

ORIGINAL ARTICLE

Measuring Sexual Orientation in Adolescent Health Surveys: Evaluation of Eight School-based Surveys

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Purpose: To examine the performance of various items measuring sexual orientation within 8 school-based adolescent health surveys in the United States and Canada from 1986 through 1999.

Methods: Analyses examined nonresponse and unsure responses to sexual orientation items compared with other survey items, demographic differences in responses, tests for response set bias, and congruence of responses to multiple orientation items; analytical methods included frequencies, contingency tables with Chi-square, and ANOVA with least significant differences (LSD) post hoc tests; all analyses were conducted separately by gender.

Results: In all surveys, nonresponse rates for orientation questions were similar to other sexual questions, but not higher; younger students, immigrants, and students with learning disabilities were more likely to skip items or select "unsure." Sexual behavior items had the lowest nonresponse, but fewer than half of all students reported sexual behavior, limiting its usefulness for indicating orientation. Item placement in the survey, wording, and response set bias all appeared to influence nonresponse and unsure rates.

Conclusions: Specific recommendations include standardizing wording across future surveys, and pilot testing items with diverse ages and ethnic groups of teens

before use. All three dimensions of orientation should be assessed where possible; when limited to single items, sexual attraction may be the best choice. Specific wording suggestions are offered for future surveys. © Society for Adolescent Medicine, 2004

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Monitoring adolescent health and risk behaviors using population-based surveillance methods is important for identifying changing trends, for developing priorities in prevention efforts, and for measuring progress toward Healthy People 2010 goals [1]. Certain populations show marked disparities in health indicators, morbidity, and mortality compared with the general population. Public health goals are focused on directing resources for reducing these health disparities.

A growing number of studies identify sexual orientation as a salient characteristic in monitoring the health of youth and adults, because of health disparities linked to sexual minority status [2]. Sexual minority adolescents (i.e., those who identify as gay, lesbian, or bisexual [GLB], or who report same-gender or both-gender romantic attractions or sexual behaviors) have an increased likelihood of several health risks compared with heterosexual peers. They are more likely to experience violence victimization, such as harassment in school, assault in the commu-

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nity, forced sexual intercourse, and physical or sexual abuse [3–12]. The violence directed at GLB youth is strongly linked to their stigmatized status. Coping with stigma, sexual prejudice, and violence can carry a high cost: researchers have noted increased prevalence of smoking, binge drinking, and injection drug use among adolescents reporting same-sex attractions [13,14]. Studies around the world have documented an increased risk of suicide and suicide attempts [11,15–20]. Sexual minority youth are more likely to be runaway or throwaway youth, and are over-represented among homeless and street youth throughout the United States and Canada [7,9,21,22]. As a result, homeless GLB teens may engage in prostitution or survival sex, with its higher risk for pregnancy and sexually transmitted disease, including HIV [9,22].

Large-scale, population-based surveys of adolescent health, such as the Youth Risk Behavior Survey (YRBS) [23] or the National Longitudinal Study of Adolescent Health [24] are among the strongest methods of tracking health and risk behaviors among the majority of adolescents. Such surveys provide a snapshot of the health outcomes adolescents have experienced, the health and risk behaviors they are engaged in, and the familial, school, and environmental contexts they negotiate. A growing number of large-scale adolescent health surveys have included survey items assessing orientation [2,7,9,11,24–26].

However, measures of sexual orientation have varied widely across such surveys. This variation can be traced in part to disagreement over the conceptual definition of sexual orientation itself [27–29], to pragmatic needs for limiting the number of items in youth surveys, and to the process by which school-based surveys are developed. Although most researchers in the field agree sexual orientation is a multi-dimensional aspect of a person's identity that includes emotional, cognitive, and behavioral dimensions, the agreement is not universal [29]. Some researchers assert self-labeling or erotic desire/attraction are components of sexual orientation, but sexual behavior is not [27]. Thus, if someone acknowledges being attracted to both genders, or identifies as bisexual, this is orientation, but sexual behavior can be influenced by unrelated issues, such as availability of partners. In contrast, other researchers assert self-labels are so strongly influenced by culture, social trends, and stigma that the labels tend to shift over time, and may not be publicly claimed, even when attractions or behavior remain stable [27]. This phenomenon has led to use of the terms, "men

who have sex with men (MSM)" and "women who have sex with women (WSW)" in STD and HIV research, to identify risk behavior rather than sexual orientation groups per se. Studies report no complete concordance between sexual attraction, self-labeling, and sexual behavior, especially among youth [7,25]. At the same time, the societal stigma toward same-gender sexual behavior makes it unlikely that persistent, consensual same- or both-gender sexual behavior is unrelated to sexual attractions or internal self-identity. Influenced by such varying perspectives, researchers also differ in the importance they assign to each dimension of orientation: for example, is same-gender sexual behavior more indicative of orientation than acknowledging same-gender sexual attractions? If one identifies as heterosexual, has no sexual experience, and acknowledges attractions to both genders, which is the salient dimension? These dilemmas have challenged the study of sexual minority populations for decades [27].

Practical issues in survey administration also influence measures used in youth health surveys, as does the process by which controversial health questions are offered, rejected, modified, and included. Developmental psychologists have created multi-item scales to measure sexual orientation in research [27,28], but general adolescent health surveys can include only one or two items, most often measuring just one dimension. Even within a single dimension, the wording, response options, and location within the survey are not consistent across surveys. Researchers often adapt items from existing surveys, even if they have not had adequate pilot-testing or validity analyses in the original study, and few school-based surveys have the additional funding needed to extensively test the revised items. Likewise, stakeholders in the surveillance of adolescent health, who may influence the final wording, may have little or no training in measurement. Research into the use of these sensitive questions in large-scale surveys has been limited. Currently, there are no recommended standard items for assessing sexual orientation [2,27,29].

As part of a larger study of sexual orientation, health risks and protective factors among respondents in school-based health surveys, we conducted an evaluation of the sexual orientation measures used in eight different surveys of adolescent health from the past 15 years in the United States and Canada. Each of the surveys included at least one question that assessed some dimension of sexual orientation. In exploring these measures, we focused on five main issues:

1. What is the variation in response rates for different dimensions of sexual orientation assessed in these survey items? i.e., in surveys that had more than one question, which sexual orientation questions were adolescents more likely to answer?
2. What other measurement issues, such as item location in the survey, item structure, circumstances under which the survey was given, or specific demographic characteristics of respondents, may help explain the response rates for these items?
3. When an item includes an "unsure" option, what can be learned about who selects this option, and can we determine what unsure means?
4. When a survey includes more than one measure assessing orientation, how congruent are the responses to these measures?
5. What appear to be the strengths and limitations of the various measures of sexual orientation for monitoring adolescent health risks and health behaviors?

We present below select findings to illustrate important considerations in evaluating and improving measures of sexual orientation in adolescent health research. Because such a large, repetitive number of analyses are difficult to summarize concisely, we present examples from one or two surveys to illustrate each issue. Based on our analyses and studies by other researchers, we offer specific recommendations for future adolescent health surveys, including item wording and number of measures.

Methods

The Surveys

The eight surveys included in this analysis are school-based surveys of adolescent health and risk behaviors, from the United States and Canada. They were conducted from 1986 through 1999; we included older surveys because they had more than one measure of orientation, or represented the largest survey of a particular ethnic group to date, i.e., the National American Indian Adolescent Health Survey. Some surveyed different cohorts of youth in the same geographic region. For regularly administered surveys from a particular region (e.g., the Minnesota Student Survey) we included only surveys with no overlap in cohorts. See [Table 1](#) for brief descriptions of the surveys' designs, sample sizes, methods of administration, geographic regions, demographic descriptions, and specific comments.

Each of the surveys included at least one item assessing sexual orientation, and five of the eight included multiple items. Only three of the oldest surveys, however, assess more than one dimension of orientation. The specific wording of items from the surveys is included in [Table 2](#).

Analyses to answer the evaluation questions included frequencies and patterns of nonresponse, including comparison to overall proportions of nonresponse and those of the nearest similar items in the survey. Where possible, we used cross-tabulations with Pearson's Chi-square to compare among groups of categorical items, and one-way ANOVAs or Kruskal Wallis ANOVAs to compare proportions of unsure and missing responses, to test for response set bias and other explanations of nonresponse [30,31]. This evaluation was intended to explore the responses within each survey, not to directly compare results across surveys. Methodological differences in sampling, regional and ethnic variation, and measurement differences render a meta-analysis impossible. To the extent the findings are similar across studies, they may suggest a robust phenomenon, but differences between studies cannot be interpreted with certainty. Likewise, some of the issues cannot be directly tested in individual surveys because alternate forms of the surveys were not administered for a true test of these issues. In those cases, we will note various explanations the evidence suggests.

Evaluation

[Table 3](#) shows the nonresponse and "not sure" response rates for the sexual orientation measures within each of the surveys. These formed the basis of many analyses used to evaluate the measures. Because rates vary significantly by gender in all the surveys, results are reported separately for boys and girls. The evaluations of response rates by other demographic characteristics were not amenable to presentation in a single table, given extreme variation in items in the various surveys, so we provide specific examples in the text instead. [Table 4](#) reports the tests for response set bias, which compare respondents on the proportion of unsure and missing responses to other survey questions.

Variation in Response Rates for Different Dimensions of Orientation

Different dimensions of orientation may be difficult for teens to acknowledge, given the stigma of non-

Table 1. Select Demographics of the Data Sets

	Minnesota Adolescent Health Survey (MNAHS) 1986	National American Indian Adolescent Health Survey (NAIAHS) 1990	Minnesota Student Survey (MSS92) 1992	Minnesota Student Survey (MSS98) 1998	British Columbia Adolescent Health Survey (BC92) 1992*	British Columbia Adolescent Health Survey (BC98) 1998*	Seattle Teen Health Risk Survey (SEA95) 1995*	Seattle Teen Health Risk Survey (SEA99) 1999*
Sample Method	Modified stratified cluster sample	National sample from reservation schools	Census 99% of school districts	Census 92% of school districts	Modified stratified cluster sample	Modified stratified cluster sample	Entire Seattle school district	Entire Seattle school district
Total N	34,710	12,978	77,374	81,247	15,549	25,838	8,406	8,665
% Female	50.1%	51.1%	49.9%	50.4%	50.8%	52.3%	50%	50%
Age/grade range	12–20	≤13 to ≥17	9th & 12th grade	9th & 12th grade	7th–12th grade	7th–12th grade	9th–12th grade	9th–12th grade
Race/ethnicity								
Black	7.7%	0%	1.4%	2.1%	Unknown	Unknown	18%	18%
Asian/Pacific Islander	3.1%	0%	2.3%	3.6%	21.8%	15.4%	26%	26%
Hispanic American	1.0%	0%	1.1%	1.5%	1.3%	1.1%	4%	4%
Indian/Alaskan Native	1.6%	100%	1.3%	0.8%	4%	6%	1%	1%
White	84.0%	0%	85.9%	86.4%	Unknown	Unknown	34%	34%
Multi-ethnic gr. or Unknown	2.5%	0%	7.9%	2.4%	≈16%	≈21%	17%	17%
How surveys were administered	Research staff in classrooms	Research staff in classrooms	Other teachers in classrooms	Other teachers in classrooms	Public health nurses in classrooms	Public health nurses in classrooms	Research staff in close class rooms	Research staff in classrooms

* Students could identify more than one ethnic group, and for BC, none of the options referred to race (i.e., black, or white) and an additional open-ended Other category included significant number of indeterminate responses such as “Canadian” or “no ethnicity.”

heterosexual orientations. Same-gender sexual behavior, for example, might be considered more revealing than admitting a same-gender attraction, and self-labeling might be more stigmatizing still. Conversely, the abstract idea of attractions or desires may be more difficult developmentally for youth to identify, compared with reporting actual behavior. To help determine which questions adolescents were most likely to answer, we examined the variation in response rates for different orientation items.

The National American Indian Adolescent Health Survey (NAIAHS) had the highest nonresponse rates and “not sure” responses for each sexual orientation item, whereas British Columbia 1992 (BC92) had the lowest nonresponse. For most items, boys were slightly less likely to answer than girls, except for items assessing gender of sexual partners, where girls were less likely to respond to questions about sexual experience with girls, and boys were less likely to respond to questions about sexual experience with boys.

Within surveys with more than one dimension of orientation (the Minnesota Adolescent Health Survey [MNAHS], NAIAHS, BC92), items about genders of sexual partners had the lowest nonresponse, although students still tended to skip same-gender sexual behavior questions more than opposite-gender behavior. Fewer than half of students had ever been sexually active, however, so as a measure of orientation, this drew a much smaller sample than other items. For surveys without a sexual behavior item, the combined self-labeling/attraction items had the lowest nonresponse rate. The combined attraction/intentions item had higher nonresponse than self-labeling/attraction, and, for MNAHS and NAIAHS, gender of sexual fantasy partners was skipped most often. However, in BC92, the fantasy item’s rate of missing responses was nearly identical to self-labeling/attraction, and quite low (fewer than 1% had missing responses). More than 1 in 5 girls and 1 in 10 boys in

Table 2. Wording of Sexual Orientation Items in the Surveys

Topic	Data Set	Question Number	Question
Self-identity/attraction	NAlAHS	81	Which of the following best describes your feelings: 100% heterosexual (attracted to persons of the opposite sex) Mostly heterosexual Bisexual (equally attracted to men and women) Mostly homosexual 100% homosexual ("gay/lesbian"; attracted to persons of the same sex) Not sure
	MNAHS	72	Many people say that they have different feelings about themselves when it comes to questions of being attracted to other people. Which of the following best describes your feelings? Same as NAlAHS 1991
	BC92	81	People have different feelings about themselves when it comes to questions of being attracted to other people. Which of the following best describes your feelings? Same as NAlAHS 1991
	BC98	93	Same as BC AHS 1992
	SEA95	58	How would you describe your sexual orientation/preference? Heterosexual—attracted to the opposite sex; Bisexual—attracted to both sexes; Homosexual (gay or lesbian)—attracted to same sex; Not sure
	SEA99	46	How would you describe your sexual orientation? Same as SEA95
	Attractions/intentions to be sexual	NAlAHS	89
MNAHS		78	Same as NAlAHS
NAlAHS		88	When you think or daydream about sex, do you think about: Males Females Both
Sexual fantasy	MNAHS	77	When you daydream or fantasize about sex, do you think about: Same as NAlAHS
	BC92	82	When you daydream or fantasize about sex, do you think about: Males Females Both I do not yet fantasize about sex
	NAlAHS	71	Have you ever had any kind of sexual experience with a male? Yes No
Sexual behavior	MNAHS	68	Same as NAlAHS
	NAlAHS	72	Have you ever had any kind of sexual experience with a female? Yes No
	MNAHS	69	Same as NAlAHS

Table 2. Continued

Topic	Data Set	Question Number	Question
	MSS92	115	During the past 12 months, with how many different male partners have you had sexual intercourse? None 1 person 2 persons 3 persons 4 persons 5 persons 6 or more persons
	MSS98	114	Same as MSS92
	MSS92	116	During the past 12 months, with how many different female partners have you had sexual intercourse? None 1 person 2 persons 3 persons 4 persons 5 persons 6 or more persons
	MSS98	115	Same as MSS 1992

BC92 chose the option, "I do not yet fantasize about sex," which was not available on other surveys.

The proportions of missing responses for self-label/attraction are similar across the different years' surveys from the same locations, and indeed, excluding the two extremes of NAIHHS and BC92, they are similar even for surveys from different locations with different wording, ranging from 3.0% to 4.7% for girls, and 3.7% to 6.3% for boys. Sexual behavior items were quite different in wording, i.e., ever having any sexual experience as opposed to sexual intercourse in the past 12 months. Because of the wording, these items' nonresponse rates cannot even be casually compared across surveys.

The MNAHS, NAIHHS, and both BC92 and BC98 had identically worded items, but markedly different proportions of nonresponse. This suggests reasons other than wording may have influenced response rates, and these are discussed below.

Contexts of Survey Administration or Measurement Issues

Circumstances under which the survey was given. A variety of circumstances may influence response rate for school-based surveys [30,31]. Time allotted for the survey can be enough for most students, but not all, so nonresponse rates in the last pages might be higher. Students must trust the anonymity of survey responses to answer sensitive questions honest-

ly—or at all. Who administers the survey, for example, how close together students must sit during the survey, and how much privacy is available for clarifying sensitive questions by survey administrators can increase or decrease a student's trust in the confidentiality of his or her responses.

Although ascertaining the circumstances of surveys so many years after the fact is difficult, some reported issues may help explain variation in nonresponse rates between the surveys. In the Seattle Teen Health Risk Survey 1995 (SEA95), many of the classrooms were crowded, with student desks placed close together (Pamela Hillard, personal communication). Research staff or teachers from other classrooms administered most surveys, but in British Columbia surveys were administered in school by local public health nurses. It is culturally customary in Canada, as in the United States, to expect health care providers will ask sensitive questions about health and behaviors, with a general belief in the confidentiality of the clinical setting [32,33]. This expectation may carry over to the research setting; although there is no way to be sure, the very low nonresponse rates in the BC surveys compared with the others might be due in part to using public health nurses to administer the surveys.

Item structure issues. How a question is structured can have a profound influence on its readability, its clarity, and on respondents' perception that its answer choices represent their experience, all of which

Table 3. Item Non-response and Unsure Response Rates by Gender

Data Set	Topic	No Response (%)		Not Sure (%)	
		Females	Males	Females	Males
NAIAHS	Self-identity/attraction	16.2	18.2	30.3	27.0
	Attraction/intention to be sexual	25.5	23.2		
	Sexual fantasy	26.7	17.4		
	Sexual behavior with males	2.7	9.6		
	Sexual behavior with females	13.2	4.8		
	Sexual behavior with males (sexually experienced only)	0.4	4.8		
MNAHS	Sexual behavior with females (sexually experienced only)	8.3	0.4		
	Self-identity/attraction	4.7	6.3	10.0	9.9
	Attraction/intentions to be sexual	6.0	6.8		
	Sexual fantasy	8.3	7.5		
	Sexual behavior with males	1.7	4.0		
	Sexual behavior with females	4.6	2.5		
MSS92	Sexual behavior with males (sexually experienced only)	0.2	1.7		
	Sexual behavior with females (sexually experienced only)	2.9	0.2		
MS98	Sexual behavior with males	9.3	20.8		
	Sexual behavior with females	18.0	13.1		
BC92	Sexual behavior with males	7.5	14.0		
	Sexual behavior with females	9.1	11.8		
BC98	Self-identity/attraction	0.6	0.7	6.0	4.8
	Sexual fantasy	0.8	0.8	21.7*	10.7*
SEA95	Self-identity/attraction	3.0	3.7	6.4	6.2
SEA99	Self-identity/attraction	4.5	5.8	5.9	5.9
SEA99	Self-identity/attraction	3.1	4.1	5.6	6.5

* Response is "I do not yet fantasize about sex."

influence response rates [31]. Items with longer options tend to be more confusing, especially if each response option is a long sentence. Questions containing two distinct ideas or statements can create confusion, especially if the respondent only agrees with one part of the statement. Complex items with a dozen options, or items that require respondents to look in one place for answer codes but mark their response far away from the code cues; items with a

skip pattern, or items with combined categories, can make it hard for a respondent to choose a response [30]. If an item requires extra effort to understand and to select a response, it is far more likely to be skipped.

Within these surveys, the items with the shortest stems, the fewest response options, and the fewest words in answers asked about the gender of sexual partners (NAIAHS and MNAHS). These items had the lowest nonresponse rate. The gender of sexual

Table 4. Tests for Response Set Bias in the Surveys

Survey and Type of Response Set Tested	Mean Proportion of Answers by Category of Orientation Response			ANOVA: F, df, p value
	Unsure	Indicated Orientation	Missing	
SEA95				
Not sure answers	0.106	0.048	0.046	F = 99.39; df = 2, 8403; p < .001
Missing answers	0.039	0.023	0.442	F = 3318.25; df = 2, 8403; p < .001
SEA99				
Not sure answers	0.159	0.065	0.083	F = 228.945; df = 2, 8662; p < .001
Missing answers	0.067	0.054	0.320	F = 785.49; df = 2, 8662; p < .001
BC92				
Not sure answers	0.149	0.096	0.111	F = 72.07; df = 2, 15546; p < .001
Missing answers	0.023	0.006	0.102	F = 143.36; df = 2, 15546; p < .001
MNAHS				
Not sure answers	0.166	0.085	0.108	F = 256.72; df = 2, 17234; p < .001
Missing answers	0.014	0.004	0.043	F = 241.06; df = 2, 17234; p < .001

partner questions in the Minnesota Student Surveys (MSS92 and MSS98) were short stems, but offered six response options, although again, responses had few words. Although shorter items typically have better response rates, the options still must be extensive enough that students can respond accurately. The sexual fantasy items also had short options, but in NIAAHS and MNAHS they had higher nonresponse rates than any other item; only BC92 offered the option, "I do not yet fantasize about sex," and 21.7% of girls and 10.7% of boys selected this response.

All the self-labeling or self-identity items included a parenthetical clarifier defining the answer as attraction to the same, opposite, or both genders. This combines two separate dimensions, which may be difficult to answer, depending on how much stigma is attached to the labels in the surveyed community. It is possible, for example, that someone might report same-gender attractions, but resist identifying as gay or lesbian because labels like "gay" are pervasive insults and slurs in that school setting [34], "gay" and "lesbian" may be considered rigid identities that do not seem to include bisexuals, or because the labels have been replaced by other terms such as "queer" or "two-spirit." Combining dimensions can increase confusion and nonresponse rates. In NIAAHS and MNAHS, another combined item asked about attraction and intentions to be sexual in the future. Although these items did not use stigmatizing labels in the wording, students may have had difficulty choosing a best response because the item combined two potentially discordant issues (current feelings and future behaviors). This item's answers were the longest, each one a full sentence. As one might expect, the item had the highest nonresponse rates.

Issues of item location. Where an item is placed can influence whether respondents choose to answer, especially when surveys are administered in groups where students might see each other's responses. Sensitive questions are more likely to be skipped if they occur on the first few pages of a survey, when most students are on the same page. In the 1997 Massachusetts YRBS, when a question about sexual orientation was moved to the first-page demographics section, the missing rate increased markedly compared with the 1995 Massachusetts YRBS [29]. On longer surveys, students may run out of time to answer the last questions, or may become impatient with answering so many questions and skip more items. Commonly, the nonresponse rate for items will increase slightly with every added page of a survey, the outcome of subject burden [31]. Similarly, items after a complex question or a skip pattern,

where students might lose track of the flow of items, will also see a higher nonresponse rate, known as comprehension artifacts [30]. Items right after sensitive questions such as sexual or criminal behavior or abuse all tend to have higher nonresponse rates than similar items in other parts of a survey [30].

The surveys in this evaluation were no exception. Nonresponse rates for demographic items on the first page tended to be 1% or lower, with a slight increase in the average nonresponse rate for questions on each page. In most of the surveys, the orientation items were placed just before, among, or just after sexual behavior items, usually in the final few pages. In the MNAHS and NIAAHS, two orientation questions followed the question about sexual abuse. In the MSS92 and MSS98, the questions about gender of sexual partners were on the last page of the survey.

To explore how item location might have influenced response rates, we compared the response with orientation items with the five items before and after the sexual behavior section, as well as to any sexual behavior questions all students were supposed to answer. Skip patterns occurred in BC98 and MSS98; students who reported they had not had sexual intercourse were directed to skip the other sexual behavior questions, and go on to questions about knowledge related to STDs and HIV/AIDs, or to the orientation questions. In general, sexual behavior questions had higher missing rates than questions before or after, but orientation items were similar in nonresponse to the sexual behavior items. For example, in SEA95, questions just before the sexual behavior section ask about alcohol use, and missing rates range from 1.9% to 3.5%. The sexual behavior questions have missing rates from 4.1% to 6.6%, with the orientation question at 5.1%. The questions after sexual behavior are about marijuana use, and whereas missing rates are higher than for alcohol use items, they are somewhat lower than for sexual behaviors, ranging from 3.9% to 5.9%. For both MNAHS and NIAAHS, the orientation questions just after the sexual abuse question had higher missing responses than the orientation item that came before; for the MNAHS, 7.9% skipped the fantasy item, 6.4% skipped attraction/intent, both just after sexual abuse, vs. 5.5% for self-labeling, and 3.5% and 2.8% for sexual experience, which came before the sexual abuse question.

Demographic Characteristics of Respondents that May Help Explain Response Rates

Different demographic characteristics may also influence whether or not students skip answers to ques-

tions, especially sensitive questions. In general, girls tend to skip fewer questions than boys. Older students are less likely to skip questions about sexual behavior than younger students, whose lack of sexual experience may make them unsure about some questions' meanings. Similarly, students with developmental delay or learning disabilities, including those who have been held back a grade, or who are in special education classes, may have more difficulty understanding and answering. Students from ethnic minorities, especially recently immigrated students, or those for whom English is a second language, may also skip questions they do not understand owing to culture or language.

In these surveys, boys did have a higher nonresponse rate than girls for most questions, although the sexual fantasy question and items assessing same-gender sexual behavior were exceptions (see Table 3). Students who reported a learning disability in those surveys that asked such a question were also more likely to skip the sexual orientation question (BC92: 2.2% with learning disability vs. 0.6% without; MNAHS: 12.1% with disability, 3.7% without; NAIHHS: 29.8% with disability, 13.5% without, all $p < .001$). Similarly, students who skipped the sexual orientation item or were unsure were more likely to have been held back a grade (BC92: 24.8% of missing had been held back, 22.6% of unsure, vs. only 14.4% of those who indicated an orientation). In BC98, students who chose unsure or did not answer were also more likely to report they spoke a language other than English at home more than half the time (13.5% of missing, 25.5% of unsure, and 10.1% of those who indicated an orientation). Ethnicity can be an indirect measure of language and cultural barriers where a question about language is not included; in the two Seattle surveys, for example, African-American and Southeast Asian students were more likely to skip the orientation question, but only Southeast Asian students were also more likely to indicate unsure than students in other ethnic groups.

Analysis of the "Unsure" or "Don't Know" Response

Because sexual identity, including orientation, is a developmental task of adolescence, at any point in time some teens will not recognize their orientation, or will be unsure about the best response. The student may not have sexual feelings or attractions yet, or may have had no sexual experience, or sexual experiences may have been unwanted or forced. When an item includes "unsure" or "don't know,"

what can be learned about who selects this option, and can we determine what unsure means?

Most of the questionnaires included an orientation item with a response of "not sure" or "don't know." Two reasons to choose such a response are being unsure of one's orientation, or being unsure of the question's meaning. One survey, BC92, offered a window into the possibility that choosing not sure was owing to being unsure of one's orientation. The sexual fantasy item included the response, "I do not yet fantasize about sex." Cross-tabulations of sexual identity with the sexual fantasy question showed more than half of those who chose not sure (53.7%) did not yet fantasize about sex, compared with only 7.7% to 21.3% of those who indicated an orientation ($\chi^2 = 3506.96$, $df = 24$, $p < .001$). Girls were more likely than boys to say they did not fantasize about sex yet, as were younger students compared with older students; and these groups were also more likely to indicate they were unsure.

Another potential reason for choosing a not sure option is response set bias [30], i.e., students tend to choose the same option when it is offered in a variety of questions (or, similarly, students who are missing on some responses tend to be more likely to skip items in the survey overall). To test for response set bias, we compared the average proportion of unsure and missing responses from other items with a "not sure" or "don't know" option among three groups: those who indicated any orientation (indicated orientation), those who indicated "not sure" (unsure) and those who did not answer the question (missing). We included only those items that all students could answer (skip patterns or male-only/female-only items were excluded), and because surveys had varying numbers of eligible questions, we used mean proportions of questions answered rather than mean number of questions answered. These proportions were tested using ANOVAs for proportion of unsure and proportions of missing in the 4 surveys where such analyses were possible (both NAIHHS and BC98 had two or fewer eligible questions). Table 4 summarizes the results of these tests.

As can be seen in Table 4, response set bias does account for some of the missing and not sure responses to the orientation items in the surveys. Students who were not sure of their orientation were significantly more likely to pick "not sure" to other questions in the survey than either students who indicated an orientation or those who skipped the orientation item. Students who did not answer the orientation question were significantly more likely to skip other questions compared with the other

groups. Post hoc analyses using Least Significant Differences tested significant differences in mean proportions among the three groups. In all post hoc tests for the not sure response set, the unsure groups' mean proportion of unsure responses was higher than the other two groups. Similarly, in post hoc tests for the missing response set, the missing groups' mean proportion was significantly different from the other two.

Congruency of Response within Surveys with More than One Measure of Orientation

When a survey includes more than one measure assessing orientation, how congruent are the responses to these measures? Only three surveys measured more than one dimension of orientation: the MNAHS and NAIHS both included self-labeling/attraction, genders of sexual behavior partners, genders of sexual fantasy partners, and the mixed attractions/intentions to be sexual item, and BC92 included self-labeling/attraction and genders of sexual fantasy partners. When cross-tabulating any one of these measures with another in the same survey, results were relatively similar across the surveys. The measures are not congruent; at least a few students in every orientation category picked responses in the other categories for a different measure, and most responses were skewed to heterosexual options. For example, nearly 1% of the "100% heterosexual" students reported solely same-gender sexual fantasies in each survey, and nearly half of students who said they were bisexual, mostly homosexual, or 100% homosexual reported exclusively opposite-gender sexual fantasies. At least a third of students had not been sexual at all, but among bisexual students, one-third reported only opposite-gender sexual behavior.

That said, prevalence of responses were in the expected direction (results not shown). Consecutively lower proportions of mostly heterosexual, bisexual, mostly homosexual and gay/lesbian students indicated exclusively opposite-gender fantasies, attraction, or behavior than the heterosexual students, and higher proportions of bisexual, mostly homosexual, and gay/lesbian students indicated same-gender or both-gender attractions, fantasies, or behaviors than did the mostly heterosexual or exclusively heterosexual students. Bisexual students reported the highest prevalence of both-gender attractions and fantasies among the orientation groups, although still less than half of these students indicated both-

gender attractions and fantasies in any of the surveys.

This lack of congruence among the different measures is important because it means that surveys that measure different dimensions of orientation may be tapping distinctly different groups, with only some overlap. Any single measure will end up excluding some adolescents that another measure would have included, and although overall relationships and trends in health behaviors by orientation might be similar, prevalence data probably cannot be directly compared between such groups.

Strengths and Limitations of Measures for Monitoring Health Risks and Health Behaviors

What appear to be the strengths and limitations of the various measures for monitoring adolescent health risks and health behaviors? Although it would seem, based on nonresponse rates alone, that actual sexual behavior is the best measure of orientation for capturing the widest range of sexual minority youth, this is misleading. The majority of adolescents in every survey had not been sexually active, and of those who identified as other than heterosexual, a majority still reported exclusively heterosexual behavior. Whether this is owing to lack of opportunity (a commonly chosen reason for abstinence among students in the 1996 Voice of Connecticut Youth Survey [4]) or owing to other reasons, limiting a survey to sexually active students may undercount the number who would identify as gay, lesbian, or bisexual, and who may feel social stigma or distress owing to their orientation. Questions focused exclusively on recent sexual activity, such as those asked in the MSS surveys, create an even greater risk of undercounting. Students who were sexually active with same- or both-gender partners more than a year ago, but have not had a partner in the past year, will not be counted. Further, because the questions about sexual behavior on most surveys are focused on heterosexual "sexual intercourse," and tacitly imply pregnancy prevention as the primary reason for condom use, adolescents who do not identify same-gender sexual behaviors as intercourse, and have no risk of pregnancy, may not answer the questions as expected. Risks for STD transmission via same-gender sexual behaviors may be obscured by item wording. This was an issue identified by gay, lesbian and bisexual students in a recent cognitive processing study exploring their answer choices to sexual and orientation questions commonly used on school-based surveys [36]. Further, asking about the gender of sexual

partners does not identify whether those sexual experiences were consensual or not. Because between 10% and 30% of adolescents have experienced forced sexual contact, unwanted sexual contact may help explain potential discordance between attraction and actual behaviors.

At the same time, surveys that ask only about orientation self-identity may under- or overestimate risks for HIV and other STDs among adolescents, and thus may not be as useful a measure for exploring sexual behavior risks. Because of cultural variation in orientation labels, adolescents may not identify by the labels chosen for a particular survey, which again, may misattribute adolescents, or cause skipped responses, and those adolescents at greatest risk may be missed. Research on the timing of sexual orientation developmental milestones by Rosario and colleagues [37] suggests self-labeling often comes after attractions and behavior are already well established, and sexual minority adolescents who feel comfortable in disclosing their orientation may have already worked through any psychological distress engendered by negative attitudes from community and family. As a result, out gay, lesbian and bisexual adolescents may be better adjusted than peers who are just beginning to identify their attractions. Studies by D'Augelli et al [17] suggest that suicidal ideation and attempts are more likely to occur among those who are still struggling with self-identity but who recognize their same-gender or both-gender attractions, so studies of suicide attempts may find self-identity a less useful dimension than attraction. In contrast, studies that use self-identity as a single measure may be better for identifying those likely to be targets of violence in school and community settings. Self-identity questions more clearly represent the teen's perspective on their identity, and although that may change over time, it may be more accurate than reported unwanted behaviors, or attractions never acted upon. An external, more indirect measure of orientation that still identifies students at risk for targeted violence is a measure asking if students have been harassed because others thought they were gay, lesbian, or bisexual. Whereas the Seattle surveys found 4 out of 5 students reporting such harassment also identified as heterosexual rather than gay or bisexual [38], the same analysis found harassed students of any orientation were more likely to report risk behaviors such as suicide attempts and substance use. Thus, if the goal is to identify the level of anti-gay violence in school, such a question might be a useful measure.

Thus, whereas each of the dimensions of orientation can be useful in differentiating added risks for health problems among adolescents, and certain measures are better for some types of health monitoring than others, no one dimension appears to accurately address all the health issues of concern among youth. Individual measures can underestimate or overestimate health risks within this population.

Discussion

One of the developmental tasks of adolescence is establishing a sexual identity, including orientation, a process that appears to begin in late childhood and continues through the teen years. Because this is a developmental process, at any one point during adolescence the number of teens who actually identify as gay, lesbian, or bisexual tends to be small, between 1% and 8% [23,35]. Six of the eight surveys we examined included a measure that used orientation labels, and although those labels differed, and some items conflated identity and attraction, the proportions of youth in each survey who identified as unsure or who skipped the questions were fairly consistent across surveys. The only markedly different survey was the NIAHHS, with a much larger proportion of adolescents responding "not sure," or not responding at all, which suggests more research is needed to create culturally appropriate wording for surveys among American Indian adolescents.

Surveys with a measure of sexual orientation have documented the health disparities among sexual minority youth owing to stigma and victimization. Although we have increasing evidence of elevated risk, we know little about factors that may mediate those risks for gay, lesbian and bisexual teens. Some preliminary studies have suggested protective factors salient for adolescents in the general population may not be equally salient for sexual minority youth [15]. Thus, interventions focused on enhancing protective factors among heterosexual teens may not work for gay, lesbian and bisexual teens. To the extent that we understand the challenges they face, factors mediating their risks, and interventions that are most effective, we can help prevent poor health outcomes and lifelong social costs. To do this, however, we need to quantify the prevalence of the population, track changes in trends over time, and identify relationships between risk and protective factors. These can be accomplished best through population-based surveys with items specific for gay, lesbian, bisexual and questioning youth.

But which measure or measures are best? At least three dimensions of sexual orientation are commonly measured among adolescent health surveys (attraction, behavior, and self-labeling), although few surveys include more than one of these dimensions. Each of these measures has benefits and drawbacks for surveillance of health behaviors and risks among this population, but no single measure is adequate for all health risks [29]. Sexual orientation unfolds during adolescence, and the transition does not move consistently across all dimensions at once. Adolescents may experiment with behaviors or identities; their behaviors may conform to societal expectations rather than personal inclination. They may disconnect behavior and self-labeling owing to cultural stigma attached to certain labels, or, for a host of other reasons, may be attracted, behave, and identify in discordant ways.

Because of this, any single measure in a cross-sectional study will miss some adolescents at risk, or misrepresent them, depending on the health concern. Not all adolescents who identify as gay, lesbian, bisexual, or heterosexual are sexually active. The social stigma assigned to a nonheterosexual identity can create mental distress; if the only measure of orientation is gender of sexual partners, then self-identified gay, lesbian or bisexual youth who are distressed, depressed, or suicidal but have not had same-gender sexual behavior will not be included. For the same reason, if the only measure is self-labeling or attraction, this may mask population differences in behavioral risks for HIV, other sexually transmitted infections, or pregnancy, because not all GLB youth have engaged in same-gender or opposite-gender sex, and some of those who identify as heterosexual will have same-gender sexual experience. Without a measure of actual sexual behavior (preferably assessing number and gender of sexual partners), exploring risk and protective factors related to health concerns like pregnancy and sexually transmitted disease will be difficult. The distinction between self-labeling and attraction is owing to the developmental path of orientation and the cultural load of stigma in certain words. In general, adolescents will not self-label until after attraction, and often after sexual behavior, so if a self-label is the only item, fewer of those at risk for mental health or sexual health issues associated with orientation will be identified. Likewise, adolescents appear to be less willing to disclose a stigmatized identity, even in presumably anonymous and confidential surveys, than they are to disclose attractions and behaviors.

Obviously, the best option is to include all three dimensions in adolescent health surveys, as each one provides different, equally useful information. However, if students are already burdened by the number of items, three dimensions may be hard to justify. To effectively measure the highest priority health concerns, the best choice would include behavior plus either self-labeling or attraction. Of the last two, attraction (depending on wording) is probably the most stable measure over time, because "labels" for nonheterosexual identities have changed several times over the past century, and vary cross-culturally [27]. These studies indicate that orientation items, although sensitive questions, are no more sensitive or more likely to be skipped than other sexual risk behavior questions. This finding can reassure researchers and school administrators who are concerned that such items might be too sensitive for most students to answer, and who worry that non-response rates will render the results inaccurate and of limited use.

There are both limitations and strengths to our evaluation. None of the surveys allowed for testing various wording of measures, or different locations of items. All the surveys were given only in English, although students for whom English was a second language did participate in all of them. Only the oldest surveys had multiple measures to compare across dimensions, and one of those surveys was focused exclusively on one ethnic group. As with all school-based surveys, our evaluation's results are based on the responses (and nonresponses) of students who are present in school the day of the survey, and influenced by the contexts in which the surveys were administered in ways we cannot test, but only infer. At the same time, these eight surveys represent a significant portion of the school-based surveys in the United States and Canada with sexual orientation items; half the surveys have identically worded items, and several are from the same regions at different points in time, which allows for some comparisons with similar populations. The similarity of some findings in surveys with different sampling methods and different ethnic groups in different regions suggests these measures have similar issues across a spectrum of adolescent students. Given the wide range of ages in the surveys, from 12 or 13 to 20 years of age, or 7th through 12th grades, our evaluations may fit school-based surveys of students across adolescence.

Although the orientation measures used in these eight surveys have also been used in a growing array of surveys around the world, there has been almost

Table 5. Recommended Wording for Sexual Orientation Measures for Adolescent Health Surveys, in Order of Priority

Dimension of Orientation	Item and Response Options
Attraction	Who are you sexually attracted to? Males Females Both males and females I am not sexually attracted to anyone yet Alternately, if two items are possible: Are you sexually attracted to males? Yes/No Are you sexually attracted to females? Yes/No
Gender of sexual partners	How many different males have you had sexual experiences with in your life? None 1 person 2 people 3 or more How many different females have you had sexual experiences with in your life? None 1 person 2 people 3 or more
Self-labeling	How would you describe your sexual orientation? Heterosexual (sexually attracted to the opposite sex) Mostly heterosexual Bisexual (attracted to both men and women) Gay or lesbian (attracted to the same sex) Other: _____ I am not sure yet I don't understand this question
Fantasies	When you think or daydream about sex, do you dream about: Males Females Both I don't daydream about sex yet

no testing of adolescents' understanding of these measures or their response options. Pilot testing with qualitative research methods are still necessary before using these measures [36]. Students of different ages, ethnic groups, and cognitive abilities should be included in such testing, to make sure items are culturally appropriate and comprehensible to teens in the survey community. Similarly, large-scale surveys should conduct psychometric evaluations of the sexual orientation measures used, with analyses of those who choose unsure or who do not answer. Longitudinal studies, and studies of different data-gathering methods, such as computer-based surveys, internet surveys, and interviews, are needed to understand how methods of data gathering interact with development over time in influencing student responses to these items.

Finally, it would be most useful for researchers to use the same measures, provided the items are validated with their population first. This would facilitate national and international comparisons and meta-analyses. Based on our unique opportunity to compare and

contrast the performance of items from these eight surveys, we have several recommendations to help standardize orientation measures for surveys in the next decade. Table 5 lists the specific wording choices we recommend, listed in the order we consider a priority, if a limited number of items are allowed on a survey. However, the list is not comprehensive, and other measures could be used along with the ones listed. If only one item is allowed on a survey, we would recommend an attraction question, especially if the survey includes younger adolescents. Items should be located with other sexual behaviors in the survey, but measures of attraction and self-labeling should not be placed within a skip pattern that excludes students who have never had sexual intercourse. None of the orientation items should be placed adjacent to sexual abuse questions.

Given the current health disparities documented for sexual minority adolescents and adults, we must continue monitoring the health issues of gay, lesbian, bisexual and questioning youth as part of population-based surveys of health behaviors. Improving the ac-

curacy and effectiveness of the measures will only enhance our surveillance, improve our understanding of their health needs, and more effectively guide health promotion efforts for this vulnerable population.

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