61% of students.
- Across the disability clusters, high levels of involvement ranged from 6% for students in the cognitive cluster to 16% for their peers in physical/health cluster.
- Low levels of family involvement at school ranged from 52% for the physical/health disability cluster to 78% for the cognitive cluster.

Academic Outcomes

SEELS has conducted both descriptive and multivariate analyses of relationships between household income and family support and four measures of academic performance: W-scores on standardized measures of reading comprehension and mathematics calculation abilities, oral reading fluency rates, and teacher-given grades. Findings support earlier SEELS analyses in identifying a variety of significant relationships.

Household Income

Descriptive Findings (Exhibit 5-2)

- Consistent with prior SEELS results and other research, descriptive findings illustrate that students with disabilities from higher income backgrounds generally enjoyed a substantial advantage in academic performance that was fairly consistent across disability clusters.

Exhibit 5-2
Academic Outcomes Associated with Household Income, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
Average							
Passage comprehension score[a]							
$20,000 or less	474.5	477.9	454.7	482.9	476.7	478.9	459.3
More than $50,000	489.7	491.8	468.5	494.2	485.8	489.1	469.6
Oral reading fluency rate[b]							
$20,000 or less	63.2	66.0	39.2	72.3	70.7	71.4	57.0
More than $50,000	92.8	93.6	53.8	107.3	111.0	89.7	79.5
Mathematics calculation score[a]							
$20,000 or less	491.4	493.6	477.7	495.6	496.6	490.3	478.9
More than $50,000	503.7	506.3	483.8	501.9	509.2	500.6	485.1
Grade point average[c]							
$20,000 or less	2.5	2.5	2.4	2.4	2.7	2.6	2.5
More than $50,000	2.9	3.0	2.4	2.8	3.1	2.8	2.5

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 school program questionnaire and student direct assessment, 2001, and parent interview/survey, 2000.

- Regarding passage comprehension, for example, those from higher income families had higher W-scores among students with disabilities overall and across disability clusters, with the exception of the sensory cluster; significant differences ranged from 11 to 15 W-score points.
- The advantage of higher income is even more evident and consistent for oral reading fluency. For students overall, the gap between the income groups was 30 correct words per minute. Across disability clusters, it ranged from 15 words per minute for the cognitive disability cluster to more than 40 for the sensory cluster.
- The relationship between mathematics performance and income for students overall (12 W-score points) is somewhat less pronounced than that observed for reading and applies only to the high-incidence and physical/health disability clusters.
- The relationships between teacher-given grades and household income also are less pronounced than those noted for reading. Higher grades are noted for students in the higher income group overall, and for those in the high-incidence, behavior, and sensory disability clusters.

Multivariate Findings

- Household income is associated with initial differences in reading comprehension for students with disabilities overall and for students in the high-incidence, behavior, and severe disability clusters. In each case, students from households with incomes of more than $50,000 had initial reading comprehension W-scores 3 to 5 points higher than their peers from households with incomes of $20,000 or less, irrespective of other differences between them.
- Oral reading fluency rates also were significantly higher for the higher income category for students with disabilities overall and for those in the same three clusters; differences ranged from 12 to 24 more words read correctly per minute.
- In contrast, for mathematics calculation, higher household incomes are associated with higher W-scores only for students overall and in the sensory disability cluster.
- Higher household income is associated with initially higher grades for students in the high-incidence disability cluster but with lower grades for those in the severe cluster.
- Household income has a weaker and less consistent relationship with growth over time on academic performance measures than with Wave 1 status. Only for passage comprehension are significant relationships observed. A lower rate of growth in passage comprehension scores is apparent for higher income students overall and in the cognitive disability cluster, controlling for other factors.

Parents' Expectations for Students' Educational Attainment

Descriptive Findings (Exhibit 5-3)

- A pattern of higher academic performance is apparent in bivariate analyses for students with disabilities whose parents expected them definitely to attend postsecondary school than for students whose parents doubted they would.
- In passage comprehension, for example, those who definitely were expected to attend postsecondary school had higher W-scores among students overall (14 points) and across all disability clusters except the cognitive and sensory disability clusters; significant differences ranged from 8 W-score points for the high-incidence cluster to 22 points for the physical/health cluster.
- A similar pattern is apparent with regard to oral reading fluency rates. Overall, students expected definitely to continue their education read 31 correct words per minute faster than their peers who were not expected to continue. Students in the cognitive and sensory disability clusters, again, did not show this relationship. Across other disability clusters, differences related

Exhibit 5-3
Academic Outcomes Associated with Parents' Expectations for Students' Educational Attainment, by Disability Cluster

	All disabilities	Disability Cluster: High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
Average							
Passage comprehension score[a]							
Definitely will	488.8	489.9	468.5	495.9	486.5	492.1	470.2
Probably will not	475.3	481.4	458.1	484.0	480.1	469.8	450.4
Oral reading fluency rate[b]							
Definitely will	89.8	90.7	57.8	102.5	97.4	96.2	76.7
Probably will not	58.9	60.0	41.4	76.1	84.5	61.7	44.4
Mathematics calculation score[a]							
Definitely will	501.7	502.9	483.5	503.0	502.3	504.1	486.7
Probably will not	490.2	493.1	478.7	496.3	503.5	485.7	471.6
Grade point average[c]							
Definitely will	3.1	3.2	2.8	2.9	3.2	3.1	2.9
Probably will not	2.3	2.3	2.4	2.2	2.2	2.3	2.2

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 school program questionnaire and student direct assessment, 2001, and parent interview/survey, 2000.

to parents' expectations ranged from 26 words per minute faster in the behavior disability cluster to 35 words per minute faster for the physical/health cluster.

- The relationship between mathematics performance and parental expectations for students with disabilities overall also favors students whose parents held higher expectations for their educational attainment, but is less consistent across disability clusters than those observed for reading; only students in the high-incidence and severe disability clusters show significant differences related to parents' expectations.
- Students whose parents expected them definitely to pursue postsecondary education had significantly higher grades overall and across all disability clusters; differences ranged from .4 to 1.0 on a 4-point scale.

Multivariate Findings

- As with household income, relationships are observed primarily with regard to students' initial status on academic measures, with few relationships noted with the rate of growth in outcomes over time.

- For students with disabilities as a group, high parental expectations for post-high-school education are associated with more positive academic outcomes on all measures at Wave 1: initially higher test scores in reading and mathematics (4 W-score points on both measures), faster oral reading rates (7 correct words per minute), and higher grades (.3 points on a 4-point scale).
- Grade point averages were the most consistently related to parents having high expectations, with differences of 0.3 or 0.4 observed for students with disabilities overall and for those in four of the six clusters (exceptions are those in the cognitive and severe disability clusters).
- For students in the behavior cluster, positive expectations for postsecondary education enrollment are associated with 31 additional words read correctly per minute in Wave 1, controlling for other factors.
- For students in the physical/health disability cluster, high parental expectations for postsecondary education are associated with initially higher reading comprehension scores of 11 W-score points, but a lower rate of growth in passage comprehension over time (-6 W-score points).
- In addition to students with disabilities overall, high parental expectations for postsecondary attendance are associated with higher initial mathematics calculation test scores only for students in the sensory disability cluster (5 W-score points). These students also had a higher rate of growth in oral reading fluency (11 correct words per minute) than students in that cluster whose parents doubted they would pursue postsecondary education.

Family Support for Education Provided at Home

Descriptive Findings (Exhibit 5-4)

- Results reveal positive relationships between family support provided at home and academic performance on some measures for some students.
- Students with disabilities overall and those in the cognitive and severe disability clusters who received high levels of support at home had higher W-scores for passage comprehension, ranging from 14 points for students in the cognitive disability cluster to 24 points for those in the severe cluster.
- Higher family support at home also relates to higher rates of oral reading fluency, also for students with disabilities overall and those in the cognitive and severe disability clusters. Overall, students receiving higher levels of support for education at home read 16 correct words per minute faster than their peers who received lower levels of support; differences for the cognitive and severe disability clusters were 35 and 38 correct words per minute, respectively.
- Although no significant differences in mathematics performance are noted for students with disabilities overall or those in most clusters who experienced high versus low levels of family support for education at home,

Exhibit 5-4
Academic Outcomes Associated with Family Support for Education Provided at Home, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension score[a]							
High family support	481.5	483.7	462.8	488.4	482.2	484.0	468.4
Low family support	467.0	479.6	448.5	480.9	477.7	468.4	444.2
Oral reading fluency rate[b]							
High family support	73.7	74.4	49.8	87.2	86.5	81.0	71.2
Low family support	57.9	80.7	14.4	75.2	90.4	69.5	33.2
Mathematics calculation score[a]							
High family support	495.8	498.0	479.2	498.9	500.7	495.1	483.6
Low family support	488.7	499.2	471.0	492.2	495.6	494.4	468.2
Grade point average[c]							
High family support	2.7	2.8	2.4	2.5	2.9	2.7	2.6
Low family support	2.4	2.8	2.2	2.3	2.2	2.4	2.0

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 school program questionnaire and student direct assessment, 2001, and parent interview/survey, 2000.

a marked differences is apparent for students in the severe disability cluster (15 W-score points).

- Family support at home has a significant relationship with teacher-given grades for students with disabilities overall and those in the sensory and severe clusters (.7 and .6 points on a 4-point scale).

Multivariate Findings

- The level of family support at home is not strongly related to academic outcomes when included in analyses along with other factors. No significant relationships are apparent between family support at home and either initial status or growth over time for students with disabilities overall on any of the academic outcomes measures.
- However, high levels of parental support at home are associated with benefits for students in the cognitive and severe disability clusters. They had 9 and 5 points higher Wave 1 W-scores in passage comprehension, respectively. Students in the cognitive disability cluster who had high levels of parent support at home also had higher mathematics calculation scores (8 W-score points on average), and those in the severe disability had higher grades (.2 points) than students receiving low levels of support.

- In contrast, among students in the high-incidence and behavior disability clusters, high levels of parental support at home are associated with 30 and 17 fewer words read correctly per minute, respectively, at Wave 1, controlling for other factors.

Family Involvement at School

Descriptive Findings (Exhibit 5-5)

- Descriptive results indicate positive relationships between family involvement at school and reading performance and grades for some students. The pattern of relationships is similar to that observed for parental support at home, although differences are somewhat smaller and less consistent across disability clusters.
- For passage comprehension, students with disabilities as a whole whose parents demonstrated high levels of parental involvement at school had higher W-scores than students who received little such support. For students in the cognitive disability cluster, the relationship is in the opposite direction.

Exhibit 5-5
Academic Outcomes Associated with Family Involvement at School, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension score[a]							
High family involvement	485.9	488.3	448.6	491.5	488.4	483.5	469.1
Low family involvement	479.9	483.0	463.2	487.2	479.7	484.7	460.6
Oral reading fluency rate[b]							
High family involvement	85.1	86.1	42.5	90.9	97.1	82.9	72.8
Low family involvement	72.0	73.8	49.7	85.7	83.0	83.4	61.0
Mathematics calculation score[a]							
High family involvement	500.1	501.5	482.7	500.7	503.7	495.2	483.6
Low family involvement	496.0	498.7	481.9	499.4	497.6	496.1	480.6
Grade point average[c]							
High family involvement	2.9	2.9	2.6	2.7	3.1	2.8	2.7
Low family involvement	2.6	2.7	2.4	2.4	2.7	2.7	2.4

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 school program questionnaire and student direct assessment, 2001, and parent interview/survey, 2000.

- Greater family involvement at school also relates to higher rates of oral reading fluency for students overall and in the high-incidence clusters (13 and 12 correct words per minute, respectively).
- The most consistent pattern of relationships between family involvement at school and academic performance involves teacher-given grades. Grades were significantly higher for students whose parents were actively involved at school compared with those who had less-involved parents among students with disabilities overall and those in the high-incidence, sensory, and severe disability clusters.
- There are no significant bivariate relationships between mathematics performance and the level of family involvement at school.

Multivariate Findings

- The few significant relationships between initial status and high parental involvement include lower reading fluency for students in the behavior disability cluster (-9 correct words per minute) and lower grades for students in the high-incidence cluster (-.1 on a 4-point scale), contrary to expectations. However, analyses do show higher grades for students in the severe disability cluster whose parents showed high levels of support at school (.1 points).
- Family involvement at school is associated with a lower rate of growth in oral reading fluency rates for students in the sensory disability cluster.

Social Adjustment Outcomes

Although both family income and family support that reinforces student learning could be expected to have more direct and sizable relationships with academic outcomes, SEELS analyses also demonstrate some significant relationships with two social adjustment outcomes—membership in school or community groups, and involvement in disciplinary incidents at school.

Household Income

Descriptive Findings (Exhibit 5-6)

- Higher household income consistently and strongly relates to the likelihood of membership in school or community groups for students with disabilities as a group and for those in all six disability clusters at Wave 1, perhaps reflecting the reality that membership dues and other costs associated with group activities were more affordable for students from higher-income families. Students with disabilities from higher income households were between 16 and 29 percentage points more likely to belong to extracurricular groups than peers from households with incomes of $20,000 or less.
- In contrast, being from a lower-income household is related to being involved in more disciplinary actions in the previous school year for students with disabilities as a whole and for those in the high-incidence cluster.

Exhibit 5-6
Social Adjustment Outcomes Associated with Household Income, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
Average							
Percentage belonging to groups							
$20,000 or less	56	60	49	53	58	55	39
More than $50,000	84	88	65	82	82	83	58
Number of disciplinary actions in the prior school year							
$20,000 or less	2.4	2.3	1.8	4.2	2.3	1.9	1.6
More than $50,000	0.8	0.6	1.4	2.4	0.6	1.2	1.0

Sources: SEELS Wave 1 school program questionnaire, 2001, and parent interview/survey, 2000.

Multivariate Findings

- Having a higher household income is consistently and positively related to belonging to a school or community group for students with disabilities as a whole and for those in all six disability clusters at Wave 1. Differences ranged from 9 percentage points for students in the sensory disability cluster to 27 percentage points for students in the physical/health cluster.
- Higher household income also relates to being involved in fewer disciplinary actions initially for students overall, and for students in the sensory disability cluster.
- Few relationships are apparent between income and growth in social adjustment outcomes over time. Exceptions are that having higher household income is related to a lower rate of growth in belonging to school or community groups for students in the high-incidence and physical/health disability clusters, as well as a lower rate of growth in the number of disciplinary actions for students in the severe cluster.

Parents' Expectations for Students' Educational Attainment

Descriptive Findings (Exhibit 5-7)

- Parental expectations for postsecondary education are associated with both a higher likelihood of group memberships and with involvement in fewer disciplinary incidents for students with disabilities as a whole and for those in the high-incidence disability cluster.

Exhibit 5-7
Social Adjustment Outcomes Associated with Parents' Expectations for Students' Educational Attainment, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
Average							
Percentage belonging to groups							
Definitely will	78	80	66	68	70	80	61
Probably won't	60	64	54	58	72	60	45
Number of disciplinary actions in the prior school year							
Definitely will	0.9	0.7	1.6	2.9	0.6	1.1	1.7
Probably won't	2.1	1.7	1.8	4.9	2.1	1.6	0.8

Sources: SEELS Wave 1 school program questionnaire, 2001, and parent interview/survey, 2000.

- Students in the physical/health and severe disability clusters whose parents expected they definitely would enroll in postsecondary education also were more likely to belong to groups than students whose parents doubted they would pursue additional education after high school.

Multivariate Findings

- Multivariate analyses of the differences in initial status and change over time in social adjustment outcomes for students whose parents reported that they definitely would attend postsecondary school contrasted with peers whose parents indicate that they were unlikely to do so, reveal few significant relationships, controlling for other factors.
- Two exceptions are a lower initial rate of disciplinary actions for students in the physical/health disability cluster (-1 incident) whose parents had higher expectations and a lower rate of growth in disciplinary actions over time for students with disabilities as a whole (-.3 incidents).

Family Support for Education Provided at Home

Descriptive Findings (Exhibit 5-8)

- There are positive and consistent relationships between family support and membership in school or community groups in bivariate analyses. Among students overall and in five of the six disability clusters, students with disabilities who received high levels of support for education at home were 14 to 29 percentage points more likely to belong to school or community groups than students with less supportive parents. Students in the high-incidence disability cluster are the exception to this finding.

Exhibit 5-8
Social Adjustment Outcomes Associated with Family Support for Education Provided at Home, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Percentage belonging to groups							
High family support	72	76	57	69	72	73	58
Low family support	53	75	43	50	43	53	34
Number of disciplinary actions in the prior school year							
High family support	1.3	1.0	1.7	2.7	1.2	1.3	1.6
Low family support	1.8	2.2	1.5	5.2	1.5	1.7	0.5

Sources: SEELS Wave 1 school program questionnaire, 2001, and parent interview/survey, 2000.

- Family support for education at home is not associated with variations in the number of disciplinary actions in which students were involved, with the exception of students in the severe disability cluster, among whom a high rate of support is associated with more disciplinary trouble at school.

Multivariate Findings

- Multivariate analyses of the differences in initial status and growth over time in social adjustment outcomes for students with high and low levels of support for education provided at home, controlling for other factors demonstrate few relationships, as was true regarding parental expectations
- The exceptions are a higher rate of growth in group membership for students in the sensory and severe disability clusters who had high levels of support at home, compared with those with less support, but a lower rate of growth for students in the behavior disability cluster.

Family Involvement at School

Descriptive Findings (Exhibit 5-9)

- For students with disabilities overall and in all disability clusters, students receiving high levels of involvement at school were from 21 to 33 percentage points more likely to belong to school or community groups.
- Family involvement at school also is associated with involvement in fewer disciplinary actions for students overall and in the high-incidence and sensory disability clusters.

Exhibit 5-9
Social Adjustment Outcomes Associated with Family Involvement at School, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
Average							
Percentage belonging to groups							
High involvement	89	91	77	90	84	83	74
Low involvement	59	63	48	57	63	62	43
Number of disciplinary actions in the prior school year							
High involvement	0.8	0.4	2.3	2.9	0.5	0.7	0.9
Low involvement	1.8	1.6	1.7	3.3	1.8	1.9	1.3

Sources: SEELS Wave 1 school program questionnaire, 2001, and parent interview/survey, 2000.

Multivariate Findings

- High parental involvement at school is consistently related to a higher likelihood of belonging to a school or community group for students with disabilities overall and for all disability clusters, except the physical/health cluster. Differences in rates range from 9 percentage points for students in the high-incidence and sensory clusters to 23 percentage points for students in the cognitive cluster.
- High parental involvement at school is related to a higher rate of growth in belonging to a school or community group, relative to less supported students with disabilities, for students overall and in the high-incidence and behavior clusters (1 to 5 percentage points); the opposite relationship is apparent for the cognitive cluster (-1 percentage point).
- The only relationship noted with the number of disciplinary actions in which students with disabilities were involved is a higher rate of growth in disciplinary actions among students in the physical/health cluster (1 incident).

Summary

This chapter has examined the relationships of household income, parental expectations for postsecondary education, and family supports at home and at school with academic and social adjustment outcomes. Significant relationships are apparent for both outcome domains, although generally, more relationships are apparent in bivariate than multivariate contexts, and in multivariate analyses, more relationships occur with regard to initial status on outcome measures at Wave 1 than to growth in outcomes over time.

Relationships between family measures and academic outcomes are uniformly in the expected direction—higher income, higher expectations, and higher levels of support at home and at school generally relate to more positive academic outcomes. Income differences are particularly related to reading measures, whereas variations in parents' expectations for education attainment have the most consistent positive relationships with grades.

Families' support for education at home and involvement at school also generally relate to more positive academic outcomes in bivariate relationships, but are not sustained, for the most part, when household income and other factors are accounted for. However, patterns of relationships differ for students in different disability clusters.

In particular, the positive relationships that household income and parents' expectations for postsecondary education have with academic outcomes for students with disabilities overall and those in most disability clusters do not occur for students in the cognitive or severe disability clusters. These groups have relatively larger proportions of low-income families, and the cognitive limitations that occur for all students in the cognitive cluster and most students in the disability cluster are likely to limit variation in parents' expectations for any postsecondary education enrollment. In contrast, students in these two clusters have the strongest and most consistent relationships between academic outcomes and family support both at home and at school—relationships that appear in bivariate analyses and that are maintained when other factors are introduced. Higher scores on both reading measures are apparent for students in both groups who received high levels of family support at home; students in the cognitive disability cluster also had higher mathematics abilities and those in the severe cluster also had higher grades.

Other interesting cluster-specific patterns also are apparent with regard to academic outcomes. For example, earlier SEELS analyses (Blackorby et al., 2004) have suggested that grades have low correlations with measured achievement, suggesting that these two types of measures represent different views of student performance. There are, however, several interesting relationships between grades and family expectations and support. For example, higher expectations for postsecondary education are associated with higher grades for students in the high-incidence, behavior, sensory, and physical/health disability clusters. With the exception of the behavior disability cluster, these are the students with disabilities most likely to attend postsecondary school. Even for the behavior cluster, a group that often has a pattern of troubling outcomes, high expectations for educational attainment are associated with greater improvements in grades over time. Also of interest are the findings that students in the high-incidence cluster who received high levels of support for education at home were well behind in oral reading fluency in Wave 1, but had a rate of change that grew an average 6 words per year faster than their peers who did not receive such support.

Regarding social adjustment outcomes, the strongest and most consistent relationships are between household income and the likelihood that students

belonged to school or community groups. Strong bivariate relationships for students with disabilities overall and in each disability cluster are maintained when other factors are accounted for in multivariate analyses. Relationships between higher income and involvement in fewer disciplinary actions also are born out in both bivariate and multivariate analyses for students with disabilities overall and in the high-incidence cluster. Higher levels of family support provided at both home and involvement at school also consistently relate to a higher likelihood of group memberships, and higher family support at school also is associated with greater growth over time in group memberships.

These findings demonstrate that family factors are important in understanding the pattern of differences in the outcomes that students achieve and some factors, such as parental support at home and at school can be encouraged by school policies.

6. Relationships Between Students' Social Skills and Classroom Behaviors and Their Longitudinal Outcomes

by Carl Sumi, Mary Wagner, Anne-Marie Knokey, and Jose Blackorby

Chapter 2 has shown the diverse performance of students with disabilities across a range of outcomes and over time. The SEELS conceptual framework (Chapter 1) and previous SEELS analyses (Blackorby, Wagner, Cameto, Davies, et al., 2004) suggest that variations in student performance over time are shaped by many factors. This chapter focuses on the how academic and social adjustment outcomes of students with disabilities relate to aspects of their ability to deal positively with others they encounter at school. The importance of these kinds of interpersonal interactions for positive child development is well-established. Competence in social exchanges is a key factor in academic success, whereas problems in social functioning can indicate difficulties in multiple domains (Magnusson & Bergman, 1990). Students receiving special education include a disproportionate number of students who are at risk for delays or difficulties in social development, particularly students with autism and emotional disturbances, who predominate in the behavior cluster. However, parents have reported that some students in all primary disability classifications have these kinds of social disabilities as secondary conditions (Wagner & Blackorby, 2002).

The chapter begins by describing the social skills and behavioral factors that are expected to relate to academic and social adjustment outcomes for students with disabilities over time and by presenting their distribution across disability clusters. For each factor, we then describe results of bivariate and multivariate analyses that identify its relationships with students' initial status on outcomes as well as with the growth in outcomes over time, while controlling for other factors.[1]

Factors Expected to Be Associated with Outcomes

This chapter focuses on two aspects of students' ability to develop positive interpersonal relationships at school: social skills and behavior in class, including

- cooperating with peers,
- following directions,

[1] The complete set of factors included in the multivariate analyses is listed in Chapter 1. Specifications of models and complete results are reported in the *Methodological Volume in Support of the SEELS Comprehensive Report, What Makes a Difference? Influences on Outcomes for Students with Disabilities: SEELS Sampling, Data Collection, and Analysis Procedures* (Javitz, Blackorby, Wagner, McCracken, & Knokey, 2007) available at www.seels.net.

- persisting in completing classroom tasks, and
- completing homework on time.

Social skills. Students with disabilities differ markedly in their ability to relate to others (Cadwallader, Cameto, Blackorby, Giacalone, & Wagner, 2002), an ability that is facilitated by a variety of social skills that range from starting conversations readily and being comfortable in social situations to controlling one's temper. The social skills of students with disabilities were assessed by asking parents about the frequency with which their children exhibited nine aspects of social interactions, which were drawn from the Social Skills Rating System, Parent Form (Gresham & Elliott, 1990a). This instrument measures three underlying factors: assertion (the ability and willingness to become involved in social activities); self-control (the ability to cope with frustration and to deal with conflict); and cooperation (the ability to work or play with others and stay on task). Parents reported their children's frequency of demonstrating each behavior as "never," "sometimes," or "very often." The summative scale for the items ranged from 9 ("never" exhibits any of the skills) to 27 (exhibits all of the skills "very often"). Exhibit 6-1 depicts the percentage of students with disabilities overall and for each disability cluster who exhibited high (25 through 27) and low social skills (9 through 17).

Classroom behaviors. Another important factor in the ability of students to establish positive relationships at school is learning to abide by behavioral expectations in the classroom. For example, succeeding in and learning from collaborative classroom activities, such as group discussions or projects, requires that students cooperate with each other. Being able to follow rules and directions also helps students understand instructional content and succeed. Students who demonstrate an ability to persist with a task, especially difficult ones, also are likely to have greater success not only in school, but also later in the labor market. Finally, completing homework allows students to practice and reinforce instruction received during the school day, and doing so on time demonstrates a commitment to meeting classroom expectations. To assess students' performance of these classroom behaviors, teachers were asked to rate students as to whether they cooperated with others, followed directions, persisted in completing tasks, and completed homework on time "very often," "sometimes," or "never."

Distribution of Factors Across Disability Clusters

As with many aspects of their functioning and experiences, students in different disability clusters demonstrated markedly different patterns of social skills, peer relationships, and classroom behaviors (Exhibit 6-1)

Exhibit 6-1
Factors Pertaining to Students' Interpersonal Relationships at School, by Disability Cluster

		Disability Cluster					
	All Disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Percentage with parents reporting students' social skills as							
High (scores of 25 through 27)	10	12	5	3	11	9	4
Low (scores of 9 through 17)	28	23	39	43	21	32	48
Percentage whose teachers say they "very often"							
Cooperate with peers	47	53	25	25	53	44	23
Follow directions	52	57	44	29	57	49	37
Persist in completing tasks	33	36	26	22	40	30	27
Complete homework on time	43	47	35	25	55	37	40

Sources: SEELS Wave 1 parent interviews, 2000, and teacher and school program questionnaires, 2001.

- Overall, students with disabilities were almost three times as likely to be rated as having low social skills as high skills.
- About half of students with disabilities were reported to cooperate with peers and follow directions "very often," and 43% completed homework as frequently. About one-third persisted in completing tasks "very often."
- There is a consistent pattern of variations in factors related to interpersonal relationships at school across clusters, with students in the high-incidence and sensory disability clusters generally demonstrating stronger interpersonal skills and relationships than students in the cognitive, behavior, and severe disability clusters (the latter two groups have large proportions of students with emotional disturbances and autism, respectively).
- Students in the cognitive, behavior, and severe disability clusters were more likely to have low social skill ratings (39% to 48% did so) than their peers in the high-incidence and sensory clusters (23% and 21%, respectively). They also were about half as likely to be reported to cooperate with peers "very often" (23% and 25%) as those in the high-incidence or sensory disability clusters (53%).
- Similarly, teacher ratings of the frequency with which students followed directions were highest for students in the high-incidence and sensory clusters (57%), whereas teachers rated students in the behavior (29%) and severe (37%) disability clusters less highly.

- Teachers also reported high levels of persistence among students in the high-incidence (36%) and sensory disability clusters (40%), and substantially lower levels for those in the behavior cluster (22%).
- Timely homework completion also was highest for students in the sensory disability cluster (55%) and lowest for students in the behavior cluster (25%).

Academic Outcomes

Although social skills and students' classroom behaviors could be expected to have a more direct relationship to social adjustment than to academic outcomes, SEELS analyses reveal several significant relationships with students' performance on reading and mathematics assessments, oral reading fluency, and grades, as discussed in the following sections.

Social Skills

Descriptive Findings (Exhibit 6-2)

- Many students with disabilities with high social skills experienced greater academic success than did their peers with low social skill ratings. In passage

Exhibit 6-2
Academic Outcomes Associated with Variations in Social Skills, by Disability Cluster

	All disabilities	Disability Cluster: High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
Average							
Passage comprehension score[a] for students with							
High social skills	486.5	487.6	461.7	493.3	489.2	493.4	457.8
Low social skills	477.8	480.8	460.9	486.8	480.5	483.7	457.1
Oral reading fluency rate[b] for students with							
High social skills	86.3	87.0	71.2	102.1	101.3	80.3	32.8
Low social skills	64.5	62.8	41.3	87.5	89.7	85.9	58.7
Mathematics calculation score[a] for students with							
High social skills	499.1	500.6	475.9	498.9	505.1	500.1	472.9
Low social skills	491.6	493.6	478.7	498.1	495.1	492.4	477.9
Grade point average for students with[c]							
High social skills	3.2	3.2	3.2	2.5	3.2	3.2	3.2
Low social skills	2.3	2.2	2.3	2.4	2.4	2.4	2.2

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest overall grades.

Sources: SEELS Wave 1 parent interview, 2000, and school program and teacher questionnaires and student direct assessments, 2001.

comprehension, for example, students with high social skills overall and in four of six disability clusters had higher W-scores at Wave 1 than counterparts with lower skills in bivariate analyses.

- This pattern extends to oral reading fluency. Students with high social skills in all but the physical/health and severe disability clusters read correctly from 11 to 30 more words per minute than their did peers with low social skills.
- Regarding mathematics performance, overall, students with high social skills averaged 499 W-score points, 7 W-score points higher than students with low social skills.
- With the exception of students in the behavior disability cluster, across disability clusters, students with high social skills tended to receive higher grades than their peers with low social skills.

Multivariate Findings

- For students with disabilities as a group, only initial rates of oral reading fluency are sensitive to differences in social skills, and the relationship is not in the expected direction; students with high social skills read an average of 10.4 correct words per minute fewer than students with low social skills. A similar relationship is evident for students in the cognitive and sensory disability clusters (-19 and -24 correct words per minute, respectively).
- Students in the high-incidence cluster show consistently positive relationships between having high social skills and several academic outcomes, including initial rates of oral reading fluency and grades and the rate of growth in passage comprehension. Students in the high-incidence cluster who had high social skill ratings correctly read about 16 more words per minute than students with low skills ratings and had a 6-percentage-point greater increase in passage comprehension scores over time, independent of other differences between them.
- Positive relationships also are noted for students in the physical/health disability cluster who had high social skills with regard to growth in both passage comprehension and mathematics calculation scores (6 and 7 W-score points, respectively).
- Students in the severe disability cluster with high social skills have positive relationships with initial mathematics calculation scores (8 percentage points) and with growth in passage comprehension scores over time (6 W-score points).
- Students in the sensory cluster also show significant relationships between having high social skills and some academic outcomes, but consistently in the negative direction. In addition to a lower oral reading fluency rate, students in this cluster who had high social skills had average initial mathematics calculation scores that were 7 W-score points lower than students with low social skills; growth over time in passage comprehension W-scores also was 7 points lower.

Cooperating with Peers

Descriptive Findings (Exhibit 6-3)

- In bivariate relationships, there are no apparent differences in passage comprehension or mathematics calculation scores in Wave 1 for students who varied in their frequency of cooperating with peers.
- In contrast, students who cooperated with peers "very often" appear to read more fluently than students who cooperated "sometimes" or "never." Among students overall and in the sensory, physical/health, and severe disability clusters, students who cooperated "very often" read 6 to 17 more words correctly per minute than students who "sometimes" or "never" cooperated with peers.
- Higher grades are noted for highly cooperative students overall relative to less cooperative students, and for students in the high-incidence and cognitive disability clusters.

Exhibit 6-3
Academic Outcomes Associated with Frequency of Cooperating with Peers, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
Average							
Passage comprehension scale[a] for students who cooperated with peers							
Very often	484.7	488.3	459.3	492.2	483.6	485.3	465.5
Sometimes/never	479.5	484.0	458.0	487.4	476.9	483.3	463.4
Oral reading fluency rate[b] for students who cooperated with peers							
Very often	83.1	87.2	46.6	88.8	93.2	82.5	70.9
Sometimes/never	69.9	70.8	45.4	87.9	81.0	76.7	64.9
Mathematics calculation score[a] for students who cooperated with peers							
Very often	499.3	501.9	478.5	503.3	504.8	498.2	483.8
Sometimes/never	493.9	497.6	475.4	499.0	492.7	492.9	479.2
Grade point average[c] for students who cooperated with peers							
Very often	2.9	3.0	2.7	2.4	2.9	2.9	2.5
Sometimes/never	2.6	2.6	2.4	2.5	2.7	2.8	2.4

[a] W-score.
[b] Words read correctly per minute.
[c] On a scale of 0 to 4, with 4 = the highest A grade.
Sources: SEELS Wave 1 teacher questionnaire and student direct assessments, 2001, and parent interview/survey, 2000.

Multivariate Findings

- The only significant relationship observed for students with disabilities overall involves a positive association between cooperating "very often" with peers and a higher oral reading fluency rate (10 more correct words per minute).
- Students in the behavior cluster who cooperated "very often" with peers experienced a rate of growth in oral reading fluency that averaged almost 20 more words correctly per minute than the rate of growth of less cooperative peers.
- In contrast, lower rates of growth in passage comprehension are apparent for students in the high-incidence and physical/health disability cluster (-8 and -7 W-score points, respectively).

Following Directions

Descriptive Findings (Exhibit 6-4)

- In bivariate analyses, no significant differences are noted in performance on standardized tests of passage comprehension or mathematics calculation for students with disabilities who followed directions "very often" and those who followed directions "sometimes" or "never."
- However, with regard to oral reading fluency and grades, there are consistent differences related to the frequency with which students followed directions. Among students overall, as well as for students in the high-incidence, sensory, and severe disability clusters, students who followed directions "very often" averaged significantly more words read correctly per minute (from 9 to 16 words) than students who followed directions "sometimes" or "never." Similarly, higher grades are noted for students who complied with directions frequently for students overall and those in all but the behavior cluster.

Multivariate Findings

- For students overall, teachers' reports of students following directions "very often" are associated with higher mathematics calculation scores (4 W-score points) and higher grades in Wave 1 (.2 points on a 4-point scale).
- Students in the severe cluster who frequently followed directions also had mathematics calculation W-scores that were 10 points higher, on average, than peers who "sometimes" or "never" did.
- However, a negative relationship is noted for students in the cognitive disability cluster with regard to passage comprehension (-17 W-score points).

Exhibit 6-4
Academic Outcomes Associated with Frequency of Following Directions, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension scale[a] for students who followed directions							
Very often	484.7	488.6	460.9	488.9	483.2	484.8	466.4
Sometimes/never	479.1	483.2	456.5	488.7	476.9	483.7	463.5
Oral reading fluency rate[b] for students who followed directions							
Very often	81.5	86.4	44.0	83.9	91.8	81.1	72.5
Sometimes/never	70.5	70.2	47.8	89.9	82.5	77.4	63.2
Mathematics calculation score[a] for students who followed directions							
Very often	499.5	502.5	479.6	502.5	504.1	498.6	484.3
Sometimes/never	493.0	496.1	473.9	499.2	492.7	491.8	478.4
Grade point average[c] for students who followed directions							
Very often	3.0	3.0	2.7	2.7	3.0	3.0	2.6
Sometimes/never	2.5	2.5	2.3	2.4	2.6	2.6	2.4

[a] W-score.
[b] Words read correctly per minute.
[c] On a scale of 0 to 4, with 4 = the highest A grade.
Sources: SEELS Wave 1 parent interview, 2000, and teacher questionnaire and student direct assessments, 2001.

- Similarly, for students in the high-incidence disability cluster, following directions "very often" is associated with reading an average of 21 fewer correct words per minute than students who followed directions "sometimes" or "never." Over time, however, frequently following directions is associated with a higher rate of growth in passage comprehension scores (9 W-score points) for students in that cluster.

Persistence in Completing Tasks

Descriptive Findings (Exhibit 6-5)

- No significant relationships are observed in bivariate analyses between the frequency of task persistence and passage comprehension and mathematics calculation W-scores or oral reading fluency rates.
- However, students in all disability clusters with greater persistence generally received higher grades than their peers who did not.

Exhibit 6-5
Academic Outcomes Associated with Frequency of Task Persistence, by Disability Cluster

	All disabilities	Disability Cluster: High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension scale[a] for students who persisted in completing tasks							
Very often	483.4	486.2	463.6	485.8	482.2	485.6	465.2
Sometimes/never	481.6	485.3	459.0	489.8	479.9	484.6	462.3
Oral reading fluency rate[b] for students who persisted in completing tasks							
Very often	79.9	82.8	49.9	91.3	86.5	78.4	65.8
Sometimes/never	74.8	76.1	46.8	89.5	86.6	86.2	65.4
Mathematics calculation score[a] for students who persisted in completing tasks							
Very often	497.8	500.3	481.1	496.9	501.8	495.6	482.3
Sometimes/never	496.2	498.8	478.3	501.4	498.9	495.9	480.8
Grade point average[c] for students who persisted in completing tasks							
Very often	3.1	3.1	2.9	2.9	3.1	3.1	2.8
Sometimes/never	2.5	2.6	2.4	2.4	2.7	2.6	2.3

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave school program questionnaire and teacher questionnaires and student direct assessments, 2001, and parent interview/survey, 2001.

Multivariate Findings

- Overall, more frequently persisting in completing tasks is associated with both higher initial grades and greater growth in grades over time (.2 points and .1 points, respectively).
- More frequent persistence has significant associations for students in the cognitive disability cluster, but they are inconsistent in direction. Students in this cluster who frequently persisted in completing tasks averaged an 8-point lower initial W-score in mathematics calculation, but 9-point higher rates of growth over time and higher initial grades (.3 points on a 4-point scale).
- Students in the sensory disability cluster who persisted in completing tasks "very often" received 8 W-score points more in mathematics calculation than their peers who persisted "sometimes/never." They also received higher grades initially (.4 points on a 4-point scale) and had higher rates of growth in passage comprehension (7 W-score points).

- High levels of persistence are related to 9-point higher initial W-scores in passage comprehension and higher grades (.3 points) for students in the behavior disability cluster.
- Students with high persistence in the severe cluster had higher initial reading fluency rates but lower fluency growth rates over time (15 and -14 correct words per minute, respectively).
- High persistence is related to 6-point lower initial passage comprehension W-scores for students in the high-incidence cluster.

Completing Homework on Time

Descriptive Findings (Exhibit 6-6)

- As with several previous measures, oral reading fluency appears to be most sensitive to variations in the frequency with which students with disabilities competed homework on time. For students with disabilities overall and those in four clusters, those who completed homework "very often" read from 8 to 19 more correct words per minute than students who less often completed homework in a timely way.

Exhibit 6-6
Academic Outcomes Associated with Frequency of Completing Homework on Time, by Disability Cluster

		Disability Cluster					
	All Disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension scale[a] for students who completed homework							
Very often	485.4	489.1	463.6	491.2	482.1	485.9	467.9
Sometimes/never	479.4	483.6	455.3	488.1	478.9	483.4	461.3
Oral reading fluency rate[b] for students who completed homework							
Very often	85.7	89.6	56.4	86.2	93.8	81.4	71.5
Sometimes/never	68.8	70.2	38.5	88.8	79.1	78.1	62.9
Mathematics calculation score[a] for students who completed homework							
Very often	499.6	502.3	482.7	501.9	503.4	493.9	483.3
Sometimes/never	494.0	497.5	472.6	499.8	494.1	496.1	478.4
Grade point average[c] for students who completed homework							
Very often	3.0	3.1	2.8	2.7	3.0	3.0	2.6
Sometimes/never	2.5	2.5	2.4	2.5	2.6	2.7	2.4

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 parent interview, 2000, and school program and teacher questionnaire and student direct assessment, 2001.

- Completing homework on time "very often" is related to higher teacher-given grades for students overall and for those in the high-incidence disability cluster.

Multivariate Findings

- For students with disabilities as a group, timely completion of homework is associated with higher grades (.2 points on a 4-point scale) in Wave 1, but lower rates of growth in passage comprehension over time (-4 W-score points).
- The relationships between completing homework on time "very often" and higher grades observed for students overall also is apparent for those in the high-incidence, behavior, and severe disability clusters (.3, .6, and .3 points, respectively).
- Students in the high-incidence disability cluster also show a positive relationship between frequent timely homework completion and higher initial oral reading fluency rates (15 correct words per minute), whereas students in the behavior cluster show a negative relationship with growth in passage comprehension scores over time (-10 W-score points).

Social Adjustment Outcomes

This section presents both the bivariate and multivariate relationships between students' social skills and selected classroom behaviors and two social adjustment outcomes—the likelihood that students belong to organized extracurricular groups at school or in the community and the number of disciplinary incidents in which students were involved in the prior school year. It is reasonable to expect that classroom behaviors would have stronger and/or more consistent relationships with academic than with social outcomes. Analyses bear out this expectation; persisting with classroom tasks and persistence in completing classroom tasks have few or no significant relationships with social adjustment outcomes in bivariate and/or multivariate analyses and are not discussed in this section.

Social Skills

Descriptive Findings (Exhibit 6-7)

- The level of students' social skills clearly relates to their involvement in extracurricular groups. Among students overall and in five of the six disability clusters, students with high social skills were more likely to belong to school or community groups than peers with low social skills. Students in the behavior cluster are the exception; they were equally likely to belong to groups regardless of the level of their social skills.

- In contrast, the behavior disability cluster is the strongest illustration of a pattern of students with high social skills tending to be involved in fewer disciplinary actions than students with low social skills. Students in that cluster who had high social skills were involved in an average of 1.7 disciplinary incidents in the preceding school year, compared with more than 4 such incidents among those with low social skills.
- The opposite relationship is apparent for students in the severe disability cluster, among whom having high social skills is associated with involvement in almost three times the number of disciplinary actions (2.7 vs. 1.0).

Exhibit 6-7
Social Adjustment Outcomes Associated with Variations in Social Skills, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Percentage belonging to groups among students with							
High social skills	79	81	61	65	78	78	73
Low social skills	54	57	45	63	51	54	41
Average number of disciplinary actions in the prior school year among students with							
High social skills	1.0	1.0	1.1	1.7	0.4	1.1	2.7
Low social skills	2.0	1.5	2.1	4.1	1.7	1.7	1.0

Sources: SEELS Wave 1 parent interview, 2000, and school program questionnaire, 2001.

Multivariate Findings

- For students overall, having high social skill ratings is associated with an 8-percentage-point higher likelihood of belonging to groups at Wave 1 compared with students with low social skills. Having higher skills also is related to growth on that dimension over time of 10 percentage points.
- Only for the high-incidence disability cluster did the overall pattern of higher group membership at Wave 1 for students with higher social skills persist; they were 14 percentage points more likely to belong to groups than lower-skilled students.
- For students in the behavior, physical/health, and severe disability clusters, having high social skills is related to significantly higher rates of growth in group memberships than were experienced by students with lower social skills, ranging from 11 to 37 percentage points. In contrast, a lower rate of growth in group memberships (-4 percentage points) is apparent for students in the sensory disability cluster.

- Although among students in the behavior disability cluster, differences in social skill ratings are not associated with differences in the number of disciplinary incidents in which students were involved, having high social skills is associated with a rate of growth over time that is one incident higher than was experienced by students with low social skills.

Cooperating with Peers

Descriptive Findings (Exhibit 6-8)

- Among students with disabilities overall, those who "very often" cooperated with peers were more likely to belong to school or community groups than students who only "sometimes" or "never" were cooperative with other students.
- With the exception of students in the sensory disability cluster, among students with disabilities overall and consistently across disability clusters, students with disabilities who cooperated with peers "very often" were involved in fewer disciplinary incidents than students who cooperated "sometimes" or "never." The greatest difference is apparent for students in the behavior disability cluster, among whom students who infrequently cooperated with peers were involved in about four times as many disciplinary actions as those who cooperated "very often."

Exhibit 6-8
Social Adjustment Outcomes Associated with Frequency of Cooperating with Peers, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Percentage belonging to groups among those who cooperated with peers							
Very often	75	78	58	71	76	71	58
Sometimes/never	66	72	51	67	64	64	50
Average number of disciplinary actions in the prior school year among those who cooperated with peers							
Very often	0.6	0.5	1.0	1.1	0.8	0.3	0.2
Sometimes/never	2.3	2.0	1.9	4.5	1.8	2.2	1.5

Sources: SEELS Wave 1 parent interview/survey, 2000, and teacher and school program questionnaires, 2001.

Multivariate Findings

- Cooperating "very often" with peers is related to involvement in fewer disciplinary actions in Wave 1 for students overall and for those in the high-incidence, sensory, and severe disability clusters (from 1 to 2 incidents), controlling for other differences between them. However, this factor is

unrelated to involvement in disciplinary incidents among students in the behavior cluster, contrary to the bivariate relationship, and it does not relate to the rate of growth in disciplinary incidents over time for any group.

- Differences in the frequency with which students were reported by teachers to cooperate with peers are unrelated to differences in group membership rates in Wave 1 and, for the most part, also unrelated to differences in the rates of growth in group memberships over time. The exception is the physical/health disability cluster; students in that cluster who cooperated with peers "very often" had a 33-percentage-point greater increase in group memberships over time than students who were less cooperative with peers.

Following Directions

Descriptive Findings (Exhibit 6-9)

- Bivariate relationships regarding the frequency with which students with disabilities followed directions are similar to those found for cooperating with peers. Among students overall, those who "very often" followed directions were more likely to belong to school or community groups.
- Not surprisingly, students with disabilities who "sometimes" or "never" followed directions tended to be involved in more disciplinary incidents than students who followed directions "very often." This relationship is consistent across disability clusters, except for students in the physical/health and severe disability clusters.

Multivariate Findings

- There are no significant relationships between following direction and the likelihood of group memberships at Wave 1 for students with disabilities overall or those in any disability cluster, and only students in the high-incidence cluster show a relationship between the frequency of following directions and growth in group memberships over time (19 percentage points).
- Some relationships are apparent, however, between the frequency with which students followed directions and the number of disciplinary incidents in which they were involved. Students overall and those in the behavior and sensory disability clusters who followed directions "very often" averaged from 1 to 2 fewer disciplinary actions in Wave1 than their peers who followed directions "sometimes" or "never."

Exhibit 6-9
Social Adjustment Outcomes Associated with the Frequency of Following Directions, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Percentage belonging to groups among those who followed directions							
Very often	73	76	57	72	75	69	56
Sometimes/never	67	73	51	66	64	66	50
Average number of disciplinary actions in the prior school year among those who followed directions							
Very often	0.8	0.7	0.9	1.7	0.8	0.9	1.2
Sometimes/never	2.3	1.9	2.2	4.3	1.9	1.9	1.1

Sources: SEELS Wave 1 parent interview, 2000, and teacher and school program questionnaires, 2001.

Completing Homework on Time

Descriptive Findings (Exhibit 6-10)

- Among students overall and those in most disability clusters, students who "very often" completed homework on time were more likely to belong to school or community groups; the exception was students in the behavior disability cluster.

Exhibit 6-10
Social Adjustment Outcomes Associated with the Frequency of Completing Homework on Time, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Percentage belonging to groups among those who competed homework							
Very often	75	79	57	71	74	71	58
Sometimes/never	66	71	51	67	66	66	48
Average number of disciplinary actions in the prior school year among those who completed homework							
Very often	0.7	0.5	1.0	2.0	0.9	0.7	0.8
Sometimes/never	2.2	1.9	2.0	4.3	1.6	1.8	1.4

Sources: SEELS Wave 1 parent interview, 2000, and school program and teacher questionnaires, 2001.

- Students with disabilities who "sometimes" or "never" completed homework on time tended to be involved in more disciplinary incidents than students who completed homework on time "very often," particularly among students in the behavior disability cluster.

Multivariate Findings

- Overall, students with disabilities who completed homework on time "very often" had lower initial levels of and lower growth in disciplinary actions over time (less than an average of one incident in each case).
- Timely completion of homework is associated with lower initial levels of disciplinary actions (one incident) for students in the high-incidence and severe disability clusters. Regarding growth over time in this outcome, significant relationships are observed for students in the physical/health disability cluster, among whom students who completed homework on time "very often" had one incident less growth in disciplinary actions than did students who completed homework on time less often.
- No relationships are evident between this factor and either the initial status of or growth in rates of group memberships.

Summary

Analyses of relationships between academic outcomes and social skills and classroom behaviors show consistently positive relationships with grades, particularly with regard to classroom behaviors. For students overall, those who frequently followed directions and completed homework on time had higher grades in Wave 1. Students in three clusters also demonstrate positive relationships between homework completion and grades, and those in four of the six clusters show a positive and significant relationship between persisting in completing classroom tasks and higher grades. These findings underscore the role of teachers' subjective judgments regarding students' behavior in their determination of grades.

In contrast to the pattern demonstrated with regard to grades, measures of actual academic abilities, as measured by standardized measures of reading and mathematics performance, show quite inconsistent relationships with social skills and classroom behaviors. Having high social skills, for example, is related to lower oral reading fluency scores for students with disabilities overall and those in three disability clusters and to lower mathematics calculation scores for students in one cluster; higher oral reading fluency and mathematics calculation scores are apparent for students with high social skills in one cluster. Each classroom behavior is associated with both higher and lower Wave 1 performance levels across clusters and with both higher and lower levels of growth in academic abilities over time.

Regarding relationships with the two measures of social adjustment outcomes, multivariate analyses demonstrate that social skills relate only to the prosocial indicator of social adjustment—belonging to school or community

groups. Having higher social skills is related both to initially higher rates of group memberships for students overall and in one disability cluster and to higher rates of growth for students overall and those in three disability clusters. No relationships are apparent between social skills levels and the negative indicator of social adjustment—the number of disciplinary incidents in which students were involved.

In contrast, three of the classroom behaviors examined in this chapter relate consistently to lower initial levels of disciplinary actions, suggesting that more frequently cooperating with peers, following directions, and completing homework on time also are behaviors that helped students stay out of trouble at school, controlling for other differences between them. Two of the classroom behaviors—persistence in completing tasks and finishing homework on time, also are associated with lower levels of growth in the number of disciplinary incidents at school. Perhaps not surprisingly, students' classroom behaviors are unrelated to the likelihood that they belonged to extracurricular groups in Wave 1. However, there are scattered associations with growth in group memberships over time, although not in a consistent direction.

This chapter has described a set of social skills and classroom behaviors and has examined their relationship with various indicators of students' social and academic outcomes. The findings support the conclusion that social skills and classroom behaviors are an important element in understanding the variations in outcomes experienced by students with disabilities, although more so for students with some kinds of disabilities than others. However, the fact that the direction of several significant relationship are not always in the expected direction reinforces the reality that social adjustment and academic performance are complex phenomena that do not always conform to hypothesized relationships supported by prior research.

7. Relationships Between the School Programs of Students with Disabilities and Their Longitudinal Outcomes

by Jose Blackorby, Ellen Schiller, Anne-Marie Knokey, and Mary Wagner

The Individuals with Disabilities Education Act (IDEA) has evolved from initially guaranteeing access to a free, appropriate public education to inclusion in federally mandated state accountability systems. Under NCLB, schools are held accountable for adequate yearly progress (AYP) in ensuring that all students achieve academic proficiency, including specific subgroups of students; those subgroups include students with disabilities. Furthermore, schools are to implement instruction that is supported by research evidence.

This report shows that many individual, household, and school factors are related to students' ability to succeed academically and socially in school and that these correlates differ for different types of students and different outcomes. Although some factors that are associated with student progress are those over which schools have limited direct influence (e.g., household income, parents' support for education), there are many decisions about curricula, instruction, and supports about which schools have considerable latitude and that can help shape student outcomes.

This chapter examines the relationships between some of these factors and longitudinal academic and social adjustment outcomes for students with disabilities overall and those in the six disability clusters. First, we describe variation in these school program characteristics across disability clusters. Then, for each factor, there is a description of the bivariate and multivariate relationships with students' initial status on academic outcome measures and with the rate of growth in those outcomes over time, while controlling for other factors. Similar descriptive and multivariate analysis results then are presented for social adjustment outcomes.

Factors Expected to Be Associated with Outcomes

This chapter focuses on six school program characteristics[1] that are associated in important ways with student's academic performance and social adjustment success:

[1] These factors have been selected from the larger set of school program characteristics that were listed in Chapter 1 and that were included in multivariate analyses because they have the strongest or most consistent relationships to academic and/or social adjustment outcomes. Specifications of models and complete results are reported in the *Methodological Volume in Support of the SEELS Comprehensive Report, What Makes a Difference? Influences on Outcomes for Students with Disabilities: SEELS Sampling, Data Collection, and Analysis Procedures* (Javitz, Blackorby, Wagner, McCracken, & Knokey, 2007) available at www.seels.net.

- participation in general education classes for academic instruction,
- class size,
- degree of curriculum modification,
- individual instruction,
- general instructional activities, and
- teacher competence in teaching reading.

Participation in general education academic classes. A fundamental principle of federal special education policy, most recently codified in the 2004 reauthorization of IDEA, is the principle that students should receive their education in the least restrictive environment (LRE). The law requires "that to the maximum extent appropriate children with disabilities, including children in public or private institutions or other care facilities, are educated with children who are nondisabled" (20 U.S.C. 1412[1][5]). For many students with disabilities, the least restrictive environment is a general education classroom. Further, including students with disabilities in such classrooms for academic instruction, not just nonacademic courses, is most likely to provide access to content that is aligned with grade-level standards.

Including students with disabilities in general education classrooms has been shown to benefit both students with disabilities (Baker, Wang, & Walberg, 1994; Waldron, 1997) and general education students (Stainback & Stainback, 1996; Staub & Peck, 1994; Waldron, 1997). Previous SEELS analyses have suggested that the degree to which students with disabilities take courses in general education classrooms is related to both their functional abilities and academic performance. Taking more courses in general education classrooms is associated with having reading and math abilities that are closer to grade level (Blackorby, Chorost, Garza, & Guzman, 2004). However, students with disabilities who take more courses in general education classes also tend to receive lower grades, other things being equal. To further illuminate the relationships between instructional setting and students outcomes, the percentage of academic classes taken in general education is included in these analyses.

Class size. The relationship between class size and student outcomes has received considerable attention in recent years. Proponents of smaller classes contend that they allow teachers to be more effective in reaching students, particularly in the early grades. Lower teacher-student ratios may be particularly important for students with disabilities if they create an environment that promotes students' engagement and inclusion or that allows teachers to tailor instruction more effectively to the needs of diverse learners (Achilles & Finn, 2000; Finn et al., 2001; Harris & Graham, 1996). SEELS asked language arts teachers of participating students to report the total number of students in the class in which participating students received their primary language arts instruction; this number is assumed approximate the class size in which students received most of their overall academic instruction.

Degree of curriculum modification. NCLB and IDEA both stress that students with disabilities should receive access to and succeed in acquiring skills commensurate with challenging grade-level content standards. Many students with disabilities participate in the general education curriculum with little or no modification. However, other students with disabilities require varying levels of modification to the general curriculum to support their learning. SEELS asked language arts teachers to describe the degree of curriculum modification provided specific students with disabilities in their classes.[2]

Individual instruction. American students are increasingly heterogeneous with respect to culture, ethnicity, English language proficiency, and disability (Carnine, Miller, Bean, & Zigmond, 1994; Harris, Graham, & Deshler, 1998; Kame'enui & Carnine 1998; McLaughlin, Artiles, & Pullin, 2001). One popular way to address the instructional needs of diverse students is to lower the student-teacher ratio by dividing students into small groups for instructional activities. This approach is thought to help meet students' needs because it makes some types of tailored instruction, assessment, presentation, and communication more feasible than in larger groups (Achilles & Finn, 2000; Achilles, Finn, & Bain, 1998). It is a common strategy that is part of many research-based practices, such as direct instruction, cooperative learning, peer tutoring, and strategic instruction. These approaches differ in focus or in the roles that students play, but they all reduce the size of the instructional group in some way (Carnine, 1997; Elbaum, Vaughn, Hughes, & Moody, 1999; Fuchs, Fuchs, Mather, & Simmons, 1997; Gersten & Carnine, 1986; Gersten & Dimino, 1990; Klingner &Vaughn, 1998; Maheady, Mallette, & Harper, 1996; Slavin, 1996; O'Connor & Jenkins, 1995; Vaughn, Bos, & Schumm, 1997). SEELS measured the frequency (i.e., never, rarely, sometimes, often) of individual instruction teachers reported giving participating students in their language arts classes. Previous SEELS reports have documented both variation in the use of particular instructional groupings across students and links to several outcomes (Blackorby, et al., 2004).

General instructional activities. A typical language arts class in American elementary or middle schools usually includes a range of activities, which might include teacher presentations of new skills or material and small-group or independent work (Henke, Chen, & Goldman, 1999). The choice among this variety of activities can reflect both the specific point in the curriculum being addressed and a strategy for how best to meet the needs of students. For example, at one point in a unit, teachers may have students answer questions and participate in class discussions, whereas at another, they may have students work together on presentations or projects. These activities differ in their purposes and

[2] Responses include: general education grade-level curriculum materials are used without modification; some modification in general education curriculum materials have been made (e.g., modified content expectations, below grade level curriculum is used); substantial modifications in general education curriculum materials have been made (e.g., very different content expectations, significantly below grade level curriculum is used): specialized curriculum or materials are used (e.g., parallel curriculum, individual curriculum or materials).

the role that students play. Skilled teachers are able to adjust the mix of these activities to meet students' needs (McLeskey & Waldron, 2002; Moody, Vaughn, Hughes, & Fischer, 2000; Pressley, Roehrig, Bogner, Raphael, & Dolezal, 2002; Vaughn, Hughes, Moody, & Elbaum, 2001). To provide a national perspective on the variety of classroom activities experienced by students with disabilities, SEELS asked language arts teachers of students with disabilities to rate the frequency with which those students engaged in the following general classroom activities (i.e., those not directly related to a specific subject matter): responding orally to questions, taking quizzes or tests, working independently, participating in class discussion, and working on a project or presentation. These ratings were summed to create a 28-point instructional activities scale. Scores from 24 to 28 are considered high involvement in general instruction activities.

Teacher competence in teaching reading. SEELS asked students' primary language arts teachers to rate themselves on a number of dimensions, including their ability to teach reading, on a scale that ranged from "needs improvement" (a value of 1) to "fully competent" (a value of 5).

Distribution of Factors Across Disability Clusters

As would be expected, students in different disability clusters who differed on the variety of school program characteristics addressed in this chapter demonstrated markedly different outcomes (Exhibit 7-1).

Participation in General Education Academic Classes

- Overall, nearly half of students with disabilities took more than 80% of their academic classes in general education settings in Wave 1. Almost 4 in 10 students took fewer than 60% of their academic classes there.
- In Wave 1, the rate of participation in general education academic classes was highest among students in the high-incidence cluster; 55% took more than 80% of their academic classes in general education settings. More than 40% of students in the behavior, sensory, and physical health disability clusters took more than 80% of their academic classes in those settings.
- By contrast, students in the cognitive and severe disability clusters were least likely to take academic classes in general education in Wave 1. Fewer than 16% of students with severe disabilities and 9% of students with cognitive disabilities took 80% or more of their academic classes in general education settings.

Exhibit 7-1
Percentage of School Program Characteristics, by Disability Cluster

	All disabilities	Disability Cluster: High Incidence	Cognitive	Behavior	Sensory	Physical/ Health	Severe
Percentage whose proportion of academic classes in general education setting was							
Up to 60%[a]	39	29	79	46	46	43	77
80% or more[a]	47	55	9	41	45	45	16
Percentage in language arts classes with							
1 to 11 students	25	18	45	31	40	22	49
21 students or more	42	47	18	42	38	44	19
Percentage of curriculum modification in language arts classes							
No modifications	29	35	4	26	33	29	7
Some modifications	35	38	22	42	30	34	21
Substantial modifications	18	16	28	16	15	19	22
Specialized curriculum	18	11	47	16	23	19	50
Percentage receiving individual instruction "often"	39	34	59	39	39	46	59
Percentage with high participation in general instruction activities in language arts classes	26	30	14	23	28	28	11
Percentage with teachers who rate themselves "fully competent" to teach reading	88	88	86	88	88	88	85

[a] The levels of participation in general education presented here mirror that reported by the U.S. Department of Education using state-reported data from its Data Analysis System (DANS) (U.S. Department of Education, 2002).

Source: SEELS Wave 1 teacher questionnaire, 2000.

Class Size

- Overall, the size of language arts classes of students with disabilities varied greatly. Twenty-five percent of students participated in language arts classes with 10 or fewer students, whereas 42% received their primary language arts instruction in classes that were more than twice as large.
- In each disability cluster, there were students taking language arts in classes in each of the class-size categories.

- Students in the high-incidence, behavior, sensory, and physical/health disability clusters were in larger classes at fairly comparable rates (38% to 47%) in Wave 1.
- In contrast, students in the cognitive and severe disability clusters were much less likely to take language arts in classes of more than 21 students; attendance in smaller classer was most common among those students.

Degree of Curriculum Modification

- Overall, about 3 in 10 students with disabilities participated in the general education curriculum with no modifications, and about one-third received what teachers described as "some" modifications. However, 18% of students received substantial modifications or specialized curricula.
- Although the majority of students in each disability cluster were reported to receive some level of modification, students in the cognitive and severe disability clusters were least likely to take part in a general education curriculum with only "some" or no modifications.

Individual Instruction

- Thirty-nine percent of students with disabilities were reported to receive individual instruction from a teacher frequently in the course of language arts instruction.
- Individual instruction was most frequently received by students in the cognitive and severe disability clusters (59%) in Wave 1. Thirty-four to 46% of students in other disability clusters received it often.

General Instructional Activities

- Approximately one-quarter of students with disabilities exhibited a high degrees of participation in general classroom activities in their language arts classes, such as responding to questions and participating in class discussions.
- Students in the high-incidence, sensory, and physical/health disability clusters were most likely to participate actively in general instructional activities. Their peers in the cognitive and severe disability clusters were half as likely to do so.

Teacher Competence in Teaching Reading

- Eighty-eight percent of language teachers of students with disabilities rated themselves as highly competent to teach reading.
- There were no differences in teacher self-ratings of competence in teaching reading across disability cluster in Wave 1.

Academic Outcomes

SEELS analyses of selected school program characteristics reveal several significant relationships with students' performance on reading and mathematics assessments, oral reading fluency, and grades, as discussed in the following sections.

Participation in General Education Academic Classes

Descriptive Findings (Exhibit 7-2)

- Bivariate analyses show that, across measures, students with disabilities who took more academic classes in general education settings had greater academic success than peers who took fewer classes there.
- For passage comprehension, taking more than 80% of academic classes in general education is associated with higher W-scores for students overall and in four disability clusters (the cognitive and behavior disability clusters are the exceptions). Significant differences ranged from 11 W-score points for students in the high-incidence cluster to 27 points for those in the severe disability cluster.
- Students who took more academic classes in general education settings also read considerably faster than those who took fewer academic classes there. This pattern was observed for students overall and for each disability cluster, with differences ranging from 23 words per minute for students in the cognitive disability cluster to 43 words per minute for students in the sensory and physical/health disability clusters.
- Mathematics performance also showed a sizeable advantage for students who took more academic classes in general education settings for students overall and those in the high-incidence, physical/health, and severe disability clusters.
- By contrast, the grades given by teachers varied less for students who differed in general education participation for academics differences were significant only for students in the high-incidence disability cluster.

Multivariate Findings

- Consistent with the bivariate findings, for students with disabilities overall, taking more academic classes in general education is associated with higher initial W-scores in passage comprehension and math calculation (2 and 3 points, respectively), as well as a higher rate of oral reading fluency (5 correct words per minute). However, there are no relationships with growth over time in any outcome for students with disabilities overall.

Exhibit 7-2
Academic Outcomes Associated with Percentage of Academic Classes in General Education Settings, by Disability Cluster

	All disabilities	Disability Cluster: High incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average:							
Passage comprehension score for students who participated in general education for[a]							
Up to 60% of academic classes	472.7	479.6	458.1	480.7	473.6	474.6	455.9
More than 80% of academic classes	490.3	490.8	468.1	493.9	489.4	492.9	483.7
Oral reading fluency rate for students who participated in general education for[b]							
Up to 60% of academic classes	56.3	57.2	46.7	72.7	63.6	56.5	48.6
More than 80% of academic classes	95.0	94.4	70.1	105.1	106.2	99.3	87.7
Mathematics calculation score for students who participated in general education for[a]							
Up to 60% of academic classes	489.3	494.7	475.6	496.7	493.0	484.1	474.2
More than 80% of academic classes	502.2	502.6	494.1	501.0	508.7	502.9	493.5
Grade point average for students who participated in general education for[c]							
Up to 60% of academic classes	2.6	2.6	2.5	2.6	2.7	2.7	2.5
More than 80% of academic classes	2.9	3.0	2.3	2.5	3.0	3.0	2.7

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 language arts teacher questionnaire and student direct assessment, 2001, and parent interviews/survey, 2000.

- Mathematics calculation scores showed the most consistent relationships with general education participation for academics, with higher W-scores being apparent for those with participation in general education for more than 80% of academic classes for students in each disability cluster (2 to 4-W-score points) compared with those who took fewer than 60% of classes in that setting, independent of other differences between them.

- Both reading measures showed advantages for those in the cognitive and sensory disability clusters who took more academic classes in general education (4 and 3 W-score points, respectively). A higher oral reading fluency rate also is shown for students in the high-incidence disability cluster (5 correct words per minute), and students in the behavior cluster who took more classes in general education settings had higher passage comprehension scores (3 W-score points), controlling for other differences between students.
- No differences are observed in grades for students overall or in any of the six disability clusters.
- The only significant relationships between general education participation and growth over time involve passage comprehension scores and oral reading fluency rates. Students in the behavior and severe disability clusters who took more than 80% of academic classes in general education settings had lower rates of growth in passage comprehension (1 and 2 W-score points, respectively), and for oral reading fluency, a positive relationship is noted for students in the physical/health disability cluster (3 correct words per minute), but a negative one for those in the severe cluster (-2 correct words per minute).

Class Size

Descriptive Findings (Exhibit 7-3)

- Consistent with the findings related to participation in general education classes, students with disabilities as a whole in larger language arts classes, which more frequently were general education classes, demonstrated a pattern of higher academic performance than their peers who were in smaller classes. This pattern is apparent for all academic outcome measures.
- Again, the most consistent relationships are shown for oral reading fluency. Students in larger classes had reading rates that were more than 30 correct words per minute faster than their peers in smaller classes. This finding applies to students overall and to those in each disability cluster. The widest difference is 44 words per minute for students in the severe disability cluster.
- In passage comprehension, students in larger classes had higher W-scores for students overall and in all but the cognitive and behavior disability clusters, ranging from 11 points for students in the high-incidence cluster to 27 W-score points for those in the severe cluster.
- A similar pattern is observed with regard to mathematics as was apparent for reading. These somewhat more modest differences apply to the high-incidence, physical/health, and severe disability clusters, and ranged from 9 to 26 W-score points.
- Significant differences in grades associated with class size apply only for students with disabilities overall and those in the severe disability cluster.

Exhibit 7-3
Academic Outcomes Associated with Class Size, by Disability Cluster

	All disabilities	Disability Cluster: High incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension score for students in classes with[a]							
1 to 11 students	472.8	479.4	454.3	483.1	472.3	479.7	454.4
21 students or more	489.6	490.7	467.9	492.8	489.1	493.2	481.8
Oral reading fluency rate for students in classes with[b]							
1 to 11 students	54.8	58.6	32.7	71.8	64.7	58.3	51.1
21 students or more	93.7	94.4	66.8	102.7	93.2	93.0	95.4
Mathematics calculation score for students in classes with[a]							
1 to 11 students	491.1	496.9	474.3	497.1	495.4	487.2	469.6
21 students or more	503.1	504.2	484.3	504.6	503.4	503.7	495.7
Grade point average for students in classes with[c]							
1 to 11 students	2.6	2.7	2.5	2.6	2.7	2.7	2.4
21 students or more	2.8	2.9	2.5	2.4	3.0	2.9	2.8

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 language arts teacher questionnaire and student direct assessment, 2001, and parent interviews/survey, 2000.

Multivariate Findings

- Despite a pattern of significant relationships favoring students in larger classes in the descriptive analyses, there are few significant relationships between class size and academic outcomes in multivariate analyses, suggesting that other factors, such as student functioning or instructional setting, explain differences better. There are no significant relationships at all for the high-incidence, cognitive, or behavior disability clusters, for example.
- Being in a larger class is associated with both lower Wave 1 grades (-.1 on a 4-point scale) and lower growth rates in oral reading fluency (-2 correct words per minute) over time for students with disabilities as a whole, holding other differences between students constant.
- Students in the sensory disability cluster in larger classes had lower Wave 1 grades (-.1 on a 4-point scale) and a slower rate of growth in them (-.1) over time relative to students in smaller classes.

- Students in the physical/health disability cluster in larger classes had a lower rate of growth in mathematics calculation (-5 W-score points) over time, but being in larger classes is associated with a higher rate of growth in passage comprehension (4 W-score points) for students in the severe disability cluster.

Degree of Curriculum Modification

Descriptive Findings (Exhibit 7-4)

- Across all academic measures, bivariate analyses show that students with disabilities as a whole who received no modification to their language arts curriculum had greater academic success than those who received substantial modification.
- As with other school factors, oral reading fluency appears to be especially sensitive to differences in levels of curriculum modification, regardless of disability cluster. Students as a whole who received no curriculum modification read more than 50 words per minute faster than peers who received substantial modification. Differences ranged from 42 to 67 more correct words read per minute for those with no modification.

Exhibit 7-4
Academic Outcomes Associated with Degree of Curriculum Modification, by Disability Cluster

		Disability Cluster					
	All disabilities	High incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension score for students with[a]							
No modification	492.9	492.8	485.7	496.5	488.9	496.0	492.8
Substantial modification	470.0	479.6	454.2	486.3	463.4	462.1	453.7
Oral reading fluency rate for students with[b]							
No modification	104.7	103.3	95.3	120.6	112.1	107.6	111.4
Substantial modification	52.4	56.3	37.5	75.3	70.2	40.2	49.6
Mathematics calculation score for students with[a]							
No modification	503.0	502.9	502.1	502.2	509.2	506.0	495.9
Substantial modification	489.9	499.4	473.6	495.9	484.8	485.7	473.4
Grade point average for students with[c]							
No modification	3.1	3.2	2.4	2.4	3.2	3.2	2.8
Substantial modification	2.6	2.7	2.4	2.5	2.8	2.8	2.3

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 language arts teacher questionnaire and student direct assessment, 2001, and parent interviews/survey, 2000.

- In passage comprehension, students with disabilities who received no curriculum modification had higher W-scores for students overall and in all but the behavior disability cluster than students who received substantial modification. The differences ranged from 13 W-score points for students in the high-incidence disability cluster to 39 points for students in the severe cluster.
- The relationships between curriculum modification and mathematics performance generally resemble those for passage comprehension, with the exception that there are no differences observed for students in the high-incidence or behavior disability clusters who differed in the level of curriculum modification.
- An association between having no curriculum modification and higher teacher-given grades is apparent for students overall and those in the high-incidence, sensory, and severe disability clusters.

Multivariate Findings

- Overall, students who received no curriculum modification had higher Wave 1 passage comprehension W-scores (6 points) and higher initial oral reading fluency rates (24 more correct words per minute) than students with substantial modification. Over time, not having a modified curriculum also was associated with a higher rate of growth in math calculation scores (4 W-score points).
- For students in the high-incidence cluster, having no curriculum modification is associated with an average oral reading fluency rate that was 19 correct words per minute faster than those receiving substantial modification, and with a higher rate of growth in grades over time (.4 points on a 4-point scale).
- By contrast, for students in the behavior disability cluster, having no curriculum modification is associated with lower mathematics calculation W-scores (-12 points) in Wave 1 relative to those with substantial curriculum modification. However, it also is related to higher rates of growth in passage comprehension (9 W-score points) and math calculation (8 W-score points) over time.
- The only relationship between the level of curriculum modification and academic outcomes for students in the sensory disability cluster pertains to a higher rate of growth in mathematics calculation W-scores (8 points), and the only relationship for students in the severe disability cluster involves lower initial mathematics calculation scores at Wave 1 (-12 W-score points).
- Students in the physical/health disability cluster who received no modifications had higher initial average passage comprehension scores (22 W-score points) and oral reading fluency rates (42 correct words per minute) than their peers, but no relationships are observed regarding growth in any outcome over time.

- No significant relationships are apparent for students in the cognitive disability cluster.

Individual Instruction

Descriptive Findings (Exhibit 7-5)

- Students with disabilities overall and those in the high-incidence disability cluster who received frequent individual instruction showed a pattern of poorer academic performance than their peers who received it rarely or never across all academic outcome measures.
- The pattern of lower performance for those receiving frequent individual instruction is particularly apparent for students in the behavior and physical/health disability clusters.

Exhibit 7-5
Academic Outcomes Associated with Frequency of Individual Instruction, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension score for students who received individual instruction[a]							
Often	474.3	480.3	454.9	482.4	479.6	479.0	456.0
Rarely never	490.3	492.0	467.2	495.1	484.7	490.6	470.3
Oral reading fluency rate for students who received individual instruction[b]							
Often	61.1	62.2	44.7	76.3	68.4	73.2	53.0
Rarely never	96.2	98.4	53.2	102.4	123.0	102.8	69.3
Mathematics calculation score for students who received individual instruction[a]							
Often	491.3	495.8	476.1	495.2	494.8	490.1	475.8
Rarely never	501.5	502.1	478.8	506.9	514.4	508.2	485.2
Grade point average for students who received individual instruction[c]							
Often	2.6	2.6	2.4	2.6	2.6	2.6	2.4
Rarely never	3.0	3.1	2.4	2.2	3.1	3.2	2.6

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 language arts teacher questionnaire and student direct assessment, 2001, and parent interviews/survey, 2000.

Multivariate Findings

- Relationships between academic outcomes and receiving frequent individual instruction in language arts, while holding other factors constant, concentrate in initial status, not growth over time.
- Overall, controlling for other factors, students who received frequent individual instruction had lower passage comprehension scores (-7 W-score points) in Wave 1. This finding applied to students in the high-incidence, cognitive, and severe disability clusters (-8 to -19 W-score points).
- For students in the behavior disability cluster, frequent individualized instruction is associated with lower initial mathematics calculation scores (-12 W-score points), but higher grades (.6 on a 4-point scale).
- For students in the severe disability cluster, frequent individual instruction is related to lower levels of passage comprehension (-13 W-score points) and mathematics calculation ability (-11 W-score points) in Wave 1.
- The only relationship between frequent individual instruction and growth over time in academic outcomes is a lower rate of growth in oral reading (-19 correct words per minute) for students in the physical/health disability cluster, controlling for other factors.

General Instructional Activities

Descriptive Findings (Exhibit 7-6)

- Students with disabilities overall and those in the severe disability cluster who participated actively in general instructional activities had a pattern of higher academic performance across all outcome measures compared with students who were less active participants.
- Students in the high-incidence disability cluster who were active in general classroom activities had higher oral reading fluency rates and grades than students in those groups who participated less actively.
- Students in the cognitive, sensory, and physical/health disability clusters show significant relationships for three of the four measures of academic outcomes. Frequent participants in all three clusters had higher oral reading fluency rates, those in the cognitive and physical/health disability clusters had higher passage comprehension W-scores, students in the sensory and physical/health clusters had higher mathematics calculation W-scores, and those in the cognitive and sensory disability clusters had higher grades.
- No significant relationships are apparent between the frequency of participation in general instructional activities and any academic outcome.

Exhibit 7-6
Academic Outcomes Associated with Participation in General Instructional Activities, by Disability Cluster

	All disabilities	Disability Cluster: High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
Average							
Passage comprehension score for students whose participation was[a]							
High	485.8	487.4	468.3	492.0	483.6	487.9	474.2
Low	464.8	483.6	443.8	481.1	472.7	447.5	436.1
Oral reading fluency rate for students whose participation was[b]							
High	81.5	82.3	58.1	93.7	94.6	85.2	74.9
Low	49.6	62.1	24.6	107.7	67.9	24.9	45.0
Mathematics calculation score for students whose participation was[a]							
High	499.5	501.4	481.2	502.5	504.4	499.8	483.8
Low	486.7	494.8	470.2	496.8	479.6	464.1	461.6
Grade point average for students whose participation was[c]							
High	2.9	3.0	2.7	2.6	2.9	2.9	2.6
Low	2.2	2.2	2.2	2.5	2.3	2.5	2.1

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 language arts teacher questionnaire and student direct assessment, 2001, and parent interviews/survey, 2000.

Multivariate Findings

- Higher levels of participation in general instructional activities are associated with higher W-scores in passage comprehension (8 points) in Wave 1 for students overall and those in the high-incidence, physical/health, and severe disability clusters, ranging from 9 to 12 W-score points.
- In contrast, students in the behavior disability cluster had a lower average passage comprehension score (-9 W-score points).
- In mathematics calculation in Wave 1, greater participation is associated with higher W-scores in for students in the physical/health disability cluster W-score points) and with higher grades for students in the behavior disability cluster (.5 points on a 4-point scale).
- The only relationships between frequency of participation in general instructional activities and growth in academic outcomes over time are observed for teacher-given grades. Greater participation in general

instructional activities relates to higher rates of growth in teacher-given grades for students overall as well as those in the high-incidence and physical/health disability clusters (ranging from .2 to .3 points).

Teacher Competence in Teaching Reading

Descriptive Findings

- No statistically significant differences are apparent for students with disabilities overall or in any disability cluster whose language arts teachers rated themselves as "very competent" to teach reading, compared with those whose teachers gave themselves lower marks on this scale.

Multivariate Findings

- In contrast to the absence of bivariate relationships between teachers' self-ratings of their ability to teach reading and language arts and academic outcomes, differences are observed for some disability clusters on some measures, although there are no significant relationships for students with disabilities overall.
- Higher teachers' self-ratings of their ability to teach reading are associated with higher initial passage comprehension W-scores for students in the sensory disability cluster (7 points), but also with a lower rate of growth in passage comprehension (-4 W-score points) over time.
- Students in the severe disability cluster had higher initial scores in passage comprehension (6 W-score points) and higher grades (.2 points) when they had teachers who rated themselves as "fully competent" to teach reading/language arts, compared with those whose teachers reported themselves as "competent."
- In the behavior disability cluster, teacher ratings of full competence in teaching reading and language arts are associated with lower grades (-.3 points on a 4-point scale) in Wave 1.
- In the physical/health disability cluster, teachers' being "fully competent" to teach reading relates to a higher rate of growth in grades (.3 points) over time compared with students whose teachers rated themselves as "competent," whereas a lower rate of growth is apparent in mathematics calculation (-7 W-score points) for students in the cognitive disability cluster, controlling for other differences between them.

Social Adjustment Outcomes

Not surprisingly, school program factors have stronger and more consistent relationships with academic than with social adjustment outcomes. In fact, there are few or no significant relationships between social adjustment outcomes and variations in class size; this factor is not discussed in this section. However, for

other factors, SEELS analyses demonstrate several significant relationships, as discussed in the following sections.

Participation in General Education Academic Classes

Descriptive Findings (Exhibit 7-7)

- Greater participation in general education academic classes is related to more positive social outcomes for students with disabilities overall and those in the high-incidence disability cluster in bivariate analyses. Specifically, students in these two groups who took more than 80% of their academic classes in general education settings were more likely to belong to school or community groups by 17 and 13 percentage points, respectively, and they had been involved in 1 fewer disciplinary incident in the previous school year.
- Fewer disciplinary actions also are associated with taking a large majority of academic classes in general education settings for students in the behavior and sensory disability clusters.
- Students in the physical/health disability cluster who took more academic classes in general education settings were significantly more likely than students spending less time there to belong to school or community groups.

Exhibit 7-7
Social Adjustment Outcomes Associated with Percentage of Academic Classes in General Education Settings, by Disability Cluster

		Disability Cluster					
	All disabilities	High incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Percentage belonging to groups for students whose participation in general education for academic classes was							
0 to 60%	60	66	51	61	66	55	51
More than 80%	77	79	57	73	82	79	64
Number of disciplinary actions in prior year for students whose participation in general education for academic classes was							
0 to 60%	2.1	1.8	1.9	4.4	1.8	1.4	1.2
More than 80%	1.1	0.9	1.4	2.6	0.5	1.4	1.5

Sources: SEELS Wave 1 school program questionnaire, 2001, and parent interviews/survey, 2000.

Multivariate Findings

- There are fewer differences in their initial status and change in social outcomes over time than were observed for academic measures when we compare students who took more than 80% of their academic classes in general education with peers who took fewer than 60% of such classes. In fact, there are no significant relationships observed for students with disabilities over all or in the cognitive, sensory, and severe disability clusters with regard either to Wave 1 status or growth over time.
- For students in the high-incidence cluster, greater participation in general education academic classes is associated with a higher likelihood of initial group membership for students by 4 percentage points but also with a higher rate of growth in disciplinary incidents (.2 incidents) over time.
- Students in the behavior disability cluster who took a large proportion of their classes in general education settings had a higher initial rate of disciplinary actions (.4 incidents) than students who took fewer such classes, but also a greater rate of growth over time in group membership by 11 percentage points.
- Students in the physical health disability cluster had a lower initial level and a lower rate of growth in disciplinary actions (-.2 incidents) when those taking more than 80% of academic classes in general education are compared with those who took fewer than 60% of such classes there.

Degree of Curriculum Modification

Descriptive Findings (Exhibit 7-8)

- In bivariate analyses, the degree of curriculum modification is related to social outcomes in a pattern than varied only slightly across disability clusters. For example, for students overall and those in most disability clusters, students receiving no modification to the curriculum were more likely to belong to school or community groups than those receiving substantial modification by between 8 and 25 percentage points. However, there is no difference observed for students in the behavior disability cluster.
- Similarly, curriculum modification also has a fairly consistent relationship across disability clusters with the number of disciplinary actions in which students were involved. Students receiving no modification in curriculum overall and in the cognitive, behavior, sensory, and physical/health disability clusters were involved in fewer disciplinary incidents than those with a substantially modified curriculum.

Exhibit 7-8
Social Adjustment Outcomes Associated with Degree of Curriculum Modification, by Disability Cluster

	All disabilities	Disability Cluster: High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Percentage belonging to groups among students with							
No modification	77	78	62	74	74	78	61
Substantial modification	61	67	52	66	63	42	44
Number of disciplinary actions in prior year for students with							
No modification	1.3	1.2	1.4	2.2	0.8	1.4	0.9
Substantial modification	1.8	1.2	1.7	4.8	1.9	1.6	0.8

Sources: SEELS Wave 1 school program questionnaire, 2001, and parent interviews/survey, 2000.

Multivariate Findings

- Relationships between differences in the level of curriculum modification in language arts classes and initial status and growth in social adjustment outcomes, holding other factors constant, concentrated in the area of group membership.
- Among students in the cognitive disability cluster, having no curriculum modification is associated with an initially much higher rate of group membership—a 44 percentage-point difference. It also is associated with slower rates of growth in group membership for students in the cognitive, behavior, and sensory disability clusters (78, 74, and 8 percentage points, respectively).
- In contrast, a higher rate of growth in group membership is found for students in the high-incidence disability cluster (11 percentage points) who had no curriculum modification in their language arts instruction.

Individual Instruction

Descriptive Findings (Exhibit 7-9)

- The frequency of individual instruction relates with social outcomes for students with disabilities overall only in the case of group memberships; students receiving individual instruction often were less likely to belong to school or community groups than peers who rarely or never did. A similar relationship is apparent for students in the high-incidence and severe clusters.
- The frequency of individual instruction is not related to the number of disciplinary actions in which students were involved.

Exhibit 7-9
Social Adjustment Outcomes Associated with Frequency of Individual Instruction, by Disability Cluster

	All disabilities	Disability Cluster: High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
Average							
Percentage belonging to groups of students who received individual instruction							
Often	64	70	51	58	68	64	47
Rarely or never	79	82	58	74	85	72	67
Number of disciplinary actions in prior year of students who received individual instruction							
Often	1.6	1.3	1.6	3.6	1.8	1.5	1.1
Rarely or never	1.1	0.8	1.8	3.2	0.7	0.4	1.5

Sources: SEELS Wave 1 school program questionnaire, 2001, and parent interviews/survey, 2000.

Multivariate Findings

- The few bivariate differences in social outcomes described above for students who differed in the frequency of their individual instruction from a teacher do not appear when other factors are included in the analysis. The only significant relationship is slower growth (-.8 incidents) in disciplinary actions for students in the sensory disability cluster.

General Instructional Activities

Descriptive Findings (Exhibit 7-10)

- Greater student participation in general instructional activities has a positive relationship with the likelihood of students belonging to school or community groups for students with disabilities overall and for those in all disability clusters except the behavior cluster. Significant differences range from 22 percentage points among students in the high-incidence disability cluster to 34 points among peers in the physical/health cluster.
- Participation in general instructional activities is unrelated to the number of disciplinary incidents in which students were involved for most groups. Exceptions are the physical/health and severe disability clusters, among whom students who participated more actively in classroom activities were involved in more disciplinary actions.

Exhibit 7-10
Social Adjustment Outcomes Associated with Participation in General Instructional Activities, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Percentage belonging to groups for students whose participation was							
High	75	78	62	67	76	73	63
Low	43	56	36	65	50	39	31
Number of disciplinary actions in prior year for students whose participation was							
High	1.4	1.1	1.7	3.5	1.2	1.3	2.1
Low	1.8	1.9	1.5	9.1	0.8	0.2	0.3

Sources: SEELS Wave 1 school program questionnaire, 2001, and parent interviews/survey, 2000.

Multivariate Findings

- The bivariate relationships between frequent participation in general instructional activities and group memberships are not evident in multivariate analyses. However, a fairly consistent and positive relationship between greater participation and involvement in more disciplinary actions is apparent in multivariate, but not in bivariate analyses.
- Overall and among students in the sensory, physical/health, and severe disability clusters (ranged from), those who were active participants initially were involved in from 1 to 1.4 more disciplinary incidents, controlling for other factors. There are no relationships with rates of growth in such actions.
- In contrast, there are no relationships between participation in general instruction activities and rates of group membership in Wave 1, but there are several relationships with growth in membership over time. Students in the cognitive disability cluster who were active classroom participants had a 51-percentage-point higher rate of growth in belonging to groups, whereas active participants in the behavior and physical/health disability clusters had lower rates of growth (25 and 36 percentage points, respectively) over time.

Teacher Competence in Teaching Reading

Descriptive Findings

- As was the case with academic outcomes, there are no statistically significant differences in social adjustment outcomes in bivariate relationships for students with disabilities overall or in any disability cluster whose language arts teachers rated themselves as “very competent” to teach reading,

compared with those whose teachers gave themselves lower marks on this scale.

Multivariate Findings

- When other factors are included in the analysis, few associations are evident between social adjustment outcomes and teachers' self-ratings of competence in teaching reading, while holding other factors constant.
- Exceptions are that for students in the behavior disability cluster, teachers' ratings of competence to teach reading are associated with a lower rate of growth over time in group membership by 26 percentage points. In the sensory disability cluster, they initially were related to higher Wave 1 group membership rates (18 percentage points).
- For students overall, and for those in the physical/health disability cluster, teachers' self-ratings of competence are related to a higher rate of growth in the number of disciplinary actions students were involved in over time (.3 and 1.5 incidents, respectively).

Summary

Using both descriptive and multivariate analyses, this chapter has examined a number of factors related to instructional settings, curriculum modification, instructional groupings and activities, and teacher competence, and their relationships to academic and social adjustment outcomes. The results illustrate the complexities involved in providing effective educational services to the diverse population of students with disabilities. There is not, for example, a handful of factors that, taken together, appear to have consistent positive influences across disability clusters or outcome measures. For example, although practices that engage students more actively in general instructional activities in the classroom are associated with more positive reading outcomes for students with disabilities overall and for those in the high-incidence, physical/health, and severe disability clusters, a negative relationship is apparent for students in the behavior cluster, and no relationship is evident for those in the cognitive and sensory disability clusters.

Further, some differences that appear to be related to variations in school factors in descriptive findings do not remain significant when included in multivariate models that include individual and household factors. This illustrates the realities that school program factors are intertwined with the characteristics of the students who experience them and that their influence on student outcomes can be limited in comparison with individual and family characteristics.

This chapter demonstrates the difficulties of disentangling the influences of school factors that are related to one another. For example, as noted above, being more involved in general instructional activities in academic classes is related to positive academic outcomes for students overall and in several disability clusters.

Further, students who receive less curriculum modification also have a pattern of better academic outcomes. However, participating in the general curriculum without modification is related to participation in general instructional activities as well. For example, it may be that students who are in greatest need of a modified curriculum are more likely to receive it than those who do not, and students with fewer challenges to begin with are those who are best able to participate in general instructional activities.

SEELS analyses have attempted to disentangle these interrelationships by including multiple school factors in the analyses simultaneously so that relationships between outcomes and one factor are intended to be independent of the influence of other factors. Similarly, a variety of disability-related factors are included in the analyses to attempt to cope with the fact that variations in the school programs of students with disabilities reflect variations in their disabilities, as required in their individualized education programs (IEPs). Despite these analytic efforts, it is not certain that the analyses completely account for preexisting differences between students and the intertwining of school factors.

Despite these methodological difficulties and the reality of student diversity, one factor addressed in this chapter demonstrates a consistent and positive relationship to multiple measures of academic achievement for students in most disability clusters. It appears that taking more academic classes in general education settings is related to higher reading and mathematics performance, independent of differences between students on other factors included in the analyses. This findings underscores the importance of ensuring students with disabilities are educated in the least restrictive environment appropriate for their individual needs.

8. Relationships Between Receiving Accommodations and Learning Supports and Longitudinal Outcomes

by Anne-Marie Knokey, Jose Blackorby, and Mary Wagner

Through successive reauthorizations of IDEA in 1997 and 2004 and the passage of NCLB in 2000, the performance of students with disabilities has received more attention in accountability systems than ever before. Essential elements of these laws include requirements for the provision of appropriate accommodations to support students' participation in statewide tests, and all states have written guidelines to indicate the accommodations they allow (Thurlow, Lazarus, Thomas, & Roby, 2002). Despite concerns about the technical consequences of providing accommodations, they have become increasingly common in both day-to-day instruction and accountability testing. Accommodations are intended to remove obstacles that are unrelated to a student's understanding of the content of the tests or ability to provide answers to test items so that his or her true capabilities can be measured. Accommodations can include alterations to setting, timing/scheduling, presentation, or response mode (Thurlow, Lazarus, Thomas, & Roby, 2002; Wagner, Newman, Cameto, Levine, & Marder, 2003). In addition, accommodations and supports include can changes made to aspects of the educational process to enable students with disabilities to perform at levels consistent with their abilities (Elliott, Kratochwill, & Schulte, 1998; Haigh, 1999; Thurlow, Ysseldyke, & Siverstein 1995; Tindal, Heath, Hollenbeck, Almond, & Harniss, 1998; Ysseldyke et al., 1999).

Factors Expected to Be Associated with Outcomes

SEELS questionnaires asked teachers to report on accommodations and learning supports that students received, as specified in their IEP or 504 plan. The following are addressed in this chapter. [1]

- **More time for taking tests.** Some students with disabilities may be better able to demonstrate what they have learned when they are given additional time to read test items, formulate a response, and record that response.

[1] The accommodations and learning supports discussed in this chapter have been selected from a larger set of such variables that were included in the multivariate analyses. They are highlighted because they have the strongest and/or more consistent relationships with outcomes in multivariate analyses. Specifications of models and complete results are reported in the *Methodological Volume in Support of the SEELS Comprehensive Report, What Makes a Difference? Influences on Outcomes for Students with Disabilities: SEELS Sampling, Data Collection, and Analysis Procedures* (Javitz, Blackorby, Wagner, McCracken, & Knokey, 2007) available at www.seels.net.

- **Alternative tests or assessments.** Students with disabilities who are not able to participate in general education accountability tests or in classroom-based assessments with accommodations may be given alternative tests or assessments.
- **Modified grading standards.** Some teachers apply a modified set of expectations to grade the performance of students with disabilities. The set may include differences in the types of evidence of academic progress and/or in a variety of factors that teachers consider in evaluating students.
- **Slower-paced instruction.** Some students with disabilities may benefit when the pace of instruction is slower because it increases their opportunity to work with specific units of content or academic skills.
- **Help from a teacher's aide, instructional assistant, or personal assistant.** Teacher's aides are typically paraprofessionals who provide assistance in general or special education classes either to individual students or to the class as a whole. With the increasing emphasis on inclusion and access to the general education curriculum, teacher's aides have taken on a more prominent role in the education of students with disabilities.
- **Help from a reader or interpreter.** Providing a support person to read text for a student or to interpret speech into sign language is not a common support, but one that is important for students who require it.
- **Participation in a behavior management program.** Special educators have developed a suite of interventions and approaches called "behavior management programs" that can facilitate the reduction of problem behaviors and introduce more positive ones. Successful behavior management programs can help students improve both academically and socially.
- **Learning strategies or study skills instruction.** In addition to helping students master academic skills and content, some students with disabilities also are provided instruction in cognitive strategies to help them monitor and guide their own learning.

This chapter examines the relationships that providing these accommodations and learning supports to students with disabilities have with longitudinal academic and social adjustment outcomes. This is an important endeavor because these types of supports represent some of the features of students' school programs that can be changed by schools and, therefore, may suggest opportunities for improving student outcomes. However, although the intent of accommodations and learning supports is to improve student performance, previous SEELS analyses have found that receipt of accommodations may be a proxy for need and, therefore, be associated statistically with lower performance relative to that of peers who do not receive and, presumably, do not need the accommodation (Blackorby, Wagner, Cameto, Marder, et al., 2004).

The chapter begins with a description of the variation in receipt of accommodations and learning supports among students with disabilities overall

and among those in each disability cluster. Then, for each accommodation or learning support, a table presents the bivariate relationships between receipt and outcomes. Multivariate analysis results follow, which identify significant relationships between receipt of accommodations and supports and students' initial status on outcome measures and relationships to the observed rate of growth in outcomes over time, while controlling for other factors. Findings are reported first for academic and then for social adjustment outcomes.

Distribution of Factors Across Disability Clusters

Exhibit 8-1 shows the frequency of receiving various accommodations and learning support in Wave 1 for all students with disabilities and for those in each disability cluster.

More Time for Taking Tests

- Overall, more than 70% of students with disabilities received additional time for taking tests in Wave 1.
- Although receiving additional time for testing was common for students in most disability clusters, students in the sensory and severe disability clusters were less likely than others to receive this accommodation; 56% and 50%, respectively, did so.

Exhibit 8-1
Receipt of Accommodations and Learning Supports, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Accommodations							
Percentage receiving in Wave 1							
More time for taking tests	71	72	72	77	56	67	50
Alternative tests or assessments	29	21	60	25	28	33	52
Modified grading standards	34	31	54	27	17	31	38
Slower-paced instruction	46	41	72	42	35	38	50
Learning Supports							
Percentage receiving in Wave 1							
Help from a teacher's aide	41	34	61	41	43	43	72
Help from a reader or interpreter	12	11	16	10	24	10	12
Behavior manage-ment program	18	10	21	55	8	13	38
Learning strategies or study skills instruction	33	34	32	35	21	28	28

Source: SEELS Wave 1 school program questionnaire, 2001.

Slower-Paced Instruction

- Slower-paced instruction was provided to nearly half of students with disabilities.
- With the exception of students in the cognitive disability cluster, among whom 72% received this accommodation, receipt ranged from 35% to 50% of students across disability clusters.

Help from a Teacher's Aide

- In Wave 1, 41% of students overall received some form of assistance from teacher's aides.
- More than 60% of students in the cognitive disability cluster and 72% of those in the severe cluster received assistance from teacher's aides in Wave 1, compared with 34% to 43% of students in other disability clusters.

Help from a Reader or Interpreter

- Approximately one-tenth of students with disabilities overall received the services of a reader or interpreter; similar percentages of students in most disability clusters received this form of support.
- Not surprisingly, the receipt of reader or interpreter services was most common among students in the sensory cluster; 24% of students in that cluster received services from a reader or interpreter.

Participation in a Behavior Management Program

- In Wave 1, almost one-fifth of students with disabilities participated in some type of behavior management program.
- Not surprisingly, participation was highest among of students in the behavior disability cluster; 55% of these students were reported to have a behavior management program. Participation also was high, relative to students with disabilities overall, among those in the severe disability cluster; 38% received this form of support.

Learning Strategies or Study Skills Instruction

- Overall, approximately one-third of students with disabilities received some type of learning strategies or study skills instruction in Wave 1.
- Receipt of this form of instruction ranged from 21% to 35% of students across disability clusters.
- Students in the sensory disability cluster were the least likely to receive learning strategies or study skills in Wave 1.

Academic Outcomes

Both bivariate and multivariate analyses of the relationships between the receipt of accommodations and learning supports and longitudinal academic outcomes reveal some positive relationships, which suggest that these forms of assistance benefit some students with disabilities. However, a variety of negative relationships also are noted. It is likely that these relationships occur because the variety of disability-related factors included in multivariate analyses are insufficient to completely disentangle the receipt of an accommodation or learning aide from a student's need for it for some groups of students.

More Time for Taking Tests

Descriptive Findings (Exhibit 8-2)

- For most academic outcomes, receiving more time to take tests is unrelated to variations in performance in bivariate analyses for students with disabilities overall.
- The exception is oral reading fluency, for which a lower rate is apparent for students with disabilities overall who received this accommodation, and for students in the behavior and sensory disability clusters.
- The opposite relationship is evident for students in the cognitive disability cluster, among whom recipients of this accommodation read more fluently and had higher scores in passage comprehension than their peers who did not have additional time.
- Significantly lower teacher-given grades are evident for students in the high-incidence and severe disability clusters who received additional time for testing.

Exhibit 8-2
Academic Outcomes Associated with Receiving More Time for Taking Tests, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension score for students who[a]							
Received more time for taking tests	480.3	484.0	462.1	487.9	479.6	484.6	466.9
Did not receive it	480.5	486.5	445.0	494.1	483.1	480.0	461.6
Oral reading fluency rate for students who[b]							
Received more time for taking tests	66.7	66.9	51.9	81.1	70.6	72.6	64.0
Did not receive it	78.9	80.4	27.6	109.6	112.7	81.7	72.4
Mathematics calculation score for students who[a]							
Received more time for taking tests	494.9	498.7	478.2	499.8	497.2	491.8	480.2
Did not receive it	495.9	498.8	471.5	500.9	506.0	493.9	482.1
Grade point average for students who[c]							
Received more time for taking tests	2.6	2.6	2.5	2.5	2.8	2.8	2.6
Did not receive it	2.7	2.9	2.4	2.6	2.9	2.7	2.3

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 school program questionnaire and student direct assessment, 2001, and parent interviews/survey, 2000.

Multivariate Findings

- Consistent with descriptive findings, students with disabilities who received more time for taking tests read correctly eight fewer words per minute than their peers who did not have extra time.
- This relationship extends to students in the behavior, sensory, and severe disability clusters, who read from 14 to 17 fewer correct words per minute. Students in the sensory cluster who received more time for test-taking also had lower grades than peers who did not (-.2 on a 4-point scale), and those in the severe disability cluster also had lower initial scores on the passage comprehension subtest, independent of other differences between them.
- In contrast, positive relationships are observed for students in the physical/behavior disability cluster, among whom receiving more time for testing relates to higher passage comprehension and mathematics calculation W-scores (7 and 6 points, respectively).

- Over time, students with disabilities as a whole who received more time for taking tests had a higher rate of growth in passage comprehension; W-scores were an average of 2 points higher than for peers who did not receive more time, controlling for other differences between them.
- Higher rates of growth also are apparent for students in the sensory disability cluster on measures of passage comprehension (3 W-score points) and grades (.1 point).
- However, receiving additional time is related to lower rates of growth in oral reading fluency (-7 correct words per minute) and grades (-.2 points) for students in the physical/health disability cluster.

Alternative Tests or Assessments

Descriptive Findings (Exhibit 8-3)

- As a whole, students with disabilities who took alternative tests or assessments had lower scores on all three standardized measures of academic performance. Relative to those who took standard tests, students who took alternative assessments had mean passage comprehension and mathematics calculation scores that were 16 and 11 W-score points lower, and they read 21 fewer correct words per minute. Despite lower performance, students with disabilities overall who received this accommodation had higher grades in Wave 1.
- A pattern of lower scores for students who took alternative tests is most consistent for passage comprehension; it is evident for students in the high-incidence, cognitive, physical/health, and severe disability clusters
- Alternative test takers in the high-incidence and severe disability clusters also had lower oral reading fluency rates than those tested with standard assessments, and high-incidence and physical/health disability cluster members who took alternative tests had lower mathematics calculation scores than students in those clusters who did not.
- The higher grades apparent for students with disabilities as a whole who took alternative tests also appears among students in the sensory and severe disability clusters.

Multivariate Findings

- The fairly consistent findings of lower performance among students taking alternative tests are largely mitigated in the multivariate analysis, and differences do not form a consistent pattern.

Exhibit 8-3
Academic Outcomes Associated with Taking Alternative Tests or Assessments, by Disability Cluster

	All disabilities	Disability Cluster: High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension score for students who[a]							
Took alternative tests or assessments	469.1	476.9	453.8	484.8	476.4	466.9	456.3
Did not take them	484.9	486.8	464.3	490.9	482.7	489.4	473.6
Oral reading fluency rate for students who[b]							
Took alternative tests or assessments	54.7	56.0	43.6	73.1	59.2	52.7	57.9
Did not take them	75.3	74.4	51.0	92.3	97.1	81.3	74.5
Mathematics calculation score for students who[a]							
Took alternative tests or assessments	487.2	493.0	475.1	495.0	494.5	482.6	477.0
Did not take them	498.2	500.3	479.4	501.7	503.1	495.8	483.7
Grade point average for students who[c]							
Took alternative tests or assessments	2.7	2.7	2.6	2.5	2.9	2.8	2.6
Did not take them	2.5	2.5	2.4	2.5	2.5	2.7	2.4

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 school program questionnaire and student direct assessment, 2001, and parent interviews/survey, 2000.

- Only with regard to oral reading fluency rates did students with disabilities overall who received alternative assessments score lower than those who did not, controlling for other differences between them; they read 5 fewer correct words per minute than their peers who did not receive this accommodation. Taking alternative assessments also is associated with a lower rate of growth over time in mathematics calculation scores for students with disabilities overall (-2 W-score points).
- Taking alternative test or assessments is associated with initial differences on passage comprehension scores only for students in the physical/health disability cluster. In that case, students taking alternative tests or assessments had initial passage comprehension scores 10 W-score points lower than their peers who did not take such tests. These students also had a lower rate of growth in mathematics calculation scores than their peers who did not take

alternative tests or assessments (-7 W-score points), controlling for other factors.

- Students in the behavior disability cluster who took alternative assessments read 17 correct words per minute slower than their peers who did not receive this accommodation. However, students in this cluster who took such tests had initially higher grades (.3 points on a 4-point scale).
- Across disability clusters, the few relationships between taking alternative tests and growth in academic outcomes were negative. Those who received this accommodation in the high-incidence disability cluster show a lower rate of growth by 9 correct words per minute than students who did not take alternative tests of assessments, and those in the sensory and severe disability clusters who took them had lower rates of growth in grades (-.2 and -.3 points, respectively).
- Descriptive findings that suggested that students in the cognitive disability cluster (the group that was most likely to take alternative test/assessment) had lower performance than students in other disability clusters were not supported in multivariate analyses. No significant relationships with initial academic outcomes or growth in them over time are apparent for students in the cognitive disability cluster.

Modified Grading Standards

Descriptive Findings (Exhibit 8-4)

- Students with disabilities as a whole who had modified grading standards exhibited a pattern of lower academic performance relative to those who did not on all measures: passage comprehension and mathematics calculation W-scores were lower by 12 and 10 points, respectively; their oral reading fluency rate was 21 correct words per minute slower; and their grades were .2 points lower on a 4-point scale.
- Students in the high-incidence disability cluster closely mirrored the pattern for students with disabilities as a whole.
- Students in the sensory and severe disability clusters who received this accommodation had lower scores for passage comprehension and slower oral reading fluency rates than those who did not. Recipients in the severe disability cluster also lagged behind nonrecipients in grades received from teachers

Multivariate Findings

- All relationships between receipt of this accommodation and academic outcomes measures are negative.

Exhibit 8-4
Academic Outcomes Associated with Being Subject to Modified Grading Standards, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ Health	Severe
Average							
Passage comprehension score for students who[a]							
Received accommodation	472.6	479.6	455.5	485.0	466.6	477.9	456.0
Did not receive it	484.7	487.2	462.7	490.8	484.0	485.8	471.0
Oral reading fluency rate for students who[b]							
Received accommodation	56.2	57.6	45.7	72.8	59.7	62.9	51.4
Did not receive it	77.6	77.3	49.0	92.4	93.8	80.4	76.2
Mathematics calculation score for students who[a]							
Received accommodation	488.9	494.2	474.8	496.9	491.2	487.6	474.9
Did not receive it	498.6	500.9	480.5	501.1	502.8	494.4	484.2
Grade point average for students who[c]							
Received accommodation	2.5	2.5	2.5	2.5	2.6	2.7	2.3
Did not receive it	2.7	2.8	2.5	2.5	2.9	2.8	2.6

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 school program questionnaire and student direct assessment, 2001, and parent interviews/survey, 2000.

- Among students with disabilities overall, being subject to modified grading standards is associated with lower passage comprehension W-scores (-3 points) than those received by peers who did not have this accommodation. This finding applies to students in the high-incidence, cognitive, and sensory disability clusters as well (-5, -6, and -7 W-score points, respectively).
- Students with disabilities overall and in the physical/health disability cluster who were subject to modified grading standards also had lower grades initially (-.1 and -.4 points on a 4-point scale).
- Students in the cognitive disability cluster who had this accommodation had lower scores in oral reading fluency (-10 correct words per minute) than students who did not.
- The only relationship between being subject to modified grading standards and growth over time in academic outcomes is a positive relationship for oral reading fluency (10 correct words per minute) for students in the physical/health disability cluster.

Slower-Paced Instruction

Descriptive Findings (Exhibit 8-5)

- As was the case for some other accommodations, receiving slower-paced instruction is consistently associated with lower academic outcomes for students with disabilities as a whole across all measures. Again, students in the high-incidence disability cluster mirror this pattern.
- Across clusters, the most consistent pattern of poorer outcomes for those receiving slower-paced instruction is evident regarding oral reading fluency. Students in five of six clusters demonstrate this pattern, ranging from 23 to 51 fewer correct words per minute for recipients of this modification relative to those who received instruction at the typical pace.
- In addition to lower oral reading fluency rates, students in the physical/health and severe disability clusters who received slower-paced instruction also had lower passage comprehension and mathematics calculation W-scores, and those in the sensory disability cluster also had lower grades.

Exhibit 8-5
Academic Outcomes Associated with Receiving Slower-Paced Instruction, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension score for students who[a]							
Received accommodation	473.3	479.1	458.3	485.3	474.5	471.2	455.0
Did not receive it	486.3	488.6	458.3	492.0	484.9	489.6	474.8
Oral reading fluency rate for students who[b]							
Received accommodation	54.3	53.3	46.4	74.4	54.4	54.4	53.4
Did not receive it	82.9	82.6	49.0	97.2	105.6	83.7	77.4
Mathematics calculation score for students who[a]							
Received accommodation	488.5	492.4	477.0	495.4	493.6	485.9	475.5
Did not receive it	500.9	503.3	477.2	503.2	505.1	495.8	485.1
Grade point average for students who[c]							
Received accommodation	2.5	2.5	2.5	2.5	2.5	2.6	2.4
Did not receive it	2.7	2.8	2.5	2.6	3.0	2.9	2.5

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 school program questionnaire and student direct assessment, 2001, and parent interviews/survey, 2000.

Multivariate Findings

- The lower rates of academic performance on some measures that are apparent for students with disabilities as a whole in bivariate analyses are not sustained when other differences between students are considered. Among students with disabilities overall, there are no significant relationships between receiving this accommodation and any academic outcome measure in Wave 1 or growth over time. Neither are there any significant relationships for students in the high-incidence or cognitive disability clusters.
- However, for three of the disability clusters, receipt of slower-paced instruction relates to mathematics calculation W-scores, but not in the same direction. Students in the behavior and sensory disability clusters receiving slower-paced instruction scored 6 and 4 points lower, respectively, than their peers who did not, whereas students in the severe disability cluster scored 5 points higher, controlling for other factors.
- The only significant relationship with growth in any measure is a lower rate of growth in grades (-.5 points on a 4-point scale) for students in the physical/health disability cluster.

Help from a Teacher's Aide

Descriptive Findings (Exhibit 8-6)

- As was the case for several accommodations, students with disabilities who received assistance from a teacher's aide, instructional assistant, or personal aide had a pattern of lower performance across all academic outcome measures than students who did not have this kind of help.
- Again, the pattern of lower performance for recipients is most consistent across clusters for oral reading fluency. Students in the cognitive, behavior, and sensory disability clusters reflect this pattern, with differences from nonrecipients ranging from 17 to 44 fewer correct words read per minute.
- In addition to their differences in oral reading fluency, students in the cognitive and behavior disability clusters who had help from a teacher's aide lagged behind those who did not by 13 and 15 W-score points on the measure of reading comprehension, and those in the severe disability cluster had grades that were .3 points lower.
- There are no significant differences in mathematics calculation scores related to receipt of this learning support across any disability cluster.

Exhibit 8-6
Academic Outcomes Associated with Having Help from a Teacher's Aide, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension score for students who[a]							
Received accommodation	473.9	481.9	452.8	481.7	477.4	479.5	463.6
Did not receive it	484.5	486.0	466.1	495.0	483.4	485.9	467.8
Oral reading fluency rate for students who[b]							
Received accommodation	60.1	62.6	39.7	75.2	62.0	63.9	68.2
Did not receive it	76.0	74.5	56.4	96.7	106.2	81.8	64.2
Mathematics calculation score for students who[a]							
Received accommodation	491.8	497.5	475.5	497.5	493.9	488.2	480.4
Did not receive it	497.3	499.4	478.8	502.0	505.8	495.0	481.3
Grade point average for students who[c]							
Received accommodation	2.5	2.5	2.4	2.6	2.6	2.7	2.4
Did not receive it	2.7	2.8	2.6	2.5	3.0	2.8	2.7

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 school program questionnaire and student direct assessment, 2001, and parent interviews/survey, 2000.

Multivariate Findings

- Multivariate analyses, which included a range of factors, show no significant relationships with receipt of this form of support for students with disabilities as a whole, and few for particular disability clusters. Exceptions are noted below.
- Assistance from aides shows relationships with variations in Wave 1 measures only with regard to passage comprehension scores, and they are in opposite directions for different groups of students. Students in the high-incidence disability cluster who received assistance from teacher's aides had W-scores in passage comprehension that were 7 points lower than those of their peers who did not. In contrast, for students in the severe disability cluster, such assistance correlate with getter passage comprehension by 9-W-score points.
- Somewhat more relationships are observed for growth in academic outcomes over time. Students in the behavior and physical/health disability clusters who received help from a teacher's aide had lower rates of growth in oral

reading fluency (-10 and -9 correct words per minutes) than their peers who did not receive such assistance, controlling for other factors.

- Receiving this learning support also is associated with a higher rate of growth in grades for students in the sensory and physical/health disability clusters (.3 and .5 points on a 4-point scale).

Help from a Reader or Interpreter

Descriptive Findings (Exhibit 8-7)

- A weaker pattern of relationships is associated with receipt of help from a reader or interpreter than was true for several of the other accommodations and learning supports discussed in this chapter, perhaps reflecting the fairly low rate of receipt of this form of support.
- For students with disabilities overall, significant differences are noted only for the two reading measures.

Exhibit 8-7
Academic Outcomes Associated with Having Help from a Reader or Interpreter, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension score[a]							
Received help from a reader or interpreter	471.4	477.3	449.2	489.0	466.0	478.0	458.9
Did not receive help	481.8	485.9	460.4	489.4	484.5	484.0	466.1
Oral reading fluency rate[b]							
Received help from a reader or interpreter	53.3	51.5	40.9	83.6	75.5	67.8	61.6
Did not receive help	72.3	73.6	48.2	87.8	90.2	76.0	67.5
Mathematics calculation score[a]							
Received help from a reader or interpreter	490.3	495.1	469.5	501.6	491.0	485.1	479.2
Did not receive help	495.9	499.3	478.5	499.9	503.1	493.3	481.0
Grade point average[c]							
Received help from a reader or interpreter	2.5	2.5	2.5	2.5	3.1	2.8	2.4
Did not receive help	2.6	2.7	2.5	2.5	2.7	2.8	2.5

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 school program questionnaire and student direct assessment, 2001, and parent interviews/survey, 2000.

- Regarding relationships for students in individual disability clusters, differences are noted only for oral reading fluency among students in the high-incidence disability cluster, in which recipients of reader or interpreter services read an average of 22 fewer correct words per minute in Wave 1, and for grades among students in the sensory disability cluster, in which recipients had higher grades.

Multivariate Findings

- In Wave 1, students with disabilities overall and students in the sensory disability cluster who received reader/interpreter services scored 5 and 6 W-score points lower, respectively, on the passage comprehension measure than did their peers who did not receive the services.
- Among students in the high-incidence disability cluster, receipt of reader/interpreter services is associated with oral reading fluency rates that were 12 correct words per minute slower than those of students who did not have this kind of help.
- In contrast, students in the behavior disability cluster who received reader/interpreter services experienced a greater rate of growth in oral reading fluency over time (20 correct words per minute).
- There are no significant relationships apparent for students in the cognitive, severe, or physical/health disability clusters.

Participation in a Behavior Management Program

Descriptive Findings (Exhibit 8-8)

- The potential for participation in behavior management programs to benefit students' academic performance does not appear to be realized in bivariate analyses for most students with disabilities on most academic outcome measures; few associations with academic outcomes are noted.
- Exceptions are that students who participated in behavior management programs in the high-incidence and cognitive disability clusters had lower grades than nonparticipants, and participants in the sensory disability cluster had lower W-score points in mathematics calculation.

Multivariate Findings

- In contrast to the bivariate relationships observed, students with disabilities overall and those in the high-incidence and severe disability clusters initially received higher grades when receiving this learning support, controlling for other factors.

Exhibit 8-8
Academic Outcomes Associated with Participation in a Behavior Management Program, by Disability Cluster

	All disabilities	Disability Cluster: High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
Average							
Passage comprehension score for students who[a]							
Participated in a behavior management program	475.2	475.9	454.3	488.9	468.1	482.9	465.0
Did not participate	481.4	485.7	459.6	489.7	481.9	483.4	465.2
Oral reading fluency rate for students who[b]							
Participated in a behavior management program	68.8	61.9	43.6	87.8	87.2	72.6	75.7
Did not participate	70.2	71.6	47.9	87.2	88.8	75.6	62.6
Mathematics calculation score for students who[a]							
Participated in a behavior management program	492.8	493.8	478.4	500.2	488.6	493.0	481.8
Did not participate	495.7	499.3	476.7	500.0	501.7	492.2	480.2
Grade point average for students who[c]							
Participated in a behavior management program	2.4	2.3	2.1	2.6	2.5	2.8	2.4
Did not participate	2.7	2.7	2.6	2.4	2.8	2.7	2.5

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 school program questionnaire and student direct assessment, 2001, and parent interviews/survey, 2000.

- Participation in a behavior management program is associated with growth in academic outcomes over time only for students in the cognitive disability cluster, among whom participants had a lower rate of growth in reading fluency than nonparticipants (-15 correct words per minute), and those in the behavior disability cluster, whose rate of growth in grades was lower (-.5 points on a 4-point scale).
- There are no significant relationships between participation in this form of learning support and passage comprehension or mathematics calculation scores for any group or with any measure for students in the sensory or physical/health disability clusters.

Learning Strategies or Study Skills Instruction

Descriptive Findings (Exhibit 8-9)

- As with participation in a behavior management program, there are few bivariate relationships between receiving instruction in learning strategies or study skills and academic outcomes. No relationships are observed with measures of oral reading fluency, mathematics calculation, or grades.
- On the measure of passage comprehension, students who received this instruction overall and those in the high-incidence and cognitive disability clusters had higher W-scores at Wave 1, ranging from 5 to 12 points.

Exhibit 8-9
Academic Outcomes Associated with Receiving Learning Strategies or Study Skills Instruction, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Passage comprehension score for students who[a]							
Received learning strategies or study skills instruction	484.0	488.3	466.0	492.2	475.8	482.1	468.7
Did not receive it	478.6	483.0	454.2	488.0	482.4	483.8	463.4
Oral reading fluency rate for students who[b]							
Received learning strategies or study skills instruction	70.4	71.2	53.5	86.5	81.9	69.7	70.1
Did not receive it	69.7	70.4	42.9	88.0	90.4	76.9	65.1
Mathematics calculation score for students who[a]							
Received learning strategies or study skills instruction	497.5	501.6	482.4	501.1	494.9	489.4	482.6
Did not receive it	494.1	497.4	473.9	499.6	502.4	493.4	479.7
Grade point average for students who[c]							
Received learning strategies or study skills instruction	2.6	2.6	2.5	2.6	2.7	2.6	2.6
Did not receive it	2.6	2.7	2.5	2.5	2.8	2.8	2.4

[a] W-score.

[b] Words read correctly per minute.

[c] On a scale of 0 to 4, with 4 = the highest A grade.

Sources: SEELS Wave 1 school program questionnaire and student direct assessment, 2001, and parent interviews/survey, 2000.

Multivariate Findings

- Consistent with bivariate results, students overall and those in the high-incidence disability cluster who received learning strategies or study skills instruction had higher initial scores in passage comprehension (2 and 5 W-score points, respectively).
- Student in the high-incidence disability cluster who received this form of learning support also read more fluently in Wave 1 than those who did not (7 correct words per minute).
- Among students with disabilities overall, recipients of this instruction had lower grades in Wave 1, controlling for other factors, and over time, they had a lower rate of growth in grades than nonrecipients (-.1 points on a 4-point scale on both Wave 1 and growth measures). Students in the sensory and physical/health disability clusters who received learning strategies or study skills instruction also had a lower rate of growth in grades over time than students who did not (-.1 and -.2 points, respectively).

Social Adjustment Outcomes

It is reasonable to expect that instructional accommodations and learning supports would have more consistent and stronger relationships with academic than social adjustment outcomes. In fact, three of the factors found to relate to academic outcomes have few or no significant relationships with social adjustment outcomes and are not discussed in this section; these are receiving slower-paced instruction, having help from teachers' aides, and receiving instruction in learning strategies or study skills.[2] For other factors, bivariate and/or multivariate analyses show several significant relationships with the likelihood that students with disabilities belong to extracurricular school or community groups and with the number of disciplinary incidents in which they were involved in the year preceding Wave 1 interviews, as noted in the following sections.

More Time for Taking Tests

Descriptive Findings (Exhibit 8-10)

- Bivariate analyses show no significant relationships between receiving more test-taking time and variations in the percentage of students with disabilities overall who belonged to groups. However, students in the cognitive and

[2] The accommodations and learning supports discussed in this chapter have been selected from a larger set of such variables that were included in the multivariate analyses. They are highlighted because they have the strongest and/or more consistent relationships with outcomes in multivariate analyses. Specifications of models and complete results are reported in the *Methodological Volume in Support of the SEELS Comprehensive Report, What Makes a Difference? Influences on Outcomes for Students with Disabilities: SEELS Sampling, Data Collection, and Analysis Procedures* (Javitz, Blackorby, Wagner, McCracken, & Knokey, 2007) available at www.seels.net.

severe disability clusters who received this accommodation did show a higher likelihood of group memberships than nonrecipients.

- In contrast, there is a more consistent pattern of relationships between receiving more time for test-taking and the number of disciplinary actions in which students had been involved. For students with disabilities overall and for those in all but the behavior and physical/health cluster, receiving this accommodation is associated with involvement in more disciplinary incidents.

Exhibit 8-10
Social Adjustment Outcomes Associated with Receiving More Time for Taking Tests, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
Average							
Percentage belonging to groups for students who							
Received accommodation	70	74	58	65	71	67	61
Did not receive it	64	73	39	73	69	65	43
Number of disciplinary actions in the prior school year for students who							
Received accommodation	1.9	1.7	1.9	3.4	1.7	1.1	1.6
Did not receive it	1.3	1.0	0.9	4.8	0.6	1.1	0.8

Sources: SEELS Wave 1 school program questionnaire, 2001, and parent interviews/survey, 2000.

Multivariate Findings

- There are few significant relationships between receiving more time for testing and social adjustment outcomes, when other factors are considered in the analyses. In contrast with bivariate analysis findings, those relationships are concentrated on growth in group membership rates; there are no significant relationships with the number of disciplinary actions in which students were involved.
- Specifically, for students overall and for those in the cognitive and severe disability clusters, the receipt of additional time for testing is associated with a greater rate of growth in the likelihood of group membership over time, controlling for other factors; differences are 8, 53, and 24 percentage points, respectively.

Alternative Tests or Assessments

Descriptive Findings (Exhibit 8-11)

- In bivariate analyses, students with disabilities who took alternative tests belonged to school or community groups less frequently in Wave 1 than did students who did not receive this accommodation. This pattern also is evident for students in the physical/health and severe disability clusters.
- For students with disabilities overall, those taking alternative tests faced more disciplinary actions than students who took standard assessments; the same is true for students in the high-incidence and sensory disability clusters.
- The reverse relationship is found for students in the cognitive, physical/health, and severe disability clusters, among whom recipients of this accommodation were involved in fewer disciplinary incidents in Wave 1 than nonrecipients.

Exhibit 8-11
Social Adjustment Outcomes Associated with Taking Alternative Tests or Assessments, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/health	Severe
Average							
Percentage belonging to groups for students who							
Received accommodation	59	70	49	59	64	52	43
Did not receive it	72	75	58	70	73	73	61
Number of disciplinary actions in the prior school year for students who							
Received accommodation	2.1	2.4	1.4	3.9	2.2	0.5	0.9
Did not receive it	1.6	1.2	2.0	3.7	0.8	1.4	1.5

Sources: SEELS Wave 1 school program questionnaire, 2001, and parent interviews/survey, 2000.

Multivariate Findings

- Many of the differences present in the descriptive analyses do not translate into significant relationships in the multivariate case. When significant, differences are more likely to apply to growth estimates.
- Specifically, the bivariate relationships in Wave 1 observed between taking alternative tests and disciplinary actions that are apparent for most clusters are observed in multivariate analyses only for the high-incidence cluster; for that group, a negative relationship is confirmed in multivariate analyses (-.7 incidents).

- In contrast to this single significant relationship between receipt of this accommodation and social adjustment outcomes in Wave 1, several relationships are observed over time. Students with disabilities overall who took alternative tests or assessments had a higher rate of growth in belonging to school or community groups over time (6 percentage points). Similar, but more pronounced relationships also are apparent for students in the cognitive and physical/health disability clusters, controlling for other factors (20 and 16 percentage points, respectively).
- Over time, taking alternative assessments is associated with a lower rate of growth in disciplinary actions for students in the cognitive and behavior disability clusters (-1 incident for each group).

Modified Grading Standards

Descriptive Findings (Exhibit 8-12)

- Among students with disabilities overall, being subject to modified grading standards and belonging to groups are not related in bivariate analyses. However, this relationship is apparent for students in the cognitive disability cluster, among whom recipients of this accommodation were more likely than nonrecipients to belong to school or community groups.
- On the other hand, overall and for students in the high-incidence disability cluster, students receiving modified grading standards were involved in more disciplinary actions than peers not receiving this accommodation.

Exhibit 8-12
Social Adjustment Outcomes Associated with Modified Grading Standards, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Percentage belonging to groups for students who							
Received accommodation	66	73	60	55	58	58	53
Did not receive it	69	74	44	71	73	70	51
Number of disciplinary actions in the prior school year for students who							
Received accommodation	2.2	2.2	1.6	4.5	2.1	0.8	1.3
Did not receive it	1.5	1.1	1.7	3.4	1.1	1.2	1.1

Sources: SEELS Wave 1 school program questionnaire, 2001, and parent interviews/survey, 2000.

Multivariate Findings

- The multivariate analyses identified only a few significant relationships. In Wave 1, students overall and those in the high-incidence disability cluster who had modified grading standards were more likely to belong to a school or community group by 6 and 12 percentage points, respectively.
- There are no significant relationships between receiving this accommodation and growth in social adjustment outcomes over time for any group.

Help from a Reader or Interpreter

Descriptive Findings (Exhibit 8-13)

- Students with disabilities overall who received reader/interpreter services were involved in more disciplinary incidents than students who did not receive this form of help. The opposite relationship is true for students in the physical/health disability cluster.
- No significant relationships are apparent in bivariate analyses between receiving this form of support and social adjustment outcomes for any group.

Exhibit 8-13
Social Adjustment Outcomes Associated with Having a Reader or Interpreter, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Percentage belonging to groups for students who							
Received accommodation	61	72	45	45	58	57	53
Did not receive it	69	74	54	70	74	67	52
Number of disciplinary actions in the prior school year for students who							
Received accommodation	2.5	2.4	2.4	5.2	1.3	0.4	1.2
Did not receive it	1.6	1.3	1.5	3.6	1.2	1.2	1.2

Sources: SEELS Wave 1 school program questionnaire, 2001, and parent interviews/survey, 2000.

Multivariate Findings

- Multivariate analyses suggest that receiving services from a reader or interpreter is associated with a higher rate of growth over time in group membership (29 percentage points) for students in the behavior disability cluster.

- In contrast, receiving reader/interpreter services is associated with a higher rate of growth in the number disciplinary actions over time for students in the cognitive, behavior, and sensory disability clusters, compared with students who did not receive this form of learning support.

Participation in a Behavior Management Program

Descriptive Findings (Exhibit 8-14)

- As expected, a strong and consistent relationship is apparent for students with disabilities overall and for those in five of the six disability clusters (the exception is the severe cluster) between participation in a behavior management program and being subject to more disciplinary actions at school; indeed, being involved in a high number of such incidents often is the impetus to engage a student in such a program. The mean number of disciplinary actions for students with disabilities overall was 4.6 for students who were in a behavior management program, 3.5 times more incidents than for students not in such programs.
- For students overall and for those in the behavior disability cluster, participation in a behavior management program is associated with a lower probability of belonging to school or community groups relative to nonparticipants.

Exhibit 8-14
Social Adjustment Outcomes Associated with Participation in Behavior Management Programs, by Disability Cluster

		Disability Cluster					
	All disabilities	High-incidence	Cognitive	Behavior	Sensory	Physical/ health	Severe
Average							
Percentage belonging to groups for students who							
Received accommodation	58	70	41	58	72	72	50
Did not receive it	70	74	56	77	70	66	53
Number of disciplinary actions in the prior school year for students who							
Received accommodation	4.6	5.4	3.3	5.3	4.1	3.0	2.0
Did not receive it	1.1	1.1	1.2	1.7	1.0	0.8	0.7

Sources: SEELS Wave 1 school program questionnaire, 2001, and parent interviews/survey, 2000.

Multivariate Findings

- Consistent with bivariate findings, for students with disabilities overall and those in every disability cluster, participation in a behavior management program is associated with involvement in an initially higher number of disciplinary incidents (1 or 2 incidents). It also is associated with a higher

rate of growth in disciplinary problems at school for students with disabilities overall and those in the high-incidence, behavior, and physical/health disability clusters (1 incident for each group).

- Students in the cognitive disability cluster who participated in a behavior management plan were 30 percentage points less likely to belong to groups than nonparticipants, controlling for other factors.
- Over time, students in the high-incidence cluster who received this service experienced a 5-percentage-point higher rate of growth in group membership, compared with those who did not take part in such programs; in contrast, students in the physical/health cluster experienced 65 percentage points less growth over time.

Summary

This chapter has examined the relationships between receipt of selected accommodations and learning supports and students' academic performance and social adjustment outcomes.

The purpose of many accommodations and learning supports is to assist students with disabilities in performing to levels consistent with their capabilities. It is not surprising that students' needs for academic supports would be confounded with their receipt of those support, so that negative academic outcomes are statistically associated with receiving supports on some measures for some groups of students. However, examining the receipt of specific accommodations and learning supports individually has provided insights into relationships with particular outcomes—both positive and negative.

Not surprisingly, stronger and more consistent relationships are apparent between receipt of various accommodations and learning supports and academic outcomes than with social adjustment outcomes. Among the academic outcomes, oral reading fluency generally appears to be more sensitive to receipt of accommodations and learning strategies than other measures, although relationships often are negative. Mathematics calculation scores and grades are less likely to vary with receipt of accommodations and supports; no significant relationships are found for any group, for example, between mathematics scores and receiving help from teachers' aides or participation in a behavior management program.

The complexity of factors that help shape students' academic performance and social adjustment is underscored by the fact that, across the outcome domains, many statistically significant relationships that are evident in bivariate analyses are no longer significant when additional factors are included in the analyses. For example, in bivariate analyses, students with disabilities as a whole who took alternative tests had significantly lower scores on all three standardized measures of reading and mathematics, whereas multivariate analyses confirmed such a relationship only with regard to oral reading fluency. Similarly, lower

scores were apparent in bivariate analyses on all three standardized measures for students with disabilities who received slower-paced instruction, yet none was confirmed when other factors were entered into the analyses.

There are few consistent patterns of relationships across disability clusters for receipt of particular accommodations or learning supports in multivariate analyses. An exception is a pattern of negative relationships between passage comprehension scores and being subject to modified grading standards for students with disabilities over all and those in three disability clusters. Even more pervasive a pattern concerns the involvement in more disciplinary incidents at school for students with disabilities as a whole and those in each six disability cluster who participated in behavior management programs, and a higher rate of growth in such incidents over time for students with disabilities overall and those in the high-incidence, behavior, and physical/health clusters.

Further, accommodation and supports that were most commonly provided to students in a particular disability cluster often were not associated with benefits to those students in multivariate analyses. For example, students in the sensory disability cluster were most likely to have the services of a reader or interpreter, yet no relationships are apparent between receipt of those services and three of the academic outcomes in Wave 1 for them or growth over time on any measures; the one significant relationship that is apparent is negative. Students in the behavior disability cluster were more likely than others to participate in behavior management programs, but that participation is associated with both involvement in more disciplinary incidents in Wave 1 and higher growth in incidents over time. In contrast, for students in the high-incidence disability cluster, among whom academic difficulties are prevalent, receiving instruction in learning strategies or study skills is positively related to higher scores on standardized measures of both reading and mathematics, controlling for other differences between them.

9. What We Have Learned *by Mary Wagner and Jose Blackorby*

SEELS has undertaken an ambitious analysis agenda to address the following questions:

- To what extent did academic and social adjustment outcomes for students with disabilities nationally change from 2000-01 to 2004?
- To what extent did outcomes and changes in them over time vary for students who differed in their individual and family characteristics and their school programs and supports, holding constant other differences between them?
- To what extent did the individual and combined effects of individual, family, school program, instructional, and support factors vary for students in different disability clusters and for different outcomes?

Findings related to each of these questions are summarized below, first for students with disabilities as a whole and then as they vary for students in each disability cluster.

Change in Outcomes of Students with Disabilities Over Time

SEELS was designed to collect data repeatedly for a nationally representative sample of students with disabilities so that changes in their experiences and outcomes over time could be tracked through critical years of their development. Data collected in 2000 (from parent interviews) and 2001 (from a direct assessment of children's academic abilities and surveys of school staff) are Wave 1 baseline measures against which change in six key outcomes have been documented in this report, using data collected in 2004 (Wave 3). Academic outcomes include

- scores on standardized assessments of reading passage comprehension,
- scores on standardized assessments of mathematics calculation abilities,
- the number of correct words read per minute (i.e., oral reading fluency), and
- teacher-given grades.

Social adjustment outcomes include both positive and negative indicators:

- membership in extracurricular school or community groups and
- the number of disciplinary incidents in which a student was involved in the preceding school year.

It is the change in these outcomes that the analyses presented in this report seek to illuminate.

Academic Outcomes

Aggregate measures of academic outcomes for students with disabilities as a whole demonstrate generally low academic performance, on average, and modest improvement in the 3- or 4-year period between Waves 1 and 3. For example, the median passage comprehension W-score in 2001 was 488 for students with disabilities overall, a score equivalent to a spring measure for a typical third-grader in the general population; in reality, the median grade level for students with disabilities was fifth grade when Wave 1 student assessments were conducted. The median score increased by about 12 W-score points (i.e., 2%) over 3 years, raising the performance of the group by less than one grade level—to that of a typical fourth-grader in the general population, indicating that in general, students with disabilities were losing ground relative to students in the general population. The median oral reading fluency rate of 79 correct words per minute in Wave 1 was equivalent to that of a third-grader in the general population tested in the fall; the rate increased by almost 46 percent in 3 years, to 115 correct words per minute. Students with disabilities as a whole demonstrated stronger mathematics calculation abilities than reading skill; the median test scores were 497 and 514 in Waves 1 and 3, respectively, an increase of just over 3% in scores, making them equivalent to those of fourth-graders in the general population.

These median scores mask considerable variation in performance on each measure. For example, passage comprehension W-scores ranged from 404 to 534, indicating students with disabilities as a whole include those who struggle significantly to understand what they read and those who are quite competent in gaining meaning from written text. Growth over time also varied widely, with some students with disabilities gaining more than 60 W-score points in 3 years and others losing ground by a similar amount.

Teacher-given grades were similar to other academic outcome measures in showing a wide range in performance for students with disabilities as a whole and in showing a modest improvement over time. However, this measure differed from others in that the majority of students showed above-average performance; 59% and 66% of students with disabilities as a whole were reported by parents or school staff to earn “mostly As and Bs” or “mostly Bs and Cs” in Waves 1 and 3, respectively. This measure also differed from others in that the distribution of grades generally was similar across disability clusters, despite the quite different academic performance that students in those clusters demonstrated. These findings regarding grades underscore the fact that they reflect more than students’ academic abilities.

Social Adjustment Outcomes

Membership in extracurricular school or community groups by students with disabilities has been demonstrated to relate strongly to positive outcomes both during school and in the early postschool years (Wagner, Blackorby, Cameto, & Newman, 1993; Wagner, Blackorby, & Hebbeler, 1993). SEELS analyses show that students with disabilities were active in such groups in both Waves 1 and 3,

with membership rates of about 70% at both points. About half of students were group members at both times, and about 15% were not members at either time.

Similarly, the large majority of students with disabilities were not involved in any disciplinary incidents in the school year preceding Wave 1 and 3 interviews, with little change over time. Almost half of those who had been involved in such incidents were involved in 1 or 2, although 10% of students with disabilities were involved in 6 or more incidents in a school year.

Factors Associated with Academic Outcomes and Changes in Them Over Time

Both descriptive and multivariate analyses presented in this report relate variations in outcomes and changes in them over time to four groups of factors outlined in the SEELS conceptual framework:

- disability-related characteristics;
- student demographics;
- family income, expectations, and support;
- school program characteristics; and
- accommodations and learning supports provided to students with disabilities.

The Methodological Volume in Support of the SEELS Comprehensive Report, What Makes a Difference? Influences on Outcomes for Students with Disabilities: SEELS Sampling, Data Collection, and Analysis Procedures provides the multivariate analysis results that are associated with each of the 49 variables included in the analyses. Factors shown to have the greatest number of significant relationships to one or more outcome measures have been highlighted in the chapters of this report; multivariate analysis findings regarding academic outcomes are summarized below for students with disabilities as a whole; a summary of findings related to social adjustment outcomes follows.

SEELS analyses reveal that the types of factors listed above generally relate more strongly and consistently to academic than to social adjustment outcomes. Not surprisingly, this is particularly true regarding school program factors and accommodations and learning supports. Also, measures of reading ability, particularly oral reading fluency, tend to have stronger and more consistent relationships to a variety of factors than do the mathematics outcome measure or grades.

Further, the factors examined in the analyses generally do more to explain variations in the level of performance students achieve than variations in their rate of growth in performance over time. Finally, factors more directly attributable to students themselves—particularly characteristics of their disabilities and functioning—and to their families more strongly and consistently relate to variations in performance than do characteristics of their school programs or the accommodations and learning supports they are provided. Thus,

the findings help us understand better which students have relatively stronger or weaker academic performance than how to boost the rate of their learning through their school years. Nonetheless, analyses provide important insights into the academic performance of students with disabilities.

Disability-Related Characteristics

Given the wide range in performance on most outcome measures across disability clusters, it is not surprising that the disability-related factors that distinguish those clusters and the functioning of the students within them are strongly and consistently related to variations in outcomes, even when differences between them on other individual, family, and school program factors are controlled for. The functional cognitive abilities of students—i.e., their ability to count change, tell time on an analog clock, read common signs, and look up telephone numbers and use the phone—are clear indicators of their ability to master the academic tasks of schooling. For example, students with strong functional cognitive skills scored higher on tests of reading and mathematics ability, on average, than students with lower levels of functional cognitive skills, independent of other differences between them. Having higher functional cognitive skills also relates to a greater growth in the ability to learn and demonstrate mathematics calculation skills over time. Interestingly however, students with higher functional cognitive skills showed lower rates of improvement in grades over time than did less cognitively proficient students.

The breadth of students' disabilities, indicated by the number of different disabilities school staff reported they had, also is consistently related to the academic performance of students with disabilities as a whole, with lower scores across all measures noted for students whose disabilities are more complex. The grades of students with more reported disabilities also increased over time and at lower rate than students with one reported disability.

In contrast, no differences in academic performance or change in performance over time are apparent for students with disabilities overall who differed in their ability to dress and feed themselves when other factors are controlled for in analyses. This lack of relationship in multivariate analyses is somewhat surprising in light of the strong differences in bivariate descriptive analyses between students with different levels of self-care abilities. These findings demonstrate both the intertwining of self-care abilities with other factors held constant in analyses and the independence of academic functioning from the largely physical functioning measured by self-care abilities.

Individual Student Demographic Characteristics

Three demographic characteristics of students with disabilities were highlighted in the report: age, gender, and racial/ethnic background. Of these, only age is consistently related to academic performance, with older students with disabilities showing the higher levels of performance across measures that would be expected to accompany more years of schooling. However, the performance

of younger students increased more over time than that of older students across all performance measures.

Few gender differences are apparent in either descriptive or multivariate analyses. A notable exception is that boys with disabilities overall out-scored girls in mathematics abilities, whereas girls had a higher rate of growth, on average, in oral reading fluency.

Importantly, the striking differences in performance between students with different racial/ethnic backgrounds, favoring white students, that is noted in bivariate SEELS analyses are almost completely mitigated when other factors, such as household income, are included in analyses. In fact, there are no significant differences between African-American and white students on any academic outcome measure, and Hispanic students had higher grades, on average, than white students in Wave 1 when other factors are controlled for. There are no differences at all between racial/ethnic groups in their rates of growth over time on any academic outcome measures.

Family Economics and Support

SEELS findings confirm the important role of family factors in understanding differences in the academic performance of students with disabilities. Of particular note are the relationships between academic outcomes and both household income and expectations for educational attainment. Although these factors are intertwined, in that families that can afford postsecondary education would be more likely to hold expectations that their children would pursue it, the two factors each have consistent and significant relationships with the academic performance of students with disabilities. Specifically, all four academic outcome measures were higher among students with disabilities whose parents expected they “definitely” will go on to further education after high school. Tested reading and mathematics performance also were consistently higher across measures for students with disabilities from higher- versus lower-income households, independent of other differences between students. However, there is no relationship between income and grades, nor is there a particular pattern of relationship between either expectations or income and growth in academic outcomes over time.

In contrast to the relationships between academic outcomes and income and parental expectations for postsecondary education, there is an unexpected absence of relationships between academic outcomes and family support for education at home (e.g., helping students with homework, talking with them about school) or at school (e.g., attending school meetings or class events, volunteering at school) when other factors are taken into account in multivariate analyses. Neither level of performance nor growth in performance over time is related to either form of support on any measure for students with disabilities as a whole, although some relationships are apparent (and inconsistent in direction) for particular disability clusters, as noted in later sections. This finding suggests that other characteristics of families who provide such support, or of children

who need or are given such support, better explain variations in academic achievement among students with disabilities as a whole.

Social Skills and Classroom Behaviors

SEELS findings in this document have highlighted the relationships between the academic performance of students with disabilities and the social skills their parents reported and four classroom behaviors teachers reported: the frequency with which they cooperated with peers, followed directions, persisted in completing tasks, and completed homework on time.

Few consistent relationships are observed between these factors and academic the outcomes of students with disabilities when other factors are controlled for. For example, the level of students' social skills relates only to oral reading fluency and in a negative direction. The frequency with which students with disabilities overall were reported to cooperate with peers in the classroom also relates only to oral reading fluency, but in a positive direction; the frequency with which students followed directions was the only behavior that relates to mathematics calculation abilities, and does so positively. Grades are the one measure that fairly consistently relates to teachers' reports of the frequency with which students engage in the classroom behaviors addressed; higher grades were earned by those who "very often" persisted in completing classroom tasks, followed directions, and completed homework on time. Students' persistence with classroom tasks also relates positively to growth in grades over time.

School Program Factors

The text of this report has highlighted the relationships between the academic outcomes of students with disabilities and the following aspects of their school programs: participation in general education academic classes, class size, degree of curriculum modification, frequency of receiving individual instruction, students' engagement in general instructional activities, and teachers' self-reported competence to teach reading and language arts. Findings confirm that schools can influence the level and trajectory of students' learning through decisions regarding instructional settings and activities.

Four of the factors noted above relate to more positive outcomes for students with disabilities overall, with the percentage of academic classes taken in general education settings demonstrating the most consistent positive relationship. Students with disabilities who took more of their academic classes in general education classrooms had higher reading and mathematics scores and read more fluently than students who took fewer of their academic classes in such settings, controlling for other differences between students, including functional cognitive skills, for example. Independent of instructional setting, participating in the general education curriculum without modification also relates positively to both reading measures, and to higher growth in mathematics abilities over time. More active engagement in general instructional activities in the classroom relates positively to students' reading comprehension abilities and to growth in grades over time. Finally, students with disabilities, as a group, who receive their

primary language arts instruction in smaller classes had both higher grades at Wave 1 and higher growth in oral reading fluency between Waves 1 and 3 than did students in larger classes, regardless of whether the classes were general or special education.

The frequency with which students with disabilities overall received individual instruction from their teacher relates only to passage comprehension scores and in a negative direction; there are no significant relationships with growth over time. And, although teachers' ratings of their competence to teach reading and language arts have some relationships with academic outcomes for students in some disability clusters, there are no relationships with outcomes at Wave 1 or with growth over time for students with disabilities as a whole.

Accommodations and Learning Supports

Relationships between academic outcomes and the following accommodations and learning supports have been highlighted in this report: being given more time for test-taking, taking alternative tests, being subject to modified grading standards, receiving slower-paced instruction, having help from a reader or interpreter, having help from an aide or instructional assistant, participating in a behavior management plan, and receiving instruction in learning strategies or study skills.

Findings regarding the relationships observed point up the difficulty in disentangling receipt of such accommodations and supports from the academic difficulties that underscore the need for them. Where there are significant relationships between these factors and academic outcomes for students with disabilities as a whole, most are negative; receipt of supports is associated with lower academic performance at Wave 1, and for the most part is unrelated to growth over time. Specifically, having more time for test-taking, taking alternative tests, having modified grading standards, and having help from a reader or interpreter all are associated with poorer reading performance on one measure relative to students with disabilities who did not receive these accommodations or supports, presumably because they did not need them. Lower grades also are associated with having more test-taking time and modified grading standards and with receiving study skills instruction. The two factors that show a relationship with growth over time—taking alternative assessments and receiving instruction in study skills—are negatively related to mathematics calculation scores and grades, respectively.

Exceptions involve higher grades observed for students who had a behavior management plan relative to those who did not and higher passage comprehension scores, on average, for students who received study skills instruction. No relationships, either at Wave 1 or with growth over time, are observed for students with disabilities overall who received slower-paced instruction or had help from a teacher's aide or instructional assistant.

Factors Associated with Social Adjustment Outcomes and Changes in Them Over Time

As noted in the discussion of relationships between student, family, and school program factors and student outcomes, weaker and less consistent associations are noted with social adjustment than with academic outcomes. Nonetheless, several significant relationships are observed for students with disabilities as a whole, as noted below.

Disability-Related Characteristics

SEELS findings regarding relationships between social adjustment outcomes and the number of students' disabilities and their functional cognitive and self-care skills highlight the fundamental differences between the skills that are (and are not) required to succeed in the academic and the social outcome domains. For example, although having disabilities that affected more aspects of functioning is consistently related to poorer academic outcomes and to lower growth in one measure over time, there are no significant relationships at all between the number of disabilities and the likelihood of students with disabilities belonging to school or community groups or the frequency with which they got in trouble at school. Similarly, students who were able to dress and feed themselves did not differ from those who did not on any academic measure, holding constant other differences between them; yet, students' who had mastered self-care tasks were significantly more likely to participate in extracurricular group activities than students who had not. Only the level of students' functional cognitive skills has similar relationships with social adjustment and with academic outcomes; students with higher skills were both more likely to succeed academically and to belong to extracurricular school or community groups, although they also had a higher rate of growth in disciplinary incidents over time.

Individual Student Demographic Characteristics

SEELS findings reveal that negative social adjustment, as indicated by the frequency with which students with disabilities were involved in disciplinary incidents at school, relates more to the demographic characteristics of students with disabilities than does positive social adjustment, as indicated by membership in extracurricular school or community groups. Specifically, both age and gender are significantly associated with involvement in disciplinary incidents, with more such incidents occurring among older students and boys, independent of other differences between them. Age also relates to growth in disciplinary problems at school, however, in a negative direction.

The likelihood of group membership differed only with regard to Hispanic students with disabilities relative to white peers; controlling for other factors, including household income, Hispanic students were much less likely than white students to belong to school or community groups, consistent with bivariate analyses. In contrast to significant differences between them in bivariate analyses, however, there were no differences between African-American and

white students with disabilities on either social adjustment measure when other factors are taken into consideration in analyses.

Family Economics and Support

SEELS analyses confirm a consistent relationship, in both bivariate and multivariate analyses, between higher household income and more positive social adjustment outcomes; students with disabilities from higher-income families were more likely than less affluent peers to belong to school or community groups and were involved in fewer disciplinary incidents at school, irrespective of differences between them on other factors included in the analyses. A higher level of family involvement at school in support of the education of their children with disabilities also is associated with a higher probability that students with disabilities belonged to extracurricular school or community groups, and with a higher rate of growth in group memberships over time. Additionally, parents' expectations that their children with disabilities would pursue postsecondary education is associated with a lower rate of growth in disciplinary actions over time.

Social Skills and Classroom Behaviors

Although the level of students' social skills does not consistently relate to academic outcomes for students with disabilities as a whole, being able to function more proficiently in relationships with others is associated with a higher likelihood of group memberships at Wave 1 and with a higher rate of growth in such memberships over time. In contrast, multivariate analyses reveal no such relationship between this indicator of positive social adjustment and any of the classroom behaviors considered in the analyses (i.e., the frequency with which teachers report students cooperate with others, follow directions, persist in completing classroom tasks, or completing homework on time) at Wave 1 or over time. However, some positive classroom behaviors are associated with lower rates of disciplinary trouble at school. Specifically, students with disabilities who more frequently followed directions in class and completed their homework on time were involved in fewer disciplinary incidents at school than peers who less frequently demonstrated these classroom behaviors. Timely completion of homework also is associated with a lower rate of growth in disciplinary incidents over time.

School Program Factors

It is not particularly surprising that school program factors that generally pertain to academic instruction, such as the degree of curriculum modification provided to students, class size, or the frequency with which students received individual instruction from a language arts teachers, are unrelated to either positive or negative social adjustment outcomes, controlling for other differences between students. However, students' integration into general education settings for academic classes also was unrelated to the likelihood that students with disabilities were integrated into extracurricular group activities at school or in the community. In fact, the only relationships observed between school program

factors and social adjustment outcomes involve a higher initial rate of disciplinary actions among students with disabilities as a whole who were more actively engaged in general instructional activities relative to less actively engaged students, and a higher rate of growth in such incidents over time for students whose teachers reported they were more competent to teach reading than among students with disabilities whose teachers were less confident in their abilities.

Accommodations and Learning Supports

No consistent pattern of relationships is apparent between receiving various accommodations or learning supports and social adjustment outcomes, which is consistent with the focus of these forms of support on classroom participation and learning. However, one form of support—being provided support for dealing with learning and behavior issues under a behavior management plan—does relate to one of the outcomes it is meant specifically to address, although the relationship is negative. Students with disabilities who received this form of support were involved in more disciplinary incidents at school at Wave 1 and had a higher rate of growth in such incidents over time than students who did not have a behavior management plan, presumably because they did not need one. A higher rate of growth in such incidents also is apparent for students with disabilities who received instruction in learning strategies or study skills relative to those who did not. On the other hand, positive relationships are observed with participation in extracurricular school or community groups for students who were subject to modified grading standards, and a higher rate of growth in membership is apparent for students who received more time for test-taking or who participated in alternative tests or assessments.

Differences in What Works for Students Across Disability Clusters

The discussions above have emphasized relationships between individual, household, and school factors and academic and social adjustment outcomes for the total population of students with disabilities. However, it is important to note that few of these factors have the quality of a “magic bullet” that helps us understand the outcomes of students across the six disability clusters around which analyses have been organized. What works for the group as a whole often does not appear to not work for students in some disability clusters, whereas other factors may have a relationship with outcomes only for students in specific disability clusters. Understanding these variations across disability clusters is critical to understanding the students in them and to targeting school policies and services to the students who can most benefit from them. The sections that follow highlight findings for students in each disability cluster.

Students in the High-Incidence Disability Cluster

Because this cluster of students primarily represents the largest portion of students receiving special education services—those primarily in the disability

categories of learning disability and speech/language impairment—their pattern of academic and social adjustment outcomes and the relationships of outcomes to individual, family, and school factors generally are similar to those for students with disabilities as a whole. The academic outcomes of this group tend to be fairly high relative to several other clusters. They also are the most likely to take large portions of their academic classes in general education settings and to participate actively in instructional activities in those classes. They are the least likely to have a modified curriculum and to receive frequent individual instruction and a variety of accommodations and learning supports. In the social adjustment domain, students in the high-incidence disability cluster were the most likely to belong to school or community groups, and their rate of group membership was the most stable over time. Like students with disabilities as a whole, about 7 out of 10 students represented by this cluster were not involved in any disciplinary incidents at school in the previous school year. Factors associated with variations in these academic and social adjustment outcomes are summarized below.

- **Disability factors.** Like students with disabilities as a whole, having high functional cognitive skills is strongly related to higher academic performance in both reading and mathematics and to a higher rate of growth in both reading measures. However, perhaps because most students in this disability cluster had only one disability identified by their schools, this factor generally is unrelated to variations in academic outcomes, unlike the pattern for students with disabilities as a whole. Similarly, most students in this disability cluster had high self-care skills, so that there are no associations between this factor and academic performance. In contrast, self-care skills is the only disability-related factor associated with either social adjustment outcome for students in this cluster; those with high self-care skills were involved in more disciplinary incidents at school than peers with lower skill levels. In addition to these disability factors, SEELS analyses of this cluster also included a variable distinguishing students in the category of learning disability from others in this cluster to determine whether the difference in the nature of students' disabilities independently relates to outcomes, irrespective of other differences between them; no significant differences related to disability category are apparent on any outcome measure when the other factors included in the analyses are controlled for.
- **Demographic factors.** Like students with disabilities as a whole, older students in the high-incidence disability cluster had better academic performance on multiple measures and a lower rate of growth in those measures than younger students, showing that older students had learned more, as expected, but were adding to their academic skills at a slower rate than younger peers. However, older students also were involved in more disciplinary incidents at school than younger students with high-incidence disabilities; this negative association contrasts with the higher likelihood of older students being involved in prosocial extracurricular groups. Students in the high-incidence cluster were the only group to mirror the stronger

mathematics performance of boys relatively to girls that is apparent for students with disabilities as a whole, but they did not mirror the overall group in having a higher rate of disciplinary incidents for boys. The high-incidence cluster also was the only group to show a positive association with reading ability for African-American students with disabilities relative to white peers, and they differed from students with disabilities as a whole in having poorer passage comprehension scores for Hispanic than white students. Hispanic students in this disability cluster were similar to those in most other groups in having a lower rate of group membership than white students.

- **Household factors.** The strong, positive associations between higher household income and higher academic performance that is apparent for students with disabilities as a whole also is evident for students in the high-incidence disability cluster with regard to the two reading measures and grades. In contrast, the consistent pattern of positive relationships between academic performance measures and parents' expectations for educational attainment are not born out in this group, with the exception of grades. The strongest association for this group between parental involvement and outcomes relates to a higher rate of group membership and a higher rate of growth in that measure for students with high-incidence disabilities whose parents were highly involved at school. The few other associations between outcomes and parental involvement are in the academic domain and are negative in direction.
- **Social skills and classroom behaviors.** Students with high incidence disabilities and high social skills read more fluently than students with similar disabilities who were less socially skilled, a relationships that is opposite to that observed for students with disabilities as a whole; both groups show a positive relationship between social skills and membership in extracurricular groups. More frequently completing homework on time also is associated with more fluent reading and higher grades among students in the high-incidence disability cluster. Both homework completion and more frequent cooperation with peers relate to involvement in fewer disciplinary actions at school. However, more frequently following directions and persisting in completing classroom tasks are associated with lower initial reading ability, and frequently cooperating with peers is associated with a lower rate of growth in reading fluency, independent of other differences between students in this disability cluster.
- **School program factors.** Taking a larger proportion of academic classes in general education settings appears to have benefits for students with high-incidence disabilities in both the academic and social domains; higher rates of oral reading fluency, mathematics calculation abilities, and prosocial group memberships accrued to students who were more frequently included in general education classes for academics. Stronger reading skills also are apparent for students in this disability cluster who had no modification to their language arts curriculum relative to those who did and to those who were more actively engaged in classroom instructional activities compared

with less engaged students; a higher rate of growth in grades over time also is associated with these two factors. Neither class size or teachers' self-reports of competence in teaching language arts is associated with either academic or social adjustment outcomes in Wave 1.

- **Accommodations and learning supports.** The pattern of associations between receipt of various accommodations and learning supports is inconsistent across factors and uneven in direction. Receiving more time for test-taking and slower-paced instruction are not associated with any academic or social adjustment outcomes. Poorer reading performance in Wave 1 is associated with being subject to modified grading standards and receiving help from a reader/interpreter or teacher's aide, and participation in alternative tests is accompanied by a lower rate of growth in reading fluency relative to students in this disability cluster who did not receive these forms of support. In contrast, higher grades are noted for students who participated in a behavior management program and higher reading and mathematics scores accrued to those who received instruction in study skills or learning strategies. However, participation in a behavior management program also is associated with involvement in more disciplinary actions and with greater growth in such incidents over time.

Students in the Cognitive and Severe Disability Clusters

Students in these two clusters had quite similar academic and social adjustment outcomes and, hence, they are described together in this section. Their median tested academic performance was the lowest across disability clusters, and that performance generally was the most variable within the clusters. Despite their lower performance, the grades given these students by teachers were similar to those of students in other disability clusters, and they showed the greatest increase in grades over time. Their rate of involvement in disciplinary incidents at school was fairly typical, yet their difficulty in being included in activities with typically developing peers was evidenced by fewer students in these clusters belonging to extracurricular school or community groups than those in other disability clusters.

Variations in the academic and social adjustment outcomes of students in the cognitive and severe disability clusters generally are less strongly and consistently related to the factors included in SEELS analyses than are variations in the outcomes of students with disabilities as a whole. Highlights of the findings regarding factors that are related to outcomes for these students include the following:

- **Disability factors.** The pervasive influence of disability for students in these two clusters is evident. More than half of students in the severe cluster qualified for special education services in the category of multiple disabilities, and most of the rest were in the autism category; all students in the cognitive disability cluster had mental retardation, which affected most aspects of their lives. Despite having considerably lower functional cognitive

skills than students in all other clusters, variations in them still have the strong and consistent relationships with academic performance that are observed for students with disabilities as a whole. The physical limitations common to many members of the severe disability cluster are evident in their lower self-care skills and the consistent negative relationships between those limitations and both academic performance and the rate at which they were able to participate in extracurricular school or community groups. With fewer students in the cognitive cluster having physical limitations, no relationships appear between their self-care abilities and academic or social adjustment outcomes. Also, the strong and consistent relationships between academic outcomes and the number of disability types reported by schools that is apparent for students with disabilities as a whole are entirely absent for students in these two groups, perhaps because they were less likely than students with disabilities as a whole to have only one disability identified by their schools.

In addition to these disability-related factors, analyses of these two clusters included variables to distinguish students in the cognitive disability cluster whose primary disability is mental retardation from other students in that cluster and to distinguish students in the severe disability cluster whose primary disability is autism from others in that cluster. Students in the category of mental retardation did not differ significantly from others in that cluster, independent of other differences between them that are accounted for in the analyses. In contrast, students in the severe disability cluster in the category of autism had significantly higher performance on oral reading fluency and mathematics calculation measures and higher grades than other students in that cluster.

- **Demographic characteristics.** With the exception of age, demographic differences among students in the cognitive and severe disability clusters do not show a consistent pattern of relationships with academic outcomes at Wave 1, much like students with disabilities as a whole. Students in the severe disability cluster mirror students with disabilities as a whole in that older students were involved in more disciplinary actions at school but also had a lower rate of growth in such actions over time; male students in the severe cluster also were less likely than female peers to belong to extracurricular groups. Relationships with growth in academic outcomes over time are few and tend to be negative and related only to reading abilities, whereas growth in social adjustment outcomes generally relate negatively with demographic characteristics with regard to group memberships and positively with regard to disciplinary trouble at school.
- **Household factors.** Students in the cognitive and severe disability clusters differ markedly from students with disabilities as a whole in the pattern of relationships between outcomes and household factors. Whereas there are consistent positive relationships between academic outcomes and parents' expectations for postsecondary education for students with disabilities as a whole, these relationships are absent for students in the cognitive and severe

disability clusters, perhaps reflecting in part the lower likelihood that their parents expected them to further their education after high school. Similarly, the strong positive relationships between household income and all four measures of academic performance that are observed for students with disabilities as a whole are absent for students in the cognitive cluster and apply only to the two reading measures among students in the severe cluster. In contrast, students in the cognitive and severe disability clusters are the only ones to show significant relationships between family support for education at home and reading comprehension scores. Students in the cognitive cluster also show the only significant relationship between support at home and mathematics abilities, and those in the severe cluster have the only relationship between this factor and grades. All relationships are positive, underscoring the particular importance of families supporting the educational activities at home for students with these disabilities. The pattern of relationships with social adjustment outcomes for students in the cognitive and severe disability clusters generally mirrors that of students with disabilities as a whole.

- **Social skills and classroom behaviors.** Students in the cognitive and severe disability clusters differ markedly from each other in the patterns of relationships between their social skills and classroom behaviors and their academic outcomes. For students in the cognitive disability cluster, those who had higher social skills and more positive classroom behaviors generally had lower academic performance, as in the negative relationships between social skills and oral reading fluency, persistence in classroom tasks and mathematics calculation scores, and following directions and reading comprehension abilities. In contrast, generally more positive social skills and behaviors are associated with higher academic performance for students in the severe cluster, as in the positive relationships that social skills and following directions have with mathematics calculation scores and those between persistence in classroom tasks and oral reading fluency and between timely homework completion and grades. Social skills and classroom behaviors are completely unrelated to social adjustment outcomes for students in the cognitive disability cluster, whereas for those in the severe disability cluster, more frequently cooperating with peers and completing homework on time are related to involvement in fewer disciplinary incidents at school.
- **School program factors.** Students in the cognitive and severe disability clusters were the least likely of all groups to take a large majority of their academic classes in general education classrooms. Nonetheless, students in the cognitive cluster share with students with disabilities overall the pattern of strong positive relationships between general education inclusion for academics and their tested abilities in reading and mathematics. However, there are no relationships with growth in academic outcomes for these students, indicating they are no more likely to be closing the academic gap with their peers than students with cognitive impairments who took fewer

academic classes in general education settings. Positive relationships between academic performance and general education inclusion for academics is apparent for students in the severe cluster only with regard to mathematics calculation scores, and students in this cluster who took more of their academics in general education settings actually progressed more slowly on both reading measures. Greater inclusion for academics did not translate into greater inclusion in extracurricular groups for students in either disability cluster.

Apart from general education inclusion for academics, few other school program factors are shown to make a difference in academic performance for students in the cognitive disability cluster. However, some positive relationships are apparent for students in the severe cluster, among whom higher passage comprehension scores are apparent for those who were more engaged in general instructional activities, and a higher rate of growth in hat measure is demonstrated by students in larger classes, holding constant other differences between them. In contrast, lower initial mathematics scores are noted for students in the severe cluster who had a modified curriculum. Few relationships are noted in the social adjustment domain, and those that are apparent form no consistent pattern.

- **Accommodations and learning supports.** For students in the cognitive disability cluster, providing accommodations is generally unrelated to academic performance. Of the eight accommodations and learning supports whose relationships with academic performance are highlighted in this report, only providing modified grading standards is related for this group, and that relationship is negative with regard to both reading measures. For students in the severe disability cluster, providing some forms of accommodations and learning supports has a positive pattern of relationships with some measures; positive associations are noted between passage comprehension scores and receiving help from a teacher's aide, mathematics calculation scores and receiving slower-paced instruction, and participating in a behavior management program and grades. However, receiving more time for test-taking is negatively associated with both reading measures. Importantly, receiving accommodations or learning supports generally does not relate to the rate of growth in academic performance over time; they do not help students in either the cognitive or severe disability clusters to close the gap in performance with other students. As with school program factors, few relationships are apparent between receipt of accommodations or learning supports and outcomes in the social adjustment domain; exceptions are poorer outcomes for students in both clusters who were participating in a behavior management program.

Students in the Behavior Disability Cluster

Students in the behavior disability cluster had among the highest levels of academic performance of any group and the least variability in that performance, yet they also had among the poorest grades. Although they do not differ

markedly from most other groups in the rate at which they participated in extracurricular group activities, not surprisingly, given the nature of their disability, students in this disability cluster were more likely than any other group to be involved in disciplinary incidents at school—more than half had been involved in such incidents in the school year preceding the Wave 1 interview, and more than one-fifth had been involved in six or more disciplinary actions in that year, rates half again as large as students with disabilities as a whole. However, within this cluster, there is still substantial variation in outcomes. Factors associated with that variation are summarized below.

- **Disability factors.** Students in the behavior cluster who had more than one disability identified by their schools mirror students with disabilities as a whole in the negative association between that factor and their mathematics calculation abilities at Wave 1 and growth over time in oral reading fluency; students in this cluster also had a lower rate of growth in group memberships over time, a relationship not evident for students with disabilities overall. The level of students' functional cognitive skills is less consistently related to outcomes for students in the behavior disability cluster than for students with disabilities as a whole; higher academic performance is associated with higher levels of functional cognitive skills for students in the cluster only with regard to mathematics calculation scores and grades. Further, unlike students with disabilities as a whole, and there are no relationships between either functional cognitive skills or self-care skills and group membership rates for students in the behavior disability cluster. A variable included in analyses of this disability cluster that distinguished students in the primary disability category of emotional disturbance from others shows no differences between students on reading measures or grades, independent of other differences between them, but does relate to a lower rate of growth in mathematics calculation scores for students with emotional disturbances relative to others, controlling for other differences.
- **Demographic characteristics.** Students in the behavior disability cluster share with students with disabilities overall the strong and consistent relationships between age and academic outcomes; older students had stronger academic performance on all measures at Wave 1 and lower rates of growth over time on all measures except grades. Unlike the larger group of students with disabilities, however, there is no significant relationship between age and involvement in disciplinary incidents for this group. Similarly, among students with disabilities as a group, boys scored more highly on the mathematics calculation assessment and were more likely to be in trouble at school than girls, relationships that are not apparent among students in the behavior cluster, which is more predominantly male than other clusters. The pattern of relationships between outcomes and racial/ethnic differences generally are similar for students in the behavior cluster and those with disabilities as a whole.
- **Household factors.** Students in the behavior disability cluster have relationships between outcomes and household factors that are similar to

those of students with disabilities overall, although the pattern is somewhat less consistent. Rather than relating to all academic outcome measures, as is the case for students with disabilities as a whole, for students in the behavior cluster, household income relates positively only to the two measures of reading; for both groups, it relates positively to rates of membership in groups. Similarly, only oral reading fluency and grades are positively associated with parents' expectations for postsecondary education, rather than relating consistently across all four academic outcome measures. Family involvement, both at home and at school are negatively related to oral reading fluency rates, but involvement at school is positively associated with the likelihood that students in the behavior cluster belong to extracurricular groups and with growth over time in group membership rates.

- **Social skills and classroom behaviors.** Students in the behavior cluster, on average, have poorer social skills and classroom behaviors than students in other disability clusters. Nonetheless, these factors are not powerfully or consistently related to students' outcomes. Variations in social skills are not related to either academic or social adjustment outcomes at Wave 1, nor are levels of cooperation with peers. However, social skills do relate to a larger increase in group memberships over time, and more frequently cooperating with peers is associated with a higher rate of growth in oral reading fluency. Additionally, positive relationships with reading comprehension scores and grades are noted for students in the behavior cluster who persisted with classroom tasks more frequently, higher grades are noted for those who more frequently completed homework on time, and involvement in fewer disciplinary incidents is apparent for students who followed directions more frequently. On the other hand, a lower rate of growth in mathematics calculation, passage comprehension, and prosocial group memberships each is associated with one classroom behavior measure.
- **School program characteristics.** The significant relationships between the school program factors highlighted in this report and academic outcomes for students in the behavior disability cluster are relatively few and inconsistent in direction. Negative relationships include those that both curriculum modification and individual instruction have with mathematics calculation scores and the relationships between active participation in general instructional activities and passage comprehension scores and between teachers' reports of their competence to teach reading and grades. In contrast to this latter negative relationship with grades, receiving more individual instruction and greater participation in general instructional activities are associated with higher grades in Wave 1. More inclusion in general education classrooms for academics is somewhat more consistent in that it is positively associated with higher scores in both reading and mathematics, with more positive social adjustment, and with a higher rate of growth in group memberships over time. All other relationships with growth in either academic or social adjustment outcomes over time are negative and relate only to reading measures and group memberships.

- **Accommodations and learning supports.** Participation in a behavior management program is most common among students in the behavior cluster; more than half of students in this cluster received this form of support. Yet that participation is unrelated to any academic outcome at Wave 1 and is associated with negative growth in grades over time. Receiving this kind of behavioral support also is unrelated to the indicator of positive social adjustment—group memberships—but is associated with both involvement in more disciplinary incidents at Wave 1 and with a higher rate of increase in such incidents over time. These findings suggest that students with the most significant behavioral difficulties at school received this form of support and also continued to experience their disciplinary difficulties to a greater degree over time than students who did not receive it. Three forms of accommodation or learning support are related to tested reading and mathematics performance, all negatively, as in the relationships mathematics calculations scores have with both taking alternative tests and receiving slower-paced instruction and the relationship between receiving more time for test-taking and oral reading fluency. A negative relationship also is apparent between receiving study skills instruction and the likelihood of group membership.

Students in the Sensory Disability Cluster

Students with sensory disabilities—visual or hearing impairments—have a pattern of generally positive outcomes relative to students with disabilities as a whole; for example, along with students in the behavior disability cluster, they read most fluently in Wave 1 and had the highest rate of growth over time on that measure. In the social adjustment domain, too, positive results are apparent; they were the least likely group to be involved in frequent disciplinary actions, for example. However, they also demonstrate considerable variability; their rate of growth in oral reading fluency, for example, was the most variable of any disability cluster. Factors SEELS analyses have demonstrated to be associated with variation in outcomes are summarized below.

- **Disability factors.** These factors fairly closely mirror for students in the sensory disability cluster the relationships that are apparent for students with disabilities overall. Having multiple disabilities and low self-care skills are negatively related to some measures of academic outcomes. In contrast, students in this disability cluster tended to have high functional cognitive skills, which are related to stronger academic performance on all measures at Wave 1 and to greater growth over time in mathematics calculation abilities. Higher functional cognitive and self-care skills also relate to a higher likelihood of group memberships, although involvement in more disciplinary incidents also is evident for students with sensory disabilities who have high functional cognitive skills relative to others in that disability cluster who were less skilled. A variable included in analyses of this disability cluster that distinguished students with hearing impairments from those with visual impairments shows no significant differences between students in the

disability categories of hearing and visual impairment with respect to tested academic performance; however students with hearing impairments did have a higher rate of oral reading fluency and lower grades than students with visual impairments when other factors included in the analyses are controlled for.

- **Demographic characteristics.** Students with sensory impairments are quite similar to students with disabilities as a whole on demographic factors. They also show a similar pattern of relationships between some of those factors and academic outcomes. For example, older students with sensory impairments out-performed younger students academically and had a lower rate of growth on all measures. Students with sensory impairments also replicated the lower rate of group membership among Hispanic students and were the only disability cluster to show the greater involvement in disciplinary actions among boys compared with girls that is found for students with disabilities overall. However, this is the only disability cluster to show a reading fluency disadvantage in Wave 1 for boys, and higher grades and fewer disciplinary actions for both African-American and Hispanic students relative to white students with sensory disabilities.
- **Household factors.** This group of students is characterized by particularly high parental expectations for educational attainment and high levels of involvement at home in support of children's education. Having higher expectations is associated with more positive mathematics abilities and grades for students with sensory impairments, as for students with disabilities overall. However, there are no relationships between variations in family support for education at home and any academic outcomes in Wave 1 or growth in them over time. Family support for education at school also is unrelated to academic outcomes in Wave 1, and the only relationship with growth over time pertains to oral reading fluency and is negative. The consistent pattern of positive relationships between household income and all outcome measures that is apparent for students with disabilities as a whole also is evident in the social adjustment domain for students with sensory disabilities, but applies only to mathematics calculation skills among the academic outcome measures.
- **Social skills and classroom behaviors.** High ratings of social skills by parents and positive classroom behaviors by teachers are more prominent for students in the sensory disability cluster than for most other groups. However, the two relationships between having high social skills and academic outcomes (with reading fluency and mathematics calculation scores) are negative; relationships to growth, which involve passage comprehension scores and group membership rates, also are negative. In contrast, students with sensory disabilities who were reported by teachers frequently to persist in completing classroom tasks had both higher mathematics scores and grades and a higher rate of growth in passage comprehension than students who reportedly persisted less often. Other classroom behaviors are unrelated to academic outcomes, although

frequently cooperating with peers and following directions are both associated with involvement in fewer disciplinary incidents in Wave 1 for students in this disability cluster.

- **School program characteristics.** Students in the sensory disability cluster share with students with disabilities overall the strong positive relationships between taking a higher proportion of academic classes in general education settings and stronger tested abilities in reading and mathematics, as well as the absence of relationships with growth in academic outcomes over time and with social adjustment outcomes both in Wave 1 and as they changed over time. The two groups also have similar negative relationships between class size and grades, although students with sensory impairments were more likely to be in small classes than students with disabilities as a whole. However, they differed on all other school program factors, including the absence of relationships among students with sensory impairments between Wave 1 outcomes and receiving a modified curriculum or more individual instruction or being more actively engaged in general instructional activities that were present among students with disabilities overall, and the presence of a relationship between teacher competence in teaching reading and passage comprehension scores among students with sensory impairments that is not evidence for the whole population of students with disabilities. This set of factors has few relationships with social adjustment outcomes, except for higher rates of group membership and involvement in more disciplinary incidents for students whose teachers reported more competence in teaching reading and who were more engaged in general instructional activities, respectively.
- **Accommodations and learning supports.** Receipt of several kinds of accommodations and learning supports (e.g., more time for taking tests, modified grading standards, slower-paced instruction) is less common among students in the sensory disability cluster than among other groups, whereas students with sensory disabilities were twice as likely as students with disabilities as a whole to have help from a reader or interpreter. Despite different levels of receipt, however, the two groups have similar negative relationships between having more time for test-taking and both oral reading fluency rates and grades, but also a higher rate of growth in passage comprehension over time. Negative relationships also are apparent for both groups between having help from a reader/interpreter and passage comprehension scores in Wave 1, and all groups share a negative relationship between participation in a behavior management plan and the number of disciplinary incidents in which students were involved. However, no relationships are apparent between academic outcomes and receiving study skills instruction or alternative tests among students with sensory disabilities, unlike the larger population. Besides behavior management programs, only receiving slower-paced instruction relates to social adjustment measures in Wave 1, with both higher rates of group membership and involvement in

more disciplinary incidents being associated with receipt of this accommodation.

Students in the Physical/Health Disability Cluster

About half of students in this disability cluster were identified with orthopedic impairments and half were those who qualified for the other health impairment category; about half the students, generally those in the latter category, also were reported to have ADHD. These students had generally positive academic outcomes; they shared the highest passage comprehension scores in both Waves 1 and 3 and the highest oral reading fluency rates in Wave 3, for example. Social adjustment outcomes tend to mirror those of students with disabilities as a whole. Patterns of relationships between outcomes and factors included in SEELS analyses are highlighted below.

- **Disability factors.** Unlike the consistent pattern of negative associations between multiple identified disabilities and academic outcomes that is apparent for students with disabilities as a whole, no associations are found for this factor on either academic or social adjustment outcomes for students with physical/health disabilities. Students in this disability cluster were among the most likely to receive high ratings on functional cognitive skills, yet only mathematics calculation scores and grades show the positive relationships with these skills that are apparent on all academic measures among the larger population of students with disabilities, and no relationship is apparent with regard to group membership rates among students with physical/health disabilities, unlike students with disabilities as a whole. In contrast, only group membership rates are associated with differences in self-care abilities for students with disabilities as a whole, whereas among those in the physical/health disability cluster, greater reading fluency but also involvement in more disciplinary incidents are found for students with high self-care skills relative to those with lower skills, despite students with physical/health disabilities being among the most likely to have only moderate self-care skills ratings. A variable included in analyses of this disability cluster shows no significant differences between students in the primary disability category of orthopedic impairment and other students on academic measures, independent of other differences between them, with the exception of students with orthopedic impairments having a higher grade point average.
- **Demographic characteristics.** As with students with disabilities as a whole, age is the most important distinguishing demographic characteristic among students with physical/health disabilities. Stronger academic performance on all measures is apparent for older members of this disability cluster, as are higher numbers of disciplinary incidents in Wave 1 and growth over time in them. No associations are apparent for this disability cluster with regard to gender. In contrast, although there were no significant differences between African-American and white students in the larger population of students with disabilities, African-American students in this disability cluster had

lower passage comprehension scores than their white peers. Group membership rates were lower for Hispanic relative to white students in both the population and this disability cluster, although students with physical/health disabilities had a higher rate of growth in those memberships over time.

- **Household factors.** Students in this disability cluster are the most likely to come from higher-income households, yet their economic differences are unrelated to differences in their academic performance, in sharp contrast to the academic advantage among students with disabilities as a whole who came from higher-income households. In the social adjustment domain, however, both groups demonstrate more positive outcomes for students from higher- versus lower-income households. Students with physical/health disabilities also have a less consistent pattern of positive relationships between academic outcomes and parents' expectations for their education attainment than is evident for the larger group of students with disabilities; only passage comprehension scores and grades were higher for students in this cluster whose parents were more confident of their future postsecondary education participation. However, these students were the only group to show benefits of parental expectations in terms of involvement in fewer disciplinary incidents in school. No associations are found with any academic or social adjustment outcome or with growth in them over time for family involvement either at home or at school.
- **Social skills and classroom behaviors.** Students in this disability cluster exhibit positive social skills and classroom behaviors at about the same rate as students with disabilities as a whole. Yet, although variations in students' social skills and the frequency with which they exhibit positive classroom behaviors are associated with differences in some academic and social adjustment outcomes for some groups of students with disabilities, no such associations are apparent on any measure in Wave 1 for students in this disability cluster. The few relationships that are apparent with growth in academic outcomes over time are inconsistent in direction, whereas when there are relationships with growth in social adjustment measures, more positive social skills and behaviors generally are associated with higher rates of growth in membership in prosocial extracurricular groups and lower rates of growth in the negative outcome of number of disciplinary incidents.
- **School program characteristics.** As with factors related to social skills and behaviors, students with physical/health disabilities have school programs that are quite similar, on average, to those of students with disabilities as a whole, yet their patterns of relationships between those factors and outcomes differ somewhat. For example, the consistent pattern of positive associations between taking more academic classes in general education settings and both reading and mathematics performance that is noted for students with disabilities overall is evident only with regard to the mathematics measure for students in this disability cluster, although they also exhibit a higher rate of growth in reading fluency that is not evident for the larger population of

students with disabilities. Reading measures were higher for students with physical/health disabilities who had no curriculum modification, and positive relationships also are apparent for students who are more actively engaged in general instructional activities. They scored higher on both mathematics and reading subtests and had a higher rate of growth in grades over time compared with less engaged students in this cluster. However, the same factor has less desirable relationships with social adjustment outcomes, showing involvement in more disciplinary actions in Wave 1 and a lower rate of growth in group memberships for more engaged students. Class size and the frequency of individual instruction are unrelated to any academic or social adjustment outcomes in Wave 1, but are associated with lower rates of growth in some academic measures over time.

- **Accommodations and learning supports.** Although receiving more time for test-taking, the most commonly provided accommodation for students with disabilities, is associated with negative academic outcomes (oral reading fluency and grades) for students with disabilities as a whole, this accommodation appears to be advantageous for students in the physical/health cluster; students who received it had higher scores on tests of both reading comprehension and mathematics calculation abilities than those who did not. Taking alternative assessments and being subject to modified grading standards are related negatively to some academic outcomes both for students in this cluster and students with disabilities overall. Receiving other accommodations is unrelated to any academic outcomes in Wave 1, and associations with growth generally are negative. Only participation in a behavior management program and receipt of study skills instruction relate to social adjustment outcomes; a higher rate of disciplinary actions is associated with the former and a lower rate with the latter for students in this disability cluster; lower rates of growth in group memberships are evident for those receiving both forms of learning support.

This summary of findings from SEELS analyses of the longitudinal academic and social adjustment outcomes of students with disabilities and factors associated with them powerfully demonstrates the complexity of the dynamic, multifaceted processes that help shape student learning and behavior. What students "bring to the table" in terms of their own strengths and challenges and their family profiles exercise powerful influences over their outcomes. Yet schools are important partners in shaping both academic performance and behavior; decisions made about instructional settings and practices and about accommodations and learning supports make a difference in what students learn and how they behave and can help alter for the better students' trajectories into the future. But it is clear that there is no one constellation of decisions that benefits all students equally, underscoring the critical importance of individualized programs to meet individual needs, a hallmark of special education since it became a right of students with disabilities.

What also is apparent from this, the most comprehensive analysis of student behavior and performance ever conducted of elementary and middle school students with disabilities as they transitioned through 5 years of their school careers, is that even this generous longitudinal look at their experiences and outcomes seems somehow too short. It cannot answer the critical questions of whether students completed school and were well-prepared to achieve their greatest potential in the post-high-school world. Those will continue to be important questions to ask and standards of accountability to hold for all students.

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