Reducing Sensitive Survey Response Bias in Research on Adolescents: A Comparison of Web-Based and Paper-and-Pencil Administration

By: David L. Wyrick[*], Lloyd Bond[†]

Abstract:

Purpose. Using the Problem Oriented Screening Instrument for Teenagers (POSIT), the effect of mode of administration on (1) students' willingness to disclose sensitive information and (2) response rates was investigated.

Design. A 2×2 unequal N factorial analysis of variance (ANOVA) design was employed. Mode of administration (paper-and-pencil vs. Web-based) was crossed with grade level (middle vs. high school).

Setting. The study was conducted in two middle and two high schools.

Subjects. A total of 628 middle and high school students completed the survey.

Measures. The POSIT is a self-report measure with 139 yes/no items that identifies stressors in 10 functional areas (e.g., Substance Use).

Analysis. An unequal N 2 (mode) $\times$ 2 (grade level) factorial ANOVA was employed.

Results. No statistically significant differences were found for self-reported risk across modes of administration. Students completing the Web-based version of the survey were four times more likely to skip an item.

Conclusions. Effect of Mode on Reporting of Sensitive Information—Students completed the Web-based surveys in computer labs with other students. The intent of the Web-based survey was to increase perceived privacy but the environment likely negated any effect. Effect of Mode on Response Rates—The higher response rate for the paper-and-pencil survey was the opposite of what was expected and revealed that students were more likely to skip sensitive items on the Web survey.

Article:

PURPOSE

The focus of this study was an examination of the effect of mode of survey administration (paper-and-pencil vs. Web-based) on (1) students' willingness to disclose sensitive personal information and (2) response rates.

Self-report data from adolescents have become increasingly important. However, the accuracy of such data is often threatened when adolescents wish to conceal personal behaviors from any number of entities (e.g., the sponsors of the questionnaire, families, and friends).[1] A wealth of research has consistently revealed the unwillingness of survey participants to disclose sensitive information (e.g., underreporting of substance abuse).[2,3]

Regardless of the use of these data, it is imperative that steps be taken to encourage accuracy. Two factors have consistently been found to have large effects on adolescent respondent behavior: (1) the nature of the question asked and (2) the method of administering the question.[4] If the nature of the question being asked is sensitive, then methods capable of increasing perceived privacy of the respondent are vital.

One possible method for mitigating survey response bias among adolescents was evaluated. The Problem Oriented Screening Instrument for Teenagers (POSIT) was used to examine the effect of mode of administration (paper-and-pencil vs. Web-based) on students' willingness to disclose sensitive personal information and overall response rates.

Paper-and-Pencil Surveys

Paper-and-pencil is currently the most common administration mode for self-administered surveys, but paper-and-pencil surveys have several limitations (e.g., limited use of branching patterns, expense, and the risk of keying errors).[5,6]

Web-Based Surveys

There are several advantages of Web-based survey administration. First, questionnaires can be used to collect data from individuals all over the world. Second, programming languages allow for questionnaires that are sophisticated and engaging. Third, the Internet offers direct transfer of information, greatly expediting the collection, analysis, and reporting of data.

The POSIT

The POSIT is a self-report measure with 139 yes/no items that identifies stressors in 10 functional areas (e.g., Substance Use/Abuse, Mental Health, Family Relations, and Physical Health).[7] Several studies have reported on the reliability/validity of the POSIT. The most recent

was conducted in 2001 by Knight et al.[8] For a sample of 15- to 18-year-olds, the 1-week test-retest reliabilities of the POSIT scales ranged from .72 to .88.[8]

METHODS

Design

This investigation employed a 2 3 2 unequal N factorial analysis of variance (ANOVA) design. Mode of administration (paper-and-pencil vs. Webbased) was crossed with grade level (middle vs. high school). Students were stratified by school level and randomly assigned to one of the two experimental conditions. Students' scores on the POSIT served as the dependent variable. Mode of administration and grade level served as the independent variables.

Level of sensitivity for each item was determined by a panel of reviewers. The panel categorized each item dichotomously as ''nonsensitive'' (''Are most of your friends older than you are?'') or ''sensitive'' (''Do you get into trouble because you use drugs or alcohol at school?'' ''Do people pick on you because of the way you look?'' and ''Have you ever spent the night away from home when your parents didn't know where you were?''). The interrater agreement exceeded 90%. Ninety-nine items were designated as nonsensitive and 37 items designated as sensitive.

Sample

Guidance counselors each recruited one teacher who taught a minimum of four periods of a required course (e.g., Physical Education and Health). From the class rosters, 100 students were randomly assigned to each counselor. Students were required to obtain parental consent to participate in the study. A final sample of 628 students was successfully recruited (78.5% of the available sample).

Table 1
Analysis of Variance Results

Source	Sum of Squares	df	Mean Square	F	Significance	Effect Size
Mode	2.982	1	2.982	1.044	0.307	0.11
Error	17.398	609	2.857			
Total	38.448	617				

Measures

Data were collected by guidance counselors at each school during school hours. Paper-and-pencil students were provided a large envelope in which they placed completed surveys. Web-based students were assigned a unique username and password, known only to the student.

Issues Related to Web-Based Data Collection. When completing a paper-and-pencil survey, participants have the freedom to skip questions they do not wish to answer. In this study, each item of the Web-based version of the POSIT was presented in succession on a separate page. Therefore, to mimic the freedom of the paper-and-pencil survey to skip questions, in addition to

responding with a Yes or No, students were given the option to select an ''I do not want to answer this question'' response. If a student decided to skip a question, his or her response was coded as missing data. To further enhance student privacy, an anchor tab was inserted at the bottom of each question page. When an answer choice was selected the computer automatically scrolled down to the anchor tab putting the student's answer out of sight while the selected answer was being stored. This feature helped protect the privacy of students using slow computers.

A progress thermometer was provided to inform students of how many items were completed and how many items remained. A practical concern was that some students might not be able to complete a survey in one sitting (e.g., because of power failure or fire drills). The system was created to maintain confidentiality while, if necessary, allowing students to use unique identification numbers to log back into their partially completed surveys. No students experienced an interruption and therefore did not have to take advantage of this feature. Students assigned to the paper-and-pencil version were surveyed during class. Adequate time was given to allow each student to complete the survey in one sitting.

Analysis

An unequal N 2 (mode) 3 2 (grade level) factorial ANOVA was employed. All reversed items were recoded such that a high score on the survey represented increased risk. Eleven students failed to complete a minimum of 75% of the survey, resulting in a final sample size of 617.

RESULTS

Survey Sample

Participants were students recruited from two high schools and two middle schools (43.9% male and 56.1% female). Minority students in the sample were primarily African-Americans (34%), Asians (7%), and Hispanics (1%).

Effect of Mode on Reporting of Sensitive Information

The hypothesis that Web administration would result in higher self-reports of risk on sensitive items than the paper-and-pencil mode was not supported; no statistically significant differences were found for self-reported risk on sensitive items across modes of administration as measured by the POSIT (see Tables 1 and 2).

Effect of Mode on Response Rates

It was hypothesized that students taking the Web-based version of the survey would be less likely to omit items than those taking the paper-and-pencil version. In point of fact, just the opposite occurred. The paper-andpencil version of the survey contained a total of 168 instances of skipped items out of a possible 41,170, or .41%. By contrast, the Web-based data set contained a total of 651 instances of omitted items out of a possible 38,740 (1.68%). Thus, although omit rates were quite small for both administration modes, students completing the

Web-based version of the survey were four times more likely to skip an item than were students completing the paper-and-pencil version.

Table 2
Descriptive Statistics

Mode	Grade	Mean	SD	N
Paper-and-pencil	Middle school	0.141	0.137	120
	High school	0.189	0.166	199
	Total	0.171	0.157	319
Web	Middle school	0.133	0.159	108
	High school	0.222	0.196	190
	Total	0.189	0.188	298
Total	Middle school	0.137	0.147	228
	High school	0.205	0.182	389
	Total	0.180	0.173	617

DISCUSSION

Summary

To obtain valid self-report data, investigators must motivate participants to answer truthfully and accurately. Beebe et al[9] point out that studies reporting increased reporting of sensitive information when completing computerized versus paper-and-pencil surveys were conducted in household settings. Beebe et al[9] and Halfors[10] have since conducted school-based studies and found that students did not report more sensitive information when completing a computerized survey.

This study investigated a similar method capable of motivating middle and high school students to answer truthfully when completing the POSIT. It was hypothesized that a Web-based version of the POSIT, as opposed to a computerized version that resides on the local hard drive or network, would result in higher reporting rates of sensitive information and fewer miss ing data. In the present investigation, there were no main effects for mode. That is, students did not report higher rates of sensitive information when completing a Web-based version of the POSIT compared to a paper-and-pencil version.

Further, the hypothesis that the Web-based version of the POSIT would result in fewer missing data was not supported. Students skipped more POSIT items on the Web-based version when compared to the paper-and-pencil version.

Limitations

There are a variety of challenges that are peculiar to school-based research that may account for these results. First, students typically complete the Web-based surveys in computer labs with other students. Although the intent of the Web-based survey is to provide an enhanced sense of privacy, in this instance it is possible that the environment negates any such effect.

The higher response rate, or lower missing data rate, for the paper-andpencil mode of administration was the direct opposite of what was expected.[10] This may be a genuine, if surprising, result. However, the result may be traceable to a feature of the Web version of the POSIT. It is common with computerized surveys to provide a ''skip,'' ''forward,'' or ''backward'' option to mimic the freedom to maneuver within a survey that is present in paper-and-pencil format. Although students assigned to the Web condition were allowed to move backward to review or change previous answers, they were not allowed to move forward without answering each question. To ensure the right of students to not answer a question, a third response option was added. In addition to ''yes'' and ''no'' options, an option to skip that particular question was added. It is possible that this additional option served as a constant reminder to those students in the Web condition that they could skip any question. It is possible that if the paper-and-pencil survey had included a similar response option for each item, the observed difference between response rates might not have occurred.

Significance

Finally, the implications of this study's results for local, state, and federally sponsored school-based surveys should be discussed. Efficiency, cost-effectiveness, and the possibility of new analyses (i.e., response latency) are just a few of the presumed advantages of Web-based surveys.[11] However, there are issues that need to be considered. Most importantly, steps should be taken to ensure that the Web-based administration mimics as closely as possible the design features of the paper-and-pencil item formats. Although it would be logistically more difficult, future replication in schools should take steps to ensure that no one can observe a student's responses in the Web-based version (i.e., keyboard entry of responses or physical arrangement of the computer lab). Other issues (differences in respondent maneuverability and differing modes of response production for paper-and-pencil and computerized surveys) will also require further examination and replication before transition to Web-based surveys can be recommended.

ACKNOWLEDGMENT

REFERENCES

1. Lessler JT, Reilly JM. 1999. Mode of interview and reporting of sensitive issues: design and implementation of audio computer-assisted self-interviewing. Available at: http://citeseerx.ist.psu.edu. Accessed June 10, 2008.

2. Weinberg NZ, Rahdert E, Colliver JD, Glantz MD. Adolescent substance abuse: a review of the past 10 years. J Am Acad Child Adolesc Psychiatry. 1998;37:252–261.

3. Winters KC, Stinchfield RD, Henly GA, Schwartz RH. Validity of adolescent self-report of alcohol and other drug involvement. Int J Addict. 1992;25: 1379–1390.

4. Sudman S, Bradburn NM. Response Effects in Surveys: A Review and Synthesis. Chicago, Ill: Aldine Publishing Company; 1974. National Opinion Research Center Monographs in Social Research.

5. Aquilino W. Interview mode effects in surveys of drug and alcohol use: a field experiment. Public Opin Q. 1994;58:210–240.

6. Turner CF, Lessler J, Devore J. Effects of mode of administration and wording on reporting of drug use. In: Turner CF, Lessler JT, Gfroerer J, eds. Survey Measurement of Drug Use: Methodological Studies. Washington, DC: US Government Printing Office; 1992:177–220.

7. Rahdert E. Adolescent Assessment/Referral System Manual. Rockville, Md: US Department of Health and Human Services; 1991. DHHS publication ADM 91- 1735.

8. Knight JR, Goodman E, Pulerwitz T, DuRant RH. Reliability of the Problem Oriented Screening Instrument for Teenagers (POSIT) in adolescent medical practice. J Adolesc Health. 2001;29:125–130.

9. Beebe T, Harrison PA, McRae JA, Anderson RE, Fulkerson JA. An evaluation of computer-assisted self-interviews in a school setting. Public Opin Q. 1998;62:623–632.

10. Halfors D, Khatapoush S, Kadushin C, Watson K, Saxe L. A comparison of paper vs. computer-assisted self interview for school alcohol, tobacco, and other drug surveys. Eval Program Plann. 2000;23:149–155.

11. Tourangeau R, Smith TW. Asking sensitive questions: the impact of data collection mode, question format, and question context. Public Opin Q. 1996;60:275–304.

* Send reprint requests to David L. Wyrick, MPH, PhD, UNC Greensboro, 437 HHP Bldg, Greensboro, NC 27402; dlwyrick@uncg.edu.
† David L. Wyrick, MPH, PhD, is with the Department of Public Health Education, University of North Carolina at Greensboro, Greensboro, North Carolina. Lloyd Bond, PhD, is Senior Scholar at the Carnegie Foundation for the Advancement of Teaching, Palo Alto, California.