Washington State

Healthy Youth Survey

Bias Analysis 2002

2002 Healthy Youth Survey Data

WASHINGTON STATE DEPARTMENT OF HEALTH

Healthy Youth Survey
Bias Analysis

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Overview

Survey responses are often used to estimate the frequency of behaviors or other characteristics in a population larger than those who actually completed the survey. Thus, while only a portion of public school students took the Healthy Youth Survey in 2002, we would like to use their responses to characterize all 6th, 8th, 10th and 12th graders in Washington. This is only possible if those who participated in the Healthy Youth Survey are not different in their behaviors from those who did not participate. If they are different, we say that the survey is biased and we are then limited in our ability to generalize the results to all students. Bias represents systematic error and is different from the random fluctuation that is measured by confidence intervals.

From our analysis of bias presented below, we conclude that the results of the 2002 Healthy Youth Survey can be generalized to all public school students in 6th, 8th, 10th and 12th grades who do not attend alternative schools. However, caution should be exercised in using questions that were asked at the end of the non-optional portion of the questionnaires. There does not seem to be bias on the "tear-off" questions even though they were at the end of the questionnaire. While we do not know the reasons for this apparent discrepancy, completing the tear-off was decided at the school level, while failure to complete the survey was at the individual level.

Potential Sources of Bias In the 2002 Healthy Youth Survey

There are three potential sources of bias in the 2002 Healthy Youth Survey.

- The response rates for students on the 2002 Healthy Youth Survey were under 70 percent, with most of the low response rate due to schools refusing to participate, rather than individual students opting not to complete the survey. The low school response rate introduces the possibility of bias due to differences between students in schools that participated and those that were asked to participate, but did not, especially for grades 10/12 (see the section on response rates for more information).
- Among participating schools, approximately 40 percent did not complete the optional “tear-off” questions at the end of the survey, providing cause for additional concern about possible bias for these items.
- Bias might be caused on the last items on the survey due to some students being unable to complete the questionnaire in the time allotted.

Methods of Assessing Bias

In order to assess possible bias, we compared

- Characteristics of participating and non-participating (refusing) schools, among those schools that were randomly selected for the state sample (link to below);

- The responses of students in schools completing the optional items to students in schools "tearing off" these items, based on other items that were completed by all participating students; and
- The responses of students who completed the last 30 items on the survey (not including the optional items) to students who did not complete these items, based on other items that were completed by all participating students. These analyses focused on Form B because survey non-completion was more pronounced for form B than the other forms.

To examine whether there were differences as described above, we conducted analyses of variance (ANOVAs) for continuous items and chi-squares for dichotomous items. The predictor variables were participation (participated/refused), completion/non-completion of the optional questions, or completion/non-completion of the questions at the end of the survey. Outcome variables depended on the type of bias being assessed and are discussed below. Analyses were generally conducted by grade and for all grades combined, although for some analyses, data were not available for all grades. Differences were considered statistically significant if the probability of finding a difference as large as the one measured would be expected to occur fewer than five times out of 100 (i.e. $p < 0.05$) by chance alone. Consideration of chance findings due to multiple comparisons is discussed, when needed, below. Additionally, where we found significant or marginally significant differences, we examined the possible role of alternative school under-representation.

Results and Conclusions

Characteristics of Participating and Non-participating Schools

In order to test whether the results of the Healthy Youth Survey might be biased due to the refusal of some schools to participate in the survey, we compared schools on several characteristics for which data were available from other sources. Where we found significant differences between schools, we also considered the possible role of under-representation of alternative schools in explaining these differences.

The characteristics on which we compared schools were:

- Percentages of children participating in the free or reduced lunch program.
- Percentage minority enrollment.
- Percentage of 10th graders meeting standards in writing, reading, listening, math, and all four areas combined on Washington Assessment of Student Learning (WASL) scores.
- Graduation rates.
- Percentage of high school dropouts and students whose status was unknown.
- Percentages of 6th graders who indicated on a survey administered along with Iowa Test of Basic Skills (ITBS) achievement testing:
    - They have computers at home.
    - They changed schools during the school year.
    - A language other than English is spoken in the home.

- They feel safe at school only some of the time, or never.

We used the most recent data available for each measure. This meant that the comparison of minority enrollment was based on 2002-2003 data, and comparisons of free/reduced lunch, graduation, dropouts/status unknown, WASL scores, and ITBS data were based on 2001-2002 data.

Free/reduced price lunches. Percentage of children participating in the free or reduced price lunch program provides an estimate of socioeconomic status. There were no differences in the percentage of children receiving free or reduced lunch between the participating and non-participating schools (all p-values > .11)

Percentage minority. There were no differences between participating and non-participating schools on the percentage of students who had a race/ethnicity other than white. (all p-values > .30)

WASL scores.

- **Writing.** We found a significant difference between participating and non-participating schools on WASL writing scores, measured as the percentage of students meeting standards ($p < .03$). In participating schools, 51.1 percent met the writing standards compared to 41.1 percent in non-participating schools. This difference became non-significant when alternative schools were omitted, ($p > .19$; 54.3 percent in participating and 48.6 percent in non-participating schools).
- **Reading.** We found a marginally significant difference between participating and non-participating schools on WASL reading scores, ($p < .08$). In participating schools, 56.0 percent met the reading standards compared to 47.5 percent in non-participating schools. The difference did not approach significance when alternative schools were omitted ($p > .26$; 60.1percent and 55.4 percent respectively).
- **Math.** We did not find a difference between participating and non-participating schools on WASL math scores ($p > .26$).
- **Listening.** We found a significant difference between participating and non-participating schools on WASL writing scores ($p < .04$). In participating schools, 81.0% met the listening standards compared to 74.3 percent in non-participating schools. This difference disappeared when alternative schools were omitted ($p > .28$; 82.9 percent and 80.3 percent respectively).
- **Met all four standards.** We did not find a significant difference between participating and non-participating schools on meeting all four standards ($p > .11$).

Graduation. Graduation rates in schools in the 10th and 12th grade sample were significantly higher in the participating compared to the non-participating schools ($p < .004$). The average graduation rate was 80.0 percent in participating schools and 62.3 percent in non-participating schools. This difference became no longer statistically significant when alternative schools were omitted ($p > .07$; graduation rates = 85.0 percent and 74.5 percent respectively).

Dropouts/status unknown. For schools in the 10th and 12th grade sample, there was no difference in the percentages of students in grades 9 - 12 who dropped out or were of unknown status ($p > .31$).

ITBS survey. A survey administered along with the Iowa Test of Basic Skills (ITBS) achievement tests in grade 6 provides additional information that we used to compare participating and non-participating schools on four other characteristics. (This test is also given in grades 3 and 9, but these grades were not surveyed and so this information was not used.) We compared participating and non-participating schools on:

- Percentages of students answering "yes" to the question "Do you have a computer in your home?" (yes/no).
- Percentages of students answering "yes" to the question "Have you attended any other school during this school year?" (yes/no).
- Percentages of students answering "B" or "C" in response to the following question: "How often is English spoken in your home?" (A. Only English is spoken in my home; B. Sometimes another language is spoken; C. Another language is spoken more often than English).
- Percentages of students answering "C" or "D" in response to the following question: "Do you feel safe at school? (A. Always; B. Most of the time; C. Some of the time; D. Never).

None of the tests approached significance (all p-values > . 25).

Possible Effect of Underrepresentation of Alternative Schools on Statewide Estimates

These analyses indicate that alternative schools were under-represented in the state sample and that largely as a result of this under-representation, participating schools had significantly higher proportions of graduating students and higher scores on WASL writing and listening tests compared to non-participating schools. These analyses further suggest that the HYS results may provide under-estimates for some behaviors that differ between students in alternative and regular schools. However, whether statewide rates were affected depends on the number of students in the alternative schools. Alternative schools tend to be smaller than regular schools. If the number of students in alternative schools was small, even though students in alternative schools were under-represented, it might not have a major effect on statewide rates. Only 216 students out of 9,260 students in grades 10/12 were in alternative schools. Even if this number were doubled (i.e., if response rates for alternative and regular schools were similar and an additional 216 students from alternative schools participated) then students in alternative schools would make up only 432/9476=4.6 percent of the participants.

In order to address the possible effect of under-representation of alternative schools on statewide estimates, we conducted several analyses in which we weighted students from those alternative schools that did participate to provide weighted estimates. We conducted these analyses on grades 10/12 because most alternative schools are at the secondary level. We gave each student in a participating alternative school a weight of 2 (effectively doubling their effects on statewide estimates) because the response rate for alternative schools (29.6 percent) was about half that of regular schools (66.7 percent).

Items Compared

- Language spoken in home (% English)
- Mother's education (% < H.S. graduate)
- Watch TV 3+ hours/day
- Drink 2+ sodas/day
- Meet recommendations for vigorous activity
- Eat dinner with family most of the time or always
- Overweight or at risk for overweight
- Tobacco makes you cool (percent definitely no)
- Wear tobacco logos (percent definitely no)
- Smoked cigarettes in the past 30 days
- Drank alcohol in the past 30 days
- Used marijuana in the past 30 days
- Gang membership
- Seriously considered suicide in past year
- Perceived availability of drugs (percent at risk)
- Attitude favorable toward drugs (percent at risk)
- Community opportunities for prosocial involvement (percent protected)
- School rewards for prosocial involvement (percent protected)
- Number of risk factors (RF: % 1 RF, % 2 RF, % 3 RF, % 4RF)
- Number of protective factors (PF: % 1 PF, % 2 PF, % 3 PF, % 4 PF)

The results indicate that the under-representation of alternative schools did not have a large impact on the results of the survey. None of the weighted and unweighted estimates differed by more than 1 percent, with the exception of smoking cigarettes in the past month, which differed by 1.2 percent for 12th graders. The vast majority (46 of the 52 comparisons or 88 percent) differed by 0.5 percent or less. Also, the confidence intervals of the unweighted estimates included the weighted estimate for each item compared.

Conclusions

The analyses of school characteristics indicated that participating and non-participating schools differed in graduation rates and two WASL scores, and this difference appeared to be primarily due to the fact that alternative schools were underrepresented in the state sample. Because of the small size of these schools, this under-representation did not appear to affect the statewide estimates. However, statewide results probably are not representative of students in alternative schools.

Optional "Tear-off" Questions

We compared student responses to questions on the non-optional part of the questionnaire to assess whether there were differences between students in schools that tore off and schools that administered the optional questions. In addition to several questions related to demographics, we selected items from the non-optional portion of the questionnaire that were conceptually related to questions on the tear-off section. We conducted 42 analyses (including 24 chi-squares for dichotomous items and 18 ANOVAs for continuous items). By chance we would expect about two of these tests to be significantly different at $p < .05$ and two were, suggesting that responses to the optional questions were not biased by differences between schools that tore off and schools that administered these questions.

The items selected for analysis follow. Unless otherwise indicated, there were no differences in responses between schools that completed and did not complete the optional section.

- Language spoken in home (percentage English): grades 6, 8, 10, 12
- Mother's education (percentage who were less than a high school graduate): grades 10, 12
- Eat dinner with family (never, rarely, sometimes, most of the time, always): grades 8, 10, 12
- Youth Quality of Life Scale (continuous): grades 8, 10, 12
- Tobacco makes you cool (Definitely no, probably no, probably yes, definitely yes): grades 8, 10, 12
- Wear tobacco logos (Definitely no, probably no, probably yes, definitely yes): grades 8, 10, 12
- Perceived availability of drugs (percentage at risk): grades 6, 8, 10, 12
- Attitude favorable toward drugs (percentage at risk): grades 6, 8, 10, 12
- Community opportunities for prosocial involvement (percentage protected): grades 6, 8, 10, 12
- School rewards for prosocial involvement (percentage protected): grades 6, 8, 10, 12
- Number of risk factors: grades 6, 8, 10, 12 ($p < .04$ for grade 10)
- Number of protective factors: grades 6, 8, 10, 12 ($p < .05$ for grade 8)

Failure to Complete Survey

Some items at the end of the survey had relatively high non-completion rates (i.e. 15 percent or more of the students did not answer the questions) We were concerned that those items at the end of the questionnaire, which were completed by fewer than 85 percent of the participants, might be subject to bias due to differences between students who were able to complete the survey in the time allotted and those who were not. In order to assess this possible source of bias, we conducted a set of 15 analyses (five at each of grades 8, 10 and 12) in which we compared the responses of students missing any of the last 30 items before the tear-off sheet on Form B to students who answered all of these questions.

The following items were used for comparison:

- Language spoken in home (percentage English)
- Grade average lower than B
- Smoked cigarettes in the past 30 days
- Drank alcohol in the past 30 days
- Feel safe at school some of the time or never

Eight out of the 15 comparisons achieved statistical significance, which is more than would be expected by chance. Significant differences were:

- 8th graders completing Form B were more likely to speak English in the home, have grade averages of B or higher, be non-smokers, and feel safe in school compared to non-completers
- 10th graders completing Form B were more likely to have grade averages of B or higher, be non-smokers, and feel safe in school compared to non-completers
- 12th graders completing Form B were more likely to speak English in the home compared to non-completers

Additional analyses conducted to examine the possible effects on this source of bias on statewide rates obtained from the survey revealed that omitting non-completers from analyses of questions asked early in the survey reduced rates of smoking in the past month from 9.5% (1.4 percent) when all 8th graders who responded to Form B were included to 8.1 percent (1.5 percent) when only those individuals who completed the survey were included. When both Forms A and B were considered, results were similar: prevalence rates for smoking in the past month decreased from 9.2 percent (1.1 percent) when all 8th graders were included to 7.6 percent (1.1 percent) when only those individuals who completed the survey were included.

Because of these findings, we advise caution in interpreting the following items, administered at the end of Form B, for which there were less than 85 percent completion rates:

- Grade 8 and 10: L08-L11, D13, D16, D38, D03 (computed from D38), D39, D04 (computed from D39), D40-D56, P34
- Grade 12: D13, D16, D47-D56, P34