

Appendix A. Technical notes and methodology for volume 2:
Comparisons across disability groups

Appendix A provides information about the National Longitudinal Transition Study 2012 (NLTS 2012), as well as on the statistical procedures and analytic variables used in this report. The first seven sections (A.1 through A.7) provide detail on the study drawn from the NLTS 2012 Design Documentation (Burghardt et al., 2017). The next three sections provide information on the report's statistical procedures (A.8), generation of standard errors (A.9), and analytic variables (A.10). Additional NLTS 2012 information is available in Burghardt et al. (2017) and, for data users, the NLTS 2012 data file documentation (Bloomenthal et al., 2017).

A.1. Purpose and design of the study

The NLTS 2012 is the third in the series of NLTS studies sponsored by the U.S. Department of Education to examine youth with disabilities receiving services under the Individuals with Disabilities Education Act (IDEA), a long-standing federal law last updated in 2004. Under IDEA, youth with disabilities can be eligible to receive special education and related services through an individualized education program (IEP). The NLTS studies have used survey and administrative data to describe the backgrounds of youth with an IEP and their functional abilities, activities in school and with friends, academic supports received from schools and parents, and preparation for life after high school. The first study, called the NLTS, focused on youth with an IEP ages 13 to 21 in the 1985–1986 school year. The second study, the NLTS 2, focused on youth with an IEP ages 13 to 16 in the 2000–2001 school year. The NLTS 2012 focused on youth with and without an IEP ages 13 to 21 during the 2011–2012 school year.

The NLTS 2012 was designed to address three sets of questions about youth with an IEP and their experiences. Each set of questions involve comparing different groups of youth. The first set of questions pertains to the nature and extent of *differences between youth with an IEP and other youth*. The NLTS 2012 is the first NLTS to permit direct comparisons of youth with and without an IEP, having included representative samples of both groups. Among the youth without an IEP is a representative set of students who receive accommodations through a plan developed under Section 504 of the Rehabilitation Act, another federal law pertaining to the rights and needs of youth with disabilities. The second set of questions focus on the extent of *differences among the disability groups recognized by IDEA*: autism, deafblindness, emotional disturbance, hearing impairment,¹ intellectual disability, multiple disabilities, orthopedic impairment, other health impairment, specific learning disability, speech or language impairment, traumatic brain injury, and visual impairment. Critical to the study, and a driving force behind the sampling and weighting plans, is having nationally representative sets of youth from each of these disability groups. The third set of questions concern *differences between the current group of youth with an IEP and those in previous decades*. The NLTS 2012, when combined with the two earlier surveys, provides information on the extent of changes over three decades in the characteristics and experiences of youth in special education.

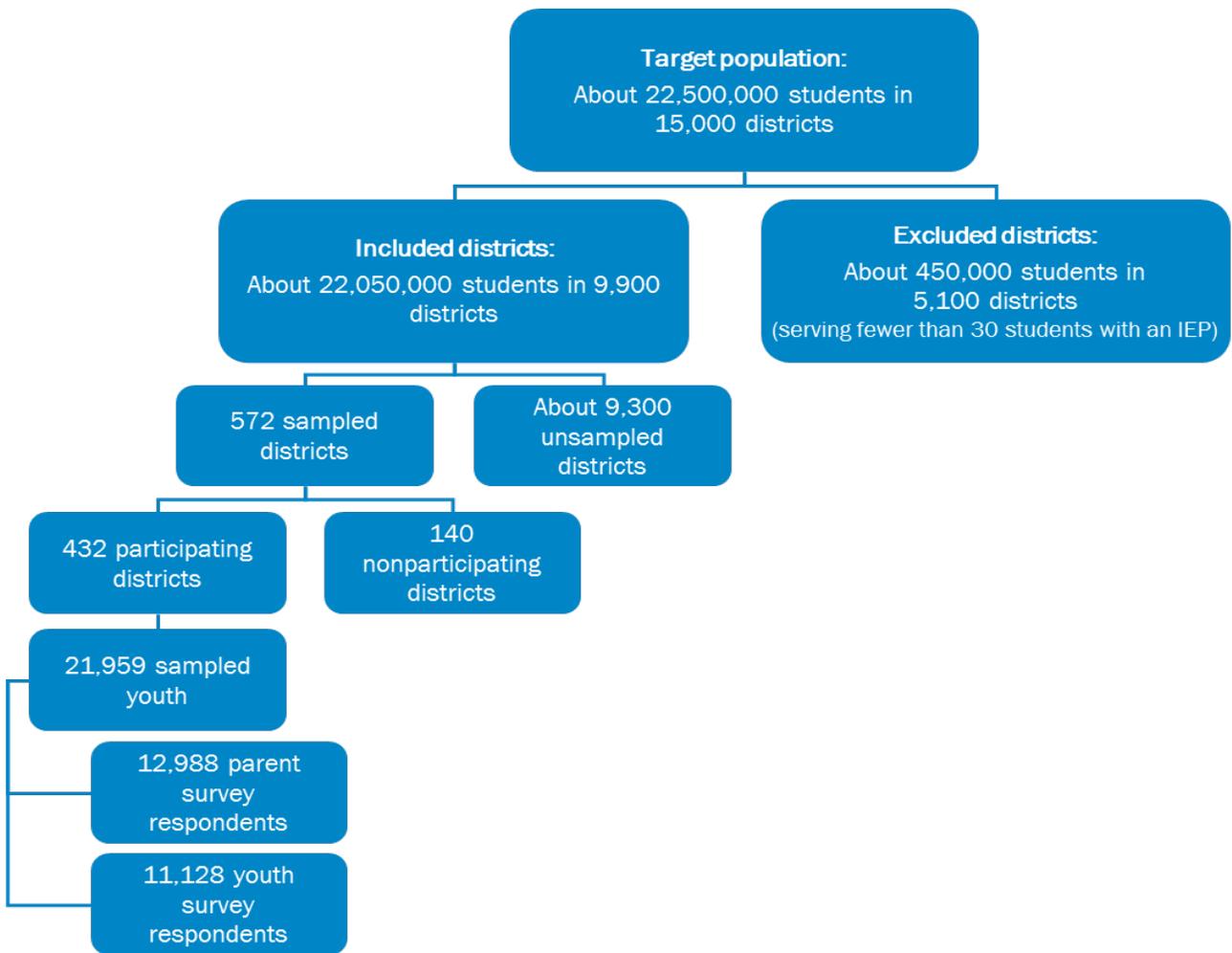
Three report volumes contain findings from the analysis of the NLTS 2012 data. Volume 1 focuses on comparisons of youth with an IEP and youth without an IEP. Volume 2, this volume, focuses on comparisons of youth with an IEP across disability groups. Volume 3 focuses on comparisons of youth with an IEP across time. The publications will be available on the [Institute of Education Sciences website for the NLTS 2012](#) when published.

¹ Because youth with deafness and hearing impairments are small groups, they have been combined into one group.

A.2. District and youth sample design

The NLTS 2012 used a two-stage national probability sample to produce precise, nationally representative estimates of the backgrounds and experiences of groups of secondary students. The most important groups were youth with an IEP in each of 12 disability groups recognized by IDEA, followed by groups of youth without an IEP, including those with a 504 plan and those with neither a 504 plan nor an IEP. The first stage consisted of selecting a stratified national probability sample of districts and then recruiting those districts to participate. Districts included local education agencies, charter schools that operate independently, and state-sponsored special schools that serve deaf and/or blind youth. The second stage consisted of selecting a stratified sample of youth from each of the districts that agreed to participate. The two-stage sample design resulted in a sample of 21,959 youth in 432 participating districts, who represent a target population of 22.5 million students in grades 7 through 12 or secondary ungraded classes in about 15,000 districts (figure A-1).

Figure A-1. NLTS 2012 sample selection and data collection results



Source: National Longitudinal Transition Study 2012.

The sampling design for local education agencies and independent charter schools used three approaches to balance the objectives of generating precise disability group estimates with the efficient use of resources. First, these districts needed to serve a minimum of 30 youth with an IEP to be included in the study.² Second, groups of these districts were combined into district units based on size and geography, so that district units included sufficient youth with an IEP to support data collection. Third, district units were stratified into small, medium-sized, and large district unit strata based on their estimated number of age-eligible youth with an IEP. Study districts were selected as a stratified random sample of district units within each district unit size stratum. Large district units were sampled at a disproportionately higher allocation and small district units were sampled at a disproportionately lower allocation; the medium-sized district units were sampled in proportion to their estimated population size.

The study did not enforce a minimum size requirement for state-sponsored special schools or group them into district units. It selected these schools with certainty and assigned them to a fourth district stratum.

The first-stage sample included 521 local education agencies and charter schools from 300 district units, plus all 51 state-sponsored special schools serving deaf and blind students in the United States. Of the 572 total districts sampled, 432 (or 76 percent) ultimately participated (table A-1).

Table A-1. District participation rate, by district sampling stratum

District sampling stratum	Number of sampled districts	Number of participating districts	Percentage of districts that participated
Large district units	195	154	79
Medium-sized district units	125	90	72
Small district units	201	151	75
Special schools	51	37	73
Total	572	432	76

Note: Large, medium-sized, and small district unit strata include local education agencies and charter schools.

Source: National Longitudinal Transition Study 2012.

Participating districts provided a list of their youth attending grades 7 to 12, and their youth attending secondary ungraded classes who were ages 13 or older as of December 1, 2011. The study selected a stratified random sample of youth from the lists that participating districts provided. After the samples were selected, district staff provided student and parent contact information for each of the sampled youth. The 14 youth sample strata included the 12 IDEA disability groups, youth with a 504 plan but no IEP, and those with neither a 504 plan nor an IEP (table A-2). The 21,959 youth selected for the study sample included 17,476 youth with an IEP, 1,168 youth with a 504 plan but no IEP, and 3,315 youth with neither a 504 plan nor an IEP.³ For the IDEA disability groups, the study aimed to have larger respondent samples in the groups that are more prevalent in the student population.

² This criterion limited the costs of data collection and the burden on small districts. It led to the exclusion of districts with about 450,000 (2 percent) of all students in the target population (figure A-1).

³ The total sample of 21,959 youth was released over two years during 2012 and 2013. More detail on data collection methods, procedures, and results is provided in section A.4.

Table A-2. Number of youth eligible and selected for the study sample, by youth sampling stratum

Youth sampling stratum (disability groups)	Number of sampled youth
All youth	21,959
IEP	17,476
Autism	1,648
Deaf-blindness	191
Emotional disturbance	2,299
Hearing impairment	942
Intellectual disability	2,092
Multiple disabilities	1,610
Orthopedic impairment	797
Other health impairment	2,119
Specific learning disability	2,980
Speech or language impairment	1,899
Traumatic brain injury	470
Visual impairment	429
No IEP	4,483
504 plan but no IEP	1,168
Neither 504 plan nor IEP	3,315

Source: National Longitudinal Transition Study 2012.

A.3. Content of parent and youth survey instruments

The parent and youth survey instruments used items from prior NLTS surveys as well as new items developed for the NLTS 2012 to address current policy-relevant issues.

The parent survey. The parent survey covered the following topics:

- **Disabilities and abilities**, including whether youth have a disability and, if so, what kind. It also covers whether they have had an IEP or a 504 plan, and their functional abilities.
- **School enrollment and service receipt**, including youth enrollment and graduation status, whether they were ever suspended or expelled, receipt of special education and related services, and other supports received through the school.
- **Parents' involvement in their children's education**, including whether parents attend school events, meet with teachers, help with homework, and participate in IEP and transition planning meetings.
- **Parents' expectations for their children's futures**, including how much education they think youth will obtain, challenges in furthering education and employment, and expected living arrangements and financial independence.
- **Background characteristics and socioeconomic status**, including household size; the primary language used at home; youths' race and ethnicity; parents' income, education, and marital status; and household receipt of federal financial assistance.

The youth survey. The youth survey covered the following topics:

- **Perceptions about school**, including coursework, relationships with staff, and experiences with bullying.
- **Receipt of academic supports through school**, including supplementary academic instruction outside of regular school hours.
- **Participation in IEP and transition-planning meetings**, including whether youth attended these meetings and their role in defining their educational goals.
- **Extracurricular and social activities**, including participation in school-sponsored sports and clubs, other organized activities outside of school, and interactions with friends.
- **Employment experiences**, including paid employment and school-sponsored work activities.
- **Expectations for the future**, including those for postsecondary education and independent living.
- **Indicators of self-determination**, including indicators of personal autonomy and self-direction.

The study refined the survey instruments three times. The most substantial change involved converting the survey from a telephone survey to a web questionnaire.

A.4. Data collection methods, procedures, and results

Data collection was conducted from February through October 2012 and from January through August 2013. The study revised the data collection strategies and continued data collection in 2013 to address low response rates during 2012. Survey administration in 2012 was by computer-assisted telephone interviewing. In 2013, the study introduced a web survey option and field interviewers. In addition, parent survey respondents received a portion of their cash incentive payment in advance. During both years, the study needed to contact parents first for youth who were younger than 18. If a parent consented to the study, the parent was surveyed first and subsequently interviewers attempted to survey the youth. This procedure led to a higher response rate among parents than among youth.

Across the two years of data collection, 12,988 parent surveys were completed, representing a 59 percent unweighted response rate and a 57 percent weighted response rate (table A-3). A total of 11,128 youth surveys were completed (86 percent of the parent respondents), representing a 51 percent unweighted response rate and a 48 percent weighted response rate of the full youth sample (table A-4). Youth were ages 12 to 23 when interviews took place, with the vast majority (greater than 97 percent) ages 13 to 21. Less than two percent were 12 years old, and less than one percent were 22 or 23 years old. All students were enrolled in grades 7 through 12 or in a secondary ungraded class at the time of sampling.

Table A-3. Parent survey response rates, by disability group

Disability group	Total unweighted sample	Completed surveys (unweighted)	Unweighted response rate	Total weighted sample	Completed surveys (weighted)	Weighted response rate
All youth	21,959	12,988	59%	22,161,451	12,670,711	57%
IEP	17,476	10,459	60%	2,579,497	1,531,665	59%
Autism	1,648	1,078	65%	157,283	103,679	66%
Deaf-blindness	191	138	72%	632	447	71%
Emotional disturbance	2,299	1,231	54%	229,167	123,644	54%
Hearing impairment	942	568	60%	31,702	19,250	61%
Intellectual disability	2,092	1,331	64%	254,965	165,425	65%
Multiple disabilities	1,610	994	62%	67,970	42,078	62%
Orthopedic impairment	797	510	64%	25,359	16,724	66%
Other health impairment	2,119	1,273	60%	372,367	224,040	60%
Specific learning disability	2,980	1,701	57%	1,303,679	755,134	58%
Speech or language impairment	1,899	1,079	57%	110,383	65,192	59%
Traumatic brain injury	470	293	62%	14,634	8,841	60%
Visual impairment	429	263	61%	11,358	7,211	63%
No IEP	4,483	2,529	56%	19,581,954	11,139,046	57%
504 plan but no IEP	1,168	664	57%	355,401	198,616	56%
Neither 504 plan nor IEP	3,315	1,865	56%	19,226,553	10,940,430	57%

Note: The weighted response rates use the unit nonresponse adjusted weights.

Source: National Longitudinal Transition Study 2012.

Table A-4. Youth survey response rates, by disability group

Disability group	Total unweighted sample	Completed surveys (unweighted)	Unweighted response rate	Total weighted sample	Completed surveys (weighted)	Weighted response rate
All youth	21,929	11,128	51%	22,038,063	10,521,016	48%
IEP	17,449	8,960	51%	2,575,964	1,302,251	51%
Autism	1,647	954	58%	157,159	91,524	58%
Deaf-blindness	191	109	57%	632	341	54%
Emotional disturbance	2,287	1,052	46%	227,694	104,823	46%
Hearing impairment	941	466	50%	31,676	15,751	50%
Intellectual disability	2,090	1,146	55%	254,759	141,228	55%
Multiple disabilities	1,607	863	54%	67,863	36,428	54%
Orthopedic impairment	797	432	54%	25,359	14,040	55%
Other health impairment	2,116	1,078	51%	371,943	189,082	51%
Specific learning disability	2,977	1,442	48%	1,302,597	639,279	49%
Speech or language impairment	1,898	943	50%	110,311	56,135	51%
Traumatic brain injury	469	244	52%	14,613	7,371	50%
Visual impairment	429	231	54%	11,358	6,247	55%
No IEP	4,480	2,168	48%	19,566,884	9,465,925	48%
504 plan but no IEP	1,168	576	49%	355,401	1699,869	48%
Neither 504 plan nor IEP	3,312	1,592	48%	19,211,483	9,296,056	48%

Note: The weighted response rates use the unit nonresponse adjusted weights. The total sample for the youth survey is less than the study sample of 21,959 because the study team learned that 30 youth were institutionalized, incarcerated, deceased, or had joined the military after the parent survey was completed. The study retained these youth in the study sample as well as their completed parent surveys but treated them as ineligible for the youth survey.

Source: National Longitudinal Transition Study 2012.

The response rates by year suggest that the revised data collection strategies in 2013 were an improvement. First, the new strategies helped reach sample members not reached by the 2012 survey (tables A-5 and A-6). In 2012, the unweighted parent survey response rate was 36 percent of 18,258 students in the sample released that year, and the unweighted youth survey response rate was 30 percent. The 2013 data collection increased the response rates for the original 2012 sample by 24 percentage points for parents (to 60 percent) and by 22 percentage points for youth (to 52 percent).

Second, in 2013 the study also attempted to reach members of an additional sample release of 3,701 youth to increase the number of respondents in each disability group. The cases for the additional sample release came from the same student lists that districts had provided and that were used to generate the sample released for data collection during 2012. The response rates were 52 percent for parents and 47 percent for youth from the additional sample released in 2013, each more than 15 percentage points higher than for the sample released in 2012.

Altogether, the 2013 data collection accounted for about half of all surveys collected across 2012 and 2013. Specifically, the 6,366 responses to the parent survey and 5,684 responses to the youth survey obtained during 2013 totaled 49 percent and 51 percent, respectively, of all respondents.

Table A-5. Unweighted parent survey response rates, by disability group and year

Disability group	Sample released in 2012			Sample released in 2013
	Proportion responding in 2012	Proportion responding in 2013	Cumulative response rate in 2012+2013	Response rate in 2013
All youth	36%	24%	60%	52%
IEP	37%	24%	61%	52%
Autism	42%	23%	65%	71%
Deaf-blindness	45%	28%	73%	n/a
Emotional disturbance	33%	23%	56%	46%
Hearing impairment	36%	25%	61%	57%
Intellectual disability	40%	25%	65%	55%
Multiple disabilities	39%	24%	63%	56%
Orthopedic impairment	38%	25%	63%	66%
Other health impairment	38%	23%	61%	53%
Specific learning disability	35%	25%	60%	49%
Speech or language impairment	33%	24%	57%	54%
Traumatic brain injury	38%	24%	62%	n/a
Visual impairment	40%	21%	61%	n/a
No IEP	32%	25%	57%	52%
504 plan but no IEP	33%	23%	56%	59%
Neither 504 plan nor IEP	32%	26%	58%	51%

n/a = not applicable because the study did not release any sample for the disability group in 2013.

Note: The study released 18,258 cases for data collection in 2012 and 3,701 new cases in 2013.

Source: National Longitudinal Transition Study 2012.

Table A-6. Unweighted youth survey response rates, by disability group and year

Disability group	Sample released in 2012			Sample released in 2013
	Proportion responding in 2012	Proportion responding in 2013	Cumulative response rate in 2012+2013	Response rate in 2013
All youth	30%	22%	52%	47%
IEP	31%	22%	53%	47%
Autism	36%	21%	57%	69%
Deaf-blindness	35%	23%	58%	n/a
Emotional disturbance	27%	21%	48%	40%
Hearing impairment	27%	23%	50%	50%
Intellectual disability	33%	23%	56%	51%
Multiple disabilities	33%	23%	56%	45%
Orthopedic impairment	31%	22%	53%	66%
Other health impairment	31%	20%	51%	47%
Specific learning disability	28%	22%	50%	44%
Speech or language impairment	28%	21%	49%	50%
Traumatic brain injury	31%	21%	52%	n/a
Visual impairment	35%	19%	54%	n/a
No IEP	27%	22%	49%	48%
504 plan but no IEP	28%	20%	48%	57%
Neither 504 plan nor IEP	26%	22%	48%	46%

n/a = not applicable because the study did not release any sample for the disability group in 2013.

Note: The study released 18,258 cases for data collection in 2012 and 3,701 new cases in 2013.

Source: National Longitudinal Transition Study 2012.

Because youth in the study had a wide range of disabilities and needs, the study offered them the following accommodations to help them respond to the survey, if needed:

- Option to participate in the survey by web, by telephone, or in person
- Ability to take breaks, and, if longer breaks were needed, to complete the survey at different points in time
- Use of any assistive technology the youth normally use (for example, optical devices to enlarge print, hearing aids, sign language, or lip reading)
- Option to take the survey in English or Spanish
- Option to have a parent or other household adult translate the survey for youth who do not speak English or Spanish, or to act as a sign language interpreter

Reflecting in part the use of these accommodations, the sample youth completed most youth surveys (84 percent, table A-7). The study permitted the parent survey respondents to act as proxies when youth were unable to provide their own responses even with accommodations (16 percent). Proxy responses were most common among youth with deaf-blindness (52 percent) and least common among youth with neither a 504 plan nor an IEP (3 percent). In addition, a small number of independent youth who were at least age 18 (9 respondents) provided their own consent to participate in the study and therefore acted as parent proxies, responding to both the parent and youth surveys. Proxy respondents, whether for the parent or the youth survey, received abbreviated surveys that omitted questions based on personal opinions, since one person cannot respond from the perspective of another person.

Table A-7. Proxy responses in the youth survey, by disability group

Disability group	Proxy respondents (percentage)	Total respondents
All youth	16	11,128
IEP	19	8,960
Autism	33	954
Deaf-blindness	52	109
Emotional disturbance	8	1,052
Hearing impairment	19	466
Intellectual disability	34	1,146
Multiple disabilities	48	863
Orthopedic impairment	31	432
Other health impairment	8	1,078
Specific learning disability	4	1,371
Speech or language impairment	6	943
Traumatic brain injury	16	244
Visual impairment	9	231
IEP, unspecified disability	6	71
No IEP	4	2,168
504 plan but no IEP	6	576
Neither 504 plan nor IEP	3	1,592

Source: National Longitudinal Transition Study 2012.

A.5. Weighting

The analyses in this volume use the *enrolled youth weights* provided in the NLTS 2012 restricted-used data file (RUF). These weights are designed for analyses using the population of youth who were enrolled in school in the reference school year (the 2011–2012 school year for those surveyed in 2012 and the 2012–2013 school year for those surveyed in 2013). They are particularly appropriate for analyzing measures where youth age or grade at the time of the survey is important for interpreting the response. The study includes 11,853 parent survey respondents and 10,144 youth respondents with a positive value for these weights. These weights were poststratified so that the weighted count of sample members by age at interview matches the count of all youth (ages 13 to 21) enrolled in public schools during the 2011–2012 school year. This approach addressed the differences across disability groups in the extent respondents completed the surveys in 2012 versus 2013. The poststratification counted students younger than age 13 as 13-year-olds, and students older than age 21 as 21-year-olds.

A.6. Unit nonresponse bias analysis

Addressing the potential for bias caused by nonresponse has become more important over the past decade because of the downward trend in response rates to surveys. Although low response rates do not necessarily increase nonresponse bias, they do create the potential for such bias (Groves, 2006). The National Center for Education Statistics (NCES) Statistical Standards specify that a nonresponse bias analysis be conducted whenever unit response at any stage of sample selection is less than 85 percent (Standard 4-4-1). The response rates for the parent and youth surveys fell below that threshold, making a nonresponse bias analysis appropriate.

The study used three methods to assess the potential for nonresponse bias in the NLTS 2012 parent and youth surveys, summarized below. Together, the results from applying these methods suggested that nonresponse adjustments to the weights succeeded in limiting the potential for bias.

- **Using administrative data to examine and adjust for nonparticipation of districts and nonresponse to the surveys.** This approach assessed whether nonresponse adjustments to the sampling weights achieved the goal of reducing differences between participants and the full sample on measures available from administrative records for the full sample. The study conducted this analysis both at the district level and at the youth level. At the district level, there were no statistically significant differences between participating and nonparticipating districts on any of the measures examined before or after adjustments to the district sampling weights. At the youth level, the nonresponse adjustments to the youth sampling weights substantially reduced the number of differences between respondents and the full sample. The proportion of variables where a statistically significant difference remained was no larger than what would be expected by chance.
- **Conducting a follow-up survey of nonrespondents to compare parent survey respondents to the full sample on some survey measures.** This approach involved conducting a short survey to secure responses to selected survey items from a subsample of parents who had not responded to the NLTS 2012 parent survey. This Nonrespondent Follow-Up Survey (NFS) provided a basis for comparing parent survey respondents to the full sample, including respondents and nonrespondents. The analysis of the NFS pointed to one variable with the greatest potential for bias—the age at which youth first received special education services. Specifically, parent survey respondents appeared to be more likely than nonrespondents to report that their child first received special education at a younger age. The NFS suggested other smaller differences between respondents and nonrespondents in variables that might be correlated with reduced likelihood of receiving special education services before age 8.
- **Generating an alternative set of weights using responses from the NFS as a sensitivity analysis to gauge whether potential bias in the age youth first received services could appreciably affect the NLTS 2012 report findings.** This approach examined how the potential bias in the age at which youth first receive special education services may have affected the measures and intergroup comparisons presented in the NLTS 2012 Volume 1 and 2 reports. The respondent sample was reweighted so that the distribution of age at which youth first received special education was the same in the respondent sample as in the combined NFS and respondent samples. The analyses in Volumes 1 and 2 were then re-conducted, and the results compared with those reported in the two volumes. The NFS-reweighted sensitivity analysis indicated that this potential source of nonresponse bias does not appreciably affect the main findings in Volumes 1 and 2. While the sensitivity analysis did not specifically examine the Volume 3 findings, that volume includes a subset of the variables covered in Volumes 1 and 2 and hence the results are likely to apply to that volume as well.

The NLTS 2012 design documentation provides more detail on each of these analyses (Burghardt et al., 2017).

A.7. Imputation and the handling of missing data

The study imputed values for a binary variable that indicates whether the youth sample member is from a low-income household. This variable is defined as household income below 185 percent of the federal poverty level, which is the eligibility threshold for schools' free or reduced-price lunch programs. Household income is calculated using parent-reported income or the midpoint of parent-reported income ranges. The federal poverty

line for the household is based on the year for which income is reported, the state of residence, and the total number of adults and children in the household. Missing values were imputed due to associations between low household income, IEP status, and subsequent outcomes as youth transition to life after high school. The study used a hot deck imputation procedure to impute values for the variable, using other variables that were most highly correlated with whether the household’s income was above or below 185 percent of the federal poverty level, as determined from logistic regression models. Just over 7 percent of parent survey respondents have imputed values for this variable.

The study did not impute values for any other variable used in the analysis for Volumes 1 or 2.

One variable analyzed in chapter 6 of this volume—a binary variable for whether youth with an IEP reported having attended a transition-planning meeting—is missing values for 16 year olds who responded to the survey in 2012 due to a skip logic error in the instrument (Burghardt et al., 2017). As a result, the analysis of parent-reported and youth-reported transition-planning experiences in this volume focuses on youth who are 17 years old or older.

A.8. Statistical procedures in this report

The report presents comparisons of group averages that have been tested for statistically significant differences (set at a probability of 0.05) to assess whether they are larger than might be expected due to sampling variation. Many of the comparisons in Volumes 1 and 2 are between overlapping groups where one group is a subset of a larger reference group. This approach was adopted in consultation with IES and the study’s technical working group to clarify the presentation of information about several groups in a single figure or table. Examples of comparisons between overlapping groups include those made between: (1) youth with a 504 plan (but no IEP) and all youth without an IEP, and (2) youth in a disability group and all youth with an IEP.

The statistical comparisons in Volumes 1 and 2 follow an approach similar to that which the National Center for Education Statistics uses for the National Assessment of Educational Progress (NAEP) study to make “part-whole” comparisons, such as between a state and the nation (U.S. Department of Education, 2009).⁴ The conclusions in this volume are supported by F-tests that are computed using the following formula:

$$F = \frac{(\mu_1 - \mu_0)^2}{\text{var}(\mu_1) + \text{var}(\mu_0) - 2\text{cov}(\mu_1, \mu_0)}$$

In the formula, μ_1 and μ_0 are the estimates of the means for the two groups being compared. For example, μ_1 could be the mean for youth with autism and μ_0 the mean for youth with an IEP overall. The F-statistic includes a covariance term because the variances of the means depend on the entire NLTS 2012 sample. As a result, the two means are not independent, and the covariance term is non-zero.⁵ In a traditional F-test made between

⁴ See http://nces.ed.gov/nationsreportcard/tdw/analysis/2004_2005/infer_compare2_overlap.aspx.

⁵ The NAEP study’s test statistic is $\frac{(\mu_1 - \mu_0)^2}{\text{var}(\mu_0) + (1 - 2p)\text{var}(\mu_1)}$, where p is the proportion of students from the larger group who are in the subset. The F-statistic used in Volumes 1 and 2 can be shown to be equivalent to the square of the NAEP test statistic under the assumption that the $\text{cov}(\mu_1, \mu_{-1}) = 0$, where μ_{-1} is the estimated mean

independent groups, this covariance term is zero. The test statistic is compared to an F distribution, with degrees of freedom equal to one and the difference between the number of primary sampling units and strata. Whether the F-test statistic is considered statistically significant is determined by comparing it to published tables of critical values. The report did not make a statistical adjustment for multiple comparisons, perhaps increasing the number of statistically significant findings.

The report focuses on differences that are both (a) statistically significant (not due to chance) and (b) at least five percentage points to call attention to the variation that is substantive and policy relevant. The study team selected this level in consultation with IES and content experts, judging differences of less magnitude not large enough to inform policy, practice, or the targeting of technical assistance. The five percentage point level was not empirically derived or based on an external standard.

A.9. Variance estimation

The sample design for the NLTS 2012 included multiple stages of sampling and stratification with different selection rates of youth across disability groups. Many standard software packages calculate estimates under the assumption of a simple random sample design as in traditional mathematical statistics and do not account for the clustering of students within schools. Assuming that the NLTS 2012 is a simple random sample design is not correct and can lead to estimated variances and confidence intervals that are too small. Underestimating the width of confidence intervals can incorrectly lead to conclusions that two groups differ by a statistically significant margin when they do not. Analyses with the NLTS 2012 data should use statistical software with the capabilities of accounting for the complex design. To support the variance estimation, the study developed variance estimation parameters that permit the computation of variance estimates through a Taylor series approximation using only the analytic weight.

for all youth in the larger group who are not in the subset. This assumption is not borne out in the NLTS 2012 data given its sample design. The NAEP study also uses a t-test instead of an F-test. The results of F-tests are equivalent to the results of t-tests when the null hypothesis for the F-test consists of only one comparison.

A.10. Analytic variables

The study used information collected through the parent and youth surveys, and from administrative sources, to address five broad questions of interest to policymakers, educators, and other stakeholders. These questions are listed below as they appear in Volumes 1 and 2 (Lipscomb et al., 2017, and this volume), and described in more detail in chapter 1. As in other IES reports, the volumes only include the survey measures most relevant to addressing these questions.⁶

- What are the background characteristics of youth and the schools they attend?
- What challenges do youth face relating to health, functional abilities, and independence?
- How engaged are youth in school and with friends?
- What academic supports do youth receive?
- How are youth preparing for life after high school?

The first subsection (A.10.1) provides a list of the analytic variables included in Volumes 1 and 2. The next subsection (A.10.2) provides more detail on indices and constructed measures the study developed that involve administrative data. The final two subsections describe a set of key indicators (A.10.3) and subgroup characteristics (A.10.4) for the analysis. All analyses use data from the NLTS 2012 RUF. The NLTS 2012 data file documentation (Bloomenthal et al., 2017) provides more information for researchers, including copies of the parent and youth survey instruments and codebook descriptions of each variable.

A.10.1. List of analytic variables

The full set of analytic variables used in Volumes 1 and 2 are provided in table A-8, organized by the five questions addressed in each volume. The table indicates the variable name from the RUF, the appendix table, and whether the variable appears in the main body. Volume 3 uses a subset of these variables that are comparable across the NLTS and/or the NLTS 2. More detail on the variables in Volume 3 are provided in that volume.

⁶ For example, the report excludes measures on the reasons youth left school because the analyses focus on youth still in secondary education. It also excludes parent-reported youth disabilities because the report uses information provided by the districts instead (although these measures affect skip logic for other measures).

Table A-8. Variables used in the NLTS 2012 reports, by volume

Description	Variable name	Volume 1		Volume 2	
		Appendix table number	Included in main body	Appendix table number	Included in main body
What are the background characteristics of youth and the schools they attend?					
Household income relative to 185 percent of the federal poverty level	p_h_pov185	B-1	Yes	B-1	Yes
Household income categories	p_h_income	B-2	No	B-2	No
Youth in household that received SNAP benefits in the past two years	p_h_snap	B-3	Yes	B-3	Yes
Youth in household that received TANF or state welfare in the past two years	p_h_tanf	B-4	Yes	B-4	Yes
Youth received SSI benefits in the past two years	p_y_ssi	B-5	Yes	B-5	Yes
Highest education level attained by the parent or parent's spouse	p_h_ed	B-6	Yes	B-6, B-7	Yes
Youth in household in which the parent or parent's spouse has a paid job	p_h_employed	B-7	Yes	B-8	Yes
Youth has any health insurance	p_y_inshealth	B-8	No	B-9	No
Youth has private health insurance	p_y_inshealthpriv	B-9	No	B-10	No
Youth has government-assisted or public health plan	p_y_inshealthother	B-10	No	B-11	No
Youth's parent is neither married nor in a marriage-like relationship	p_p_notmarried	B-11	Yes	B-12	Yes
Number of adults in the household	p_h_nadult	B-12	No	B-13	No
School's academic proficiency (groups based on proficiency within state)	sch_pctprof_q4	B-17	Yes	B-14	Yes
School's locale	sch_locale	B-18	Yes	B-15, B-16, B-17	Yes
Type of school the youth attends	p_y_school	B-20	No	B-18	Yes
School's share of youth with IEP (groups based on all schools in US)	sch_pctiep_q4	B-19	Yes	B-19	No
Youth age in years at the time of the parent interview	p_y_age	B-16	Yes	B-20, B-21, B-22	Yes
Youth gender	p_y_gender	B-13	Yes	B-23	Yes
Youth race/ethnicity	p_y_raceeth3	B-14	Yes	B-24, B-25, B-26	Yes
Youth limited English proficient status	d_y_lep	B-15	Yes	B-27	Yes
What challenges do youth face relating to health, functional abilities, and independence?					
Youth general health status	p_y_health	C-1, C-47, C-49	Yes	C-1, C-48, C-50, C-52	Yes
Youth has a chronic physical or mental health condition	p_y_chronic	C-2	Yes	C-2	Yes
Youth uses prescription behavioral medicines	p_y_medicine	C-3	Yes	C-3	Yes
How well youth communicates by any means	p_y_communicate	C-4	Yes	C-4	Yes
How well youth understands what people say to them	p_y_understand	C-5	Yes	C-5	Yes

Table A-8 (continued)

Description	Variable name	Volume 1		Volume 2	
		Appendix table number	Included in main body	Appendix table number	Included in main body
How well youth speaks clearly	p_y_speak	C-6	No	C-6	No
How well youth carries on an oral conversation	p_y_converse	C-7	No	C-7	No
How well youth sees (with glasses or contacts)	p_y_see	C-8	Yes	C-8	Yes
How well youth hears (with a hearing aid)	p_y_hear	C-9	Yes	C-9	Yes
How well youth uses arms and hands	p_y_armshands	C-10	Yes	C-10	Yes
How well youth uses legs and feet	p_y_legsfeet	C-11	Yes	C-11	Yes
Youth functional abilities index score (0 is low, 3 is high)	p_y_func_index	C-12	No	C-12	No
How well youth uses an ATM or cash machine	p_y_useatm	C-13	Yes	C-13	Yes
How well youth makes appointments	p_y_makeappt	C-14	Yes	C-14	Yes
How well youth gets to places outside the home	p_y_getplace	C-15	Yes	C-15	Yes
Frequency youth fixes own meals	p_y_fixmeal	C-16	Yes	C-16	Yes
Frequency youth does laundry	p_y_dolaundry	C-17	Yes	C-17	Yes
Frequency youth straightens up own room or living area	p_y_cleanroom	C-18	Yes	C-18	Yes
Frequency youth buys a few things needs at the store	p_y_buything	C-19	Yes	C-19	Yes
Youth activities of daily living index score (0 is low, 3 is high)	p_y_daily_index	C-20	No	C-20	No
Youth with higher activities of daily living index scores	p_y_daily_index_group	C-48, C-50	Yes	C-21, C-49, C-51, C-53	Yes
Youth has a driver's license or learner's permit	y_y_havelicense	C-23	Yes	C-22	Yes
Youth is registered to vote	y_y_registervote	C-24	No	C-23	Yes
Youth has a savings or checking account	y_y_haveaccount	C-21	Yes	C-24	Yes
Youth has an allowance or other money that can decide how to spend	y_y_haveallowance	C-22	Yes	C-25	Yes
How often youth chooses activities to do with friends	y_y_chooseactivity	C-25	Yes	C-26	Yes
How often youth writes letters, texts, or talks on phone to friends and family	y_y_writefriend	C-26	Yes	C-27	Yes
How often youth chooses gifts to give to family and friends	y_y_givegift	C-27	Yes	C-28	Yes
How often youth plans weekend activities that s/he likes to do	y_y_planweekend	C-28	Yes	C-29	Yes
How often youth goes to restaurants that s/he likes	y_y_restaurant	C-29	Yes	C-30	Yes
How often youth goes to movies, concerts, and dances	y_y_attendevent	C-30	Yes	C-31	Yes
How often youth volunteers in activities of interest	y_y_volunteertime	C-31	Yes	C-32	Yes
Youth personal autonomy index score (0 is low, 3 is high)	y_y_autonomy_index	C-32	No	C-33	No

Table A-8 (continued)

Description	Variable name	Volume 1		Volume 2	
		Appendix table number	Included in main body	Appendix table number	Included in main body
Youth knows how to make friends	y_y_knowfriend	C-37	No	C-34	Yes
Youth is able to make friends in new situations	y_y_ablefriend	C-39	No	C-35	Yes
Youth tells people when can do things that others say s/he cannot do	y_y_assertability	C-40	No	C-36	Yes
Youth knows how to make up for own limitations	y_y_cancompensate	C-45	No	C-37	Yes
Youth feels loved because gives love	y_y_givelove	C-46	No	C-38	Yes
Youth believes that trying hard in school helps to get a good job	y_y_tryjob	C-35	No	C-39	No
Youth keeps trying even after getting something wrong	y_y_trywrong	C-36	No	C-40	No
Youth knows how to make good choices	y_y_goodchoice	C-33	Yes	C-41	No
Youth is able to make choices that are important to him or her	y_y_importantchoice	C-38	No	C-42	No
Youth knows what s/he does best	y_y_knowself	C-41	No	C-43	No
Youth likes him/herself	y_y_likeself	C-42	No	C-44	No
Youth is confident in own abilities	y_y_isconfident	C-34	Yes	C-45	No
Youth is liked by others	y_y_isliked	C-43	No	C-46	No
Youth believes that it is better to be yourself than to be popular	y_y_issecure	C-44	No	C-47	No
How engaged are youth in school and with friends?					
How much youth agrees that feels part of the school	y_y_belongatschool	D-1	Yes	D-1	Yes
How much youth agrees that feels close to people at school	y_y_closeatschool	D-2	Yes	D-2	Yes
How much youth agrees that feels happy to be at school	y_y_happyatschool	D-3	Yes	D-3	Yes
How much youth agrees that feels safe in school	y_y_feelsafe	D-4	Yes	D-4	Yes
How much youth agrees that teachers encourage students to do their best	y_y_tchencourage	D-5	Yes	D-5	Yes
How much youth agrees that a school adult tells him/her when does a good job	y_y_adultpraise	D-8	Yes	D-6	Yes
How much youth agrees that a school adult listens to him/her	y_y_adultlisten	D-6	Yes	D-7	Yes
How much youth agrees that a school adult believes in him/her	y_y_adultbelieve	D-7	Yes	D-8	Yes
How much youth agrees that teachers treat students fairly	y_y_treatedfairly	D-9	No	D-9	No
How much youth agrees that a school adult cares about him/her	y_y_adultcare	D-10	No	D-10	No
How much youth agrees that a school adult notices when s/he is not there	y_y_adultnotice	D-11	No	D-11	No
How much youth agrees that a school adult wants him/her to do their best	y_y_adultencourage	D-12	No	D-12	No
How much youth agrees that class work is hard to learn	y_y_hardclasswork	D-13	Yes	D-13	Yes
How much youth agrees that has trouble keeping up with homework	y_y_troublehomework	D-14	Yes	D-14	Yes

Table A-8 (continued)

Description	Variable name	Volume 1		Volume 2	
		Appendix table number	Included in main body	Appendix table number	Included in main body
How much youth agrees that needs more help from teachers than is getting	y_y_needmorehelp	D-15	Yes	D-15	Yes
Number of hours of homework per week	y_y_hourshomework	D-16	No	D-16	No
Youth has repeated a grade	p_y_heldback	D-17	Yes	D-17	Yes
Youth participated in a school sport or club in the past year	y_y_schactany	D-18, D-53, D-57	Yes	D-24, D-40, D-44, D-48	Yes
Youth participated in a school sports team in the past year	y_y_schactsports	D-19	No		No
Youth participated in a school fine arts club in the past year	y_y_schactarts	D-20	No		No
Youth participated in student government in the past year	y_y_schactgov	D-21	No		No
Youth participated in a school academic club in the past year	y_y_schactacademics	D-22	No		No
Youth participated in a school vocational or career club in the past year	y_y_schactcareer	D-23	No		No
Youth participated in a school volunteer group in the past year	y_y_schactvolunteer	D-24	No		No
Youth participated in another school club in the past year	y_y_schactother	D-25	No		No
Youth participated in a nonschool sport or club in the past year	y_y_nonactany	D-26	Yes	D-25	Yes
Youth participated in a nonschool sports team in the past year	y_y_nonsports	D-27	No		No
Youth participated in a nonschool fine arts club in the past year	y_y_nonactarts	D-28	No		No
Youth participated in a nonschool religious youth group in the past year	y_y_nonactrel	D-29	No		No
Youth participated in nonschool math/science/computer lessons in the past year	y_y_nonacademics	D-30	No		No
Youth participated in a nonschool volunteer group in the past year	y_y_nonactvolunteer	D-31	No		No
Youth participated in another nonschool activity in the past year	y_y_nonactother	D-32	No		No
Number of days a week youth got together with friends in the past year	y_y_seefriends	D-33, D-54, D-58	Yes	D-18, D-41, D-45, D-49	Yes
How often youth uses text messages to communicate with friends	y_y_textfriends	D-34	Yes	D-19	Yes
How often youth uses social media to communicate with friends	y_y_socmediafriends	D-35	Yes	D-20	Yes
How often youth uses instant messages to communicate with friends	y_y_imfriends	D-36	No	D-22	No
How often youth uses email to communicate with friends	y_y_emailfriends	D-37	No	D-23	No
How often youth uses a telephone to communicate with friends	y_y_callfriends	D-38	No	D-21	Yes
Youth was teased or called names at school during the school year	y_y_teased	D-39, D-55, D-59	Yes	D-26, D-42, D-46, D-50	Yes
Youth experienced students making up something to make others not like them	y_y_rumors	D-40	Yes	D-27	Yes
Youth was attacked or in fights at school or on their way to or from school	y_y_attacked	D-41	Yes	D-28	Yes
Youth was told to do something in order to be friends with someone	y_y_manipulated	D-42	Yes	D-29	Yes

Table A-8 (continued)

Description	Variable name	Volume 1		Volume 2	
		Appendix table number	Included in main body	Appendix table number	Included in main body
Youth was teased or threatened by electronic methods	y_y_cyberbullied	D-43	Yes	D-30	Yes
Youth had items stolen from their locker, desk, or other place at school	y_y_robbed	D-44	Yes	D-31	Yes
How often youth was late to class this school year	y_y_lateclass	D-45	Yes	D-32	Yes
How often youth cut or skipped class this school year	y_y_cutclass	D-46	Yes	D-33	Yes
How often youth was late for school this school year	y_y_lateschool	D-47	Yes	D-34	Yes
Youth has received an out-of-school suspension	p_y_suspended	D-49, D-52, D-56	Yes	D-35, D-39, D-43, D-47	Yes
Youth has been expelled from school	p_y_expelled	D-50	Yes	D-36	Yes
How often youth got in trouble for acting out this school year	y_y_actout	D-48	No	D-37	No
Youth has been arrested in the past two years	p_y_arrested	D-51	Yes	D-38	Yes
What academic supports do youth receive?					
Youth received more time to take tests in the past year	p_y_accsrv_testtime		No	E-1	Yes
Youth received more time to complete assignments in the past year	p_y_accsrv_worktime		No	E-2	Yes
Youth received a computer or calculator when others did not in the past year	p_y_accsrv_computer		No	E-3	Yes
Youth received books in an alternate format in the past year	p_y_accsrv_materials		No	E-4	Yes
Youth took summer school	p_y_summerschool	E-4	No		No
Youth received assistance from a reader or interpreter in the past year	p_y_accsrv_reader		No	E-5	Yes
Youth received modified or alternate tests or assessments	p_y_accsrv_testcontent		No	E-6	Yes
Youth received shorter or different assignments	p_y_accsrv_workcontent		No	E-7	Yes
Youth received tutoring services at school	p_y_accsrv_tutor		No	E-8	Yes
Youth received assistance from an aide	p_y_accsrv_aid		No	E-9	Yes
Youth received any therapeutic services in the past year	p_y_therapservornurs		No	E-10	Yes
Youth received psychological or mental health services in the past year	p_y_accsrv_mental		No	E-11	Yes
Youth received speech and language therapy in the past year	p_y_accsrv_lang		No	E-12	Yes
Youth received special transportation assistance in the past year	p_y_accsrv_transp		No	E-13	Yes
Youth received physical or occupational therapy in the past year	p_y_accsrv_phys		No	E-14	Yes
Youth received orientation and mobility services in the past year	p_y_accsrv_mob		No	E-15	Yes
Youth received nursing care in the past year	p_y_accsrv_nurse		No	E-16	Yes
Youth received audiology services in the past year	p_y_accsrv_hear		No	E-17	Yes

Table A-8 (continued)

Description	Variable name	Volume 1		Volume 2	
		Appendix table number	Included in main body	Appendix table number	Included in main body
Youth received vision services in the past year	p_y_accsrv_see		No	E-18	Yes
Youth received school-based academic help outside school hours	y_y_supp	E-1, E-12, E-14	Yes	E-19, E-30, E-32, E-34	Yes
Youth received guidance on what courses to take	y_y_guidecoursesnow	E-2	Yes	E-20	Yes
Youth received school academic help outside school hours according to parents	p_y_supp	E-3	No	E-21	No
Youth took catch-up courses or double-dosed classes during school hours	p_y_catchup	E-5	Yes	E-22	Yes
How often parents or another household adult went to a parent-teacher conference	p_p_schconf	E-6	Yes	E-23	Yes
Parent/household adult attended an IEP meeting in the past two years	p_p_iepmeet		No	E-24	Yes
How often parents or another household adult helped with homework	p_p_helphomework	E-7, E-13, E-15	Yes	E-25, E-31, E-33, E-35	Yes
How often parents or another household adult talked with youth about school	p_p_talksch	E-8	No	E-26	No
How often parents or another household adult attended a school or class event	p_p_schevent	E-9	Yes	E-27	Yes
How often parents or another household adult attended a general school meeting	p_p_schmeet	E-10	Yes	E-28	No
How often parents or another household adult volunteered at school	p_p_schvolunteer	E-11	Yes	E-29	No
How are youth preparing for life after high school?					
Youth attended an IEP meeting the past two years	y_y_iepmeet17, y_y_iepmeet		No	F-1, F-2	Yes
Youth attended a transition-planning meeting	y_y_tpmeet		No	F-3	Yes
Parent/household adult attended a transition-planning meeting	p_p_tpmeet		No	F-4	Yes
Staff from a community service agency attended the transition-planning meeting	p_y_transagency		No	F-5	Yes
Parent was invited to the transition-planning meeting	p_p_tpinvite		No	F-6	No
Youth was invited to the transition-planning meeting	p_y_tpinvite		No	F-7	No
Youth's interests/strengths/preferences discussed at transition-planning meeting	p_y_tpinterests		No	F-8	Yes
Youth got information on life after high school at transition-planning meeting	p_y_tpinfo		No	F-9	Yes
Youth provided at least some input in IEP and transition-planning	p_y_goalsomeinput		No	F-10, F-36, F-41, F-46	Yes
Youth provided at least some input in IEP and transition-planning	y_y_goalsomeinput		No	F-11	No
Youth played at least an equal part in developing plan goals	p_y_goals		No	F-12	No
Youth's educational expectations	y_y_edexpect	F-1, F-2, F-3, F-4, F-5, F-28, F-32	Yes	F-13, F-14, F-37, F-42, F-47	Yes
Parent's educational expectations for youth	p_y_edexpect	F-6, F-7, F-8	Yes	F-15, F-16	Yes
Parent thinks readiness will be an issue for youth in furthering educ	p_y_edissueprep	F-9	Yes	F-17	Yes
Parent thinks need to work will be an issue for youth in furthering educ	p_y_edissuework	F-10	Yes	F-18	Yes

Table A-8 (continued)

Description	Variable name	Volume 1		Volume 2	
		Appendix table number	Included in main body	Appendix table number	Included in main body
Parent thinks paying for school will be an issue for youth in furthering educ	p_y_edissueaid	F-11	Yes	F-19	Yes
Parent thinks lack of information will be an issue for youth in furthering educ	p_y_edissueinfo	F-12	Yes	F-20	Yes
Youth took a college entrance or placement test	y_y_anyplacetest	F-16, F-29, F-33	Yes	F-21, F-38, F-43, F-48	Yes
Youth took a course for college credit during high school	p_y_collegecredit	F-17	Yes		No
Youth received help from school staff with the college application process	y_y_helpany	F-18	Yes	F-22	Yes
Youth had any work experience in the past year	y_y_anyjob	F-19	No		No
Youth had a paid work experience in the past year	y_y_anypaidjob	F-20, F-30, F-34	Yes	F-23, F-39, F-44, F-49	Yes
Youth had a paid or unpaid school-sponsored work activity in the past year	y_y_schjob	F-21	Yes	F-24	Yes
Youth had non-school-sponsored paid work experience in the past year	y_y_othjob	F-22	Yes		No
Youth knows what further education is needed for jobs might want	y_y_knowjob	F-13	Yes	F-25	Yes
Youth knows where to get help paying for postsecondary education	y_y_knowedaid	F-14	Yes	F-26	Yes
Youth gets enough school help with identifying future schools	y_y_helpschool	F-15	Yes	F-27	Yes
Parent thinks lack of information will be an issue for youth getting a job	p_y_jobissueinfo	F-24	Yes	F-28	Yes
Parent thinks keeping SSI eligibility will be an issue for youth getting a job	p_y_jobissuebenefits	F-23	Yes	F-29	Yes
Youth knows what kinds of jobs he or she would like or be good at doing	y_y_knowjob	F-25	Yes	F-30	Yes
Youth gets enough help from school staff about careers	y_y_issuehelp	F-26	Yes	F-31	Yes
Parent expects youth to be living independently at age 30	p_y_livingexp	F-27, F-31, F-35	Yes	F-32, F-40, F-45, F-50	Yes
Youth expects to be living independently at age 30	y_y_livingexp		No	F-33	No
Parent expects youth to be financially self-supporting by age 30	p_y_finanexp		No	F-34	No
Youth expects to have had a job by age 30	y_y_jobexporanyjob		No	F-35	No

Note: Volume 1 findings are reported in Lipscomb et al., (2017).

Source: National Longitudinal Transition Study 2012.

A.10.2. Indices and constructed measures that involve administrative data

This section describes indices and constructed measures the study developed based on administrative data. Administrative sources included school district records provided as part of the sample frame and records maintained by the U.S. Department of Education’s Common Core of Data, EDFacts, and Office of Civil Rights. Brief descriptions of all analytic variables can be found in the note and source fields below each table or figure. In addition, detailed descriptions of each variable are provided to users of the NLTS 2012 data in the NLTS 2012 data file documentation (Bloomenthal et al., 2017).

Indices

- Functional abilities index (*p_y_func_index*).** This index is a measure of the prevalence and degree of functional limitations. The index comprised eight parent-reported categorical measures of the youth’s abilities drawn from the NLTS 2: the ability to communicate, the ability to speak clearly, the ability to carry on an oral conversation, the ability to understand what people say, the ability to see, the ability to hear, the ability to use arms and hands, and the ability to use legs and feet. Each component measure has categorical values from 0 to 3 (table A-9). The functional abilities index is the average of parent ratings on each of the eight component measures and has values ranging from 0 to 3, with higher values representing greater functional abilities index scores. The internal consistency is 0.79.⁷ The analysis focuses on whether youth have an index value at or above (versus below) the average for all youth with an IEP. The study team used this level as an approximation of higher and lower functional abilities (less complex and more complex functional needs). In addition to the challenges that physical limitations can pose, research finds a link, particularly among youth with severe disabilities, between being able to communicate and understand others without trouble and a greater likelihood of being employed after high school (Carter et al., 2012).

Table A-9. Components of the functional abilities index

Components of the Index	Response categories for components
How well does {youth}: <ul style="list-style-type: none"> • Communicate by any means • Speak clearly • Carry on an oral conversation • Understand what others say to them • See with glasses or contacts • Hear with a hearing aid 	How well does {youth}: <ul style="list-style-type: none"> (3 points) Normally (2 points) Has a little or mild amount of trouble (1 point) Has a lot or moderate amount of trouble (0 points) Does not at all or has a severe to profound amount of trouble
Does {youth} use both of the following normally: <ul style="list-style-type: none"> • Arms and hands • Legs and feet 	Does {youth} use both of the following normally: <ul style="list-style-type: none"> (3 points) Yes (1 point) No (0 points) Has no use of one or both

Note: For this report, a response of “No” in reference to whether youth have normal use of both arms and hands, or of both legs and feet, has been interpreted as “No (but has some use of both)”. The NLTS 2012 parent survey does not fully define the difference between responses of “No” and “Has no use of one or both,” and parent survey respondents may have interpreted the response categories in different ways. The only instruction in the survey is that youth who were missing an arm/hand or a leg/foot should be counted as having no use of one or both.

Source: National Longitudinal Transition Study 2012

⁷ Internal consistency is an indicator of how closely related the components of an index are to each other. It is measured by Cronbach’s alpha, a value between 0 and 1 where higher values indicate greater internal consistency.

- Activities of daily living index (*p_y_daily_index*)**. This index is a measure of the extent of youth abilities to complete several typical teenage tasks independently, based on both the number of tasks completed and how well or often youth complete them. The index comprised seven categorical measures drawn from the NLTS 2: how well the youth uses an ATM without help, how well the youth makes appointments without help, how well the youth gets to nearby places without help, frequency the youth fixes a meal when needed without help, frequency the youth does laundry when needed without help, frequency the youth cleans rooms when needed without help, frequency the youth buys things when needed without help. Each component measure has categorical values from 0 to 3 (table A-10). The index is the average of parent ratings on each of the seven component measures and has values ranging from 0 to 3, with higher values representing greater activities of daily living index scores. The internal consistency is 0.82. The analysis focuses on whether youth have an index value at or above (versus below) the average among all youth with an IEP. The study team used this level as an approximation of higher and lower task performance. Research studies have found that youth with an IEP who perform these activities of daily living were more likely to be employed after high school and to report higher quality of life (Carter et al., 2012; Roessler, Brodin, & Johnson, 1990).

Table A-10. Components of the activities of daily living index

Components of the index	Response categories for components
How well does {youth} do each of the following without help: <ul style="list-style-type: none"> • Use an ATM or cash machine • Make appointments, such as with a doctor, dentist, or potential employer • Get to places outside the home, like to school, to a nearby store or park, or to a neighbor's house 	How well does {youth} do each of the following without help: <ul style="list-style-type: none"> (3 points) Very well (2 points) Pretty well (1 point) Not very well (0 points) Not at all well or not allowed
When the following chores need doing, about how often does {youth} do the following: <ul style="list-style-type: none"> • Fix own breakfast or lunch • Do laundry • Straighten up own room or living area • Buy a few things at the store 	When the following chores need doing, about how often does {youth} do the following: <ul style="list-style-type: none"> (3 points) Always (2 points) Usually (1 point) Sometimes (0 points) Never

Source: National Longitudinal Transition Study 2012.

- Personal autonomy index (*y_y_autonomy_index*)**. This index is a measure of the extent youth report acting according to their preferences, interests, and abilities. The index comprised seven categorical measures: frequency the youth chooses his or her activities with friends; frequency that the youth communicates with friends and family; frequency the youth chooses gifts to give family and friends; frequency the youth goes to restaurants that he or she likes; frequency the youth goes to movies, concerts, and dances; frequency the youth plans weekend activities that he or she likes to do; and frequency the youth volunteers in activities of interest. Each component measure has categorical values from 0 to 3 (table A-11). These measures come from the autonomy subscale of the Arc Self-Determination Scale. The index is the average of youth ratings on each of the seven component measures and has values ranging from 0 to 3, with higher values representing greater personal autonomy index scores. The internal consistency is 0.78. The analysis examines this index as a continuous measure rather than through assigning cutoffs. Many disability experts view youths' sense of self-determination, and particularly their sense of autonomy, as important for their success in adulthood (Shogren et al., 2015; Shogren & Shaw, 2016).

Table A-11. Components of the personal autonomy index

Components of the index	Response categories for components
<ul style="list-style-type: none"> • My friends and I choose activities that we want to do • I write letters, texts, or talk on the phone to friends and family • I go to restaurants that I like • I choose gifts to give to family and friends • I go to movies, concerts, and dances • I plan weekend activities that I like to do • I volunteer in things I am interested in 	(3 points) I do every time I have the chance (2 points) I do most of the time I have the chance (1 point) I do sometimes, when I have the chance (0 points) I do not do, even if I have the chance

Source: National Longitudinal Transition Study 2012.

Constructed measures that involve administrative data

- **Youth disability group (*d_y_disability*)**. This variable indicates the youth's primary disability group as reported by school districts, and is used to form the groups in the analysis. The categories are autism, deaf-blindness, emotional disturbance, hearing impairment, intellectual disability, multiple disabilities, orthopedic impairment, other health impairment, specific learning disability, speech or language impairment, traumatic brain injury, visual impairment, IEP but unspecified disability, 504 plan but no IEP, neither 504 plan nor IEP.
- **Youth age (*p_y_age*)**. This variable indicates the youth's age in years at the time the parent survey respondent completed the parent survey. School districts provided the birth date information used in the study, which parents either confirmed or corrected in the survey.
- **Youth gender (*p_y_gender*)**. This variable indicates whether the youth is male or female. The variable relies on district-reported data when parent-reported data is missing.
- **Youth race/ethnicity (*p_y_raceeth3*)**. This variable indicates whether the youth is Black (not Hispanic); Hispanic; or White, Asian, or other race (not Hispanic). Black includes African American. Hispanic includes Latino. Other race includes American Indian or Alaska Native, and Native Hawaiian or other Pacific Islander. The variable relies on district-reported data when parent-reported data is missing.
- **Youth limited English proficiency status (*d_y_lep*)**. This variable indicates whether the youth is limited English proficient or not, as reported by the school district.
- **School's academic performance based on math and reading proficiency rates (*sch_pctprof_q4*)**. This variable is based on the academic proficiency rate of the school the youth attended at sampling, using EDData data for 2011-2012. Academic proficiency is expressed as the average of each school's rate of proficiency in math and in reading. The distribution of schools within each state was divided into quarters based on the average math and reading proficiency rate in each school. This variable has categorical values from 1 (lowest-performing quarter) to 4 (highest-performing quarter) to indicate a school's academic proficiency.
- **School's locale (*sch_locale*)**. This variable indicates whether the school the youth attended at sampling is located in a city, suburb, or town or rural area, as indicated by the Common Core of Data for 2011-2012 or the Private School Survey for 2009-2010.

- **School's share of students with an IEP (*sch_pctiep_q4*)**. This variable is based on the percentage of students who have an IEP at the school the youth attended at sampling. The percentage of students who have an IEP at a school is calculated by dividing the count of students with an IEP from ED*Facts* by all students from the Common Core of Data for 2011-2012 or from the Private School Survey for 2009-2010 (expressed as a percentage). If any data were missing, then the variable was set equal to the school percentage of students with an IEP from the U.S. Department of Education's Office for Civil Rights. The distribution of schools nationwide was divided into quarters based on the percentage of students in each school who received services under an IEP. This variable has categorical values from 1 (lowest national quarter) to 4 (highest national quarter).

A.10.3. Key indicators that may be linked to post-high school success

A subset of the measures included in this volume were selected by the study team as key indicators and a focus of the volume's executive summary and subgroup analyses. These indicators pertain to key experiences, services, and expectations that may be predictors of students' post-high school outcomes. Several of them also represent supports or activities that the IDEA encourages schools to offer to youth with an IEP to improve their outcomes. Table A-12 identifies these key indicators and some of the reasons why they are important to policymakers, educators, and other stakeholders.

Table A-12. Key indicators that may be linked to post-high school success

Chapter	Measure	Respondent	Why measure is important to policymakers and educators
3	Not having very good or excellent general health	Parent	Health status is an important predictor of success in college and the labor market (Currie et al., 2010; Smith, 2009). Meeting special health care needs are important for helping youth with disabilities maximize their independence in adulthood (American Academy of Pediatrics, American Academy of Family Physicians, American College of Physicians—American Society of Internal Medicine, 2002).
3	Performance on activities of daily living (index score at or above the average score for youth with an IEP)	Parent	The ability to complete daily activities at home and in the community may be a signal of preparedness to live independently in the future. Promoting functional independence is also an intent of transition services provided by schools under IDEA 2004. Prior studies on youth with an IEP found an association between performance on activities of daily living and higher rates of post-high school employment and self-reported quality of life (Carter et al., 2012; Roessler et al., 1990).
4	Ever having been suspended from school	Parent	Suspensions cause students to miss instruction and opportunities to be engaged in school, and are associated with a variety of negative outcomes including low academic achievement, dropping out of high school, and adult incarceration (Christle, Jolivette, & Nelson, 2005; Sullivan et al., 2014; Zablocki & Krezmien, 2012). Concern about high rates of disciplinary actions among students with disabilities is reflected in the IDEA 2004 performance indicator that requires states to monitor how often youth with an IEP are suspended and expelled.
4	Being teased or called names this school year	Youth	Studies including students overall have found that higher rates of teasing and bullying in high school were associated with lower school academic performance and higher dropout rates (Cornell et al., 2013; Lacey & Cornell, 2013). The U.S. Department of Education recognizes the threat bullying can pose to youth with disabilities; when bullying prevents youth from accessing school services and other opportunities, it constitutes a denial of rights under IDEA 2004 (U.S. Department of Education, 2014).
4	Participating in at least one school-sponsored extracurricular activity in the past year	Youth	Participating in organized extracurricular activities is thought to help students connect with school and friends, and build teamwork and leadership skills. Prior studies of youth overall found a correlation between participation in these activities and academic performance, educational attainment, and labor-market success (Barron et al., 2000; Lipscomb, 2007; Stevenson, 2010).
4	Usually getting together with friends outside of school and organized activities at least weekly in the past year	Youth	Along with schools and families, friends can be a key source of support as youth transition from high school to adult life, providing valuable information about job opportunities and enhance quality of life (Canha et al., 2016; Cotterell, 2013; Kersh et al., 2013). Prior research on youth with disabilities found that the amount of time they spent per week interacting socially with friends and family was positively correlated with their level of independence after high school (Heal et al., 1999).
5	Receiving school-provided academic instruction outside school hours during the school year	Youth	The extent to which youth receive school-provided academic instruction outside school hours (for example, through peer tutors or after school programming), is one way schools attempt to meet the educational needs of all students, including those with disabilities. Although studies have not examined relationships between receiving supplementary academic instruction and post-high school outcomes directly, this form of support has been found to be correlated with achievement gains in math and reading, with suggestive larger benefits for students with disabilities than for other students (Black et al., 2008; Somers, et al., 2010; Springer et al., 2014).

Table A-12 (continued)

Chapter	Measure	Respondent	Why measure is important to policymakers and educators
5	Receiving parental help with homework at least weekly during the school year	Parent	Updates to IDEA since 1997 have emphasized the need to get parents involved in the educational development of their children. Parental homework help is positively correlated with achievement-related outcomes for high school students, although the relationship appears to vary by grade level and the type of homework help (Patall, Cooper, & Robinson, 2008). Among youth in special education specifically, parental involvement in education at home is a predictor of postsecondary enrollment in career and technical education programs as well as in two-year and four-year colleges (Wagner et al., 2014).
6	Youth providing at least some input in IEP and transition planning	Parent	Since IDEA began mandating transition services in 1990, practitioners and policymakers have placed greater emphasis on youth being active participants during IEP meetings and discussions about their transition plans (Johnson, 2012; Martin & Marshall, 1995; Wehmeyer et al., 1998). This emphasis on promoting self-determination reflects prior findings that student participation in transition planning significantly predicted youth with disabilities who enroll in postsecondary education and become employed after high school (Benz, Lindstrom, & Yovanoff, 2000; Halpern, Yovanoff, Doren, & Benz, 1995).
6	Expecting to obtain postsecondary education	Youth	Youths' educational expectations are forecasts of their likely educational outcomes. Prior studies found that youth who expected to go to college in the future were more likely than other youth to obtain postsecondary education (Ou & Reynolds, 2008; Sciarra & Ambrosino, 2011).
6	Taking a college entrance or placement test	Youth	Most colleges require either an entrance test for admission or a placement test to determine whether youth will be required to take remedial math or English courses. Taking one of these tests is an important step toward applying to a two- or four- year college and is consistent with the emphasis IDEA 2004 places on pursuing measurable postsecondary goals.
6	Having a paid job in the past year, including school-sponsored and nonschool jobs	Youth	A common finding in the research literature is that paid employment during high school is a strong predictor of, though not necessarily causally related to, post-high school employment and education for youth with an IEP (Mazzotti, et al. 2015; Test, et al. 2009). Although these findings may reflect, in part, the fact that youth who are already more independent during high school are more capable of working, high school employment experiences may also help students with disabilities to develop competencies that are useful for their longer-term success (Cobb, Lipscomb, Wolgemuth, & Schulte, 2013). For this reason, placing students in paid jobs is a key component of several work-based learning programs and other initiatives designed to improve employment outcomes for youth with disabilities (Baer et al., 2003; Fraker, 2013; Luecking & Fabian, 2000).
6	Expecting youth to live independently by age 30	Parent	A primary goal of transition planning under IDEA 2004 is for families and schools to help youth with an IEP identify the supports they will need to allow them to live independently. Parents' expectations that their child will be self-supporting, a measure related to the ability to live independently, have been shown, at least for youth with severe disabilities, to be a predictor of whether they secure jobs after high school (Carter et al., 2012).

ED is U.S. Department of Education; IDEA 2004 is 2004 authorization of the Individuals with Disabilities Education Act.

Source: National Longitudinal Transition Study 2012.

A.10.4. Subgroup characteristics

Findings presented in the last section of chapters 3 through 6 pertain to subgroups of youth with an IEP—based on individual, household, and school background characteristics—to provide greater insight into the differences among youth. Table A-13 identifies these characteristics and how they are defined.

Table A-13. Subgroup characteristics

Chapter	Characteristic	How subgroups of the characteristic are defined
2	Household income	<ul style="list-style-type: none"> • Low income (household income at or below 185 percent of the federal poverty level) • Higher income (household income above 185 percent of the federal poverty level (higher income))
2	Race and ethnicity	<ul style="list-style-type: none"> • Black (not Hispanic) • Hispanic • White, Asian, or other race (not Hispanic)
2	Gender	<ul style="list-style-type: none"> • Female • Male
2	Age (when parent survey completed)	<ul style="list-style-type: none"> • 14 years old or younger • 15 to 18 years old • 19 years old or older
3	Functional abilities index	<ul style="list-style-type: none"> • Lower functional abilities (scores on the functional abilities index that are below the average for youth with an IEP) • Higher functional abilities (scores on the functional abilities index that are at or above the average score for youth with an IEP)
2	School's academic performance	<ul style="list-style-type: none"> • Lower-performing school (average of school's math and reading proficiency rate is in the lowest 25 percent in the state) • Higher-performing school (average of school's math and reading proficiency rate is in the top 75 percent in the state (higher-performing school))
2	School locale	<ul style="list-style-type: none"> • City • Suburb • Town or rural area
2	Share of school's youth with an IEP	<ul style="list-style-type: none"> • Smaller share (among the lowest 75 percent of schools in the United States) • Larger share (among the top 25 percent of schools in the United States²)

Source: Parent survey (gender, age, household income, race/ethnicity, functional abilities index); ED Facts (school's academic performance); Common Core of Data (school locale); and ED's Office of Civil Rights (share of school's youth with an IEP).