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Characteristics of High-Expenditure Students with Disabilities, 1999-2000

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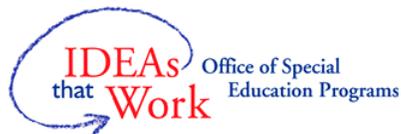
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SEEP Reports

This document is part of a series of reports based on descriptive information derived from the Special Education Expenditure Project (SEEP), a national study conducted by the American Institutes for Research (AIR) for the U.S. Department of Education, Office of Special Education Programs (OSEP). SEEP is being conducted by AIR under the auspices of the Center for Special Education Finance (CSEF). It is the fourth project sponsored by the U.S. Department of Education and its predecessor, the Department of Health, Education and Welfare, in the past 40 years to examine the nation's spending on special education and related services. See Kakalik, Furry, Thomas, and Carney (1981), Moore, Strang, Schwartz, and Braddock (1988), and Rossmiller, Hale, and Frohreich (1970).

The SEEP reports are based on analyses of extensive data for the 1999-2000 school year. The SEEP includes 23 different surveys to collect data at the state, district, and school levels. Survey respondents included state directors of special education, district directors of special education, district directors of transportation services, school principals, special education teachers and related service providers, regular education teachers, and special education aides. Survey responses were combined with other requested documents and data sets from states, schools, and districts to create databases that represented a sample of approximately 10,000 students with disabilities, more than 5,000 special education teachers and related service providers, approximately 5,000 regular education teachers, more than 1,000 schools, and well over 300 local education agencies.

The series of SEEP reports will provide descriptive information on the following issues:

- What are we spending on special education services for students with disabilities in the U.S.?
- How does special education spending vary across types of public school districts?
- What are we spending on due process for students with disabilities?
- What are we spending on transportation services for students with disabilities?
- How does education spending vary for students by disability and what factors explain differences in spending by disability?
- What role do functional abilities play in explaining spending variations for students with disabilities?
- What are we spending on preschool programs for students with disabilities?
- Who are the teachers and related service providers who serve students with disabilities?
- How are special education teaching assistants used to serve students with disabilities?
- What are we spending on special education services in different types of schools?
- How does special education spending vary across states classified by funding formula, student poverty, special education enrollment levels, and income levels?

One of the SEEP reports will also be devoted to describing the purpose and design of the study.

Table of Contents

Highlights.....	v
I. Introduction.....	1
II. What are We Currently Spending on Students at the Top of the Expenditure Distribution?	3
Per Pupil Total Educational Expenditures	4
Total Spending Versus Special Education Spending.....	5
III. Ethnicity and Gender of Students with Average and High Total Educational Expenditures	11
IV. Primary Disability Category	18
V. Functional Abilities.....	22
VI. Gap between Grade-Level Placement and Grade-Level Reading and Math	26
VII. Instructional Services.....	27
VIII. Class Size.....	31
IX. Summary and Conclusions	34

Exhibits

Exhibit 1. Per Pupil Spending to Educate School-Aged Students with Disabilities at Different Points on the Expenditure Distribution, Compared with Spending on the Average Regular Education Student in the United States, 1999-2000 ..5	
Exhibit 2. Percentage of Total Spending on Elementary School Students with Disabilities Devoted to Special Education Services at Different Points on the Distribution	7
Exhibit 3. Per Pupil Regular and Special Education Spending to Educate Elementary School Students with Disabilities at Different Points on the Distribution	8
Exhibit 4. Percentage of Total Spending on Secondary School Students with Disabilities Devoted to Special Education Services at Various Points on the Distribution	9
Exhibit 5. Per Pupil Regular and Special Education Spending to Educate Secondary School Students with Disabilities at Different Points on the Distribution	10
Exhibit 6. Ethnic Distribution of High- and Average-Expenditure Students with Disabilities Across School Types	13
Exhibit 7. Percentage of High- and Average-Expenditure Elementary School Students with Disabilities by Gender and Ethnicity.....	14
Exhibit 8. Percentage of High- and Average-Expenditure Secondary School Students with Disabilities by Gender and Ethnicity.....	15
Exhibit 9. Percentage of High- and Average-Expenditure Students with Disabilities Served in Special Education Schools by Gender and Ethnicity	17
Exhibit 10. Distribution of Elementary School Students with Disabilities by Primary Disability and Expenditure Category.....	19
Exhibit 11. Distribution of Secondary School Students with Disabilities by Primary Disability and Expenditure Category.....	20
Exhibit 12. Distribution of Average- and High-Expenditure Special Education School Students by Primary Disability and Expenditure Category.....	21

Exhibit 13. A Comparison of ABILITIES Index Scores of Average- and High-Expenditure Elementary School Students	23
Exhibit 14. A Comparison of ABILITIES Index Scores of Average- and High-Expenditure Elementary School Students	24
Exhibit 15. Gap between Grade Level and Performance in Reading and Math, by School Type, 1999-2000.....	26
Exhibit 16. Hours per Week of Instructional Services Provided to Elementary School Students with Disabilities, 1999-2000.....	28
Exhibit 17. Hours per Week of Instructional Services Provided to Secondary School Students with Disabilities, 1999-2000.....	30
Exhibit 18. Class Size of Instructional Services Provided to Elementary School Students with Disabilities, 1999-2000.....	31
Exhibit 19. Class Size for Instructional Services Provided to Secondary School Students with Disabilities, 1999-2000.....	32

Appendices

Appendix A: Per Pupil Total Educational Expenditures and Special Education Expenditures, by School Type	37
Appendix B: Distribution of Students with Average and High Expenditures Gender, Ethnicity and School Type.....	39
Appendix C: Primary Disability Category, by School Type.....	41
Appendix D: ABILITIES Index Average Scores, by School Type.....	42
Appendix E: Gap Between Grade Level and Performance in Reading and Math, by School Type	44
Appendix F: Hours Per Week of Instructional Services Provided To Students with Disabilities, by School Type.....	45
Appendix G: Class and Group Size of Instructional Services.....	47
Appendix H: ABILITIES Index Form.....	49
Appendix I: The ABILITIES Index: Psychometric Properties and Construct Validity.....	51

Highlights

- **Per pupil total educational expenditures.** Total spending on a high-expenditure student is higher by tens of thousands of dollars than total spending on an average-expenditure special education student.
- **Special education spending.** Spending on special education services makes up about 80 percent of the total education spending on high-expenditure students. In contrast, special education spending on average-expenditure students was about half of the total educational expenditures.
- **Ethnicity.** Non-Hispanic whites are more represented among high-expenditure students (64.7 percent) than among average-expenditure students (61.3 percent). An opposite pattern was observed among African American students, who were more represented in the average-expenditure group (21.7 percent) than in the high-expenditure group (17.1 percent).
- **Gender.** Male students with disabilities outnumber female students with disabilities at a ratio of 2:1. This proportional representation is evident both among high-expenditure and average-expenditure students.
- **Primary Category of Disability.** The disability categories of Specific Learning Disability, Speech or Language Disorder, and Other Health Impairment are the only three disability categories that are more associated with average-expenditure than with high-expenditure students.
- **Functional Abilities.** High-expenditure students tend to have significantly greater levels of dysfunction in most functional ability domains compared to average-expenditure students, as measured by the ABILITIES Index (Bailey, Simeonsson, Buisse & Smith, 1993).
- **Educational Needs.** High-expenditure students have a significantly higher gap between grade level placement and grade level achievement in reading and in math compared to average-expenditure students.
- **Instructional Services.** High-expenditure students in elementary schools receive more hours per week of specialized services than average-expenditure elementary school students. High-expenditure secondary school students receive more hours per week both in special (self-contained) classrooms taught by a special education teacher, and with resource specialists and related service providers.
- **Class Size.** High-expenditure students attend special education classrooms that have smaller class sizes compared to average-expenditure students. They also work with resource specialists and related service providers in settings with lower teacher-student ratios.

I. Introduction

Under the federal Individuals with Disabilities Education Act (IDEA), school districts are required to meet the educational needs of all students with disabilities. However, school districts struggle to provide adequate services to students with disabilities who have extraordinary needs and require unusually high expenditures to meet those needs. A growing number of states provide separate funding provisions to help school districts manage the extremely high expenditures required by these high-need students. Although these state funding mechanisms vary greatly, they are generally aimed towards students whose services exceed a specified level of educational expenditures (Parrish, Harr, Anthony, Merickel, & Esra, 2003).

In response to concerns about the expenditures required to serve these students, the President's Commission on Excellence in Special Education recommended that the IDEA include models for funding the costs of high-need children and allow state and local education agencies to proactively prepare for unanticipated fiscal obligations associated with the provision of special education (U.S. Department of Education, 2002a).

The purpose of this report is to identify those students with disabilities on whom we are spending the most money, and to find out who these students are and how they differ from other students with disabilities. Specifically, the aim of the report is to provide a descriptive analysis of the magnitude of variations in per pupil expenditures to educate students with disabilities across all school districts in the nation, and to explore the characteristics of those students at the top of the expenditure distribution. This information will enhance our understanding of children with exceptionally high expenditures and assist educational leaders in determining how best to address the service needs of these students.

The descriptive analysis presented here focuses on different significant points along the distribution of expenditures on children with disabilities and looks at the characteristics of these children with respect to

- demographic characteristics (i.e., gender, ethnicity)
- primary category of disability
- functional abilities
- grade level performance in reading and math
- types of instructional services
- class sizes and caseloads in which they are served

This report focuses on kindergarten through twelfth-grade students. Preschool students, students enrolled in vocational schools and juvenile justice schools, and students served outside of their local school districts in non-public schools or other public agencies are not included due to insufficient sample size. The small sample sizes preclude the possibility of further dividing these samples by grade level placement and level of

associated education expenditures. In addition, the large variation in the resource allocation systems of preschools and non-public schools might hinder any meaningful comparison with the mainstream school system.

This report and other SEEP reports use the phrase “student with a disability” to refer to a student receiving special education services, as determined by the student’s individual education program (IEP), under the IDEA. All figures used in this report are based on 1999-2000 school year data. Total education expenditures include all school resources, including regular and special education, transportation, and all other special needs programs (Chambers, Parish, & Harr, 2004).

II. What Are We Currently Spending on Students at the Top of the Expenditure Distribution?

In this section, we look at the variations in total educational expenditures for students with disabilities by school type.¹ Total educational spending encompasses *all* school resources, including *both special and regular education* and other special needs programs, used to provide a comprehensive educational program to meet student needs. Thus, the focus is on *what is being spent to educate a student with disabilities*, rather than just what is being spent on special education services. Ranges of expenditures, sample sizes, average per pupil expenditures, standard errors and estimated population figures are presented in Appendix A.²

The analysis presented in this report attempts to define students with high expenditures in a way that will allow analysis of the individual student characteristics that are correlated with high expenditures.³ Therefore, we limit the scope of this analysis to students who have particularly high expenditures relative to all other students with disabilities in the nation who are from the same age group and the same type of school.

We present student profiles and associated expenditures separately for elementary and secondary schools to illustrate several differences between these two school types. First, the internal organization of elementary schools is different from that of secondary schools. Elementary schools typically serve kindergarten through fifth or sixth grade, are usually located in the students' residential neighborhoods, and serve smaller populations than middle/junior high and high schools. In addition, elementary schools usually have self-contained (non-departmentalized) classrooms as opposed to the departmentalized classrooms that are common in most middle and high schools.

Second, there is a national trend to provide more inclusive education for secondary-age students with disabilities. Typically, only students with the most severe disabilities remain in special education classrooms in the secondary school level. Special education students with greater needs generally do not move to the departmentalized environments typical of secondary schools. Third, according to a study conducted by the National Center on Secondary Education and Transition (Thurlow, 2002, January), the level of accommodations received by students with disabilities in regular secondary education classrooms may be lower than the amount of accommodations received by elementary

¹ Expenditures are presented in actual unadjusted dollars. If this analysis were repeated for individual state samples, dollar amounts would need to be adjusted for variations from state to state and from district to district. Additional analysis, not reported here, demonstrated that in the case of a national sample, such differences are diminished.

² The averages were calculated by taking into account the characteristics of the stratified sample and the student weights. For a description of the SEEP samples and the calculation of student weights, see Chambers, Parrish, Shkolnik, Levine, & Makris (2003).

³ These students are often referred to as "high-cost." This report deliberately uses the term high-expenditure instead of "high-cost" to emphasize the fact that all that is being measured is the flow of dollars, regardless of the results attained by students with disabilities. For further discussion, see Chambers, Parrish, & Harr (2004).

school students. Finally, by the time they reach high school, some students with disabilities drop out of school or transfer to special or alternative schools. A combination of these factors may create different distributions of students with various levels of needs in elementary and secondary schools, and may also affect economies of scale (reduced costs per student due to a larger number of students) in the operation of special education programs.

Another type of school included in the analysis is state schools that are specialized to accommodate and educate students with disabilities. Special education schools provide educational services to students in the disability categories of Visual Impairment, Hearing Impairment, Mental Retardation, and Orthopedic Impairment. Because special education schools differ from regular schools in both their distribution of services and organization of instructional classes, they were analyzed separately. Students in this type of school were not differentiated by grade-level placement (i.e., elementary, secondary) due to small sample size.

Total Per Pupil Educational Expenditures

For the purposes of the analyses presented in this report, we have divided students with disabilities into two groups within each school type: a *high-expenditure* group and an *average-expenditure* group. The top 5 percent of the expenditure distribution were defined as the “high-expenditure” group of students. (This decision was based solely on considerations of sample size and does not reflect fiscal policies or conceptual definitions of high-need students.)

As a baseline for comparisons, we selected students with levels of expenditures that do not represent the upper or lower extremes. Thus, “average-expenditure” students with disabilities were defined as students whose total educational expenditures are in the second and the third quartiles of the expenditure distribution.⁴

Exhibit 1 compares this high-expenditure group to a more extreme group (the top 1 percent with respect to total education expenditures) and the average expenditure group. Average per pupil expenditures are presented separately by school type (i.e., elementary schools, secondary schools, and special education schools). The average per pupil expenditure for students in the second and third quartiles was \$9,460, \$10,221, and \$21,281 for elementary, secondary, and special education schools, respectively.⁵ In contrast, the average per pupil expenditure was \$39,909, \$35,924, and \$57,129 for students in the top 5 percent of the expenditure distribution, and \$57,411, \$61,381, and \$88,966 for students in the top 1 percent of the distribution.

⁴ An expenditure distribution was identified separately for each school type (i.e., elementary, secondary and special education schools).

⁵ In comparison, the median per pupil expenditure was \$9,130, \$9,873, and \$21,169 for students with disabilities enrolled in elementary, secondary, and special education schools, respectively. These amounts are only slightly lower than the average expenditure calculated for the expenditures in the second and third quartiles of the distribution.

The average expenditure on students at the top 1 percent of the expenditure distribution is several times greater than the average expenditure on students who are located in the middle of the distribution (second and third quartiles). It is 6.1 times greater for elementary schools, 6.0 times greater for secondary schools, and 4.2 times greater for special education schools ($6.1 = \$57,411/\$9,460$, $6.0 = \$61,381/\$10,221$, and $4.2 = \$88,966/\$21,281$).

The difference between expenditures per student at the top 5 percent of the expenditure distribution and in the middle of the distribution is also notable. It is 4.2 times greater for elementary schools, 3.5 times greater for secondary schools, and 2.7 times greater for special education schools ($4.2 = \$39,909/\$9,460$, $3.5 = \$35,924/\$10,221$, and $2.7 = \$57,129/\$21,281$).

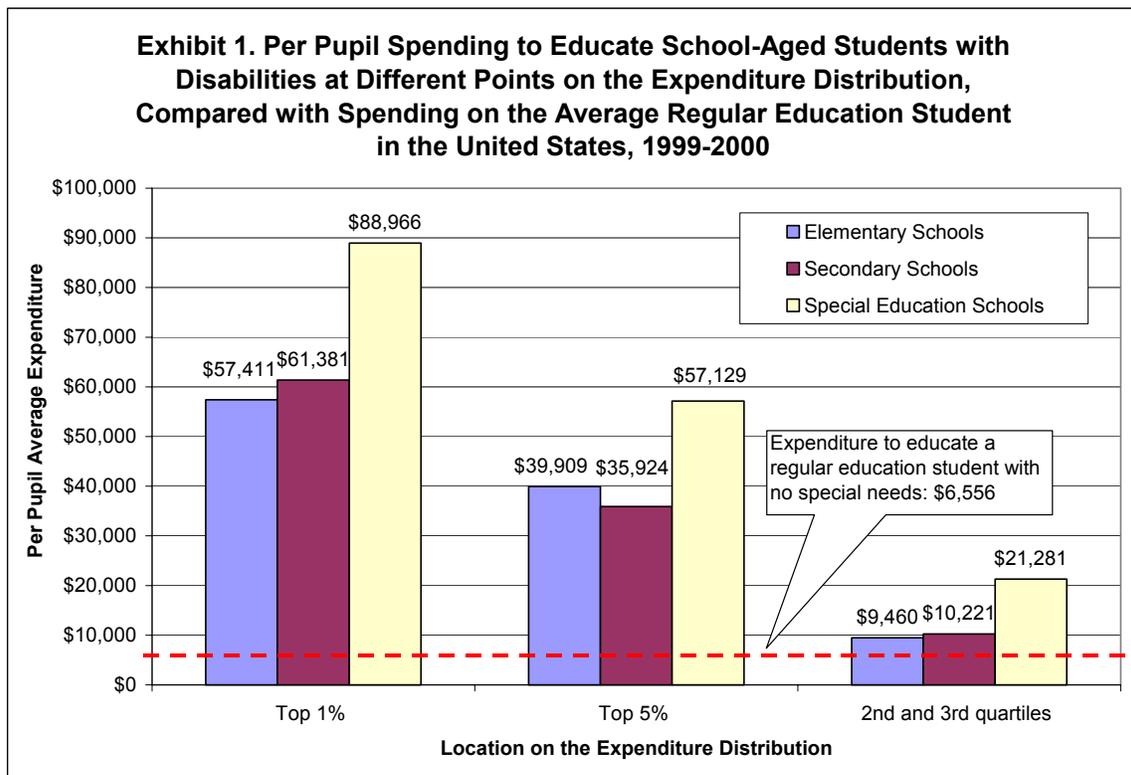


Exhibit 1 reads: The per pupil total expenditure to provide regular and special education services to elementary school students with disabilities whose total expenditures are located at or above the 99th percentile of the expenditure distribution is estimated to be \$57,411. In comparison, total spending on elementary school students at or above the 95th percentile of the expenditure distribution is estimated to be \$39,909.

As reported by Chambers, Parrish, and Harr (2004), the base expenditure on a regular education student who requires *no* services from any special program is \$6,556. A comparison of this figure to the average per pupil expenditures of students with disabilities at the top of the expenditure distribution reveals that regardless of the type of school in which students with disabilities are enrolled, the difference amounts to tens of thousands of dollars, ranging from a difference of \$29,638 for secondary school students who are at the top 5 percent of the expenditure distribution (=35,924-\$6,556) to a difference of \$82,410 for students in special education schools who are at the top 1 percent of the expenditure distribution (=\$88,966-\$6,556).

In order to ensure a sufficient sample size for exploring the characteristics of students with high expenditures, we chose to focus on students at the top 5 percent of the expenditure distribution. This group consisted of 8.3 percent of the total number of sampled special education students in elementary schools, 8.9 percent of the students in secondary schools, and 18 percent of the students in special education schools.⁶ In contrast, students whose total educational expenditures were in the second and the third quartiles consisted of 44.2 percent, 46.7 percent and 35.7 percent, respectively, of the total number of sampled special education students in elementary, secondary, and special education schools. As shown in Appendix A, while high-expenditure elementary students make up only 8.3 percent of the population of students with disabilities, the amount expended on them is 17.1 percent of the total amount, for a ratio of 2.1. The ratio is 1.7 for secondary students, with 8.9 percent of the students accounting for 15.1 percent of the total expenditure.

Total Spending Versus Special Education Spending

Total special education spending includes the amounts used to employ special education teachers, related service providers, and special education administrators, as well as spending on special transportation services and non-personnel items (e.g., materials, supplies, technological supports) purchased under the auspices of the special education program. Some portion of this special education spending is for instructional services that normally would be provided as part of the regular education curriculum offered to regular education students.

In the 1999-2000 school year, total spending on regular and special education services to students in elementary, secondary, and special education schools was \$31.0 billion, \$31.1 billion, and \$0.6 billion, respectively. Special education spending alone was \$18.8, \$18.3 billion, and \$0.5 billion, for students with disabilities enrolled in elementary, secondary, and special education schools, respectively. As shown in Exhibit 2 (elementary school students) and Exhibit 3 (secondary school students), the special education spending portion varies as a function of the total expenditure distribution category.

⁶ The relatively large percentages of students with high expenditures are due to oversampling of students with low-incidence disabilities (i.e., a higher-than-proportionate number were included in the SEEP sample). Oversampling was conducted to ensure adequate sample sizes for these less common disability categories.

Exhibit 2 shows how much of the total education expenditure on an elementary school student goes to special education services. Each bar represents a range of students, in order from the lowest to highest total expenditure, and the dotted line shows the average percentage for special education expenditures (61.4 percent). The exhibit shows that, for students in the middle expenditure group (between the 25th and 75th percentile), special education expenditures made up 52.4 percent of their total expenditures. For students whose total expenditures were in the 95th percentile, special education expenditures represented 79.6 percent of the total.

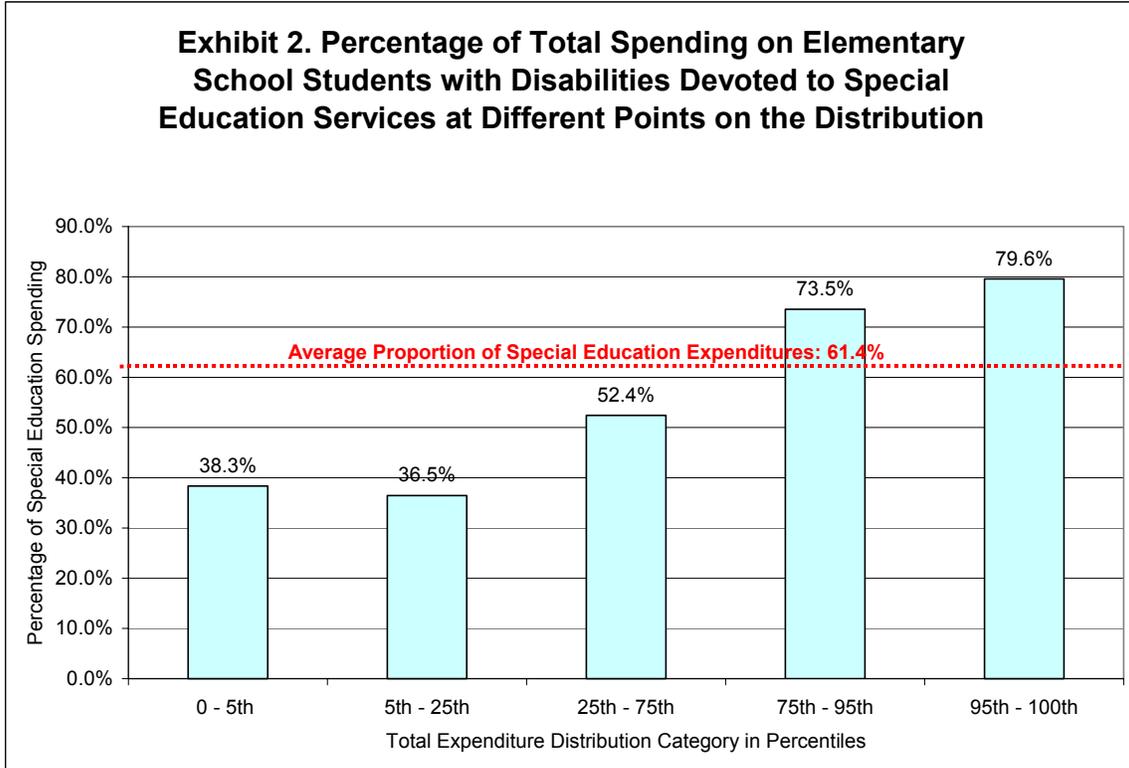


Exhibit 2 reads: Most of the total educational expenditure (79.6 percent) goes to special education services for elementary school students with disabilities at the top 5 percent of the expenditure distribution.

Exhibit 3 shows the distribution of per pupil special education expenditures and additional expenditures attributable to regular education services and other special programs (e.g., Title I or programs for English language learners) for *elementary* school students with disabilities. The distribution is divided into five groups of unequal size. The middle group of expenditures (25th-75th percentile) is compared to the highest and to the lowest 5 percent of the distribution, and to two additional middle groups: the 5th-25th and 75th-95th percentiles. Variations in special education expenditures are the primary source for the variations in total educational expenditures. These special education expenditures amount to \$31,766 per pupil for students whose total educational expenditures are at the top 5 percent of the expenditure distribution.

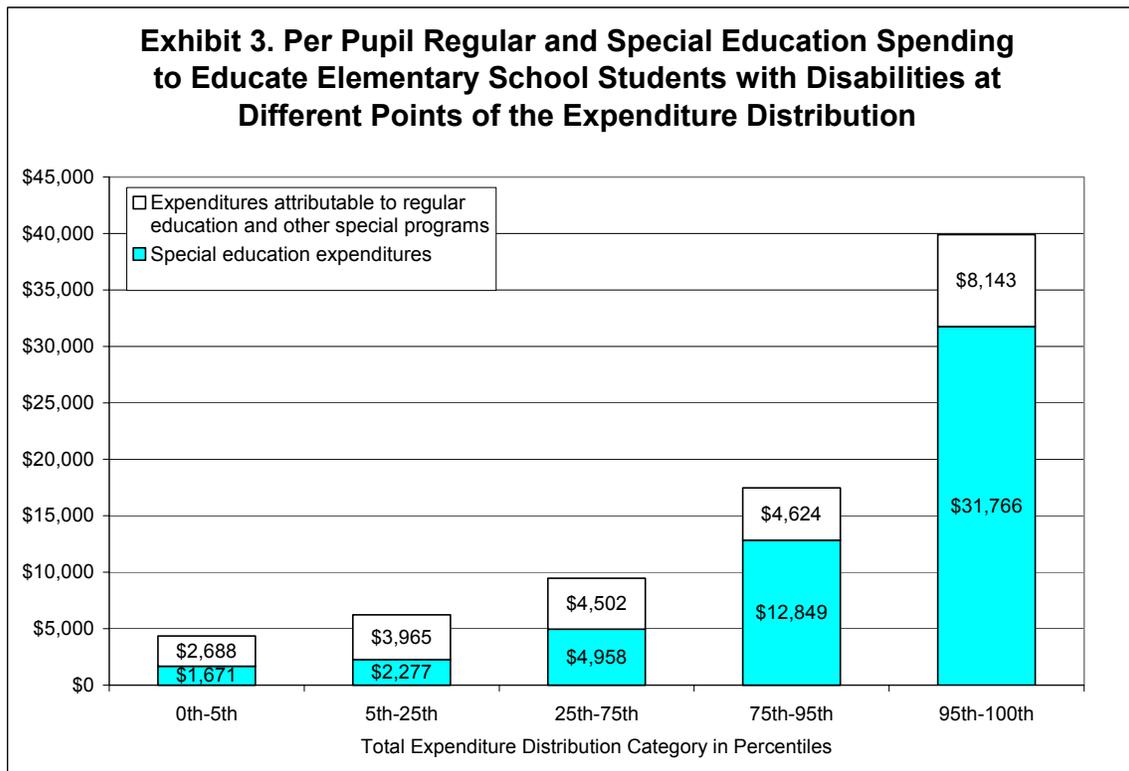


Exhibit 3 reads: The average per pupil educational spending on students at the top 5 percent with respect to the expenditure distribution is composed of \$31,766 for special education services, and \$8,143 for regular education services and other special programs.

Exhibit 4 presents the same information as in Exhibit 2, but for secondary schools instead of elementary schools. The exhibit shows how much of the total education expenditure on a secondary school student goes to special education services. Each bar represents a range of students, in order from the lowest to highest total expenditure, and the dotted line shows the average percentage for special education expenditures (58.7 percent). The exhibit shows that, for students in the middle expenditure group (25th-75th percentile), special education expenditures made up 48.8 percent of their total expenditures. For

students in the top 5 percent, special education expenditures represented 87.7 percent of the total.

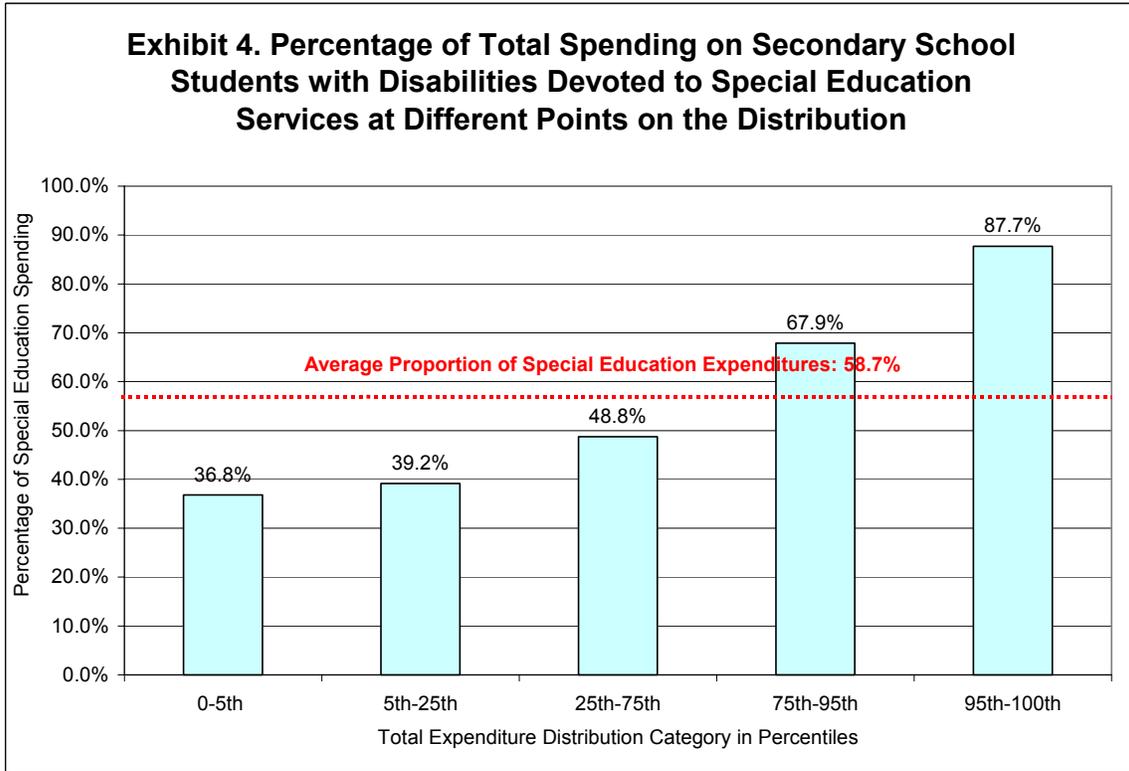


Exhibit 4 reads: Most of the total educational expenditures (87.7 percent) goes to special education services for secondary school students with disabilities whose total expenditures are at the top 5 percent of the expenditure distribution.

Exhibit 5 shows the distribution of per pupil special education expenditures and additional expenditures attributable to regular education services and other special programs for secondary school students with disabilities. The distribution is divided into five unequal parts of the expenditure distribution. The middle group of expenditures (25th-75th percentile) is compared to the highest and lowest 5 percent of the distribution, and to students in the 5th-25th and 75th-95th percentiles. Variations in special education expenditures are again the primary source for the variations in total educational expenditures. These expenditures are \$31,502 per pupil for students at the top 5 percent of the expenditure distribution.

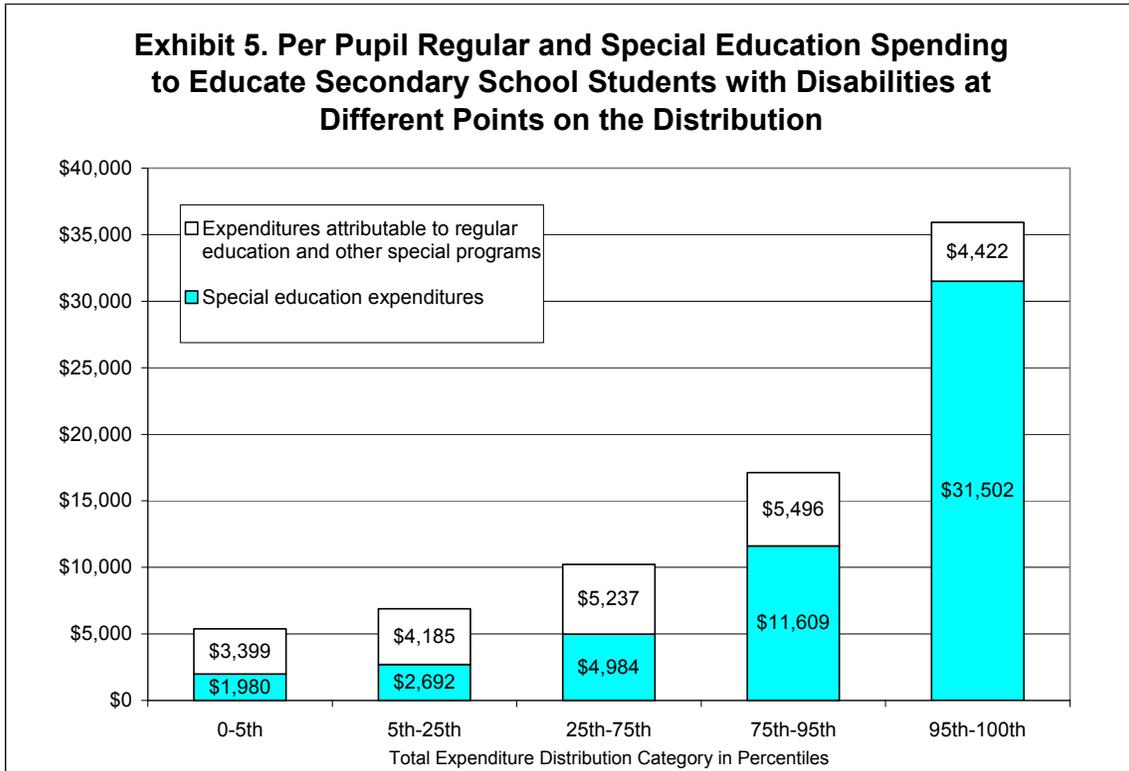


Exhibit 5 reads: The average per pupil educational spending on secondary school students at the top 5 percent of the expenditure distribution is composed of \$31,502 for special education services and \$4,422 for regular education services and other special programs.

In sum, the difference between total spending on a student in the top 5 percent of the expenditure distribution is higher by tens of thousands of dollars than the total spending on the average-expenditure special education student. An increasing share of expenditures for special education services accounts for this difference. About 80 percent of the total educational spending on students with high expenditures went toward special education services, while approximately half of the total educational expenditures on students with average expenditures was spent on special education services. To understand the nature and origin of this difference, Sections IV-VIII of this report explore the need characteristics of students with disabilities.

While the analysis in this report is focused on students who are served within the public schools operated by the sample districts and intermediate educational units (IEUs), we also address the question of the magnitude of the difference in expenditure between this sample and students who are served outside of their local school districts in a non-public school or other public agency.⁷ The average per pupil spending to educate non-public school students was larger than the equivalent spending on students in state special education schools (\$23,805 compared to \$21,281 for the second and third quartiles, and \$91,027 compared to \$57,129 for the top 5 percent of the distribution).⁸ The amount attributable to special education and related services for nonpublic school students is essentially 100 percent of their total educational expenditures.

⁷ This sample was not included in the current analysis due to small sample size, and lack of information on the set of services these students receive, class sizes and caseloads, the types of schools that the students attended.

⁸ Average per pupil expenditure for non-public school students at the top 1 percent of the expenditure distribution could not be presented due to sample size smaller than 30.

III. Ethnicity and Gender of Students with Average and High Total Educational Expenditures

There is widespread concern about overrepresentation of minorities in special education (Donovan & Cross, 2002). Over the last two decades, a steady pattern of overrepresentation has been evident among African Americans in the Mental Retardation and Emotional Disturbance categories and Native Americans in the Specific Learning Disability category, while Asian Americans have been underrepresented in most categories. (For a review and synthesis of the literature, see Hosp & Reschly, 2003). Concerns have been raised by educators and policymakers that a child's race and ethnicity might be associated with the child's probability of being misidentified, misclassified, and inappropriately placed in special education programs, and might result in a lower probability of receiving early intervention services.

According to the National Center for Education Statistics (2000), about 15.7 percent of the U.S. school-age population was African American in the 1999-2000 school year. In contrast, African American students represented 21.3 percent, 22.3 percent, and 3.7 percent of the total number of students with disabilities in elementary, secondary, and special education schools, respectively. All three differences are statistically significant ($p < .01$).

In addition, according to NCES, about 78.8 percent of the school-age population in the nation was white in the school year 1999-2000. In contrast, white students represented 53.4 percent, 40.5 percent, and 66.4 percent, respectively, of the total number of students with disabilities in elementary, secondary, and special education schools in the nation in the 1999-2000 school year.

Prior to this study, little was known about the ethnic makeup of the group of students with high educational expenditures. Specifically, we asked: *Does over-representation of African American students exist both among students with high expenditures and students with average expenditures?* As Exhibit 6 shows, African American students are over-represented among the average-expenditure (24 percent) group, and under-represented among the high-expenditure group (11.3 percent). This difference is statistically significant ($p < .01$).

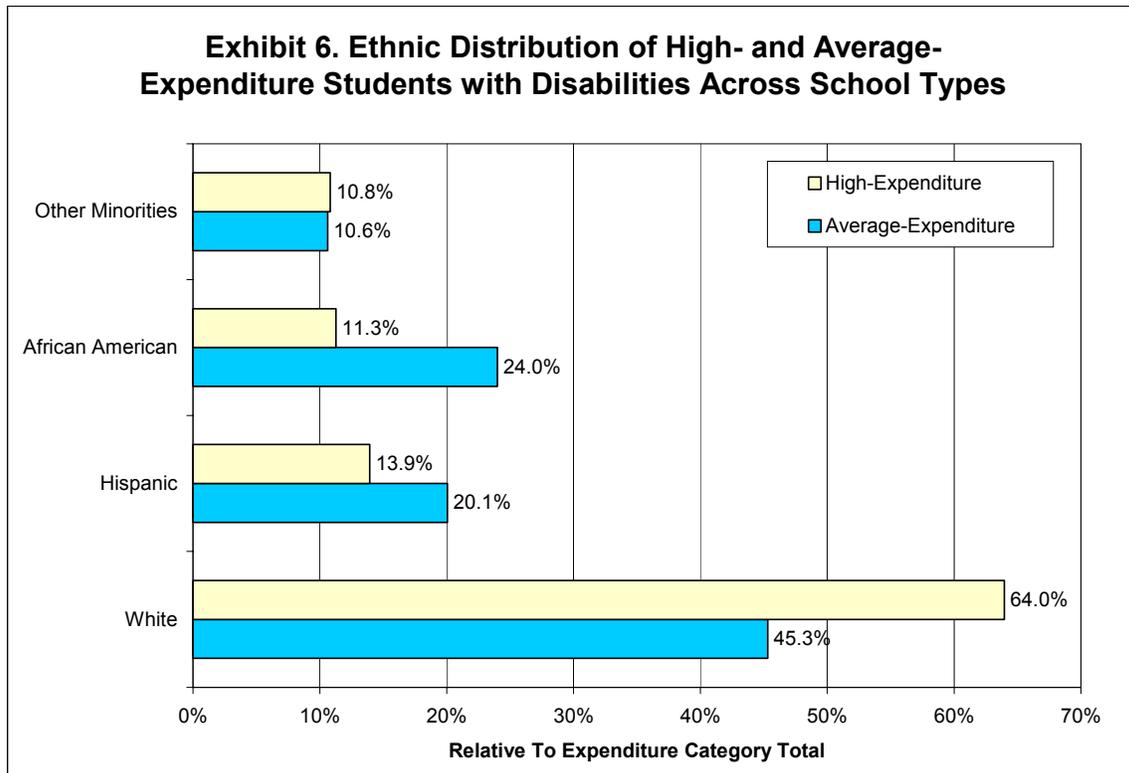


Exhibit 6 reads: African American students represent 24.0 percent of average-expenditure students.

Another topic of interest is the disproportionate representation of males among students with disabilities (U.S. Department of Education, 2002b; Wehmeyer & Schwartz, 2001). According to NCES, 51.3 percent of the total school-age population in 1999-2000 was male. However, estimates based on the SEEP data for 1999-2000 show that males represented about 64.9, 68.4 percent, and 82.2 percent of the total number of students with disabilities in elementary, secondary, and special education schools, respectively. All three differences are statistically significant ($p < .01$).

Gender distribution varies as a function of expenditure category. Among elementary school students with disabilities, male students are more represented in the high-expenditure group than in the average-expenditure group (82.3 percent vs. 63.1 percent, $p < .01$). An opposite pattern was observed for secondary school students with disabilities; males were more represented among average-expenditure students than among high-expenditure students (69.6 percent vs. 55.7 percent, $p < .01$). Similarly, among special education school students, males were more represented among average-expenditure students than among high-expenditure students (82.8 vs. 76.7, $p < .01$). In all sub-groups, despite the variations noted above, males consisted of the majority of special education students.

As a next step, the interaction between ethnicity and gender by school type was examined. Exhibit 7 presents a breakdown of the proportions of elementary school students by gender and ethnicity for high- and average-expenditure students. Several notable differences were observed. First, the representation of white males among high-expenditure students with disabilities is more than twice the percentage of white males among average-expenditure students (66 percent vs. 31.6 percent, $p < .01$). An opposite trend was observed among African American students. The representation of African American males among average-expenditure students was almost three times higher than among high-expenditure students (15.7 percent vs. 5.6 percent, $p < .01$). Similarly, Hispanic males were more represented among average- than among high-expenditure elementary school students with disabilities (10.3 percent vs. 4.5 percent, $p < .01$).

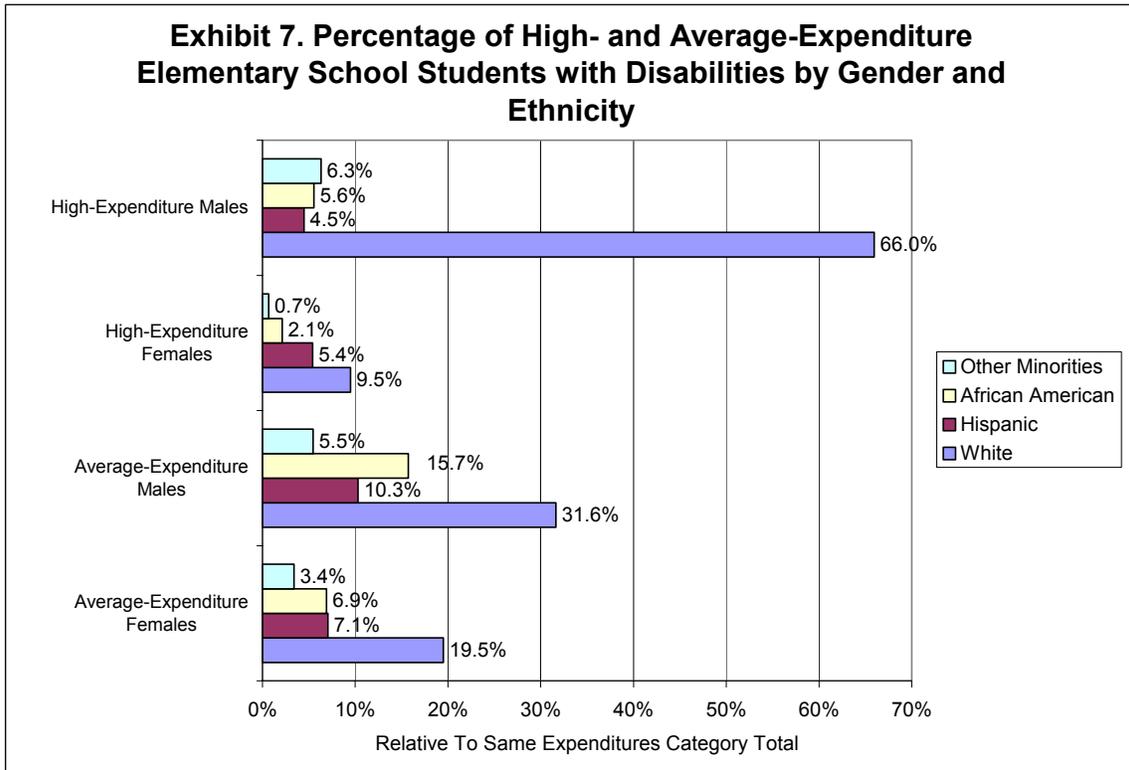


Exhibit 7 reads: African American students represent 7.7 percent of high-expenditure elementary school students with disabilities (5.6 percent males and 2.1 percent females).

In secondary schools, a different pattern emerges with respect to distribution of gender and ethnicity. There is a higher percentage of white males in the average-expenditure group than in the high-expenditure group (25.9 percent vs. 24.9 percent, $p < .01$). In addition, there is a higher percentage of white females than white males in the high-expenditure group (27.5 percent vs. 24.9 percent, $p < .01$). Similar to the trend observed in elementary schools, there is a higher percentage of African American and Hispanic males in the average-expenditure group than in the high-expenditure group (17.1 percent vs. 9.0 percent, $p < .01$, and 17.7 percent vs. 13.3 percent, $p < .01$, for African American and Hispanic students with disabilities, respectively).

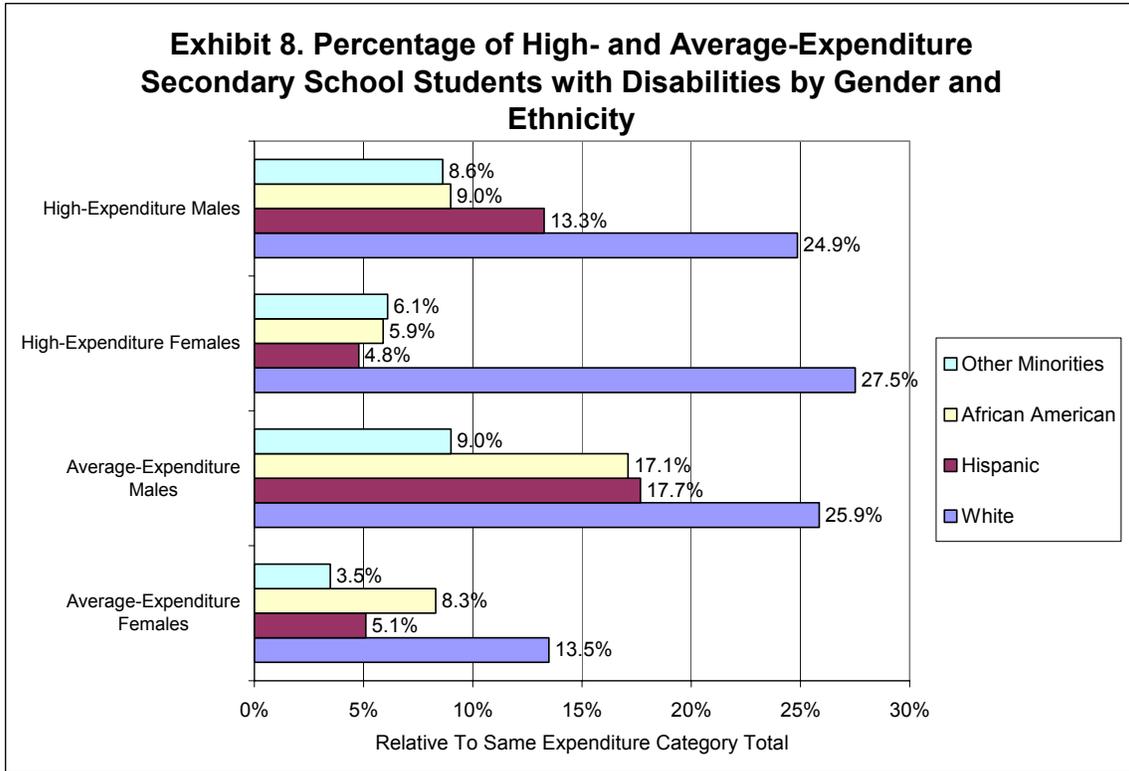


Exhibit 8 reads: African American students represent 14.9 percent of high-expenditure secondary school students with disabilities (9.0 percent males and 5.9 percent females).

Special education schools show trends similar to regular elementary schools in the representation of students by gender and ethnicity. As shown in Exhibit 9, 64.4 percent of the high-expenditure group in secondary schools is composed of white males, compared to 55.7 percent in the average-expenditure group ($p < .01$). African American males are more represented in the average-expenditure group than in the high-expenditure group (22.9 percent vs. 8.3 percent, $p < .01$).

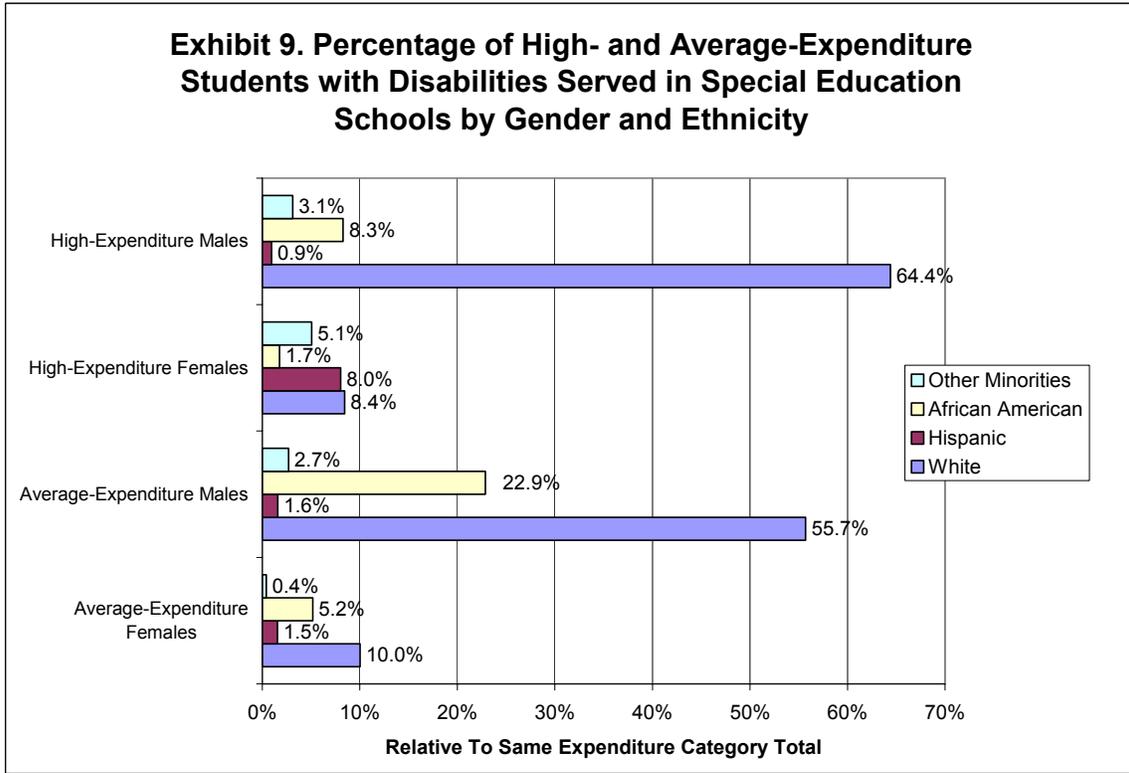


Exhibit 9 reads: African American students represent 10 percent of high-expenditure students with disabilities in special education schools (8.3 percent males and 1.7 percent females).

In sum, in agreement with the previous literature cited above, SEEP data show that there is an overrepresentation of male students and African American students among the school-age population of students with disabilities in regular and special education schools in the nation, with the exception of high-expenditure students in secondary schools. The representation of white males is greater in high-expenditure groups in regular elementary and special education schools, and among average-expenditure students in regular secondary schools. The distribution by gender of minority students is similar across school types.

IV. Primary Disability Category

States report disability data in the following IDEA categories⁹:

- Autism (AUT)
- Deaf-Blindness (DB)
- Developmental Delay¹⁰ (DD)
- Emotional Disturbance (ED)
- Hearing Impairment/Deafness (HI/D)
- Mental Retardation (MR)
- Multiple Disabilities (MD)
- Other Health Impairment (OHI)
- Orthopedic Impairment (OI)
- Specific Learning Disability (SLD)
- Speech or Language Impairment (SLI)
- Traumatic Brain Injury (TBI)
- Visual Impairment/Blindness (VI/B)

While disability categories are relatively easy and useful for broad classification purposes, each category is a family of disorders varying in the number, nature, and severity of their symptoms. To determine the effect that these variations may have on education expenditures, we compared the distribution of primary disability categories across school types and expenditure-level groups. Exhibits 10 and 11 present the distribution of students with average and high expenditures by disability category in elementary and secondary schools, respectively. Full details and differences between the proportions are presented in Appendix C. In both elementary and secondary schools, the disability categories of Specific Learning Disability, Speech and Language Impairment, and Other Health Impairment were more represented in the average-expenditure group, while the rest of the disability categories were more represented among high-expenditure students.

The high- and average-expenditure groups of students are composed very differently. For example, the percentage of average-expenditure students in the Specific Learning Disability category is about four times greater than the percentage of high-expenditure students in this category (52 percent vs. 13.9 percent for elementary schools, 37.8 percent

⁹ Due to small sample sizes, two of these 13 disability categories are not included in the exhibits in this report: namely, school-aged children with Deaf-Blindness or Developmental Delay.

¹⁰ The Developmental Delay category, introduced in 1997-98, is applicable only to children ages 3 through 9. Its use for students ages 6 through 9 is optional for states and local education agencies (LEAs).

vs. 9.1 percent for secondary schools). On the other hand, the category of Multiple Disabilities is almost five times more common in the high-expenditure group than in the average-expenditure group (17.6 percent vs. 3.8 percent for elementary schools, 20 percent vs. 3 percent for secondary schools).

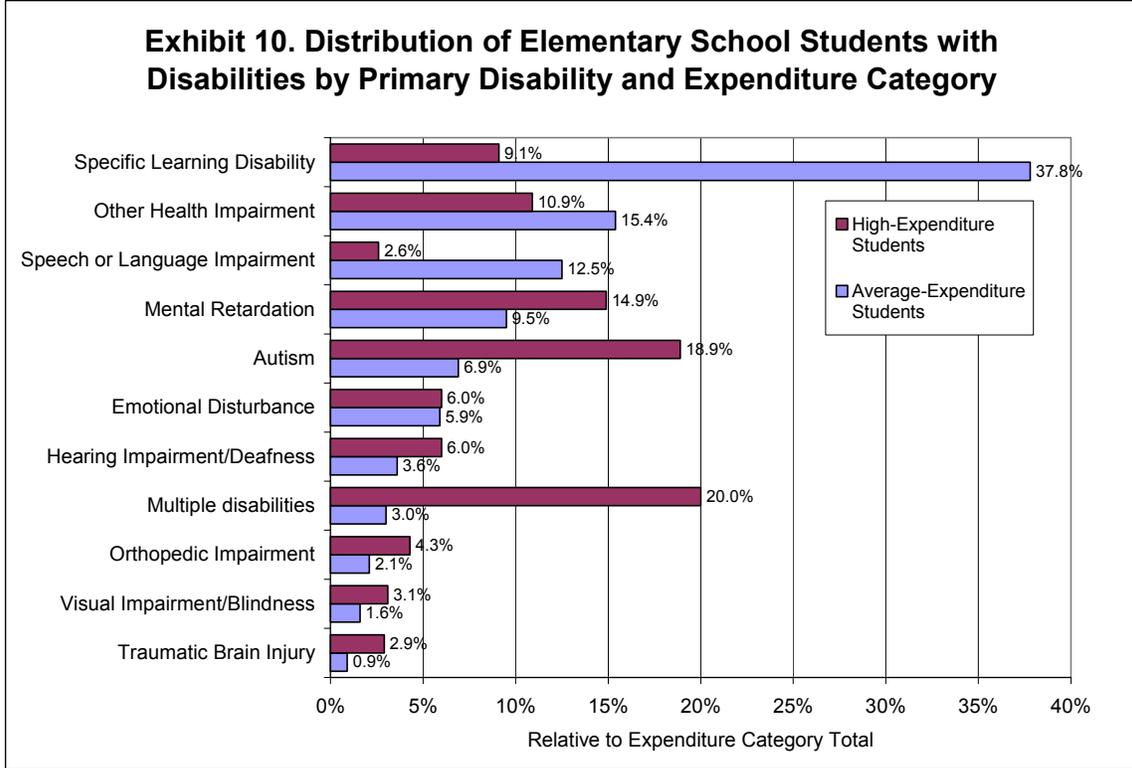


Exhibit 10 reads: About 37.8 percent of average-expenditure elementary school students are in the Specific Learning Disability category, In contrast, 9.1 percent of high-expenditure students are in the Specific Learning Disability category.

The representation of students with Specific Learning Disability, Speech and Language Disorder or Other Health Impairment, although relatively small, among students with exceptionally high expenditures, raises an important issue of the predictability of students' expenditures based solely on their category of disability. Clearly, there are extreme cases in each classification group, and generalizations about educational needs or expenditures cannot be made based on disability category alone. The representation of all disability categories among students with very high expenditures adds to the notion that disability categories serve as general classifications rather than labels. In other words, they are informative, but not enough to accurately predict the magnitude of expenditures spent.

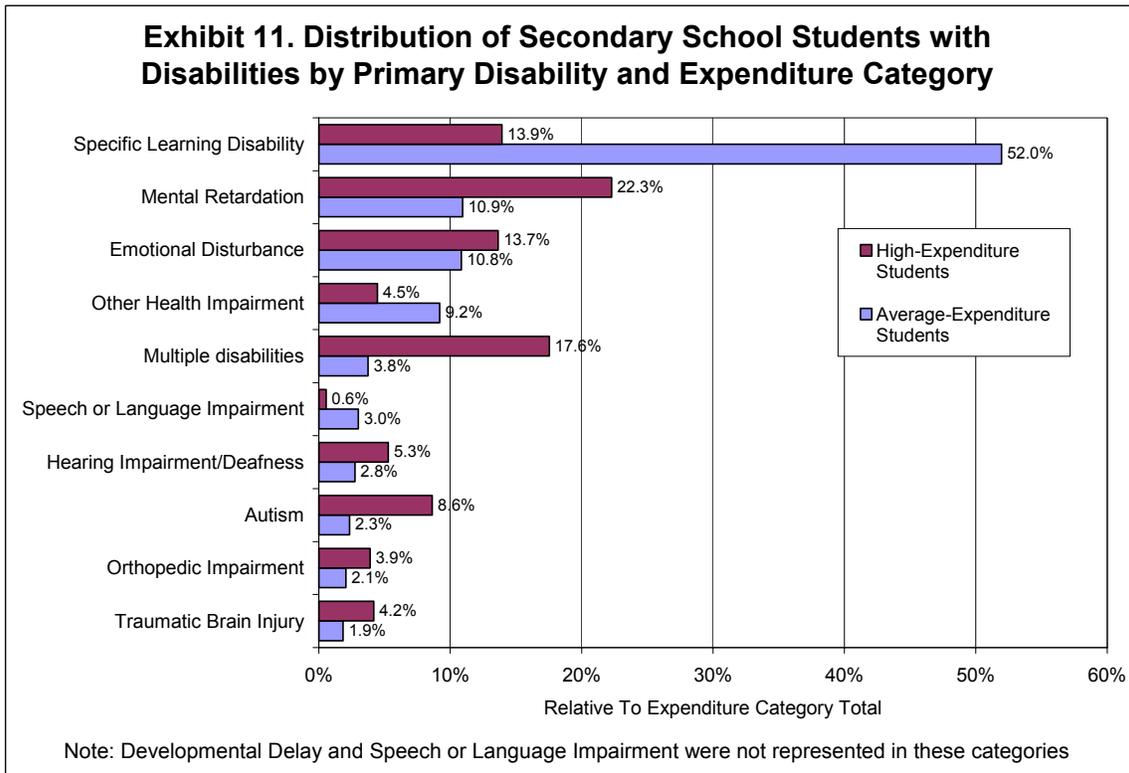


Exhibit 11 reads: About 52.0 percent of average-expenditure elementary school students are in the Specific Learning Disability category. In contrast, less than 13.9 percent of high-expenditure students are in the Specific Learning Disability category.

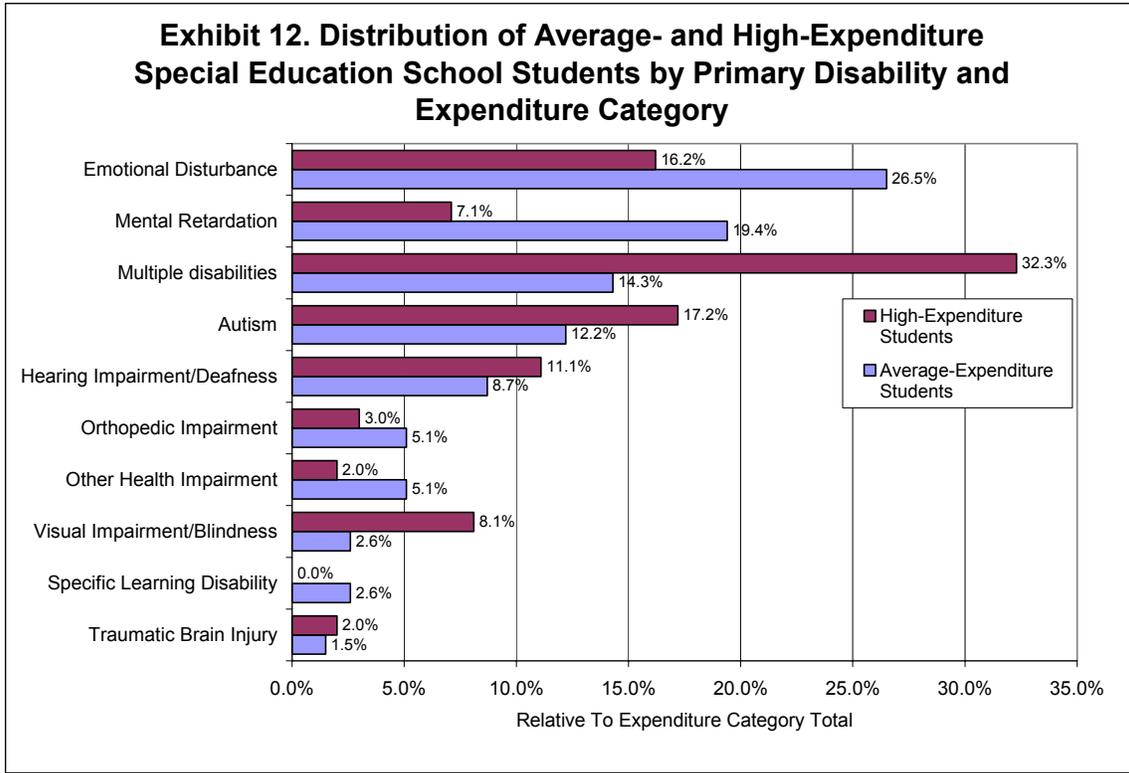


Exhibit 12 reads: About 26.5 percent of average-expenditure elementary school students are in the Emotional Disturbance category, compared to 16.2 percent of high-expenditure elementary students.

In sum, while all disability categories are present in the high-expenditure group, high-incidence disability categories typically considered as “low-cost,” such as Specific Learning Disability, are less common among high-expenditure students than among average-expenditure students.

V. Functional Abilities

Functional assessment of cognitive, physical, and social abilities adds to the information provided by disability categories in two major ways. First, it helps in estimating the severity of the impairment. Second, it provides information on additional domains that are not directly related to the disability category. For example, it can provide an estimate of the level of social functioning of a student in the Visual Impairment category.

As a measure of functional abilities, we used the student ABILITIES index developed by Bailey and Simeonsson (1988). This index is an instrument for measuring the physical, cognitive, and social abilities of children with disabilities. It measures abilities in nine areas:

- Audition (hearing)
- Behavior and social skills (social skills and inappropriate behavior)
- Intellectual functioning
- Limbs (legs, arms, hands)
- Intentional communication (understanding others, communicating with others)
- Tonicity (muscle tone)
- Integrity of physical health
- Eyes (vision)
- Structural status (shape, body form & structure)

Teachers were asked to respond to 19 items using a Likert scale from 0 (normal) to 5 (profound) that described successive levels of ability/disability.¹¹ The instrument's psychometric properties have been documented in several studies (Bailey et al., 1993; Bailey, Buysse, & Simeonsson, 1995; Buysse, Smith, Bailey, & Simeonsson, 1993). For a summary of the psychometric properties of the ABILITIES Index, see Appendix I.

Exhibits 13 and 14 present a comparison of ABILITIES Index scores of average- and high-expenditure students in regular elementary and secondary schools. Means, standard errors, and results of statistical tests of significance are presented in Appendix D.

¹¹ The special education teacher or service provider most knowledgeable about the student was asked to complete a form based on the ABILITIES Index as part of the SEEP survey. This form is included in Appendix H.

Exhibit 13. A Comparison of ABILITIES Index Scores of Average- and High-Expenditure Elementary School Students

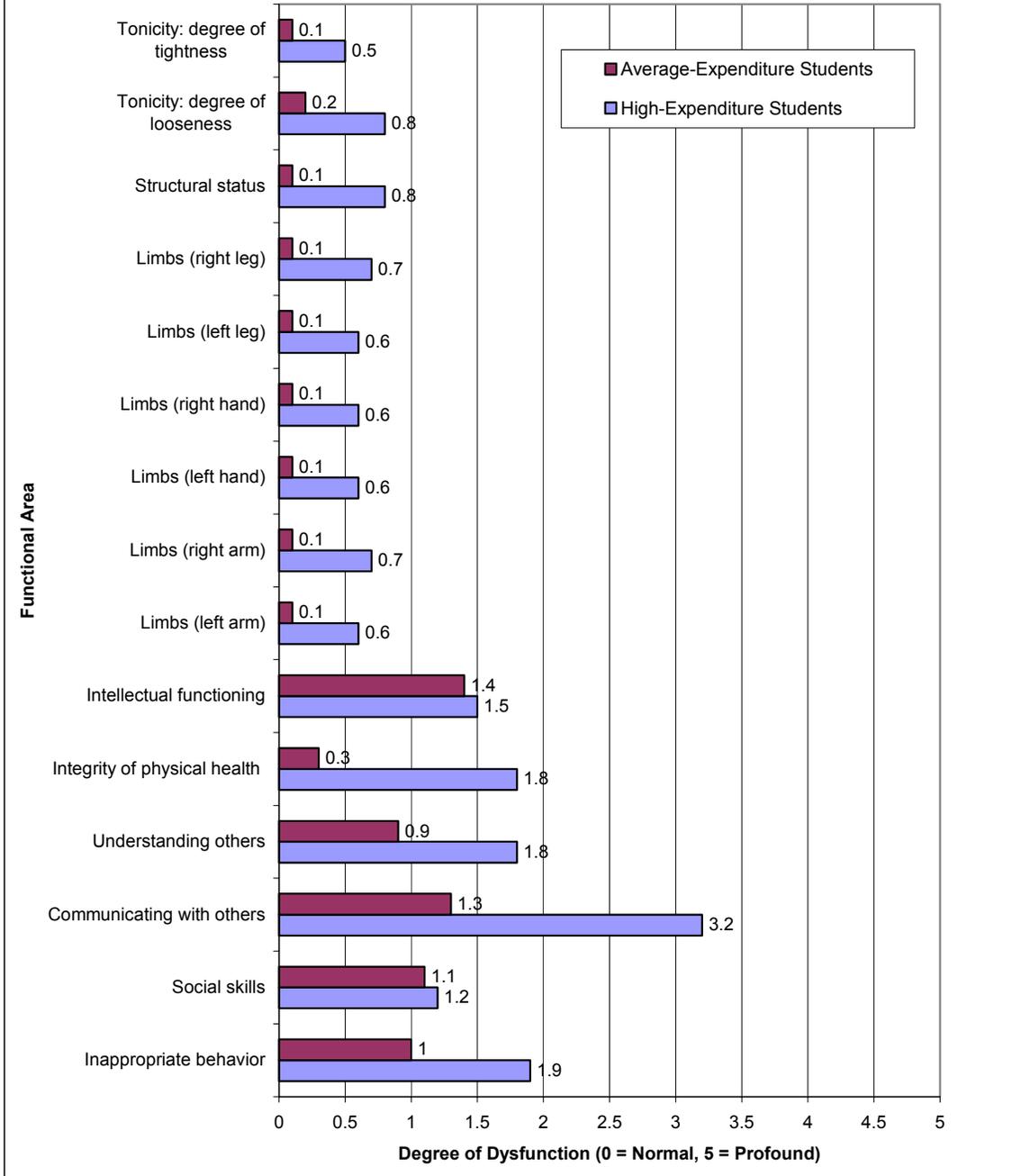


Exhibit 13 reads: ABILITIES Index scores for tonicity (degree of tightness) were 0.2 and 0.8, respectively, for average-expenditure and high-expenditure elementary school students with disabilities.

Exhibit 14. Comparison of ABILITIES Index Scores of Average- and High-Expenditure Secondary School Students

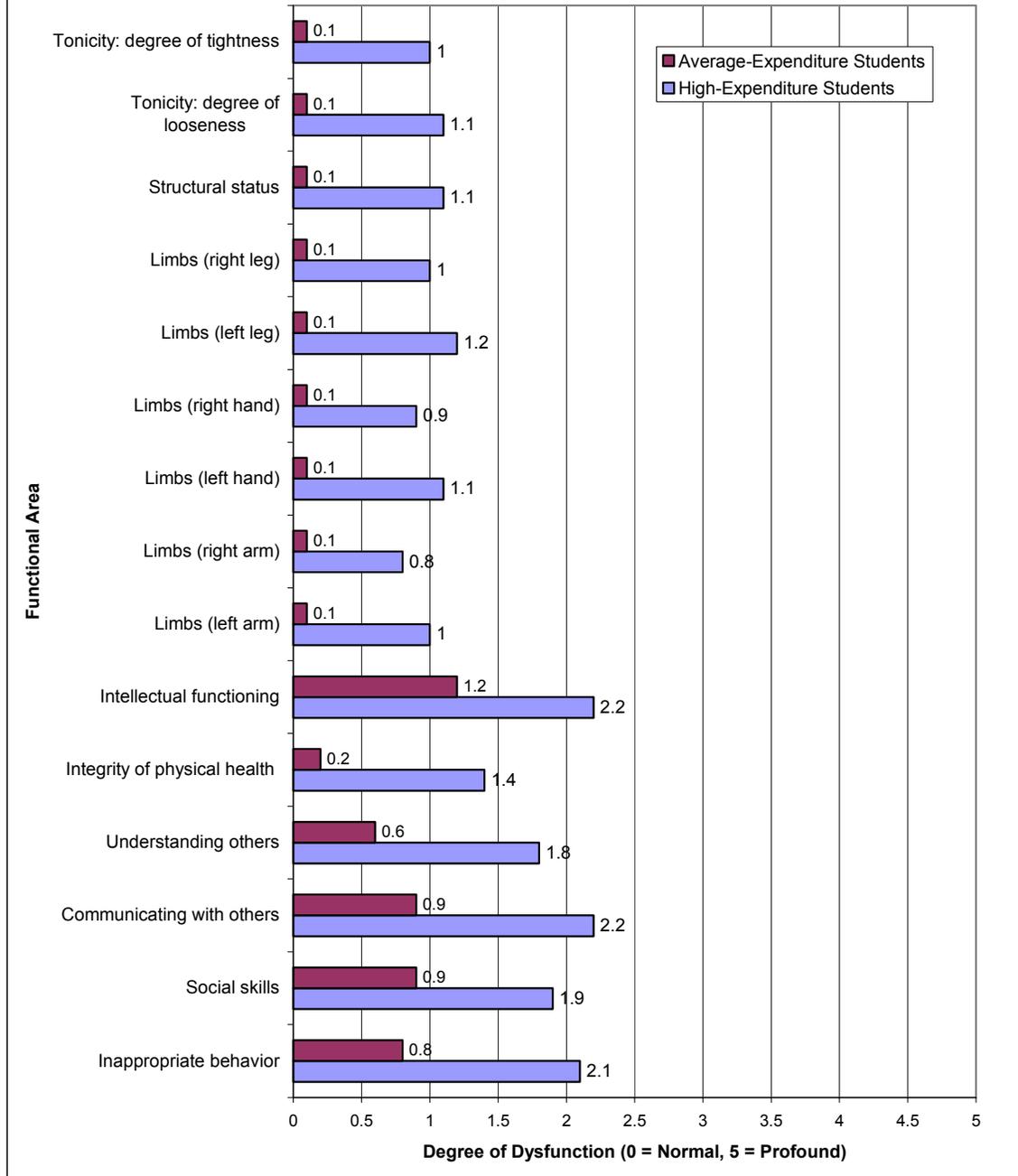


Exhibit 14 reads: ABILITIES Index scores for tonicity (degree of tightness) for average-expenditure and high-expenditure secondary school students with disabilities were 0.1 and 1, respectively.

As expected, students with high expenditures were found to have significantly more profound limitations in most areas of functional abilities compared to average-expenditure students. The exhibits show that there is also a difference between elementary- and secondary-level students. Average-expenditure students in elementary schools have lower scores in almost all categories, indicating a lower degree of dysfunction. There are only two exceptions. In the category of “integrity of physical health,” average-expenditure secondary students average 1.8, compared to 1.4 for elementary students. In the category of “understanding others,” both levels of average-expenditure students score an average of 1.8. For high-expenditure students, the general pattern is reversed. Scores are higher (indicating more profound disability) for high-expenditure secondary school students in all categories except “communicating with others,” in which elementary school students score an average of 3.2, significantly higher than the 2.2 average for secondary school students.

Comparing the average scores on each of the items of the ABILITIES Index, there were significant differences between high-expenditure and average-expenditure elementary school students on all dimensions except for two: social skills and intellectual functioning. In addition, vision seemed to vary to a lesser extent between the two groups. However, for secondary school students, there were significant differences between the two expenditure groups in *all* functional areas.

It may be that expenditure variations in these areas are less pronounced in elementary school than in secondary school. This makes sense in light of the factors, both developmental and environmental, that differentiate elementary from secondary school students. First, as noted earlier in this report, there is a greater tendency to include students with disabilities in regular classrooms in secondary schools than in elementary schools. Since inclusion places a heavier demand on students’ social competence than a more segregated environment, secondary school students who are placed in special classrooms may represent more extreme cases of dysfunction than elementary school students who are placed in the same type of classrooms. From a developmental point of view, the range and subtleties of the students’ social skill repertoire rapidly expand (Rubin, Coplan, & Nelson, 1999) with age; therefore these skills become increasingly important for their social, emotional, and academic well-being and require larger attention in terms of services and intervention.

Additionally, the lack of significant differences could also be due to measurement reasons. It may be easier to capture individual differences in social and cognitive skills among secondary school students than in elementary school students. Social skills and intellectual functioning are more difficult to isolate from communication ability and level of appropriate behavior in elementary school than in secondary school.

VI. Gap between Grade Level and Performance in Reading and Math

Students' academic needs can be expressed in terms of the gap between their grade level and their performance in reading and math. For example, if a student in third grade is reading at the second-grade level, this gap is 1 year. The greater the gap, the greater the need for academic assistance. Specifically, our question was, *to what extent is this gap greater among high-expenditure students than average-expenditure students?* We calculated the mean difference, or gap, between grade level and achievement levels in reading and math. As shown in Exhibit 15, gaps in reading and math are significantly greater among secondary school high-expenditure students than among average-expenditure students. No significant differences were found between average- and high-expenditure groups in regular elementary and special education schools.¹² Means and standard errors are presented in Appendix E.

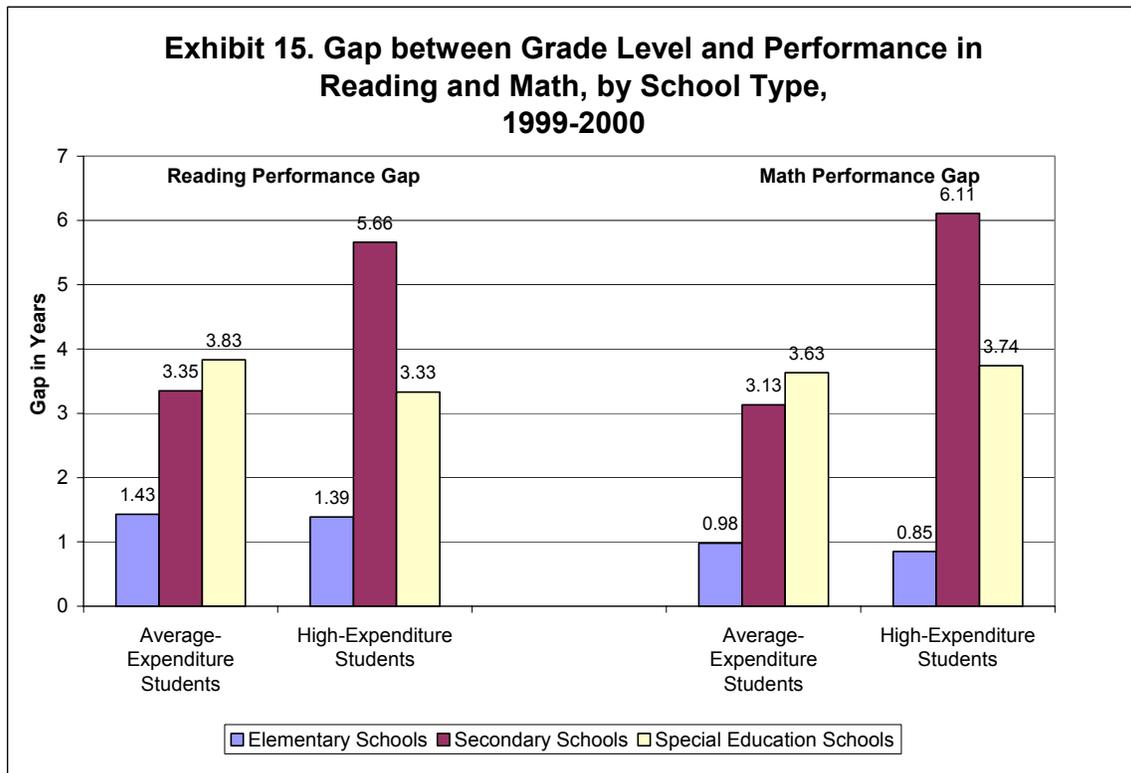


Exhibit 15 reads: The average gap between grade level placement and grade level reading performance is 3.35 years for average-expenditure and 5.66 for high-expenditure students enrolled in secondary schools.

¹² A breakdown by disability category is not presented due to insufficient sample sizes. Differences in achievement gap between average- and high-expenditure students were significant or show tendency towards significance in all disability categories among secondary school students except for Orthopedic Impairment and Traumatic Brain Injury. Differences in achievement gap in reading and math were non-significant in all disability categories among elementary school students.

VII. Instructional Services

In addition to primary disability category and grade-level performance gap, the educational services received by the student (as determined by the student's individual educational program, or IEP) may be another indicator of that student's needs.¹³ For example, the amount of time a student spends in a regular classroom and the total amount of time provided by related service providers (e.g., speech/language therapists, physical/occupational therapists, counselors) may reflect the severity of a student's disability.

As a first step in considering these educational services, we compared the classroom placements of high-expenditure students with those of average-expenditure students. Analysis of the data revealed that 19.4% percent of elementary school high-expenditure students with disabilities spend no time in a regular classroom, compared with 20.5% percent of elementary school average-expenditure students. Different patterns are evident among secondary school students. About three out of every five (60.1 percent) of the secondary school high-expenditure students with disabilities receive no instructional services in a regular classroom, compared to less than one-fifth (21.2 percent) of the average-expenditure students. These differences between elementary and secondary schools may be explained by the different decision criteria employed in secondary and elementary schools with respect to inclusion in regular classrooms. In secondary schools there is a greater tendency to refrain from including a student in a regular classroom only if the student cannot be accommodated in this environment. Thus, the more extreme cases are served in segregated environments. It follows that the composition of the high-expenditure group in secondary schools may be different from the respective one in elementary schools from this reason.

The second step in this analysis of educational placements is to consider the hours per week that average-expenditure and high-expenditure students with disabilities spend in different placements. Exhibits 16 and 17 show the average number of hours per week that elementary and secondary school students spend in each type of instructional service and placement. Note that, in order to present meaningful figures, these averages include only the students who received the services, and therefore do not capture the differences in likelihood of placements discussed above (means, standard errors, and results of tests for significance are presented in Appendix F).

¹³ Special education school students were not included in this analysis. Comparing the services provided to students in regular schools and special education schools was not meaningful due to differences in organization of instructional classes. In addition, the sample size for special education schools was insufficient to compare amounts of services by grade-level groupings.

Exhibit 16 presents the number of hours of services provided to elementary school students with disabilities. Students with average levels of expenditures spend more time both in regular education classrooms and in special education (self-contained) classrooms than high-expenditure students, possibly because high-expenditure students are more likely to receive therapy from related service providers than average-expenditure students. The exhibit shows that the smaller number of high-expenditure students that do spend time with general education staff in a regular classroom still spend less time, on average, in that setting than do high-expenditure students (14.4 hours vs. 25.1 hours). Differences in time spent with resource service providers and subject matter specialists were not statistically significant, as shown in Appendix F.

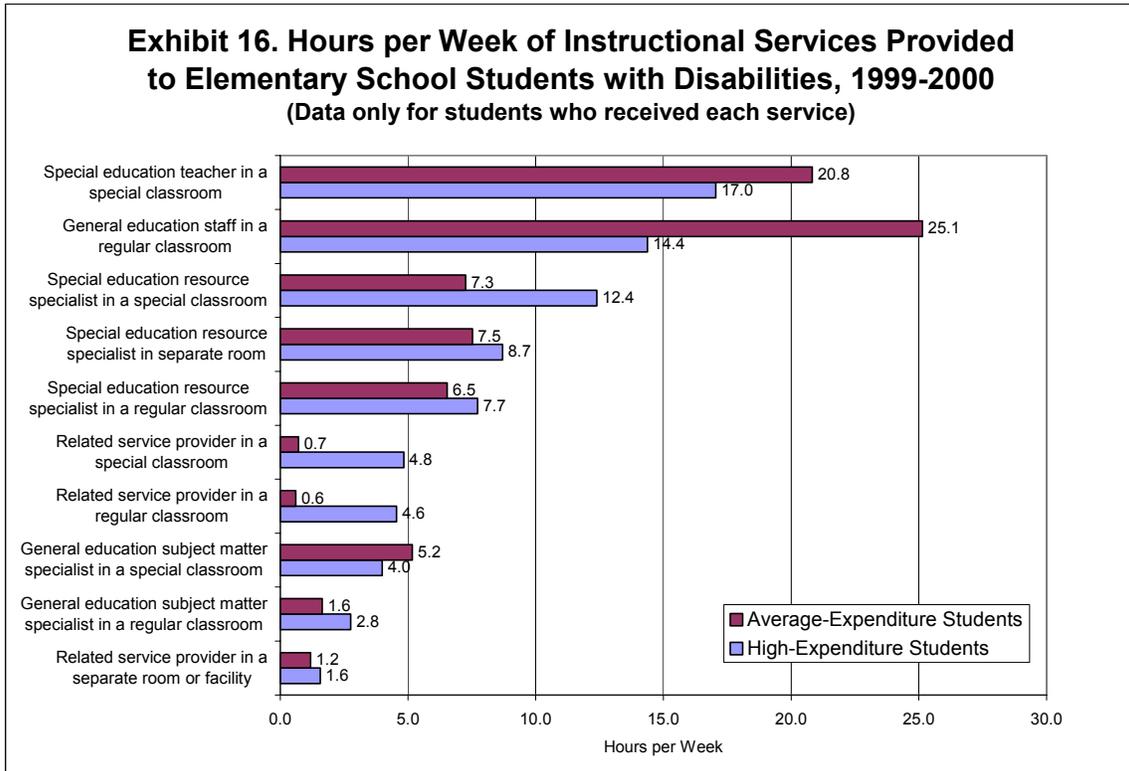


Exhibit 16 reads: Average-expenditure elementary school students tend to receive on average 25.1 hours per week of instructional time in a regular education classroom taught by regular education staff. In contrast, high-expenditure students tend to receive, on average, 14.4 hours per week of the same type of service. (Note that those students who received zero hours of a particular service were excluded from these averages.)

Exhibit 17 presents the same information as in Exhibit 16, but for secondary schools instead of elementary schools. The exhibit shows how much time per week secondary school students spend in each type of instructional setting. High-expenditure students spend more time in special education (self-contained) classrooms than average-expenditure students (24.7 hours vs. 15.8 hours). This difference may reflect secondary schools' greater tendency, compared to elementary schools, to include students in regular classrooms. Only the students who cannot be accommodated in regular classrooms are placed in special classrooms. Data analysis also showed that students with high levels of expenditures are more likely to receive therapy from related service providers in special (self-contained) classrooms or separate classrooms than average-expenditure students. In addition, high-expenditure students spend more time with a special education resource specialist in a special education classroom, and with a general education subject matter specialist in a regular classroom. Interestingly, the exhibit shows that high-expenditure students that do spend time with general education staff in a regular classroom spend amounts of time similar to those of average-expenditure students (as indicated by a difference in the number of hours that is not statistically significant; see Appendix F).

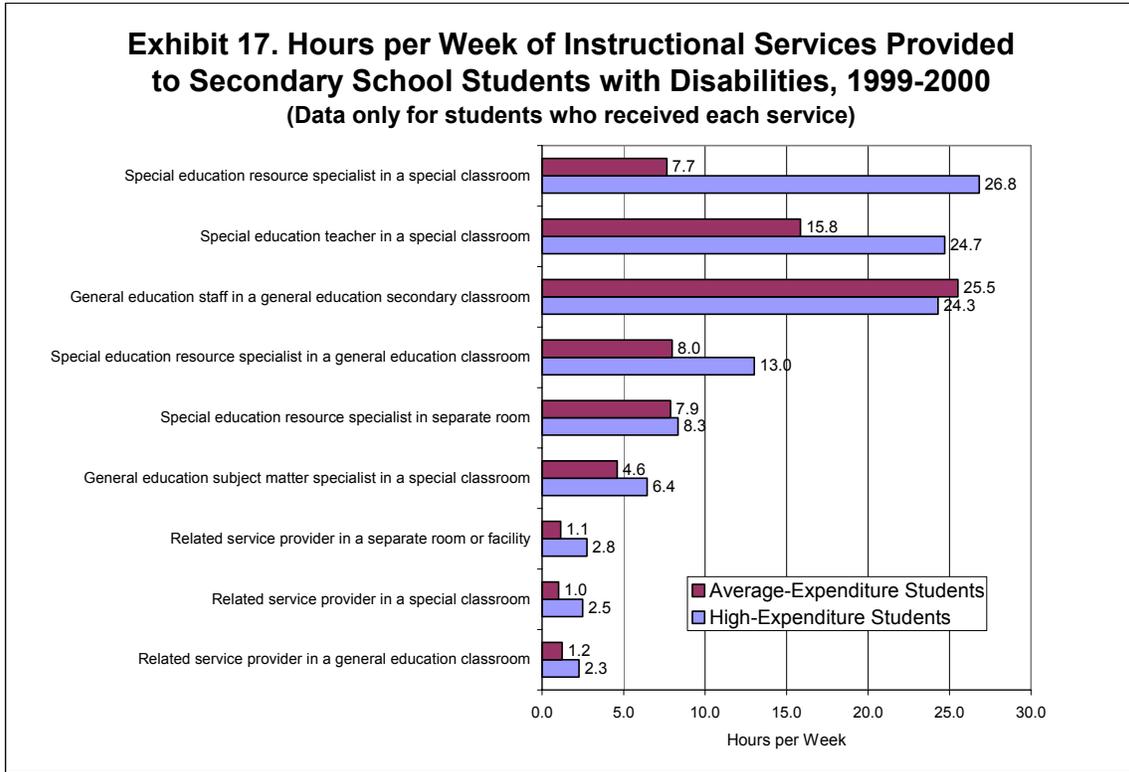


Exhibit 17 reads: Average-expenditure secondary school students tend to receive, on average, 25.5 hours per week of instructional time in a regular education classroom taught by regular education staff. In contrast, high-expenditure students tend to receive, on average, 24.3 hours per week of the same type of service. (Note that those students who received zero hours of a particular service were excluded from these averages.)

In sum, added expenditures on elementary school high-expenditure students result from a larger amount of hours per week of specialized services, while added expenditures on secondary school high-expenditure students result from greater likelihood of being placed in special education classrooms in addition to a greater amount of resource and related services.

VIII. Class Size

Additional factors that are indirectly related to student characteristics may impact per pupil educational expenditures. For example, inter-state, inter-district and intra-district inequalities in resource allocation may be partly responsible for the expenditure level (Burke, 1999). These factors are closely linked to district and school characteristics, such as district size, availability of financial resources, and the prevalence of students with disabilities in one school (Baker, 2003). One indicator of the impact of district size and prevalence of students with significant disabilities on the economics of scale is class size. Having one teacher for a larger number of students reduces per pupil expenditures, and is more likely to happen in larger schools and districts.

Class size was defined as the number of students (special education and non-special education) who are served at the same time by the same service provider. Exhibit 18 presents class sizes for instructional services provided to elementary school students. Exhibit 19 presents the information for secondary school students. Means, standard errors and results of statistical tests of significance are presented in Appendix G.¹⁴

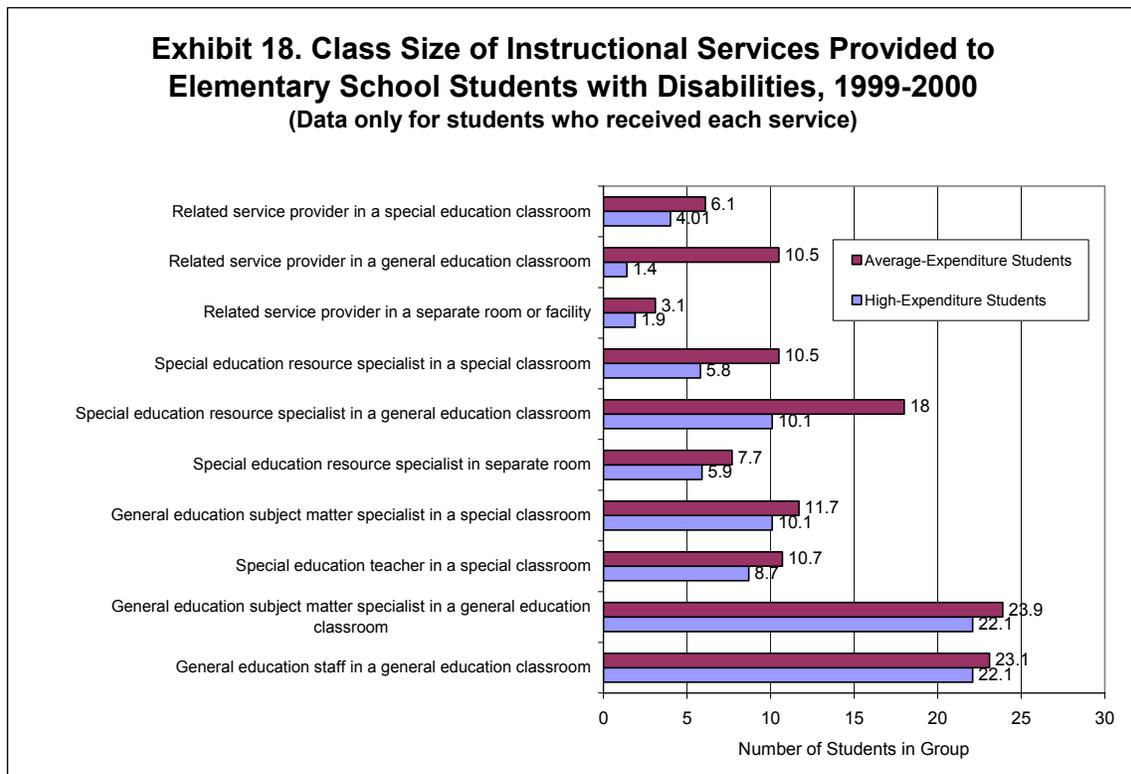


Exhibit 18 reads: Average-expenditure elementary school students are taught by a special education teacher in larger special (self-contained) classes than high-expenditure students (10.7 students vs. 8.7 students).

¹⁴ A similar comparison for special education schools students is not presented due to differences in instructional organization and insufficient sample size.

Both elementary and secondary high-expenditure students learned in significantly smaller classes than average-expenditure students for most instructional services. The following services were significantly different:

- For elementary school students:
 - Special education teacher in a special (self-contained) classroom
 - Special education resource specialist in a general education classroom
 - Special education resource specialist in a special classroom
 - Related service provider in a separate room or facility
 - Related service provider in a general education classroom.

- For secondary school students:
 - Special education teacher in a special (self-contained) classroom
 - General education subject matter specialist in a special classroom
 - Special education resource specialist in a general education classroom
 - Related service provider in a general education classroom.

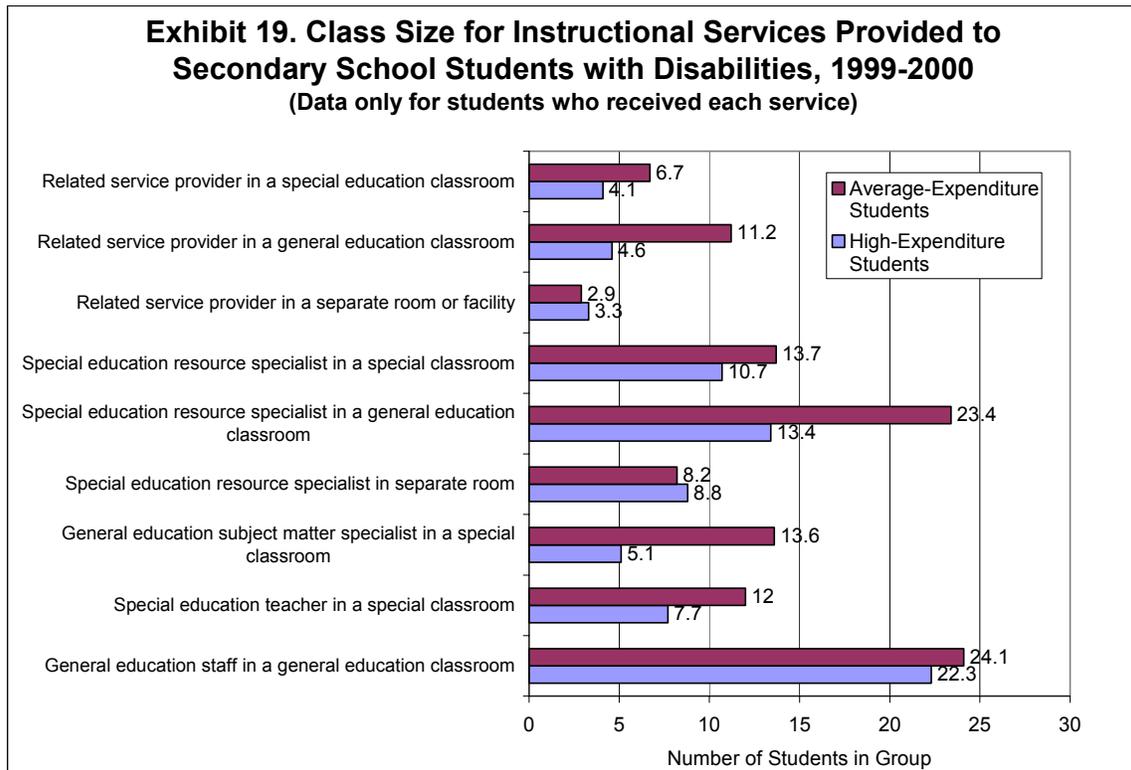


Exhibit 19 reads: Average-expenditure secondary school students are taught by a special education teacher in larger special (self-contained) classes than high-expenditure students (12 students vs. 7.7 students).

In sum, differences in expenditures between average-expenditure students and high-expenditure students may be attributable in part to class size differences for services provided in special (self-contained) classrooms and services provided by specialists. The two groups did not differ in the size of a regular classroom taught by a general education teacher.

IX. Summary and Conclusions

The descriptive analysis presented in this report served as a basis for identifying profiles of students with high total educational expenditures. We focused the analysis on school-age students with disabilities who are enrolled in the public schools operated by a nationally representative sample districts or intermediate educational units. We were able to show that the average per pupil total expenditures at the top 5 percent of the expenditure distribution is higher by tens of thousands of dollars than the average per pupil expenditures in the second and third quartiles of the distribution (e.g., \$39,909 vs. \$9,460 for elementary school students). About 80 percent of the total educational spending on students with high expenditures was expended on special education services, versus approximately half for average-expenditure students.

The findings suggest that African American males are over-represented, relative to the population, in both the high- and average-expenditure categories of students with disabilities. Students with the highest expenditures are less likely to be in the disability category of Specific Learning Disability, Speech or Language Disorder, or Other Health Impairment than average-expenditure students. Their high needs are demonstrated by a gap between grade level and performance in reading and math of one year in elementary school and four years in secondary school. In addition, high-expenditure students have significantly higher levels of dysfunction in most functional abilities domains, using the ABILITIES Index developed by Bailey and Simeonsson. Finally, students with high expenditures are significantly more likely to receive instruction from a special education teacher in a special (self-contained) classroom and to receive more hours per week of specialized services than average-expenditure students. In addition, they are less likely to be included in a regular education classroom taught by general education staff. These findings suggest that the expenditures required to serve students with disabilities are due to multiple factors (e.g., disability category, functional abilities, services, and student performance).

This report focused mainly on student-level characteristics (e.g., primary disability category, functional abilities), and on other factors that may be the joint result of student characteristics and resource allocation in the school (e.g., class size). There is ongoing debate about the role that other factors within the school, district, and state play in determining educational expenditures (see for example, Parrish, Matsumoto, & Fowler, 1995; Greene & Forster, 2002). In this context, further analysis is needed to examine the extent to which school and district characteristics affect the number of students with high expenditures in a school district.

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Appendix A

Per Pupil Total Educational Expenditures and Special Education Expenditures, by School Type

A.1. Elementary Schools

Percentiles	Sample Size (N)	Proportion of Total Number In Elementary Schools	Total Estimated Population of Special Education Students in this Category	Total Educational Expenditure per Student Served	Standard Error	Total Special Education Spending per Student Served	Standard Error	Total Expenditure	Total Special Education Spending	Percent of Total Educational Expenditure
95th-100th	350	8.3%	130,983	\$39,909	\$1,190	\$31,766	\$3,108	\$5,227,400,547	\$4,160,805,978	79.6%
75th-95 th	1,415	33.5%	523,083	\$17,473	\$410	\$12,849	\$408	\$9,139,829,259	\$6,721,093,467	73.5%
25th-75 th	1,866	44.2%	1,310,208	\$9,460	\$133	\$4,958	\$258	\$12,394,540,623	\$6,496,365,813	52.4%
5th-25 th	472	11.2%	525,014	\$6,242	\$61	\$2,277	\$174	\$3,277,034,247	\$1,195,432,573	36.5%
0-5th	116	2.7%	129,485	\$4,360	\$168	\$1,671	\$247	\$564,490,912	\$216,422,747	38.3%
Total	4,219	100.0%	2,618,773	\$77,443	\$1,961			\$30,603,295,588	\$18,790,120,578	61.4%

A.2. Secondary Schools

Percentiles	Sample Size (N)	Proportion of Total Number In Secondary Schools	Total Estimated Population of Special Education Students in this Category	Total Educational Expenditure per Student Served	Standard Error	Total Special Education Spending per Student Served	Standard Error	Total Expenditure	Total Special Education Spending	Percent of Total Educational Expenditure
95th-100th	359	8.9%	130,249	\$35,924	\$1,959	\$31,502	\$2,061	\$4,679,065,076	\$4,103,103,998	87.7%
75th-95 th	1,148	28.4%	518,856	\$17,105	\$247	\$11,609	\$340	\$8,875,031,880	\$6,023,399,304	67.9%
25th-75 th	1,892	46.7%	1,297,747	\$10,221	\$195	\$4,984	\$338	\$13,264,272,087	\$6,467,738,933	48.8%
5th-25 th	510	12.6%	518,937	\$6,877	\$69	\$2,692	\$160	\$3,568,709,202	\$1,397,198,107	39.2%
0-5th	139	3.4%	129,997	\$5,379	\$80	\$1,980	\$181	\$699,240,438	\$257,361,650	36.8%
Total	4,048	100.0%	2,595,786					\$31,086,318,683	\$18,248,801,992	58.7%

A.3. Special Education Schools

Percentiles	Sample Size (N)	Proportion of Total Number In Special Education Schools	Total Estimated Population of Special Education Students in this Category	Total Educational Expenditure per Student Served	Standard Error	Total Special Education Spending per Student Served	Standard Error	Total Expenditure	Total Special Education Spending	Percent of Total Educational Expenditure
95th-100th	99	18.0%	1,227	\$57,129	\$5,024	\$50,097	\$8,407	\$70,088,327	\$61,461,165	87.7%
75th-95 th	169	30.8%	5,905	\$29,962	\$1,014	\$27,556	\$1,305	\$176,934,833	\$162,726,662	92.0%
25th-75 th	196	35.7%	11,360	\$21,281	\$319	\$20,130	\$674	\$241,752,160	\$228,676,800	94.6%
5th-25 th	74	13.5%	5,816	\$14,000	\$345	\$11,136	\$816	\$81,424,462	\$64,767,343	79.5%
0-5th	11	2.0%	184	\$9,883	\$0	\$9,251	\$0	\$1,817,685	\$1,701,424	93.6%
Total	549	100.0%	24,492					\$572,017,467	\$519,333,395	90.8%

Appendix B

Distribution of Students with Average and High Expenditures Gender, Ethnicity and School Type

Ethnicity	Gender	Elementary				Secondary				Special Education			
		2nd and 3rd Q. with Respect to Total Educational Expenditures		Top 5% with Respect to Total Educational Expenditures		2nd and 3rd Q. with Respect to Total Educational Expenditures		Top 5% with Respect to Total Educational Expenditures		2nd and 3rd Q. with Respect to Total Educational Expenditures		Top 5% with Respect to Total Educational Expenditures	
		N	%	N	%	N	%	N	%	N	%	N	%
White	F	430	23.1%	77	22.1%	372	19.8%	80	22.3%	44	22.6%	23	23.2%
	M	790	42.4%	149	42.7%	704	37.4%	149	41.5%	73	37.4%	44	44.4%
	Total	1,220	65.5%	226	64.8%	1,076	57.2%	229	63.8%	117	60.0%	67	67.6%
Hispanic	F	65	3.5%	12	3.4%	70	3.7%	15	4.2%	5	2.6%	2	2.0%
	M	93	5.0%	17	4.9%	134	7.1%	32	8.9%	11	5.6%	3	3.0%
	Total	158	8.5%	29	8.3%	204	10.8%	47	13.1%	16	8.2%	5	5.0%
African American	F	99	5.3%	28	8.0%	175	9.3%	15	4.2%	13	6.7%	5	5.1%
	M	264	14.2%	34	9.7%	265	14.1%	40	11.1%	37	19.0%	16	16.2%
	Total	363	19.5%	62	17.7%	440	23.4%	55	15.3%	50	25.7%	21	21.3%
Other Minorities	F	42	2.3%	7	2.0%	57	3.0%	14	3.9%	3	1.5%	3	3.0%
	M	79	4.2%	25	7.2%	105	5.6%	14	3.9%	9	4.6%	3	3.0%
	Total	121	6.5%	32	9.2%	162	8.6%	28	7.8%	12	6.2%	6	6.1%
Total	F	636	34.2%	124	35.5%	674	35.8%	124	34.5%	65	33.3%	33	33.3%
	M	1226	65.8%	225	64.5%	1208	64.2%	235	65.5%	130	66.7%	66	66.7%
	Total	1862	100.0%	349	100.0%	1882	100.0%	359	100.0%	195	100.0%	99	100.0%

Note. Sample sizes presented in this table do not include students with missing data. Gender data were not available for one high-expenditures, four average-cost elementary school students, ten average-expenditures secondary school students and one average-expenditures student in a special education school. Because of rounding, details may not add to totals.

Appendix C

Primary Disability Category, by School Type

	Secondary Schools			Elementary Schools			Special Education Schools		
	Top 5%	2-3 Q	% Difference ¹⁵	Top 5%	2-3 Q	%	Top 5%	2-3 Q	%
Autism	8.64%	2.33%	-73.0%	18.9%	6.9%	-63.6%	17.2%	12.2%	-28.7%
Emotional Disturbance	13.65%	10.84%	-20.6%	6.0%	5.9%	-1.8%	16.2%	26.5%	64.2%
Hearing Impairment/ Deafness	5.29%	2.75%	-48.0%	6.0%	3.6%	-40.2%	11.1%	8.7%	-22.0%
Mental Retardation	22.28%	10.94%	-50.9%	14.9%	9.5%	-36.1%	7.1%	19.4%	174.3%
Multiple disabilities	17.55%	3.75%	-78.6%	20.0%	3.0%	-85.3%	32.3%	14.3%	-55.8%
Orthopedic Impairment	3.90%	2.06%	-47.2%	4.3%	2.1%	-51.3%	3.0%	5.1%	68.3%
Other Health Impairment	4.46%	9.20%	106.3%	10.9%	15.4%	42.1%	2.0%	5.1%	152.5%
Specific Learning Disability	13.93%	51.96%	273.0%	9.1%	37.8%	313.9%	0.0%	2.6%	N/A
Speech or Language Impairment	0.56%	3.01%	437.5%	2.6%	12.5%	386.0%	0.0%	0.0%	0.0%
Traumatic Brain Injury	4.18%	1.85%	-55.7%	2.9%	0.9%	-68.2%	2.0%	1.5%	-24.3%
Visual Impairment/ Blindness	4.46%	0.90%	-79.8%	3.1%	1.6%	-48.7%	8.1%	2.6%	-68.4%

¹⁵ Percent Difference as a Proportion of the Special Education Cost Group

Appendix D

ABILITIES Index Average Scores, by School Type

D.1. Elementary school students with disabilities

Variable	Top 5% with Respect to Total		2nd and 3rd Q. with Respect to Total		F	p
	Educational Expenditures	Std Error of Mean	Educational Expenditures	Std Error of Mean		
Total Score	1.6	0.1	0.7	0.1	235.0	<.0001
Inappropriate behavior	1.9	0.2	1.0	0.1	89.2	<.0001
Social Skills	1.2	0.4	1.1	0.1	1.8	N.S.
Communicating with others	3.2	0.7	1.3	0.1	289.3	<.0001
Understanding others	1.8	0.1	0.9	0.1	85.6	<.0001
Integrity of physical health	1.8	0.5	0.3	0.0	502.3	<.0001
Intellectual functioning	1.5	0.5	1.4	0.1	0.2	N.S.
Limbs (left arm)	0.6	0.2	0.1	0.0	112.9	<.0001
Audition (left ear)	1.0	0.4	0.1	0.0	333.1	<.0001
Vision: Left eye	0.3	0.1	0.2	0.0	2.0	N.S.
Limbs (left hand)	0.6	0.2	0.1	0.0	106.3	<.0001
Limbs (left leg)	0.6	0.3	0.1	0.0	110.2	<.0001
Limbs (right arm)	0.7	0.4	0.1	0.0	137.9	<.0001
Audition (right ear)	1.0	0.4	0.1	0.0	393.2	<.0001
Vision: Right eye	0.4	0.2	0.2	0.0	11.9	<.001
Limbs (right hand)	0.6	0.2	0.1	0.0	268.1	<.0001
Limbs (right leg)	0.7	0.4	0.1	0.0	122.7	<.0001
Structural status	0.8	0.4	0.1	0.0	173.6	<.0001
Tonicity: Degree of tightness	0.5	0.2	0.1	0.0	67.9	<.0001
Tonicity: Degree of looseness	0.8	0.4	0.2	0.0	129.9	<.0001

D.2. Secondary school students with disabilities

Variable	Top 5% with Respect to Total Educational Expenditures	Std Error of Mean	2nd and 3rd Q. with Respect to Total Educational Expenditures	Std Error of Mean	F	p
Total Score	1.8	0.1	0.5	0.0	522	<.0001
Inappropriate behavior	2.1	0.2	0.8	0.1	164.8	<.0001
Social Skills	1.9	0.1	0.9	0.1	99.8	<.0001
Communicating with others	2.2	0.2	0.9	0.1	289.2	<.0001
Understanding others	1.8	0.2	0.6	0.1	245.6	<.0001
Integrity of physical health	1.4	0.2	0.2	0.0	305.1	<.0001
Intellectual functioning	2.2	0.2	1.2	0.1	119.3	<.0001
Limbs (left arm)	1.0	0.2	0.1	0.0	291.5	<.0001
Audition (left ear)	0.3	0.1	0.1	0.0	29.1	<.0001
Vision: Left eye	0.7	0.1	0.2	0.0	65.3	<.0001
Limbs (left hand)	1.1	0.2	0.1	0.0	320.3	<.0001
Limbs (left leg)	1.2	0.2	0.1	0.0	292.4	<.0001
Limbs (right arm)	0.8	0.2	0.1	0.0	204.9	<.0001
Audition (right ear)	0.4	0.1	0.1	0.0	82.1	<.0001
Vision: Right eye	0.8	0.1	0.3	0.0	71.2	<.0001
Limbs (right hand)	0.9	0.2	0.1	0.0	232.6	<.0001
Limbs (right leg)	1.0	0.2	0.1	0.0	235.0	<.0001
Structural status	1.1	0.2	0.1	0.0	314.5	<.0001
Tonicity: Degree of tightness	1.0	0.2	0.1	0.0	277.9	<.0001
Tonicity: Degree of looseness	1.1	0.2	0.1	0.0	376.3	<.0001

Appendix E

Gap Between Grade Level and Performance in Reading and Math, by School Type

	Regular Elementary Schools			Regular Secondary Schools			Special Education Schools		
	N	Mean	SE	N	Mean	SE	N	Mean	SE
Reading									
Average-Expenditure	1,564	1.42	0.14	1,388	3.35***	0.08	111	3.83	0.32
High-Expenditure	220	1.39	0.16	211	5.66	0.24	35	3.33	0.63
All students	3,336	1.33	0.10	2,873	3.90	0.27	274	3.13	0.82
Math									
Average-Expenditure	1,551	0.98	0.32	1,375	3.13***	0.07	108	3.63	0.32
High-Expenditure	218	0.85	0.12	210	6.11	0.22	35	3.74	0.51
All students	3,309	0.90	0.08	2,844	3.75	0.26	270	3.18	0.82

Note. Mean is the mean difference, or gap, between grade-level placement and grade-level reading performance. Asterisks denote significant differences between average-expenditures and high-expenditures students. * p<. 05, ** p<.01, *** p<.001

Appendix F

Hours Per Week of Instructional Services Provided To Students with Disabilities, by School Type

F.1. Elementary school students

Instructional Service	High-Expenditure Students	Std Error of Mean	Average-Expenditure Students	Std Error of Mean	F	p
Related service provider in a separate room or facility	1.6	0.2	1.2	0.2	16.1	<.001
General education subject matter specialist in a regular classroom	2.8	0.6	1.6	0.2	6.4	N.S.
General education subject matter specialist in a special classroom	4.0	1.7	5.2	1.1	0.6	N.S.
Related service provider in a regular classroom	4.6	0.6	0.6	0.1	95.6	<.001
Related service provider in a special classroom	4.8	0.7	0.7	0.1	136.0	<.001
Special education resource specialist in a regular classroom	7.7	2.5	6.5	0.7	1.5	N.S.
Special education resource specialist in separate room	8.7	1.4	7.5	0.7	2.0	N.S.
Special education resource specialist in a special classroom	12.4	3.7	7.3	1.6	7.6	N.S.
General education staff in a regular classroom	14.4	5.0	25.1	0.8	257.5	<.001
Special education teacher in a special classroom	17.0	2.9	20.8	1.0	25.7	<.001

Note. P values represent level of significance after applying Bonferonni correction for multiple comparisons.

F.2. Secondary school students

Instructional Service	High-Expenditure Students	Std Error	Average-Expenditure Students	Std Error of Mean	F	p
Related service provider in a general education classroom	2.3	0.6	1.2	0.2	2.4	N.S.
Related service provider in a special classroom	2.5	0.7	1.0	0.2	12.7	<.005
Related service provider in a separate room or facility	2.8	0.7	1.1	0.1	72.4	<.001
General education subject matter specialist in a special (self-contained) class	6.4	0.7	4.6	0.2	10.1	N.S.
Special education resource specialist in separate room	8.3	1.1	7.9	1.3	0.2	N.S.
Special education resource specialist in a general education classroom	13.0	3.8	8.0	0.7	16.7	<.001
General education staff in a general education secondary classroom	24.3	1.7	25.5	1.1	1.3	N.S.
Special education teacher in a special (self-contained) class	24.7	0.9	15.8	0.5	160.2	<.001
Special education resource specialist in a special (self-contained) class	26.8	3.6	7.7	1.2	107.5	<.001

Note. P values represent level of significance after applying Bonferonni correction for multiple comparisons.

Appendix G

Class and Group Size of Instructional Services

G.1. Elementary Schools

Instructional Service	Average Class Size: Average-Expenditure Students	Std Error of Mean	Average Class Size: High Expenditure Students	Std Error of Mean	F	p
General education staff in a general education classroom	23.1	0.3	22.1	4.1	6.3	N.S.
General education subject matter specialist in a general education classroom	23.9	0.8	22.1	2.0	2.4	N.S.
Special education teacher in a special classroom	10.7	0.4	8.7	0.6	55.7	<.001
General education subject matter specialist in a special classroom	11.7	1.1	10.1	0.8	0.9	N.S.
Special education resource specialist in separate room	7.7	0.5	5.9	1.7	6.3	N.S.
Special education resource specialist in a general education classroom	18.0	1.5	10.1	2.2	23.3	<.001
Special education resource specialist in a special classroom	10.5	1.0	5.8	1.2	15.6	<.01
Related service provider in a separate room or facility	3.1	0.2	1.9	0.2	51.1	<.001
Related service provider in a general education classroom	10.5	2.2	1.4	0.3	92.2	<.001
Related service provider in a special education classroom	6.1	0.6	4.01	0.28	30.8	<.001

Note: P values represent level of significance after applying Bonferonni correction for multiple comparisons.

G.2. Secondary Schools

Instructional Service	Average Class Size 2-3Q	Std Error of Mean	Average Class Size Top 5%	Std Error of Mean	F	p
General education staff in a general education classroom	24.1	0.8	22.3	1.2	5.9	N.S.
Special education teacher in a special classroom	12.0	0.5	7.7	0.9	156.6	<.001
General education subject matter specialist in a special classroom	13.6	0.7	5.1	2.5	38.0	<.001
Special education resource specialist in separate room	8.2	1.1	8.8	2.8	0.6	N.S.
Special education resource specialist in a general education classroom	23.4	1.0	13.4	2.0	41.5	<.001
Special education resource specialist in a special classroom	13.7	1.5	10.7	2.9	4.7	N.S.
Related service provider in a separate room or facility	2.9	0.3	3.3	0.7	1.8	N.S.
Related service provider in a general education classroom	11.2	2.5	4.6	1.4	16.0	<.001
Related service provider in a special education classroom	6.7	1.3	4.1	0.8	9.0	<.05

Note: P values represent level of significance after applying Bonferonni correction for multiple comparisons.

Appendix H

ABILITIES Index Form

	A		B		I	L						I		T		I	E		S
	Audition (Hearing) Rate Both		Behavior & Social Skills Rate Both		Intellectual Functioning	Limbs (Use of hands, arms, and legs) Rate All						Intentional Communication Rate Both		Tonicity (Muscle Tone) Rate Both		Integrity of Physical health	Eyes (Vision) Rate Both		Structural Status
	Left Ear	Right Ear	Social Skills	Inapprop. Behavior	Thinking & Reasoning	Left Hand	Left Arm	Left Leg	Right Hand	Right Arm	Right Leg	Understanding others	Communicating with others	Degree of tightness	Degree of looseness	Overall Health	Left Eye	Right Eye	Shape, Body Form & Structure
0	Normal		All behaviors typical & appropriate for age		Normal for age			Complete normal use				Normal	Normal	Normal	Normal	General good health	Normal		Normal
1	Suspected hearing loss		Suspected disability	Suspected inapprop. Behaviors	Suspected disability			Suspected difficulty				Suspected disability	Suspected disability	Suspected disability	Suspected disability	Suspected health problems	Suspected vision loss		Suspected difference or interference
2	Mild hearing loss		Mild disability	Mildly inapprop. Behaviors	Mild disability			Mild difficulty				Mild disability	Mild disability	Mild disability	Mild disability	Minor ongoing health problems	Mild vision loss		Mild difference or interference
3	Moderate hearing loss		Moderate disability	Moderately inapprop. Behaviors	Moderate disability			Moderate difficulty				Moderate disability	Moderate disability	Moderate disability	Moderate disability	Ongoing but medically-controlled health problems	Moderate vision loss		Moderate difference or interference
4	Severe hearing loss		Severe disability	Severely inapprop. Behaviors	Severe disability			Severe difficulty				Severe disability	Severe disability	Severe disability	Severe disability	Ongoing poorly-controlled health problems	Severe vision loss		Severe difference or interference
5	Profound hearing loss		Extreme disability	Extremely inapprop. Behaviors	Profound disability			Profound difficulty				Profound disability	Profound disability	Profound disability	Profound disability	Extreme health problems, near total restriction of activities	Profound vision loss		Extreme difference or interference

Appendix I

The ABILITIES Index: Psychometric Properties and Construct Validity

The premise of this assessment method draws on the limitation of disability categories as failing to distinguish among students based on important dimensions that are directly relevant to their everyday life at schools, such as motor abilities, communication skills and language development. The nine functional abilities included in this scale are assumed to be developmentally relevant to all age groups: audition, behavior and social skills, intellectual functioning, limbs, intentional communication, tonicity, integrity of physical health, eyes and structural status. These nine domains are further sub-divided into 19 separate scores. For example, the domain “audition” is coded separately for left- and right ears. It was noted by the authors that the ABILITIES Index was not designed to derive a single overall score, rather individual rated domains (Bailey, et al., 1993).

The original version of the ABILITIES Index was rated on a 6-point scale (Bailey, et al., 1993). The first two points on the scale represented low level of dysfunction (1=Normal, 2=Suspected). The next two points represented a mid-level of dysfunction (3=Mild, 4=Moderate). Finally, the top two points on the scale represented more severe cases of dysfunction (5=severe, 6=extreme).¹⁶ Ratings were compared between parents and teachers, parents and specialists, and teachers and specialists. Overall, in about 67.2 percent of the cases there was exact agreement on the level of dysfunction. For approximately 86.2 percent of the cases there was agreement within one point on the 6-point scale. Bailey et al. reported similar findings (1995). Exact agreement between special education professionals (e.g., related service providers, psychologists, and social workers) across all items was 60.4 percent, and agreement within one point was 87.5 percent.

The authors reported a considerable variation in agreement across items, with the lowest agreement observed for social skills, inappropriate behavior, intellectual functioning, communication, and structural status (Bailey, et al., 1993). It was also reported that these were also the items for which the children exhibited the greatest variability in skills (Bailey, et al., 1993).

Similar findings were presented in a second study (Bailey, et al., 1995). Exact agreement between professionals was lowest for behavior (40 percent) and intentional communication (44 percent). In addition, disagreement was relatively low for communication between teachers and professionals who specialized in this domain. Agreement within one point was observed in 64 percent and 45 percent of the cases, respectively, between teachers and language pathologists for expressive (communicating with others) and receptive (understanding others) communication.

¹⁶ The label ‘Extreme’ was changed to ‘Profound’ in more recent versions of the scale (Bailey, et al., 1995).

Test-retest reliability of teachers' ratings was measure in an interval of one month (Bailey, et al., 1993). There was a satisfactory level of reliability for most of the items. Exact agreement was lowest for receptive communication (48 percent), expressive communication (45 percent), social skills (55 percent), and inappropriate behavior (53 percent). Intraclass correlations and Coefficient kappa were lowest for left ear ($r=0.25$, $kappa=0.49$), right ear ($r=0.25$, $kappa=0.49$), and health (0.19, $kappa=0.34$). In 64.7 percent of the cases, individual raters have exact agreement with consensus ratings, and in 86.7 of the cases they agree within one point (Bailey et. al, 1995). The lowest rates of exact agreement were in the areas of social skills (53 percent), inappropriate behavior (53 percent), and communication (55 percent).

Severity affected rates of disagreement on items relating to limbs, health, and structural status.¹⁷ Ethnicity affected rates of disagreement only with respect to intellectual functioning, with a greater disagreement among professionals rating children from diverse cultural groups than those rating European-American children.

There are very few research findings regarding the validity of the ABILITIES Index. Construct validity of the ABILITIES Index was demonstrated in two studies employing a sample of infants, toddlers and preschool-age children (Bailey, Hatton, Mesibov, Ament, & Skinner, 2000; Buysse, Bailey, & Donals, 1994). The ABILITIES Index was highly correlated with the Battelle Developmental Inventory (BDI; Newborg, Stock, Wnek, Guidubaldi, & Svincki, 1988), a measure of children aged birth to 8 years on five domains: Personal-social, adaptive, motor, communication and cognitive. It was also related to likelihood of being placed in inclusive early childhood programs (Buysse, Bailey, & Donals, 1994), and to differences between young boys with Autism compared to young boys with fragile X Syndrome (Bailey, Hatton, Mesibov, Ament, & Skinner, 2000). Finally, consumer validity was assessed using a sample of parents, educators and diagnostic specialists of infants, toddlers, preschoolers and young children (Buysse, Smith, Bailey, & Simoensson, 1993). Parents' ratings of the usefulness of the ABILITIES Index were significantly higher than ratings of educators and specialists. A concern was raised that, when viewed apart from other assessment batteries, the ABILITIES Index may lack the sensitivity and precision necessary to diagnose a disabling condition or determine service eligibility.

In conclusion, the ABILITIES Index demonstrates satisfactory reliability, considering that it has been tested in heterogeneous groups composed of parents, teachers and specialists from different disciplines. In addition, it seems to overcome the difficulty of measuring limitations of very young children who may be less able to communicate their mental and physical states. Highest reliability was found for areas in which there is relatively small variation among students (e.g., hearing, and vision), and lowest reliability for areas in which there are large variations among students (e.g., communication and behavior). Little is known about the properties of the ABILITIES Index when used to assess adolescent students with disabilities. Most of the published literature using the ABILITIES Index has focused on young children. The original study, introducing the

¹⁷ This relationship was not assessed for hearing, tonicity, and vision.

reliability of the scale was conducted with children ages 1 to 8 years (Bailey, et al., 1993). The team consensus study (Bailey, et al., 1995) included children aged one month to 17 years, with a mean of 5 years and 3 months. Reliability seemed to be inversely linked to variability among students. Since variability among students typically increases with age, a concern may arise regarding the reliability of the ABILITIES Index in assessing older children.