

## Analysis of Student Nonresponse Bias in the 2005 NAEP

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Weighted student response rates for 2005 NAEP indicate that response rates for students in grade 12 (public and private) and two grade 8 TUDA districts (New York City and Cleveland) fall below 85 percent within participating schools. The respective response rates are shown below. Thus NCES statistical standards call for nonresponse bias analyses to be conducted for these four groups, but not for any other student types from the 2005 NAEP assessments. This report provides nonresponse bias analysis results for these four student groups.

### *Weighted Student Response Rates*

Population Group	Reading	Mathematics	Science
Grade 12 Public	66.4%	66.7%	67.1%
Grade 12 Private	83.4%	84.1%	83.0%
Grade 8 Cleveland	77.6%	79.9%	76.3%
Grade 8 New York City	83.8%	83.5%	83.3%

In each of these population groups, the reading, mathematics, and science assessments were administered through a common spiral. Thus is unlikely that there could be any substantial difference in the underlying student response rates for these assessments, and most of the small amount of variation across subjects must be attributable to sampling variance. In each case an analysis was conducted to test the association between response and subject. These tests were not statistically significant. Once adjustments for nonresponse are considered (see below), there were no significant differences, except for Cleveland Grade 8. Since there was little evidence of differential response by subject, so as to increase the power of the analyses students selected for all three subjects were pooled. The weights used did not include a subject specific factor, so that in each case the sum of the weights estimates the total size of the student population (and not, for example, three times that total). In each a test was conducted to see

The analysis of student nonresponse bias for operational assessments in the 2005 NAEP was conducted in two parts for each student group, first using the student base weights, and second using the nonresponse adjusted student weights for the estimates based only on respondents. Various characteristics of the students were considered. Thus the first analysis indicates the potential for nonresponse bias that was introduced through student nonresponse. The second analysis indicates the potential for bias after accounting for the effects of nonresponse weight adjustments. The second analysis, 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.

Each of these analyses compared students on the distributions of students by sex, race, relative age, school lunch eligibility, Title 1 eligibility, SD and LEP status, subject, and reporting subgroup (grade 12 private only). 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 p-values for these chi-square tests are presented in the tables.

The results of these analyses are presented and summarized by student group type in the tables below.

Student Base Weights	
<b>Reporting group</b>	<b>Characteristics with p-values less than 0.05</b>
Grade 12 Public	Relative Age, SD
Grade 12 Private	None
Grade 8 New York City	Relative Age, SD
Grade 8 Cleveland	Sex, Relative Age, SD

Nonresponse Adjusted Student Weights	
<b>Reporting group</b>	<b>Characteristics with p-values less than 0.05</b>
Grade 12 Public	Sex, Race, Relative Age, LEP
Grade 12 Private	None
Grade 8 New York City	Relative Age, LEP
Grade 8 Cleveland	Subject

There are a lot of significant variables both before and after the nonresponse adjustments. However, though many of these are significant, the actual difference is quite small. For example, for grade 12 public schools, the difference between the full sample and respondents for the variable Relative Age is only 0.6 percent when using the base weights, though this variable is significant. The largest differences are for the variable Relative Age for grade 8 in Cleveland (4%) and New York City (2.2%) with the base weights, and these differences practically disappear after the nonresponse adjustments.

Table 1. 2005 NAEP Public Grade 12 - Percentages of full sample and responding students by various subgroups (sample size = 41813)

		Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi- square p-value
<b>Sex</b>						0.105
	Male	49.0	48.7	-0.3	-0.006	
	Female	51.0	51.3	0.3	0.006	
<b>Race</b>						0.411
	White, not Hispanic	65.8	66.1	0.3	0.005	
	Black, not Hispanic	14.2	14.1	-0.1	-0.009	
	Hispanic Heritage	13.9	13.5	-0.4	-0.030	
	Asian/Pacific Islander	4.7	4.8	0.1	0.030	
	American Indian/Alaskan Native	0.9	0.9	0.0	0.000	
	Other	0.5	0.6	0.1	0.132	
<b>Relative Age</b>						0.004
	Born before or on 10/86	24.8	24.2	-0.7	-0.027	
	Born after 10/86	75.2	75.8	0.7	0.009	
<b>Free Lunch Eligibility</b>						0.116
	Student Not Eligible	71.7	71.5	-0.2	-0.003	
	Free or Reduce Lunch	24.9	25.5	0.6	0.025	
	Missing	3.4	3.0	-0.4	-0.117	
<b>Title 1</b>						0.404
	Receiving Services	17.1	16.6	-0.5	-0.032	
	Not Receiving Services	82.3	82.7	0.4	0.005	
	Information Not Available	0.6	0.7	0.1	0.246	
<b>SD</b>						0.000
	Yes	7.7	7.2	-0.5	-0.059	
	No	92.3	92.8	0.5	0.005	
	Information Not Available	0.0	0.0	0.0	N/A	
<b>LEP</b>						0.938
	Yes	3.8	3.8	0.0	-0.010	
	No	96.0	96.0	0.0	0.000	
	Missing	0.2	0.2	0.0	0.000	
<b>Subject</b>						0.462
	Mathematics	26.6	26.5	0.0	-0.002	
	Reading	34.6	34.4	-0.2	-0.004	
	Science	38.9	39.1	0.2	0.005	

Table 2. 2005 NAEP Private Grade 12 - Percentages of full sample and responding students by various subgroups (sample size = 8664)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi- square p-value
<b>Private Reporting Subgroup</b>					0.742
Conservative Christian	13.9	14.4	0.5	0.038	
Roman Catholic	53.1	52.4	-0.8	-0.014	
Lutheran	2.2	2.1	-0.1	-0.063	
Other Private	30.7	31.1	0.4	0.012	
<b>Sex</b>					0.676
Male	46.8	46.6	-0.2	-0.005	
Female	53.2	53.4	0.2	0.005	
<b>Race</b>					0.790
White, not Hispanic	77.8	77.4	-0.4	-0.005	
Black, not Hispanic	6.8	7.1	0.3	0.046	
Hispanic Heritage	7.4	7.6	0.1	0.017	
Asian/Pacific Islander	6.3	6.2	-0.1	-0.019	
American Indian/Alaskan Native	0.4	0.5	0.0	0.071	
Other	1.2	1.3	0.1	0.041	
<b>Relative Age</b>					0.872
Born before or on 10/86	20.6	20.6	0.0	-0.002	
Born after 10/86	79.4	79.4	0.0	0.001	
<b>Free Lunch Eligibility</b>					0.398
Student Not Eligible	20.8	21.4	0.6	0.027	
Free or Reduce Lunch	4.4	4.6	0.2	0.038	
Missing	74.8	74.1	-0.7	-0.010	
<b>Title 1</b>					0.495
Receiving Services	1.9	2.1	0.1	0.068	
Not Receiving Services	97.0	96.8	-0.2	-0.002	
Information Not Available	1.1	1.2	0.0	0.045	
<b>SD</b>					0.156
Yes	4.3	4.2	-0.1	-0.016	
No	94.9	94.9	0.0	0.000	
Information Not Available	0.8	0.9	0.1	0.111	
<b>LEP</b>					0.429
Yes	0.5	0.6	0.1	0.180	
No	98.8	98.8	0.0	0.001	
Missing	0.7	0.6	-0.1	-0.181	
<b>Subject</b>					0.787
Mathematics	26.9	27.1	0.1	0.005	
Reading	34.2	34.1	-0.1	-0.003	
Science	38.9	38.8	0.0	-0.001	

Table 3. 2005 NAEP Cleveland Grade 8 - Percentages of full sample and responding students by various subgroups (sample size = 3435)

		Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi- square p-value
<b>Sex</b>						<b>0.047</b>
	Male	48.6	47.7	-0.9	-0.019	
	Female	51.4	52.3	0.9	0.018	
<b>Race</b>						0.436
	White, not Hispanic	17.0	16.5	-0.4	-0.026	
	Black, not Hispanic	71.7	72.2	0.5	0.007	
	Hispanic Heritage	9.6	9.4	-0.2	-0.019	
	Asian/Pacific Islander	0.4	0.5	0.1	0.195	
	American Indian/Alaskan Native	0.4	0.3	0.0	-0.111	
	Other	1.0	1.1	0.1	0.094	
<b>Relative Age</b>						<b>0.000</b>
	Born before or on 10/90	42.5	38.5	-4.0	-0.094	
	Born after 10/90	57.6	61.5	4.0	0.069	
<b>Free Lunch Eligibility</b>						N/A
	Student Not Eligible	0.0	0.0	0.0	N/A	
	Free or Reduce Lunch	100.0	100.0	0.0	0.000	
	Missing	0.0	0.0	0.0	N/A	
<b>Title 1</b>						0.233
	Receiving Services	99.8	100.0	0.1	0.001	
	Not Receiving Services	0.2	0.0	-0.1	-0.765	
<b>SD</b>						<b>0.040</b>
	Yes	10.2	9.6	-0.7	-0.067	
	No	89.8	90.5	0.7	0.008	
<b>LEP</b>						0.617
	Yes	2.3	2.2	-0.1	-0.043	
	No	97.7	97.8	0.1	0.001	
	Missing	0.0	0.0	0.0	0.500	
<b>Subject</b>						0.119
	Mathematics	33.2	34.0	0.8	0.025	
	Reading	31.7	31.6	-0.1	-0.003	
	Science	35.1	34.4	-0.7	-0.021	

Table 4. 2005 NAEP New York City Grade 8 - Percentages of full sample and responding students by various subgroups (sample size = 6471)

		Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi- square p-value
<b>Sex</b>						0.875
	Male	50.4	50.4	0.0	0.001	
	Female	49.6	49.6	0.0	-0.001	
<b>Race</b>						0.056
	White, not Hispanic	15.8	15.3	-0.5	-0.031	
	Black, not Hispanic	34.3	34.0	-0.3	-0.009	
	Hispanic Heritage	36.8	36.8	0.0	0.000	
	Asian/Pacific Islander	12.8	13.6	0.8	0.063	
	American Indian/Alaskan Native	0.3	0.3	0.0	-0.121	
	Other	0.0	0.0	0.0	-0.250	
<b>Relative Age</b>						0.000
	Born before or on 10/90	20.3	18.1	-2.2	-0.109	
	Born after 10/90	79.8	82.0	2.2	0.028	
<b>Free Lunch Eligibility</b>						0.368
	Student Not Eligible	12.1	12.0	-0.1	-0.011	
	Free or Reduce Lunch	85.9	85.8	0.0	0.000	
	Missing	2.1	2.2	0.2	0.078	
<b>Title 1</b>						0.135
	Receiving Services	74.5	73.6	-0.9	-0.012	
	Not Receiving Services	25.5	26.4	0.9	0.036	
<b>SD</b>						0.038
	Yes	9.9	9.5	-0.5	-0.047	
	No	90.1	90.5	0.5	0.005	
<b>LEP</b>						0.720
	Yes	7.6	7.7	0.0	0.007	
	No	92.4	92.3	-0.1	-0.001	
	Missing	0.0	0.0	0.0	0.000	
<b>Subject</b>						0.899
	Mathematics	33.6	33.6	0.0	-0.001	
	Reading	32.5	32.7	0.1	0.003	
	Science	33.8	33.7	-0.1	-0.003	

Table 5. 2005 NAEP Nonresponse Adjusted Public Grade 12 - Percentages of full sample and responding students by various subgroups (sample size = 41813)

		Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi- square p-value
<b>Sex</b>						<b>0.021</b>
	Male	49.0	48.7	-0.2	-0.005	
	Female	51.0	51.3	0.2	0.005	
<b>Race</b>						<b>0.000</b>
	White, not Hispanic	65.8	65.4	-0.4	-0.006	
	Black, not Hispanic	14.2	14.1	-0.2	-0.012	
	Hispanic Heritage	13.9	14.1	0.2	0.016	
	Asian/Pacific Islander	4.7	5.0	0.3	0.064	
	American Indian/Alaskan Native	0.9	0.9	-0.1	-0.086	
	Other	0.5	0.6	0.1	0.208	
<b>Relative Age</b>						<b>0.041</b>
	Born before or on 10/86	24.8	24.7	-0.1	-0.006	
	Born after 10/86	75.2	75.3	0.1	0.002	
<b>Free Lunch Eligibility</b>						0.289
	Student Not Eligible	71.7	71.2	-0.5	-0.007	
	Free or Reduce Lunch	24.9	25.6	0.7	0.027	
	Missing	3.4	3.3	-0.2	-0.050	
<b>Title 1</b>						0.415
	Receiving Services	17.1	17.0	-0.2	-0.010	
	Not Receiving Services	82.3	82.3	0.0	0.000	
	Information Not Available	0.6	0.7	0.1	0.246	
<b>SD</b>						0.064
	Yes	7.7	7.5	-0.2	-0.022	
	No	92.3	92.5	0.2	0.002	
	Information Not Available	0.0	0.0	0.0	N/A	
<b>LEP</b>						<b>0.025</b>
	Yes	3.8	4.0	0.2	0.052	
	No	96.0	95.8	-0.2	-0.002	
	Missing	0.2	0.2	0.0	-0.045	
<b>Subject</b>						0.840
	Mathematics	26.6	26.5	-0.1	-0.003	
	Reading	34.6	34.6	0.0	0.001	
	Science	38.9	38.9	0.0	0.001	

Table 6. 2005 NAEP Nonresponse Adjusted Private Grade 12 - Percentages of full sample and responding students by various subgroups (sample size = 8664)

	Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi- square p-value
<b>Private Reporting Subgroup</b>					1.000
Conservative Christian	13.9	13.9	0.0	0.000	
Roman Catholic	53.1	53.1	0.0	0.000	
Lutheran	2.2	2.2	0.0	0.000	
Other Private	30.7	30.7	0.0	0.000	
<b>Sex</b>					0.270
Male	46.8	46.7	-0.1	-0.003	
Female	53.2	53.3	0.1	0.003	
<b>Race</b>					0.380
White, not Hispanic	77.8	77.0	-0.8	-0.010	
Black, not Hispanic	6.8	6.7	-0.1	-0.019	
Hispanic Heritage	7.4	7.8	0.3	0.044	
Asian/Pacific Islander	6.3	6.8	0.4	0.066	
American Indian/Alaskan Native	0.4	0.5	0.1	0.190	
Other	1.2	1.3	0.1	0.057	
<b>Relative Age</b>					0.991
Born before or on 10/86	20.6	20.6	0.0	0.000	
Born after 10/86	79.4	79.4	0.0	0.000	
<b>Free Lunch Eligibility</b>					0.608
Student Not Eligible	20.7	21.0	0.3	0.012	
Free or Reduce Lunch	4.4	4.6	0.2	0.043	
Missing	74.9	74.4	-0.4	-0.006	
<b>Title 1</b>					0.470
Receiving Services	1.9	2.0	0.1	0.057	
Not Receiving Services	97.0	96.8	-0.2	-0.002	
Information Not Available	1.1	1.1	0.0	0.036	
<b>SD</b>					0.097
Yes	4.3	4.2	-0.1	-0.019	
No	94.9	94.9	-0.1	-0.001	
Information Not Available	0.8	0.9	0.1	0.160	
<b>LEP</b>					0.730
Yes	0.5	0.6	0.1	0.160	
No	98.8	98.8	0.0	0.000	
Missing	0.7	0.7	-0.1	-0.083	
<b>Subject</b>					0.739
Mathematics	26.9	27.1	0.1	0.006	
Reading	34.2	34.0	-0.2	-0.005	
Science	38.9	38.9	0.0	0.001	



Table 7. 2005 NAEP Nonresponse Adjusted Cleveland Grade 8 - Percentages of full sample and responding students by various subgroups (sample size = 3433)

		Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi- square p-value
<b>Sex</b>						0.703
	Male	48.6	48.5	-0.1	-0.002	
	Female	51.4	51.5	0.1	0.002	
<b>Race</b>						0.705
	White, not Hispanic	17.0	17.0	0.0	0.001	
	Black, not Hispanic	71.7	71.8	0.1	0.002	
	Hispanic Heritage	9.6	9.4	-0.2	-0.022	
	Asian/Pacific Islander	0.4	0.5	0.1	0.122	
	American Indian/Alaskan Native	0.4	0.3	0.0	-0.111	
	Other	1.0	1.0	0.0	0.031	
<b>Relative Age</b>						0.676
	Born before or on 10/90	42.4	42.4	-0.1	-0.001	
	Born after 10/90	57.6	57.6	0.1	0.001	
<b>Free Lunch Eligibility</b>						N/A
	Student Not Eligible	0.0	0.0	0.0	N/A	
	Free or Reduce Lunch	100.0	100.0	0.0	0.000	
	Missing	0.0	0.0	0.0	N/A	
<b>Title 1</b>						0.251
	Receiving Services	99.8	100.0	0.1	0.001	
	Not Receiving Services	0.2	0.0	-0.1	-0.765	
<b>SD</b>						0.466
	Yes	10.3	10.2	-0.1	-0.010	
	No	89.8	89.9	0.1	0.001	
<b>LEP</b>						0.762
	Yes	2.3	2.3	0.0	-0.017	
	No	97.7	97.7	0.0	0.000	
	Missing	0.0	0.0	0.0	N/A	
<b>Subject</b>						0.040
	Mathematics	33.2	34.2	1.0	0.030	
	Reading	31.7	31.5	-0.2	-0.006	
	Science	35.1	34.3	-0.8	-0.023	

Table 8. 2005 NAEP Nonresponse Adjusted New York City Grade 8 - Percentages of full sample and responding students by various subgroups (sample size = 6471)

		Full sample weighted percentage	Respondent weighted percentage	Bias	Relative bias	Chi- square p-value
<b>Sex</b>						0.289
	Male	50.4	50.2	-0.1	-0.003	
	Female	49.6	49.8	0.1	0.003	
<b>Race</b>						0.409
	White, not Hispanic	15.8	15.6	-0.2	-0.015	
	Black, not Hispanic	34.3	34.4	0.0	0.001	
	Hispanic Heritage	36.8	36.8	0.0	0.001	
	Asian/Pacific Islander	12.8	13.0	0.2	0.013	
	American Indian/Alaskan Native	0.3	0.3	-0.1	-0.152	
	Other	0.0	0.0	0.0	-0.250	
<b>Relative Age</b>						0.014
	Born before or on 10/90	20.3	20.0	-0.3	-0.013	
	Born after 10/90	79.8	80.0	0.3	0.003	
<b>Free Lunch Eligibility</b>						0.559
	Student Not Eligible	11.9	11.8	-0.1	-0.007	
	Free or Reduce Lunch	84.2	84.2	-0.1	-0.001	
	Missing	3.9	4.1	0.2	0.038	
<b>Title 1</b>						0.063
	Receiving Services	74.5	73.5	-1.0	-0.014	
	Not Receiving Services	25.5	26.5	1.0	0.040	
<b>SD</b>						0.384
	Yes	9.9	9.8	-0.1	-0.012	
	No	90.1	90.2	0.1	0.001	
<b>LEP</b>						0.049
	Yes	7.6	7.9	0.3	0.033	
	No	92.4	92.1	-0.3	-0.003	
	Missing	0.0	0.0	0.0	0.000	
<b>Subject</b>						0.610
	Mathematics	33.6	33.4	-0.2	-0.007	
	Reading	32.5	32.7	0.2	0.006	
	Science	33.8	33.9	0.0	0.001	