

Non-Response in Wave III of the Add Health Study

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INTRODUCTION

Non-response is a potential threat to the accuracy of estimates obtained from sample surveys and can be particularly difficult to avoid in longitudinal studies. The purpose of this report is to investigate non-response in Wave III of Add Health and its influence on study results. Non-response in earlier waves of Add Health has been investigated by the Survey Research Unit at the University of North Carolina. Findings showed that total bias for 13 measures of health and risk behaviors rarely exceed 1% in either Wave I or Wave II, which is small relative to the 20% to 80% prevalence rates for most of these measures.

In the following section, we present an overview of the Wave III sampling plan and results of the field work. Next, we characterize the non-response found in the original sampling variables. We then take advantage of the longitudinal design of Add Health to estimate total and relative bias on demographics and a variety of health and risk behaviors reported by both non-responders and responders during their Wave I In-home Interview. We conclude with a discussion of how the bias caused by non-response can be minimized during future waves of data collection.

THE WAVE III SAMPLE

The Add Health Study is a longitudinal survey of adolescents attending schools in the United States who were listed on 7th through 12th grade enrollment rosters during the 1994 -1995 academic year. Four interviews have been administered to samples of these students. The In-School Survey (1994-1995) included all students from sampled schools who were in attendance on the day of the interview. Samples of adolescents from the school rosters and those filling out the In-School Survey were selected for the Wave I In-Home Survey (1995). Almost all were sought for follow-up in the Wave II In-Home Survey (1996) and the Wave III In-Home Survey (2001).

The adolescents selected for the In-Home Surveys were sampled for two different purposes. The first purpose was to make national estimates of the experiences and behaviors of U. S. adolescents and the second purpose was for specialized genetic analyses. Adolescents chosen for the first purpose were selected with a known probability allowing sampling weights to be constructed. This group can be referred to as the probability sample. Because there were not enough sibling pairs in the probability sample for the desired genetic analyses,

a convenience sample of additional siblings were selected outside of the sampling frame. Since sampling weights could not be constructed for these additional siblings, no sampling weights exist for analyzing the adolescents belonging to the genetic sample. Since the two samples were selected for different analytical purposes and are analyzed separately, we will trace the outcome of the field work for the entire sample, and then present the response rate of the combined sample as well as each individual sample.

Figure 1 shows a summary of the final disposition of Wave I cases released to the field for the Wave III Interview. Of the 20,745 Wave I respondents, 687 were classified as ineligible for the Wave III interview because they were not part of the probability sample or the genetic sample, 96 were reported as deceased during the fieldwork, leaving 19,962 eligible for the Wave III Interview. Contact was established with 17,632 cases, and 15,170 completed the interview. Table 1 provides detailed information on the final status codes in each category depicted in figure 1. It is worth noting that for purposes of the field work, cases that were not interviewed because they were inaccessible to the field interviewer (non-existent, permanently out of the country, ineligible due to age, not a sibling of originally sampled adolescent, or on active military duty) were classified as ineligible. However, these cases were classified as eligible for creating the Wave III final sampling weights because they were members of the Wave I sample who represent part of the population we are following. Hence, they will be considered as eligible for the purpose of looking at the effects of non-response on study results. The “Not solicited” group includes cases who could not be found during the fieldwork. The “Solicited, but unable” group includes cases who were located, but did not agree to participate. Approximately half of this group was unavailable after repeated attempts while the other half failed to participate because of language barriers, being institutionalized or incarcerated, mentally incapable, or being outside the region covered by the field interview process. The “Solicited, but unwilling” group includes the cases who refused to participate and the “Other” group includes cases who were interviewed or scheduled for interview, but data could not be used because of data anomalies.

Response rates for the Wave III Survey are shown in Table 2. The overall sampling rate for Wave III is 75.6% for the probability sample and 79.6% for the genetic sample. The reasons for non-response were split almost equally by respondents who were not located (Not Solicited) and those who declined to participate (Unable or Unwilling) in the interview. Less than 0.1 % of the non-response (Other category) was caused by anomalies that occurred during the field work.

NON-RESPONSE AND THE SAMPLE DESIGN

The Wave I sampling strategy selected a sample of 80 high schools and 52 middle schools from the U.S. with unequal probability of selection. Incorporating systematic sampling methods and implicit stratification into the Add Health study design ensured the sample was representative of U.S. schools with respect to region of country, metropolitan area, school type, ethnicity, and school size. Table 3 shows the distribution of people interviewed at Wave III for each of these five school attributes. There was no statistically significance difference in response rate for type of school (public, private, or catholic) or for schools with different sizes of enrollment. However, statistically significant differences were noted in the percent interviewed for school characteristics of metropolitan area, percent white enrollment, and region of country. In general, respondents were more likely to have been sampled from rural schools having at least 94% of the enrollment being white while being least likely to have attended a school in the Northeast U.S. Adjustments were incorporated in the construction of the sampling weights to compensate for non-response at Wave III. The last two columns of Table 3 show that these adjustments ensure the population estimates using only the cases interviewed (column 4, computed with the Wave III final weight) matches estimates computed using all eligible cases from Wave I (column 3, computed with the Wave I final weight).

Post-stratification adjustments were made during construction of Wave III sample weights by each sex-race-grade combination so that population estimates using the Wave III respondents conformed to population estimates from those eligible for the Wave III interview. Table 4 shows the distribution of people interviewed at Wave III for these three variables. Respondents were more likely to be female, non-black, and enrolled in earlier grades when at Wave I than non-respondents. The last two columns show that the population estimates using only the cases interviewed (column 4, computed with the Wave III grand sample weight) again matches estimates computed using all eligible cases from Wave I (column 3, computed with the Wave I grand sample weight).

EFFECT OF NON-RESPONSE ON STUDY RESULTS

The goal of this section is to measure the extent that the differences between respondents and non-respondents introduce bias in different estimates. We will use variables from Wave I because these measures are known on both respondents and non-respondents. Categories we considered are: demographic characteristics, school experiences, health, attitudes and physical activities, substance abuse, and violence and delinquency. To determine the overall effect of the non-response on study results, we will look at the total and relative bias remaining after estimates are adjusted with final sampling weights. All analyses were done with the survey commands in the Stata software package to adjust for clustering and unequal probability of selection of participants.

Methods

We used the probability sample to estimate bias remaining to population estimates computed with the final sampling weights. Total bias remaining is computed (in tables 5 through 10) as the difference between the estimate for the cases who were interviewed at Wave III and the estimate for the eligible cases from Wave I:

$$\text{BIAS}_{\text{REMAINING}} = P_{W3} - P_{W1}$$

where:

P_{W1} = the estimate for all eligible cases (N=18,835) computed using the final Wave I sample weight (Add Health variable GSWG1)

P_{W3} = the estimate for the 14,322 interviewed cases using the final Wave III sample weight (Add Health variable GSWG3_2)

No test of significance can be done to determine if the bias remaining is zero because different sampling weights were used to compute each estimate. Confidence intervals for each of the estimates are provided so there will be a visual way to determine if the estimates are comparable. The total bias could also be computed using only the final Wave I weights (Kalsbeek, 2001), but we chose to use a method here that more closely mimics how researchers are expected to analyze both the Wave I and Wave III samples.

Relative bias remaining was computed (in tables 5 through 10) by representing the bias as a percentage of the estimate for all eligible cases:

$$\text{BIAS}_{\text{RELATIVE}} = (\text{BIAS}_{\text{REMAINING}} / P_{W1}) * 100$$

Examining the relative bias allows estimates from different variables to be compared.

Demographic characteristics of the interviewed cases are contrasted with the eligible cases in Table 5. Bias remaining after estimates were computed with the final sampling weights is negligible for average age, weekly allowance and percentage reporting being male, selecting black, Native American or Asian race. The estimate for percent born in the U. S. shows the largest amount of bias with the estimate for respondents (using the final Wave III weight) being 2.5 percentage points higher than the estimate for all eligible cases. Inspection of the 95% confidence interval shows some overlap for this variable. The bias of all other measures is 0.5 percentage points or less with 95% confidence intervals providing essentially the same coverage. Relative bias remaining was less than one percentage point for 10 of the variables examined and between 2 and 5 percentage points for percent living with both biological parents, percent Hispanic, and percent other race.

A comparison of school characteristics measuring vocabulary, unexcused absences, and problems in school is shown in Table 6. Bias remaining on all measures is small with 95% confidence intervals for interviewed and eligible cases showing considerable overlap. Three of the bias estimates are negative, three positive and one is zero. The difference between Add Health test scores is only 0.6 points and the difference between the estimates for average number unexcused absences is 0.2 days. The difference between all other estimates for interviewed and eligible cases is 0.2 percentage points or less. Relative bias was less than 1 percentage point for all but two variables. Number of unexcused absences and % ever expelled from school had relative bias estimates of -6.5 and -2.5 percentage points.

Bias remaining in the health measures we examined is listed in Table 7. These measures include diet, lifetime number of sex partners, access to medical care, illnesses and self-assessment of overall health. Dietary measures showed less than a 0.5 percentage point difference in the estimates for percent of the population consuming fruit or dairy products. The largest bias remaining is for the percent whose last dental exam occurred more than a year ago, with the estimate for those interviewed at Wave III to be 1 percentage point lower than the estimate from the eligible cases. All other measures of access to health care (lacking insurance, not getting needed health care, could not afford health care) show the absolute value of bias remaining to range from 0.0 to 0.3 percentage points. The difference between interviewed and eligible cases on all health measures of illness is 0.1 percentage points or less. In general, the bias in the health measures is small with all the 95% confidence intervals showing essentially the same coverage. Relative bias estimates were between 2 and 4 percentage points on four of the variables and less than 2 percentage points for all other variables.

Variables measuring attitudes and physical activities listed in Table 8 show bias remaining to be less than 1 percentage point. Estimates computed using the eligible cases were slightly higher on five of the ten items with 95% confidence intervals of the interviewed and eligible cases showing considerable amount of overlap. The highest bias remaining occurred on the physical activity items, with the interviewed cases reporting 0.6 percent higher participating in team sports and 0.7 percent higher participating in aerobic activity. The eligible cases tended to have a slightly poorer attitude with bias remaining being 0.5 percentage points or less. Relative bias on three of the variables (depressed, felt fearful, and felt lonely) were between two and four percentage points while all others were less than one percentage point.

Bias remaining in estimates of substance abuse shown in Table 9 shows the estimates from the interviewed cases to differ from the eligible cases by half a percentage point or less and 95% confidence intervals to be quite consistent. Bias remaining for all variables except the substance use index shows the estimates of prevalence are under-reported indicating that interviewed cases reported less substance abuse than eligible cases. The substance use index measures the severity of risk involved with use of specific or multiple substances and has the same average value for both interviewed and eligible cases. Relative bias on three variables (ever used hard

drugs, drink alcohol without family, and substance use index) is between 2 and 4 percentage points while all others were less than 2 percentage points.

Wave I reports of violence and delinquency are compared in Table 10. Bias remaining is between 0.5 and 1 percentage point on five of the 15 items measuring the percent of occurrence and under 0.5 percentage points on the other ten items. All measures except for shoplifting are negative, indicating the eligible cases reported slightly more violent or delinquent acts at Wave I than the interviewed cases. Inspection of the 95% confidence intervals shows close to the same coverage for these items. Relative bias was less than 2 percentage points on nine of the measures and between 2 and 6 percentage points on the other 8 variables.

CONCLUSION

We estimated the bias remaining after estimates are adjusted with the final sampling weights on 67 items from Wave I. We found the bias remaining to be over one percentage point on only the estimate of percent living with both biological parents at Wave I and between 0.5 and 1 percentage points on 13 of the items. All other items had bias less than 0.5 percent. Coverage measured with 95% confidence intervals was comparable for estimates for the interviewed cases and eligible cases on all items. The direction of the bias remaining was negative about half the time and positive half time for the demographic characteristics, school experiences, health reports, and attitudes and physical activities. The bias remaining on substance abuse, violence and delinquency measures tended to be negative indicating the eligible cases had higher percentages reporting these behaviors. However, the size of the bias remaining on these items was small. Relative bias was less than two percent on 44 of the variables, between 2 and 5 percent on 21 of the variables, and between 5 and 7 percent on 2 of the variables. We conclude that the Wave III sample adequately represents the same population as the Wave I sample when final sampling weights are used to compute population estimates.

On-going research at the Survey Research Unit at the University of North Carolina has focused on studying the distribution of non-response in all waves of Add Health to identify predictors of round-specific recruitment outcomes; determine their statistical effect; develop new methodology identifying the optimum strategy for computing the sampling weights to minimize bias; and identify information that can be used to design different recruitment strategies and incentives based on the profile of the non-responders. At Wave IV plans are to develop data collection protocols to collect additional process information that will be incorporated into this research on predictors of outcomes of the recruitment process that can benefit successful recruitment in future rounds of Add Health. Process information to be collected as potential predictors will include: (i) a field interviewer record of call attempts (i.e., data on the history of each attempt, including date, time, outcome disposition, and unique interviewer id); (ii) length of interview (section-specific and total); (iii) field interviewer characteristics (with unique identifier) in electronic format, including socio-demographic characteristics as well as job-related indicators of interviewer experience, personality, attitudes, expectations, and professional competence (e.g., in locating assigned cases, basic interviewing skills, ability to pick up and deal with specific types of respondent reluctance) as measured at interviewer training; (iv) a profile of the completeness and accuracy of information initially provided to the interviewer to locate the respondent; (v) a profile of the interviewer's use of "tailoring" options provided to assist in successfully interviewing contacted cases.

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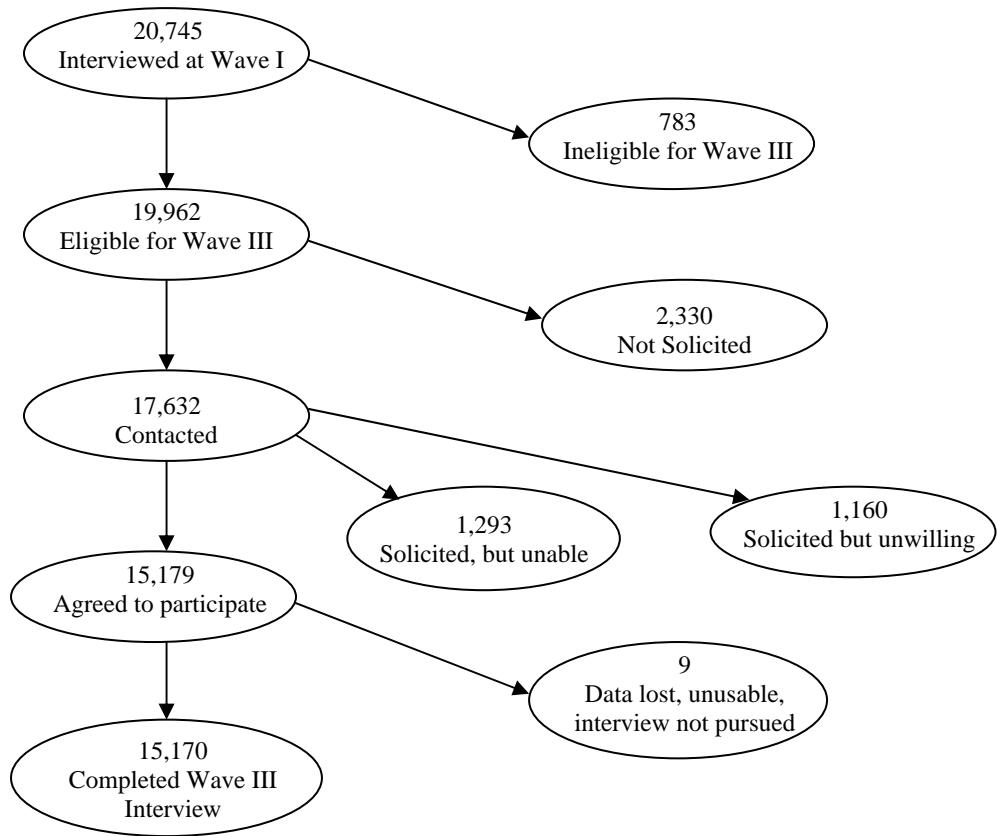


Figure 1. Wave III disposition status of Add Health cases from Wave I.

Table1. Final Disposition of the 20,745 Cases fielded for the Wave III Interview

Description	Disposition Category (Code)	N
Ineligible Cases (N=783)	Not selected for Wave III Interview	687
	Case is deceased (459)	96
Eligible, Interviewed (N=15,170)	Interview finished, FI Notes ¹ -Not, GPS-Not or Case broke off in BIOPART (490)	3
	Interview finished, FI Notes ¹ -Not, GPS-Not (491)	5
	Interview finished, FI Notes ¹ -finished, GPS Not (492)	16
	Interview finished, FI Notes ¹ -Not, GPS-finished (493)	11
	Interview-finished, FI Notes ¹ -finished, GPS-finished (494)	15,135
Eligible, Not Interviewed <i>Not solicited (N=2,330)</i>	No one home after repeated attempts (420)	39
	Case's name not identified/ Case does not exist (458)	13
	Case not located. Leads not exhausted (483)	90
	Case not located; Leads Exhausted (484)	2,125
	Other non-interview (specify) (489)	18
	Unknown outcome, ID used to interview another case, data assigned to correct case (502)	7
	Wrong person interviewed for Case (503)	38
<i>Solicited, but unable (N=1,293)</i>	R unavailable after repeated attempts (422)	658
	R unavailable for duration of field period (423)	90
	Language barrier Spanish (470)	7
	Language barrier Other (specify) (471)	2
	R Physically/mentally incapable (specify) (475)	41
	Case incarcerated – final (477)	103
	Case institutionalized – final (478)	3
	Case moved beyond viewing area (481)	27
	Case out of country for duration of study (482)	175
	Active Duty Military – Unavailable for Duration (486)	187
<i>Solicited but unwilling (N=1,160)</i>	Final Refusal by Case (460)	1012
	Final refusal by parent or guardian (461)	118
	Final refusal by other (specify) (462)	30
<i>Other (N=9)</i>	Case under 18 or believed to be under 18 at interview (451)	4
	Main case interviewed as “Partner” by mistake (485)	3
	Data lost, case interviewed (501)	2

¹ Field Interviewer (FI)

Table 2. Response rates for Wave III of the Add Health Study

Final Response Category	All Wave III		Probability Sample			Genetic Sample	
	N	Percent	N	Percent	Weighted Percent	N	Percent
Interviewed	15,170	75.99	14,322	76.04	75.60	4,298	79.62
Not solicited	2,330	11.67	2,167	11.51	11.44	488	9.04
Unable	1,293	6.48	1,228	6.52	6.82	324	6.00
Unwilling	1,160	5.81	1,109	5.89	6.09	284	5.26
Other	9	0.05	9	0.05	0.05	4	0.07
Total Eligible	19,962	100.00	18,835	100.00	100.00	5,398	100.00

Table 3. Profile of response rates for school attributes and effect of adjustments made to final sampling weights at Wave III.

School Variable	Response Rates		Effect of Sampling Weight Adjustments	
	% Interviewed at Wave III	p-value ¹	Eligible for Wave III (Wave I final weight) N=18,835	Interviewed at Wave III (Wave III final weight) N=14,322
<i>School Enrollment</i>				
<125	76.53	0.34	2.24 [0.82,6.00]	2.16 [0.80,5.70]
125-350	75.90		9.55 [5.33,16.54]	9.51 [5.33,16.41]
351-775	78.16		27.5 [19.84,36.78]	27.67 [19.97,36.96]
776+	74.35		60.7 [51.12,69.52]	60.67 [51.11,69.47]
<i>Type of School</i>				
Public	75.57	0.88	93.78 [88.77,96.64]	93.73 [88.69,96.61]
Catholic	74.60		3.12 [1.27, 7.50]	3.12 [1.27,7.49]
Private	77.62		3.10 [1.33,7.05]	3.15 [1.35,7.16]
<i>Metropolitan Area</i>				
Urban	72.64	0.02	26.36 [19.25,34.94]	26.78 [19.59, 35.45]
Suburban	75.38		58.26 [48.53,67.39]	57.67 [47.94, 66.83]
Rural	81.51		15.38 [8.96, 25.14]	15.55 [9.08, 25.35]
<i>Quartile % white</i>				
0%	75.09	0.01	9.64 [5.85,15.47]	9.66 [5.87,15.49]
1-66%	71.66		30.64 [22.95,39.58]	30.59 [22.97,39.46]
67-93%	76.42		32.44 [24.34,41.76]	32.85 [24.68,42.20]
94-100%	79.23		27.28 [19.48,36.77]	26.90 [19.18,36.34]
<i>Region</i>				
West	74.98	0.002	16.55 [14.24,19.15]	16.61 [14.30,19.23]
Midwest	78.88		31.18 [26.89,35.81]	30.44 [26.18 ,35.08]
South	76.07		38.51[35.31,41.82]	39.08 [35.86, 42.40]
Northeast	67.61		13.76[12.24,15.44]	13.86 [12.34, 15.54]

¹ P-value tests hypothesis that there is no association between response rate and category of variable.

Table 4. Profile of Response rates for demographic characteristics used in adjustment of final sampling weights for Wave III.

Post-stratification Variable	Response Rates		Effect of Sampling Weight Adjustments	
	% Interviewed at Wave III	p-value ¹	Eligible for Wave III (Wave I final weight) N=18,835	Interviewed at Wave III (Wave III final weight) N=14,322
<i>Sex of Respondent</i>				
Female	78.93	<0.001	49.16 [48.07,50.25]	49.15 [47.92, 50.38]
Male	72.39		50.84 [49.75, 51.93]	50.85 [49.62, 52.08]
<i>Grade at Wave I</i>				
7	78.80	0.001	17.48 [13.87,21.79]	17.48 [13.91, 21.73]
8	76.91		16.41 [13.13, 20.32]	16.41 [13.14, 20.31]
9	76.20		17.04 [15.01,19.28]	17.04 [14.96, 19.34]
10	76.32		16.20 [14.27, 18.32]	16.20 [14.29, 18.31]
11	75.90		15.52 [13.69, 17.54]	15.52 [13.66, 17.58]
12	69.64		17.36 [15.22, 19.72]	17.36 [15.18, 19.77]
<i>Race</i>				
Non-Black	76.41	0.004	83.54 [78.97, 87.28]	83.54 [78.97, 83.54]
Black	71.48		16.46 [12.72, 21.03]	16.46 [12.72, 21.03]

¹ P-value tests hypothesis that there is no association between response rate and category of variable.

Table 5. Bias remaining in estimated demographic characteristics reported at the Wave I in-home interview.

Variable from Wave I In-home interview	Interviewed Cases estimates using Wave III weight N=14,322	Eligible Cases estimates using Wave I weight N=18,835	Bias remaining	% Relative Bias remaining
Average Median Census tract income (in \$1000)	29.8 [28.0,31.6]	29.7 [27.9,31.5]	0.1	0.41
Average Age	15.5 [15.2,15.7]	15.5 [15.2,15.7]	-0.0	-0.11
% Male	50.8 [49.6,52.1]	50.8 [49.8,51.9]	0.0	0.01
% Living with both Biological Parents	55.9 [53.4,58.3]	53.4 [50.9,55.9]	2.5	4.64
% Born in United States	94.0 [92.3,95.8]	93.5 [91.7,95.4]	0.5	0.53
% working for pay	59.5 [56.8,62.2]	59.4 [56.7,62.1]	0.1	0.22
Average Weekly allowance (\$)	6.0 [5.5,6.4]	6.0 [5.6,6.4]	0.0	-0.73
% Hispanic ¹	11.9 [8.5,15.2]	12.2 [8.8,15.5]	-0.3	-2.42
% White ¹	73.3 [68.3,78.3]	73.2 [68.2,78.2]	0.1	0.12
% Black ¹	16.5 [12.3,20.6]	16.5 [12.3,20.6]	0.0	0.00
% Native American ¹	3.2 [2.3,4.1]	3.2 [2.4,3.9]	0.0	0.03
% Asian ¹	4.2 [2.5,5.9]	4.2 [2.5,5.8]	0.0	0.89
% other race ¹	7.1 [5.1,9.1]	7.3 [5.4,9.3]	-0.2	-3.40

¹ Participants could select more than one race category.

Table 6. Bias remaining in estimated school experiences reported at the Wave I in-home interview.

Variable from Wave I In-home interview	Interviewed Cases estimates using Wave III weight N=14,322	Eligible Cases estimates using Wave I weight N=18,835	Bias remaining	% Relative Bias remaining
Add Health Picture Vocabulary Test Score	101.3 [100.0,102.6]	100.7 [99.4,102.1]	0.6	0.58
Number of unexcused absences	1.9 [1.6,2.2]	2.1 [1.7,2.4]	-0.2	-6.50
% ever expelled from school	4.4 [3.5,5.2]	4.5 [3.7,5.3]	-0.1	-2.49
% having trouble getting along with teachers	17.8 [16.7,19.0]	18.0 [16.9,19.1]	-0.2	-0.94
% having trouble paying attention in class	31.0 [29.4,32.6]	30.9 [29.3,32.5]	0.1	0.24
% having trouble getting homework done	30.6 [28.8,32.3]	30.6 [29.0,32.2]	-0.0	-0.12
% having trouble getting along with other students	16.2 [15.2,17.2]	16.3 [15.4,17.3]	-0.1	-0.71

Table 7. Bias remaining in estimated health reported at the Wave I in-home interview.

Variable from Wave I In-home interview	Interviewed Cases estimates using Wave III weight N=14,322	Eligible Cases estimates using Wave I weight N=18,835	Bias remaining	% Relative Bias remaining
% had milk, yogurt, cheese ¹	84.6 [83.4,85.9]	84.4 [83.2,85.5]	0.2	0.34
% had fruit or fruit juice ¹	78.0 [76.5,79.5]	77.6 [76.3,79.0]	0.4	0.48
total number of sex partners	1.6 [1.3,1.9]	1.6 [1.3,1.9]	0.0	1.16
% lacking current health insurance	12.0 [10.3,13.8]	12.3 [10.6,14.0]	-0.3	-2.27
% needed, did not get medical care ²	19.0 [17.8,20.1]	18.8 [17.6,19.9]	0.2	1.13
% had last dental exam over 1 year ago	31.7 [29.3,34.1]	32.7 [30.4,35.0]	-1.0	-3.12
% needed, could not afford medical care last year ²	2.8 [2.4,3.3]	2.8 [2.4,3.3]	-0.0	-0.75
% had headaches ³	7.1 [6.4,7.7]	7.2 [6.6,7.8]	-0.1	-1.44
% had stomach ache ³	3.6 [3.1,4.1]	3.7 [3.1,4.2]	-0.1	-1.49
% felt very tired daily ³	7.4 [6.8,8.0]	7.5 [7.0,8.1]	-0.1	-1.88
% felt real sick daily ³	0.8 [0.6,1.0]	0.8 [0.6,1.0]	-0.0	-3.93
% reported poor to fair health	7.0 [6.2,7.7]	7.0 [6.3,7.7]	-0.0	-0.82
% reported being in poor physical condition	9.6 [8.8,10.5]	9.4 [8.7,10.2]	0.2	2.31

¹ Reports are for food consumed yesterday.

² Reports are for past year.

³ Reports are for daily or almost daily illness.

Table 8. Bias remaining in attitudes and physical activities reported at the Wave I in-home interview.

Variable from Wave I In-home interview	Interviewed Cases estimates using Wave III weight N=14,322	Eligible Cases estimates using Wave I weight N=18,835	Bias remaining	% Relative Bias remaining
% participated in team sports at least weekly	72.3 [70.7,73.9]	71.7 [70.1,73.2]	0.6	0.93
% participated in aerobic activity at least weekly	83.4 [82.3,84.5]	82.7 [81.8,83.6]	0.7	0.84
% felt depressed ¹	9.5 [8.7,10.3]	9.8 [9.1,10.5]	-0.3	-3.03
% had bad appetite ¹	8.6 [7.8,9.4]	8.7 [7.9,9.4]	-0.1	-0.62
% felt hopeful about future ¹	63.6 [62.1,65.0]	63.2 [61.7,64.6]	0.4	0.07
% felt life was a failure ¹	3.6 [3.1,4.0]	3.7 [3.2,4.1]	-0.1	0.63
% felt fearful ¹	3.3 [2.9,3.7]	3.3 [2.9,3.7]	-0.0	-2.48
% felt happy ¹	78.8 [77.4,80.1]	78.3 [77.0,79.5]	0.5	0.35
% talked less than usual ¹	9.1 [8.3,9.9]	9.5 [8.7,10.2]	-0.4	0.62
% felt lonely ¹	7.9 [7.3,8.5]	8.0 [7.4,8.6]	-0.1	-3.99

¹ Reports are for experiencing the attitude or feeling most or all of the time during the past week.

Table 9. Bias remaining in substance abuse reported at the Wave I in-home interview.

Variable from Wave I In-home interview	Interviewed Cases estimates using Wave III weight N=14,322	Eligible Cases estimates using Wave I weight N=18,835	Bias remaining	% Relative Bias remaining
% ever tried marijuana	27.5 [25.0,30.0]	28.0 [25.6,30.4]	-0.5	-1.81
% ever used hard drugs	12.0 [10.7,13.3]	12.4 [11.1,13.6]	-0.3	-2.59
% ever smoked cigarettes daily	21.3 [19.1,23.5]	21.7 [19.7,23.8]	-0.4	-1.67
%Smoke cigarettes daily during the last month?	10.2 [8.6,11.8]	10.5 [9.0,12.0]	-0.3	-1.94
% drink alcohol without family	40.8 [37.9,43.8]	41.3 [38.4,44.2]	-0.5	-2.70
% get drunk once a month or more	16.4 [14.7,18.2]	17.0 [15.2,18.7]	-0.6	-1.13
Substance use index ¹	1.3 [1.2,1.4]	1.3 [1.2,1.4]	-0.0	-3.32

¹The substance use index is an ordinal scale that measures the severity of risk involved with specific or multiple substances: 0=never used substances; 1=tried smoking or drink once a month or more; 2=regular smoker or get drunk one or more a month and no use of marijuana or hard drugs; 3=used marijuana in the last month, smoked or drank alcohol but no use of hard drugs; and 4=used hard drugs in any combination with other substances.

Table 10. Bias remaining in violence and delinquency reported at the Wave I in-home interview.

Variable from Wave I In-home interview	Interviewed Cases estimates using Wave III weight N=14,322	Eligible Cases estimates using Wave I weight N=18,835	Bias remaining	% Relative Bias remaining
% saw shooting or stabbing	10.7 [9.1,12.3]	11.2 [9.7,12.7]	-0.5	-4.42
% threatened with a knife or gun	12.2 [10.9,13.5]	12.8 [11.6,14.1]	-0.6	-4.8
% paint graffiti ¹	8.9 [8.1,9.8]	9.0 [8.2,9.8]	-0.1	-0.95
% damage property ¹	18.2 [16.8,19.5]	18.3 [17.1,19.4]	-0.1	-0.49
% shoplift ¹	23.2 [21.9,24.5]	23.2 [21.9,24.4]	0.0	0.30
% in a serious physical fight ¹	31.8 [30.0,33.7]	32.5 [30.7,34.2]	-0.7	-1.97
% seriously injure someone ¹	17.8 [16.6,19.0]	18.5 [17.2,19.7]	-0.7	-3.60
% run away from home ¹	8.0 [7.3,8.8]	8.5 [7.8,9.3]	-0.5	-5.50
% steal a car ¹	9.8 [8.8,10.7]	10.2 [9.3,11.0]	-0.4	-3.89
% steal goods worth \$50 or more ¹	4.7 [4.2,5.3]	4.8 [4.3,5.3]	-0.1	-1.97
% burglarize a building ¹	4.9 [4.2,5.6]	4.9 [4.4,5.5]	-0.1	-1.08
% use or threaten others with a weapon ¹	3.9 [3.4,4.5]	4.1 [3.6,4.5]	-0.1	-3.06
% sell drugs ¹	7.3 [6.3,8.3]	7.7 [6.7,8.6]	-0.4	-4.80
% steal goods worth less than \$50 ¹	19.7 [18.4,20.9]	19.3 [18.1,20.5]	0.4	1.85
% take part in a group fight ¹	19.7 [18.4,21.0]	19.9 [18.6,21.1]	-0.2	-0.80
Average delinquency index ²	1.0 [1.0,1.1]	1.1 [1.0,1.1]	-0.1	-0.97
Average violence index ³	1.2 [1.2,1.3]	1.3 [1.2,1.3]	-0.1	-2.67

¹ Reports are for past year.

² The delinquency index is created from nine behaviors reported at Wave I including paint graffiti, damage property, shoplift, runaway from home, steal a car, sell drugs, and burglary. The count of delinquent acts is expressed as a proportion of all possible and non-missing responses multiplied by 9.

³ The violence index is created from nine behaviors reported at Wave I including such items as fighting, pulled a knife or gun on someone, shot or stabbed someone, and used a weapon in a fight. The count of violent acts is expressed as a proportion of all possible and non-missing responses multiplied by 9.