

# TECHNICAL PAPERS ON HEALTH AND BEHAVIOR MEASUREMENT

## TECHNICAL PAPER 8

### **Effects of Mode of Administration and Wording on Data Quality**

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# Survey Measurement of Drug Use

## Methodological Studies

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## Effects of Mode of Administration and Wording on Data Quality

*Charles F. Turner, Judith T. Lessler, Barbara J. George,  
Michael L. Hubbard, and Michael B. Witt*

Decisions about the suitability of different data collection strategies hinge upon a series of both practical and theoretical concerns. The quality of the data produced by a particular strategy should be one of the key elements in such decisionmaking. In this chapter we summarize the findings of our investigations of selected aspects of the quality of the data produced by the different versions of the survey questionnaire and different modes of administration used in the field test of the National Household Survey on Drug Abuse (NHSDA). (For a description of the procedures used in the NHSDA field test, see Chapter 7.) Among the aspects of quality we consider are:

- The rates of nonresponse;
- The extent to which respondents and interviewers correctly executed the branching instructions embedded in the questionnaires;
- The internal consistency of the reports of drug use given by respondents.<sup>1</sup>

Several of these aspects of survey quality may be assessed separately for each measurement of drug use. The results of such analyses, together with the evidence of bias derived from our previous analysis of estimated

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<sup>1</sup>That is, the extent to which respondents' reports of drug use are logically consistent with one another.

prevalence rates (see Chapter 7), provide the key ingredients for our conclusions concerning the relative quality of the data produced by the different versions of the survey evaluated in the NHSDA field test.

## COMPLETENESS OF SURVEY RESPONSE

A first criterion of data quality is the existence of the data itself. As Madow et al. (1983) have observed, the best strategy for dealing with the difficulties posed by missing data is to avoid the problem by ensuring the completeness of response in the first instance. In general, methods of imputation and other analytic strategies employed to obtain population estimates in the presence of substantial amounts of missing data are a poor second choice to having accurate data from all respondents.<sup>2</sup> Thus, *other things being equal*, there is good reason to prefer data collection strategies that produce lower rates of nonresponse.

### Survey Response

The screening response rate for this survey was 94.6 percent. Interviews were subsequently completed with 75.8 percent of screened respondents. The major causes of noninterviews in the Field Test were inability to contact the designated respondent (5.3 percent) and the respondent's refusal to be interviewed (12.3 percent).<sup>3</sup>

Given that the Field Test embedded an experimental test of four alternate questionnaires, it might be thought that different forms of the survey might have different levels of success in obtaining respondent compliance. The experience of the Field Test was, however, that the overwhelming majority of respondent refusals occurred *prior* to the respondent being assigned to an experimental condition. Fewer than 10 respondents discontinued the survey after they had begun.

### Item Response

Given that the four versions of the questionnaires often presented differently worded questions in different formats, we can, in turn, ask whether

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<sup>2</sup>We add the qualification to this generalization that these data must not be seriously degraded in quality. Merely obtaining "any measurement" for a respondent on a given variable is not necessarily better than having missing data if this alternative involves having measurements whose error structure is markedly different in unknowable ways from measurements made for other respondents.

<sup>3</sup>The interview response rate was substantially higher for the youngest group of respondents. Response rates were: 85.6 percent for 12 to 17 year olds; 70.9 percent for 18 to 25 year olds; 74.3 percent for 26–34 year olds; and 73.3 percent for persons 35 and older. (Calculation of these age-specific response rates included 142 Hispanic persons who were not interviewed due to language difficulties. Since questionnaires written in Spanish were not available for Hispanic respondents, these respondents are properly treated as ineligible.)

there were noteworthy differences in the amounts of data obtained on the key variables. For each of 15 drugs, Table 8-1 displays the (unweighted) percentage of persons who failed to respond to questions on their age at first use of the drugs, frequency of use in the past year, frequency of use in their lifetime, and recency of use.

Overall, these tabulations indicate that item nonresponse was highest in the self-administered conditions. This is particularly true for illicit drugs. So, for example, rates of nonresponse to the *recency of use* questions are higher in the self-administered conditions for *every* substance except smokeless tobacco. For marijuana, cocaine, crack, hallucinogens, and heroin, the rates of nonresponse to the interviewer-administered forms range between 0.3 and 0.8 percent while the nonresponse rates on the self-administered forms range between 1.6 and 2.3 percent. A similar pattern occurs for other questions inquiring about use of these drugs. This finding of increased nonresponse (but decreased bias as reflected in higher reported prevalence rates) is consistent with the admittedly scarce literature on the effects of offering more anonymous modalities for response to a survey of sensitive behaviors (for a review, see Miller, Turner, and Moses, 1990: Chapter 6; Bradburn and Sudman, 1979).

Given the findings of our analysis of the prevalence of reported drug use (Chapter 7), it is reasonable to focus attention on differences in the nonresponse rates obtained with the two self-administered versions (A and C). In 31 of the 44 possible comparisons of response rates between Versions A and C in Table 8-1, we find that the nonresponse rates are higher for the new wording of the self-administered questionnaire than for the current wording. We do note, however, that for all four types of questions (recency, age at first use, etc.), nonresponse rates for items asking about inhalants and hallucinogens are lower with the new wordings than with the current wordings of these items. This result suggests (but does not prove) that the explanatory introductions provided in the new versions of the questionnaire and the revised question wordings may have aided some respondents in understanding the concepts of "hallucinogens" and "inhalants" used in these questions.

The generally higher nonresponse rates found with the new wording of the self-administered form is, nonetheless, perplexing. Although the differences between the two self-administered versions are relatively small—typically 1 to 2 percentage points—they do overwhelmingly favor the current version of the form. A small part of these differences does, of course, arise from the fact that the new version (C) of the questionnaire makes considerable use of skip instructions. Faulty execution of a skip

TABLE 8-1 Unweighted Nonresponse Rates for Drug Use Questions

DRUG USE	Questionnaire Form				Wording <sup>a</sup>		Mode of Admin. <sup>b</sup>	
	A	B	C	D	Old	New	Self	Int.
<i>AGE FIRST TRIED DRUG</i>								
Cigarettes <sup>c</sup>	0.1	0.0	2.0	3.1	0.1	2.6	2.0	1.6
Smokeless Tobacco <sup>c</sup>	-	-	2.3	1.3	-	1.8	-	-
Alcohol	0.5	0.1	3.8	2.5	0.3	3.1	2.1	1.3
Sedatives	0.7	0.1	2.0	1.2	0.4	1.6	1.3	0.7
Tranquilizers	1.2	0.2	1.3	1.4	0.7	1.3	1.2	0.8
Stimulants	0.6	0.1	2.0	0.8	0.4	1.4	1.3	0.5
Analgesics	0.6	0.1	2.1	1.3	0.4	1.7	1.3	0.7
Marijuana/Hashish	1.2	1.0	3.0	1.7	1.1	2.3	2.1	1.3
Inhalants	4.3	0.1	0.4	0.4	2.2	0.4	2.4	0.2
Cocaine/Crack	1.2	0.2	2.9	0.6	0.7	1.7	2.0	0.4
Crack	-	-	-	-	-	-	-	-
Hallucinogens	1.3	0.2	0.4	0.2	0.8	0.3	0.9	0.2
PCP	-	-	-	-	-	-	-	-
Heroin	1.6	0.6	2.4	0.8	1.1	1.6	2.0	0.7
Ice	-	-	-	-	-	-	-	-
<i>FREQUENCY OF USE IN PAST YEAR</i>								
Cigarettes <sup>c</sup>	-	-	-	-	-	-	-	-
Smokeless Tobacco <sup>c</sup>	0.4	1.1	2.9	1.8	0.7	2.3	2.9	1.5
Alcohol	0.7	0.9	1.6	0.4	0.8	1.0	1.2	0.6
Sedatives	0.6	0.1	1.4	0.4	0.4	0.9	1.0	0.2
Tranquilizers	1.1	0.2	0.8	0.2	0.7	0.5	0.9	0.2
Stimulants	1.0	0.1	0.5	0.6	0.5	0.6	0.7	0.4
Analgesics	0.8	0.1	1.5	0.5	0.5	1.0	1.2	0.3
Marijuana/Hashish	1.8	0.9	3.4	1.1	1.3	2.2	2.6	1.0
Inhalants	2.7	0.1	0.4	0.2	1.5	0.3	1.6	0.2
Cocaine/Crack	1.4	0.2	4.3	0.7	0.8	2.4	2.8	0.5
Crack	-	-	2.6	0.5	-	1.5	-	-
Hallucinogens	1.3	0.2	0.6	0.2	0.8	0.4	1.0	0.2
PCP	-	-	-	-	-	-	-	-
Heroin	-	-	2.3	0.7	-	1.5	-	-
Ice	-	-	-	-	-	-	-	-

<sup>a</sup>Contrasts Versions A and B (Old wording) to Versions C and D (New Wording).

<sup>b</sup>Contrasts Versions A and C (Self-Administered) to Versions B and D (Interviewer-Administered).

<sup>c</sup>For tobacco, Questionnaire Form C was the only self-administered form. Missing data rates for tobacco by mode of administration contrast Form C to Forms B and D.

instruction (i.e., skipping when it is inappropriate) elevates the nonresponse rates for the items that were skipped over. As discussed below, faulty execution of skip instructions occurred with some frequency in Version C. This was particularly so when the layout of the form gave inappropriate visual cues. However, as will subsequently be seen (Table 8-4), faulty execution of branching instructions in Version C typically resulted in respondents supplying information that was not required rather than skipping over questions they should have answered.

TABLE 8-1 *Continued*

DRUG USE	Questionnaire Form				Wording <sup>a</sup>		Mode of Admin. <sup>b</sup>	
	A	B	C	D	Old	New	Self	Int.
<i>NUMBER OF TIMES USED IN LIFETIME</i>								
Cigarettes <sup>c</sup>	0.1	0.1	0.3	0.2	0.1	0.2	0.3	0.2
Smokeless Tobacco <sup>c</sup>	-	-	-	-	-	-	-	-
Alcohol	-	-	-	-	-	-	-	-
Sedatives	0.6	0.1	1.9	1.4	0.4	1.7	1.2	0.8
Tranquilizers	1.1	0.1	1.3	1.6	0.6	1.4	1.2	0.8
Stimulants	0.5	0.1	2.0	0.7	0.3	1.3	1.2	0.4
Analgesics	0.5	0.1	1.8	1.3	0.3	1.5	1.1	0.7
Marijuana/Hashish	1.1	0.9	3.1	0.7	1.0	1.9	2.1	0.8
Inhalants	2.2	0.1	0.4	0.2	1.2	0.3	1.3	0.2
Cocaine/Crack	0.6	0.2	2.5	0.5	0.4	1.5	1.5	0.4
Crack	-	-	-	-	-	-	-	-
Hallucinogens	1.0	0.2	0.6	0.2	0.6	0.4	0.8	0.2
PCP	-	-	-	-	-	-	-	-
Heroin	1.8	0.6	2.4	0.7	1.2	1.5	2.1	0.7
Ice	-	-	-	-	-	-	-	-
<i>REGENCY OF USE</i>								
Cigarettes <sup>c</sup>	2.3	3.3	1.3	0.1	2.8	0.7	1.3	1.7
Smokeless Tobacco <sup>c</sup>	0.2	1.1	2.4	1.6	0.7	2.0	2.4	1.3
Alcohol	0.7	0.2	1.4	0.4	0.5	0.9	1.0	0.3
Sedatives	0.6	0.1	1.8	1.4	0.4	1.6	1.2	0.8
Tranquilizers	1.2	0.1	1.1	1.6	0.7	1.3	1.2	0.8
Stimulants	1.0	0.1	1.9	0.7	0.5	1.3	1.4	0.4
Analgesics	0.8	0.1	1.6	1.3	0.5	1.5	1.2	0.7
Marijuana/Hashish	1.2	0.9	2.6	0.7	1.0	1.7	1.9	0.8
Inhalants	2.9	0.1	0.5	0.4	1.5	0.4	1.7	0.2
Cocaine/Crack	1.4	0.2	1.8	0.5	0.8	1.1	1.6	0.4
Crack	1.1	0.2	2.5	0.5	0.7	1.5	1.8	0.4
Hallucinogens	2.6	0.2	0.5	0.4	1.5	0.4	1.6	0.3
PCP	1.9	6.7	-	-	4.2	-	-	-
Heroin	2.3	1.0	2.4	0.7	1.6	1.5	2.3	0.8
Ice	1.6	0.2	-	-	0.9	-	-	-

It should also be noted that the new wording of the questionnaire sometimes required that several questions be answered to replicate the measurement provided by a single question in the current version. The basis for adopting this strategy was our assumption that we could improve the accuracy of reporting if compound questions were decomposed into separate questions. For example, Version A of the questionnaire asks a single question about the recency of use of stimulants "for *nonmedical reasons*." In contrast, Version C of the questionnaire, asks three separate questions about recency of (1) use for "kicks, to get high, to feel good or for curiosity;" (2) use of "a stimulant that was prescribed for someone else;" and (3) use in greater amounts or more often than prescribed. In comparing response rates, Table 8-1 treats nonresponse to any of these

subquestions as nonresponse for the variable that is comparable to recency of nonmedical use in Version A. Given the greater opportunity for item nonresponse in Version C, it is not surprising that the nonresponse rate for stimulant use in Version C would be 1.9 percent versus 1.0 percent in Version A. Indeed, we also note that this difference persists even when the questions are administered by interviewers (nonresponse rates: 0.1 vs. 0.7).

## CONSISTENCY OF RESPONSE

A number of internal consistency checks can be performed to assess whether respondents' reports of drug use are logically consistent. Consider, for example the case of a 19-year-old who reports that the most recent time he used marijuana was 3 or more years ago. If the same respondent also indicates that he first tried marijuana at age 18, then clearly one of his responses must be in error. A similar error might be detected if, for example, a respondent reported that he had never used cocaine but then he reported a non-zero frequency of cocaine use during the past year in response to subsequent questions.

### Logical Consistency of Responses on Recency of Drug Use

To assess the extent of such inconsistent responses in the different versions of the questionnaires, we first identified sets of questions that provided instances in which explicit inconsistencies might be detected in the self-reported recency of cocaine, marijuana, alcohol, and tobacco use. In these instances, no judgment is required since the inconsistencies involve two or more reports that logically could not both be true. (In the next section we will discuss other, less stringent, indicators of *apparent* inconsistencies.)

Table 8-2 summarizes the overall results of our analysis. Given the findings of our prevalence rate analysis (Chapter 7) that self-administered questionnaires appear to be less prone to reporting bias, we will again restrict our comments at the outset to the two self-administered questionnaires (A and C). If we focus attention upon instances in which the difference in inconsistency rates exceeded 1 percentage point, we find seven noteworthy divergences in the inconsistency rates obtained by questionnaire Versions A and C (see Table 8-2). As can be readily seen in Figure 8-1, for five of these seven differences in inconsistency rates, the new version (C) of the questionnaire produced lower rates of inconsistent reporting than the current version (A). Furthermore, we observe that all four of the largest (percentage point) differences in inconsistent reporting rates favor the new version of the questionnaire. So, for example, while



TABLE 8-2 Unweighted Percent of Respondents Giving Inconsistent Responses to Drug Use Questions by Questionnaire Version

DRUG USE REGENCY	Questionnaire Form				Wording <sup>a</sup>		Mode of Admin.		Total
	A	B	C	D	Old	New	Self	Int.	
<i>CIGARETTES<sup>a</sup></i>									
Lifetime	.1	.1	.1	.1	0.1	.1	.1	.1	.1
Past Year II <sup>c</sup>	4.4	2.6	1.4	1.2	1.4	1.8	3.5	1.3	2.4
Past Month	.2	.4	.9	.5	0.9	.4	.3	.7	.5
<i>ALCOHOL</i>									
Lifetime	.7	.0	3.2	1.7	1.9	.9	.4	2.4	1.4
Past Year I <sup>b</sup>	9.0	.0	4.6	1.2	6.9	.6	4.6	2.8	3.7
Past Year II <sup>c</sup>	14.9	8.4	2.0	.6	8.7	4.4	11.7	1.3	6.5
Past Month	8.3	1.7	2.3	.6	5.4	1.2	5.1	1.4	3.2
<i>MARIJUANA</i>									
Lifetime	.5	.0	.4	.0	.4	.0	.2	.2	.2
Past Year I <sup>b</sup>	2.9	.1	2.8	.1	2.9	.1	1.5	1.4	1.5
Past Year II <sup>c</sup>	.5	.1	.6	.6	.6	.4	.3	.6	.5
Past Month	5.6	.5	1.4	.2	3.6	.4	3.1	.8	1.9
<i>COCAINE</i>									
Lifetime	1.2	.1	.3	.0	.7	.1	.7	.1	.4
Past Year I <sup>b</sup>	.9	.1	4.2	.5	2.5	.3	.5	2.3	1.4
Past Year II <sup>c</sup>	.2	.0	.4	.4	.3	.2	.1	.4	.2
Past Month	.6	.0	.5	.0	.6	.0	.3	.2	.3

NOTES. This analysis identifies inconsistencies in responses to recency questions by comparison to responses to other questions with which the recency response should be logically consistent. For example, persons who respond to the recency question for marijuana by reporting that they have never used marijuana should not give (nonzero) responses to a question asking how many times they have tried marijuana.

<sup>a</sup>For cigarettes, Questionnaire Form C was the only self-administered form. Rates of inconsistency shown in this table contrast Form C to Forms B and D.

<sup>b</sup>Past Year I refers to inconsistencies between the recency response and those past-year-use questions that appeared on the same drug answer sheet as the recency question in Questionnaire A.

<sup>c</sup>Past Year II refers to inconsistencies between the recency response and those past-year-use questions that appeared on the answer sheet entitled, 'Drugs' in Questionnaire A.

8.3 percent of respondents to the current version (A) gave inconsistent responses concerning use of alcohol in the past month, only 2.3 percent of respondents gave inconsistent responses when completing the new version of the questionnaire (C). Similarly for marijuana use during the past month, 5.6 percent of respondents to the current version gave inconsistent responses compared to only 1.4 percent of persons completing the new version.

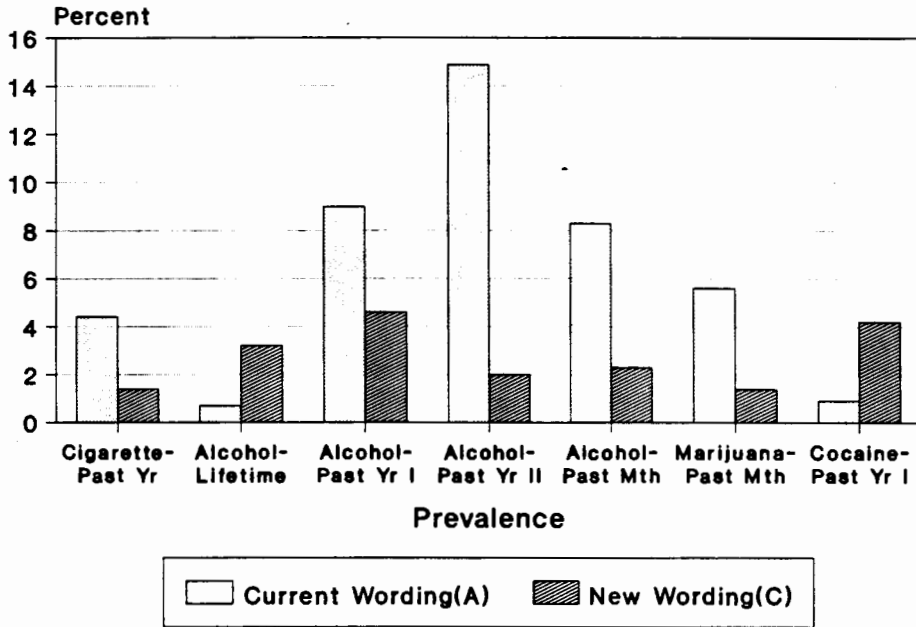


FIGURE 8-1 Percent of respondents giving inconsistent answers to self-administered questions about drug use using current wording (Version A) and new wording (Version C) of the survey questionnaire.

Overall, these results<sup>4</sup> encourage the belief that the new version of the self-administered questionnaire produced, on average, better comprehension of the questionnaire and hence more consistent responding. This having been said, there remains one cause for concern. If we consider the rate of inconsistent reporting relative to the base prevalence rates, then the inconsistency observed in Version C for the reporting of cocaine use during the preceding year becomes quite noteworthy. Only 3.2 percent of respondents<sup>5</sup> reported cocaine or crack use during the previous year in response to the direct question on recency of cocaine use (Q.6 on Version C). However, the reports of cocaine use during the previous year were inconsistent for 4.2 percent of cases on Version C.

We examined the source of these inconsistencies in greater detail because we were concerned about this relatively high level of inconsistency. We found that the majority of these inconsistencies involved respondents who indicated that their most recent cocaine use was more than a year ago but who subsequently answered the question asking about the ways

<sup>4</sup>That is, for those cases where the differences in the rates of inconsistencies were sufficiently large to merit attention (i.e., 1 or more percentage points).

<sup>5</sup>Percent is unweighted.

that they had used cocaine during the past 12 months. We believe that this error may have been introduced by a change in question wording that stressed thinking of all the ways that cocaine was used as well as the time period. The two wordings are:

*Version A (Current Wording):*

CN-7: Circle the numbers of all the ways you have used cocaine *in the past 12 months*. (PLEASE CIRCLE ALL THAT APPLY.)

*Version C (New Wording):*

9: Think about all the ways you have used cocaine during the past 12 months? Since the 12-month reference date, have you . . . MARK ONE BOX ON EACH LINE.

We suspect that some respondents may have been confused by the new preamble that stressed thinking of all the ways that they had used cocaine. Thus we note that these same respondents (cocaine users who indicated that their most recent use was more than 1 year ago) responded quite consistently to Question 8 of Version C which asked whether they had used cocaine during the past 12 months. Indeed, 18 of the 33 inconsistent respondents to the cocaine recency question in Version C

- Indicated that they had used cocaine *more than 1 year ago*<sup>6</sup> in response to Question 6;
- Answered “No” in response to the direct question (Q.8) about cocaine use in the past 12 months;
- Indicated nonetheless one or more *methods* of cocaine use during the past 12 months in response to Question 9.

The second potential cause for the high relative inconsistency rate for this question on Version C was, we suspect, respondent confusion as to the particular forms of drugs being referenced. In Version C, the respondents were first asked a series of questions about use of “any form of cocaine,” then they were asked a series of questions about use of “the form of cocaine known as ‘crack,’” and finally they were asked two questions concerning their use of “any form of cocaine other than ‘crack’.” Review of the microdata for the inconsistent responses to these questions on Version C indicates that 10 of the “inconsistent” respondents reported use of cocaine during the previous 12 months in response to the recency question (Q.6),<sup>6</sup> and all 10 of these respondents also indicated that:

<sup>6</sup>That is, by responding that their usage had been either: “within the past 30 days,” “more than 30 days but less than 6 months ago,” or “6 months or more but less than 1 year ago.”

- They had “used any form of cocaine in the past 12 months” (Q. 8); and also that
- They had used cocaine in the past 12 months by one or more specific methods (e.g., sniffing, smoking) in response to Q. 9.

However, when these respondents came to the final four questions (Q.18 to Q.21) asking first about crack use and then about use of “any form of cocaine other than crack,” all 10 respondents reported *never* using crack and never having used “any form of cocaine other than crack.” Given the evidence from the three earlier questions (Questions 6, 8, 9), it is reasonable to infer that these respondents were misreporting non-use of cocaine other than crack on Q.21. It is possible that these respondents were confused by the switching of drug referents from “cocaine” to “crack” to “forms of cocaine other than crack.” Among other confusions, this switching invites the inference that the final question is intended to inquire about a form of cocaine other than that referred to by the two previous series of questions.

We suspect that the lower rate of inconsistent reporting of cocaine use during the past year in Version A may, in turn, reflect the fact that (1) questions about methods of cocaine use in the past 12 months in Version A offer explicit response categories for lifetime *nonuse* and for *nonuse* in the past 12 months, and (2) the questions on frequency of cocaine use during the past 12 months occur following the questions on recency of cocaine use. We note, in particular, that respondents in Version A are not subject to the same switching of drug referents when responding to the frequency of use questions.

We would also note, however, that Version A does have a parallel switching of referents involving reports of quantity and cost of cocaine (other than crack) purchased in the last month. To identify this switching of referents, Version A displays a notice in large bold type at the top of each page describing the referent when it is switched to crack and when it is switched back to cocaine other than crack. If the switching of referents is to be continued in future versions of the NHSDA questionnaire, such a notice would be helpful on whatever questionnaire is used. There is, however, good reason to question whether respondents’ understanding of the relationship between cocaine and crack is adequate to allow questioning about relatively complex concepts such as “any form of cocaine other than crack.” We believe that careful consideration should be given to the need for detailed information on *particular forms* of cocaine. If the information is required, further laboratory research might be appropriate to

determine how this information might be obtained without exceeding the respondent's ability to make the needed distinctions between substances.

### Inferred Inconsistencies

An extensive series of analyses was also performed across survey versions assessing the rates at which the different questionnaire versions produced reports that *seemed* potentially inconsistent—although logically possible. An extreme case of such inconsistency would be an individual who reported having 5 or more drinks on each of 30 days in the past month but who reported having drunk alcohol only 30 times in the past year. While logically possible, this extreme variation between behavior in the past 30 days versus the preceding 11 months might lead to the suspicion that the respondent had misunderstood the questions or had provided inaccurate responses. Such suspicions cannot be proven, but across a number of occurrences of such discrepancies, one can reasonably expect that some portion of them will reflect true inconsistencies.

While no claim is made that these inferred inconsistencies represent true errors in response, one would expect—given random assignment of questionnaire versions to respondents—that there should be equivalent distributions<sup>7</sup> of the actual behaviors across versions. Hence variation across questionnaire versions in the extent of such inferred inconsistencies can be taken to be induced by the questionnaire itself rather than by differences in the actual behaviors of the groups of respondents receiving different questionnaire versions.

In Table 8-3 we present comparisons across questionnaire versions of the rates of inferred inconsistency in reporting of alcohol use.<sup>8</sup> We present the results for inconsistent reporting of alcohol use because the samples available for this analysis were relatively large due to the high prevalence of reported alcohol use in the population.<sup>9</sup>

The estimates of frequency of alcohol use shown in Table 8-3 were constructed from two separate questions: (1) a direct question about the

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<sup>7</sup>That is, within the limits of sampling variability.

<sup>8</sup>In conducting this analysis of frequency of alcohol use, we found one further measure of logical consistency that could be tested. It was possible to compare the total number of drinks reported in the past month with the maximum number of drinks taken on one day in the last month. For the self-administered versions: 3.4 percent of Version A respondents and 1.4 percent of Version C respondents reported drinking a greater number of drinks in one day than the total they reported for the previous month. For the interviewer-administered versions, the corresponding percentages were 0.9 (B) and 0.0 (D).

<sup>9</sup>This analysis requires reporting of *some* drug use during the previous 30 days. A parallel analysis of marijuana reporting yielded between 38 and 61 cases per questionnaire version, and cocaine use provided only 6 to 20 cases per questionnaire version.

TABLE 8-3 Percent of Respondents with Inferred Inconsistencies in Their Reporting of Alcohol Use by Questionnaire Version (Unweighted Percents)

Type of Inconsistency <sup>b</sup>	Current Wording <sup>a</sup>		New Wording <sup>a</sup>	
	Self Admin.	Int. Admin	Self Admin.	Int. Admin
Number of Days Drank Within Last Month Inconsistent With Frequency of Use in Last Year <sup>c</sup>				
By 1 Freq. Category	43.5	36.4	32.1	33.2
By >1 Freq. Category	15.2	8.3	6.7	8.0
Number of Days Drank Five or More Drinks in Past Month Inconsistent With Frequency of Use in Past Year <sup>d</sup>				
By 1 Freq. Category	2.8	3.1	1.4	1.9
By >1 Freq. Category	.8	1.2	.0	.3
Number of Days Drank Maximum Number of Drinks in Past Month Inconsistent with Frequency of Use in Past Year <sup>e</sup>				
By 1 Freq. Category	5.1	5.6	3.4	7.5
By >1 Freq. Category	2.3	.9	1.0	.3
Base N <sup>f</sup>	356	324	296	361

NOTES. Analysis includes all respondents reporting use of alcohol one or two times a month (or more often) in response to the frequency of alcohol use question.

<sup>a</sup>Questionnaire versions are: current wording in self-administered format (A); current wording in interviewer-administered format (B); new wording in self-administered format (C); new wording in interviewer-administered format (D).

<sup>b</sup>Frequency categories were: [1] Daily; [2] Almost daily or 3 to 6 days a week; [3] About 1 or 2 days a week; [4] Several times a month (about 25 to 51 days a year); [5] 1 to 2 times a month or so (6 to 11 days a year); [6] 3 to 5 days in the past 12 months; [7] 1 or 2 days in the past 12 months.

<sup>c</sup>Responses were considered inconsistent if 12 times the number of days in last month that the respondent reported having a drink was inconsistent with the number of days the respondent reported drinking during the year.

<sup>d</sup>Responses were considered inconsistent if 12 times the number of days in last month that the respondent reported having 5+ drinks was *greater than* the number of days in the last year on which the respondent reported having alcohol.

<sup>e</sup>Responses were considered inconsistent if 12 times the number of days in last month that the respondent reported having maximum number of drinks was *greater than* the number of days in the last year on which the respondent reported having alcohol.

<sup>f</sup>Base N for tabulation includes all monthly alcohol users (based on their response to frequency of use question).

frequency of use in the past year, and (2) an estimate of what annual frequency *ought to be* given the respondents' reports of the frequency of their drinking during the previous 30 days. The latter estimate was made by assuming that respondents' yearly frequency would be 12 times their

monthly frequency. There are, of course, good reasons to object to such a simple estimation procedure. Seasonal and other factors (e.g., holidays) are well known to affect the frequency of drinking in the population. While such problems compromise any claim that the observed rates are unbiased indicators of the true rate of inconsistency in reporting, the biases in the estimation procedure introduced by such seasonal and other factors will be equivalent across questionnaire versions (since respondents were randomly assigned). Hence the differences between versions are of interest even though the rates themselves may be subject to bias.

Table 8-3 shows that in the self-administered format the rates of inferred inconsistency in reporting of alcohol use are higher *in every instance* for the current NHSDA question wordings (Version A) than for the new wordings (Version C). Comparisons of the results for the interviewer-administered versions are more mixed.

### ABILITY TO FOLLOW BRANCHING INSTRUCTIONS

A major difference between the current and revised versions of the survey questionnaire is the more extensive use of branching instructions in the new version. This strategy avoids the repetition of questions that are redundant (given previous responses). So, for example, the new version of the questionnaire first inquires whether a respondent consumed any alcohol during the previous 12 months. If respondents reply “no,” they are instructed to skip 17 questions that inquire about the quantity and effects of alcohol use in the past 12 months and the co-use of other drugs with alcohol. In contrast, the current version of the NHSDA questionnaire requires that all respondents answer these questions by checking boxes indicating that they have not consumed any alcohol during the preceding 12 months.

The effectiveness of this new strategy depends, of course, on the ability of respondents to follow such branching or skip instructions. To investigate the accuracy of respondents’ compliance with the branching instructions on the new questionnaire, we examined each question that might have been followed by a skip (i.e., a branching question) to determine whether or not the branching instruction was correctly executed.

Four outcomes are possible at each branching question; they are

- *Correctly executed Don't skip:* After answering the branching question, the respondent *should not have branched* to another question but should have continued with the next question in the sequence. The respondent correctly *did not skip*.

- *Incorrectly executed Don't skip*: After answering the branching question, respondent *should not have branched* to another question but should have continued with the next question in the sequence. Respondent *incorrectly skipped* to a new question.
- *Correctly executed Do skip*: After answering the branching question, respondent *should have branched* to another question rather than continuing with the next question in the sequence. Respondent *correctly skipped to the proper question*.
- *Incorrectly executed Do skip*: After answering the branching question, respondent *should have branched* to another question rather than continuing with the next question in the sequence. Respondent *incorrectly executed the skip instruction* (either by continuing with the next question or by skipping to the wrong question).

### Branching Accuracy

To assess the accuracy of branching, we tabulated the number of respondents who correctly and incorrectly followed each branching instruction. For each instance in which a branching instruction was incorrectly executed, we also noted which question was next answered after the incorrect branch. Table 8-4 summarizes these data by presenting for each branching question the unweighted frequency of persons who correctly and incorrectly followed the branching instructions. Table 8-4 also displays the percentage of respondents<sup>10</sup> who correctly followed the branching instruction, and the percentage of respondents who should *not* have skipped but who incorrectly did skip. The latter percentages are important because they define the *relative loss* due to branching errors of respondents who had information to give about use of a drug. The size of this group *relative* to the size of the group of respondents with information to provide on their drug use is an important indicator of the cost of employing branching questions.

Table 8-4 shows that the overwhelming majority of survey respondents did correctly execute the branching instructions. The rates of correct branching range from 93 to 99 percent. The relative loss of information through incorrect branching although nontrivial also appears to be quite small.

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<sup>10</sup>For these tabulations, persons who did not answer the branching question cannot be classified since they failed to provide the information needed to determine whether they should have skipped or not. For each branching question, the sample includes only respondents who gave a valid answer.



TABLE 8-4 Unweighted Number and Percent of Respondents Correctly and Incorrectly Executing Branching Instructions on New Version of Self-Administered Questionnaire (Version C)

Branch Question	Correct Don't Skip	Correct Skip	Incorrect Don't Skip	Incorrect Skip	Percent	
					Correct Branching <sup>a</sup>	Information Loss <sup>b</sup>
Cg1: Ever Smoked	480	299	0	11	98.6	0.0
Cg3: Ever Smoked One Cig. per Day	289	181	1	18	96.1	0.3
Cg3: Smoking Recency	187	256	3	32	92.7	1.6
Cg5: Smoke in last 12 Months	237	239	1	6	98.6	0.4
Cg6: Ever Used Smokeless Tobacco	74	698	0	7	99.1	0.0
A11: Ever Drank Alcohol	588	176	27	1	96.5	4.4
A12: Ever Drank 1+ Times per Month	401	376	13	1	98.2	3.1
A13: Alcohol Recency of Use	376	358	5	47	93.4	1.3
A14: Consumed Alcohol in Last Year	505	45	2	26	95.2	0.4
MJ6: Smoked Marijuana in Last Month	56	697	4	2	99.2	6.7
COC18: Ever Used Crack	20	731	0	26	96.7	0.0
COC20: Cocaine Use (except Crack)	65	659	0	53	93.2	0.0

NOTE. Respondents who did not respond to the branch question itself are excluded from these tabulations.

<sup>a</sup>Percent of respondents who correctly followed the branching instructions.

<sup>b</sup>Percent of respondents who should have continued responding to question sequence but who incorrectly skipped after the branch question, i.e., (Incorrect, Don't Skip) divided by (Incorrect, Don't Skip plus Correct, Don't Skip).

The largest frequency of branching errors (53) occurred on the question asking about use of forms of cocaine other than crack. This is the same item that produced high rates of reporting inconsistency. As we previously noted, the concept involved may be too convoluted for some respondents to comprehend easily. Moreover, the information it requests duplicates information supplied earlier in the cocaine form, and thus this repetition invites misunderstanding as to the intent of the question. We suspect that all of these factors contribute to the relatively high error rate in the execution of the skip instructions on this question.

### Design of Forms and Branching Errors in Version C

A more detailed review of branching errors<sup>11</sup> suggested some potential design factors that might reduce respondents' errors in following the branching instructions. First, our review suggests that it would be helpful to put "Stop" boxes on separate pages whenever they are the targets of branching instructions. We note, for example, that on the alcohol form, 41 respondents followed the branching instructions for Q.2 and Q.3 by going to the *correct page* and then answering the question that appears at the top of that page rather than "Going to the Stop Box." There would be less opportunity for such errors if respondents were instructed to turn to a page that contained only the instruction that respondents should stop work and inform the interviewer that the form is complete.<sup>12</sup>

Second, a review of the branching errors leads us to suspect that the visual layout of Version C assisted in some instances and interfered in other instances with correct execution of the branching instructions. Consider, for example, the question about age at first use of alcohol shown at the top of Figure 8-2. Twenty-seven of the 615 respondents who reported alcohol use failed to complete the age question. In contrast, when the branch question involved a long, visually distinct sublist, there were typically many fewer instances of incorrect skips to the following question. One such example is shown at the bottom of Figure 8-2. For this question, 237 respondents correctly executed the branch to the questions listed under Question 5, and only one respondent failed to correctly branch to the question list. One suspects that both the length and visual salience of the list and the fact that the following question is on the next page assisted respondents in following these branching instructions. Here and in other instances we examined, it appeared that successful execution

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<sup>11</sup>Details of this analysis are not presented here; they may be found in Appendix C of RTI (1991).

<sup>12</sup>The boxes are labeled "Stop Box" on the questionnaire, but one may also wonder whether use of the jargon "Stop Box" is helpful to the average respondent.

1. Have you ever drunk a beer, a glass of wine or a wine cooler, a shot of liquor, or a mixed drink with liquor in it? If you have only had sips from another person's drink, answer "no."  
**MARK ONE BOX.**

1  Yes → a. Think about the very first time you drank a beer, glass of wine or wine cooler, a shot of liquor, or a mixed drink. Not counting sips you might have had from someone else's drink, how old were you the first time you drank an alcoholic beverage?  
 2  No

\_\_\_\_\_ years old

**GO TO QUESTION 2.**

**CONTINUE WITH QUESTION 2.**

YOUR 12-MONTH REFERENCE DATE IS: \_\_\_\_\_

5. The next questions are about the past 12 months—the period from the date written above up to and including today.

Did you smoke a cigarette during the past 12 months?  
**MARK ONE BOX.**

1  Yes → a. During the past 12 months, have you smoked cigarettes every day or almost every day for two or more weeks in a row?  
**MARK ONE BOX.**  
 2  No

**GO TO QUESTION 6 ON PAGE 6.**

1  Yes 2  No

b. During the past 12 months, have you felt that you needed or were dependent on cigarettes?  
**MARK ONE BOX.**  
 1  Yes 2  No

c. During the past 12 months, have you needed larger numbers of cigarettes to get the same effect?  
**MARK ONE BOX.**  
 1  Yes 2  No

d. During the past 12 months, have you have you tried to cut down on your use of cigarettes?  
**MARK ONE BOX.**  
 1  Yes 2  No

e. During the past 12 months, have you felt sick or had withdrawal symptoms because you stopped or cut down on cigarettes?  
**MARK ONE BOX.**  
 1  Yes 2  No

**CONTINUE WITH QUESTION 6 ON PAGE 6.**

FIGURE 8-2 Example of a visually obscured and a visually salient branching instruction. 27 of 615 respondents who should have answered Question 1a skipped it. In contrast, only 1 of 238 respondents inappropriately skipped Question 5a.

of the branch instructions was aided by a visual layout that made the alternative branches visually salient and straightforward to follow.

Similarly, we noted that arrows depicting the skip patterns seemed to be more effective when they appeared adjacent to the box being checked rather than at the end of the phrase describing the answer category. Since respondents must focus on the answer box in order to check it, there is good reason to believe that visual cues attached to the box itself will be better attended to.

Finally, we note that inconsistency in form layout seemed to encourage errors in branching and item response. The most telling case of this phenomenon occurred with interviewers administering Version B of the questionnaire. In this version, the forms on sedatives, tranquilizers, stimulants, analgesics, and inhalants all contain a box in bold-face type at the bottom of the first page of the section. This box instructs interviewers to circle "91" and skip to the next form if the respondent reports no use of the drug in question. On the hallucinogens form, however, this box appears in the middle of the page and it is followed by two other questions asking about age at first use of hallucinogens. A substantial number of interviewers (5 percent) appear to have mistakenly circled 91 in its accustomed position at the bottom of the page. Given the different layout of the hallucinogens form, however, they were actually answering Question 3 and leaving Question 1 unanswered.

Clearly, inconsistency in visual layout can have an effect upon the likelihood that professional interviewers will err in completing their forms. Given the evidence on branching errors made by respondents in Version C and this evidence concerning interviewer errors, we suspect that improvements in the visual layout of the self-administered forms used in this survey might reduce the frequency of branching and other errors made by respondents.

## EFFECTS OF ANCHORING

According to our cognitive appraisal, one of the major shortcomings of the current NHSDA questionnaire (see Chapter 2) is the vagueness of reference period boundaries. One of the major changes incorporated in the new versions of the questionnaire was an anchoring manipulation. This manipulation was intended to clarify the boundary dates for respondents. If this manipulation were successful, we would expect to obtain more consistent reporting of drug use with the new versions of the questionnaire. Furthermore, whether anchored or not, it would be reasonable to expect that there should be increasing inconsistency in reports as the respondent's most recent use of a drug approached the reference period

boundary. For example, we would expect more inconsistent reporting of alcohol use during the past year by respondents who stopped drinking about one year ago. If the anchoring manipulation were successful, we might expect its effect to be most pronounced for behaviors that changed near reference period boundaries.

To assess the effects of anchoring in the new versions of the questionnaire, we examined inconsistencies between answers given to the drug use recency questions and answers given to other drug use questions that used explicit reference periods. For each reference period, we looked at two types of inconsistency: indications of use in the recency question and no use in reference-period-specific questions and vice versa.

Table 8-5 presents the frequency of logical inconsistencies between answers to the drug use recency questions and those for three types of reference-period-specific drug use questions: (1) questions about drug use in the previous month, (2) questions about the frequency and kinds of drug use in the past year, and (3) questions about drug dependency symptoms during the past year.<sup>13</sup> Examination of Table 8-5 reveals that, in general, inconsistencies are more frequent close to reference period boundaries, with a gradual dropoff further from the boundary. Thus, respondents who most recently used a drug 1 to 6 months ago (based on their response to the recency question) gave more inconsistent answers on 30-day use questions and fewer on past-year drug use questions. Similarly, respondents who most recently used a drug between 6 and 12 months ago or 1 to 3 years ago gave more inconsistent answers on 12-month use questions and fewer inconsistent answers on 30-day use questions.

This general finding is well illustrated by the results for reporting of alcohol use during the past year. Figure 8-3 plots the percent of respondents in the self-administered conditions who gave inconsistent answers to the annual use questions. These percents are calculated separately for groups of respondents defined by the timing of their most recent reported use of alcohol. (The caret on the horizontal axis of this figure marks the boundary of the reference period for annual use.) The observed inconsistencies (in both the anchored and the unanchored conditions) occur more frequently among persons whose most recent use of alcohol<sup>14</sup> was nearest the boundary of the reference period (12 months). This supports our supposition that the vagueness of the reference period boundaries

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<sup>13</sup>Table 8-5 presents results for those questions for which sufficient data were available. The number of cocaine users was too small to yield reliable results.

<sup>14</sup>That is, as reported in response to the alcohol recency question.

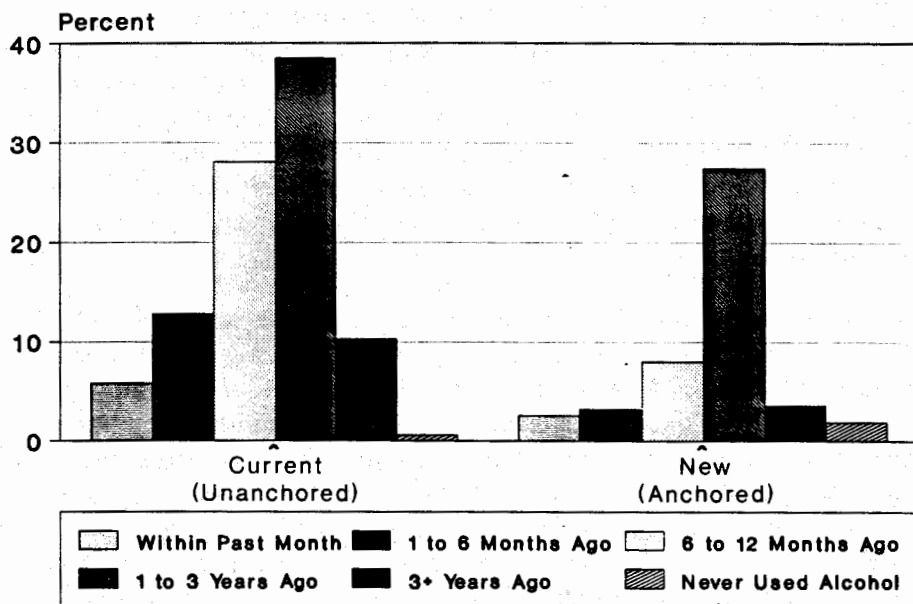
TABLE 8-5 Unweighted Percent of Respondents Giving Answers to Drug Use Recency Questions That Are Inconsistent with Their Answers to Questions About Previous Month and Previous Year Drug Use by Questionnaire Version and Reported Recency of Drug Use

Drug Use Recency	Previous Month				Previous Year <sup>a</sup>				Previous Year <sup>b</sup>			
	A	B	C	D	A	B	C	D	A	B	C	D
<i>CIGARETTE RECENCY</i>												
Within Past Month	0.0	0.0	0.0	0.0	-	-	-	-	8.2	5.9	1.1	0.0
Between 1 and 6 Months Ago	8.7	13.3	6.7	3.7	-	-	-	-	17.4	6.7	13.3	18.5
Between 6 and 12 Months Ago	0.0	0.0	5.0	0.0	-	-	-	-	36.0	26.3	10.0	13.0
Between 1 and 3 Years Ago	0.0	0.0	2.6	2.2	-	-	-	-	2.5	2.2	0.0	2.2
Three or More Years Ago	0.0	0.4	1.5	0.9	-	-	-	-	0.9	0.9	1.5	0.5
Never Used	0.0	0.0	0.0	0.0	-	-	-	-	0.7	0.0	0.0	0.0
<i>ALCOHOL RECENCY</i>												
Within Past Month	6.8	1.9	3.7	0.7	5.8	0.0	2.6	0.2	18.4	11.2	2.4	0.2
Between 1 and 6 Months Ago	31.4	5.4	1.1	1.6	12.8	0.0	3.2	1.6	24.5	17.2	2.1	1.6
Between 6 and 12 Months Ago	7.0	4.3	0.0	0.0	28.1	0.0	8.0	5.4	36.8	21.3	8.0	5.4
Between 1 and 3 Years Ago	7.7	0.0	2.0	0.0	38.5	0.0	27.5	11.1	2.6	2.3	2.0	0.0
Three or More Years Ago	3.5	0.0	3.6	0.0	10.3	0.0	3.6	0.0	0.0	0.0	0.0	0.0
Never Used	0.0	0.0	0.0	0.0	0.6	0.0	1.9	0.0	0.6	0.0	0.0	0.0
<i>MARIJUANA RECENCY</i>												
Within Past Month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Between 1 and 6 Months Ago	56.0	5.3	11.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Between 6 and 12 Months Ago	29.6	0.0	6.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Between 1 and 3 Years Ago	14.8	0.0	4.3	0.0	24.1	0.0	21.3	2.4	7.4	2.4	6.4	2.4
Three or More Years Ago	7.8	1.1	2.8	1.0	4.7	0.6	6.2	0.0	0.0	0.0	1.1	2.0
Never Used	0.2	0.2	0.2	0.0	0.4	0.0	0.2	0.0	0.0	0.0	0.9	0.0

NOTES. Columns labelled A, B, C, and D identify questionnaire versions. The versions are: current wording in self-administered format (A); current wording in interviewer-administered format (B); new wording in self-administered format (C); new wording in interviewer-administered format (D).

<sup>a</sup>Questions about frequency and specific kinds of use during past year.

<sup>b</sup>Questions about drug dependency symptoms during past year.



#### Reference Period Boundary: ^

FIGURE 8-3 Percent of respondents in anchored and unanchored (self-administered) conditions who gave inconsistent responses to questions asking about their use of alcohol during the past year. Percents are tabulated separately for groups defined by the length of time since their most recent use of alcohol (as reported in response to the alcohol recency question).

contributes to inconsistencies in the data. Also, this figure clearly shows that anchoring did reduce the frequency of inconsistent reports.

## CONCLUSIONS

Overall, the foregoing results suggest two broad conclusions. First, respondents are, in general, capable of responding to a self-administered form—even when that form includes many branching or skip instructions. Second, the changes made to the NHSDA questionnaire generally improved respondent understanding of the questions and thereby improved the quality of the data that were collected.

These general conclusions about the practicality of using self-administered forms and the superiority of the new wordings and formats must be qualified in a number of ways. Thus we note that while the self-administered form was previously demonstrated (see Chapter 7) to provide increased reporting of illicit drug use, this comparative advantage is bought at the price of some loss of data. For questions asking about illicit drug use, nonresponse rates were 1 to 2 percentage points higher using

the self-administered format. It would appear that the social relationship between interviewer and interviewee may encourage (or pressure) a small number of respondents to provide a response when they would otherwise have skipped a question asking about their use of illicit drugs. It is not known, of course, whether this small number of additional respondents provide interviewers with accurate reports of their drug use. The prevalence estimates reported in Chapter 7 do, however, engender some skepticism that this is true.

While we also found that the new questionnaire wording generally produced more consistent responses, it too yielded slightly higher non-response rates for questions asking about drug use. (The rates again differed by 1 to 2 percentage points.) The substantive advantages of the new wording were, however, often dramatic. Thus the proportion of respondents giving inconsistent answers to questions about drug use declined in many instances by factors of 2 to 10 and more (see Table 8-2). Moreover, we found that anchoring the reference periods in the new questionnaire not only produced the anticipated decline in inconsistent response but did so for the predicted categories of respondents (i.e., those whose behavior appeared to have changed near the reference period boundary).

There was one important exception to these general findings of the superiority of the new questionnaire wording. That exception involved the reporting of cocaine use. It appears from our analyses that respondents may have difficulty in switching referents from *cocaine* to *crack* to “*forms of cocaine other than crack*.” This switching led to a high level of inconsistent reporting of cocaine use. Inconsistent reporting was particularly high for respondents receiving the new version of the questionnaire. Our analyses led us to suspect that this high level of inconsistent reporting occurred because the new questionnaire wording did not emphasize as strongly as the old wording the fact that the referents were being switched.

The evidence for the ability of respondents to follow branching instructions is relatively strong. In 10 of 12 instances involving the reporting of drug use (Table 8-4), more than 95 percent of respondents correctly followed the branching instructions incorporated in the new version of the questionnaire. (In the two other instances the rate was 93 percent.) Moreover, our analyses indicated that most errors involved respondents answering questions that they should have skipped. Overall, the information loss due to incorrect skipping was extremely low (see Table 8-5). Furthermore, the available evidence suggests that careful attention to the



visual cues provided by the layout of a form can substantially reduce such respondent errors in following branching instructions.

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