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FOLLOW-UP STRATEGIES IN A MAIL SURVEY: EFFECT ON RETURN RATE AND RESPONSE BIAS

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The present study was designed (1) to assess the effects of various follow-up techniques on the return rate and response bias of demographic and attitudinal measurements, and (2) to explore the possibility that reaction to extensive follow-ups biases the responses from initially uncooperative selectees.

Approximately 1500 Navy and Marine Corps personnel from San Diego were → next page

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mailed the DoD Family Housing Preference Survey and were assigned to 10 follow-up groups. Eight of the groups formed a completely crossed 2 x 2 x 2 design, defining the follow-up by type of mail, type of material, and number of follow-ups. Two additional groups were formed, one receiving no follow-up and the other receiving extensive follow-up. Both return rate and response bias on 12 attitudinal and demographic variables were studied.

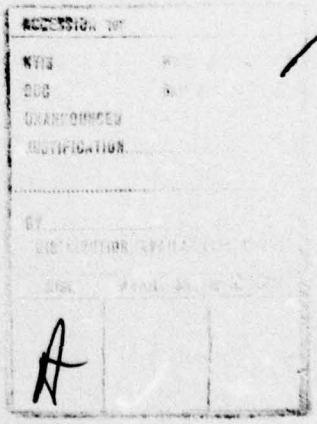
The results in this study indicate that some type of follow-up procedure results in greater return rates than no follow-up. Response bias was found in some variables.

FOREWORD

This study was sponsored by the Naval Facilities Engineering Command (NAVFACENGCOM). It was conducted in conjunction with the Department of Defense Family Housing Preference Survey of 1975.

All phases of the project were directed by E. P. Somer to whom a special word of appreciation is due for his valuable suggestions and guidance throughout the project.

J. J. CLARKIN
Commanding Officer



SUMMARY

Problem

A widely held view in survey research is that response bias significantly affects population parameter estimates. Numerous studies have documented effects on demographic variables, but few have researched the effects on attitudinal measures.

Purpose

The present study was designed to assess the effects of various follow-up techniques on return rate and response bias in mail surveys involving demographic and attitudinal measurements, and to explore the possibility that negative reaction to extensive follow-ups biases the responses from initially uncooperative selectees.

Approach

Approximately 1500 Navy and Marine Corps personnel from San Diego who received the DoD Family Housing Preference Survey were assigned to 10 follow-up groups. Eight of the groups formed a completely crossed 2 x 2 x 2 design, defining the follow-up by type of mail (special delivery or regular mail), type of material (letter only or letter and additional questionnaire with return envelope), and number of follow-ups (one or two). Two additional groups were formed, one receiving no follow-up and the other receiving extensive follow-up.

Both return rate and response bias on 12 attitudinal and demographic variables were studied using a three-way analysis of variance to compare the eight treatment groups, and two linear contrasts to compare them to the no follow-up and extensive follow-up groups.

Findings

Using a significance level of .01, the eight treatment groups were not found to differ on return rate, but did differ significantly from both the no follow-up group and the extensive follow-up group.

Regarding response bias, two of the attitudinal variables indicated differences in means between the no follow-up groups and the eight treatment groups, but no differences were found between the eight treatment groups and the extensive follow-up group. The analyses of variance among the eight treatment groups indicated inconsistent effects, with four significant main effects and six significant interactions.

Late respondents were expected to be more neutral on satisfaction and policy items than the early respondents, but this expectation was not confirmed.

Conclusions

This study's results support those of earlier studies, which indicated that employing some type of follow-up elicits greater return rates than using no such procedure. With the exception of extensive follow-up, there was no evidence that one follow-up technique is more effective than another.

The population parameters of the attitudes investigated may be more accurately estimated by obtaining a larger sample of respondents through follow-up treatments. However, if the issues studied are not critical, and small differences in any one of the variables carry low or no risks, then a follow-up need not be obtained.

Recommendations

Further studies of respondents should be carried out to explore the consistency of differences between various treatment groups when the issues and population differ from those in this study. Investigators employing mail surveys should attempt to determine whether a bias exists through the use of a follow-up on a subsample of nonrespondents. In addition, a letter follow-up is recommended over a duplicate package of materials by special delivery, due to the lower cost and the failure to produce a consistent bias.

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INTRODUCTION

Problem

A widely held view in survey research is that response bias significantly affects population parameter estimates. There are numerous studies documenting demographic differences between early respondents, late respondents, and nonrespondents. However, such demographic differences do not necessarily indicate that the responses to attitudinal measures are also affected by a response bias. A need therefore exists for empirical testing of this assumption using attitudinal measures typical of survey research.

Survey follow-ups appear to be consistently successful in increasing the return rate (Bachrach & Scoble, 1967; Donald, 1960; Eckland, 1965; Goldstein & Kroll, 1957; Hinrichs, 1975; Levine & Gordon, 1958; Scott, 1961; Suchman & McCandless, 1940). Since follow-ups almost always increase return rates, it is worthwhile to know what kinds of and how many follow-ups most effectively increase return rate and/or decrease response bias.

Because so few studies have employed simultaneous comparisons of several different follow-up techniques in relation to both return rate and response bias (Friedman & Goldstein, 1975; Field, 1975; Nevin & Ford, 1976; Panos & Rice, 1967), there is a need for further investigation in these areas.

Purpose

The present study, which was designed to assess the relative values of several methods of follow-up in a mail survey, concerns three factors of follow-ups: type of mail, type of material, and number of follow-ups. The specific purposes are:

1. To compare the effects of various follow-up techniques (including no follow-up) on the obtained return rate.

2. To determine whether population parameter estimates of attitudes are affected by the use of various follow-up techniques and to compare these estimates with those obtained when no follow-up is used.

3. To test the theory that individuals react negatively to increased urging to respond to a mail questionnaire survey and that this reaction biases responses to attitudinal items.

Background

Return Rate

"Type of mail" has been covered extensively in the literature on return rates for the original mailing. Few studies, however, have concerned themselves with the type of mail employed in the follow-up. Landy and Bates (1973) found neither main nor interaction effects for return rate in a 3 x 3 x 3 (type of postage x degree of personalization x nonmonetary reward) design. Special delivery follow-ups are generally more effective than first-class mail follow-ups (Blumberg, Fuller, & Hare, 1974; Champion & Sear, 1969;

Gullahorn & Gullahorn, 1959; Kephart & Bressler, 1958; Phillips, 1951; Slocum, Empey, & Swanson, 1956), and hand-stamped envelopes are generally more effective than postage-permit envelopes (Champion & Sear, 1969; Gullahorn & Gullahorn, 1959; Hammond, 1959; Kimball, 1961; Robinson & Agism, 1951; Watson, 1965).

Very few studies have been concerned with the type of material used in the follow-up. A postcard follow-up was shown to be as effective as a letter follow-up (Sletto, 1940; Watson, 1965). Sheth and Roscoe (1975), using a 2 x 4 x 8 factorial design (questionnaire length x type of follow-up method x geographical region), found that a telephone reminder was most effective and a letter alert followed by a telephone interview, least effective. Only one study (Etzel & Walker, 1974) investigated the relative advantages of including a new questionnaire with the follow-up letter, finding that the response rate among the group receiving only the letter was slightly (but not significantly) higher than that for the group receiving an additional questionnaire.

Thus, only a few of the studies cited above investigated several follow-up methods simultaneously or compared special delivery and regular mail follow-ups. Only one compared a letter-only follow-up to a letter and a new questionnaire.

Response Bias

Response bias has been studied by determining whether differences exist between respondents and nonrespondents or between early respondents and late resondents. The findings can be grouped into three variable categories: demographic, attitudinal, and other (behavioral, personality, and aptitude).

Demographic Variables. The literature relating demographic variables to survey response behavior is extensive and shows differences in income, age, education, marital status, sex, family size, and ethnicity (Baur, 1947; Bell, 1961; Benson, Booman, & Clark, 1951; Britton & Britton, 1951; Clausen & Ford, 1947; Davis, 1964; Donald, 1960; Ellis, Endo, & Armer, 1970; Ferber, 1956, Franzen & Lazarsfeld, 1945; Gannon, Nothern, & Carrol, 1971; Gaudet & Wilson, 1940; Hilgard & Payne, 1944; Hochstim & Athanasopoulos, 1970; Hood & Back, 1970; Kirk & Sereda, 1969; Lowenstein, Colombotos, & Elinson, 1962; Lundberg & Larsen, 1949; Mayer & Pratt, 1966; Ognibene, 1970, 1971; Parten, 1950; Robins, 1963; Roeher, 1963; Rosnow, Rosenthal, McConochie, & Arms, 1969; Sobol, 1959; Stonborough, 1942; Suchman & McCandless, 1940; Suchman, 1962; Vincent, 1964; Wallace, 1954).

Attitude Variables. Several studies have also demonstrated that respondents tend to have greater interest in the topic or the sponsoring organization than nonrespondents or late respondents (Ball, 1930; Bell, 1961; Donald, 1960; Edgerton, Britt, & Norman, 1947; Franzen & Lazarsfeld, 1945; Larson & Catton, 1959; Lundberg, 1942; Newman, 1962; Pace, 1939; Scheverian & Blaine, 1966, Shuttleworth, 1941; Stanton, 1939).

Broedling and Fuller (1976), surveying the same sample four times with four separate surveys, used the proportion of surveys returned as an index of each subject's tendency to respond to mail surveys. A number of demographic characteristics were related to response tendency but no relationship was found between response tendency and the attitudes assessed by each item individually.

Other Variables (Behavioral, Personality, and Aptitude). Ognibene (1970) found respondents to differ from nonrespondents on leadership, gregariousness, and reading habits. Lubin, Levitt, and Zuckerman (1962) found respondents to be more orderly and dependent, but less aggressive, dominant, autonomous, and intraceptive. Vincent (1964) found respondents to be more responsible, tolerant, and intellectual. Macek and Miles (1975) found respondents to have a higher mean IQ than nonrespondents.

Relationship to Mail Survey Method. A few studies have related response bias to survey method. The ethnicity (Friedman & Goldstein, 1975) and sex (Field, 1975) of the signature on the cover letter were found to affect neither rate of return nor response bias on attitude items.

Nevin and Ford (1976) studied the effects of a follow-up that included a veiled threat (that the nonrespondent would continue receiving such letters until he responds) or a casual letter. The response rate for the "veiled threat" group was significantly higher than for the "casual letter" group, but the researchers found no response bias on the questionnaire concerning residents' attitudes about university residence halls.

Panos and Rice (1967) used a 2 x 2 x 3 design (type of cover letter x type of outgoing postage x class of outgoing mail). They found significant main effects on response rate but not on the measures--mostly aptitude variables--obtained from the respondents.

Correcting for Response Bias

Four methods have been proposed to correct for possible response bias: (1) using population data, (2) obtaining a subsample with a 100 percent return rate, (3) using early and late respondents, and (4) relating the probability of responding to actual response.

Using Population Data. By comparing the respondents and nonrespondents on dimensions for which complete data are available for the entire population, weighting schemes can be developed for making the respondents representative of the population. Mandell (1974) presented a method for determining the bias in the estimate of a population mean as a function of differential response rates among subgroups, based on background variables. Rubin (1975) developed a method (based on Bayesian techniques) that estimates the effect of nonrespondents, using the linear relationship of background variables to observed variables. It requires the assignment of two subjective parameters that summarize the researcher's notions about the similarity of these relationships for respondents and

nonrespondents. However, weighting nonrespondents according to the similarity of their biographical characteristics to those of the respondents does not necessarily correct the sample's biased composition.

There are dangers in using this method. An absence of bias in the background variables does not imply an absence of bias in the variables measured on the survey (Donald, 1960; Ford & Zeisel, 1949). Similarly, when differences are observed in background variables, it is not possible to determine whether the source of this difference is due to nonresponse or to other aspects of sampling (Lowe & McCormick, 1955).

Obtaining a Subsample with 100 Percent Return Rate. Drawing a subsample of the nonrespondents and making every effort to obtain responses is proposed by several methodologists. Birnbaum and Sirhew (1950), Fuller (1974), and Hansen and Hurwitz (1946) present methods for correcting the estimates based on the responses from the subsample. El-Badry (1956) proposed a variation of this method in which, using a stepwise procedure, a random sample of nonrespondents at each wave receives a follow-up (questionnaire or other methods), with the last wave consisting of the most resistant subjects. Each method assumes that a 100 percent subsample can eventually be obtained, an unrealistic assumption in most applied settings.

Using Early and Late Respondents. This method of correcting for response bias (1) assumes that the tendency to respond lies on a continuum, and (2) utilizes data from the late respondents to estimate information on the nonrespondents. Methodologists who have described this approach assume either that the nonrespondents resemble the late respondents or that nonrespondents are more extreme that late respondents (Bridge, 1974; Clausen & Ford; 1947; Deming, 1953; Donald, 1960; Edgerton, Britt, & Norman, 1947; Ellis, Endo, & Armer, 1970; Ferber, 1948; Filion, 1974; Franzen & Lazarsfeld, 1945; Hilgard & Payne, 1944; Kivlin, 1965; Larson & Catton, 1959; Lehman, 1963; Lundberg & Larsen, 1949; Mayer & Pratt, 1966; Newman, 1962; Pace, 1939; Reid, 1942; Robins, 1963; Scheverian & Blaine, 1966; Shuttleworth, 1939, 1940; Suchman & McCandless, 1940; Toops, 1926).

If the assumptions are valid, this method may make it possible to accurately estimate the population parameters. However, past studies generally fail to support the assumption that nonrespondents are more like late respondents than early respondents (Baur, 1947; Eckland, 1965; Ellis, Endo, & Armer, 1970; Filion, 1974; Ford & Zeisel, 1949; Kivlin, 1965; Mayer & Pratt, 1966; Pace, 1939; Scott, 1961).

Filion (1974) fit a linear regression over cumulative response waves to examine the response bias in the Canada Migratory Game Bird Harvest Survey. He found good linear fits to three waves of responses on behavioral measures (e.g., proportion of permit holders who hunted at least one day), but these measures changed very little with the addition of respondents at each wave.

Eckland (1965) found that college dropouts required less prodding to respond than graduates, but that there was no relationship between the amount of prodding required and the veracity of respondents' replies.

Clausen and Ford (1947) found that educational plans changed monotonically from first- to second- to third-wave respondents. However, the relationship does not appear to be linear.

Ellis, Endo, and Armer (1970) explored trends in their measurements by dividing their target population into early respondents, late respondents (respond only after one follow-up), potential nonrespondents (resisting normal follow-up but responding to special efforts), and nonrespondents. They found no evidence of a linear trend on demographic variables. On three academic potential variables, they found monotonically decreasing curves, but quantitative Scholastic Aptitude Test was the only one for which linear extrapolation would have been effective. On four academic performance variables, no fits appear to be linear and only one is monotonic. In all seven academic variables, the potential respondents resembled the late respondents more than they resembled the nonrespondents, which runs counter to the assumptions of several schemes for correcting for nonrespondents. Thus, although there was no bias on demographic variables, there was a bias on academic potential variables, and the direction, although not the magnitude, could generally be predicted.

Relating the Probability of Responding to Actual Response. Tsai (1973) developed a method that uses two or three mailings of surveys, different in content except for the item(s) on which a response bias is being estimated. All mailings are sent to a random sample of the population, and the number of surveys responded to indicates the probability of responding. A functional relationship between probability of responding and actual response is found from which the population mean may be estimated. As described in the Response Bias section, this method was employed by Broedling and Fuller (1976) who found no relationship between tendency to respond and attitudinal measures.

None of the methods available for correcting for response bias is free from inherent difficulties: (1) demographic variables may indicate a difference when none is present, and vice versa, (2) a subsample with 100 percent return rate is extremely difficult to obtain, (3) nonrespondents are not always similar to late respondents, and (4) tendency to respond may not be related to actual responses.

Reactance Theory

Brehm (1966) postulated that each individual has a set of behavioral freedoms and that, if any of these freedoms is threatened, the individual will react and become motivated to reestablish his freedom. Social influence, or persuasive communication, has been studied extensively as one major determinant of reactance. Typically, laboratory experiments have manipulated social influence by having confederates restrict the subjects' freedom of choice through freedom-threatening statements (Brehm & Sensenig, 1966; Worchel & Brehm, 1971). The importance of the threatened freedom to the subject and whether or not the subject was able to attribute causality for the behavior to environmental influences were found to affect the degree of reactance experienced (Worchel & Andreoli, 1974).

Reactance has also been used as an explanation for an individual's unwillingness to help others. Berkowitz (1973) contended that a demand (explicit or implicit) to help someone, and even a felt obligation, is a bothersome threat to the individual's freedom of action. He cites evidence that, at times, increased pressure to aid a person in need reduces the individual's willingness to help the one who is dependent upon him.

Organ (1974) found that conferral of a favor by a superior on a suborinate will generate counter-compliance on the part of the subordinate in a situation which restricts the subject's range of freedom (e.g., a high degree of surveillance). Mazis (1975) cites other factors that have been found to affect reactance: conformity pressures, the involvement of peers in eliminating alternatives, and individual difference variables (including feelings of competence, feelings of inadequacy, and locus of control).

Mazis (1975), in a study of housewives' responses to implementation of an antiphosphate ordinance, found that the principal mode of response was toward reduced attractiveness of the forced alternative.

These findings could be extended to the situation encountered in mail surveys. The more the subject's freedom is restricted by pressure to respond to the survey, the more likely he is to negatively react toward the survey. His feelings could be expressed directly by not responding to the survey, or indirectly in terms of the attitudes expressed on the topic of the survey.

METHOD

Sample

This study was conducted in 1975 as part of the Department of Defense Family Housing Preference Survey (Stumpf & Kieckhaefer, 1975). A questionnaire was used to obtain both demographic and attitudinal data from military families. The questionnaire was mailed to a systematic sample and stratified by paygrade group,[1] with disproportionate sampling of the various groups (Table 1). Selection for the survey was limited to military personnel having dependents who either lived with them or were primarily supported by them.

The follow-up study was confined to the San Diego portion of the survey sample. Approximately 1500 Navy and Marine Corps personnel were chosen at random and assigned to 10 follow-up groups.

Since the sampling was disproportionate by paygrade, the selectees within each of the 10 groups were weighted by paygrade group in all analyses, based upon the population of personnel meeting the criteria for possible inclusion in the survey as reported in the Navy and Marine Corps personnel strength reports as of 31 January 1975 (Table 2).

Design and Data Collection

Each individual selected for inclusion in the survey was sent a package of materials in a government-franked envelope marked "first class" and mailed to his duty station address. This package included the following items:

1. A cover letter signed by the Deputy Assistant Secretary of Defense.

2. A military questionnaire containing 107 multiple-choice items and an optical scan answer sheet.

3. A spouse questionnaire containing 87 multiple-choice items and an optical scan answer sheet.

4. A Family Housing questionnaire containing 20 items (some write-in and some multiple choice) with two separate instruction sheets.

5. A franked return envelope.

All variables included in this study were obtained from the military questionnaire (item 2 above).

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[1]The strata were (1) E-1 to E-3, (2) E-4 to E-6, (3) E-7 to E-9, (4) WO-1 to WO-4 and O-1 to O-3, (5) O-4 to O-5, and (6) O-6.

Table 1

Survey Population by Paygrade Stratum and Follow-up Group

Follow-up Group	Paygrade Stratum 1	2	3	4	5	6	Group Total
I	19	18	16	18	18	7	96
II	21	18	15	17	18	7	96
III	21	17	17	17	16	8	96
IV	21	14	17	18	17	9	96
V	23	16	15	18	16	8	96
VI	21	14	17	18	17	9	96
VII	21	16	14	17	19	9	96
VIII	21	17	17	19	15	7	96
IX	22	17	16	17	16	8	96
X	125	106	99	98	99	65	592
Stratum Total	315	253	243	257	251	137	1456
Target Population	4983	22826	6387	3398	2055	294	

Table 2

Subject Weighting by Paygrade Stratum and Follow-up Group

Follow-up Group	Paygrade Stratum 1	2	3	4	5	6
I	.63	3.05	.96	.45	.27	.10
II	.57	3.05	1.02	.48	.27	.10
III	.57	3.23	.90	.48	.31	.08
IV	.57	3.92	.90	.45	.29	.08
V	.52	3.43	1.02	.45	.31	.08
VI	.57	3.92	.90	.45	.29	.08
VII	.57	3.43	1.10	.48	.26	.08
VIII	.57	3.23	.90	.43	.33	.10
IX	.55	3.23	.96	.48	.31	.08
X	.59	3.19	.96	.51	.31	.07

Note: For paygrade i, $w_i = \frac{n}{N} \cdot \frac{N_i}{n_i}$

where n = sample size, N = population size, n_i = size of ith sample stratum, and N_i = size of ith population stratum.

After the original mailing, follow-up treatment varied among the groups. A completely crossed three-factor design with two levels for each factor was employed. The three factors designated (1) whether the follow-up was sent by regular mail or by special delivery, (2) whether the selectee was mailed only a letter in the follow-up(s) or a letter with duplicates of the original materials, and (3) whether one or two follow-ups were sent. In addition, one group received no follow-up and one group received as extensive a follow-up as possible (after receiving two special delivery package follow-ups), including phone calls and additional mailings.

Each member of Group I was sent one follow-up letter by regular mail; Group II, one by special delivery; Group III, two letters by regular mail; and Group IV, two by special delivery. Each member of Group V was sent one follow-up package by regular mail; Group VI, one by special delivery; Group VII, two packages by regular mail; and Group VIII, two by special delivery. Members of Group IX received extensive follow-up and Group X, no follow-up. (Groups I-VIII are subsequently referred to as "treatment groups.")

The first follow-ups were mailed to nonrespondents approximately 10 days after the original mailing, and the second to those who still had not responded about 1 week later. No further attempts were made to contact selectees in Groups I-VIII or Group X, but any responses received from these groups up to a year after the original mailing were included in the analysis.

The analyses of the 12 variables employed are based upon the usable responses obtained from those military personnel who were accompanied by their dependents and were still stationed in San Diego when they completed the survey (Table 3). About 5 percent of all those responding to the survey were instructed not to provide any attitudinal data because they were not living with their dependents at the time of the survey. These individuals were included in the computation of return rates but not in the analyses of response bias.

Additional respondent losses were experienced due to ship deployments, frequent transfers to other duty stations, and omission of the respondent's social security number, which was required to identify which treatment group he belonged to. Although only a small percentage of the obtained responses were unusable, the actual return rates would be higher than reported herein if the unreachable and unidentifiable individuals had not been considered part of the selected sample. However, it was decided not to distinguish between unavailables, unwilling nonrespondents, and the small number of respondents who refused to identify themselves, since the study was designed to compare the obtained, usable responses.

Table 3

Number of Subjects (with Dependents) Who Responded

Follow-up Group	Paygrade Stratum 1	2	3	4	5	6	Group Total
I	2	8	11	9	8	5	43
II	4	9	10	7	10	3	43
III	3	10	9	9	10	5	46
IV	3	10	13	11	12	6	55
V	4	6	10	7	11	5	43
VI	3	8	5	7	8	5	36
VII	4	7	7	8	11	7	44
VIII	1	10	7	7	6	4	35
IX	4	9	11	16	13	6	59
X	6	24	31	30	49	38	178
Stratum Total	34	101	114	111	138	84	582

The primary concern was not with the specific factor motivating the individual selectee to respond but, rather, with a comparison of the different follow-up methods to see whether, as a whole, the responses obtained using one follow-up method differ from those obtained using other follow-up methods. Thus Groups I-IX are composed of a variety of respondent types (e.g., the respondents assigned to a group receiving two follow-ups are those who responded without any follow-up, those who responded after one, and those who required two before responding). In other words, the "two follow-ups" groups are typical of the total sample of responses one would be likely to obtain using a mail survey with two follow-ups.

Description of Variables

The 10 groups were compared with regard to (1) return rate and (2) 12 selected variables, categorized as measures of preference, demographics, importance, satisfaction, and opinions (see Table 4). Demographic and attitudinal variables were selected from the large number of items on the questionnaire, based on two criteria: (1) no pair of variables should yield a Pearson product moment correlation coefficient less than .50 (to avoid redundancy), and (2) the selected variables should represent a broad variety of the variable types likely to be found in survey research.

Table 4

Description of Variables Used in Study

Category	Variable Number	Variable Name	High Score Indicates
Preference Measures	1	Preference for civilian community	Prefers civilian[b] community
	2	Preference for military career	Prefers military career
Demographic Measures	3	Number of dependents you live with	Large number of dependents
	4	Paygrade group	High paygrade
	5	Housing location	Occupies civilian housing[a]
Importance Measure	6	Perceived importance of various military benefits and facilities	Low importance[b]
Satisfaction Measures	7	Satisfaction with quality of life	High satisfaction[b]
	8	Satisfaction with amount of housing allowance for paygrade	High satisfaction
	9	Satisfaction with current housing costs	High satisfaction
Opinion Measures	10	Opinion of present policy for building military family housing	Favorable opinion
	11	Opinion of variable housing allowance policy	Favorable opinion
	12	Opinion of fair market rental policy	Favorable opinion

[a]Mobile home occupants were excluded from this measure.

[b]Multiple item scaled score.

Hypotheses and Predictions

Return Rate

Higher pressure groups will yield higher return rates than lower pressure groups. Specifically:

1. One follow-up will yield a higher return rate than no follow-up, and two will yield a higher rate than one.

2. Extensive follow-up will produce the highest return rate.

3. Use of special delivery mail will yield a higher return rate than regular mail.

4. A package of duplicate materials will result in a higher return rate than a letter alone.

Response Bias

It was expected that those with the greatest interest in the survey topic or the sponsoring organization and those holding the most extreme opinions on the survey topic would be the two groups most likely to respond. Two types of predictions arise:

1. On variables 1-6 (preference, demographic, and importance), the groups receiving the greatest pressure to respond would have different mean scores than those receiving less pressure. Specifically, higher pressure groups would score higher on variables 1, 5, and 6, and lower on variables 2, 3, and 4, based on past research on demographic variables (Broedling & Fuller, 1976) and the expectation that those involved in the military community would be more likely to respond.

2. On variables 7-12 (satisfaction and opinion), respondents in the groups receiving the greatest amount of pressure would have less extreme opinions and, therefore, smaller group standard deviations, when compared with those receiving less pressure to respond.

Reactance Theory

On the basis of reactance theory, it was predicted that the higher pressure groups would react more negatively to the preference, attitude, satisfaction, and opinion variables. Specifically, they would be expected to have (1) higher mean scores on variables 1 and 6 and (2) lower mean scores on variables 2 and 7-12. It should be noted that some of these predictions differ from those based on response bias research. The extent to which each set of predictions is supported will be discussed in Results.

Method of Analysis

Several analyses were performed on the responses from the 10 groups, including a three-way analysis of variance (ANOVA) on the 8 treatment groups and two one-way ANOVAs using linear contrasts. The first contrast compared

the mean of the treatment groups with that of the extensive follow-up groups and the second, the mean of the treatment groups with that of the control group. Because a large number of statistical tests were performed on the data, the alpha level of significance was set at .01. Since the design used disproportionate sampling, the weights appearing in Table 2 were applied to all observations. Let w_i be the weight for person i and x_{ij} be the response from person i on item j. Then, for example, the estimate of the mean for item j is

$$\frac{\sum_{i=1}^{n} w_i x_{ij}}{\sum_{i=1}^{n} w_i} .$$

The return rate was computed similarly for all selectees in a given group, assigning a value of 1 to x if the person responded and 0 if the person did not respond.

RESULTS AND DISCUSSION

Return Rate

Using the techniques described previously, return rates for the 10 groups were compared (Tables 5-7). A t-test comparing the mean of the treatment groups with that of the no follow-up group resulted in a significant difference ($t = 5.10$, $p < .01$), indicating that using some follow-up procedure will yield a far greater return rate than using none at all. A similar t-test, which compared the mean of the treatment groups with that of the extensive follow-up group, also resulted in a significant difference ($t = 4.76$, $p < .01$), indicating that still greater return rates can be achieved through extensive follow-up. However, the three-way analysis of variance on the eight treatment groups indicated that the type of mail, the number of follow-ups, and the type of follow-up material (letter vs. package) did not affect the return rate; i.e., none of the main effects or interactions for these factors were significant at the .01 level.

Certain aspects of the procedures used may account for the non-significant differences in return rate. First, the "special delivery" follow-ups may have been distributed simultaneously with the regular mail distributed at the duty station. Thus, while the selectee might be impressed by the "special delivery" stamp on the envelope, it would not be likely to have the same impact as if the letter or package had been specially delivered to his residence. Second, the fact that the first and second follow-ups were very closely spaced (1 week apart) may have lessened the impact of the second follow-up. Third, the "letter vs. package" comparison may have been affected by two offsetting tendencies: while the follow-up package may have encouraged responses from some selectees who misplaced or discarded the original package, the large number of items included in the follow-up package may have guaranteed reactance among other selectees and made them less likely to respond than those receiving only a letter follow-up.

Response Bias

Measures of Central Tendency

Group means are shown in Table 8. Linear contrasts between the no follow-up and treatment groups and the treatment and extensive follow-up groups indicated that none of the differences in any of the six variables for which mean differences were predicted (variables 1-6) were statistically significant at the .01 level, despite the fact that return rates differed substantially (ranging from .26 to .77).

Table 5

Return Rate for Each Follow-up Method

Type of Follow-up	One Follow-up		Two Follow-ups	
	Regular	Spec. Del.	Regular	Spec. Del.
Letter	.46	.50	.52	.61
Package	.46	.43	.43	.46

Table 6

Mean Return Rate by Number of Follow-ups

Number of Follow-ups	Response Rate	Number of Selectees
None	.26	592
One	.46	384
Two	.50	384
Extensive	.77	96

Table 7

Mean Return Rate by Type of Mail and by Type of Material

Follow-up Method	Response Rate	Number of Selectees
Letter Follow-up	.52	384
Package Follow-up	.44	384
Regular Mail	.47	384
Special Delivery	.50	384

Table 8

Weighted Means on Variables 1-12 for Each Follow-up Method

Variable Number and Name	Type of Material	One Follow-up		Two Follow-ups		Control Group	Eight Treatment Groups (Combined)	Extensive Follow-up Group
		Regular	Special Delivery	Regular	Special Delivery			
1. Preference for Civilian Community	Letter	4.5	4.1	4.6	4.1	4.5	4.5	4.7
	Package	4.4	4.7	4.7	4.5			
2. Preference for Military Career	Letter	2.9	3.4	3.3	3.2	2.9	3.1	3.1
	Package	3.0	3.0	2.6	3.2			
3. Number of Dependents You Live With	Letter	2.5	3.1	2.7	2.9	2.8	2.8	2.8
	Package	2.9	2.7	2.7	3.2			
4. Paygrade Group	Letter	2.6	2.5	2.5	2.5	2.8	2.5	2.7
	Package	2.7	2.4	2.6	2.4			
5. Housing Location	Letter	1.7	1.7	1.6	2.0	1.8	1.8	1.9
	Package	1.9	1.7	1.9	1.8			
6. Perceived Importance of Various Benefits and Facilities	Letter	3.7	3.6	3.7	3.5	3.7	3.7	3.6
	Package	4.1	3.7	4.1	3.5			
7. Satisfaction with Quality of Life	Letter	4.8	4.7	4.6	4.8	4.6	4.6	4.7
	Package	4.7	4.3	4.3	4.5			
8. Satisfaction with Amount of Housing Allowance	Letter	3.2	3.3	3.9	2.9	3.0	3.3	3.3
	Package	3.0	3.2	3.4	3.7			
9. Satisfaction with Current Housing Costs	Letter	2.8	2.5	2.5	2.5	2.4	2.5	2.7
	Package	2.2	2.5	2.2	2.6			
10. Opinion of Present Policy for Building Military Housing	Letter	5.9	5.6	5.8	5.9	5.6	5.5	5.9
	Package	5.2	5.3	5.2	5.4			
11. Opinion of Variable Housing Allowance Policy	Letter	4.6	5.2	5.9	5.6	5.5	5.2	5.3
	Package	5.1	5.8	5.0	4.6			
12. Opinion of Fair Market Rental Policy	Letter	4.6	3.4	3.7	4.8	4.6	4.1	4.2
	Package	4.0	3.9	4.8	3.8			
Range of Sample Size (weighted)	Letter	30<n<42	34<n<46	44<n<49	52<n<61	133<n<142	287<n<365	42<n<53
	Package	31<n<39	36<n<43	25<n<41	35<n<44			

Table 9 shows that the results of the three-way ANOVAS on the treatment groups are inconsistent from one variable to another and that little support is provided for the differences between group means that were predicted on the basis of response bias research. Of the six variables that were expected to show differences in means due to response bias (1-6), four showed neither significant main effects nor interaction effects (variables 1-4). However, variable 6 (importance of military benefits and facilities) showed significant main effects for type of material (B) and type of mail (A). As predicted, those receiving packages scored higher than those receiving letters alone (mean of 3.9 vs. 3.6). Contrary to prediction, however, those receiving special delivery mail scored lower than those receiving regular mail (mean of 3.6 vs. 3.9). There were no main effects for variable 5 (housing location), but there were interaction effects for type of mail by type of material (A x B) and type of mail by number of mailings (A x C). As predicted, when regular mail was used, the "package" groups scored higher than the "letter" groups, but the opposite was true when special delivery mail was used. Also as predicted, when two follow-ups were administered, "special delivery" groups scored higher than the "regular mail" groups, but the groups receiving only one follow-up showed the opposite effect.

The failure to find significant support for the predicted differences in means among the eight treatment groups might be attributable to the design features discussed above in Return Rate. However, these design features cannot account for the finding of no significant difference on the first six variables when the two most extreme groups (no follow-up and extensive follow-up) were compared post hoc, nor can they explain the lack of significant differences when the eight treatment groups were compared with the control group and the extensive follow-up group.

Table 9

Summary of Analyses of Variance for Variables 1-12

Variable Number and Name	Main Effects			Interaction Effects			
	A = Type of Mail	B = Type of Material	C = Number of Mailings	AXB	AXC	BXC	AXBXC
1. Preference for civilian community							
2. Preference for military career							
3. Number of dependents you live with							
4. Paygrade group							
5. Housing location				X	X		
6. Perceived importance of various benefits and facilities	X	X					
7. Satisfaction with quality of life		X			X		
8. Satisfaction with amount of housing allowance				X			
9. Satisfaction with current housing costs							
10. Opinion of present policy for building military housing		X					
11. Opinion of variable housing allowance policy						X	
12. Opinion of fair market rental policy							X

Note: Effects that were significant at the .01 level are indicated by "X." Blank cells indicate that effect was not significant at .01 level. Range of weighted sample size $287<n<365$

No predictions were made as to the effect of response bias on the group means for the remaining six variables (7-12). The linear contrasts revealed two statistically significant differences for these variables (8 and 12) between the no follow-up and treatment groups only. There were no significant differences using a post hoc linear contrast between the no follow-up and extensive follow-up groups, perhaps due to the smaller number of observations in the latter. The three-way ANOVAS summarized in Table 9, however, showed significant main effects for variables 7 and 10 and significant interaction effects for variables 7, 8, 11, and 12. As shown:

1. Variables 7 and 10 indicated a significant main effect for type of material (B), with "letter" respondents scoring higher than "package" respondents.

2. Variable 8 had a significant type of mail by type of material interaction (A x B), with "regular mail" groups scoring higher with a letter than a package, while "special delivery" groups scored higher with a package.

3. Variable 7 yielded a significant interaction effect for type of mail by number of mailings (A x C). The "one follow-up" group scored lower when the follow-up was delivered by special delivery mail than when it was delivered by regular mail, while the "two follow-ups" groups scored lower with regular mail.

4. Variable 11 was the only one producing a significant type of material by number of mailings interaction (B x C). The "letter" groups scored lower than the "package" groups when one follow-up was mailed, but with two follow-ups the letter groups scored higher.

5. Variable 12 was the only one to produce a significant three-way interaction (A x B x C). The "letter, special delivery, one follow-up" group scored much lower than the others, while the "package, regular, two follow-ups" group and the "letter, special delivery, two follow-ups" group scored much higher.

One method of extrapolating to predict nonresponse bias establishes trends from the results of several waves and predicts the nonresponses by continuing these trends (Ferber, 1948; Ford & Zeisel, 1949; Campbell, 1949). However, the trends may not be linear or even monotonic (Baur, 1947). Two variables in this study (8 and 12) indicated significant differences between the no follow-up and treatment groups. The means indicate that the treatment and extensive follow-up groups are very similar for these two variables.

Measures of Dispersion

If a response bias exists, it may manifest itself in the spread of responses about the mean rather than in differences between group means. It was predicted that response bias would cause those who required more pressure before responding to be more neutral on the three satisfaction variables (7, 8, and 9) and the three policy preference variables (10, 11, and 12). In other words, selectees who were extremely satisfied or dissatisfied and selectees who had strong feelings for or against housing

policies would tend to respond initially to the survey, whereas the more neutral selectees would decline from responding unless additional pressure was applied to them. The F-ratios indicated no significant differences between the variances of the no follow-up, treatment, and extensive follow-up groups, indicating that low pressure respondents do not necessarily hold more extreme opinions than high pressure respondents.

Reactance Theory

It was predicted on the basis of reactance theory that higher pressure groups would have higher mean scores on variables 1 and 6 and lower mean scores on variables 2 and 7-12. The linear contrasts indicated that, although the mean of the no follow-up group was different from that of the treatment groups, it increased with increasing follow-up on variable 8 and decreased on variable 12. The significant main effects attributable to type of material (letter vs. package) were all in the predicted direction, with the package groups (i.e., those receiving more pressure to respond) scoring more negatively than the letter groups. The only other significant main effect was in the opposite direction of that predicted by reactance theory, with the special delivery groups scoring less negatively than the regular mail groups. This may indicate that the duplicate package of materials had a stronger psychological impact upon the selectee than did a special delivery follow-up or an additional follow-up. The interaction effects appear inconsistent, as in the analysis of response bias.

CONCLUSIONS

The results of past studies indicating that some type of follow-up procedure results in greater return rates than no follow-up have been supported in this study. The study also indicated that extensive follow-up (including phone contact) substantially improves return rates compared with less extensive follow-up methods. However, it was not shown that one of the follow-up techniques used in this study increases return rate more effectively than another, unless extensive follow-up procedures are used.

Although return rates between the control, treatment, and extensive follow-up groups were shown to differ, only the no follow-up and treatment groups differed on the population parameter estimates of the mean, and the differences were evidenced on only 2 of the 12 variables included in the study (neither of which was predicted based on past research or intuition). The 12 variables showed few consistent main effects or interaction effects in the analyses of variance, and no marked differences in means were found when extensive follow-up procedures were applied.

The main effect that was statistically significant for the largest number of variables was the type of material used in the follow-up--letter or duplicate questionnaire package. The effect was found for three variables, with the "package" groups reacting more negatively to these items than the "letter" groups. Reactance theory may account for the negative reaction on these variables. However, reactance did not appear to operate in relation to the type or number of mailings.

There appears to be little research on the "letter" vs. "package" factor and how it affects either return rate or response bias. The findings of this study suggest that it may be a worthwhile factor to explore in a variety of settings using mail surveys.

If differences among the eight treatment groups do, in fact, exist, the finding of no significant differences in return rate and few consistent differences in group means on the 12 variables studied might be due to specific features of the study that failed to actually differentiate between the two levels of a given factor. In particular, special delivery letters in government-franked envelopes may be treated by recipients as regular mail letters in such envelopes. In addition, the first and second follow-ups may have been too closely spaced (1 week apart). However, these features do not account for significant differences between the means of the no follow-up, treatment, and extensive follow-up groups on only 2 of the 12 variables investigated.

This study supports the assumption that the population parameters of the attitudes investigated may be more accurately estimated, although not always, by obtaining a larger sample of respondents through follow-up treatments.

To assess the generalizability of these results, however, it is necessary to conduct further studies of respondents. Such studies should include variations of the design characteristics described above and different attitudes and populations.

RECOMMENDATIONS

1. Some kind of follow-up should be employed to determine whether the attitudes measured produce a response bias, if the cost of follow-up is low and the risk of a small bias in the estimate of the population mean is great.

2. The proportion of responses desired, based on the sample size, should determine the extensiveness of follow-ups used.

3. A letter follow-up by regular mail is recommended over a duplicate package of materials by special delivery, due to the lower cost with no consistent bias produced.

REFERENCES

Bachrach, S. D., & Scoble, H. M. Mail questionnaire efficiency: Controlled reduction of nonresponse. Public Opinion Quarterly, 1967, 31, 265-271.

Ball, R. J. The correspondence method in follow-up studies of delinquent boys. Journal of Juvenile Research, 1930, 14, 107-113.

Baur, J. E. Response bias in a mail survey. Public Opinion Quarterly, 1947, 2, 594-600.

Bell, C. R. Psychological versus sociological variables in studies of volunteer bias in surveys. Journal of Applied Psychology, 1961, 45, 80-85.

Benson, S., Booman, W. P., & Clark, K. E. A study of interview refusals. Journal of Applied Psychology, 1951, 35, 116-119.

Berkowitz, L. Reactance and the unwillingness to help others. Psychological Bulletin, 1973, 79(5), 310-317.

Birnbaum, Z. W., & Sirhew, M. G. Bias due to non-availability in sampling surveys. Journal of the American Statistical Association, 1950, 45, 98-111.

Blumberg, H. H., Fuller, C., & Hare, A. P. Response rates in postal surveys. Public Opinion Quarterly, 1974, 38(1), 113-123.

Brehm, J. W., (Ed.) A theory of psychological reactance. New York: Academic Press, 1966.

Brehm, J. W., & Sensenig, J. Social influence as a function of attempted and implied usurpation of choice. Journal of Personality and Social Psychology, 1966, 4, 703-707.

Bridge, R. G. Nonresponse bias in mail surveys: The case of the Department of Defense post-service survey (R-1501-ARPA). Santa Monica, CA: The Rand Corporation, July 1974. (NTIS No. AD 787048)

Britton, J. H., & Britton J. O. Factors in the return of questionnaires mailed to older persons. Journal of Applied Psychology, 1951, 35, 57-60.

Broedling, L. A., & Fuller, C. H. An assessment of nonresponse bias in mail surveys of naval personnel (Tech. Rep. 76-30), San Diego: Navy Personnel Research and Development Center, February 1976.

Campbell, D. T. Bias in mail surveys. Public Opinion Quarterly, 1949, 13, 562.

Champion, D. J., & Sear, A. Questionnaire response rate: A methodological analysis. Social Forces, 1969, 47, 335-339.

Clausen, J. A., & Ford, R. N. Controlling bias in mail questionnaires. Journal of the American Statistical Association, 1947, 42, 497-511.

Davis, J. A. Attrition in the 1962 and 1963 follow-up waves in the NORC panel survey of June 1961 college students. Working Paper, NORC Survey, 1964, 431-467.

Deming, W. E. On a probability mechanism to attain an economic balance between the resultant error of response and the bias of nonresponse. Journal of the Americn Statistical Association, 1953, 48, 363-370.

Donald, M. M. Implications of nonresponse for the interpretation of mail-questionnaire data. Public Opinion Quarterly, 1960, 24, 99-114.

Eckland, B. Effects of prodding to increase mail back returns. Journal of Applied Psychology, 1965, 49, 165-169.

Edgerton, H. A., Britt, S. H., & Norman, R. D. Objective differences among various types of respondents to a mailed questionnaire. American Sociological Review, 1947, 12, 433-444.

El-Brady, M. A. A sampling procedure for mailed questionnaires. Journal of the American Statistical Association, 1956, 51, 209-227.

Ellis, R., Endo, C., & Armer, J. The use of potential nonrespondents for studying nonresponse bias. Pacific Sociological Review, 1970, 13, 103-110.

Etzel, M. J., & Walker, B. J. Effects of alternative follow-up procedures on mail survey response rates. Journal of Applied Psychology, 1974, 59(2), 219-221.

Ferber, R. The problem of bias in mail returns: A solution. Public Opinion Quarterly, 1948, 12, 669-672.

Ferber, R. Observations on a consumer panel operation. Journal of Marketing, 1956, 17, 246-259.

Field, H. S. Effects of sex on investigator on mail survey response rates and response bias. Journal of Applied Psychology, 1975, 60(6), 772-773.

Filion, F. L. Estimating bias due to nonresponse in mail surveys. Public Opinion Quarterly, 1974, 39(4), 175-176.

Ford, R. N., & Zeisel, H. Bias in mail surveys cannot be controlled by one mailing. Public Opinion Quarterly, 1949, 13, 495-501.

Franzen, R., & Lazarsfeld, P. F. Mail questionnaires as a research problem. Journal of Psychology, 1945, 20, 293-320.

Friedman, H. H., & Goldstein, L. Effect of ethnicity of signature on the rate of return and content of a mail questionnaire. Journal of Applied Psychology, 1975, 60(6), 770-771.

Fuller, C. H. Weighting to adjust for survey nonresponse. Public Opinion Quarterly, 1974, 38(2), 239-246.

Gannon, M. J., Nothern, J. C., & Carroll, S. J., Jr. Characteristics of nonrespondents among workers. Journal of Applied Psychology, 1971, 55, 586-588.

Gaudet, H., & Wilson, E. Who escapes the personal investigator? Journal of Applied Psychology, 1940, 24, 773-777.

Goldstein H., & Kroll, B. H. Methods of increasing mail response. Journal of Marketing, 1957, 21, 55-57.

Gullahorn, J. T., & Gullahorn, J. F. Increasing returns from nonrespondents, Public Opinion Quarterly, 1959, 23, 119-121.

Hammond, E. C. Isolation in relation to type and amount of smoking. American Statistical Association Journal, 1959, 54, 35-51.

Hansen, M. H., & Hurwitz, W. H. The problem of nonresponse in sampling surveys. Journal of the American Statistical Association, 1946, 41, 517-529.

Hilgard, E. R., & Payne, S. L. Those not at home: Riddle for pollsters. Public Opinion Quarterly, 1944, 8, 254-261.

Hinrichs, J. R. Factors related to survey response rates. Journal of Applied Psychology, 1975, 60(2), 249-251.

Hochstim, J. R., & Athanasopoulos, D. A. Personal follow-up in a mail survey: Its contribution and its cost. Public Opinion Quarterly, 1970, 34, 69-81.

Hood, T. C., & Back, K. W. Self-disclosure and the volunteer: A source of bias in laboratory experiments. Journal of Personality and Social Psychology, 1971, 17, 130-136.

Kephart, W. M., & Bressler, M. Increasing the responses to mail questionnaires: A research study. Public Opinion Quarterly, 1958, 22, 123-132.

Kimball, A. E. Increasing the rate of return in mail surveys. Journal of Marketing, 1961, 25, 63-65.

Kirk, B. A., & Sereda, L. Accuracy of self-reported college grade averages and characteristics of non and discrepant reporters. Educational and Psychological Measurement, 1969, 29, 147-155.

Kivlin, J. E. Contributions to the study of mail-back bias. Rural Sociology, 1965, 30, 322-326.

Landy, F. J., & Bates, F. The noneffect of three variables on mail survey response rate. Journal of Applied Psychology, 1973, 58(1), 147-148.

Larson, R. F., & Catton, W. R. Can mail-back bias contribute to a study's validity? American Sociological Review, 1959, 24, 243-245.

Lehman, E. C., Jr. Tests of significance and partial returns to mail questionnaires. Rural Sociology, USA, 1963, 28(3), 284-289.

Levine, S., & Gordon, G. Maximizing returns on mail questionnaires. Public Opinion Quarterly, 1958, 22, 568-575.

Lowe, F. E., & McCormick, T. C. Some survey sampling bias. Public Opinion Quarterly, 1955, 13, 487-494.

Lowenstein, R., Colombotos, J., & Elinson, J. Interviews hardest-to-obtain in an urban health survey. Proceedings of the Social Statistics Section of the American Statistical Association, 1962, pp. 160-164.

Lubin, B., Levitt, E. E., and Zuckerman, M. Some personality differences between respondents and nonrespondents to a survey questionnaire. Journal of Consulting Psychology, 1962, 26, 192-197.

Lundberg, G. A. Social research. New York: Longmans, Green, & Co., 1942.

Lundberg, G. A., & Larsen, O. N. Characteristics of hard-to-reach individuals in field surveys. Public Opinion Quarterly, 1949, 13, 487-494.

Macek, A. J., & Miles, G. H. IQ score and mailed questionnaire response. Journal of Applied Psychology, 1975, 60(2), 258-259.

Mandell, L. When to weight: Determining nonresponse bias in survey data. Public Opinion Quarterly, 1974, 38(2), 247-252.

Mayer, C. S., & Pratt, R. W., Jr. A note on nonresponse in a mailed survey. Public Opinion quarterly, 1966, 30, 637-646.

Mazis, M. B. Antipollution measures and psychological reactance theory: A field experiment. Journal of Personality and Social Psychology, 1975, 31(4), 654-660.

Nevin, J. R., & Ford, N. M. Effects of a deadline and a vieled threat on mail survey responses. Journal of Applied Psychology, 1976, 61(1), 116-118.

Newman, S. W. Differences between early and late respondents to a mailed survey. Journal of Advertising Research, 1962, 2(2), 37-39.

Ognibene, P. Traits affecting questionnaire response. Journal of Advertising Research, 1970, 10, 18-20.

Ognibene, P. Correcting nonresponse bias in mail questionnaires. Journal of Marketing Research, 1971, 8, 233-235.

Organ, D. W. Social exchange and psychological reactance in a simulated superior-subordinate relationship. Organizational Behavior and Human Performance, 1974, 12, 132-142.

Pace, R. C. Factors influencing questionnaire returns from former university students. Journal of Applied Psychology, 1939, 23, 388-397.

Panos, R. J., & Rice, J. E. Experimental analysis of different mail follow-up techniques within a national sample of hard-core nonrespondents. Proceedings of the 75th Annual Convention of the American Psychological Association, 1967.

Parten, M. Surveys, polls, and samples. New York: Harper Brothers, 1950, pp. 331-425.

Phillips, W. M., Jr. Weaknesses of the mail questionnaire: A methodological study. Sociology and Social Research, 1951, 35, 260-267.

Reid, S. Respondents and nonrespondents to mail questionnaires. Educational Research Bulletin, Ohio State University, 1942, 21, 87-96.

Robins, L. N. The reluctant respondent. Public Opinion Quarterly, 1963, 27, 276-286.

Robinson, R. A., & Agism, P. Making mail surveys more reliable. Journal of Marketing, 1951, 15, 415-424.

Roeher, G. A. Effective techniques in increasing response to mailed questionnaires. Public Opinion Quarterly, 1963, 27, 299-302.

Rosnow, R. L., Rosenthal, R., McConochie, R. M., & Arms, R. L. Volunteer effects on experimental outcomes. Educational and Psychological Measurement, 1969, 29, 825-846.

Rubin, D. B. A method for formalizing subjective notions about the effect of nonrespondents in sample suveys (RB-75-21). Princeton, N.J.: Educational Testing Service, 1975.

Scheverian, K. P., & Blaine, H. R. Questionnaire return bias in the study of blue collar workers. Public Opinion Quarterly, 1966, 30, 656-663.

Scott, C. Research on mail surveys. Journal of the Royal Statistical Society, 1961, 124(2) series A, 143-191.

Sheth, J. N., & Roscoe, A. M. Impact of questionnaire length, follow-up methods, and geographical location on response rate to a mail survey. Journal of Applied Psychology, 1975, 60(2), 252-254.

Shuttleworth, F. K. Notes on the validity of mail questionnaire returns. Journal of Applied Psychology, 1939, 23, 95-104.

Shuttleworth, F. K. Sampling errors involved in incomplete returns to mail questionnaires. Psychological Bulletin, 1940, 37, 437.

Shuttleworth, F. K. Sampling errors involved in incomplete returns to mail questionnaires. Journal of Applied Psychology, 1941, 25, 588-591.

Sletto, R. F. Pretesting of questionnaires. American Sociological Review, 1940, 5, 193-200.

Slocum, W. L., Empey, L. T., & Swanson, H. S. Increasing response to questionnaire and structured interviews. American Sociological Review, 1956, 21, 221-225.

Sobol, M. G. Panel mortality and panel bias. American Statistical Association Journal, 1959, 54, 52-68.

Stanton, F. Notes on the validity of mail questionnaire returns. Journal of Applied Psychology, 1939, 23, 95-104.

Stonborough, T. H. W. Fixed panels in consumer research. Journal of Marketing, 1942, 7, 129-138.

Stumpf, S., & Kieckhaefer. W. Department of defense family housing preference survey: Attitudes and preferences of military personnel and spouses concerning housing and basic allowance for quarters (Tech. Rep. 76-20). San Diego: Navy Personnel Research and Development Center, November 1975.

Suchman, E. A. An analysis of 'bias' in survey research. Public Opinion Quarterly, 1962, 26, 102-111.

Suchman, E. A., & McCandless, B. Who answers questionnaires? Journal of Applied Psychology, 1940, 24, 758-769.

Toops, H. A. The returns for follow-up letters to questionnaires. Journal of Applied Psychology, 1926, 10, 92-101.

Tsai, R. A method for correcting the bias due to nonresponse in a mail survey (WTR 73-44). Washington, D.C.: Naval Research and Development Laboratory, June 1973.

Vincent, C. E. Socio-economic status and familial variables in mail questionnaires responses. American Journal of Sociology, 1964, 69(6), 647-653.

Wallace, D. A case for and against mail questionnaires. Public Opinion Quarterly, 1954, 18, 40-52.

Watson, J. J. Improving the response rate in mail research. Journal of Advertising Research, 1965, 5, 45-50.

Worchel, S., & Andreoli, V. Attribution of causality as a means of restoring behavioral freedom. Journal of Personality and Social Psychology, 1974, 29(2), 237-245.

Worchel, S., & Brehm, J. W. Direct and implied social restoration of freedom. Journal of Personality and Social Psychology, 1971, 18, 294-304.

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Commander, Naval Facilities Engineering Command (Code 08) (5)
Commanding Officer, Naval Health Research Center
Commanding Officer, Naval Education and Training Program Development Center
Commanding Officer, Naval Development and Training Center (Code 0120)
Commanding Officer, Fleet Combat Direction Systems Training Center, Pacific (Code 00E)
Commanding Officer, Naval Aerospace Medical Institute (Library Code 12) (2)
Commanding Officer, Canadian Forces Personnel Applied Research Unit
Director, Training Analysis and Evaluation Group (TAEG)
Center for Naval Analyses
Superintendent, U. S. Naval Academy
Superintendent, U. S. Military Academy
Superintendent, U. S. Coast Guard Academy
Superintendent, Naval Postgaduate School
Navy War College
Army Research Institute for Behavioral and Social Sciences
Technical Training Division, Air Force Human Resources Laboratory Lowry Air Force Base
Flying Training Division, Air Force Human Resources Laboratory, Williams Air Force Base
Advanced Systems Division, Air Force Human Resources Laboratory, Wright-Patterson Air Force Base
Technical Library, Air Force Human Resources Laboratory (AFSC), Lackland Air Force Base
Personnel Research Division, Air Force Human Resources Laboratory (AFSC), Lackland Air Force Base (2)
Occupational and Manpower Research Division, Air Force Human Resources Laboratory (AFSC), Lackland Air Force Base
Program Manager, Life Sciences Directorate, Air Force Office of Scientific Research (AFSC)
National Research Council, Division of Anthropology and Psychology
National Science Foundation
Science and Technology Division, Library of Congress
Defense Documentation Center (12)