

SELF-PROXY RESPONSE STATUS AND QUALITY OF CIGARETTE-RELATED INFORMATION

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I. BACKGROUND FOR THE STUDY

The Fire Safe Cigarette Act of 1990 authorized the U.S. Consumer Product Safety Commission (CPSC) to conduct research and assess the feasibility of developing a performance standard to reduce cigarette ignition propensity. Data were collected at the scene of fires and through a telephone survey to help the CPSC determine the relationship between various characteristics of cigarettes and smokers and the risk of fire.

A methodological study to evaluate the data quality of self- and proxy reports used in the national survey. This study was done by comparing results between the original respondent (whether a self-, smoker proxy, or nonsmoker proxy report) to self-reports at a reinterview.

Data for the national survey were collected for all smokers in a household. The information was reported by one household member 18 years of age or older. For the total of 2,206 smokers, 51.1% were self-reports, 26.2% were smoker proxy reports and 22.7% were nonsmoker-proxy reports. Self-reports for all smokers in a household or selecting one smoker per household were not feasible in the survey. This methodological study assesses the quality of the proxy-reported data.

The proxy information provides a means of obtaining data on more smokers in the fire service area. An important issue is whether the proxy report is as accurate, complete, and reliable as the data that would have been obtained from the actual smoker. Self-reported data are usually assumed to be more accurate, complete, and reliable. However, the survey literature suggests that the distribution of responses from proxies often differs from those of self-respondents without allowing us to conclude which is better. This is because there is rarely an external means available or used to validate the self- and proxy reports, or the study design is limited in some other manner.

Moore (1988), after completing a review of the literature on self-proxy reporting spanning three decades, concludes that this "research has not produced conclusive evidence of consistent response bias or response error variance differences due to the self/proxy status." He attributes this finding to the methodological shortcomings of much of this literature but cautions that "lack of convincing

evidence of quality differences is not synonymous with convincing evidence of no quality differences." The literature is further complicated by findings such as those reported by Mathiowetz and Groves (1985). In reviewing the health survey literature, they found that "although early studies indicate less agreement between the interview report and medical record data for proxy reports than for self reports, more recent studies indicate no difference in response error by type of respondent, or suggest that in some cases proxy reports may be more accurate."

Whether the self-report is of higher quality than a proxy report will depend upon the individual, their circumstances in relation to the subject matter, and the subject matter itself. Proxy reporting for the mentally impaired or for children has been preferred to no data at all. Proxy reporting in cases where a self-report may be subject to a high level of social desirability or sensitivity might be preferred. However, the best report is one that can be recalled and reported most accurately. The acceptability of who will report must be evaluated in light of this criterion.

This empirical study evaluates the reliability and degree of missing information for self- and proxy reports of cigarette-related information. The study is based on comparisons of original responses given by proxies to subsequently obtained responses from the actual smoker. Original self-reports are compared to self-reports in reinterview of the same person as a measure of reliability. This difference in test-retest reliability can then be factored out of proxy/self-report comparisons to draw some conclusions about the validity of proxy responses. The real issue is whether self-reports provide any higher quality information than proxy reports when problems of reliability that exist even for the self-reported data are factored out.

The remainder of this report is organized as follows:

- design of the reinterview study
- report of the findings based on reinterview data
- final conclusions

While the study is limited in scope and design, it provides some assessment of response quality in a decade when large numbers of epidemiological and social studies related to smoking and cigarette usage are and have been undertaken.

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²Preliminary analysis of the main survey of the responses of the three respondent groups is available. The analysis of the main survey is limited by the nonrandom selection of respondents but does attempt to control for respondent characteristics.

II. DESIGN OF THE REINTERVIEW STUDY

In the original survey,² one respondent in each household answered questions about household level data, personal characteristics and smoking behavior of all smokers identified, and the characteristics of cigarettes smoked by all smokers. Although the respondents were self-selected (interviews were conducted with any adult member of the household 18 years of age or older who answered the telephone or was the first eligible adult to come to the telephone), it is instructive to see if there are differences in responses by respondent characteristics. For individual level data, respondents are characterized as:

- self-reporters (smokers reporting their own data)
- smoker proxies (data provided by smokers about other smokers in the household)
- nonsmoker proxies (nonsmokers providing data on smokers)

This section presents a direct assessment of the correspondence between proxy and self-reports for the *same individuals*.

The reinterview sample comprised 600 cases selected from households with three or fewer smokers.

This approach produced 294 completed reinterviews, with 97 that were originally nonsmoker proxy interviews, 95 that were smoker proxy interviews, and 102 that were self-reports. No attempts were made to convert refusals at reinterview.

The reinterview study was restricted to those households with three or fewer smokers in order to reduce the difficulty of identifying the original respondent, since the names of individuals were not collected as part of the original survey. This restricted set comprised 95 percent of the households in the original study. Only one respondent was interviewed in any household at the reinterview. The person to be interviewed was identified by the original reporting status and by demographic information such as age, sex, and education. If there was any question as to whether the respondent was the person originally interviewed, the case was replaced. Similarly, if a respondent refused, no attempt was made to convert the refusal for the reinterview. Because of the decision rules, twice as many cases were randomly assigned as were ultimately thought to be needed.

The questions for the reinterview were worded exactly as they were worded in the main study. An introductory phrase--"as of the date (actual date read) of the previous interview"--was added to questions to place the respondent in the context of the interview date.

Finally, respondents from each of the three groups were randomly assigned to one of two versions of the questionnaire. The only difference between the two versions was the wording of the categories for the income question. In version one, for example, a category reads "\$10,000 - 19,999 a year." In version two, the category reads "\$10,000 up to \$20,000."

III. FINDINGS BASED ON THE REINTERVIEW DATA

This section examines the data from the random sample selected for reinterview, assessing the reliability of proxy responses provided in the main interview by comparing them to a follow-up survey of randomly selected smokers. In addition, because the sample includes reinterviews with some individuals who were interviewed themselves in the initial sample, the (test-retest) reliability of data is measured and the reliability of responses by the type of the initial respondent can be compared. The degree to which individual data items are missing for the original survey and the reinterview survey is also examined.

Analysis of reinterview data included the variables measuring smoker behavior and cigarette characteristics, two household characteristics--number of smokers in household and household income--and smoker's age. The income variable was included because of interest in testing two versions of question wording.

The analysis examines the degree to which reinterview responses match those of the initial survey and how this differs by type of initial respondent. The degree to which the reinterview respondent (always a self report) was able to provide data not reported by proxy respondents is then examined.

The percentage of mismatches varies across variables and original respondent groups. Table I presents the percentage of responses that do not match, given that data was provided on both the original survey and the reinterview. Overall, the percentage of mismatches ranges from zero for whether the cigarette was filtered to 45 percent for income category. The percentages of mismatches for cigarette information ranges from zero for filtered to 32 percent for brand code. Several differences between groups are also seen. Except for household characteristics, the degree of mismatch is highest for cases where the original respondent was a nonsmoker proxy.

Among the measures of smoking behavior and cigarette characteristics, the most notable differences across respondent groups are in the percent of mismatches on brand code, length of cigarette, pack type, and amount smoked. For each of these variables the difference between the group with the highest mismatch and that with the lowest is 10 percentage points or more. However, only the differences for length and pack type were statistically significant at the 5 percent level. While the observed mismatch on these two variables was highest for the nonsmoker proxies, the only large (significant at the 5 percent level) difference between the two proxy groups was for pack type.

The results must be evaluated in light of the degree of mismatch between the self-reports at the original and reinterview since that is as accurate as can be expected for proxy responses. The degree of mismatch for the individuals who originally supplied data on themselves (self-respondents) is surprisingly high for some variables. For example, the self-mismatch for brand code is 25.5%, lower than the degree of mismatch for the two proxy groups (34.4 and 35.1 percent, respectively) but higher than what one

might expect. Because brand code is perhaps the most essential cigarette characteristic collected, two factors will be examined to explain the degree of mismatch:

- the difference in elapsed time between original interview and reinterview for matches and mismatches
- the frequency of brand change cases as reported at reinterview for matches and mismatches

The mean number of days elapsed between interview and reinterview for the sample as a whole was 66.7; 68 for the original self-reporter; 66.5 for the smoker proxy; and 65.7 for the nonsmoker proxy. The range and distributions for elapsed time were also about the same. The nonsmoker proxy had more mismatches on the whole and slightly less time elapsed between original interview and reinterview. Similarly, those cases where the brand mismatched had the least number of elapsed days (63.5) between interviews. While there is some difference, one would expect more accurate and reliable data with the least amount of time elapsing between interviews. Because there is, in fact, less reliability with the least amount of elapsed time, one might conclude that the amount of elapsed time between interviews does not explain the relatively high level of mismatch on brand code for the sample as a whole.

As part of the reinterview, respondents were asked how frequently they changed the brand of cigarette they usually smoked. As expected, if a person frequently changed their brand they would be less likely to recall what brand they were smoking two months or more before the interview. The most frequent brand changers have a greater percentage of mismatch than those who seldom or never change their brand. Also, while respondents were asked to report the usual brand they smoked, some respondents said they had no "usual" brand. In those cases, they were asked to report the brand they smoked most often and, if that was not possible, the brand they smoked closest to the interview. Individuals who had no usual brand may have reported accurately at the time of the interview but could not remember accurately at a later time. (Recall that respondents were asked to think back and report as of the date of the original interview.) Nonetheless, even among self-reporters who say they never change brands, 20 percent gave a different brand at reinterview than they did in the initial interview.

Differences in a proxy's ability to report on the length of cigarette someone else smoked is somewhat understandable. This question provided three answer choices requiring a finer distinction of regular or kings, long or deluxe, and extra long. Most other questions have two answers indicating the presence or absence of a characteristic. This information may be too refined for some proxy reporters. The degree to which this fact affects the use of the data for the 16.4 percent having a mismatch depends on how different the cigarette characteristics (porosity, density, etc.) are when analyzed for these cases by length.

The other cigarette characteristic for which the proportion of mismatches was significantly greater for proxies than for self-reporters was pack type (soft or hard). Again, the overall distribution is quite similar for the original survey response and the reinterview with the smokers themselves, but the original respondents were slightly more likely to indicate soft pack than the reinterview respondents. Examination of the original survey-reinterview crosstabulation for each of the respondent groups shows that this pattern occurs for all three, including the group of original self-reporters. While the proportion of mismatches is clearly lower for the self-reporters (7.4 percent) than for the two proxy groups (especially the nonsmoker proxy group, at 21.6 percent), the pattern of a higher reported use of hard packs in the original interview exists for all groups. Thus, the difference may be due more to the passage of time than an indication that nonsmoker proxies at the original interview gave frequent incorrect responses.

For other measures, the percentage of mismatches was highest for income (45.4 percent) and lowest for age within 2 years (10.3 percent). For income and number of smokers in the household, the highest degree of mismatch was for nonsmoker proxies.

The mismatch on income category for smoker proxies is substantially higher at 64.6 percent than the 35.1 percent for the self-reports and 36.7 for nonsmoker proxies. This sizeable difference suggests that the three groups may differ on other personal characteristics which may be associated with knowledge of household income. For example, more self-reporters were women and survey experience indicates that more women answer the telephone. If this is the case, perhaps more male heads of household were smoker proxies (although complete information is not available from the data set). Other studies indicate that more adult females answer "don't know" to household income questions and that, when the answer is given, it is often different from that reported by the male head of household. However, this is only one possible explanation for the high level of mismatch in the smoker proxy group for the income question.

Although the degree of mismatch was quite high for the income question, the overall reliability was similar for the two versions of the income question (43.1 percent for version 1 overall compared to 47.7 percent for version 2). However, a larger discrepancy exists between the two versions within each of the three respondent groups than overall, ranging from a 15 percentage point difference when the original respondent was a smoker proxy to a 9-11 percentage point difference for the other groups. The differences within subgroups are not large enough to be statistically significant due to small sample sizes.

Finally, the degree of mismatch on age was highest when the original respondent was a nonsmoking proxy, but the difference between this group and the self-reporters in percent mismatched is not large enough to be statistically significant at even the 10 percent level.

Table II shows data on non-response. The figures show the percentage of cases where responses were missing from:

- both the initial interview and the reinterview
- the reinterview only
- the original interview only

Data missing from both interviews indicate no change in the quality of data. If the original respondent was a proxy, data missing from the reinterview indicates that the proxy provided more information than the self-reporter at reinterview, while data missing from the original interview "only" indicate that the proxy provided less information. The amount of data that is missing is another indication of the relative quality of data provided by the three groups of original respondents.

The comparisons indicate that nonsmoker proxies were less likely than other groups to provide data the smoker would have provided as a self-reporter. Noteworthy differences are seen for several smoking measures--whether filtered or mentholated cigarettes are smoked and amount smoked. Smaller differences are seen for length of cigarette and pack type. For other measures, the most noticeable result is the trivial difference on income. The difference on age of smoker is also small.

A comparison of missing data by version of income question indicated no differences overall and, among the subgroups defined by original respondent, differences are seen only for nonsmoking proxies. These differences lead to no conclusions about whether one version is superior.

IV. CONCLUSIONS

While the reinterview survey is modest with a sample size of 300, one person per household in one of each of the three reporting statuses was randomly assigned to the reinterview. Only self-reports were collected at the reinterview. The degree of mis-match in the answers was compared for the original and reinterview response. For cigarette characteristics, notable differences were seen for brand code, pack type, length of cigarette, and amount smoked. However, only the pack type and length of cigarette showed statistically significant differences between the self-self reports and proxy-self reports. The most notable differences were for the nonsmoker proxy group. The degree of mismatch for the brand code was relatively high but the difference between the self-self comparison and the proxy-self comparison was not significant. The level of overall difference reported at the reinterview was thought to be a function of the frequency with which the respondent changed brand. More frequent changes had higher levels of mismatched answers for brand code between the original and reinterview. This is a recall problem and may not reflect a difference due to the self-proxy response status.

More of a difference is seen between the self- and proxy reports when the degree of missing data is examined. The nonsmoker proxy group had more missing data in the original survey. The degree of missing data is the greatest for filtered, mentholated, and the amount smoked questions.

In this study, any missing data in the "key" code usually resulted in the deletion of the case. The "key" code comprised manufacturer's code, brand code, length of cigarette, filter, pack type, and whether mentholated. If

anything is missing in this string, the case is usually deleted from the analysis since it could not be matched to the manufacturer's data on density, porosity, etc. Practically this means that, while the nonsmoker proxy data is not as reliable on some measures, its higher degree of missing information will result in a higher proportion of these cases being deleted from the analysis. Furthermore, when distributions of the group data between the original and reinterview sample are compared after these cases are deleted, they are similar on the measures of interest.

One limitation of the study is that respondents were not randomly assigned to one of the three groups in the original survey. The self-reporter was merely the person who answered the telephone. Therefore, generalizations about differences in the three groups are limited by the fact that these differences could merely be related to differences in the characteristics of the population in the three groups, although analysis of demographic differences between the three groups does not indicate that this is the case.

This study was designed as a modest attempt to evaluate differences in the quality of the data between the self and proxy reports. The self and smoker proxy reports compare favorably. There were some differences for the nonsmoker proxy reports, particularly for the length of the cigarette and pack type. The percent of cases in the original survey of 2,206, which were nonsmoker proxy reports, is 22.7. Furthermore, many of these cases were dropped from the analysis due to missing data. However, future cigarette-related studies might consider restricting the reporting respondent for a household to a smoker. Further research of the response quality of self-proxy reported cigarette-related information would benefit from a formal experiment with a larger sample size, initial random selection of the reporting respondent in the household (not just the person who answers the telephone), and creative use of validating measures, such as the use of diaries by all smokers in the household.

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TABLE I

PERCENTAGE OF CASES WHERE REINTERVIEW RESPONSES DO NOT MATCH ORIGINAL RESPONSE.
BY TYPE OF RESPONDENT TO ORIGINAL INTERVIEW

Variable	Percentage (%) Mismatch and Number of Cases							
	Original Respondent			Total Sample	χ^2	Df	p =	Significant Contrasts ^a
	1 Self	2 Smoker Proxy	3 Nonsmoker Proxy					
1. # Smokers in HH Sample Size	11.1 99	28.4 95	14.4 97	17.9 291	11.07	2	0.004	1-2, 2-3
2. Brand Code Sample Size	25.5 98	34.4 93	35.7 90	32.0 281	.04	2	0.218	None
3. Length of Cigarette (Regular/Long/Extra Long) Sample Size	7.1 98	19.6 92	23.3 90	16.4 280	9.94	2	0.007	1-2, 1-3
4. Filtered or Not Sample Size	0.0 98	0.0 95	0.0 90	0.0 283	NA	NA	NA	None
5. Pack Type (soft or hard) Sample Size	7.4 95	10.0 90	21.6 88	12.8 273	9.22	2	0.010	1-3, 2-3
6. Mentholated or Not Sample Size	4.1 98	9.5 95	6.1 87	6.8 280	2.22	2	0.330	None
7. Amount Smoked Per Day (Whether more than a pack) Sample Size	13.1 99	22.6 93	25.3 83	20.0 275	4.76	2	0.092	1-3
8. Annual HH Income (in \$10,000 intervals) ^b Sample Size	35.1 77	64.4 73	36.7 68	45.4 218	6.33	2	0.042	1-2, 2-3
9. Age Within 2 Years Sample Size	8.2 98	7.5 93	15.2 92	10.3 283	93.68	2	0.159	NA

Includes only cases where a valid response (other than don't know) was provided on both surveys.

^aComparisons where the between group difference is significant at the 5 percent level. Contrast 1-2 is self vs. smoker proxy, 2-3 is smoker proxy vs. non-smoker proxy, 1-3 is self vs. non-smoker proxy.

^bTwo versions of the income question were asked. The analysis detailed significant differences in mismatches between versions, either overall or with the groups of original respondents. Percent mismatched were 43.7 for Version 1 and 47.7 for Version 2 ($\chi^2 = 0.46$, $Q_p = 0.496$).

TABLE II

MISSING DATA BY TYPE OF ORIGINAL RESPONDENT

		Self (n = 102)	Smoker Proxy (n = 95)	Non-Smoker Proxy (n = 98)	Total	χ^2	p =
<u>Number of Smokers in Household</u>	Data Missing From: Both Reinterview Original	0.0 2.9 0.0	0.0 0.0 0.0	0.0 2.0 0.0	0.0 1.7 0.0	2.6	0.265
<u>Brand Code</u>	Data Missing From: Both Reinterview Original	0.0 2.9 0.0	0.0 0.0 0.0	0.0 1.0 0.0	0.0 1.4 0.0	3.31	0.192
<u>Length</u>	Data Missing From: Both Reinterview Original	1.0 2.9 0.0	0.0 0.0 3.2	0.0 2.0 6.1	0.3 1.7 3.1	10.80	0.095
<u>Filtered</u>	Data Missing From: Both Reinterview Original	0.0 2.9 1.0	0.0 0.0 0.0	0.0 1.0 7.1	0.0 1.4 2.7	14.39	0.006
<u>Pack Type</u>	Data Missing From: Both Reinterview Original	2.9 2.9 1.0	0.0 3.2 2.1	1.0 2.0 7.1	1.4 2.7 3.4	9.93	0.128
<u>Mentholated</u>	Data Missing From: Both Reinterview Original	1.0 2.9 0.0	0.0 0.0 0.0	1.0 1.0 9.2	0.7 1.4 3.1	22.97	0.001
<u>Amount Smoked</u>	Data Missing From: Both Reinterview Original	0.0 2.9 0.0	0.0 0.0 2.1	1.0 2.0 12.2	0.3 1.7 4.8	22.62	0.001
<u>Income</u>	Data Missing From: Both Reinterview Original	10.8 7.8 9.8	7.4 7.4 8.4	6.1 9.8 10.2	8.1 9.8 8.1	6.00	0.424
<u>Age of Smoker</u>	Data Missing From: Both Reinterview Original	0.0 2.9 1.0	0.0 0.0 2.1	0.0 1.0 5.1		6.66	0.155

NOTE: The χ^2 statistic reported in the fifth column is for a test of whether the distributions of the responses for the three types of respondents differ by more than might be expected due to normal sampling variability, if the three samples had each been drawn from the same population. The p value in the last column gives the probability of observing a dispersion as large as that which is actually observed if the samples had been drawn from the same population.