Does it Pay to Try Again? Using Production Metrics from the Recruiting Process on an Establishment Survey to Design Recruiting Protocols

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Introduction and Past Literature

Early survey literature states that the number of contact attempts is one of the most powerful predictors of response rate (Dillman, Christenson, Carpenter, & Brooks, 1974; Goyder, 1985, 1987; Heberlein & Baumgartner, 1978). Nevertheless, repeatedly contacting sample members to gain their agreement to participate often fails to produce an increase in survey completions. More recently, survey literature has focused on this concept of diminishing returns in household surveys. Findings from the Behavioral Risk Factor Surveillance System Survey show that after 31 days in the field, the number of cases receiving a final disposition and the number completing interviews declines drastically. This decline was such that continuing data collection beyond 31 days was deemed inefficient (Qayad, Balluz, & Garvin, 2009). The Survey of Income and Program Participation Methods Panel also documents diminishing returns from repeated attempts. Contact logs from this study show that 24% of cases were finalized at the first contact. After only three attempts, 60% of cases were finalized. This number increases to 90% upon eight attempts (Bates, 2003). Similarly, Tancreto and Bentley (2005) reported findings that tell a similar story. Using the experience of nonresponse follow-up efforts in the 2000 census, the authors showed that additional attempts, whether face to face or over the telephone, achieved smaller gains in survey completions relative to earlier attempts. The cumulative gains in response rates after the fourth attempt were half of the gains after the third attempt.

In addition to looking at the relationship between number of contact attempts and gains in response rates, some literature also examines the relationship between the length of the field period and gains in response rates. Using a 10-day effort within the Current Population Survey, Groves and Couper (1998) found diminishing returns in the latter days of the field period. Specifically, the first 30% of the time was highly productive and yielded a 43% cumulative resolution rate. This productivity waned, and by the close of day 7, 70% of the time had elapsed and 79% of cases had been resolved. The last 30% of the time needed to be devoted to only 21% of the cases. In addition to increasing completion rates, researchers may decide to extend a data collection period to improve the representativeness of the completed cases and reduce nonresponse bias. Teitler, Reichman, and Sprachman (2003) document a study demonstrating that as the data collection period progressed, respondent sample characteristics more closely resembled those of the population. However, the authors also found this increased representativeness quickly diminished as levels of effort increased.

Problem

The concept of diminishing returns *on establishment surveys* has not received significant attention in the survey research literature. Some notable exceptions are Messeri et al., 1995; Edwards, Long, Hogue, and O'Neill, 2009; and Britt and Featherston, 2007. Messeri et al. offer a straightforward discussion of the steps taken and personnel involved when patient care agencies decide whether to participate in a study and state the average length of time (16.4 weeks) needed for recruiting and collecting data from these agencies. The calendar time needed for organizations to complete surveys is also a focus of the Edwards et al. and Britt and Featherston papers; Edwards et al. found that that it took 154 days to reach the targeted response rate, and Britt and Featherston reported an average completion time of 40 weeks. Apart from these papers, there are few published metrics or guidance for establishment surveys regarding the length of data collection and the persistence of contact attempts. Although

respecting that organizations need time to process the survey request, survey researchers nevertheless face the question of "how much is enough?"

Although our research cannot answer this question for all types of establishments, in this paper we examine the relationship between level of effort and completion rates on the National Survey of Residential Care Facilities (NSRCF).

Research Questions

We developed four research questions about the relationship between level of effort and completion rates. In developing and answering these, we found the response process model for establishment surveys outlined by Sudman, Willimack, Nichols, and Mesenbourg (2000) and expanded upon by Willimack, Nichols, and Sudman (2002) and Willimack (2007) to be useful in providing a theoretical basis for our findings. Summarized briefly, what we will call the "Sudman-Willimack model" depicts how organizations reach their decision about whether to participate in a survey. The model recognizes that organizations proceed through steps of understanding the nature of the survey questions, determining the appropriate respondent(s) and/or administrative records possessing this information, assessing the priority of responding, and finally, responding. To the organization, these steps are *work that does not produce organizational benefits*. The steps and decisions will vary based on attributes of the organization, such as its structure, differentiation of functions, and the way authority is structured. The model explains a number of points that we found in our research and that practitioners of establishment surveys observe in general: why establishment surveys tend to have longer field periods than household surveys, and why some establishments seem to be harder to contact and take longer to agree to participate than other establishments.

Our first research question was: *what is the relationship between level of effort made on a given case and the rate at which that case completes the interview?* We operationalized level of effort in two ways: the number of contact attempts made by interviewers, and the elapsed calendar time from when the interviewer began working the case until the case communicated its final decision. Our second research question examined *how the level of effort required to complete cases varied by organizational characteristics of the facility, namely size, ownership, and geographic location.* Specifically, we looked at how small versus very large establishments and those independently owned versus owned by a larger organization differ in terms of the level of effort required to achieve a completed interview. Third, we asked: *do late responders differ significantly from others on key items in the instrument?* Late responder analysis has been recognized and widely used as a form of nonresponse analysis (Ramirez, 2007). It assesses whether late responders (who proxy for the nonresponders) differ from those who respond earlier in ways that systematically introduce bias into the parameter estimates collected by the survey. We were interested in the late responder analysis since it directly told us whether the additional level of effort and calendar time yielded additional completed cases, without which our survey estimates for key variables would have been biased. Finally, our fourth research question essentially paraphrased the title of our paper: *"Does it pay to try again?"* We assessed the likelihood that an additional contact attempt will result in the establishment agreeing to the interview. We combined this assessment with the findings of the late responder analysis to answer if and when it paid to try again on the NSRCF. We use the terms establishment, organization, respondent and case interchangeably in our analyses. Because the NSRCF was surveying residential care facilities, we often use the term facilities as well.

Data Source

Our data come from the 2010 NSRCF, a national study of residential care facilities providing long-term care to primarily older adult populations conducted by the National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention (CDC). The 2010 NSRCF used a stratified two-stage probability sample design. The first stage was the selection of residential care facilities (RCFs) from the sampling frame representing the universe of RCFs. To be eligible for the study, RCFs were selected that are licensed, registered, listed, certified, or otherwise regulated by the state and that have four or more licensed, certified, or registered beds; provide room and board with at least two meals a day; provide around-the-clock on-site supervision; and help with personal care, such as bathing and dressing, or health-related services, such as medication management. Facilities licensed to serve the mentally ill or the developmentally disabled populations exclusively were excluded. The primary sampling strata of RCFs were

defined by facility size and region. Within these sampling strata of RCFs, facilities were sorted by metropolitan statistical area status and selected by using systematic random sampling. There were 3,605 RCFs randomly selected to become the survey sample. NCHS contacted the 3,605 facilities by mail and telephone and asked the facilities to complete a short telephone screener. Of these 3,605 facilities, 2,644 were determined eligible while eligibility could not be ascertained for 325 facilities. The unweighted response rate for the screener was 90.5%. Facilities that screened as eligible facilities were asked to make an appointment to complete an in-person survey. Of the 325 facilities with unknown eligibility, 262 were estimated to be inscope using the percent of eligible facilities in the group that could be contacted, bringing the total number of estimated inscope facilities to 2,906. Interviews were completed with 2,302 facilities, for a first-stage facility unweighted response rate of 79% and a weighted (for differential probabilities of selection) response rate of 81%. In the second stage of sampling, depending on facility size, three to six residents were sampled from each participating facility. Data were collected using two separate questionnaires: the facility questionnaire included questions about the sampled facility, and individual resident questionnaires were used to collect information about sampled residents. All data collected on sampled residents came from interviews with facility staff who answered questions based on referring to the residents' records or their own knowledge of the residents; residents were never interviewed. More information on the NSRCF design may be found in the NCHS Series 1 Methods Report (Moss et.al, 2011).

For this paper, we analyzed only the 2,644 eligible facilities. Of these, 2,302 later completed the in-person survey, and the balance of 342 refused. We used the NSRCF facility questionnaire data, sample frame data, and paradata. Paradata capture data about the survey process, including type of contact made, date of contact, and outcomes, while sample frame data capture characteristics known about the establishments.

Measures and Methods of Analysis

The analysis is divided into two broad sections: the first section addresses the relationship between level of effort made on a given case and the case completion rates (i.e., the first two research questions), and the second section examines whether late responders differ significantly from non-late responders on key items in the instrument (third research question). In the first section of the analysis, we operationalized level of effort in two ways, using two metrics.

1. **Contact attempts**. We counted the number of contact attempts made by interviewers over the course of working a case. These included making phone calls, leaving voicemail messages, sending letters or e-mails, making in-person visits, speaking to personnel at the establishment, and setting interview appointments. This metric is designed to measure interviewer effort. On some projects, this metric is called "events" or "attempts."

2. **Elapsed time**. We calculated the elapsed days from when the interviewer first began working the case to when the establishment either completed the in-person survey or conveyed to the interviewer their final decision not to complete. We conceptualized five points in the lifecycle of each case: (a) start, (b) complete screener, (c) make appointment for interview, (d) complete interview, and (e) refuse. A case can take one of three potential paths:

Screen, schedule, then complete: a-b-c-d
Screen, schedule, then refuse, a-b-c-e
Screen, refuse: a-b-e

Our metric of elapsed days for the full survey begins counting from point **a** and ends at what we consider to be the establishment making their final decision. In the case of a refusal, this is point **e**. In the case of a complete, this is point **d.** The argument could be made that point **c** better represents the final decision point among establishments which complete, but we felt that since establishments can (and frequently do) decide at the last minute to cancel, the time between **c** and **d** also represents deliberation time during the establishment's decision process. Those deliberations end when the establishment finally completes the in-person survey.

In the late-responder section of the analysis, we used these same two metrics - elapsed time for completion, number of contacts attempts - to identify late responders. We defined late responders in two ways: facilities whose elapsed time to complete the survey exceeded 120 days, and facilities that completed the survey after more than 20 contact attempts. Using the number of elapsed time criterion, there were 436 late responders among completed cases (18.9%). There were 243 late responders (10.6%) using the number of contact attempts criterion.

The late responder analysis was divided into 2 parts. In the first part we compared the size distribution of completed facilities to the size distribution of facilities on the sample frame, and examined how the inclusion and exclusion of the late responders impacted the distribution. This gave us a picture of how late responders might impact the survey results from a nonresponse bias perspective. In the second part, we compared late responders with non-late responders on key survey estimates to examine whether there were significant differences between them. The NSRCF collected information on a host of facility and resident characteristics. T-test and Chi-square tests were used to identify significant differences between non-late and late responders. We took into account the probability of selection by using base weights in the analyses.

Findings

To begin, we present the basic metrics we found for elapsed time and number of contact attempts. Table 1 describes these two metrics for all cases, completed cases, and refusal cases. Because a high response rate was needed on this survey, interviewers expended a great effort over an extended period of time to gain cooperation among establishments. As shown, the average completed case required 77.42 days and 11.01 contact attempts to complete. Interviewers spent more time working on the harder cases, only some of whom ultimately completed the survey. Among cases that ultimately refused, the interviewers spent, on average, 164.57 days, or about 5 and a half months, attempting to convince these facilities to participate. The mean number of contact attempts was 20.73.The bottom row for "all cases" shows findings that fall between the findings for completes and refusals, reflecting the means of all cases until they reached their final outcome, whether that outcome was a complete or a refusal.

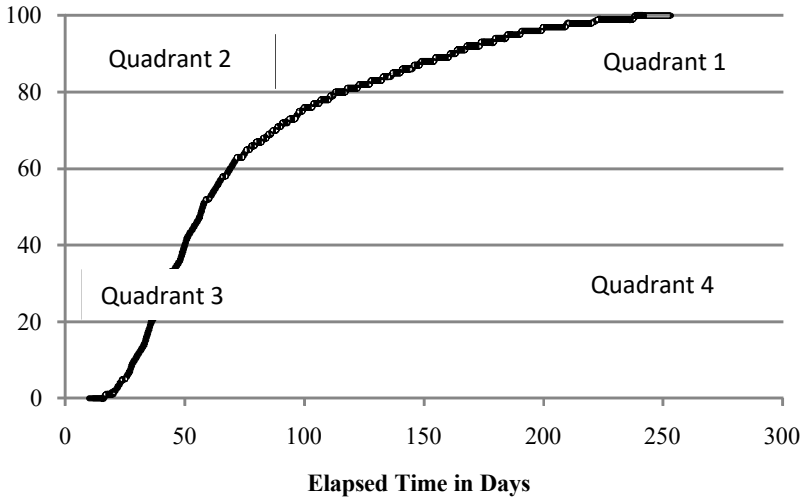
Table 1. Descriptive Statistics for Elapsed Time and Number of Contact Attempts by Different Case Outcomes

Type of Cases	Elapsed Time (Days)			Number of Contact Attempts		
	Mean	SD	Min, Max	Mean	SD	Min, Max
Completed Cases	77.42	51.40	10, 253	11.01	7.36	2, 57
Refusal Cases	164.57	56.81	9, 252	20.73	11.80	4, 66
All Cases	88.75	59.78	9, 253	12.28	8.71	2, 66

I. Addressing Research Question 1: W*hat is the relationship between level of effort made on a given case and the rate at which that case completes the interview?*

To address the first research question, we charted the percentage of completed cases along the continuum of days in the field period. In other words, Figure 1 shows the percentage of ultimately complete cases that were complete on a given day in that case's field period. As is typically the situation, interviewers do not begin contacting all cases on the same day. Therefore, the x-axis displays the number of days in an individual case's field period, as opposed to an overall period. The graph normalizes the life cycle of the case, simulating a situation where all of the cases were started at the same time. All cases that completed the interview are included (n=2,302). This graph shows that the relationship between length of the field period and the number of completes is consistent with the relationship typically found in household studies. As the field period progresses fewer completes are obtained. The most difficult cases are those that are shown in the upper right hand corner of the graph, in Quadrant I. These cases required the longest amount of time in the field and were completed after almost all of the other cases. Conversely, the "low-hanging fruit" are shown in Quadrant III of the graph. These cases were completed both early in the field period and were among the first to be completed overall. One case, which was completed in the shortest amount of time, was completed in only 10 days. The longest case took 253 days to complete. These durations are lengthier than one would typically find on a household survey. They complement earlier findings (Willimack et al., 2002; Willimack, 2007) that there is a response process in organizations that is different from, and longer than, that among household respondents.

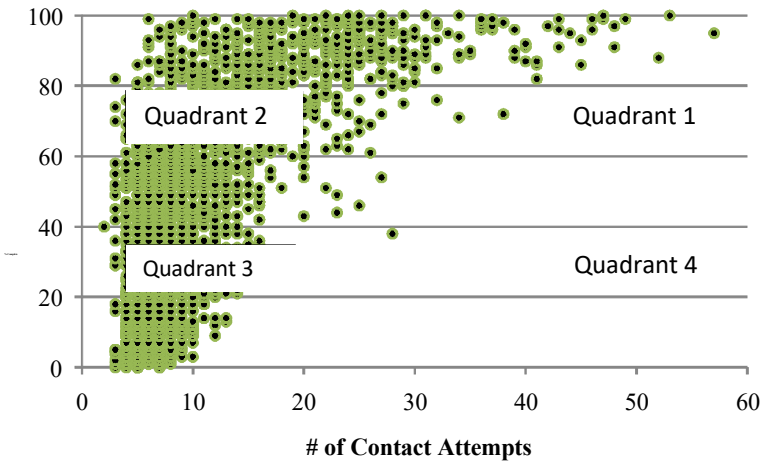
Figure 1. Percent Complete Cases by Elapsed Time



In addition to the percent of completed cases by duration in the field, we operationalized level of effort by measuring number of attempted contacts with sample members throughout the data collection period. Figure2, depicting completed cases by contact attempt, shows a less curvilinear distribution. This graph shows us that some cases were completed with few attempts, but at the end of the data collection period, when a large percentage of cases had already been completed. These cases populate Quadrant II of the graph. This could be explained by contacts at the sampled establishment indicating that appropriate staff would not be available for a number of weeks, and thus making appointments for recontact far into the future. These cases would have a longer field period with few contact attempts. Notice that there are no cases in the fourth quadrant of the graph. For a case to be depicted here, more than 30 contact attempts would have had to occur before half of the sample was completed—an impossibility.

Overall, this scatter plot graph reveals a similar pattern as the previous line graph. The highest numbers of contact attempts were made after the majority of cases were completed. The scatter plot also provides a view of the outliers and illustrates, for instance, how quite a few cases among the first 50% to be completed necessitated twenty or more attempts. The scatter plot also shows how cases overall follow a trend but are not clustered tightly around a central line.

Figure 2. Percent Complete Cases by Number of Contact Attempts



II. Addressing Research Question 2: ***How does the level of effort required to complete cases vary by organizational characteristics of size and ownership and geographic characteristics?***

To investigate this question we looked at our two metrics of elapsed time and contact attempts for different subgroups of sample members. The NSRCF sample specified whether a facility was independently owned or part of a chain; it also specified its geographic census region and the number of licensed beds in the facility. Small facilities were defined as having between four and 10 beds, medium facilities had 11 to 25 beds, large facilities had 25 to 100 beds, and very large facilities had over 100 beds. One could theorize that differences in characteristics of the facilities could affect their response patterns and timing of decisions to participate. Larger facilities and those that are a part of a chain may take more time to gain necessary permissions to participate in the survey. Similarly, gaining access to the necessary data and identifying appropriate staff to provide these data may take longer in larger facilities, resulting in longer field periods. The next four graphs display these relationships.

Figure 3 shows the number of days the case had been worked versus the percentage of chain-affiliated facilities that had been completed, project wide, by that day. The other line displays this for independent facilities. The graph shows that while these two lines do not diverge widely and certainly become equal at the end of the field period, there is a point when independent facilities appear to complete quicker than chain-affiliated facilities. Shortly after day 80, the completion rate among chain-affiliated facilities is 60%, while independent facilities are closer to 70%. This differential continues until approximately day 225 when the two lines converge. In addition to graphing, we also conducted several t-tests of the difference of means. The mean elapsed completion time for chain-affiliated facilities was 82.2 days and for independent facilities was 73.9 days; the t-tests revealed that the difference in means was statistically significant (p-value <0.01).

Figure 3. Percent Complete Cases by Elapsed Time by Facility Type

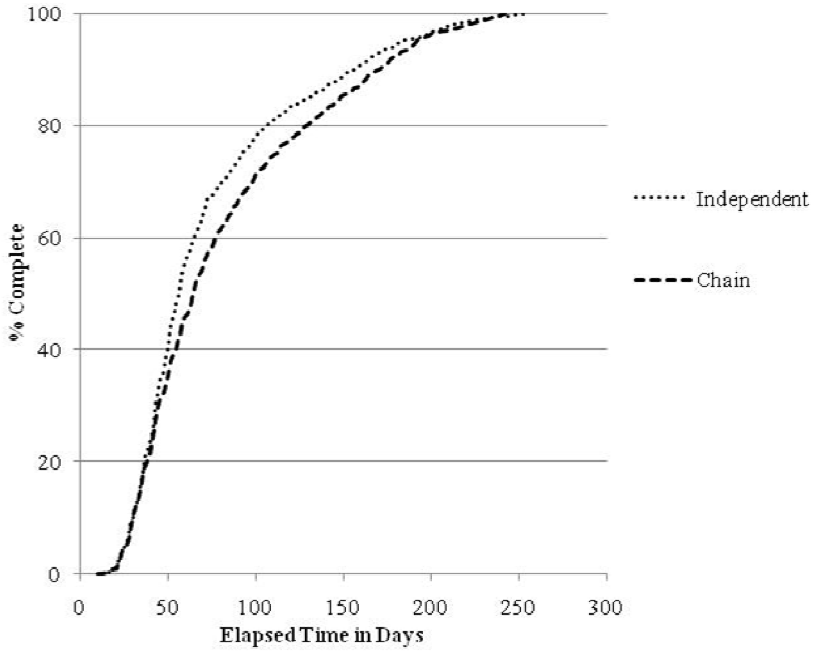
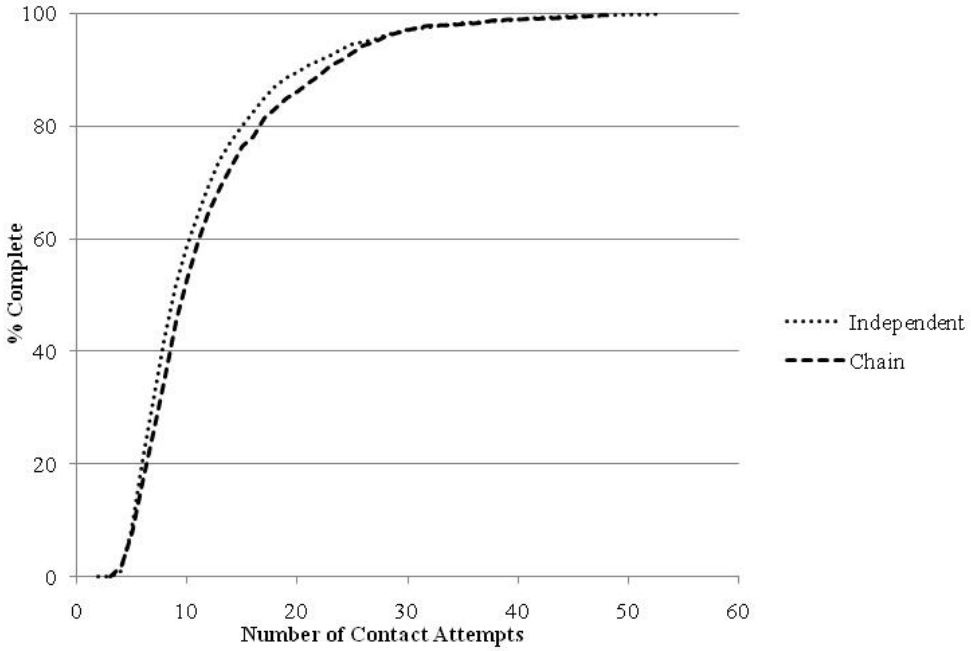


Figure 4 charts the relationship between the number of contact attempts for each case and the percent of completes that had been obtained by that point in the project's field, broken out by ownership type. Looking at the means, we see that the mean number of contact attempts for chains to reach completion is 11.47 and for independent facilities it is 10.67. The means are quite close to one another, yet the t-test of difference of means did prove that the means of the two facility types are statistically different from one another ($p < 0.01$).

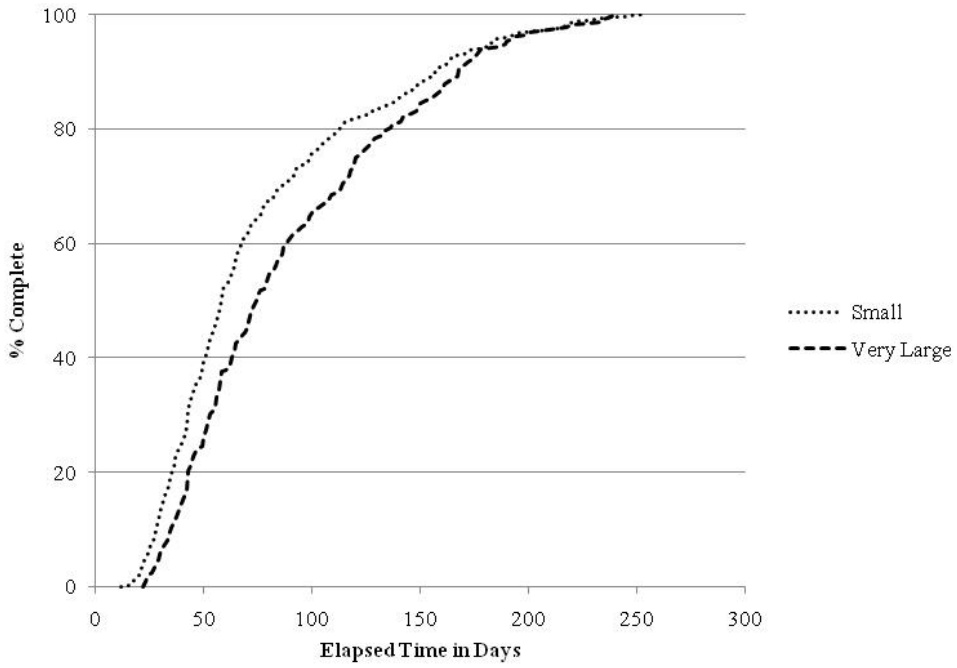
Figure 4. Percent Complete Cases by Number of Contact Attempts by Facility Type



We now turn to a discussion of facility size. The following two graphs (Figures 5 and 6) display two curves, one for very large facilities and one for small-sized facilities. Our t-tests of the difference of means between the very large (100+ beds) and the small (4-10 beds) facilities showed that the mean elapsed time (very large: 88.1 days versus small: 75.8 days), and mean number of contact attempts (very large: 13.1 attempts versus small: 10.9 attempts) , differed significantly ($p < 0.01$). There were no statistically significant differences between any other combinations of sizes. Therefore, our graphs focus only on small facilities versus very large facilities.

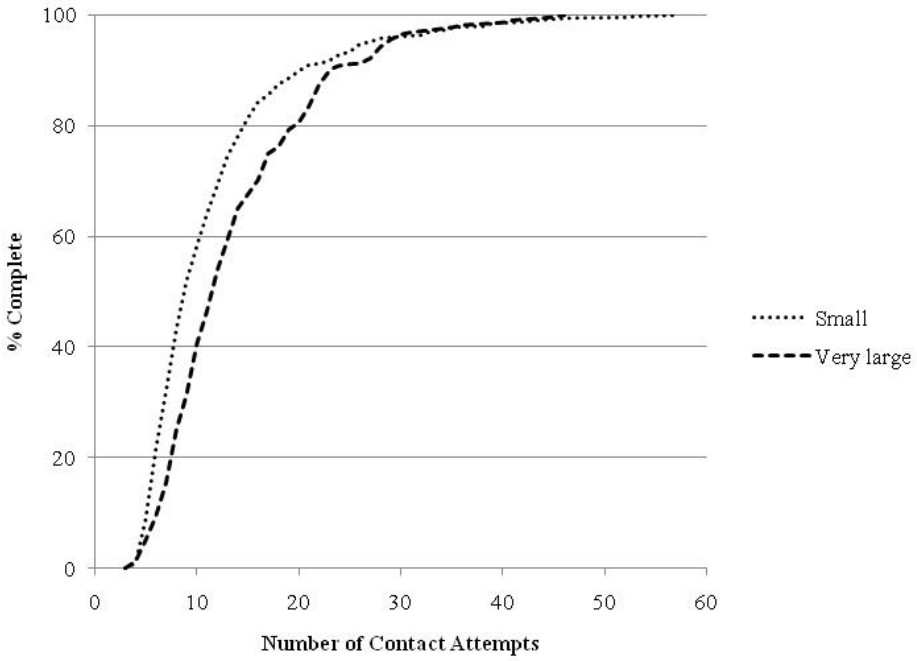
Figure 5 clearly shows that small facilities reach completion sooner than very large facilities—the curve representing small facilities is almost always above the curve representing the very large facilities, until the very end of the field period. This graph also shows how both sizes of facilities experience diminishing returns in response rates as the field period continues. At day 175, about 90% of cases were completed. To complete the final 10% of cases, another 75 days were required.

Figure 5. Percent Complete Cases by Elapsed Time by Size



Finally, Figure 6 tells a similar story. Relative to the total number of completed cases, small facilities require fewer attempts before completing the interview.

Figure 6. Percent Complete Cases by Number of Contact Attempts by Size



We examined the differences in these two metrics between facilities in the four census regions of Northeast, South, Midwest, and West. There was no clear direction of difference among facilities in the South, Northeast, Midwest, and West regions. We then grouped the non-South regions together and performed t-tests on the difference of means between South and non-South metrics. The mean elapsed time was 83.7 days for the South and 71.7 for the non-South, and the mean number of contact attempts was 12 for the 10 for the non-South. The t-tests tests confirmed that the South was indeed statistically higher ($p < 0.01$) compared to the non-South. We do, however, lack a theory as to why this is the case.

III. Addressing Research Question 3: ***Do late responders differ significantly from non-late responders on key items in the instrument?***

Before addressing this question directly, we decided to assess whether excluding the late responders would have impacted the distribution of small, medium, large and very large facilities among the completed facilities. If the distribution of the completed cases differed significantly from that of the full in-scope sample, this would have signaled nonresponse bias. We compared the size distributions among the entire selected sample (which we consider to be the gold standard - if we had 100% participation the distribution of the completed cases would have matched the distribution of the sample) to the size distribution of all responding facilities, and then to the non-late responders and late responders in turn. Table 2 shows these distributions. Differences between non-late and late responders are evident in the very large strata. Overall, 7% of the sampled cases belonged to the very large stratum and among facilities completing the survey, a slightly lower percentage - 6.5% - belonged to the very large strata. Had there been only up to 20 contact attempts and only the non-late responders included, only 6.1% would have belonged to the very large stratum. Among the responders responding after more than 20 contact attempts,10.35% belonged to the very large stratum. Similarly, using the elapsed time criterion, 6.0% and 8.4% of the non-late and late responders, respectively, belong to the very large strata. This shows that later cases are disproportionately weighted toward very large facilities, a pattern which was also evident in Figures 5 and 6.

Table 2. Distribution of facilities by facility size

	In-scope	All	Non-late	Late responders

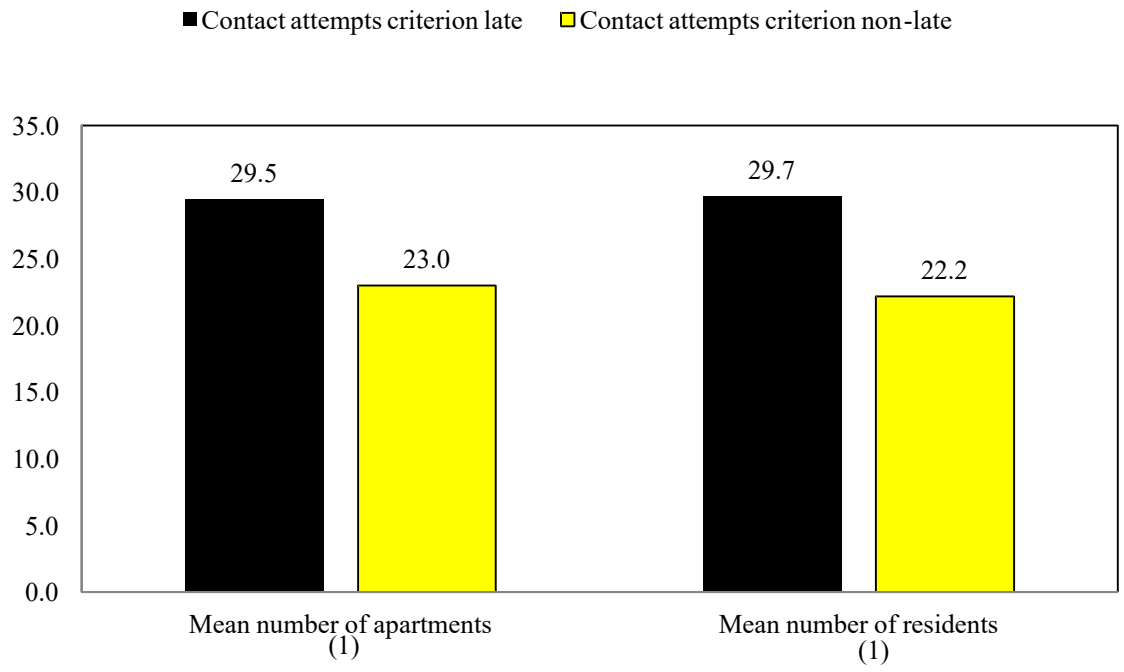
Facility size	sample	responding Facilities	Ā20 attempts	Ā 120 days time	>20 attempts	>120 days time
Small	49.9	51.4	52.0	51.5	46.1	50.7
Medium	15.9	15.5	15.6	15.6	14.9	15.1
Large	27.2	26.6	26.4	26.8	28.7	25.8
Very large*	7.0	6.5	6.1	6.0	10.3	8.4

*Differences between late and non-late responders by contact attempts and elapsed time significant at p<0.01 based on chi-square test.

We then continued with Research Question 3 by examining whether late responders differed significantly from non-late responders on survey estimates. Results from this analysis show that late and non-late responders according to the criterion of >20 contact attempts differed significantly from one another in: the mean number of apartments, the mean number of residents, chain ownership, whether respite care is offered, whether the facility serves Medicaid patients, various resident demographic measures, and the number of hours worked by aides and LPNs. Many of these are related to size and could be a reflection of the fact that late responders are disproportionately weighted towards the very large stratum, as shown in Table 2.

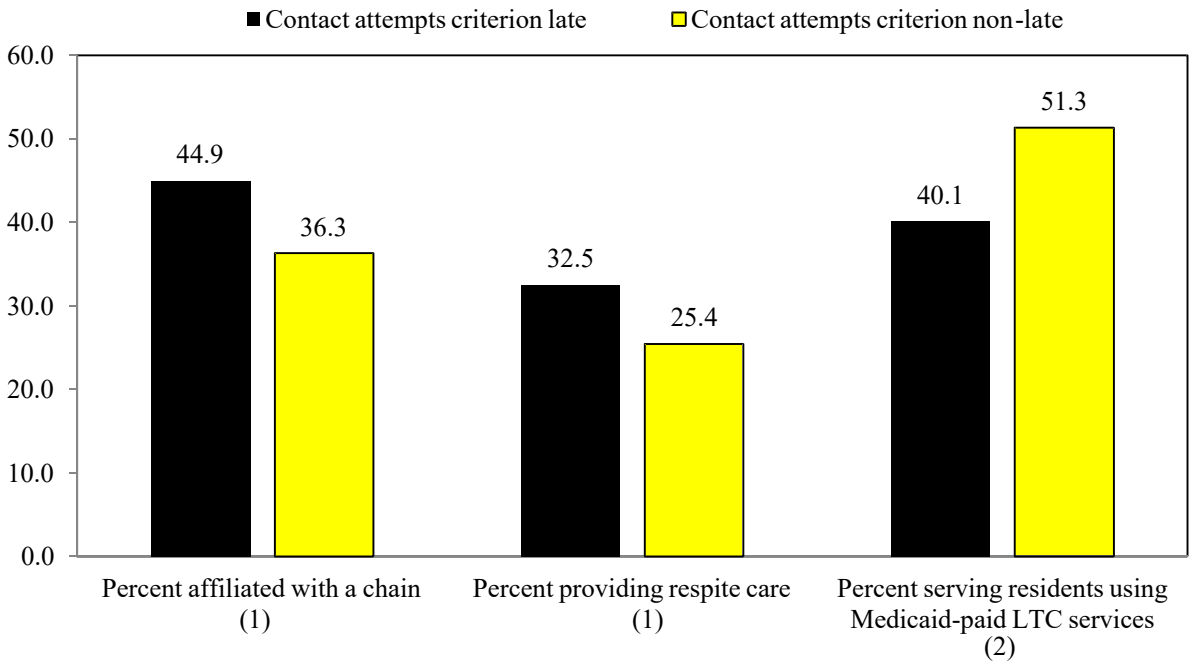
Statistically significant differences between late and non-late responders are shown in Figures 7-9. Only the >20 contact attempts criterion is shown.

Figure 7. Selected Facility Size Indicators by Response Status



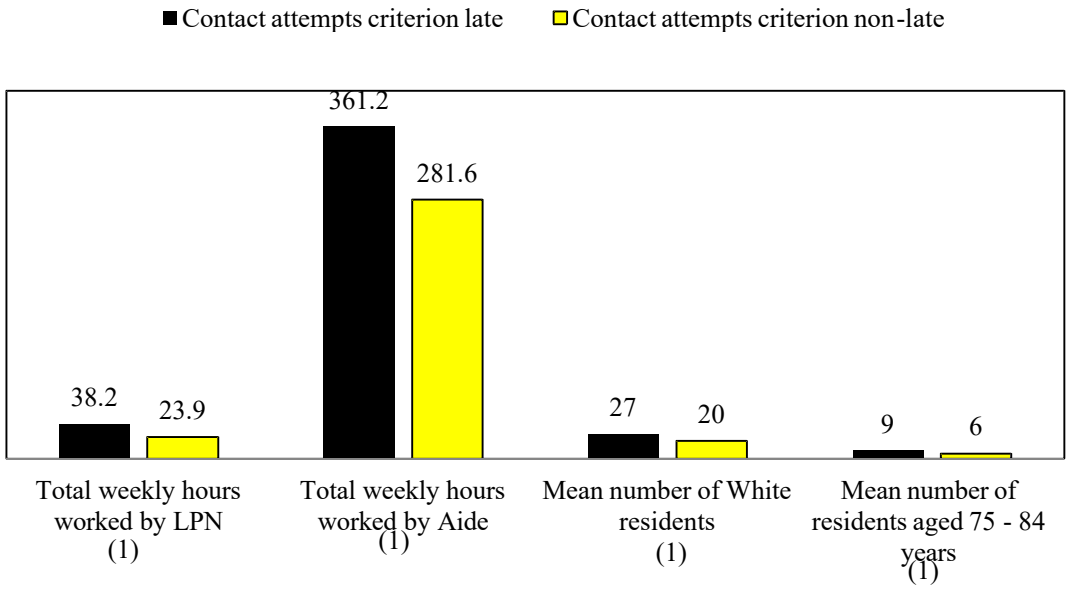
[1] Difference between late and non-late responders significant (p<.01)

Figure 8. Selected Facility Characteristics by Response Status



[1] Difference between late and non-late responders significant ($p<.05$)
[2] Difference between late and non-late responders significant ($p<.01$)

Figure 9. Selected Caregiver and Resident Characteristics by Response Status



[1] Difference between late and non-late responders significant (p<.01)

Results from this analysis show that non-late and late responders to the NSRCF do differ in their responses to selected key survey questions, including facility size and ownership characteristics.. One of the limitations of this analysis relates to the fact that the analysis is done at the facility level but does not look at what the effects of non-response would be at the resident level. Since large facilities account for a large percent of residents, it is likely that having a lower response rate for larger facilities may affect estimates of resident characteristics more than they might of facility characteristics.

IV. Discussion and Research Question 4: *Does it pay to try again?*

This paper began with the question "Does it pay to try again?" The evidence from the NSRCF suggests an affirmative answer in several respects.

First, in terms of completed cases, additional contact attempts produced data from additional facilities. Table 4 shows the distribution of facilities by the total number of contact attempts they had. The number and percentage of these facilities that had the desired outcome of complete (rather than a refusal) is also shown.

Table 4. Distribution of Total Number of Contact Attempts by Facility, and Completion/Noncompletion Outcome

# of Contact Attempts	# of Facilities	Complete	%
1-5	451	443	98.23%
6-10	1,040	991	95.29%
11-15	505	422	83.56%
16-20	263	203	77.19%

21-25	173	121	69.94%
26-30	96	63	65.63%
31-35	37	21	56.76%
36-40	35	18	51.43%
41-45	18	10	55.56%
46-50	14	7	50.00%
>50	12	3	25.00%
TOTAL	2,644	2,302	

Although a completion was most likely from the first attempts, there was a better-than-ever chance of a positive outcome event after 30 or more attempts because 21 out of the 37 (56.76%) of the respondents who received 31 to 35 contact attempts elected to complete the survey. Even as many as 40 to 50 attempts were still more likely than not to yield additional completed cases among various facility types (size, ownership). The outcome after 51 or more attempts, however, was not very positive since only 25% of those cases elected to complete the survey. The extent to which other establishments would behave like the NSRCF respondents is not known. However, it is important to link the findings about contact attempts presented in this paper to the Sudman-Willimack response process model. Multiple contact attempts in establishment surveys function toward a variety of purposes. There are likely to be multiple points of contact within a single establishment. Establishments are bureaucratic entities with both formal and informal internal divisions of responsibility. The decision to participate in a survey may require input from the director of the organization, from a legal department, and from the individuals who supply the requested information. There may not be a single custodian of information. The NSRCF requested information as varied as counts of residents, services used by residents, employees functioning in various capacities, and the physical properties of the facilities. No single individual in the facility may be the best source about these varied features. Establishment surveys may attempt to identify a single point of contact in the responding organization to assemble the requested responses. However, this may contribute to additional respondent burden to an individual. Also, a single respondent may not have information to provide the full array of data requested in the survey. In addition, contact attempts may be made as a courtesy to verify receipt of information about the survey or a reminder of a pending appointment.

Second, in terms of nonresponse bias on NSRCF, if the data from facilities completed after >20 contact attempts had not been added to the sample of completed facilities, the resulting data set would be deficient in terms of survey estimates which were key for our study, such as facility size, facility ownership, resident demographics, staffing of aides and LPNs, and Medicaid patients. Relying only on non-late responders, the picture of residential care would have under-represented large facilities, facilities affiliated with chains, and facilities offering more hours of LPNs and aides. Without these additional data points, the final data set would have presented an inaccurate picture of residential care facilities and the services they offer.

Information about calling patterns among facilities of varying characteristics may be useful in planning the recruitment protocol for establishment surveys.

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