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Glenn D. Israel

Social Science Computer Review published online 28 November 2012
DOI: 10.1177/0894439312464942

Social Science Computer Review
00(0) 1-13

DOI: 10.1177/0894439312464942
sscr.sagepub.com

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Abstract

This study examines how available e-mail addresses can be incorporated into mixed-mode procedures for surveys of the public, especially client groups. Cooperative Extension Service clients provide the basis for analyzing how implementation procedures affect response rates and substantive findings. These clients form three strata based on contact information provided: postal address only, e-mail only, and both. From clients who provided mail and e-mail addresses, four experimental groups were created, including two mixed-mode groups, a mail-only group and an e-mail-only group. Using mail and e-mail addresses to implement a sequence of e-mail and postal invitations in a mixed-mode design resulted in response rates that are equivalent to those for mail-only surveys. Also, clients who provided a postal address only differed on some attributes from those in the other strata. This study demonstrates the benefit of obtaining e-mail addresses and using them in mixed-mode surveys.

Keywords

mixed-mode, response rate, survey, reachable sample, contact mode

Introduction

Researchers aspire to find effective strategies for getting people to use the web for responding to surveys, in part due to the high costs associated with large-scale surveys. Recent studies, for example, estimated that survey costs could be reduced by using a web-then-mail sequence instead of the standard postal-delivered survey (Holmberg, Lorenc, & Werner, 2010) or procedures encouraging responding via the web (Russell, Boggs, Palmer, & Rosenberg, 2010). Cost savings for mixed-mode surveys are, however, likely to vary, depending on the specific situation, and could be higher when developing multiple-mode surveys.

[1] Department of Agricultural Education and Communication, University of Florida, Gainesville, FL, USA

Corresponding Author:
Glenn D. Israel, Department of Agricultural Education and Communication, University of Florida, 218 Rolfs Hall, PO Box 110540, Gainesville, FL 32611, USA.
Email: gdisrael@ufl.edu

Web-hosted surveys have performed well in some instances, such as those of college students who are generally well connected and skilled in using web technologies (Kaplowitz, Hadlock, & Levine, 2004; Millar & Dillman, 2011; Werner & Forsman, 2005), but less so in surveys of the general population (Messer & Dillman, 2011; Smyth, Dillman, Christian, & O'Neill, 2010). One reason for caution in deciding to employ web-hosted instruments is that response rates for web surveys tend to be lower than those for mail and telephone modes (Bech & Kristensen, 2009; Fricker & Schonlau, 2002; Kwak & Radler, 2002; Manfreda, Bosnjak, Berelak, Haas, & Vehovar, 2008). Web-hosted surveys involving the general population are particularly problematic because many U.S. adults lack a high-speed Internet connection (Horrigan, 2009), and access to the web is a key determinant of response behaviors (Couper, Kapteyn, Schonlau, & Winter, 2005). Consequently, a survey of the general population or segments of it requires access to an alternative mode or it risks having substantial nonresponse and nonresponse bias.

Thus, the relative advantage or disadvantage of web surveys is affected by design features such as the number of contacts and modes used in sending the survey invitation as well as the target population's attributes. Recent studies also show that survey invitations via postal mail with a paper questionnaire generated a higher response rate than postal invitation for the web-hosted version or the choice of web or paper instruments (Israel, 2010; Lesser, Yang, & Newton, 2011; Messer & Dillman, 2011; Smyth et al., 2010). Survey procedures with mixed-mode sequencing and strategic timing might, however, improve response rates to be comparable or even higher than traditional mail surveys. Since surveys that rely solely on web-hosted instruments usually result in fewer responses, switching to a paper questionnaire later in the contact sequence can help to overcome access and respondent preference barriers (Converse, Wolfe, Huang, & Oswald, 2008; Holmberg et al., 2010; Millar & Dillman, 2011; Werner & Forsman, 2005; Wolfe, Converse, Airen, & Bodenhorn, 2009). These studies were, however, often focused on populations who are thought to be a well connected and technologically literate, including K–12 teachers, school counselors, and college students. Thus, there is a need to examine which survey procedures prove effective in eliciting responses in other populations.

I extend this line of research to explore the effect of mode sequencing on survey data for a quasi-general population—Cooperative Extension Service clients. Extension clients, like the general population and clients of other organizations, do not have universal access to the Internet. Previous surveys suggest that Extension clients tend to be older and better educated than the general population but, overall, they are diverse with regard to gender, occupation, residence, education, and age (Israel, 2010). The preexisting client relationship provides an opportunity to obtain mail or e-mail addresses to contact people. When both mail and e-mail addresses can be obtained, this allows for the comparison of procedures using all postal contacts and paper questionnaires with e-mail contacts and web instruments as well as mixed-mode strategies based on previous research (Israel, 2010, 2011). Thus, my research questions start with "Does using postal and e-mail addresses reduce the proportion of undeliverable survey invitations relative to that for postal-only or e-mail-only addresses?" and "Are there mixed-mode combinations of e-mail/web and mail/paper procedures that generate response rates that are equal to mail surveys?"

Finally, because complete contact information cannot be obtained from everyone, in part because some people are not connected to the Internet or unwilling to share certain contact information, there might be differences in demographic attributes, service utilization, and client satisfaction based on the type of contact data. Those responding via the web tend to differ from those responding via the mail (Israel, 2010; Smyth et al., 2010), and it stands to reason that the responses of persons who provide only a postal address or an e-mail address might differ from those providing both. Consequently, my third research question asks "Are there are differences in demographic attributes, service utilization, and client satisfaction among respondents based on the type of contact data obtained?"

Background

As Millar and Dillman (2011) observe, the simultaneous application of multiple contacts, token cash incentives, personalized communication, and a respondent-friendly instrument can lead to higher response rates in self-administered mail surveys than those lacking one or more of these features. Evidence supporting this view is seen in reports by Smyth, Dillman, Christian, and O'Neill (2010) who achieved a 71% response rate to a general household survey, Israel (2011) who obtained a 64.5% response rate with a quasi-general public population, Bech and Kristensen (2009) who got 42.5% of older adults to respond, and Friese, Lee, O'Brien, and Crawford (2010) who garnered a 33.7% response rate from nurses. On the other hand, response rates to web-hosted surveys were lower in three of the four studies, which align with Manfreda and others' meta-analysis (2008).

Millar and Dillman (2011), however, offer hope that carefully designed mixed-mode strategies can improve response rates of surveys involving the web to be equivalent to mail surveys. Two mixed-mode experimental groups involving e-mail invitations to the web-hosted version of the survey achieved statistically equivalent response rates with the mail-only group in a population of college students (Millar & Dillman, 2011). This suggests design features for mixed-mode surveys that might achieve comparable response rates to mail-only surveys - customizing the contact modes sequence and tailoring invitation messages to match contact and response mode combinations.

Mixed-Mode Versus Unimode

A number of studies have focused on specialized populations with nearly universal Internet access, such as college students, to examine response rates of paper and postal surveys. A series of postal contacts using paper questionnaires (a unimode approach) generally performs well and provides a standard for comparison (Kaplowitz et al., 2004; Millar & Dillman, 2011). Although unimode web surveys tend to have lower response rates than mail surveys, a series of e-mail contacts to a web-hosted survey has been found to have a smaller response rate disparity relative to mail surveys than did a series of postal contacts for a web survey (Manfreda et al., 2008).

The use of mixed-mode methods for a web-hosted questionnaire has two dimensions: mode of contact and mode of response. Invitations to a web-hosted questionnaire can be delivered through the mail (which then requires the respondent to type in the URL) or e-mail (which typically have a "clickable" URL embedded in the message). Mixed-mode approaches, most commonly web and mail, have been suggested as a means to allow people to respond using their preferred method (Dillman, Smyth, & Christian, 2009). In several studies, offering a simultaneous choice of response mode (either web or mail) resulted in a lower response rate than sequential mode (e.g., web then mail) or unimode approaches (Israel, 2010; Smyth et al., 2010), but Friese et al. (2010) had a statistically equivalent response rate. Likewise, Millar and Dillman (2011) found that offering a mode choice to college students was as effective as the unimode postal standard. Because of the uncertainty of the effect of offering a mode choice, Millar and Dillman (2011) suggested that the sequential use of modes might simplify the response decision-making process and encourage a higher final response rate.

A mixed-mode approach emphasizing the use of the web-hosted survey initially and then offering the paper version through a postal contact can generate a substantial number of responses via the web, and the combined responses from the web and paper surveys are substantively similar to the mail survey comparison group (Friese, Lee, O'Brien, & Crawford, 2010; Israel, 2010; Smyth et al., 2010). On the other hand, these studies show that the overall response rate tends to be lower than the mail survey standard. Finally, I note that mixed-mode methods may better suit populations with nearly universal access to the Internet or strata within more generalized populations where two or more types of contact information (including e-mail addresses) can be obtained, such as clients and/or members of public or private organizations (Greenlaw & Brown-Welty, 2009).

Customizing Contact Mode Sequence

Effectively combining contact mode (i.e., postal and e-mail) with questionnaire mode (i.e., paper and web) might be important to reducing undeliverable survey invitations and attaining high response rates. Postal contacts can be used to deliver paper surveys and URLs to web-hosted surveys, as well as cash incentives, but e-mail contacts are practical for sending invitations to web surveys so as to put the questionnaire "at hand" (Holmberg et al., 2010).

In addition, a postal prenotice has shown mixed effects on the likelihood of responding to e-mailed invitations for a web survey (Kaplowitz et al., 2004; Millar & Dillman, 2011). A postal pre-letter might help reduce fears about potential threats from e-mail messages and unfamiliar website and establish the credibility of a subsequent e-mail request (Manfreda et al., 2008; Millar & Dillman, 2011). A physical letter is also likely to command more attention from the recipient and better communicate the importance of the survey than an e-mail message. This is because people receive more e-mails than postal letters and, consequently, e-mail messages can be quickly deleted or forgotten.

Dillman, Smyth, and Christian (2009) suggest that the messages in each contact should be tailored to the specific role it plays in the survey process. For example, a paper questionnaire can be mailed to a person for whom an e-mail address is available. Then a follow-up e-mail message containing a link to the survey URL can be scheduled to arrive shortly after a postal invitation. The text of this e-mail would emphasize how the embedded link can be used to conveniently access the web version of the survey. This carefully timed correspondence facilitates respondents using their preferred mode and might increase the overall response rate (Millar & Dillman, 2011).

Rational for this Study's Mode-Sequenced Contacts

Based on the above, I incorporated features that might encourage a high response rate into two of the experimental treatment groups. The first group used a postal pre-letter as the initial contact, given the premise that this mode would garner more attention and better legitimize subsequent contacts. This group then focused on emphasizing responding via the web through an e-mail invitation and e-mail reminder. Finally, the group used a final postal contact with the paper survey, which has been shown to be more effective in following requests to complete the survey on the web (Börkan, 2010; Converse et al., 2008; Millar & Dillman, 2011). The second group used the same postal pre-letter. It then emphasized a sequential choice by sending the paper survey with a postal invitation letter, followed a few days later by an e-mail message stressing the convenience of the web. The second group also used a final postal contact with the paper survey. Given previous studies, I expected the first group to have proportionately more web responses than the second group. These two groups were compared to a mail-only group (which is the traditional standard; see Fricker & Schonlau, 2002), as well as an e-mail-only group. Given the ephemeral nature of e-mail messages, it makes sense to include the URL link in each message so that respondents can act on the invitation immediately. Thus, the initial contact for an e-mail-only survey should include a URL link along with a complete explanation of the survey.

Method

I used data collected for the annual survey of Florida Cooperative Extension Service's (FCES) clients in 2010. FCES is a public agency that provides an array of educational programs and the survey was sent to a sample of clients who had attended a workshop or seminar, called the Extension office, visited the office, or received educational information via e-mail. The survey followed essentially the same procedures as described in previous studies (Israel, 2010, 2011).

For this study, I selected a sample ($n = 2,331$) from a list of 3,467 clients in 15 of Florida's 67 counties (note: randomization was used to assign counties to a year in the 5-year rotation system).[1] Selected clients were sorted into three strata: those providing both an e-mail address and a postal address, those providing a postal address only, and those providing an e-mail address only. For clients in the first strata (providing both an e-mail and a postal address), I randomly assigned them to four experimental groups:

1. *Mail only*: Postal invitations with paper questionnaires only ($n = 365$).
2. *E-mail preference*: After sending a postal pre-letter, the request to complete the survey and subsequent reminder were sent via e-mail. The final contact switched modes to a postal follow-up ($n = 367$).
3. *E-mail complement:* The pre-letter and initial request were sent by mail. Five days after sending the postal request, an e-mail with the link to the survey was sent. The final contact switched modes to a postal follow-up ($n = 364$).
4. *E-mail only:* E-mail invitations with web questionnaires only ($n = 364$).

For the second and third strata, clients who provided only a postal address or only an e-mail address, respectively, were designated as Groups 5, *mail only* ($n = 588$), and 6, *e-mail only* ($n = 283$). Thus, comparisons among the groups within the first strata are experimental, while all other comparisons reflect selection processes that affect the collection of postal and e-mail addresses.

I used a unified mode design in constructing the mail and web instruments (Dillman et al., 2009; Israel, 2010). This included using the same questions and question order and, more importantly, minimizing visual design differences. The two-page mail questionnaire had 21 items and utilized gray shading to distinguish blocks of related questions. Similarly, the Internet survey presented questions in groups or singly on a separate screen (see Israel, 2010).

The web survey was hosted on a university server. Clients who had received the invitation via e-mail could click on the link to access the URL and then enter the personal identification number (PIN). Upon entry, the informed consent information was presented. When the "agree to participate" button was selected, the screen containing the initial questions was presented.

I constructed the correspondence to provide the same verbal and visual presentation to clients. A series of contacts were used to implement the survey, as shown in Table 1. Some clients in Group 2 who were sent the e-mail invitation did not receive it. Undeliverable e-mails resulted from addresses where the writing could not be accurately deciphered, they were typed into the contact database incorrectly, or had become obsolete as clients changed e-mail service providers between collecting the contact data and initiating the survey. I then sent these clients a postal invitation and questionnaire and their data are included in Group 2's results below.

I analyzed the data using SAS for Windows, Version 9.2 (SAS Institute Inc). The z statistic was used to test for differences between proportions. In addition, the Wald chi-square test was used for differences in demographic attributes, use of Extension, and satisfaction/outcomes by treatment for categorical and ordinal variables, while analysis of variance was used to test for differences for interval variables. Comparisons of attributes between experimental groups and strata used data weighted for design effects and nonresponse (Biemer & Christ, 2008).

Findings

The first research question asked "Does using postal and e-mail addresses reduce the proportion of undeliverable survey invitations relative to that for postal-only or e-mail-only addresses?" The data in Table 2 indicates that single mode groups had a higher percentage of undeliverable invitations, especially for the two e-mail-only groups. The two mixed-mode groups had the lowest undeliverable

Table 1. Survey Procedures by Contact Information Strata and Treatment Group.

	Contact information available					
	Postal and e-mail address				Postal only	E-mail only
	1. Postal only	2. E-mail preference	3. E-mail complement	4. E-mail only	5. Postal only	6. E-mail only
First contact	Mail pre-letter	Mail pre-letter	Mail pre-letter	E-mail invitation with link	Mail pre-letter	E-mail invitation with link
Second contact	Mail letter and questionnaire	E-mail invitation with link	Mail letter and questionnaire	E-mail with link	Mail letter and questionnaire	E-mail with link
Third contact	Mail post card	E-mail with link	E-mail with link	E-mail with link	Mail post card	E-mail with link
Fourth contact	Mail letter and questionnaire	Mail letter and questionnaire	Mail letter and questionnaire	E-mail with link	Mail letter and questionnaire	E-mail with link

Table 2. Percentage of Ineligible, Undeliverable, and Reachable by Contact Information Strata and Treatment Group.

	Contact information available					
	Postal and e-mail address				Postal only	E-mail only
	1. Postal only	2. E-mail preference	3. E-mail complement	4. E-mail only	5. Postal only	6. E-mail only
Ineligible	1.1%	1.4%	.3%	.8%	1.2%	2.1%
Undeliverable	4.7%	1.4%	1.9%	14.0%	7.1%	17.0%
Reachable	94.3%	97.3%	97.8%	85.2%	91.7%	80.9%
N	365	367	364	364	588	283

Note. Difference in proportion of undeliverable rate for experimental groups, *z* statistic for the difference between proportions, and *p* value (significant *p* values in boldface after Bonferroni-Holm correction):

1 vs. 2 = 3.3%	$z = 2.611$	$p =$ **.005**
1 vs. 3 = 2.8%	$z = 2.069$	$p = .019$
1 vs. 4 = −9.3%	$z = -2.721$	$p =$ **.003**
2 vs. 3 = −0.5%	$z = -0.596$	$p = .275$
2 vs. 4 = −12.6%	$z = -5.010$	$p =$ **<.001**
3 vs. 4 = −12.1%	$z = -4.559$	$p =$ **<.001**

percentage because mail was substituted when an e-mail invitation bounced and vice versa. Note also that the sampling frame included a small percentage of clients who registered for but did not attend Extension events, were deceased, had a professional relationship with the organization and these were coded as ineligible.

Next, I address the question, "Are there mixed-mode combinations of e-mail/web and mail/paper procedures that generate response rates that are equal to mail surveys?" The two mixed-mode treatments, e-mail preference and e-mail complement, had response rates statistically equivalent to the postal-only group (Table 3). The e-mail preference group had a majority of respondents who completed the survey on the web (130 of the 212 respondents), while about one sixth of respondents (41 of 223) in the e-mail complement group completed the survey on the web. This shows the effect of the number and timing of the e-mail invitations on the mode of response, where the e-mail preference group was invited to complete the survey on the web first (and an e-mail reminder), while the e-mail complement group received the paper survey and then the email invitation. Among the four experimental groups, the e-mail-only group (Group 4) had a statistically lower response rate than Groups 1–3. Finally, the response rate for the postal-only group with just a mailing address (Group 5) was equivalent to that for the treatment group providing both postal and e-mail addresses (Group 1); likewise the two e-mail-only groups generated similar response rates.

The contribution of each contact to the total response rate is shown in Table 4. The e-mail preference treatment (Group 2) obtained all of the web responses following the two e-mail contacts and no additional web responses followed the final postal contact. This substantiates the observation about the short, ephemeral life span of e-mail messages. Note that there were a few responses by mail following the second and third contacts for Group 2, which reflect instances where e-mail messages were undeliverable and a postal contact was immediately substituted. Finally, a large percentage of the respondents for this group used the paper survey sent with the fourth contact.

The other mixed-mode group, the e-mail complement, had a different response pattern. While the response rate for the second contact was nearly equal to that of the e-mail preference group, the

Table 3. Response Rate by Mode and Treatment Group.

	Contact information available					
	Postal and e-mail address				Postal only	E-mail only
Response mode	1. Postal only	2. E-mail preference	3. E-mail complement	4. E-mail only	5. Postal only	6. E-mail only
Mail	58.1%	23.0%	51.1%	–	59.4%	–
Web	–	36.4%	11.5%	48.1%	–	45.4%
Total	58.1%	59.4%	62.6%	48.1%	59.4%	45.4%
n[a]	344	357	356	310	539	229

[a] Undeliverable and ineligible were subtracted for the sample size. Response rates calculated as (completed and partial responses/sample size) × 100.

Note. Difference between total response rate for experimental groups, *z* statistic for the difference between proportions, and *p* value (significant *p* values in boldface after Bonferroni-Holm correction):

1 vs. 2 = −1.3%	$z = -.257$	$p = .399$
1 vs. 3 = −4.5%	$z = -1.140$	$p = .127$
1 vs. 4 = 10.0%	$z = 2.654$	$p =$ **.004**
2 vs. 3 = −3.2%	$z = -.891$	$p = .187$
2 vs. 4 = 11.3%	$z = 2.926$	$p =$ **.002**
3 vs. 4 = 14.5%	$z = 3.779$	$p <$ **.001**

Table 4. Response Rate by Contact, Mode, and Treatment Group.

	Contact information available					
	Postal and e-mail address				Postal only	E-mail only
Contact and response mode	1. Postal only	2. E-mail preference	3. E-mail complement	4. E-mail only	5. Postal only	6. E-mail only
First contact						
Mail	–	–	–	–	–	–
Web	–	–	–	16.8%	–	15.8%
Second contact						
Mail	27.6%	1.1%	23.6%	–	28.4%	–
Web	–	24.1%	–	18.1%	–	18.4%
Third contact						
Mail	15.4%	0.8%	13.2%	–	11.7%	–
Web	–	12.3%	11.5%	10.3%	–	8.8%
Fourth contact						
Mail	15.1%	21.0%	14.3%	–	18.9%	–
Web	–	0.0%	0.0%	2.9%	–	2.2%
Total	58.1%	59.4%	62.6%	48.1%	59.0%	45.2%
n[a]	344	357	356	310	539	229

[a] Undeliverable and ineligible were subtracted for the sample size. Response rates calculated as (completed and partial responses/sample size) × 100.

quick e-mail follow up elicited many mail and web responses. The final contact, a postal letter and paper survey, generated additional responses by mail but no web surveys.

The postal-only groups (1 and 5) showed a similar pattern of responses, with the largest percentage of responses following the second contact. The two e-mail-only groups (4 and 6) also shared a similar pattern of responses for each contact. The fourth and final contact for these groups had a negligible effect, which is consistent with the observation by Manfreda, Bosnjak, Berelak, Haas, and Vehovar (2008) that additional contacts by e-mail have a diminishing impact. It is also interesting to note that the percentage responding to the first contact (about 16%) is about two thirds of that for the e-mail preference group (24%), which had received a postal pre-letter. This suggests that the pre-letter was effective in encouraging some respondents to respond to the initial e-mail request.

Further analysis (data not shown) failed to reveal substantive difference between any of the four experimental treatment groups (for the strata comprising clients providing mail and e-mail addresses). Responses to satisfaction items, questions about using Extension's services, and demographic questions did not differ significantly between the four treatments, even though the e-mail-only group had a significantly lower response rate.

Comparing Client Strata

Finally, I address the third research question, "Are there are differences in demographic attributes, service utilization, and client satisfaction among respondents based on the type of contact data obtained?" The analysis revealed some differences between the three strata of extension clients (Table 5). Those who provided a postal address only tended to be older than those in the other two strata. Because of the age difference, this group had used Extension's services for a longer amount of time but was much less likely to have sought information through the web portal. Finally, respondents in the mail-only strata were less likely to share information with other persons in comparison to those in the other two strata.

Conclusions and Discussion

This study posed three research questions to assess the utility of using mixed-mode strategies to survey Extension clients. The first addressed whether using both postal and e-mail addresses reduced the proportion of undeliverable invitations relative to those via mail only or e-mail only. In general, having both postal and e-mail address provided a small advantage over having only the postal address and a considerable one over having only an e-mail address. This said, obtaining both types of contact information is a challenge, especially in the case of e-mail addresses where approximately 15% of those provided by clients bounced. Although I think it is desirable, the availability of multiple types of contact data is a key factor in the survey design for organizational clients or the general population.

This study also addressed the question of how a mixed-mode sequence of invitations compared with mail-only and e-mail only-invitations on response rate. The results comparing the four experimental treatments showed that two groups combining e-mail with postal mail invitations generated response rates statistically equal to the mail-only treatment group. The e-mail-only group had a significantly lower response rate. The resulting data were substantively equivalent among the four treatments.

The response rate for the mixed-mode treatments using mail and e-mail contacts suggest that there is a complementary relationship that is superior to e-mail-only surveys. It is likely the mixed-mode approach provides an opportunity for more people to act on mode preferences (Millar & Dillman, 2011) as well as allowing the researcher to take advantage of the cost savings from e-mail invitations and responses via the web. It also appears that the mechanism for generating

Table 5. Comparison of Responses by Contact Information Strata (Weighted for Design and Nonresponse).

	Mail only	E-mail only	Mail and e-mail	Test statistic[a]
Demographic items				
Age (mean)	$n = 447.6$ 62.1	$n = 77.4$ 51.5	$n = 423.4$ 54.8	$F = 18.47$; $df = 2$; $p < .001$
Sex (% female)	$n = 464.3$ 43.9	$n = 88.9$ 43.5	$n = 450.0$ 41.9	$\chi^2 = .1001$; $F_{adj} = 0.047$; $df = 2$; $p = .955$
Educational attainment	$n = 456.2$	$n = 88.1$	$n = 442.6$	$\chi^2 = 24.622$;
High school graduate or less	19.1	3.4	10.1	$F_{adj} = 2.638$;
Some college	48.8	19.1	32.4	$df = 6$;
College bachelor's degree	16.4	47.6	32.0	$p = .093$
Postgraduate degree	15.8	29.9	25.5	
Place of residence	$n = 452.7$	$n = 89.6$	$n = 440.8$	$\chi^2 = 13.714$;
Farm	15.0	0.4	7.0	$F_{adj} = 2.694$;
Rural, nonfarm	29.0	65.5	20.7	$df = 4$;
Urban	56.0	34.1	72.3	$p = .087$
Use of Cooperative Extension Service (CES) items				
Number of years (mean)	$n = 348.6$ 14.8	$n = 80.9$ 6.3	$n = 396.9$ 9.4	$F = 11.40$; $df = 2$; $p = .001$
Number of contacts last year (mean)	$n = 390.6$ 5.2	$n = 83.4$ 5.8	$n = 407.7$ 5.9	$F = 0.16$; $df = 2$; $p = .857$
Visited *Solutions for your life* web portal	$n = 455.9$	$n = 89.6$	$n = 447.2$	$\chi^2 = 30.944$;
Yes	7.5	44.2	32.6	$F_{adj} = 6.078$;
No	86.8	52.3	65.4	$df = 4$;
Don't know	5.7	3.5	2.0	$p = .008$
Satisfaction and outcome items				
Information accuracy	$n = 454.6$	$n = 84.7$	$n = 439.8$	$\chi^2 = 20.916$;
Very dissatisfied	0.5	2.4	0.3	$F_{adj} = 0.816$;
Dissatisfied	3.3	7.5	0.7	$df = 8$;
No opinion	5.6	9.7	2.9	$p = .613$
Satisfied	30.3	19.6	22.9	
Very satisfied	60.3	60.8	73.2	
Timely delivery	$n = 454.2$	$n = 84.7$	$n = 440.3$	$\chi^2 = 22.022$;
Very dissatisfied	0.6	2.4	0.9	$F_{adj} = 1.376$;
Dissatisfied	3.7	7.9	1.4	$df = 8$;
No opinion	4.3	5.8	3.3	$p = .343$
Satisfied	36.1	23.9	24.5	
Very satisfied	55.3	60.0	70.0	
Information relevance	$n = 455.0$	$n = 84.7$	$n = 440.1$	$\chi^2 = 22.363$;
Very dissatisfied	0.6	2.2	0.5	$F_{adj} = 1.398$;
Dissatisfied	4.1	7.5	1.5	$df = 8$;
No opinion	2.7	4.6	3.4	$p = .336$
Satisfied	34.8	23.6	25.7	
Very satisfied	57.8	62.1	68.8	
Easy to understand	$n = 456.8$	$n = 84.7$	$n = 443.5$	$\chi^2 = 12.937$;
Very dissatisfied	0.5	2.4	0.5	$F_{adj} = 0.809$;
Dissatisfied	2.1	0.8	0.7	$df = 8$;
No opinion	2.9	10.5	2.9	$p = .617$
Satisfied	35.6	24.7	25.5	
Very satisfied	58.9	61.6	70.4	
Shared information with another person	$n = 449.7$	$n = 88.1$	$n = 439.9$	$\chi^2 = 19.974$;
Yes	67.4	78.1	76.1	$F_{adj} = 3.924$;
No	29.7	19.8	20.5	$df = 4$;
Don't know	2.9	2.0	3.4	$p = .032$
Overall satisfaction	$n = 454.8$	$n = 88.9$	$n = 444.5$	$\chi^2 = 29.266$;
Very dissatisfied	0.3	1.6	0.4	$F_{adj} = 1.829$;
Dissatisfied	3.6	7.2	1.5	$df = 8$;
No opinion	6.5	4.0	2.7	$p = .221$
Satisfied	26.7	27.5	21.7	
Very satisfied	62.8	59.7	73.7	

[a] The adjusted F value is used for the Wald chi-square test for tables larger than 2×2.

responses is different between the two mixed-mode treatments. By offering only the web-hosted survey initially, the e-mail preference treatment pushed more respondents to the web. These might be described as respondents who have flexible attitudes toward the web mode as well as those who prefer the web mode. The final contact via postal mail served to capture responses from people who prefer a paper questionnaire. I attempted to provide a timely option for responding via the web to people who had received the paper survey with the e-mail complement treatment. I speculate that those who responded via the web in this treatment prefer using the web mode. It is likely that the closer the e-mail invitation arrives with the paper survey, the respondents are better able to choose their preferred mode. It can be tricky, however, to coordinate the concurrent arrival of postal and e-mail invitations. For both mixed-mode treatments, a final postal contact garnered a substantial number of responses, which is consistent with previous studies (Börkan, 2010; Converse et al., 2008; Millar & Dillman, 2011).

Despite issues of timing and sequence, both the mixed-mode treatments performed as well as the mail-only standard. Thus, I suggest that a mixed-mode survey design is warranted when e-mail addresses are available. It should be noted that these results differ from mixed-mode designs using postal mail invitation to recruit respondents to use the web. Smyth et al. (2010), Friese et al. (2010), and Israel (2010) had lower response rates for web-preference treatments than mail-only treatments.

Finally, the third research question asked whether the availability of specific contact information appears to reflect the segmentation of the survey population into strata that differ demographically, in service utilization and in customer satisfaction. The analysis showed some differences between the three strata of Extension clients, and these differences led to somewhat varying results on the questions related to customer satisfaction. Consequently, it is important to use modes that provide access to all segments in the population of interest, thereby ameliorating coverage bias. In addition, either pre-survey sampling adjustments or post-survey weighting might be necessary to maintain the overall representativeness of the data (see Lesser et al., 2011).

Given the similarity of Cooperative Extension Service clients to those of many governmental agencies and nonprofit organizations, considerable savings can be realized from a mixed-mode methodology over one based on a mail-only approach. This was especially true for the e-mail preference treatment, which replaced two postal mailings with e-mail invitations. One could argue that e-mail-only invitations can be used for the sample segment with both postal and e-mail contact information with two caveats—first, the response rate is likely to be lower with a resulting loss of precision in the population estimates and, second, the results might be biased without using postal invitations to a supplemental sample of those without an e-mail address. Nevertheless, it appears worthwhile to collect e-mail addresses in tandem with postal addresses, which then provides opportunities for customizing the survey process to facilitate high response rates at a cost savings over traditional mail surveys.

Acknowledgment

This research is part of Florida Agricultural Extension Station project FLA-AEC-004832.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author received no financial support for the research, authorship, and/or publication of this article.

Note

1. Although the population of interest is adult Extension clients, there has not been a state-wide study that provides population characteristics for clients. Consequently, the list of clients collected each year is assumed to be reasonably representative of this population. As noted by one reviewer, unmeasured processes that influence the collection of contact information could adversely affect the representativeness of the sampling frame.

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Bio

Glenn D. Israel is a professor in the Department of Agricultural Education and Communication, University of Florida, Gainesville, FL. He is a member of WERA-1010, a multistate coordinating committee for the project, "Reduction in error in rural and agricultural surveys." He can be contacted at gdisrael@ufl.edu.