Module Title

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HSLS:09 Sample Design, Weights, Variance, and Missing Data

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Module Objectives

- Describe HSLS:09 weights that must be applied to assure estimates made from the data are representative of the study population
- Describe appropriate procedures for calculating standard errors

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HSLS:09 Sample Design

- HSLS:09 includes a sample
  - Nationally representative of 9th-graders in 2009-10
  - Nationally representative of schools with 9th and 11th grades
- The sample for HSLS:09 is not a simple random sample (SRS) of the target population
  - HSLS:09 used a stratified, two-stage random sample design with primary sampling units (PSUs) defined as schools randomly selected at the first stage and students randomly selected from schools at the second stage

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Sample Design: Two-stage Stratified Sample

First stage = schools

- Stratified random sample of public and private schools

  - 1,889 eligible

    - 944 schools participated (55.5 percent weighted response rate)

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Sample Design: Two-stage Stratified Sample

- Second stage = 9th-grade students
  - Random sample from sampled schools' enrollment list
    - 25,206 eligible (about 27 per school)
      - Eligible students were capable of completing a student questionnaire and algebra assessment
      - Ineligible students (language barriers or severe disabilities) were retained in the sample and contextual data were obtained
      - 24,658 were classified as questionnaire-capable
      - 548 were classified as questionnaire-incapable
    - 21,444 (86% weighted) students participated
- Samples representative nationally and for 10 states

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Purpose of Weights – Review

- Weights are used to make estimates from the sample data representative of the target population
- Weights account for differential selection probabilities and differential patterns of response/nonresponse

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HSLS:09 Weights

- Multiple weights are provided for analysis
- Weights account for nonresponse; ideally there would be a weight available that is adjusted for nonresponse to every component of every round of data collection
- Number of possible weights increases dramatically with longitudinal studies
- Researchers must decide which weight is the best for their research question

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HSLS:09 Nomenclature for Weight Variables

- 1st Character = W, signifies "Weight variable"
- 2nd Character = 1, 2, etc., signifies a particular round of data collection

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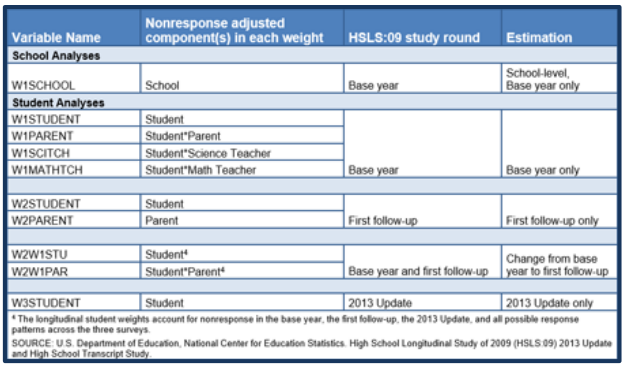
HSLS:09 Weights

- The set of weights available does not include weights that account for nonresponse to every component or combination of components
- If no weight corresponds exactly to the combination of components included in the analysis consider
    - A weight with nonresponse adjustments for *more* components than are included in the analysis
        - May result in a slightly smaller analytic sample
        - Will adjust for nonresponse associated with each of the components that it covers
    - A weight with nonresponse adjustments for *fewer* components than are included in the analysis
        - May result in a larger analytic sample and bias



Variable Name	Nonresponse adjusted component(s) in each weight	HSLS:09 study round	Estimation
School Analyses			
W1SCHOOL	School	Base year	School-level, Base year only
Student Analyses			
W1STUDENT	Student	Base year	Base year only
W1PARENT	Student*Parent		
W1SCITCH	Student*Science Teacher		
W1MATHTCH	Student*Math Teacher		
W2STUDENT	Student	First follow-up	First follow-up only
W2PARENT	Parent		
W2W1STU	Student[4]	Base year and first follow-up	Change from base year to first follow-up
W2W1PAR	Student*Parent[4]		
W3STUDENT	Student	2013 Update	2013 Update only

[4] The longitudinal student weights account for nonresponse in the base year, the first follow-up, the 2013 Update, and all possible response patterns across the three surveys.

SOURCE: U.S. Department of Education, National Center for Education Statistics. High School Longitudinal Study of 2009 (HSLS:09) 2013 Update and High School Transcript Study.

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HSLS:09 Weights (Continued)

Variable Name	Nonresponse adjusted component(s) in each weight	HSLS:09 study round	Estimation
School Analyses			
W1SCHOOL	School	Base year	School-level, Base year only
Student Analyses			
W1STUDENT	Student	Base year	Base year only
W1PARENT	Student*Parent		
W1SCITCH	Student*Science Teacher		
W1MATHTCH	Student*Math Teacher		
W2STUDENT	Student	First follow-up	First follow-up only
W2PARENT	Parent		
W2W1STU	Student[4]	Base year and first follow-up	Change from base year to first follow-up
W2W1PAR	Student*Parent[4]		
W3STUDENT	Student	2013 Update	2013 Update only

[4] The longitudinal student weights account for nonresponse in the base year, the first follow-up, the 2013 Update, and all possible response patterns across the three surveys.

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Standard Error Calculation in HSLS:09 – Replication Techniques

- This method calculates appropriate SEs based on differences between estimates from the full sample and a series of created subsamples (replicates)
- Select replicate weights that are associated with your main sampling weight (e.g., for W2STUDENT, select W2STUDENT001 through W2STUDENT002)
- HSLS:09 replication weights use the Balanced Repeated Replication (BRR) method

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Standard Error Calculation in HSLS:09 – Taylor-Series Linearization

- For HSLS:09, Taylor-series linearization requires restricted-use data
- This method uses primary sampling unit (PSU) and strata identifiers to calculate appropriate SEs
- Select the PSU and stratum variables (variable names: PSU and STRAT_ID) associated with your sampling weight variable

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Missing Data in HSLS:09

"Reserve" Codes

- -1 Item missing, don't know
- -3 Carry-through missing
- -4 Not Administered: Abbreviated interview
- -5 Data suppressed in public-use file
- -6 Unit missing, component not applicable
- -7 Legitimate skip, not applicable
- -8 Unit missing
- -9 Item missing, nonresponse

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Missing Data Example

- S1EDUEXPECT S1 G01 How far in school 9th-grader thinks he/she will get
- S1SURECLG S1 G02 How sure 9th-grader is that he/she will go to college to pursue a BA/BS

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Missing Data Example (Continued)

S1EDUEXPECT	n	%
-9 Missing	308	1.4
1 Less than high school	92	.4
2 High school diploma or GED	2572	12.0
3 Start an Associate's degree	139	.6
4 Complete an Associate's degree	1174	5.5
5 Start a Bachelor's degree	113	.5
6 Complete a Bachelor's degree	3469	16.2
7 Start a Master's degree	226	1.1
8 Complete a Master's degree	4214	19.7
9 Start Ph.D/M.D./Law/other prof degree	172	.8
10 Complete Ph.D/M.D./Law/other prof degree	4396	20.5
11 Don't know	4569	21.3
Total	21444	100.0

S1SURECLG AND S1EDUEXPECT	n	%	RECODE %
-9 Missing	397	1.9	missing
-7 Item legitimate skip/NA	8546	3.9.	missing
1 Very sure about going	9247	43.1	74.0
2 Will probably go	3092	14.4	24.7
3 Will probably not go	129	.6	1.0
4 Very sure about not going	33	.2	0.3
Total	21444	100.0	100.00

S1SURECLG	n	%
-9 Missing	397	1.9
-7 Item legitimate skip/NA	8546	39.9
1 Very sure about going	9247	43.1
2 Will probably go	3092	14.4
3 Will probably not go	129	.6
4 Very sure about not going	33	.2
Total	21444	100.0

S1SURECLG RECODED	n	%	RECODE %
-9 Missing	397	1.9	missing
(recode -7 to 0) Does not expect to go	8546	39.9	40.6
1 Very sure about going	9247	43.1	43.9
2 Will probably go	3092	14.4	14.7
3 Will probably not go	129	.6	0.6
4 Very sure about not going	33	.2	0.2
Total	21444	100.0	100.0

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Frequently Asked Questions

- When selecting a weight, do I have to subset my dataset?
  - No. The weight automatically limits your sample to cases with a positive weight
- What happens to cases where there is no positive weight?
  - They automatically drop out of your analytic sample
- What weights do I use if I'm analyzing a subsample of cases?
  - The same weights you would use when analyzing the full sample
- What if I'm running a regression – what weights do I use?
  - The same weights you would use for any other type of analysis

Module Summary and Resources

Summary

- Described HSLS:09 weights that must be applied to assure estimates made from the data are representative of the study population
- Described appropriate procedures for calculating standard errors

Resources

- Analyzing NCES Complex Survey Data
- Statistical Analysis of NCES Datasets Employing a Complex Sample Design