Non-Response in Wave IV of the National Longitudinal Study of Adolescent Health

Naomi Brownstein
University of North Carolina at Chapel Hill

William D. Kalsbeek
Survey Research Unit
University of North Carolina at Chapel Hill

Joyce Tabor
Carolina Population Center
University of North Carolina at Chapel Hill

Pamela Entzel
Carolina Population Center
University of North Carolina at Chapel Hill

Eric Daza
University of North Carolina at Chapel Hill

Kathleen Mullan Harris
Carolina Population Center
University of North Carolina at Chapel Hill

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 objective of this report is to investigate non-response and consequent bias in estimates for Wave IV of the National Longitudinal Study of Adolescent Health (Add Health). The Survey Research Unit at the University of North Carolina at Chapel Hill previously analyzed the non-response rates for the first three waves of Add Health. As shown in Chantala, Kalsbeek and Andraca, 2005, the total bias in Waves I, II, and III for 13 measures of health and risk behaviors rarely exceed 1%, which is small relative to the 20% to 80% prevalence rates for most of these measures. Results are similar for Wave IV.

In this paper, first, we outline the Wave IV sampling design and results of the field work. Second, we characterize the non-response rates overall and stratified by a number of demographic variables. Next, we use data on the health risk measures reported by Wave IV responders and non-responders during their Wave I In-home interview to estimate total and relative bias due to non-response in Wave IV. We conclude with a discussion of Wave IV bias due to non-response.

THE WAVE IV SAMPLE AND FIELD WORK RESULTS

Add Health Wave IV was designed as a follow-up interview with all original Wave I in-home respondents (n=20,745) (Harris, Halpern, Whitsel, Hussey, Tabor, Entzel and Udry, 2009). The

https://doi.org/10.17615/C6ZQ0Q

final disposition status for these cases is shown in Figure 1. At Wave III, 96 Wave I respondents were deceased and 687 were deemed ineligible because they were not part of the probability sample or the genetic sample (Chantala et al., 2005), leaving 19,962 cases to be fielded at Wave IV. During Wave IV field work, 402 additional cases were determined to be ineligible for follow up because the participant was either deceased, out of the country during the data collection period, or on active military duty and inaccessible to the field interviewers. This left a total of 19,560 original Wave I participants eligible for Wave IV.[1]

Wave IV interviewers established contact with 18,036 cases, and completed – in whole or in part – a total of 15,701 interviews. Table 1 provides frequencies and descriptions of the final status codes in each category depicted in Figure 1. The "Not solicited" group consists of eligible sample members with whom the interviewer was unable to establish contact. In most of these cases, the field contractor, RTI, was unable to locate the sample member. The "Solicited, but unable" group encompasses sample members who were located but (1) unavailable to participate; (2) physically, linguistically, or mentally incapable of completing the interview; or (3) unable to participate due to a language barrier. The "Solicited, but unwilling" group is comprised of sample members who refused to participate in the Wave IV interview. The "Other" group consists of 55 people who do not fit into the aforementioned four groups.

WAVE IV NON-RESPONSE

Table 2 lists Wave IV response rates, both weighted and unweighted. Wave IV yielded 15,701 completed interviews for an overall unweighted response rate of 80.27% for the full sample of 19,560 eligible cases. Weighted estimates were calculated for the 18,467 eligible respondents who had known sample weights in Wave I (determined by the variable gswgt1) and known disposition codes for Wave IV (determined by the variable wave4dsp). The refusals (Unwilling) were the most common type of non-responders, followed by those who were not contacted (Not Solicited) and those who were unable to participate in the interview (Unable). The "Other" group comprises less than 1% of the total non-response.

Survey process rates, including response rates, contact rates, and refusal rates are stratified by biological sex, race and other demographic variables in Tables 3 - 11. Females were more likely than males to be contacted and to respond to the survey (Table 3). Whites were more likely to be contacted than any other racial group (Tables 4,5). Over 95% of white sample members were contacted, while contact rates for other races ranged from 85% to just over 90%. Whites had the highest response rate, 83.3%, but they also had high refusal rates. Asians and Pacific Islanders had the highest refusal rates (13.7%). Native Americans and blacks had the lowest refusal rates, 5.7% and 6.0%, respectively. About 75.1%, a relatively low rate, of Hispanics (any race) responded. The lowest response rate, 70.7%, was among those whose race fell into the "Other" group.

Response varied by urban or rural status, region of the country, parental education, immigration status, and genetic relatedness. Urban respondents were more likely than rural to respond (Table

[1] Note that this eligibility classification differs from the approach taken in Wave III. In the Chantala et al. report, individuals who were inaccessible to the field interviewer were classified as eligible for creating the Wave III final sample weights; at Wave IV these cases were classified as ineligible for weighting purposes.

6). Survey process rates were most favorable for individuals from the Midwest (response and contact rates were highest and refusal rates were lowest), followed by those from the South, then the West, and finally from the Northeast (Table 7). These rates change monotonically and are least favorable in the Northeast, where the response rate is only 72.1% and the refusal rate is 12.0%. Rates are less favorable for participants whose parents have very little education and are most favorable for participants whose parents have some college education (Table 8). However, participants whose parents graduated college were more likely to refuse to participate in the Wave IV survey than were any of the other groups.

Socioeconomic status of respondents was also associated with contact, response, and refusal. As socioeconomic status increased, all three types of rates increased (Table 9). Response rates and contact rates were as low as 73.7% and 84.8%, respectively, in the lowest socioeconomic stratum and as high as 83.4% and 95.1% in the highest stratum. Refusal rates were lowest for the lowest socioeconomic stratum, at 7.5%, and highest at the second highest stratum, at 10.9%.

With increasing generation in the U.S., response rates and contact rates also increased, and refusal rates decreased. First generation immigrants (i.e., foreign-born to foreign-born parents) were least likely to respond and most likely to refuse, while third generation and higher Americans (i.e., native-born to native-born parents) were most likely to respond and least likely to refuse to participate in the survey (Table 10). These differences are marked. About 67% of first generation immigrants, 77% of second generation participants (i.e., native-born to foreign-born parents), and over 82% of third or higher generation participants responded. Moreover, 13.5% of first generation immigrants refused to participate, while only 8.3% of third generation participants refused. For participants in the Wave I genetic sample (Harris et al., 2009), non-related participants had the lowest response and contact rates (Table 11). Other related individuals had similar survey process rates regardless of the type of relatedness.

EFFECT OF NON-RESPONSE ON STUDY ESTIMATES

In this section, we quantify the total and component bias related to non-response for the Wave IV sample, overall and stratified by gender and race. Both respondents and non-respondents in Wave IV completed the survey in Wave I. Therefore, we use the known answers from Wave I to evaluate bias in Wave IV. We calculate weighted estimates of the prevalence of health risk outcomes using the grand sample weight from Wave I (gswgt1) and examine total, component and relative bias. Total bias is the bias due to any form of non-response. Component bias is bias due to an individual category of non-response. The four components are "No Contact," "Unable," "Refusal," and "Other." Components are additive in that the sum of the four component biases equals the total bias. Relative bias is defined as the total bias for a particular measure (e.g., smoking) divided by the prevalence of that measure. We analyze Wave I characteristics that are similar to those examined in the Wave III non-response analysis, including demographic characteristics, school experiences, health attitudes and physical activities, substance abuse, violence, and delinquency.

For 13 measures of health risk, we also compare bias rates for males and females. We defined biological sex of the respondent by the most recent available response. That is, we defined biological sex using the Wave IV variable, bio_sex4, if available; if bio_sex4 was missing, we defined biological sex using the Wave III variable, bio_sex3 and if bio_sex4 and bio_sex3 were

missing, we defined biological sex by bio_sex2. If biological sex was only recorded at Wave I, then we defined biological sex by the Wave I variable, bio_sex.

All analyses were completed using procedures and macros in SAS version 9.2.

Methods

We calculated bias using sample weights from Wave I (gswgt1) in the full eligible Wave I sample of 18,467 respondents with known weights. The Wave I variables that reveal potential bias are indicators for whether a particular behavior is present, so the estimated outcomes are probabilities. Non-response bias remaining was computed by weighting the difference in prevalence between responders and non-responders by the non-response rate:

$$BIAS_{REMAINING} = (1\text{-}RR4)(P_R - P_{NR})$$

where:

P_R = the weighted prevalence estimate for all respondents (N=14,800)

P_{NR}= the weighted prevalence estimate for all non-respondents (N=3667)

RR4= the weighted response rate using AAPOR definition 4[2]

We also conducted t-tests to determine if the bias remaining is significantly different from zero. There were 232 tests, total, so we used a Bonferroni adjustment for multiple comparisons.

By dividing the bias by the estimate for all eligible cases, we calculated the relative bias, given in Tables 12-17. Bias and relative bias are both reported in percentages.

$$BIAS_{RELATIVE} = (BIAS_{REMAINING} / P_{ALL})*100$$

where:

P_{ALL} = the weighted prevalence estimate for all eligible cases (N=18,467)

Variables of interest may be compared by estimating relative bias percentages.

Results

Bias remaining in variables measuring health and physical activities is shown in Table 12. The first column lists the Wave I variable measured as indicated… The second column shows the

[2] Response rate is defined as $RR4 = \frac{I + P}{(I + P) + (R + NC + O) + e(UH + UO)}$ where I = completed interview, P = Partial Interview, R = Refusal and Break-off, NC = No Contact, O = Other, UH = unknown if household/occupied HU, UO = unknown other, and e = estimated proportion of unknown cases that are eligible.

prevalence of each indicator variable among all those eligible for the Wave IV interview (i.e., both Wave IV respondents and non-respondents). The third column lists the percent bias remaining, and the fourth column, the percent relative bias remaining for each indicator variable. The results show bias remaining to be less than 1 percentage point in absolute value. These measures include access to medical care, self-assessment of overall health, and obesity. Both the highest bias and the highest relative bias were for those lacking current health insurance in 1995, comprising 12.3% of eligible participants. However, for all measures in this table, the bias due to non-response was not statistically significant.

Table 13a shows that biases remaining in estimates of use of individual substances are small in magnitude and statistically non-significant. Table 13b reports similar results based on the substance use index, which is an aggregated measure based on answers to the questions reported in Table 13a. Table 14a compares reports of individual acts of violence and delinquency. Table 14b characterizes the bias within delinquency and violence indices. The bias was not significantly different from zero for any measure in these tables.

Information about family structure is in Table 15. Responders were significantly more likely to have had two biological parents at Wave I. The relative bias is also notably high for the "other" category, which could mean either that significantly more non-responders than responders did in fact have other guardians at Wave I, or that the large and statistically significant relative bias is just a statistical artifact of the low prevalence of all subjects (i.e., 6% of responders) in this category.

Table 16 displays information on hearing vocabulary, used as a proxy for cognitive performance. The AHPVT is a modified version of the Peabody Picture Vocabulary Test (PPVT; Dunn, 1982); it includes 87 items that ask the respondent to match words (read aloud by the interviewer) with pictorial representations. Scores were age-standardized to a mean of 100 and a standard deviation of 15. There is a statistically significant trend across three of the four AHPVT score categories. Responders were more likely than non-responders to have scores above 110, while non-responders were more likely than responders to have scores between 70 and 90. The bias is also significant for the "< 70" category, which could mean either that significantly more non-responders than responders did in fact have very low AHPVT scores at Wave I, or that the large and statistically significant relative bias is a statistical artifact of the low prevalence of subjects (i.e., 2.5% of responders) in this category.[3]

In Table 17, we selected 13 health risk measures for further analysis of bias according to non-response components (Table 18) and by biological sex (Table 19) and race (Table 20). These were chosen in order to compare results with previous non-response analysis (Kalsbeek et al, 2001). Responders were significantly more likely than non-responders to lack an appetite. No other health risk measures had bias statistically different from zero.

In Table 18, bias in the 13 health risk measures is broken down into its components – No Contact, Unable, Refusal, and Other. All bias measures were less than 1% in magnitude. Very

[3] Due to IRB concerns, there was more lost to follow up on those who had confirmed or suspected cognitive impairment. Although some of these individuals completed the survey, they are listed in the "Other" category of non-response.

few of the bias measures due to "Other" reasons for not responding to the survey were significant. The only variable with significant bias for Refusals and Other reasons was lacking an appetite. Only one of the risk measures, smoking, had significant bias due to those unable to respond to the survey, but the magnitude of the bias was less than 0.25%. Fighting and skipping school both had negative bias for those not contacted. This means that people who were not locatable in Wave IV were significantly more likely than responders to have skipped school and to have participated in a fight.

Bias in the 13 health risk measures is broken down by biological sex in Table 19. Only two measures, skipping school and lacking an appetite, were significant for males. Among males, non-responders were more likely than respondents to skip school, and responders were more likely than non-responders to lack an appetite. No measures had significant bias for females.

Finally, bias is presented by race in Table 20. For comparison, whites, blacks, and Hispanics each had only one significant bias measure. Among whites, non-respondents were more likely than respondents to skip school. Among blacks, non-respondents were less likely than respondents to lack an appetite. Among Hispanics, respondents were more likely than non-respondents to lie to their parents. No bias due to non-response was statistically significant for Asians/Pacific Islanders, Native Americans or other races.

CONCLUSION

This report presented Wave IV response rates by demographic characteristics and analyzed bias remaining due to Wave IV non-response using characteristics from Wave I. Females were more likely to respond than males, and whites were more likely to respond than other races. Response rates also increased as parental education and socioeconomic levels increased.

Bias and relative bias were small in magnitude for nearly all measures. Moreover, only a few variables had bias significantly different from zero. Consequently, the differences in measurements between non-respondents and respondents are most likely due to random variation, and so do not reflect appreciable non-response bias. For example, according to the delinquency index, there is little statistical evidence of differences in delinquency levels between non-responders and responders.

However, there were a few significant results. The highest relative bias measure was the 35% relative bias due to hearing vocabulary for the lowest group with APHVT scores less than 70. While this may signify that significantly more non-responders than responders did in fact have very low AHPVT scores at Wave I, the large and statistically significant relative bias may be merely a statistical artifact of the low prevalence of all respondents (i.e., 2.5% of responders) in this category. Similarly, although the relative bias of 8% for an individual from a family structure of "other" was statistically significant, this again most likely resulted from the low prevalence of all such participants (6% of responders); note the small magnitude of the bias (0.47%). All other variables had less than 6% relative bias. That is, while taking into account the proportion of eligible Wave I subjects with a particular health risk outcome, the adjusted difference in prevalence of this outcome between responders and non-responders typically does not exceed 6%.

Note, however, that our use of a Bonferroni adjustment for multiple comparisons results in an extreme loss of power for each t-test. We use this adjustment to adequately control the overall probability of a type 1 error, meaning we have only a 5% probability of incorrectly concluding that a bias measure is statistically significant from zero (i.e., that bias exists). On the other hand, this safeguard also means we may have low power to conclude that a particular bias measure differs from zero when the bias that actually exists is either small in magnitude or has a relatively high standard error.

In conclusion, with the few aforementioned exceptions, Wave IV non-response bias is negligible and the Wave IV sample adequately represents the same population surveyed at Wave I.

ACKNOWLEDGMENTS

This research uses data from Add Health, a program project directed by Kathleen Mullan Harris and designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris at the University of North Carolina at Chapel Hill, and funded by grant P01-HD31921 from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, with cooperative funding from 23 other federal agencies and foundations. Special acknowledgment is due Ronald R. Rindfuss and Barbara Entwisle for assistance in the original design. Information on how to obtain the Add Health data files is available on the Add Health website (http://www.cpc.unc.edu/addhealth).

REFERENCES

The American Association for Public Opinion Research. 2008. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. 5th edition*. Lenexa, Kansas: AAPOR.

Biemer, Paul P., Aragon-Logan, Elvessa D. *National Longitudinal Study of Adolescent Health. Wave IV Weights.* Research Triangle Park, NC: RTI International.

Chantala, Kim, Kalsbeek, William D., and Andraca, Eugenio. (2005), "Non-response in Wave III of the Add Health Study"

Harris, K.M., C.T. Halpern, E. Whitsel, J. Hussey, J. Tabor, P. Entzel, and J.R. Udry. 2009. The National Longitudinal Study of Adolescent Health: Research Design [WWW document]. URL: http://www.cpc.unc.edu/projects/addhealth/design.

Kalsbeek, William D., Yang, Juan, and Agans, Robert P. (2002), "Predictors of nonresponse in a longitudinal survey of adolescents", ASA Proceedings of the Joint Statistical Meetings 2002.

Kalsbeek, William D, Morris, Carolyn, B., and Vaughn, Benjamin J. (2001) “Effects of nonresponse on the mean squared error of estimates from longitudinal study”, ASA Proceedings of the Joint Statistical Meetings, 2001.

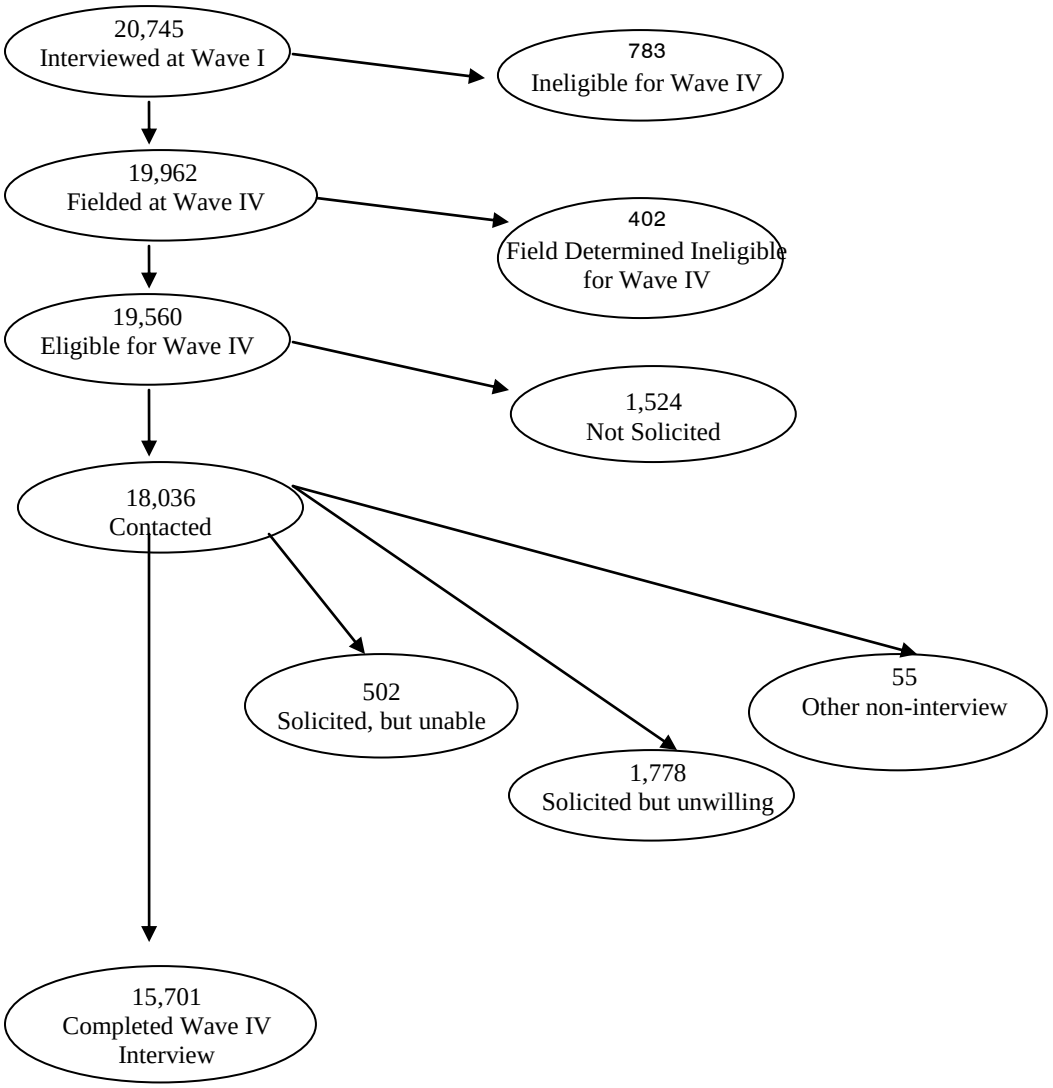

Figure 1. Wave IV disposition status of Add Health cases from Wave I.

Table 1. Wave IV Final Disposition of the 20,745 Cases Fielded at the Wave I Interview

Description	Disposition Category	**N**
Not fielded for Wave IV	N/A	783
Ineligible Cases (N=402)	Deceased	131
	Out of country for duration of study	184
	Active Duty Military – Unavailable for Duration	87
Eligible, Interviewed Retained (N=15,701)	Interview finished, break-off/partial interview	7
	Interview finished	15694
Eligible, Not Interviewed		
Not solicited (N=1,524)	Access Denied	16
	No one home after repeated attempts	8
	Incarcerated – final	110
	Institutionalized – final	15
	Unlocatable	1348
	Moved beyond interviewing area	3
	Wrong person interviewed	24
Solicited, but unable (N=502)	Unavailable after repeated attempts	418
	Unavailable for duration of field period	3
	Language barrier Spanish	4
	Language barrier Other (specify)	2
	Physically/mentally incapable (specify)	75
Solicited but unwilling (N=1,778)	Final Refusal by Sample Member	1587
	Final refusal by other	191
Other (N=55)	Interview Completed – Mentally Challenged Case – Mental Capacity Inadequate	5
	Interview Completed – Mentally Challenged Case – Unable to Determine Mental Capacity	10
	Interview Completed – Prison Case – Data Deleted	1
	Other non-interview (specify)	39

Table 2. Response Rates for Add Health Wave IV

Final Response Category	Total Number of Respondents	Unweighted %	Respondents with Weights	Weighted %
Interviewed	15,701	80.27	14,800	80.54
Not solicited	1524	7.79	1430	7.46
Unable	502	2.57	479	2.60
Unwilling	1778	9.09	1711	9.06
Other	55	0.28	47	0.33
Total Eligible	19,560	100.00	18,467	100.0

Table 3. Survey Process Rates by Biological Sex, [2] Add Health Wave IV

Gender	Males		Females	
Rate	Weighted %	Unweighted %	Weighted %	Unweighted %
Response	78.2	77.6	83.0	82.8
Contact[1]	90.9	90.4	94.2	93.9
Refusal	9.2	9.3	8.9	8.9
Total Eligible	8958	9477	9509	10,083

[1] Contact Rate is defined as the number contacted divided by the number assigned
[2] Gender responses are defined by the sample member's most recent available response

Table 4. Unweighted Survey Process Rates by Race and Ethnicity, Add Health Wave IV

	Race					
Rate	White	Black	Asian/Pacific Islander	Native American	Hispanic	Other
Response	83.3	80.5	71.2	80.2	75.1	70.7
Contact	95.2	89.7	90.3	87.4	88.2	88.8
Refusal	9.6	6.0	13.7	5.7	9.9	13.2
Total Eligible[1]	9952	4343	1368	348	3325	205

[1]There were 19 eligibles of unknown race

Table 5. Weighted Survey Process Rates by Race and Ethnicity, Add Health Wave IV

	Race					
Rate	White	Black	Asian/Pacific Islander	Native American	Hispanic	Other
Response	83.4	78.0	69.2	79.4	73.6	69.0
Contact	95.3	88.0	88.5	87.4	86.8	84.7
Refusal	9.4	6.4	15.1	5.8	9.5	11.7
Total Eligible[1]	9450	4013	1318	328	3151	189

[1] There were 18 eligibles of unknown race

Table 6. Unweighted Survey Process Rates by Urban/Rural, Add Health Wave IV

Rate	Urban	Rural
Response	84.2	77.4
Contact	94.6	90.4
Refusal	8.5	9.5
Total Eligible[1]	8331	11051

[1] There were 178 eligibles whose urban/rural status was unknown.

Table 7. Unweighted Survey Process Rates by Region, Add Health Wave IV

Rate	West	Midwest	South	Northeast
Response	76.5	85.7	82.3	72.1
Contact	89.8	95.0	93.2	89.4
Refusal	9.8	7.4	8.8	12.0
Total Eligible[1]	4654	4547	7152	2769

[1] There were 438 eligibles whose region was unknown.

Table 8. Unweighted Survey Process Rates by Parental Education, Add Health Wave IV

Rate	Less than High School	High School	Some College	College Grad
Response	76.8	80.0	82.7	81.7
Contact	88.3	92.0	93.6	94.1
Refusal	8.2	9.1	8.7	9.7
Total Eligible[1]	2308	5586	3886	6546

[1] There were 1234 eligibles with unknown parental education.

Table 9. Unweighted Survey Process Rates By Socioeconomic Status Scale[1]

SES Stratum	2	3	4	5	6	7	8	9	10
Response	73.7	78	77.5	80.9	81.2	82.2	82.8	79.1	83.4
Refusal	7.5	8.4	9.6	8.8	9	8.8	9	10.9	9.3
Contact	84.8	90.4	90.2	91.6	93.2	93	94.6	93	95.1
Total Eligible[2]	981	1730	2140	1712	2500	2318	1765	2076	3359

[1] Socioeconomic status is measured on an ordinal scale from lowest (2) to highest (10) that measures a participant's socioeconomic status at Wave I based on parent education and occupation.

[2] There were 979 eligible respondents of unknown socioeconomic status.

Table 10. Unweighted Survey Process Rates by Immigrant Generation, Add Health Wave IV

Rate	First Generation[1]	Second Generation[2]	Third+ Generation[3]
Response	67.0	77.2	82.3
Contact	85.5	91.7	93.1
Refusal	13.5	10.8	8.3
Total Eligible[4]	1552	2830	14923

[1] foreign-born to foreign-born parents
[2] native-born to foreign-born parents

[3] native-born to native-born parents
[4] There were 255 eligibles whose immigration generation was unknown

Table 11. Unweighted Survey Process Rates by Genetic Relatedness, Add Health Wave IV

Rate	Twin	Full Sibling	Half Sibling	Non-Related
Response	85.8	86.0	82.2	77.6
Contact[1]	96.1	96.0	92.9	88.2
Refusal	8.5	7.9	6.6	7.9
Total Eligible[1]	1531	2145	708	953

[1]There were 14,223 eligibles who were not in the genetic sample.

Table 12. Bias Remaining in Estimated Health and Physical Activities Reported at the Wave I In-home Interview.

Variable from Wave I In-home interview	Prevalence[1] (%)	% Bias remaining	% Relative Bias remaining
Lacking current health insurance	12.4	-0.62	-5.02
Needed, did not get medical care [1]	18.3	0.46	2.54
Reported poor to fair health	6.8	0.12	1.71
Participated in team sports at least weekly	68.1	0.45	0.66
Participated in aerobic activity at least weekly	82.2	0.44	0.53
Obese using self-report BMI	8.8	0.39	4.39
Physically disabled	2.4	-0.08	-3.34
Emotionally disabled	4.1	0.03	0.79

[1] Prevalence is percent of all eligible Wave IV respondents (i.e., all Wave I respondents eligible to participate in Wave IV) who meet the indication of the variable from the Wave I interview.

Table 13a. Bias Remaining in Substance Use Reported at the Wave I In-home Interview.

Variable from Wave I In-home interview	Prevalence (%)	% Bias remaining	% Relative Bias remaining
ever tried marijuana	29.6	-0.23	-0.79
ever used hard drugs	11.7	0.13	1.11
ever smoked cigarettes daily	20.1	0.15	0.73
smoke cigarettes daily during the last month	8.0	0.02	0.21
drink alcohol without family	38.1	0.25	0.65
get drunk once a month or more	16.9	-0.01	-0.04

Table 13b. Bias Remaining in Substance Use Index[1] Reported at the Wave I In-home Interview.

Variable from Wave I In-home interview	Prevalence (%)	% Bias remaining	% Relative Bias remaining
(0) never used substances	34.9	-0.52[2]	-1.50
(1) tried smoking or drink alcohol once a month or more	27.9	0.47	1.68
(2) regular smoker, or get drunk one or more times a month, and no use of marijuana or hard drugs	14.1	0.13	0.94
(3) used marijuana in the last month, smoked or drank alcohol but no use of hard drugs	8.1	-0.20	-2.44
(4) used hard drugs in any combination with other substances	11.7	0.12	1.04

[1]The 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.

[2]A negative percentage indicates non-respondents are higher in the listed characteristic.

Table 14a. Bias Remaining in Violence and Delinquency Reported at the Wave I In-home Interview.

Variable from Wave I In-home interview	Prevalence (%)	% Bias Remaining	% Relative Bias Remaining
saw shooting or stabbing	11.3	-0.39[2]	-3.49
threatened someone with a knife or gun	4.7	-0.36	-7.62
paint graffiti [1]	9.2	-0.14	-1.50
damage property [1]	18.9	0.33	1.74
shoplift [1]	23.1	0.00	-0.02
in a serious physical fight [1]	31.8	-0.49	-1.53
seriously injure someone [1]	18.6	-0.46	-2.48
run away from home [1]	8.5	-0.20	-2.34
steal a car [1]	10.2	-0.25	-2.47
steal goods worth $50 or more[1]	4.8	-0.22	-4.62
burglarize a building [1]	4.6	0.03	0.72
use or threaten others with a weapon [1]	4.1	-0.11	-2.72
sell drugs [1]	7.8	-0.14	-1.73
steal goods worth less than $50 [1]	18.6	0.32	1.70
take part in a group fight [1]	19.2	-0.42	-2.21

[1] Reports are for past year, (1994-1995)

[2] A negative percentage indicates non-respondents are higher in the listed characteristic.

Table 14b. Bias Remaining in Violence and Delinquency Indices Reported at the Wave I In-home Interview.

Variable from Wave I In-home interview		Prevalence (%)	% Bias Remaining	% Relative Bias Remaining
Delinquency Index[1]	0	59.9	-0.05[3]	-0.09
	1	19.8	0.06	0.32
	2	10.0	0.06	0.62
	3+	18.1	-0.07	-0.40
Violence Index[2]	0	52.2	0.59	1.12
	1	13.8	0.09	0.65
	2	12.2	-0.22	-1.79
	3+	20.4	-0.46	-2.23

[1] Higher values indicate greater delinquency. 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.

[2] Higher values indicate greater violence. 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.

[3]A negative percentage indicates non-respondents are higher in the listed characteristics.

Table 15. Bias Remaining in Family Structure Reported at the Wave I In-home Interview.

Variable from Wave I In-home interview		Prevalence (%)	% Bias remaining	% Relative Bias remaining
Family Structure	2 biological parents	52.7	1.43*[1]	2.72
	2 parents	17.8	-0.24[2]	-1.35
	single mom	19.4	-0.65	-3.35
	single dad	3	-0.07	-2.3
	other	6	-0.47*	-7.88

[1]* Denotes that the bias is significantly different from zero.

[2]A negative percentage indicates non-respondents are higher in the listed characteristics.

Table 16. Bias Remaining in Hearing Vocabulary (AHPVT)[1] Measured at the Wave I In-home Interview.

Variable from Wave I In-home interview		Prevalence (%)	% Bias remaining	% Relative Bias remaining
Hearing Vocabulary	< 70	2.5	-0.86*[2]	-34.95[3]
(AHPVT)	70 – 90	19.7	-1.16*	-5.96
	91 - 110	49.8	0.45	0.93
	> 110	28	1.58*	5.69

[1]The AHPVT is standardized to a mean of 100 and a standard deviation of 15.

[2]* Denotes that the bias is significantly different from zero.

[3]A negative percentage indicates non-respondents are higher in the listed characteristics.

Table 17. Prevalence, Bias, and Relative Bias Remaining in 13 Selected Health Risk Measures Reported at the Wave I In-home Interview.

Variable from Wave I In-home interview	Prevalence (%)	% Bias remaining	% Relative Bias remaining
Inactive[1]	5.5	-0.23[5]	-4.22
Smoked [2]	27.5	0.32	1.16
Drink [2]	47	0.29	0.63
Drunk [2]	28.8	0.08	0.27
Fought [2]	32.5	-0.62	-1.91
Skipped School [2]	28.8	-0.85	-3.05
Lied to Parents [2]	51.6	0.72	1.39
No appetite [3]	35.4	0.74*[6]	2.1
Felt Depressed [3]	38.5	0.21	0.55
Felt Tired [3]	56.7	0.41	0.73
Felt Isolated	26.7	-0.13	-0.47
Felt Unhappy at School	33.7	-0.01	-0.03
Felt Unsafe at School	29.5	-0.08	-0.26

* Denotes that the bias is significantly different from zero.

A negative percentage indicates non-respondents are higher in the listed characteristics.

[1] Does not exercise at least once on normal weeks

[2] Reports are for experiencing the attitude or feeling during the past 12 months.

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

[4] Prevalence is percent of all eligible Wave IV respondents (i.e., all Wave I respondents eligible to participate in Wave IV), who meet the indication of the variable from the Wave I interview.

[5]* Denotes that the bias is significantly different from zero.

[6]A negative percentage indicates non-respondents are higher in the listed characteristics.

Table 18. Total and Component Bias Remaining in 13 Health Risk Measures Reported at the Wave I In-Home Interview.

Health Risk Indicator	% Total	% No Contact	% Unable	% Refusal	% Other
Inactive [1]	-0.23	-0.09	-0.09	-0.03	-0.03
Smoked	0.32	-0.07	0.23*[2]	0.11	0.05
Drink	0.29	0.24	0.19	-0.22	0.09
Drunk	0.08	0.23	0.12	-0.31	0.04
Fought	-0.62	-0.91*	0.11	0.18	0.01
Skipped School	-0.85	-0.60*	0.01	-0.28	0.02
Lying to Parents	0.72	0.25	0.18	0.26	0.03
No appetite [1]	0.74*	0.07	0.09	0.50*	0.09*
Felt Depressed [1]	0.21	-0.31	0.09	0.39	0.05
Felt Tired [1]	0.41	-0.24	0.14	0.48	0.03
Felt Isolated	-0.13	-0.28	0.04	0.08	0.03
Felt Unhappy at School	-0.01	-0.35	0.15	0.13	0.06
Felt Unsafe at School	-0.08	-0.28	-0.04	0.25	0.00

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

[2]* Denotes that the bias is significantly different from zero.

Table 19. Biological sex Breakdown of Total and Component Bias Remaining in 13 Selected Health Risk Measures at the Wave I In-home Interview.

Health Risk Indicator	% Total Bias	% Bias for Males	% Bias for Females
Inactive [1]	-0.23	-0.37	-0.16
Smoked	0.32	-0.07	0.67
Drink	0.29	0.05	0.53
Drunk	0.08	-0.03	0.24
Fought	-0.62	-0.55	-0.12
Skipped School	-0.85	-0.84*[2]	-0.72
Lying to Parents	0.72	0.61	0.69
No appetite [1]	0.74*	0.41*	0.61
Felt Depressed [1]	0.21	0.06	-0.03
Felt Tired [1]	0.41	0.19	0.51
Felt Isolated	-0.13	-0.29	0.05
Felt Unhappy at School	-0.01	-0.38	0.3
Felt Unsafe at School	-0.08	-0.29	0.09

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

[2]* Denotes that the bias is significantly different from zero.

Table 20. Racial Breakdown of Total and Component Bias Remaining in 13 Selected Health Risk Measures at the Wave I In-home Interview.

Health Risk Indicator	% Total Bias	% Bias for Whites	% Bias for Blacks	% Bias for Asians	% Bias for Nat. Am.	% Bias for Hispanics	% Bias for Other Races
Inactive [1]	-0.23	-0.2	-0.02	-0.38	0.14	-0.67	0.71
Smoked	0.32	0.17	-1.05	1.29	-0.25	-0.13	3.49
Drink	0.29	-0.38	0.4	0.55	-2.48	2.01	6.14
Drunk	0.08	-0.49	-0.01	2.51	-3.15	1.08	0.88
Fought	-0.62	-0.44	-1.23	1.12	-1.6	-0.14	0.56
Skipped School	-0.85	-0.94*[2]	-0.5	2.11	-4.08	-0.26	0.41
Lying to Parents	0.72	0.3	1.05	2.47	1.6	2.66*	-0.62
No appetite [1]	0.74*	0.44	1.37*	1.71	2.05	1.69	1.7
Felt Depressed [1]	0.21	0.3	0.58	1.03	-0.36	0.03	1.24
Felt Tired [1]	0.41	0.61	1.05	0.24	0.59	-0.23	-0.16
Felt Isolated	-0.13	-0.03	-0.25	2.27	-4.39	0.08	1.18
Felt Unhappy at School	-0.01	-0.04	-0.34	-0.4	-4.23	0.97	-1.68
Felt Unsafe at School	-0.08	0.08	-0.29	0.3	-1.75	0.97	2.82

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

[2]* Denotes that the bias is significantly different from zero.