

NAEP 2015 NONRESPONSE BIAS ANALYSIS REPORT

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1. NONRESPONSE BIAS ANALYSIS IN THE 2015 NAEP

NCES statistical standards call for a nonresponse bias analysis to be conducted for a sample with a response rate below 85 percent. Weighted school response rates for 2015 NAEP indicate a need for school nonresponse bias analyses for private school samples for grades 4, 8 and 12 (paper-based operational subjects) and for public school samples of the Bureau of Indian Education (BIE) for grades 4 and 8. Based on the weighted student response rates for each subject, a student nonresponse bias analysis is necessary for the grade 12 public and private school student samples.

Note that in the analysis of student nonresponse bias, the mathematics, reading and science students are combined, since assessment subject is not considered to be a significant factor in determining whether or not a student responded in the assessment. This is confirmed by the closeness of the weighted response rates for mathematics, reading and science in each jurisdiction. Combining the students across the three subjects increases the power to detect biases, given that the same population is represented in each subject.

Response rates for schools and students are shown in tables 1 and 2, respectively, for the cases where nonresponse bias analyses are required.

Table 1. Weighted school response rates, before substitution

Domain		Response Rate
Grade 4	Private	61.2
	BIE (public)	65.5
Grade 8	Private	55.8
	BIE (public)	71.0
Grade 12	Private	57.0

Table 2. Weighted student response rates

Domain (public)		Response Rate by Subject		
		Mathematics	Reading	Science
Grade 12	National Public	77.7	77.8	77.7
	National Private	84.1	84.4	83.4

The analyses conducted in this report consider only certain characteristics of schools and students. They do not directly consider the effects of the nonresponse on student achievement; the primary focus of NAEP. Thus, these analyses cannot be conclusive of either the existence or absence of nonresponse bias for student achievement (see Peytcheva and Groves, 2009).

2. SCHOOL NONRESPONSE BIAS ANALYSIS

The school analysis, required for private school samples in grades 4, 8 and 12 (operational subjects), for public school samples for the Bureau of Indian Education (BIE) in grades 4 and 8, was conducted in three parts.

1. The distribution of the responding original school sample was compared with that of the entire eligible original school sample. Schools were weighted by their school base weights and their enrollment, referred to as a size-adjusted weight. The original sample is the sample before substitution.
2. The distribution of the responding sample, including participating substitutes was compared to the full sample (but in this case, substitutes were included in place of those nonrespondents that they replaced). Again, the size-adjusted school base weights were used for both the full sample and the respondents.
3. The same sets of schools were compared as in the second analysis, but this time when analyzing the responding schools alone, school nonresponse adjustments were applied to the size-adjusted weights.

The first part of the analysis indicates the potential for nonresponse bias that was introduced through school nonresponse. The second part of the analysis suggests the remaining potential for nonresponse bias after the mitigating effects of substitution have been accounted for. The third part indicates the potential for bias after accounting for the mitigating effects of both substitution and nonresponse weight adjustments. Both the second and third parts, however, may provide an overly optimistic scenario, since even though substitution and nonresponse adjustments may correct somewhat for deficiencies in the few characteristics examined here, there is no guarantee that they are equally as effective for other characteristics, and in particular for student achievement.

In each analysis, chi-square tests of association were conducted between school response status and each of the following four categorical variables:

- Census region;
- Reporting subgroup for private schools;
- Urban-centric locale; and
- Estimated grade enrollment divided into three equally sized categories.

The chi-square tests were carried out using procedures that appropriately account for the complex sample design used in NAEP, and the weighting procedures. The Rao-Scott chi-square test (Rao

and Scott, 1984) was computed using the SAS/STAT[®] 12.1 survey procedures software (SAS Institute Inc., 2012).

In addition, mean values of race/ethnicity percentages and enrollment for responding and nonresponding schools were compared. Two measures of the mean size of enrollment in the respective grades were considered, one using the size adjusted school weight (mean size of school attended by an average student), and the other using the school weight without the size adjustment (mean estimated grade enrollment). Differences between the means for the respondents and full sample were tested using t-tests. These tests also took account of the complex sample design, as well as the fact that the respondents are a subset of the full sample (thus in that sense the first two sets of comparisons, using only school base weights, are equivalent to testing whether the mean for respondents is significantly different from the mean for nonrespondents).

For BIE schools, reporting subgroup for private schools and the mean values of race/ethnicity percentages were not included in the analysis. Also, the categories for Census region and urban-centric locale are different from those used for private schools to account for the different distribution of schools.

The results of these analyses for grades 4, 8, and 12 private schools and for grades 4 and 8 public schools for BIE, are presented in the tables in appendix A, and summarized in tables 3, 4, 5, 6, and 7, respectively. The BIE samples at grades 4 and 8 consisted of a census of schools, and so all differences between the responding and original samples are statistically significant.

Table 3. Characteristics with p-values less than 0.05, grade 4 private schools

Analysis	Characteristics with p-values less than 0.05
Original sample	Census region, Reporting Subgroup, Locale, Size, Estimated grade enrollment, Percent Hispanic
Sample with substitutes Nonresponse adjusted	Census region, Reporting Subgroup, Locale, Size, Estimated grade enrollment Locale, Size

Table 4. Characteristics with p-values less than 0.05, grade 8 private schools

Analysis	Characteristics with p-values less than 0.05
Original sample	Census region, Reporting Subgroup, Estimated grade enrollment
Sample with substitutes	Census region, Reporting Subgroup, Locale, Size, Percent Hispanic
Nonresponse adjusted	Size, Size of school attended by average student, Percentage Two or more races

Table 5. Characteristics with p-values less than 0.05, grade 12 private schools

Analysis	Characteristics with p-values less than 0.05
Original sample	Census region, Reporting Subgroup, Percent Black, Percent Asian
Sample with substitutes	Census region, Reporting Subgroup, Estimated grade enrollment
Nonresponse adjusted	None

Table 6. Characteristics with p-values less than 0.05, grade 4 public schools for Bureau of Indian Education (BIE)

Analysis	Characteristics with p-values less than 0.05
Original sample	Census region, Locale, Size, Size of school attended by average student, Estimated grade enrollment
Sample with substitutes	Census region, Locale, Size, Size of school attended by average student, Estimated grade enrollment
Nonresponse adjusted	Census region, Size, Size of school attended by average student, Estimated grade enrollment

Table 7. Characteristics with p-values less than 0.05, grade 8 public schools for Bureau of Indian Education (BIE)

Analysis	Characteristics with p-values less than 0.05
Original sample	Census region, Locale, Size, Size of school attended by average student, Estimated grade enrollment
Sample with substitutes	Census region, Locale, Size, Size of school attended by average student, Estimated grade enrollment
Nonresponse adjusted	Census region, Locale, Size, Size of school attended by average student, Estimated grade enrollment

In general, nonresponse adjustments decreased the number of variables with significant differences. For grades 4 and 8 private, substitution and nonresponse adjustments appear to have been at least partially effective in reducing the nonresponse bias, as the important variable “private school reporting group” in each sample changed to non-significant after substitution and nonresponse adjustments. However, the biases of some other variables were still significant, or newly significant, after nonresponse adjustments. Results for grade 12 private showed no significant bias for any school characteristic after substitution and nonresponse adjustments.

For grade 4 private, the results for the urban-centric locale and school size variable remained significant after substitution and nonresponse adjustments. The absolute bias for urban-centric locale increased for city (0.6 to 2.1) and suburban (0.5 to 1.9) while decreasing for town (2.9 to 0.5) and rural (1.8 to 0.2). The absolute bias for school size had the largest change for larger size schools increasing from 1.7 to 4.5.

For grade 8 private, after nonresponse adjustments, the results for school size, mean size of school attended by an average student and percentage two or more races still have significant bias. The results for school size changed from non-significant to significant after substitution and nonresponse adjustments. As observed for grade 4 private, absolute bias increased for larger size schools, from 2.4 to 5.4 for grade 8 private. The results for mean size of school attended by an average student also changed from non-significant to significant after nonresponse adjustments, the absolute bias increasing from 3.8 (non-significant) to 6.0 (significant) and the relative bias increasing from 8.2% to 12.9%. The absolute bias for percentage two or more races increased slightly from 0.8 (non-significant) to 0.9 (significant) where the t-test P-value of 0.042 shows the significance to be weakened.

These results suggests there is potentially significant bias for school size for grades 4 and 8 private, and mean size of school attended by average student for grade 8 private after adjustments.

Even though all differences between the responding and original samples are statistically significant for BIE samples due to a census of schools, there was a slight decrease in bias, after nonresponse adjustments, for school size, size of school attended by average student, and estimated grade enrollment at both grades 4 and 8.

3. STUDENT NONRESPONSE BIAS ANALYSIS

The analysis of student nonresponse bias was required for the grade 12 public and private school student samples. This analysis was conducted in two parts for mathematic, reading, and science students combined:

1. The distribution of the responding student sample was compared with that of the entire eligible sample of students, using student base weights; and
2. The distribution of the responding student sample was compared to the entire eligible sample of students. This time, when analyzing the responding students alone, student nonresponse adjustments were applied to the weights.

The first part of the analysis indicates the potential for nonresponse bias that was introduced through student nonresponse. The second part of the analysis indicates the potential for bias after accounting for the effects of nonresponse weight adjustments. The second part, however, may provide an overly optimistic scenario, since even though nonresponse adjustments may correct somewhat for deficiencies in the few characteristics examined here, there is no guarantee that they are equally as effective for other characteristics, and in particular for student achievement.

The following student characteristics were used in the comparisons:

- Sex;
- Race/ethnicity;
- Relative age;
- Free or reduced price lunch eligibility;
- Student Disability (SD) status; and
- English Language Learner (ELL) status.

For these analyses, chi-square tests of the association between student response status and the particular variable under consideration were conducted. These tests were carried out using procedures that appropriately account for the complex sample design used in NAEP, and the weighting procedures.

The results of these analyses are presented in the tables in appendix B, and are summarized in table 8 below.

Table 8. Characteristics with p-values less than 0.05, domains of grade 12 public and private school students

Domain	Analysis	Characteristics with p-values less than 0.05
Public	Student base weights	Sex, Relative Age, SD
	Nonresponse adjusted student weights	Race, Relative Age, SD, ELL
Private	Student base weights	SD
	Nonresponse adjusted student weights	None

The sample sizes are large for student-level files, especially for public schools, which makes the tests very sensitive. In general, the number of variables with significant differences decreased or stayed the same after nonresponse adjustments. After nonresponse adjustments, for each of the significant variables, the percentage difference was actually very small, being 1.2 percent or less. Results for private schools showed no significant bias for any characteristic after nonresponse adjustments.

Even when the test result was significant, the absolute value of the bias was reduced in most cases. For example, for the public school students, relative age and SD status remained significant after nonresponse adjustments, but the absolute biases for both characteristics were reduced from 0.6 to 0.1, which is very small in terms of the absolute bias.

Exceptions occurred for race and ELL status for national public. Race became significant after the nonresponse adjustment, although the largest absolute bias remained at 0.3 for White, non-Hispanic. For ELL status, the absolute and relative biases increased slightly from 0.0 (non-significant) to 0.1 (significant) and 0.6 percent to 3.0 percent, respectively.

The change in ELL status appears to be explained by the fact that SD status and ELL status are related characteristics, since some students are both. Therefore, the procedures that were used to remove the bias in SD status had some negative impact on the bias for ELL status. This explanation is confirmed by the pattern of significant difference in SD status being reduced (absolute bias decreased from 0.6 to 0.1) and slightly introduced in ELL status (absolute bias increased from 0.0 to 0.1) in national public. Overall, the negative impact on the bias for ELL status remained relatively small.

In summary, based on the student characteristics available, there does not appear to be evidence of substantial bias resulting from student nonresponse.

REFERENCES

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- SAS Institute Inc. (2012). *SAS/STAT® 12.1 User's Guide*. Cary, NC: SAS Institute, Inc.
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Appendix A

Table A-1. 2015 NAEP grade 4 original sample - weighted percentages of full sample and responding schools by various subgroups - all private schools (sample size = 544)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Census region					0.002
Northeast	21.74	18.25	-3.5	-0.160	
Midwest	27.23	31.95	4.7	0.173	
South	31.83	32.76	0.9	0.029	
West	19.20	17.04	-2.2	-0.113	
Private school reporting subgroup					0.000
Roman Catholic	43.02	58.38	15.4	0.357	
Non-Catholic Private	56.98	41.62	-15.4	-0.269	
Urban-centric locale					0.008
City	40.90	40.28	-0.6	-0.015	
Suburban	37.99	37.54	-0.5	-0.012	
Town	7.99	10.85	2.9	0.358	
Rural	13.12	11.33	-1.8	-0.137	
Size					0.042
Large (≥ 28)	53.37	51.67	-1.7	-0.032	
Medium (16-27)	24.69	27.95	3.3	0.132	
Small (≤ 15)	21.95	20.38	-1.6	-0.071	

NOTE: Size-adjusted school weights were used.

Table A-2. 2015 NAEP grade 4 original sample - weighted mean values of various characteristics for full sample and responding schools - all private schools (sample size = 544)

	Full sample mean	Respondent mean	Bias	Relative bias	T-test p-value
Size of school attended by average student	36.77	35.18	-1.6	-0.043	0.217
Estimated grade enrollment	18.92	20.22	1.3	0.068	0.036
Race/ethnicity					
Percentage White, not Hispanic	70.80	68.77	-2.0	-0.029	0.050
Percentage Black, not Hispanic	7.86	8.45	0.6	0.075	0.302
Percentage Hispanic heritage	11.75	13.74	2.0	0.169	0.012
Percentage Asian	5.04	4.97	-0.1	-0.015	0.807
Percentage American Indian/Alaskan Native	0.43	0.27	-0.2	-0.376	0.289
Percentage Native Hawaiian/Pacific Islander	0.77	0.32	-0.5	-0.590	0.140
Percentage Two or more race	3.34	3.48	0.1	0.041	0.500

NOTE: For the mean of school size attended by average student and the race/ethnicity percents, size-adjusted school weights were used. For the mean of enrollment, school weights were used.

Table A-3. 2015 NAEP grade 4 sample with substitutes - weighted percentages of full sample and responding schools by various subgroups - all private schools (sample size = 544)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Census region					0.003
Northeast	21.74	18.48	-3.26	-0.150	
Midwest	27.23	30.89	3.66	0.134	
South	31.83	32.23	0.40	0.012	
West	19.20	18.41	-0.79	-0.041	
Private school reporting subgroup					0.000
Roman Catholic	43.02	54.52	11.49	0.267	
Non-Catholic Private	56.98	45.48	-11.49	-0.202	
Urban-centric locale					0.002
City	40.90	41.74	0.85	0.021	
Suburban	37.99	36.43	-1.56	-0.041	
Town	7.99	10.44	2.45	0.307	
Rural	13.12	11.39	-1.74	-0.132	
Size					0.000
Large (≥ 28)	53.37	50.81	-2.55	-0.048	
Medium (16-27)	24.69	29.07	4.39	0.178	
Small (≤ 15)	21.95	20.11	-1.83	-0.084	

NOTE: Size-adjusted school weights were used.

Table A-4. 2015 NAEP grade 4 sample with substitutes - weighted mean values of various characteristics for full sample and responding schools - all private schools (sample size = 544)

	Full sample mean	Respondent mean	Bias	Relative bias	T-test p-value
Size of school attended by average student	36.77	34.48	-2.3	-0.062	0.050
Estimated grade enrollment	18.92	20.24	1.3	0.070	0.011
Race/ethnicity					
Percentage White, not Hispanic	70.80	69.50	-1.3	-0.018	0.113
Percentage Black, not Hispanic	7.86	8.40	0.5	0.069	0.266
Percentage Hispanic heritage	11.75	12.88	1.1	0.096	0.104
Percentage Asian	5.04	5.14	0.1	0.018	0.792
Percentage American Indian/Alaskan Native	0.43	0.27	-0.2	-0.378	0.291
Percentage Native Hawaiian/Pacific Islander	0.77	0.31	-0.5	-0.592	0.141
Percentage Two or more race	3.34	3.50	0.2	0.046	0.472

NOTE: For the mean of school size attended by average student and the race/ethnicity percents, size-adjusted school weights were used. For the mean of enrollment, school weights were used.

Table A-5. 2015 NAEP grade 4 nonresponse-adjusted sample - weighted percentages of full sample and responding schools by various subgroups - all private schools (sample size = 544)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Census region					1.000
Northeast	21.74	21.74	0.0	0.000	
Midwest	27.23	27.23	0.0	0.000	
South	31.83	31.83	0.0	0.000	
West	19.20	19.20	0.0	0.000	
Private school reporting subgroup					1.000
Roman Catholic	43.02	43.02	0.0	0.000	
Non-Catholic Private	56.98	56.98	0.0	0.000	
Urban-centric locale					0.018
City	40.90	38.76	-2.1	-0.052	
Suburban	37.99	39.91	1.9	0.051	
Town	7.99	8.45	0.5	0.057	
Rural	13.12	12.88	-0.2	-0.018	
Size					0.007
Large (≥ 28)	53.37	48.88	-4.5	-0.084	
Medium (16-27)	24.69	28.32	3.6	0.147	
Small (≤ 15)	21.95	22.80	0.9	0.039	

NOTE: Size-adjusted school weights were used.

Table A-6. 2015 NAEP grade 4 nonresponse-adjusted sample - weighted mean values of various characteristics for full sample and responding schools - all private schools (sample size = 544)

	Full sample mean	Respondent mean	Bias	Relative bias	T-test p-value
Size of school attended by average student	36.77	35.27	-1.5	-0.041	0.470
Estimated grade enrollment	18.92	19.08	0.2	0.008	0.798
Race/ethnicity					
Percentage White, not Hispanic	70.80	69.38	-1.4	-0.020	0.133
Percentage Black, not Hispanic	7.86	8.96	1.1	0.140	0.104
Percentage Hispanic heritage	11.75	12.03	0.3	0.024	0.719
Percentage Asian	5.04	5.55	0.5	0.101	0.350
Percentage American Indian/Alaskan Native	0.43	0.24	-0.2	-0.446	0.214
Percentage Native Hawaiian/Pacific Islander	0.77	0.30	-0.5	-0.615	0.132
Percentage Two or more race	3.34	3.53	0.2	0.056	0.505

NOTE: For the mean of school size attended by average student and the race/ethnicity percents, size-adjusted school weights were used. For the mean of enrollment, school weights were used.

Table A-7. 2015 NAEP grade 8 original sample - weighted percentages of full sample and responding schools by various subgroups - all private schools (sample size = 512)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Census region					0.003
Northeast	22.19	20.25	-1.9	-0.088	
Midwest	23.56	28.06	4.5	0.191	
South	34.61	36.86	2.2	0.065	
West	19.63	14.83	-4.8	-0.245	
Private school reporting subgroup					0.000
Roman Catholic	42.79	61.24	18.5	0.431	
Non-Catholic Private	57.21	38.76	-18.5	-0.323	
Urban-centric locale					0.399
City	43.78	43.96	0.2	0.004	
Suburban	36.20	35.26	-0.9	-0.026	
Town	5.94	7.52	1.6	0.267	
Rural	14.08	13.25	-0.8	-0.059	
Size					0.128
Large (≥ 30)	57.32	54.94	-2.4	-0.041	
Medium (17-29)	24.08	27.61	3.5	0.147	
Small (≤ 16)	18.60	17.44	-1.2	-0.062	

NOTE: Size-adjusted school weights were used.

Table A-8. 2015 NAEP grade 8 original sample - weighted mean values of various characteristics for full sample and responding schools - all private schools (sample size = 512)

	Full sample mean	Respondent mean	Bias	Relative bias	T-test p-value
Size of school attended by average student	46.17	42.39	-3.8	-0.082	0.216
Estimated grade enrollment	21.51	23.73	2.2	0.103	0.018
Race/ethnicity					
Percentage White, not Hispanic	71.28	70.21	-1.1	-0.015	0.418
Percentage Black, not Hispanic	7.89	8.32	0.4	0.054	0.536
Percentage Hispanic heritage	9.75	11.18	1.4	0.147	0.074
Percentage Asian	6.10	6.07	0.0	-0.006	0.955
Percentage American Indian/Alaskan Native	0.39	0.45	0.1	0.143	0.525
Percentage Native Hawaiian/Pacific Islander	0.63	0.59	0.0	-0.056	0.837
Percentage Two or more race	3.95	3.18	-0.8	-0.195	0.065

NOTE: For the mean of school size attended by average student and the race/ethnicity percents, size-adjusted school weights were used. For the mean of enrollment, school weights were used.

Table A-9. 2015 NAEP grade 8 sample with substitutes - weighted percentages of full sample and responding schools by various subgroups - all private schools (sample size = 512)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Census region					0.033
Northeast	22.19	19.59	-2.6	-0.117	
Midwest	23.56	27.42	3.9	0.164	
South	34.61	34.77	0.2	0.005	
West	19.63	18.22	-1.4	-0.072	
Private school reporting subgroup					0.000
Roman Catholic	42.79	57.60	14.8	0.346	
Non-Catholic Private	57.21	42.40	-14.8	-0.259	
Urban-centric locale					0.043
City	43.78	45.43	1.6	0.037	
Suburban	36.20	32.51	-3.7	-0.102	
Town	5.94	8.24	2.3	0.388	
Rural	14.08	13.82	-0.3	-0.018	
Size					0.010
Large (≥ 30)	57.32	54.06	-3.3	-0.057	
Medium (17-29)	24.08	28.56	4.5	0.186	
Small (≤ 16)	18.60	17.38	-1.2	-0.066	

NOTE: Size-adjusted school weights were used.

Table A-10. 2015 NAEP grade 8 sample with substitutes - weighted mean values of various characteristics for full sample and responding schools - all private schools (sample size = 512)

	Full Sample mean	Respondent mean	Bias	Relative bias	T-test p-value
Size of school attended by average student	46.17	41.51	-4.7	-0.101	0.082
Estimated grade enrollment	21.51	23.01	1.5	0.070	0.062
Race/ethnicity					
Percentage White, not Hispanic	71.28	69.25	-2.0	-0.029	0.140
Percentage Black, not Hispanic	7.89	8.66	0.8	0.096	0.134
Percentage Hispanic heritage	9.75	11.46	1.7	0.176	0.040
Percentage Asian	6.10	6.47	0.4	0.061	0.620
Percentage American Indian/Alaskan Native	0.39	0.42	0.0	0.070	0.693
Percentage Native Hawaiian/Pacific Islander	0.63	0.55	-0.1	-0.128	0.601
Percentage Two or more race	3.95	3.20	-0.8	-0.191	0.062

NOTE: For the mean of school size attended by average student and the race/ethnicity percents, size-adjusted school weights were used. For the mean of enrollment, school weights were used.

Table A-11. 2015 NAEP grade 8 nonresponse-adjusted sample - weighted percentages of full sample and responding schools by various subgroups - all private schools (sample size = 512)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Census region					0.855
Northeast	22.19	22.19	0.0	0.000	
Midwest	23.56	23.56	0.0	0.000	
South	34.61	34.61	0.0	0.000	
West	19.63	19.63	0.0	0.000	
Private school reporting subgroup					1.000
Roman Catholic	42.79	42.79	0.0	0.000	
Non-Catholic Private	57.21	57.21	0.0	0.000	
Urban-centric locale					0.129
City	43.78	43.78	0.0	0.000	
Suburban	36.20	34.44	-1.8	-0.049	
Town	5.94	7.43	1.5	0.252	
Rural	14.08	14.34	0.3	0.018	
Size					0.029
Large (≥ 30)	57.32	51.96	-5.4	-0.094	
Medium (17-29)	24.08	28.31	4.2	0.176	
Small (≤ 16)	18.60	19.73	1.1	0.060	

NOTE: Size-adjusted school weights were used.

Table A-12. 2015 NAEP grade 8 nonresponse-adjusted sample - weighted mean values of various characteristics for full sample and responding schools - all private schools (sample size = 512)

	Full sample mean	Respondent mean	Bias	Relative bias	T-test p-value
Size of school attended by average student	46.17	40.22	-6.0	-0.129	0.028
Estimated grade enrollment	21.51	21.42	-0.1	-0.004	0.925
Race/ethnicity					
Percentage White, not Hispanic	71.28	69.74	-1.5	-0.022	0.272
Percentage Black, not Hispanic	7.89	9.10	1.2	0.153	0.069
Percentage Hispanic heritage	9.75	10.13	0.4	0.039	0.601
Percentage Asian	6.10	7.04	0.9	0.153	0.198
Percentage American Indian/Alaskan Native	0.39	0.40	0.0	0.014	0.932
Percentage Native Hawaiian/Pacific Islander	0.63	0.49	-0.1	-0.213	0.358
Percentage Two or more race	3.95	3.10	-0.9	-0.215	0.042

NOTE: For the mean of school size attended by average student and the race/ethnicity percents, size-adjusted school weights were used. For the mean of enrollment, school weights were used.

Table A-13. 2015 NAEP grade 12 original sample - weighted percentages of full sample and responding schools by various subgroups - all private schools (sample size = 144)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Census region					0.010
Northeast	27.42	19.01	-8.4	-0.307	
Midwest	22.83	35.74	12.9	0.566	
South	32.71	31.23	-1.5	-0.045	
West	17.04	14.01	-3.0	-0.178	
Private school reporting subgroup					0.000
Roman Catholic	49.12	65.67	16.5	0.337	
Non-Catholic Private	50.88	34.33	-16.5	-0.325	
Urban-centric locale					0.811
City	43.70	47.33	3.6	0.083	
Suburban	35.66	32.48	-3.2	-0.089	
Town	7.63	8.06	0.4	0.057	
Rural	13.01	12.13	-0.9	-0.068	
Size					0.542
Large (≥ 100)	53.55	54.64	1.1	0.020	
Medium (24-99)	34.08	35.34	1.3	0.037	
Small (≤ 23)	12.37	10.02	-2.3	-0.190	

NOTE: Size-adjusted school weights were used.

Table A-14. 2015 NAEP grade 12 original sample - weighted mean values of various characteristics for full sample and responding schools - all private schools (sample size = 144)

	Full sample mean	Respondent mean	Bias	Relative bias	T-test p-value
Size of school attended by average student	131.71	142.86	11.2	0.085	0.362
Estimated grade enrollment	41.76	50.71	8.9	0.214	0.065
Race/ethnicity					
Percentage White, not Hispanic	75.21	78.25	3.0	0.040	0.126
Percentage Black, not Hispanic	5.90	4.35	-1.5	-0.262	0.015
Percentage Hispanic heritage	8.57	9.89	1.3	0.153	0.304
Percentage Asian	5.51	4.24	-1.3	-0.230	0.027
Percentage American Indian/Alaskan Native	0.33	0.42	0.1	0.258	0.217
Percentage Native Hawaiian/Pacific Islander	1.57	0.36	-1.2	-0.772	0.307
Percentage Two or more race	2.91	2.50	-0.4	-0.144	0.422

NOTE: For the mean of school size attended by average student and the race/ethnicity percents, size-adjusted school weights were used. For the mean of enrollment, school weights were used.

Table A-15. 2015 NAEP grade 12 sample with substitutes - weighted percentages of full sample and responding schools by various subgroups - all private schools (sample size = 144)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Census region					0.008
Northeast	27.42	18.11	-9.3	-0.340	
Midwest	22.83	29.79	7.0	0.305	
South	32.71	32.43	-0.3	-0.009	
West	17.04	19.67	2.6	0.154	
Private school reporting subgroup					0.000
Roman Catholic	49.12	61.04	11.9	0.243	
Non-Catholic Private	50.88	38.96	-11.9	-0.234	
Urban-centric locale					0.293
City	43.70	50.53	6.8	0.156	
Suburban	35.66	28.84	-6.8	-0.191	
Town	7.63	7.68	0.1	0.007	
Rural	13.01	12.95	-0.1	-0.005	
Size					0.137
Large (≥ 100)	53.55	53.49	-0.1	-0.001	
Medium (24-99)	34.08	37.16	3.1	0.090	
Small (≤ 23)	12.37	9.35	-3.0	-0.244	

NOTE: Size-adjusted school weights were used.

Table A-16. 2015 NAEP grade 12 sample with substitutes - weighted mean values of various characteristics for full sample and responding schools - all private schools (sample size = 144)

	Full Sample mean	Respondent mean	Bias	Relative bias	T-test p-value
Size of school attended by average student	131.71	137.90	6.2	0.047	0.491
Estimated grade enrollment	41.76	52.10	10.3	0.248	0.014
Race/ethnicity					
Percentage White, not Hispanic	75.21	74.96	-0.2	-0.003	0.873
Percentage Black, not Hispanic	5.90	5.62	-0.3	-0.047	0.725
Percentage Hispanic heritage	8.57	9.95	1.4	0.161	0.115
Percentage Asian	5.51	5.44	-0.1	-0.012	0.929
Percentage American Indian/Alaskan Native	0.33	0.40	0.1	0.195	0.246
Percentage Native Hawaiian/Pacific Islander	1.57	0.95	-0.6	-0.394	0.623
Percentage Two or more race	2.91	2.68	-0.2	-0.081	0.647

NOTE: For the mean of school size attended by average student and the race/ethnicity percents, size-adjusted school weights were used. For the mean of enrollment, school weights were used.

Table A-17. 2015 NAEP grade 12 nonresponse-adjusted sample - weighted percentages of full sample and responding schools by various subgroups - all private schools (sample size = 144)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Census region					0.070
Northeast	27.42	22.35	-5.1	-0.185	
Midwest	22.83	27.89	5.1	0.222	
South	32.71	32.71	0.0	0.000	
West	17.04	17.04	0.0	0.000	
Private school reporting subgroup					
Roman Catholic	49.12	49.12	0.0	0.000	
Non-Catholic Private	50.88	50.88	0.0	0.000	
Urban-centric locale					0.493
City	43.70	47.21	3.5	0.080	
Suburban	35.66	29.65	-6.0	-0.169	
Town	7.63	7.25	-0.4	-0.050	
Rural	13.01	15.89	2.9	0.221	
Size					0.064
Large (≥ 100)	53.55	46.55	-7.0	-0.131	
Medium (24-99)	34.08	41.77	7.7	0.225	
Small (≤ 23)	12.37	11.69	-0.7	-0.055	

NOTE: Size-adjusted school weights were used.

Table A-18. 2015 NAEP grade 12 nonresponse-adjusted sample - weighted mean values of various characteristics for full sample and responding schools - all private schools (sample size = 144)

	Full sample mean	Respondent mean	Bias	Relative bias	T-test p-value
Size of school attended by average student	131.71	124.82	-6.9	-0.052	0.428
Estimated grade enrollment	41.76	45.63	3.9	0.093	0.429
Race/ethnicity					
Percentage White, not Hispanic	75.21	74.60	-0.6	-0.008	0.720
Percentage Black, not Hispanic	5.90	6.20	0.3	0.051	0.761
Percentage Hispanic heritage	8.57	9.56	1.0	0.115	0.325
Percentage Asian	5.51	5.99	0.5	0.087	0.661
Percentage American Indian/Alaskan Native	0.33	0.36	0.0	0.079	0.590
Percentage Native Hawaiian/Pacific Islander	1.57	0.82	-0.7	-0.478	0.534
Percentage Two or more race	2.91	2.47	-0.4	-0.151	0.310

NOTE: For the mean of school size attended by average student and the race/ethnicity percents, size-adjusted school weights were used. For the mean of enrollment, school weights were used.

Table A-19. 2015 NAEP grade 4 original sample - weighted percentages of full sample and responding schools by various subgroups - public schools for Bureau of Indian Education (BIE) (sample size =130)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Census region					N/A
Northeast/South	11.72	10.60	-1.1	-0.096	
Midwest	23.11	19.15	-4.0	-0.171	
West	65.18	70.25	5.1	0.078	
Urban-centric locale					N/A
Non-rural	16.53	10.46	-6.1	-0.367	
Rural fringe	13.46	15.62	2.2	0.161	
Rural, distant	16.86	16.18	-0.7	-0.041	
Rural, remote	53.15	57.74	4.6	0.086	
Size					N/A
Large (≥ 25)	57.08	48.26	-8.8	-0.155	
Medium (14-24)	34.46	44.03	9.6	0.278	
Small (≤ 13)	8.46	7.72	-0.7	-0.088	

NOTE: Size-adjusted school weights were used.

Table A-20. 2015 NAEP grade 4 original sample - weighted mean values of various characteristics for full sample and responding schools - public schools for Bureau of Indian Education (BIE) (sample size =130)

	Full sample mean	Respondent mean	Bias	Relative bias	T-test p-value
Size of school attended by average student	36.68	30.24	-6.4	-0.176	N/A
Estimated grade enrollment	24.48	22.60	-1.9	-0.077	N/A

NOTE: For the mean of school size attended by average student and the race/ethnicity percents, size-adjusted school weights were used. For the mean of enrollment, school weights were used.

Table A-21. 2015 NAEP grade 4 sample with substitutes - weighted percentages of full sample and responding schools by various subgroups - public schools for Bureau of Indian Education (BIE) (sample size =130)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Census region					N/A
Northeast/South	11.72	10.60	-1.1	-0.096	
Midwest	23.11	19.15	-4.0	-0.171	
West	65.18	70.25	5.1	0.078	
Urban-centric locale					N/A
Non-rural	16.53	10.46	-6.1	-0.367	
Rural fringe	13.46	15.62	2.2	0.161	
Rural, distant	16.86	16.18	-0.7	-0.041	
Rural, remote	53.15	57.74	4.6	0.086	
Size					N/A
Large (≥ 25)	57.08	48.26	-8.8	-0.155	
Medium (14-24)	34.46	44.03	9.6	0.278	
Small (≤ 13)	8.46	7.72	-0.7	-0.088	

NOTE: Size-adjusted school weights were used.

Table A-22. 2015 NAEP grade 4 sample with substitutes - weighted mean values of various characteristics for full sample and responding schools - public schools for Bureau of Indian Education (BIE) (sample size =130)

	Full sample mean	Respondent mean	Bias	Relative bias	T-test p-value
Size of school attended by average student	36.68	30.24	-6.4	-0.176	N/A
Estimated grade enrollment	24.48	22.60	-1.9	-0.077	N/A

NOTE: For the mean of school size attended by average student and the race/ethnicity percents, size-adjusted school weights were used. For the mean of enrollment, school weights were used.

Table A-23. 2015 NAEP grade 4 nonresponse-adjusted sample - weighted percentages of full sample and responding schools by various subgroups - public schools for Bureau of Indian Education (BIE) (sample size = 130)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Census region					N/A
Northeast/South	11.72	9.74	-2.0	-0.169	
Midwest	23.11	17.97	-5.1	-0.222	
West	65.18	72.29	7.1	0.109	
Urban-centric locale					N/A
Non-rural	16.53	16.53	0.0	0.000	
Rural fringe	13.46	13.46	0.0	0.000	
Rural, distant	16.86	16.86	0.0	0.000	
Rural, remote	53.15	53.15	0.0	0.000	
Size					N/A
Large (≥ 25)	57.08	50.33	-6.8	-0.118	
Medium (14-24)	34.46	42.63	8.2	0.237	
Small (≤ 13)	8.46	7.05	-1.4	-0.167	

NOTE: Size-adjusted school weights were used.

Table A-24. 2015 NAEP grade 4 nonresponse-adjusted sample - weighted mean values of various characteristics for full sample and responding schools - public schools for Bureau of Indian Education (BIE) (sample size =130)

	Full sample mean	Respondent mean	Bias	Relative bias	T-test p-value
Size of school attended by average student	36.68	31.22	-5.5	-0.149	N/A
Estimated grade enrollment	24.48	23.45	-1.0	-0.042	N/A

NOTE: For the mean of school size attended by average student and the race/ethnicity percents, size-adjusted school weights were used. For the mean of enrollment, school weights were used.

Table A-25. 2015 NAEP grade 8 original sample - weighted percentages of full sample and responding schools by various subgroups - public schools for Bureau of Indian Education (BIE) (sample size =108)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Census region					N/A
Northeast/South	13.26	11.46	-1.8	-0.135	
Midwest	24.23	18.22	-6.0	-0.248	
West	62.51	70.32	7.8	0.125	
Urban-centric locale					N/A
Non-rural	27.42	23.34	-4.1	-0.149	
Rural fringe	6.18	6.86	0.7	0.111	
Rural, distant	19.07	20.06	1.0	0.052	
Rural, remote	47.33	49.74	2.4	0.051	
Size					N/A
Large (≥ 26)	57.36	52.00	-5.4	-0.093	
Medium (14-25)	33.13	39.41	6.3	0.190	
Small (≤ 13)	9.52	8.60	-0.9	-0.097	

NOTE: Size-adjusted school weights were used.

Table A-26. 2015 NAEP grade 8 original sample - weighted mean values of various characteristics for full sample and responding schools - public schools for Bureau of Indian Education (BIE) (sample size =108)

	Full sample mean	Respondent mean	Bias	Relative bias	T-test p-value
Size of school attended by average student	42.06	36.97	-5.1	-0.121	N/A
Estimated grade enrollment	25.76	24.53	-1.2	-0.048	N/A

NOTE: For the mean of school size attended by average student and the race/ethnicity percents, size-adjusted school weights were used. For the mean of enrollment, school weights were used.

Table A-27. 2015 NAEP grade 8 sample with substitutes - weighted percentages of full sample and responding schools by various subgroups - public schools for Bureau of Indian Education (BIE) (sample size =108)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Census region					N/A
Northeast/South	13.26	11.46	-1.8	-0.135	
Midwest	24.23	18.22	-6.0	-0.248	
West	62.51	70.32	7.8	0.125	
Urban-centric locale					N/A
Non-rural	27.42	23.34	-4.1	-0.149	
Rural fringe	6.18	6.86	0.7	0.111	
Rural, distant	19.07	20.06	1.0	0.052	
Rural, remote	47.33	49.74	2.4	0.051	
Size					N/A
Large (≥ 26)	57.36	52.00	-5.4	-0.093	
Medium (14-25)	33.13	39.41	6.3	0.190	
Small (≤ 13)	9.52	8.60	-0.9	-0.097	

NOTE: Size-adjusted school weights were used.

Table A-28. 2015 NAEP grade 8 sample with substitutes - weighted mean values of various characteristics for full sample and responding schools - public schools for Bureau of Indian Education (BIE) (sample size =108)

	Full sample mean	Respondent mean	Bias	Relative bias	T-test p-value
Size of school attended by average student	42.06	36.97	-5.1	-0.121	N/A
Estimated grade enrollment	25.76	24.53	-1.2	-0.048	N/A

NOTE: For the mean of school size attended by average student and the race/ethnicity percents, size-adjusted school weights were used. For the mean of enrollment, school weights were used.

Table A-29. 2015 NAEP grade 8 nonresponse-adjusted sample - weighted percentages of full sample and responding schools by various subgroups - public schools for Bureau of Indian Education (BIE) (sample size = 108)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Census region					N/A
Northeast/South	13.26	12.32	-0.9	-0.070	
Midwest	24.23	17.05	-7.2	-0.296	
West	62.51	70.62	8.1	0.130	
Urban-centric locale					N/A
Non-rural	27.42	27.42	0.0	0.000	
Rural fringe	6.18	6.27	0.1	0.015	
Rural, distant	19.07	18.98	-0.1	-0.005	
Rural, remote	47.33	47.33	0.0	0.000	
Size					N/A
Large (≥ 26)	57.36	56.03	-1.3	-0.023	
Medium (14-25)	33.13	35.88	2.7	0.083	
Small (≤ 13)	9.52	8.10	-1.4	-0.149	

NOTE: Size-adjusted school weights were used.

Table A-30. 2015 NAEP grade 8 nonresponse-adjusted sample - weighted mean values of various characteristics for full sample and responding schools - public schools for Bureau of Indian Education (BIE) (sample size =108)

	Full sample mean	Respondent mean	Bias	Relative bias	T-test p-value
Size of school attended by average student	42.06	38.84	-3.2	-0.076	N/A
Estimated grade enrollment	25.76	25.66	-0.1	-0.004	N/A

NOTE: For the mean of school size attended by average student and the race/ethnicity percents, size-adjusted school weights were used. For the mean of enrollment, school weights were used.

Appendix B

Table B-1. 2015 NAEP Grade 12 - Weighted percentages of full sample and responding students by various subgroups - Public School Students (sample size = 50,333)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Sex					0.000
Male	50.06	50.70	0.6	0.013	
Female	49.94	49.30	-0.6	-0.013	
Race					0.194
White, not Hispanic	54.52	54.18	-0.3	-0.006	
Black, not Hispanic	14.84	14.75	-0.1	-0.006	
Hispanic Heritage	22.32	22.48	0.2	0.007	
Asian, not Hispanic	5.02	5.25	0.2	0.045	
American Indian/Alaskan Native	1.07	1.12	0.0	0.043	
Pacific Islander, not Hispanic	0.20	0.19	0.0	-0.035	
2 or more race	2.03	2.03	0.0	0.004	
Relative Age					0.004
Old (Born in 9/96 or earlier)	19.68	19.11	-0.6	-0.029	
Not old (Born in 10/96 or later)	80.32	80.89	0.6	0.007	
Free Lunch Eligibility					0.157
Student Not Eligible	56.02	56.04	0.0	0.000	
Free or Reduced Lunch	42.31	42.74	0.4	0.010	
Missing	1.68	1.22	-0.5	-0.273	
SD					0.000
Yes	9.88	9.28	-0.6	-0.061	
No	90.12	90.72	0.6	0.007	
ELL					0.772
Yes	3.43	3.41	0.0	-0.006	
No	96.57	96.59	0.0	0.000	

Table B-2. 2015 NAEP Nonresponse-Adjusted Grade 12 - Weighted percentages of full sample and responding students by various subgroups - Public School Students (sample size = 50,333)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Sex					0.092
Male	50.06	50.17	0.1	0.002	
Female	49.94	49.83	-0.1	-0.002	
Race					0.006
White, not Hispanic	54.52	54.19	-0.3	-0.006	
Black, not Hispanic	14.84	14.78	-0.1	-0.004	
Hispanic Heritage	22.32	22.43	0.1	0.005	
Asian, not Hispanic	5.02	5.27	0.2	0.049	
American Indian/Alaskan Native	1.07	1.09	0.0	0.016	
Pacific Islander, not Hispanic	0.20	0.19	0.0	-0.050	
2 or more race	2.03	2.05	0.0	0.013	
Relative Age					0.022
Old (Born in 9/96 or earlier)	19.68	19.56	-0.1	-0.006	
Not old (Born in 10/96 or later)	80.32	80.44	0.1	0.002	
Free Lunch Eligibility					0.162
Student Not Eligible	56.02	56.06	0.0	0.001	
Free or Reduced Lunch	42.31	42.70	0.4	0.009	
Missing	1.68	1.25	-0.4	-0.257	
SD					0.001
Yes	9.88	9.73	-0.1	-0.015	
No	90.12	90.27	0.1	0.002	
ELL					0.040
Yes	3.43	3.53	0.1	0.030	
No	96.57	96.47	-0.1	-0.001	

Table B-3. 2015 NAEP Grade 12 - Weighted percentages of full sample and responding students by various subgroups - Private School Students (sample size = 4,834)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Sex					0.800
Male	54.43	54.28	-0.1	-0.003	
Female	45.57	45.72	0.1	0.003	
Race					0.709
White, not Hispanic	73.55	72.97	-0.6	-0.008	
Black, not Hispanic	6.21	6.43	0.2	0.036	
Hispanic Heritage	8.63	8.83	0.2	0.023	
Asian, not Hispanic	8.30	8.52	0.2	0.026	
American Indian/Alaskan Native	0.28	0.26	0.0	-0.080	
Pacific Islander, not Hispanic	0.29	0.25	0.0	-0.123	
2 or more race	2.75	2.74	0.0	-0.001	
Relative Age					0.579
Old (Born in 9/96 or earlier)	20.22	20.01	-0.2	-0.011	
Not old (Born in 10/96 or later)	79.78	79.99	0.2	0.003	
Free Lunch Eligibility					0.433
Student Not Eligible	13.82	14.41	0.6	0.042	
Free or Reduced Lunch	3.83	3.40	-0.4	-0.110	
Missing	82.35	82.18	-0.2	-0.002	
SD					0.048
Yes	7.51	6.32	-1.2	-0.158	
No	92.49	93.68	1.2	0.013	
ELL					0.999
Yes	2.28	2.28	0.0	0.000	
No	97.72	97.72	0.0	0.000	

Table B-4. 2015 NAEP Nonresponse-Adjusted Grade 12 - Weighted percentages of full sample and responding students by various subgroups - Private School Students (sample size = 4,834)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi-square p-value
Sex					0.869
Male	54.43	54.46	0.0	0.001	
Female	45.57	45.54	0.0	-0.001	
Race					0.813
White, not Hispanic	73.55	73.32	-0.2	-0.003	
Black, not Hispanic	6.21	6.30	0.1	0.015	
Hispanic Heritage	8.63	8.58	-0.1	-0.006	
Asian, not Hispanic	8.30	8.49	0.2	0.022	
American Indian/Alaskan Native	0.28	0.25	0.0	-0.083	
Pacific Islander, not Hispanic	0.29	0.25	0.0	-0.143	
2 or more race	2.75	2.82	0.1	0.026	
Relative Age					0.808
Old (Born in 9/96 or earlier)	20.22	20.19	0.0	-0.002	
Not old (Born in 10/96 or later)	79.78	79.81	0.0	0.000	
Free Lunch Eligibility					0.771
Student Not Eligible	13.82	14.16	0.3	0.024	
Free or Reduced Lunch	3.83	3.71	-0.1	-0.030	
Missing	82.35	82.13	-0.2	-0.003	
SD					0.475
Yes	7.51	7.28	-0.2	-0.031	
No	92.49	92.72	0.2	0.003	
ELL					0.455
Yes	2.28	2.54	0.3	0.112	
No	97.72	97.46	-0.3	-0.003	