Washington State

Healthy Youth Survey

Bias Analysis 2010

2010 Healthy Youth Survey Data

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WASHINGTON STATE DEPARTMENT OF HEALTH

Healthy Youth Survey
Bias Analysis

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Background

The Healthy Youth Survey (HYS) is Washington State's biennial survey of public school students in grades 6, 8, 10 and 12. Since 2002, it has been administered in the fall of even numbered years. Some schools are randomly selected into a state sample, but all schools with grades 6, 8, 10 or 12 can volunteer to participate, except for those operated in correctional facilities. Because a random sample cannot guarantee a representative sample and because not all schools and students invited to participate in the state sample take the survey, we need to check if the participants do in fact represent the larger group.

This analysis—termed bias analysis—aims to find out how well the students who participated in the 2010 Healthy Youth Survey represent Washington State public school students as a whole.

Methods

To assess possible bias related to differences among students at the school level, we compared characteristics of:

- Participating and non-participating schools.
- Schools that did and did not administer the tear-off page.
- Schools that did and did not administer the sexual behavior questions.

Second, to assess possible bias at the individual student level, we compared characteristics of:

- Students who completed the survey and those who did not.
- Students who answered questions on the tear-off page and those who did not.
- Students who answered the sexual behavior questions and those who did not.

We assessed school level characteristics for the state sample and volunteer schools combined, and for state sample schools alone. Student level characteristics were assessed only for schools in the state sample.

Conclusions

The results from the 2010 Healthy Youth Survey state sample can be generalized to students attending non-alternative public schools in Washington State. However, due to a low proportion of grade 8 schools administering the sexual behavior questions and differences between schools that did and did not administer the sexual behavior questions, caution should be taken when generalizing grade 8 sexual behavior results to Washington State students.

The school-level analyses combining state sample and volunteer schools were similar to the findings for the state sample. That is, results from combining state sample and volunteer schools are also likely to be representative of students attending non-

alternative public schools in Washington, with the same caution for the grade 8 sexual activity questions. Additional analyses at the student level are needed to confirm this conclusion.

While findings from the state sample and from the state sample plus volunteer schools are likely representative of students in grades 6, 8, 10 and 12 attending non-alternative public schools in Washington, we expect that some findings from the state sample will differ from findings using the state sample plus volunteer schools combined. We have not assessed the extent of these differences, but they are likely not substantive enough to affect policy or program decisions. Nonetheless, for consistency within documents produced by the Department of Health, the department's Healthy Youth Survey program strongly recommends using the state sample without volunteer schools when providing state-level results.

These findings are limited to generalizing to Washington State from the state sample and from the state sample plus volunteer schools. They do not apply to smaller geographic areas such as counties or school districts. The smaller sample sizes for smaller geographic areas make survey results more subject to bias due to non-participating schools and students.

Introduction

The Healthy Youth Survey (HYS) is Washington State's biennial survey of public school students in grades 6, 8, 10 and 12. The HYS 2010 was administered collaboratively by the Joint Survey Planning Committee, which in 2010 included the Office of the Superintendent of Public Instruction; Departments of Health, Social and Health Services, and Commerce; the Family Policy Council; and the Liquor Control Board. HYS aims to describe health behaviors, risks, and status among public school students in Washington State. Since 2002, it has been administered in the fall of even numbered years. Some schools are selected into a state sample, but all schools with grades 6, 8, 10 or 12 can participate, except for those operated in correctional facilities. Participating schools not drawn for the state sample are termed volunteer schools. A contracted research company mailed a letter in March 2010 inviting all eligible schools in Washington State to participate. Schools registered for the survey online. Sponsoring agencies called state sample schools that did not register to solicit participation. Schools not drawn for the state sample were not called.

This analysis—termed bias analysis—aims to find out how well the students who participated in the 2010 HYS represent Washington State public school students as a whole. Information about the 2010 HYS is available at http://www.doh.wa.gov/DataandStatisticalReports/HealthBehaviors/HealthyYouthSurvey.aspx and http://www.askhys.net.

For the state sample, the Washington State Department of Health drew three random samples: schools with grade 6, schools with grade 8, and schools with grades 10, 12 or both. Within selected schools, all of the students in the target grades were invited to participate. This method assured that each eligible student in Washington State had an equally likely chance of being asked to participate in the state sample. These selection methods maximize the likelihood that students taking the survey as part of the state sample represent students in the specified grades as a whole. However, because a random sample cannot guarantee a representative sample and because not all schools and students invited to participate in the state sample took the survey, we need to check if the participants do in fact represent the larger group.

The 2010 HYS included four survey forms. Schools with students in grade 6 received Form C; schools with students in grades 8, 10 and 12 received Form A and either Form B or Form NS. Schools could select Form B or Form NS which was then interleaved with Form A, such that half of students would receive Form A and half would receive Form B or Form NS.

Schools, parents and students could each choose not to participate in the survey. Also, schools could opt out of certain parts of the survey. Schools not wanting to ask students potentially sensitive questions could tear off the last page of the survey; schools wanting to ask all of the more sensitive questions except the sexual behavior questions could opt for Form NS that did not include these questions. Finally, while filling out the survey,

students could skip any question they did not want to answer. Apart from those optional exclusions, some students did not finish the survey in the allotted time.

The factors outlined—non-participation, schools opting out of sensitive questions by tearing off the last page of the survey, selecting Form NS without the sexual activity questions, and students failing to complete the survey—can introduce bias into the survey such that the findings would not represent public school students in grades 6, 8, 10 and 12 in Washington. Bias occurs if findings are affected by differences between students who answered survey questions and those who did not. This bias analysis aims to assess bias by describing differences between participating and non-participating schools and students that might affect overall findings, and testing whether any such differences would impact results.

Potential Sources of Bias in the 2010 Healthy Youth Survey

Potential sources of bias include:

- **School participation bias**: School participation bias could occur if findings were affected by differences between students in schools that participated and students in schools that chose not to participate in the HYS.
- **Tear-off administration bias**: Not all participating schools administered the optional tear-off questions at the end of the survey. Bias could occur for questions on the tear-off page if findings were affected by differences between students who answered questions on the tear-off page and students who did not. The two most likely sources of differences are:
    - Differences among students in schools that administered the tear-off and those that did not.
    - Differences among students who completed the survey and students who did not, since the tear-off questions are at the end of the survey.
- **Sexual behavior question administration bias:** Some schools opted to administer a version of the survey (Form NS) that excluded questions about sexual behaviors. Bias for the sexual activity questions could occur if findings were affected by differences between students who answered the sexual activity questions and those who did not. The two most likely sources of differences are:
    - Differences among students in schools that administered the Form B, which included the sexual activity questions, and students in schools that did not administered Form B.
    - Differences among students who completed the survey and students who did not, since the sexual activity questions are at the end of the survey.
- **Survey completion bias**: Some students did not complete the survey in the allotted amount of time. Bias could occur for questions toward the end of the survey if students who did not complete survey would have given different answers than students who completed the survey**.**

Methods

Bias must be assessed indirectly. We cannot simply look to see if participating and non-participating schools and students gave different survey responses, because we do not have responses from non-participants. Instead, we first assessed student characteristics that might affect how students answer questions by comparing characteristics of schools that participated in all or parts of the survey and schools that did not. For this comparison, we assessed school-level information provided by the Office of Superintendent of Public Instruction.

To assess possible bias related to differences among students at the school level, we compared characteristics of:

- Participating and non-participating schools.
- Schools that did and did not administer the tear-off page. Schools that did not participate in HYS were categorized as not administering the tear-off page.
- Schools that did and did not administer the sexual behavior questions. Schools that did not participate in HYS were categorized as not administering sexual behavior questions.

Second, to assess possible bias at the individual student level, we compared characteristics of:

- Students who completed the survey and those who did not.
- Students who answered questions on the tear-off page and those who did not.
- Students who answered the sexual behavior questions and those who did not.

Table 1: Sources of potential bias and the level of analysis at which they were assessed

Source of potential bias	Description	Base population*	Level of Analysis	
			School	Student
School participation	Participating *schools* compared to non-participating *schools*	State sample	X	
		All schools	X	
School-level tear-off administration	*Schools* administering tear-off compared to s*chools* not administering tear-off	State sample	X	
		All schools	X	
School-level sexual behavior question administration	*Schools* administering questions compared to s*chools* not administering questions	State sample	X	
		All schools	X	
Student-level survey completion	*Students* who completed the survey compared to s*tudents* who did not complete the survey	State sample		X
Student-level tear-off completion	*Students* who answered tear-off questions compared to s*tudents* who did not	State sample		X
Student-level sexual behavior question completion	*Students* who answered the questions compared to s*tudents* who did not	State sample		X

* Base population for the comparison:

- "State sample" means schools that were randomly selected for the representative state sample.
- "All schools" means all schools that were eligible to participate in HYS (state sample schools plus volunteer schools).

Methods

We conducted further analyses to assess the degree to which non-completion bias may have affected survey results. First, we looked at the extent of survey non-completion for each grade. Then, by simulating the effect of non-completion bias on questions found early in the survey, we estimated how much questions at the end of the survey might be affected.

School-level Analyses

School-level Methods

In order to assess bias related to differences among students in schools that participated or did not participate in the survey or parts of the survey, we assessed the following school characteristics, available from the Office of Superintendent of Public Instruction (http://reportcard.ospi.k12.wa.us/DataDownload.aspx):

- Alternative school status
- Math and reading level indices
- Percent minority enrollment
- Percent of students receiving free or reduced price lunch
- On-time graduation rate (for schools with grades 10 and 12)
- School rural or urban designation based on geographic setting codes developed by the National Center for Education Statistics and the Washington Education Research and Data Center[1]
- Total school enrollment

School Participation Bias

We compared the above characteristics for schools that participated in HYS and schools that did not participate. We conducted separate analyses by grade comparing participating schools drawn for the state sample to schools drawn for the state sample that did not participate, and comparing all eligible participating schools (state sample plus volunteer) to all eligible schools that did not participate (state sample plus volunteer), as described in Table 1. While in most cases grades 10 and 12 are in the same school, this is not always the case. Thus, findings for grade 10 and grade 12 could differ. We assessed differences for all schools (non-alternative and alternative) and for non-alternative schools only, because bias analyses performed for previous surveys found that alternative schools were responsible for differences between participating and non-participating schools (see http://www.doh.wa.gov/DataandStatisticalReports/HealthBehaviors/HealthyYouthSurvey/TechnicalNotes/Bias/Bias2008.aspx).

Tear-off Administration Bias Analysis and Sexual Behavior Question Administration Bias Analyses

We conducted separate analyses by grade for schools drawn for the state sample and for all eligible schools comparing schools that administered the tear-off or sexual

[1] School rural or urban designation was based on geographic setting codes developed by the National Center for Education Statistics and modified by the Washington Education Research and Data Center for use by schools in Washington State (*www.**erdc**.wa.gov/briefs/pdf/201004.pdf*). This classification system features five geographic setting categories. In this analysis, the categories large metro, metro suburb and mid-size were recoded as “urban” and the categories urban fringe and distant were recoded as “rural.” Comparisons were then made between urban and rural schools.

behavior questions to schools that did not administer the questions. Schools that did not participate in HYS were categorized as not having administered the tear-off or sexual behavior questions, because the goal was to understand whether the schools that administered the tear-off or sexual behavior questions were representative of public schools as a whole. The tear-off bias analysis included all grades, while the sexual behavior bias analysis included grades 8, 10 and 12. The sexual behavior questions were not on the form for 6th graders. We compared characteristics of schools that administered the tear-off questions or sexual behavior questions and schools that did not administer the questions.

For these analyses we used t-test, Fisher's exact and Chi square to compare schools by participation status, tear-off administration status or sexual behavior question administration status. We used Chi square and Fisher's exact test to compare schools by alternative status and rural or urban designation. Fisher's exact was used if cell sizes were five or fewer and Chi square used otherwise. We used t-test to compare schools on percent minority enrollment, percent of students receiving free or reduced price lunch, math and reading level indices, on-time graduation rate, and total school enrollment. Comparisons were considered statistically significant if the *p*-value was less than 0.05 (that is, a difference of the size found would be expected to occur by chance less than 5 times in 100.).

School-level Results

Participation Bias

Schools drawn for the state sample were more likely to participate in HYS than were volunteer schools (schools not drawn for the state sample) (Tables 2a-b). This was expected, because state sample schools were called to solicit participation whereas volunteer schools were not called. Table 2c shows participation status for all eligible schools (state sample plus volunteer); the number of schools in each category is the sum of those in Tables 2a-b.

Table 2a: Participation status by grade for schools drawn for the **state sample**

Grade	Participated	Drawn for state sample	Participation Rate (%)
6	98	109	89.9
8	64	72	88.9
10	51	60	85.0
12	55	68	80.9

Table 2b: Participation status by grade for **volunteer schools**

Grade	Participated	Eligible	Participation Rate (%)
6	484	780	62.1
8	360	611	58.9
10	331	551	60.1
12	329	540	60.9

School-level Analyses

Table 2c: Participation status by grade for **all eligible schools (state plus volunteer)**

Grade	Participated	Eligible	Participation Rate (%)
6	582	889	65.5
8	424	683	62.1
10	382	611	62.5
12	384	608	63.2

For both the state sample and all eligible schools, and for all grades, alternative schools were less likely to participate in HYS than were non-alternative schools, as was found in bias analyses for previous survey administrations.

State sample

Among schools selected for the state sample, schools with grades 8, 10 and 12 that participated in HYS were similar to non-participating schools on all variables assessed. Participating schools with grade 6 had higher minority enrollment and higher total school enrollment than did non-participating schools, but these differences disappeared when limiting the analysis to non-alternative schools only.

All schools

Among all schools (state sample and volunteer), including both alternative and non-alternative schools, schools did vary on several factors by participation status. However, when only non-alternative schools were considered, the only consistent and statistically significant difference between participating and non-participating schools was that participating schools had higher total school enrollment. It is unlikely that this difference would lead to bias given that schools were similar on all of the other variables assessed.

Tear-off Administration Bias

For schools drawn for the state sample and for all schools (state sample plus volunteer), 86% to 90% of participating schools administered the tear-off, depending on grade (Tables 3a-b). However, when considering all schools *drawn* for the state sample, and including in the denominator those that did not participate and thus did not administer the tear-off, between 72% and 81% of schools administered the tear-off, depending on grade (Table 3c). When considering all eligible schools (state sample plus volunteer), and including in the denominator schools that did not participate in HYS and thus did not administer the tear-off, between 55% and 56% of schools administered the tear-off, depending on grade (Table 3d).

School-level Analyses

Table 3a: Tear-off administration status by grade for **participating schools drawn for the state sample**

Number (Percent) Administering Tear-off

Grade	Tear-off Administered	Tear-off Not Administered
6 (*n*=98)	88 (89.8)	10 (10.2)
8 (*n*=64)	55 (85.9)	9 (14.1)
10 (*n*=51)	45 (88.2)	6 (11.8)
12 (*n*=55)	49 (89.1)	6 (10.9)

Table 3b: Tear-off administration status by grade for **all participating schools** (state sample plus volunteer)

Number (Percent) Administering Tear-off

Grade	Tear-off Administered	Tear-off Not Administered
6 (*n*=582)	494 (84.9)	88 (15.1)
8 (*n*=424)	382 (90.1)	42 (9.9)
10 (*n*=382)	338 (88.5)	44 (11.5)
12 (*n*=384)	343 (89.3)	41 (10.7)

Table 3c: Tear-off administration status by grade for **schools drawn for the state sample** with non-participating schools categorized as not having administered the tear-off

Number (Percent) Administering Tear-off

Grade	Tear-off Administered	Tear-off Not Administered
6 (*n*=109)	88 (80.7)	21 (19.3)
8 (*n*=72)	55 (76.4)	17 (23.6)
10 (*n*=60)	45 (75.0)	15 (25.0)
12 (*n*=68)	49 (72.1)	19 (27.9)

Table 3d: Tear-off administration status by grade for **all eligible schools**, with non-participating schools categorized as not having administered the tear-off

Number (Percent) Administering Tear-off

Grade	Tear-off Administered	Tear-off Not Administered
6 (*n*=889)	494 (55.6)	395 (44.4)
8 (*n*=683)	382 (55.9)	301 (44.1)
10 (*n*=611)	338 (55.3)	273 (44.7)
12 (*n*=608)	343 (56.4)	265 (43.6)

State sample

We compared state sample schools that administered the tear-off to state sample schools that did not administer the tear-off, as in Table 3c. Schools that were drawn for the state sample but that did not participate in HYS were categorized as not having administered the tear-off.

School-level Analyses

For the state sample, schools with grade 6 that administered the tear-off did not vary from schools with grade 6 that did not administer the tear-off. Schools with grade 8 that administered the tear-off had higher percentage of students receiving free or reduced price lunch and lower math level indices than did schools that did not administer the tear-off; when only non-alternative schools were considered, the difference in percentage receiving free or reduced price lunch disappeared. Schools with grades 10 and 12 that administered the tear-off had higher percentage of students receiving free or reduced price lunch than did schools with grades 10 and 12 that did not administer the tear-off, but this difference disappeared when only non-alternative schools were considered. Thus, when only non-alternative schools were considered, there were no consistent differences between schools that administered the tear-off and schools that did not administer the tear-off.

All participating schools

We compared all schools (state sample plus volunteer) that administered the tear-off to all schools that did not administer the tear-off, as in Table 3d. We categorized schools as not having administered the tear-off if they were eligible to participate in HYS but did not.

Schools that administered the tear-off differed from schools that did not administer the tear-off on a number of factors, but when only non-alternative schools were considered, most of those differences disappeared. When considering only non-alternative schools, the only consistent difference between schools that administered the tear-off and those that did not was that schools that administered the tear-off had higher total school enrollment. This finding likely results from participating schools having higher enrollments than non-participating schools, as described previously.

Sexual Behavior Question Administration Bias

Among schools drawn for the state sample, approximately one-third of participating schools with grade 8 administered the sexual behavior questions, while for grades 10 and 12 about half of participating schools administered the questions (Table 4a). When considering all participating schools (state sample and volunteer), the proportion of schools administering the sexual behavior questions was slightly lower across all grades (Table 4b). When considering all schools drawn for the state sample, and including in the denominator those that did not participate, 29% of schools with grade 8 administered the sexual behavior questions, compared to 41% of schools with grade 10 and 42% of schools with grade 12 (Table 4c). When considering all eligible schools (state sample plus volunteer), and including in the denominator schools that did not participate in HYS and thus did not administer the sexual behavior questions, 17% of schools with grade 8 administered the sexual behavior questions, compared to 27% with grade 10 and 29% with grade 12 (Table 4d).

School-level Analyses

Table 4a: Sexual behavior question administration status by grade **for participating schools drawn for the state sample.**

Number (Percent) Administering Sexual Behavior Questions

Grade	Administered Questions	Did Not Administer Questions
8 (*n*=64)	21 (32.8)	43 (67.2)
10 (*n*=51)	25 (49.0)	26 (51.0)
12 (*n*=55)	29 (52.7)	26 (47.3)

Table 4b: Sexual behavior question administration status by grade for **all participating schools** (state sample plus volunteer).

Number (Percent) Administering Sexual Behavior Questions

Grade	Administered Questions	Did Not Administer Questions
8 (*n*=424)	119 (28.1)	305 (71.9)
10 (*n*=382)	170 (44.5)	212 (55.5)
12 (*n*=384)	176 (45.8)	208 (54.2)

Table 4c: Sexual behavior question administration status by grade for **schools drawn for the state sample**, with non-participating schools included as not having administered the questions

Number (Percent) Administering Sexual Behavior Questions

Grade	Administered Questions	Did Not Administer Questions
8 (*n*=72)	21 (29.2)	51 (70.8)
10 (*n*=60)	25 (41.7)	35 (58.3)
12 (*n*=68)	29 (42.7)	39 (57.3)

Table 4d: Tear-off administration status by grade for **all eligible schools**, with non-participating schools included as not having administered the tear-off

Number (Percent) Administering Sexual Behavior Questions

Grade	Administered Questions	Did Not Administer Questions
8 (*n*=683)	118 (17.3)	565 (82.7)
10 (*n*=611)	167 (27.3)	444 (72.7)
12 (*n*=608)	175 (28.8)	433 (71.2)

State sample

We compared state sample schools that administered the sexual behavior questions to state sample schools that did not administer the questions, and included in the latter category schools that were drawn for the state sample but did not participate, as in Table 4c. Schools with grade 8 that administered the sexual behavior questions had higher minority enrollment, higher percentage of students receiving free or reduced price lunch, lower math and reading level indices, and lower total school enrollment than did schools with grade 8 that did not ask the questions; rural schools were more likely to administer

the questions. When only non-alternative schools were considered, schools with grade 8 that administered the questions had higher percentage of students receiving free or reduced price lunch, lower math and reading level indices, and lower total school enrollment than did schools with grade 8 that did not administer the questions; rural schools remained more likely to administer the questions. Schools with grade 10 did not vary by sexual behavior question administration status. Schools with grade 12 that administered the sexual behavior questions had higher percentage of students receiving free or reduced price lunch; this difference remained when only non-alternative schools were considered.

Thus, for grade 8, schools that administered the sexual behavior questions differed in many ways from schools that did not administer the questions. For grade 10, schools that administered the questions were similar to schools that did not administer the questions on the characteristics assessed. For grade 12, schools that asked the sexual activity questions were similar on all but one characteristic assessed. Given the similarity on most characteristics and the potential for statistically significant differences to arise by chance when making many comparisons, we conclude that school characteristics with grade 12 that administered and did not administer the sexual activity questions were similar.

All participating schools

We compared all eligible schools (state sample plus volunteer) that administered the sexual behavior questions to all eligible schools that did not administer the questions, and included in the latter category schools that were eligible to participate but did not, as in Table 4d. At all grade levels schools administering the questions had a higher proportion of students eligible for free or reduced price lunch; this difference disappeared for grades 10 and 12 when only non-alternative schools were considered but remained for grade 8.

For schools with grade 8, rural schools were more likely than urban schools to administer the sexual behavior questions; this difference remained even when alternative schools were excluded.

Student-level Analyses

Student-level Methods

Variables of interest

We created three variables to indicate whether the students in schools from the state sample: completed the survey, answered questions on the tear-off page, or answered sexual behavior questions. Students were designated as:

- "Survey completers" if they answered all of the last 30 questions, or all of the last 20 questions for students in grade 6. "Survey non-completers" are students who failed to answer 3 or more of the last questions. Students who failed to answer one or two of the last 30 (or 20 for grade 6) were not included in the analyses.
- "Tear-off completers" if they answered at least one question on the tear-off page. Because the tear-off page is at the end of the survey, "tear-off non-completers" may be students from schools that did not administer the tear-off page or students who did not complete the survey in the allotted time.
- "Sexual behavior question completers" if they answered at least one of the four sexual behavior questions. Students not answering the sexual behavior questions might have chosen to skip them, might not have gotten to the questions in the allotted time, or might have had Form NS or Form A that do not include the questions. Additionally, the sexual activity questions are on the Form B tear-off. Students might have been at schools that asked for Form B, but did not administer the tear-off.

We compared students based on questions assessing personal characteristics found early in the main body of the survey. Systematic differences in responses to these questions increase the likelihood of bias for questions toward the end of the survey or on the tear-off, including sexual activity questions.

The characteristics for student-level comparisons include student reports of:

- School factors
    - Low grades (mostly Cs, Ds or Fs at school)
    - Feeling unsafe at school (answers of "definitely no" or "mostly no" to a question about feeling safe at school)
- Indicators of low socioeconomic status
    - Mother not completing high school
    - Father not completing high school
    - Food insecurity (family cutting meal size or skipping meals in past 12 months due of lack of money)
    - No recent dentist visit (not visiting dentist for a check-up in past two years)

- Behavioral factors
    - Cigarette smoking (any cigarette smoking in the past 30 days)
    - Marijuana smoking (having ever smoked marijuana)
    - Binge drinking (drinking 5 or more drinks on any one occasion in the past two weeks)
    - Drinking alcohol (drinking any alcohol in the past 30 days)
- Race and ethnicity
    - Race (reporting selected races; see Tables 5, 6 and 7)
    - Hispanic ethnicity
    - Non-English language spoken at home

Analysis

We conducted separate analyses by grade using SAS version 9.3 and SUDAAN version 10. We developed risk ratios to assess differences between categories of participants. A risk ratio compares rates among groups. For example, if 15% of survey completers and 30% of survey non-completers reported getting low grades, we would report a risk ratio of 0.5, meaning that completers were half as likely as non-completers to have low grades. For every risk ratio, we also provide a "95% confidence interval," which gives the range that should contain the true population value 95% of the time. The confidence interval is not a measure of how "confident" we are in the estimate; instead, it describes the range of values that we might reasonably expect to include the actual risk ratio among all Washington State students. If the confidence interval includes 1, the two groups are not statistically significantly different. Most comparisons are of survey completers, tear-off completers or those answering sexual activity questions to survey non-completers, tear-off non-completers or sexual activity question non-completers, respectively. For the race and ethnicity variables, comparisons are the percent of completers among students reporting a specified ethnicity or race compared to the percent of completers among students reporting non-Hispanic white. This group was chosen for comparison because it gives the most stable statistical estimates due to the group's relatively large sample size. Students answering "yes" to a question about speaking a language other than English at home were compared to those answering "no."

Student-level Results

Survey Completion and Comparison Characteristics

Table 5 gives risk ratios comparing students in the state sample who completed the survey in the allotted time to those who did not for the characteristics listed above. Compared to students who did not complete the survey, survey completers were less likely to report:

Student-level Analyses

- Low grades and feeling unsafe at school.
- Variables indicating low socioeconomic status.
- Ever smoking marijuana, with a weaker association among students in higher grades.
- Smoking cigarettes or binge drinking for all grades except grade 8.
- Drinking in the past 30 days for grade 6 only.

Among the race and ethnicity variables, students in grades 6 and 8 reporting black, American Indian or Alaska Native, or Hispanic were generally less likely to complete the survey than their white non-Hispanic counterparts.

Table 5: Survey completion and student characteristics, risk ratio (95% confidence interval)

Variable	Grade			
	6 RR (95% CI)[a]	8 RR (95% CI)	10 RR (95% CI)	12 RR (95% CI)
School factors (completers compared to non-completers)				
Low grades*	**0.6 (0.5-0.6)**	**0.7 (0.6-0.7)**	**0.6 (0.5-0.7)**	**0.7 (0.6-0.7)**
Feeling unsafe at school*	**0.8 (0.7-0.9)**	**0.8 (0.7-0.9)**	**0.6 (0.5-0.7)**	**0.6 (0.4-0.8)**
Indicators of low socioeconomic status (completers compared to non-completers)				
Mother not completing high school	n/a	**0.6 (0.5-0.7)**	**0.6 (0.5-0.8)**	**0.7 (0.5-1.0)**
Father not completing high school	n/a	**0.6 (0.5-0.7)**	**0.6 (0.4-0.8)**	**0.7 (0.5-0.9)**
Food insecurity	n/a	**0.5 (0.4-0.7)**	**0.4 (0.3-0.5)**	0.6 (0.3-1.0)
No recent dentist visit	n/a	**0.7 (0.6-0.9)**	**0.5 (0.4-0.8)**	**0.6 (0.4-1.0)**
Behavioral factors (completers compared to non-completers)				
Cigarette smoking*	**0.5 (0.3-0.7)**	0.9 (0.7-1.0)	**0.6 (0.5-0.7)**	**0.6 (0.5-0.8)**
Marijuana smoking	**0.6 (0.4-0.9)**	**0.8 (0.7-0.9)**	**0.8 (0.7-0.9)**	**0.8 (0.7-1.0)**
Binge drinking	**0.7 (0.5-0.9)**	0.8 (0.7-1.0)	**0.8 (0.7-1.0)**	**0.8 (0.6-0.9)**
Drinking alcohol*	**0.7 (0.5-0.9)**	0.9 (0.8-1.0)	0.9 (0.8-1.0)	0.9 (0.8-1.0)
Race/ethnicity[b] (completers among group listed compared to non-Hispanic whites or speaking only English at home)*				
American Indian or Alaska Native	**0.9 (0.9-0.9)**	**0.8 (0.8-0.9)**	1.0 (0.9-1.0)	0.9 (0.7-1.0)
Asian	1.0 (1.0-1.0)	**1.1 (1.0-1.1)**	1.0 (1.0-1.1)	1.0 (1.0-1.1)
Black	**0.9 (0.9-1.0)**	**0.9 (0.8-0.9)**	**0.9 (0.9-1.0)**	1.0 (0.9-1.0)
Hispanic	**0.9 (0.9-1.0)**	**0.9 (0.8-1.0)**	1.0 (0.9-1.0)	**1.0 (0.9-1.0)**
Non-white or Hispanic	**0.9 (0.9-1.0)**	**0.9 (0.9-1.0)**	1.0 (0.9-1.0)	1.0 (0.9-1.0)
Non-English language spoken at home*	**0.9 (0.9-1.0)**	1.0 (0.9-1.1)	1.0 (1.0-1.0)	1.0 (1.0-1.0)

[a] RR: risk ratio; 95% CI: 95% confidence interval; bolded values are statistically significant at the p <0.05 level (that is, the 95% CI does not include 1.0). A risk ratio less than 1 indicates that the characteristic is less common among students completing the survey.

[b] Other race and ethnicity groupings were not included due to small numbers; American Indian or Alaska Native, Asian, and Black groupings do not include students who report Hispanic or multiple races; the Hispanic grouping includes student of any race. Non-Hispanic whites were selected as the comparison group because rates for this group are more stable than rates for other groups due to larger numbers.

*Starred variables were also assessed in the 2004 HYS bias analysis (available: http://www.doh.wa.gov/DataandStatisticalReports/HealthBehaviors/HealthyYouthSurvey/TechnicalNotes/Bias/Bias2004.aspx)

Student-level Analyses

Tear-off Page and Comparison Characteristics

Table 6 gives risk ratios for characteristics listed above comparing students in the state sample who filled out the tear-off page to those who did not. Almost none of the comparisons showed statistically significant differences. Given that some associations are expected to be statistically significant just by chance, these results indicate that students who filled out the tear-off page are similar to those who did not fill out the tear-off page for the characteristics assessed.

Table 6: Answering tear-off page questions and student characteristics, risk ratio (95% confidence interval)

Variable	Grade			
	6 RR (95% CI)[a]	8 RR (95% CI)	10 RR (95% CI)	12 RR (95% CI)
School factors (completers compared to non-completers)				
Low grades*	**0.8 (0.6-0.9)**	0.8 (0.7-1.0)	0.9 (0.7-1.1)	0.9 (0.7-1.1)
Feeling unsafe at school*	0.9 (0.8-1.1)	0.8 (0.7-0.9)	0.9 (0.7-1.1)	0.9 (0.7-1.1)
Indicators of low socioeconomic status (completers compared to non-completers)				
Mother not completing high school	n/a	0.9 (0.6-1.1)	1.0 (0.7-1.5)	0.9 (0.7-1.1)
Father not completing high school	n/a	0.9 (0.7-1.1)	1.0 (0.8-1.5)	1.1 (0.8-1.7)
Food insecurity	n/a	n/a	n/a	1.1 (0.8-1.5)
No recent dentist visit	n/a	0.8 (0.7-1.0)	1.0 (0.6-1.5)	0.9 (0.7-1.3)
Behavioral factors (completers compared to non-completers)				
Cigarette smoking*	0.8 (0.5-1.2)	1.0 (0.8-1.2)	1.0 (0.7-1.4)	1.0 (0.7-1.5)
Marijuana smoking	1.1 (0.7-1.2)	1.0 (0.8-1.2)	1.0 (0.8-1.1)	1.0 (0.8-1.2)
Binge drinking	0.9 (0.7-1.2)	0.9 (0.8-1.1)	1.0 (0.7-1.4)	0.9 (0.7-1.2)
Drinking alcohol*	0.9 (0.7-1.2)	1.0 (0.8-1.1)	1.0 (0.8-1.2)	1.0 (0.9-1.2)
Race/ethnicity[b] (completers among group listed compared to non-Hispanic whites or speaking only English at home)*				
American Indian or Alaska Native	**0.9 (0.9-1.0)**	**0.9 (0.8-1.0)**	1.0 (1.0-1.1)	0.9 (0.8-1.1)
Asian	0.9 (0.8-1.1)	0.9 (0.8-1.2)	0.8 (0.6-1.2)	0.9 (0.7-1.1)
Black	0.9 (0.7-1.1)	0.8 (0.7-1.0)	0.9 (0.7-1.1)	0.9 (0.8-1.0)
Hispanic	0.9 (0.9-1.1)	0.9 (0.8-1.0)	1.1 (1.0-1.2)	1.0 (0.9-1.1)
Non-white or Hispanic	0.9 (0.9-1.0)	0.9 (0.8-1.0)	1.0 (0.9-1.1)	1.0 (0.9-1.0)
Non-English language spoken at home*	0.9 (0.9-1.0)	0.9 (0.8-1.1)	1.0 (0.9-1.1)	1.0 (0.9-1.1)

[a] RR: risk ratio; 95% CI: 95% confidence interval; bolded values are statistically significant at the p <0.05 level (that is, the 95% CI does not include 1.0). A risk ratio > 1 indicates that the characteristic is more common among students answering tear-off page questions.

[b] Other race and ethnicity groupings were not included due to small numbers; American Indian or Alaska Native, Asian, and Black groupings do not include students who report Hispanic or multiple races; the Hispanic grouping includes students of any race. Non-Hispanic whites were selected as the comparison group because rates for this group are more stable than rates for other groups due to larger numbers.

*Starred variables were also assessed in the 2004 HYS bias analysis (available: http://www.doh.wa.gov/DataandStatisticalReports/HealthBehaviors/HealthyYouthSurvey/TechnicalNotes/Bias/Bias2004.aspx)

Student-level Analyses

Sexual Behavior Questions and Comparison Characteristics

Table 7 gives risk ratios for characteristics listed above comparing students in the state sample who answered sexual behavior questions to those who did not. Almost none of the comparisons showed statistically significant differences. One exception is that students in grades 10 and 12 who answered sexual behavior questions are more likely to have a parent who did not graduate from high school. Given that some associations are expected to be statistically significant just by chance, these results indicate that students who answered sexual behavior questions are similar to those who did not answer sexual behavior questions on the characteristics assessed.

Table 7: Answering sexual behavior questions and student characteristics, risk ratio (95% confidence interval)

Variable	Grade		
	8 RR (95% CI)[a]	10 RR (95% CI)	12 RR (95% CI)
School factors (completers compared to non-completers)			
Low grades*	1.0 (0.8-1.2)	1.0 (0.8-1.2)	1.0 (0.9-1.2)
Feeling unsafe at school*	0.9 (0.7-1.0)	0.9 (0.6-1.3)	0.8 (0.6-1.0)
Indicators of low socioeconomic status (completers compared to non-completers)			
Mother not completing high school	1.2 (0.8-1.7)	1.5 (1.0-2.3)	**1.5 (1.0-2.1)**
Father not completing high school	1.1 (0.7-1.6)	**1.5 (1.0-2.1)**	**1.4 (1.0-1.9)**
Food insecurity	0.9 (0.7-1.2)	1.2 (0.8-1.8)	1.0 (0.8-1.3)
No recent dentist visit	1.1 (0.8-1.5)	1.2 (0.9-1.7)	1.0 (0.8-1.2)
Behavioral factors (completers compared to non-completers)			
Cigarette smoking*	0.8 (0.5-1.2)	1.0 (0.7-1.2)	1.1 (0.9-1.3)
Marijuana smoking	1.0 (0.8-1.3)	0.9 (0.8-1.1)	1.0 (0.9-1.2)
Binge drinking	1.1 (0.9-1.4)	1.0 (0.8-1.3)	1.1 (0.9-1.3)
Drinking alcohol*	1.1 (0.9-1.4)	1.0 (0.9-1.1)	1.1 (1.0-1.2)
Race/ethnicity[b] (completers among group listed compared to non-Hispanic whites or speaking only English at home)*			
American Indian or Alaska Native	1.4 (0.9-2.3)	1.3 (1.0-1.8)	0.7 (0.4-1.3)
Asian	0.7 (0.3-1.4)	0.8 (0.4-1.9)	0.9 (0.5-1.6)
Black	0.7 (0.3-1.4)	0.6 (0.4-1.2)	0.7 (0.4-1.2)
Hispanic	1.5 (0.8-2.8)	**1.9 (1.2-2.9)**	1.4 (0.9-2.2)
Non-white or Hispanic*	1.1 (0.7-1.6)	1.2 (0.9-1.8)	1.1 (0.8-1.5)
Non-English language spoken at home*	1.0 (0.6-1.6)	1.3 (0.8-2.1)	1.1 (0.8-1.5)

[a] RR: risk ratio; 95% CI: 95% confidence interval; bolded values are statistically significant at the p <0.05 level (that is, the 95% CI does not include 1.0). A risk ratio more than 1 indicates that the characteristic is more common among students answering sexual behavior questions.

[b] Other race and ethnicity groupings were not included due to small numbers; American Indian or Alaska Native, Asian, and Black groupings do not include students who report Hispanic or multiple races; the Hispanic grouping includes students of any race. Non-Hispanic whites were selected as the comparison group because rates for this group are more stable than rates for other groups due to larger numbers.

*Starred variables were also assessed in the 2004 HYS bias analysis (available: http://www.doh.wa.gov/DataandStatisticalReports/HealthBehaviors/HealthyYouthSurvey/TechnicalNotes/Bias/Bias2004.aspx)

Student-level Analyses

Potential Bias due to Survey Non-completion

Amount of survey non-completion

The analysis of student-level characteristics showed survey non-completion as the primary potential source of bias among schools in the state sample. The analysis showed that students finishing the survey are different in some respects from students who stopped earlier in the survey. If the students differ in a characteristic that influences how they would answer survey questions at the end of the survey, then percentages derived from those questions might not accurately reflect the true percentage.

An important consideration for determining the potential impact of non-completion bias is what percentage of students failed to complete the survey, and where in the survey they stopped answering questions. For each administration of HYS, the Joint Survey Planning Committee adjusts the length of the survey to try to keep non-completion under 15%. Survey non-completion is defined as missing more than 2 questions among the last 30 (or last 20 for Form C because it is shorter). Table 8 shows the percent of students not completing the survey in each grade. Grade 8 is the only one that has survey non-completion above 15%.

Table 8: Survey non-completion by grade: State-sampled schools, all forms

Grade	n	Missing more than 2 questions (%)*	Missing more than 10 questions (%)
6	11549	14.4	9.3
8	9723	22.0	17.2
10	6889	11.0	8.6
12	5908	8.1	6.1

*Number of students missing more than 2 questions among last 30, or last 20 on Form C; HYS definition of non-completion

Figure 1: Question completion over the course of Form B by grade

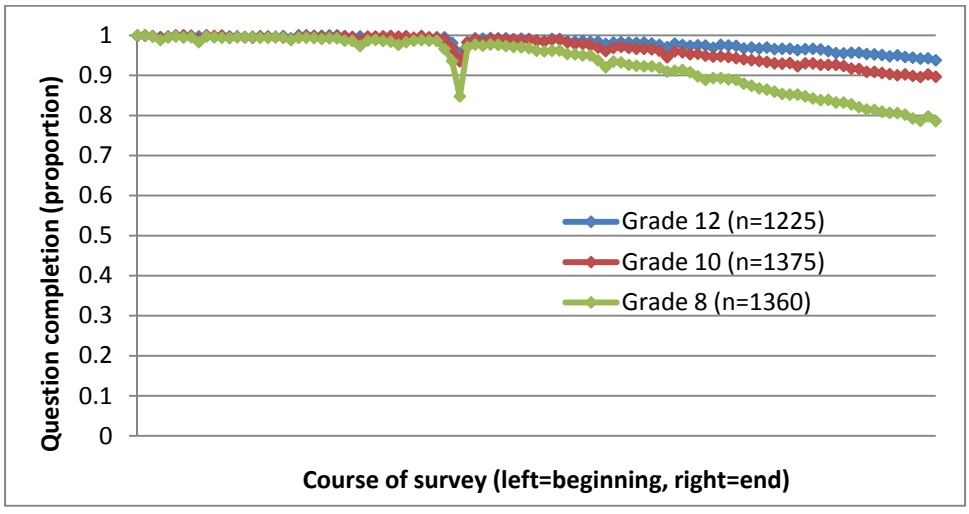

Figure 1 gives the proportion of students who answered each question on the main body of Form B. The graph shows that non-completers begin dropping out around halfway

through the survey. At that point, the rate of dropout is generally slow but relatively faster for students in grade 8.

The results shown in Table 8 and Figure 1 show that survey non-completion rates for grades 6, 10 and 12 fall below the target of 15%; the relatively high completion rates for those grades reduce concerns about potential bias. However, completion rates for students in grade 8 were as low as 80%, increasing concerns about biased estimates for questions near the end of the survey. To determine the potential magnitude of this bias, we took a closer look at how much we might expect non-completion to influence grade 8 survey results. We conducted this analysis for students in grade 8 because they had the highest rate of non-completion. We reasoned that the analysis would not be necessary for grades with higher levels of completion if we found no evidence of bias for the grade with the lowest level of completion.

Magnitude of Potential Bias due to Non-completion for Students in Grade 8

To estimate the potential magnitude of bias for questions at the end of the survey (due to some students not completing the survey), this section looks at questions found early in the survey where we have information from both survey completers and non-completers. Among students in grade 8 using Forms B or NS, we compared prevalence of responses including the entire sample and prevalence with a subset that included only survey completers. By excluding non-completers from the subset, we simulate the extent of bias that would occur if these questions were found at the end of the survey.

Table 9 shows the difference in prevalence between the two samples for several of the student characteristic questions assessed above.

Table 9: Simulating grade 8 non-completion bias with questions early on Form B/NS

Question	Options	Percent (CI)* "completers" only	Percent (CI)* full sample
Putting them all together, what were your grades like last year?	Mostly As or Bs	76.9 (74.2-79.3)	75.3 (72.6-77.8)
	Mostly Cs, Ds of Fs	23.1 (20.7-25.8)	24.7 (22.2-27.4)
I feel safe at my school.	Mostly/def. true	84.8 (83.2-86.2)	83.5 (81.5-85.4)
	Mostly/def. not true	15.2 (13.8-16.8)	16.5 (14.6-18.5)
How far did your mother get in school?	Graduated HS or more	86.6 (84.0-88.8)	85.5 (82.8-87.8)
	Didn't graduate HS	13.4 (11.2-16.0)	14.5 (12.2-17.2)
During the past 30 days, on how many days did you smoke cigarettes?	None	93.7 (92.3-94.9)	93.6 (92.4-94.7)
	At least 1 day	6.3 (5.1-7.7)	6.4 (5.3-7.6)
What language is usually spoken at home?	English	79.7 (74.9-83.8)	79.3 (74.5-83.4)
	Non-English language	20.3 (16.2-25.1)	20.7 (16.6-25.5)

* 95% confidence interval

Student-level Analyses

Even modeling the extreme scenario that each of these questions is the last question on the survey, we found no statistically significant differences between the samples. Furthermore, looking at male and female students separately, there were still no statistically significant differences. This means that, in spite of the earlier indications that non-completion bias may be present for 8th graders, the actual survey outcomes appear not to be influenced in a statistically significant way.

School-level and Student-level Conclusions

Participation Bias

As in previous survey administrations, alternative schools were less likely to participate in HYS and results of the 2010 HYS are not generalizable to alternative schools. State-sample schools with grades 8, 10 and 12 that participated in HYS were similar to non-participating schools for all variables assessed. State-sample participating schools with grade 6 had higher minority enrollment and higher total school enrollment than did non-participating schools, but these differences disappeared when limiting the analysis to non-alternative schools only.

Among all schools (state sample and volunteer), schools did vary on several factors by participation status. However, when only non-alternative schools were considered, the only consistent and significant difference between participating and non-participating schools was that participating schools had higher total school enrollment. It is unlikely that this difference would lead to bias given that schools were similar on all of the other variables assessed. That participating schools had higher total school enrollment could be due to larger schools being more likely to have resources to implement the survey. Larger schools might also be more likely to participate because reliable results would be available to them based on their size.

Tear-off Administration Bias

For schools drawn for the state sample, there were no consistent differences between schools that administered the tear-off and schools that did not administer the tear-off. When considering all eligible schools (state sample plus volunteer), schools that administered the tear-off differed from schools that did not administer the tear-off on a number of factors, but when only non-alternative schools were considered, most of those differences disappeared. When considering only non-alternative schools, the only consistent difference between schools that administered the tear-off and those that did not was that schools that administered the tear-off had higher total school enrollment. This finding likely reflects the finding that schools with larger enrollments were more likely than schools with smaller enrollments to participate in HYS. This difference is not likely to introduce bias given that schools administering the tear-off and those not administering the tear-off were similar on all other factors assessed.

The student-level analysis found that students who answered questions on the tear-off page answered selected questions on the main part of the survey in a similar manner to those who did not answer questions on the tear-off page. Thus, it is likely that students not answering tear-off questions would have answered them the same as other students had they answered tear-off questions. This finding is consistent with finding no systematic differences between schools that administered the tear-off and those that did not, as well as findings related to non-completion bias noted below. Thus, the results from tear-off page questions from state-sampled schools are likely to represent students in non-alternative public schools in Washington State. The school-level analysis

suggests that the same is true when combining results from the state-sampled and volunteer schools. Additional analysis similar to the student-level analysis for state-sampled schools is needed to confirm this conclusion.

Sexual Behavior Question Administration Bias

For schools drawn for the state sample, schools with grade 8 that administered the sexual behavior questions differed in many ways from schools that did not administer the questions, even when only non-alternative schools were considered. However, schools with grades 10 and 12 did not vary by sexual behavior question administration status.

For all eligible schools (state sample plus volunteer), schools with grade 8 that administered the sexual behavior questions had a higher proportion of students eligible for free or reduced price lunch and rural schools were more likely to administer the questions; these differences remained even when only non-alternative schools were considered. For schools with grades 10 and 12, schools administering the questions had a higher proportion of students eligible for free or reduced price lunch but this difference disappeared when only non-alternative schools were considered.

The student-level analysis found that students in grades 8, 10 and 12 in state-sampled schools who answered sexual behavior questions answered selected questions on the main part of the survey in a similar manner to students who did not answer sexual behavior questions. This finding suggests that the results of the sexual behavior questions from state-sampled schools can be generalized to students attending non-alternative public schools in Washington State. This finding is consistent with the school-level findings for grades 10 and 12. Because answering other questions in a similar manner does not guarantee answering the sexual activity questions in a similar manner, the low proportion of grade 8 schools administering the sexual behavior questions, and the differences between schools that administered the question and those that did not, results for grade 8 need to be interpreted with caution.

The conclusions about the representativeness of the responses to the sexual behavior questions might also apply when combining the results of state-sampled and volunteer schools. However, additional student-level analysis combining results from state-sampled and volunteer schools is needed to confirm this conclusion.

Non-completion Bias

Because students who fully finished the Healthy Youth Survey differed in how they answered questions early in the survey from those who failed to finish the survey, the prevalence estimates that come from the final questions on the survey are potentially subject to bias. However, findings for students in state-sampled schools who took Form B indicate that the degree of bias is not likely to be large enough to invalidate the information from any given question. Thus, using state-sampled schools the results from

questions toward the end of Form B are likely representative of public school students attending non-alternative schools in Washington State. These results need to be confirmed for other forms and for state and volunteer schools combined.

Summary

The results from the 2010 Healthy Youth Survey state sample can be generalized to students attending non-alternative public schools in Washington State. However, due to a low proportion of grade 8 schools administering the sexual behavior questions and differences between schools that did and did not administer the sexual behavior questions, caution should be taken when generalizing grade 8 sexual behavior results to Washington State students.

The school-level analyses combining state sample and volunteer schools were similar to the findings for the state sample. That is, results from combining state sample and volunteer schools are also likely to be representative of students attending non-alternative public schools in Washington, with the same caution for the grade 8 sexual activity questions. Additional analyses at the student level are needed to confirm this conclusion.

While findings from the state sample and from the state sample plus volunteer schools are likely representative of students in grades 6, 8, 10 and 12 attending non-alternative public schools in Washington, we expect that some findings from the state sample will differ from findings using the state sample plus volunteer schools combined. We have not assessed the extent of these differences, but they are likely not substantive enough to affect policy or program decisions. Nonetheless, for consistency within documents produced by the Department of Health, the department's Healthy Youth Survey program strongly recommends using the state sample without volunteer schools when providing state-level results.

These findings are limited to generalizing to Washington State from the state sample and from the state sample plus volunteer schools. They do not apply to smaller geographic areas such as counties or school districts. The smaller sample sizes for smaller geographic areas make survey results more subject to bias due to non-participating schools and students.