

Improving Contact Information for Mobile Populations: An Advance Contact Experiment

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Abstract

Locating individuals who have been selected into a sample is an important first step for many surveys. The National Survey of Recent College Graduates (NSRCG) has a very mobile target population. In past years, the NSRCG successfully updated a number of addresses by mailing a Telephone and Address Verification Form (TAVF) to the last known address of the graduate prior to soliciting a survey response. The TAVF is a means to obtain an updated address for sample cases and to identify sample cases with addresses that are not valid. In the 2006 NSRCG (NSRCG-06), an experiment of 15,876 recent college graduates compared the effect of mailing a sample TAVF against mailing a colorful brochure that requested the same information but also highlighted results from previous surveys. Three brochures were developed: one was designed to appeal to graduates of specific fields of study with historically high nonresponse; the second highlighted data of interest to racial minorities who also have lower response rates; a third brochure was generic and provided survey results relevant to all graduates. This paper will evaluate the results of this experiment and recommend methods to better improve contact information for highly mobile individuals.

Keywords: prenotification, nonresponse, mobile populations

1. Background

Locating members of a sample as mobile as the NSRCG is a challenging task. The target population consists of individuals who have earned a bachelor's or master's degree in science and engineering in the past three years. Telephone numbers and mailing addresses are provided by the educational institutions granting the degrees. However, this information may quickly become out of date. The sample is primarily young (under age 30) and prone to relocating after graduation. In past years, intensive efforts were launched to locate the sample. This research attempted to utilize what worked well previously and to test the impact of improving upon an advance mailing to sample members.

Locating efforts may be divided into three parts: batch locating, intensive locating, and sample person updates. Batch locating involves sending the frame information to a data broker who will check against a database to see if

other contact information is available. Intensive locating is a case-by-case effort. Trained researchers use the Internet, searchable databases, and other resources to locate phone and address information for individual graduates. Sample person updates are responses to prenotification materials.

In 2003, Mathematica Policy Research (MPR), the contractor for the NSRCG-03, mailed a Telephone and Address Verification Form (TAVF) to the sample. This form listed the mailing address on file and asked the recipient to update it if necessary. In addition, the form solicited day and evening telephone numbers and an email address. Of the over 17,000 TAVFs mailed in September 2003 with an advance letter, only 1,500 were returned with updated information. An additional 750 were returned by the post office with a forwarding address and 500 more were returned as undeliverable as addressed (UAA). The result of this TAVF was updated contact information for 13% of the sample.

While the NSRCG-03 advance mailing was somewhat successful, if this effort could be improved it could have a positive impact on reducing noncontact and increasing survey response rates. The U.S. Census Bureau served as the data collection contractor for the 2006 survey (NSRCG-06). In NSRCG-06, the Census Bureau tested the effectiveness of a brochure compared to the TAVF in a January 2006 advance mailing. The brochure highlighted data of interest from the NSRCG-03. It also included a tear-off postcard that will serve the same purpose as the TAVF.

1.1 Literature Review

Many other mail surveys make use of advance contact methods in order to introduce the survey topic to the recipient and to attempt to elicit response. This way, the questionnaire mailing is not the recipient's first exposure to the survey.

One meta-analysis evaluating the impact of advance contact letters (among other methods) on response rates revealed that prenotification had a range of effects (Fox, Crask, and Kim, 1988). Its impact on response rate ranged from a 9% decrease to a 47% increase. In the majority of the 22 studies evaluated, the impact of prenotification was positive. Overall, the impact of prenotification was a 7.7% increase in response. A later

meta-analysis (Yammarino, Skinner, Childers, 1991) found that prenotification among the studies observed increased response rates 28.5%

It should be noted that in the NSRCG-03, a brochure was also used to promote response. However, these brochures were incorporated as part of a larger cover letter experiment. Brochures were included within the first mail package with cases selected to receive a new experimental cover letter highlighting the importance of science and engineering. Because the brochures were not evaluated separately, it is not possible to determine any effect associated specifically with the brochures. Considered together with the experimental cover letter, the brochures offered no advantage in terms of increased response rate over the traditional cover letter with no brochure (Fecso, Broach, and Grigorian, 2004). The use of a brochure as an advance mailing was not evaluated.

Prenotification is generally accepted as a method of increasing awareness of the survey, thereby increasing response. Determining the best type of prenotification mailing may vary depending on the survey and its audience.

2. Data

2.1 Survey Methodology

The NSRCG-06 sample consists of two stages. In the first stage, 300 colleges and universities were selected into sample. The responding institutions (n=297) provided lists of graduates who had earned a bachelor's or master's degree between July 1, 2002 and June 30, 2005 (three academic years). From this sampling frame, 27,000 recent college graduates were selected for the study (9,000 per academic year). Sampled individuals from the first two academic years with domestic mailing addresses (n=15,739) were included into the advance contact experiment described in this paper. The advance contact mailing commenced January 26, 2006. Approximately five weeks later, a mail questionnaire was delivered. Postcard reminders and a second mailing followed for nonrespondents. Computer-assisted telephone interviewing (CATI) for non-response follow-up began June 7, 2006 for those sampled into in this experiment. (Those not included in this experiment followed the same mode of data collection, but on a slightly different schedule.) Reminders by mail and e-mail followed until data collection ended in November 2006.

2.2 Experiment Sample Info

The NSRCG is conducted every two to three years in order to continually monitor the career paths and graduate

school plans of science and engineering college graduates. The survey began in the 1970's and nonresponse has been increasing over the past decade, much like other government-sponsored surveys (Atrostic et al, 2001). In 1997, the second stage of data collection achieved an 81% unweighted response rate (Collins et al, 1999). By 2003, only 66% of sampled graduates responded (Wilson et al, 2005).

Nonresponse becomes a problem for analysis when those who do not respond differ substantively from those who do respond. The goal in developing the experimental design for this study was to target those individuals who are least likely to participate. By designing brochures that appeal to those individuals with characteristics most highly correlated with nonresponse, we hoped to attain comparable response rates across all demographic subgroups.

Based on response rates from the NSRCG-03, two low responding groups were selected for study: minority graduates and health/social science majors. For each of these groups a targeted brochure was developed. For minorities, including Black, Hispanic, Asian, American Indian, and Native Hawaiian degree recipients, the brochure highlights facts pertaining to minority degree attainment and features pictures of minority students. For health and social science majors, the brochure has data broken out by field of study and an introduction that names these fields of study as relevant to the data collection. In addition to these targeted brochures, a general interest brochure was created to serve as a control.

The brochures request the same information as the TAVF used in 2003 by using a tear-off postcard: updated mailing address, telephone number, e-mail address, and a contact person. However, the first three panels of the brochure display colorful charts and images of students and scientists at work. The introduction explains the importance of the study. The goal of the brochure was two-fold: first, to introduce selected individuals to the survey and to leave a favorable impression on brochure recipients which, in turn, should lead to higher survey response; and second, to collect updated address information from this highly mobile group in order to be able to contact each person six weeks later during survey data collection which also should result in higher survey response. Success of the brochures is measured by evaluating response rates of the brochures compared to the TAVF and by comparing survey response rates across brochure group assignment.

Due to the timing of this research, only cases from the 2003 and 2004 graduating classes of the NSRCG-06 were included in this experiment. Cases from the 2005 graduating class were not available until after the initial

mail-out of the brochures. Originally, the sample contained 17,439 cases. However, 15 were removed because there was no name and 48 were removed because one school requested that we not contact students directly. From the remaining 17,376 cases, 1,500 were removed because they were included in another advance contact experiment. This left 15,876 available cases for this research.

The 15,876 eligible cases were to be stratified into four groups:

1. Those who are both health/social science majors and from a minority racial group,
2. Minority graduates (non-imputed race, not a health/social science major),
3. Health/social science majors (not in the minority group), and
4. All others.

The three experimental groups (groups 1 through 3) would have received one of four mailings: the TAVF, the general brochure, or one of the targeted brochures. Since it is predicted that the targeted brochures will yield the highest response rate, the majority of the cases will receive these brochures.

After the cases had been allocated to the different brochure types, but before the initial mailing, the contact addresses were reviewed and run through PostalSoft. PostalSoft is a software package that verifies whether a U.S. address is mailable. After this process, an additional 137 cases were removed: 109 for lack of U.S. address after initial locating and 28 for which the addresses were either absent or determined to be unmailable by PostalSoft. Table 1 displays the final number of brochures and TAVFs mailed, by sample group. The forms were sent on January 26, 2006.

Table 1. Final Breakdown of Sample Cases after Initial Locating and PostalSoft Address Check

Sample Group	Brochure Type			TAVF	Total
	Major	Minor	Gen.		
Major	2,737	0	445	446	3,628
Minority	0	2,790	449	445	3,684
Combo	791	795	447	449	2,482
General	0	0	5,497	448	5,945
Total	3,528	3,585	6,838	1,788	15,739

3. Results

In order to effectively evaluate the brochure, the goal is to examine its impact two ways: response rate of the brochure and response rate of the survey.

First, the brochure response rate will inform us about the immediate goal: Did we obtain updated mailing addresses

for recipients? Within this analysis, did the targeted brochures perform better than others? Second, the survey response rate may indicate the general impression that the brochure left on its recipients. If those who received the brochure had higher survey response rates than those receiving the TAVF, then the summary of past results and targeted text and images may be a useful tool.

3.1 Brochure and TAVF Response Rates

These findings document the address update return rate as of May 1, 2006. Responses had slowed by this date (more than 13 weeks after the mailing) and the processing center had stopped checking in returns.

There are several outcomes to consider in order to fully evaluate the brochure response. Because we know that a good number of the addresses are out of date, we expect a high rate of mail undeliverable as addressed. There are two types of UAA's: those with address corrections (usually an expired forwarding address) and those without address corrections (no information available, forwarding order expired). These rates should also be compared across subgroups. We expect the rates to be similar. If they are not, then we should consider this information when comparing response rates.

At 16%, the TAVF had a much larger response rate than any of the three brochures (see Table 2). Across all groups, 6.8% completed an address update. The number of returns was not much larger than the number of UAA's with address corrections. UAA's without corrections were returned for 14% of our total mailing.

Table 2. Percentage of Brochures in Each Outcome Category by Type of Advance Mailing

Brochure Type	Response %	UAA with correct's %	UAA without correct's %	No Response %
General	6.4	6.5	14.4	72.7
Major	5.3	6.7	13.2	74.8
Minority	4.5	5.2	13.8	76.5
TAVF	16.0	6.2	14.1	63.7
Overall	6.8	6.2	14.0	73.0

Table 3 shows the response and UAA rate for each brochure type by the sample person's membership in a demographic group of interest. For example, those within the minority demographic group received either a brochure targeted to minorities, a general interest brochure, or a plain TAVF form. Those who majored in fields with traditionally low response to the NSRCG received either a brochure highlighting facts of interest by

major, a general interest brochure, or a TAVF form. Those who were in both the targeted major group and the underrepresented minority group could have received the major brochure, the minority brochure, the general interest brochure, or the TAVF.

For each of the groups, the traditional Telephone and Address Verification Form resulted in higher response than any of the brochures. The Overall row indicates the response and UAA rates for each group regardless of the type of mailing received. Each demographic group (minority, targeted major, combination minority and targeted major, and all others) was compared to everyone not in that group.

Table 3. Percentage of Brochures in Each Outcome Category by Type of Advance Mailing and Demographic Group

Demog. Group	Brochure Type	Resp. %	UAA with correct's %	UAA without correct's %	No Response %
<i>General</i>	General	6.7	6.8	14.9	71.6
	TAVF	18.8	5.6	14.1	61.5
	<i>Overall</i>	7.6*	6.7	14.8*	70.8*
<i>Minority</i>	Minority	4.4	5.0	13.6	77.1
	General	4.2	4.7	13.1	78.0
	TAVF	15.1	7.2	13.0	64.7
	<i>Overall</i>	5.7*	5.2*	13.4	75.7*
<i>Major</i>	Major	6.0	6.8	13.5	73.7
	General	6.1	7.0	10.1	76.9
	TAVF	16.4	6.5	15.1	61.9
	<i>Overall</i>	7.3	6.8	13.3	72.6
<i>Combo</i>	Minority	4.8	6.1	14.7	74.4
	Major	3.2	6.2	11.9	78.8
	General	4.7	4.7	13.5	77.1
	TAVF	13.6	5.6	14.3	66.6
	<i>Overall</i>	5.9*	5.8	13.5	74.9*

T-tests were performed to compare members of each brochure group to all others combined

** indicates significance at $p < 0.05$*

Those in the general group (that is, all non-minority, non-targeted major cases) had a significantly higher response rate than the others ($t=3.13$, $p=0.012$). This conforms to expectations, as the others were targeted for this experiment due to their low survey response in 2003. However, the general group also had a significantly higher rate of UAA without address correction. This suggests that any difficulty with eliciting response from

the minority and major groups is not associated with not being able to contact them.

The targeted major group's response rate did not differ significantly from the others. However, the minority group and the combination minority-major group did have significantly lower response rates than the others ($t=3.25$, $p=0.001$ for minority comparison; $t=2.21$, $p=0.0274$ for combination comparison). Minorities also had a significantly lower rate of UAAs with address corrections ($t=3.14$, $p=0.0017$). The reason for this is not clear.

Table 4 shows the ANOVA results to compare the means for the brochure group membership, brochure type delivered, and graduation year (cohort). Note that only cohorts 2003 and 2004 are included in this experiment.

ANOVAs for three outcomes are displayed in Table 4: the variance in the average proportion responding, the proportion of UAAs with address corrections, and the proportion of UAAs without address corrections. To evaluate whether the type of brochure received has an impact on propensity to respond, we would expect a significant F test for the brochure type independent variable on the proportion responding dependent variable (second row, right hand side). In fact, this shows that there were significant differences.

The ANOVAs for the two UAA outcomes are displayed to evaluate any differences in the rate that the sample was contacted. The brochure type sent should have no bearing on the UAA rates, and the F value for this (0.15 for UAAs with corrections; 0.55 for UAAs without) is not significant. There are no significant differences in either of the UAA rates by brochure group membership (being minority, in a low-responding major group, both, or neither). Graduation year cohort, however, does have a statistically significant difference in UAA rates.

These UAA results suggest that the groups that were less likely to respond in 2003 NSRCG (minorities and certain majors) are not less likely to be unlocatable. Response rate differences may be attributable to other reasons.

Graduation year cohort does play a role in UAA rate. Those who graduated in 2003 had higher UAA rates than those graduating in 2004. This finding is not a surprise, as our address information comes from the institutions granting the sampled degree and more time had passed between date of graduation and the date of our experimental mailing.

Table 4. ANOVA Table for Brochure Outcome

Dependent Variable	Source	Sum of Squares		Mean Square		Independent Variables	Type III Sum of Squares		Mean Square	
		DF		DF	F		DF	F		
Proportion responding	Between	19.62	7	2.80	45.00*	Brochure Group	1.37	3	0.46	7.33*
	Within	979.32	15722	0.06		Brochure Type	18.02	3	6.01	96.42*
	Total	998.94	15729			Cohort	0.53	1	0.53	8.52*
UAA with address corrections	Between	1.35	7	0.19	3.31*	Brochure Group	0.22	3	0.07	1.25
	Within	915.84	15722	0.06		Brochure Type	0.03	3	0.01	0.15
	Total	917.19	15729			Cohort	0.62	1	0.62	10.69*
UAA with no address corrections	Between	5.70	7	0.81	6.80*	Brochure Group	0.61	3	0.20	1.69
	Within	1882.28	15722	0.12		Brochure Type	0.20	3	0.07	0.55
	Total	1887.98	15729			Cohort	4.70	1	4.70	39.25*

* indicates significance at $p < 0.05$

When replicating this model (with and without the cohort variable), an interaction effect between "brochure group membership" and "brochure type sent" was not significant

Table 5. Response Rate by Type of Advance Mailing (as of June 7, 2006)

Overall			General	Major	Minority	TAVF
	Response Rate		41.63%	41.21%	33.19%	38.03%
	Sample Size		6,838	3,528	3,585	1,788
General	41.63%	6,838				
Major	41.21%	3,528				
Minority	33.19%	3,585	***	***		
TAVF	38.03%	1,788	***		***	

*** indicates significance at $p < 0.10$

3.2 Survey Response Rates¹

While the brochure did not perform as expected in its return rate, we can still evaluate its performance by determining its impact on the survey response rate. Table 5 shows the response rate as of June 7, 2006 by advance mailing type. June 7 marked the beginning of telephone nonresponse follow-up. These responses were all received by mail.

By this metric, the general brochure performed significantly better than the TAVF, with a 3.5% higher response rate. This indicates that the brochure may have left a more lasting impression upon recipients when compared to the simple TAVF.

The targeted brochures have mixed results. While the targeted major brochure did not perform significantly better than the TAVF, the mail response rate of its

recipients was not significantly different from the general brochure. Because those in the health and social sciences tend to have lower response rates than others, the fact that their response rate was similar to the general group indicates that the targeted major brochure may have succeeded in raising response to that of other majors.

Alternatively, the minority brochure performed significantly worse than all other prenotice mailings. However, the response rate of all minorities was well below that of others, regardless of the type of advance mailing received (see Herron, Henly, & Zukerberg, 2007). Still, the targeted minority brochure was not successful at increasing mail response.

4. Discussion

The targeted brochures were designed to appeal to groups with historically low response rates. By using inclusive language, images, and relevant survey results, we hoped to increase response to an advance mailing requesting updated address information and also increase response to the survey. This preliminary analysis of address updates

¹ For a full analysis of the differences in survey response rates, see the paper by Herron, Henly, White, and Zukerberg (2007).

indicates that the brochures did not perform as well as a plain one-page Telephone and Address Verification Form such as the one used in 2003.

The TAVF was mailed with a cover letter which served both to inform the sample person of their inclusion in the NSRCG sample and to request that he or she "please complete the enclosed Telephone and Address Verification Form and return it within the next two weeks using the postage-paid envelope." While the form did not have as much information about the survey as the brochures, it did have a clear purpose: complete and return in the enclosed envelope. With the brochures, the address correction form was on the final panel, so the intent of the mailing was not obvious. The information displayed may have overshadowed the request to complete the tear-off postcard.

In evaluating the mail response to the survey, however, the brochures appeared to have a positive impact for some groups. Mail response was highest among those who received the general brochure, indicating that it was useful in advertising the survey. Results were mixed for targeted groups. Targeted majors had mail response rates comparable to those of others. However, brochures targeting minorities did not help to raise response rates.

It is possible that the minority brochures were not targeted enough. The brochures displayed results by race and highlighted the increasing representation of racial minorities in higher education. There were pictures of ethnically diverse students. However, this brochure did not mention that it is especially important to hear from Black, Asian, and Latino graduates, whereas the targeted major brochure did specifically mention the need to hear from those majoring in health and social science. Perhaps a more specific mailing would have been successful at decreasing nonresponse within this group.

In total, the brochures were not a successful solution for the NSRCG. Our goal was to both update current contact information on the sample and to increase response to the survey. Because an important part of the data collection of the NSRCG is to locate sampled individuals, the first goal is essential. The brochures performed much worse on this task when compared to the traditional TAVF mailing.

Acknowledgements

The authors wish to thank Kelly Kang at the National Science Foundation for her support of this research.

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