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Privacy Concerns, Too Busy, or Just Not Interested: Using Doorstep Concerns to Predict Survey Nonresponse

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Using newly available paradata, this article explores the use of "doorstep concerns" to predict interim and final refusals in the National Health Interview Survey (NHIS). Using ten weeks of automated contact history records, we analyze privacy and burden concerns but also examine other verbal and nonverbal interactions recorded by interviewers during contact with households. We conduct a multi-model multinomial logit analysis starting with a social environmental model (e.g., region, urbanicity), followed by the addition of process variables (e.g., number of noncontacts, mode of contact), and finally include the new household-level doorstep concerns (e.g., privacy concerns, too busy). The study found that the doorstep concerns greatly improved models predicting nonresponse relative to models including only environmental variables and basic contact history measures. Privacy concerns were significant in predicting interim refusals, but not final refusals. The effects of burden differed depending upon the particular doorstep concern used as an indicator of burden.

Key words: Respondent burden; paradata; CAPI surveys; nonresponse; doorstep concerns; privacy.

1. Introduction

In their study of nonresponse in household interview surveys, Groves and Couper develop what they call "a conceptual framework for survey cooperation" (Groves and Couper 1998:30). The framework consists of four blocks of variables, two within and two beyond the researcher's control. Those within the researcher's control include *survey design variables*, such as topic and mode of administration, and *interviewer characteristics*, including experience. The two beyond the researcher's control include the *social environment* in which the survey takes place, including economic conditions, the survey-taking climate, and neighborhood characteristics; and *characteristics of household(ers)*

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(i.e., households and household members), such as household structure, socio-demographic characteristics, and psychological predispositions. In Groves and Couper's view, these four blocks of variables interact to influence the interviewer-householder interaction, which, in turn, influences the decision to cooperate or refuse. If the decision is to refuse, this may lead to further interaction in the form of persuasion attempts.

Most of the time, the block of variables associated with householders is not only beyond the researchers' control, but also beyond their knowledge, except for those household members who are eventually interviewed. As a result, attempts to link demographic and, especially, predisposition variables to survey cooperation or refusal are forced to rely on indirect methods or on experiments with respondents whose characteristics are known (e.g., Groves, Singer, and Corning 2000). For the same reason, attempts to convert refusals are hampered by the lack of systematic information about the reasons for these refusals. Although these reasons might be classed as "predispositions" beyond the researcher's control, if they become known to interviewers, and if the opportunity for further interaction can be created or maintained, interviewers may be able to counteract at least some of them and persuade the respondent to cooperate with the survey.

Some reasons for noncooperation with surveys have been investigated empirically. Among these are privacy and confidentiality concerns, and respondent burden, the latter defined as the level of effort required to provide thoughtful or accurate answers to the survey questions, reflecting both their number and difficulty (Tourangeau 2006). Inferences concerning the effects of privacy and confidentiality concerns are based on the relationship between the attitudes expressed by a sample of respondents on one survey and their subsequent behavior on another survey; thus, the characteristics of nonrespondents to the later survey are known. Inferences concerning the effects of burden are based on a very small number of experiments varying one or more burden dimensions. Research on the role of both of these factors in survey nonresponse indicates that privacy and confidentiality concerns are small but consistent predictors of survey nonresponse. The evidence for burden is less conclusive, but that for *perceived* burden is much more robust (Singer and Presser 2008).

A very few studies have attempted to collect systematic data about "doorstep interactions" between interviewers and respondents in an effort to use respondent comments to predict response propensity and to allow interviewers to "tailor" their remarks to address respondent concerns. Morton-Williams and Young (1987), for example, analyzed tape recordings of doorstep interactions between 16 interviewers and approximately 10 householders each to identify the stages of the persuasion process, what the interviewer said in each stage, and how the householder responded. They identified several types of expressed reluctance (e.g., length, suspicion about nature or content, busy at the moment) and calculated the likelihood of obtaining an interview for each type of reluctance expressed. Groves and Couper (1996) examined doorstep interactions in a much larger sample – some 9,863 households eligible for interviews for the National Comorbidity Survey, to which they appended neighborhood observations by interviewers, call records, interviewer questionnaires, and contact descriptions whose content was based on focus groups of interviewers from various organizations. Their analysis collapsed individual categories into three thematic groups: negative statements (e.g., "I'm not interested"), time-delay statements (e.g., "I'm too busy"), and questions. They report that both negative and time-delay statements are negatively related to cooperation, the former

more strongly than the latter, but that questions about the survey show a positive relationship to cooperation. Doorstep interactions, as a group, greatly improved the ability to predict cooperation over sociodemographic variables available for all householders, especially after the first contact. The study also provides some evidence for the effectiveness of interviewers tailoring their subsequent interactions to what was learned in earlier contacts about the respondent's reasons for refusal.

A subsequent study by Campanelli, Sturgis, and Purdon (1997), though based on a much smaller number of interviews, replicated a number of the Groves and Couper findings. The study included interviewers from two different organizations and compared the results of taping doorstep interactions (and subsequently content analyzing them) and having interviewers fill out a contact description form as soon as possible after their contact with the household. Unfortunately, the percent agreement for respondent statements between the two modes when all codes were used was quite low -0.31 for one organization, and 0.45 for the other, though when statements were collapsed into four categories, reliability increased to 0.61 and 0.68, respectively (Campanelli, Sturgis, and Purdon 1997, Table 4.3).

Despite the potential usefulness of contact history data both for persuading reluctant respondents and for weighting the resultant sample, relatively little use appears to have been made of the findings from these early studies. Recently, the U.S. Census Bureau began systematically collecting data on interviewer-householder interactions as part of a new contact history instrument (CHI). As a result, researchers and interviewers now have some information about the characteristics of *all* sample members (except those with whom contact was never made), including the reasons they give for refusing to cooperate. This information can be used in a variety of ways. First, it can be used by interviewers to tailor their next contact with the potential respondent in such a way as to counteract reservations that may be expressed (Groves and Couper 1996, 1998; Campanelli, Sturgis, and Purdon 1997; Sturgis and Campanelli 1998; Groves and McGonagle 2001). Second, it can be used to predict who will subsequently refuse, to identify reasons that distinguish "interim" from final refusals, and to formulate testable hypotheses about interviewer behaviors that predict the conversion of interim refusals. Third, in line with research and theorizing by Couper (1997), Campanelli, Sturgis, and Purdon (1997), and Stussman, Taylor, and Riddick (2004), information about these initial interactions between interviewers and respondents can provide clues to the quality of the subsequent interview. In this article, we use CHI data collected during ten weeks of the 2005 National Health Interview Survey (NHIS) to examine the relationship between various respondent questions, concerns, and reasons for reluctance, as recorded by interviewers, and various outcomes of the survey request.

2. Methods

2.1. The Contact History Instrument (CHI)

The CHI provides observations of interviewer-householder interactions for all households where a contact was made with a resident. Based on the recommendations of an expert panel of survey methodologists (Salvucci et al. 2002), the CHI is a stand-alone Blaise instrument first used with the NHIS in 2004. Interviewers can make a CHI entry

immediately after a contact attempt or at a later time (for example in their car or at home). If the NHIS instrument is opened, the CHI launches automatically upon exit.

Interviewers are trained to complete a CHI record each time a contact attempt is made.[4] In addition to basic information such as day and time and mode of attempt, interviewers report the outcome of the attempt (contact with a sample unit member, contact with a non-sample unit member, noncontact) and strategies employed before, during, or immediately following the attempt (left a note/appointment card, left a promotional packet, checked with neighbors, asked for assistance from the Census Regional Office, etc.).

For attempts resulting in contact with sample unit members, interviewers also complete a screen that includes 21 categories of verbal and nonverbal respondent concerns and behaviors – "doorstep concerns" that may be expressed or exhibited during interviewer-respondent interactions.[5] These categories include questions, concerns, and reasons for reluctance to participate.[6] A "no concerns" and an "other-specify" category are also included. The screen utilizes a "mark all that apply" format,[7] allowing multiple observations to be recorded for a single contact. Some categories were included specifically to capture privacy and burden concerns: "privacy concerns," "too busy," and "interview takes too much time." Additional categories emerged from systematic analyses of interviewer case notes and a series of focus groups with senior interviewers. Examples include "not interested/does not want to be bothered," "breaks appointments," "anti-government concerns," "does not understand survey/asks questions about the survey," and "hang-up/slams door" (see Figure 1 for screen capture). The ordering of response categories was driven by two objectives – to place the most frequently occurring categories toward the top of the list and to group together those categories relevant only to panel/longitudinal surveys (e.g., "gave that information last time"). Focus groups with interviewers were conducted to establish the ordering of categories that applied to all surveys.

There are some important limitations of the CHI data. First, CHI was designed to collect information at the case level. However, statements of reluctance and questions about the survey come from individuals, and information recorded for a specific case may reflect contact with multiple household members. It is unclear to what extent, if any, the inability to link doorstep concerns to specific individuals affects our results.

Second, the interpretation and recording of respondent questions and concerns is a subjective undertaking. There is bound to be variability in the completeness of CHI records and in the coding of similar doorstep concerns across interviewers. Additionally, there may be a disconnect between expressed concerns and intent. For example, Maynard

[4] Interviewers were introduced to the CHI by way of a self-study guide and a verbatim training module administered during refresher training.

[5] We use the term "doorstep concerns" throughout, although the verbal and nonverbal respondent concerns and behaviors may be expressed or exhibited, for example, at the outset (on the doorstep) of contacts with householders, during an interview, or upon completion of an interview.

[6] Since the instrument was designed for use with other U.S. Census Bureau surveys, six categories are specific to panel or longitudinal surveys and are excluded from the analyses presented here.

[7] Some research suggests that a mark all that apply format is inferior to individual yes/no check boxes (Rasinski, Mingay, and Bradburn 1994). However, using a mark all that apply format allowed the concerns to be collected on a single screen, thus reducing the time required to record a CHI entry for every single contact attempt. Requiring interviewers to check a yes/no box for all 21 categories after each attempt would have been impractical for this field application.

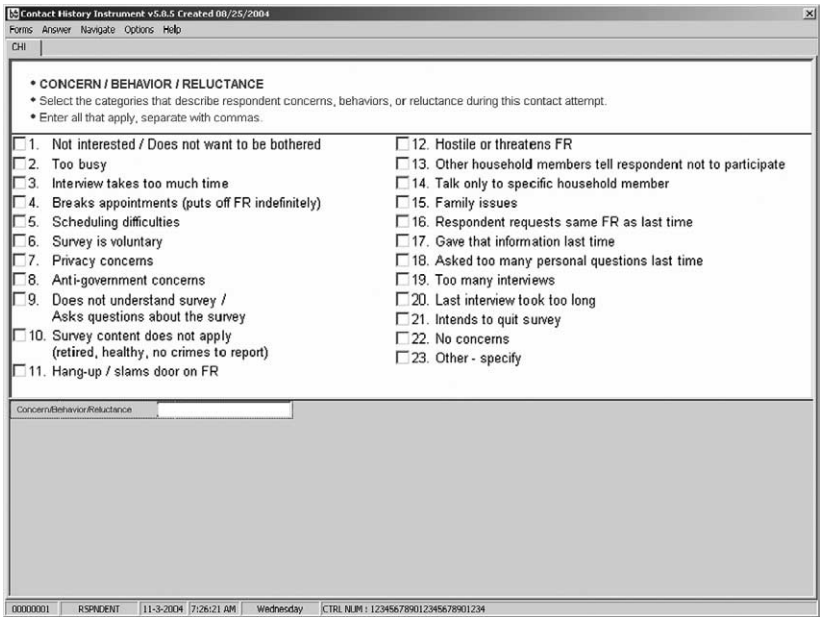

Fig. 1. Screen Capture of CHI Doorstep Concerns

and Schaeffer (1997) hypothesize that some responses, such as "bad timing" and "not interested," are merely polite ways of declining a survey request, although Couper (1997) and Campanelli, Sturgis, and Purdon (1997) offer evidence that these responses have consequences not only for participation but also for the quality of the resulting interview.

Third, a handful of concern categories capture multiple statements, the most notable among them being "not interested/does not want to be bothered." Different respondent motivations and intent likely underlie these statements, limiting our ability to interpret findings associated with this category. It also hampers our ability to make comparisons and draw conclusions relative to prior studies that have explored "not interested" as a distinct concern (Campanelli, Sturgis, and Purdon 1997; Couper 1997).

Finally, CHI data are subject to recall error. For some contact outcomes, the doorstep interaction is very brief and results in an interim refusal or scheduled callback. The details of these interactions should be readily accessible from memory and accurately recorded in the CHI. However, if the interaction leads to a partial or fully complete interview, a fair amount of time may pass between the initial doorstep interaction and the launching of CHI. Furthermore, the actual interview may influence the interviewer's recollection of the prior doorstep interaction. If, for example, the respondent becomes increasingly reluctant as the interview proceeds, the interviewer may report more doorstep reluctance than was actually exhibited. Conversely, if the respondent becomes increasingly engaged in the interview, subsequent reports of doorstep reluctance may be minimized. To date, no studies have been undertaken to measure the reliability of the CHI data. This shortcoming should be addressed, but it is difficult in personal visit surveys. Perhaps recent technological advances, such as computer-assisted recorded interviews (CARI), could be employed. At the very least, debriefings of interviewers could shed some light on this subject.

2.2. The National Health Interview Survey

The NHIS is an annual survey of the health of the civilian, noninstitutionalized household population of the United States conducted by the National Center for Health Statistics (NCHS), Centers for Disease Control and Prevention (CDC). Utilizing a multistage, clustered sample design, the NHIS produces national estimates of health insurance coverage, health care access and utilization, health status, and health behaviors.

Basic health and demographic information is collected for each member of all families residing within a sampled household. Within each family, additional information is collected from one randomly selected adult ("sample adult") aged 18 years or over, and from the parent or guardian of one randomly selected child ("sample child") aged 0–17 years. Trained interviewers with the U.S. Bureau of the Census conduct the in-person interviews using computer-assisted personal interviewing (CAPI). (First contacts in the NHIS are supposed to be by personal visit, but subsequent telephone attempts are allowed in some circumstances.)

Like other U.S. government surveys, the NHIS has witnessed a gradual decline in household response rates over the past 15 years, dropping from 95.7% in 1991 to 87.1% in 2005. While reduced accessibility of households is a contributing factor, the decline in response has largely been spurred by an increase in survey refusals. Over the same period, the NHIS refusal rate nearly tripled, from 2.7% to 8.1%.[8] In addition to declining response rates, the NHIS has witnessed an increase in partially completed interviews–interviews that meet a specified threshold for completion but are not fully complete.[9] Rising from 11.4% in 1997 to a high of 21.9% in 1999, the partially complete interview rate has remained at or above 14.1% since 2000 and was at 20.9% in 2005.

2.3. Data and Analytic Techniques

As already noted, the analyses in this article are based on CHI records for ten weeks (covering parts of quarters one and two) of the 2005 NHIS. During this period, interviewers worked a total of 9,177 eligible cases, completing CHI records for 9,053. Since our aim is to identify associations between respondent doorstep concerns and survey cooperation, subsequent analyses are based on 8,285 interviewed or final refusal cases with CHI records where at least one contact was made with a household member. (For the ten-week period studied, roughly 1.5 percent of cases eligible for analysis were missing CHI records.) Households not responding because of noncontact or language problems were excluded.

To explore the effect of various respondent doorstep concerns on survey cooperation, net of other variables, five separate multinomial logistic regressions are performed. The first includes only rudimentary environmental variables available for most surveys from the sampling frame. The second adds some process variables that provide additional detail about the contact history with the case. The third model adds a simple measure of the

[8] Response rates are based on AAPOR's RR2 while refusal rates are based on AAPOR's REF1 (AAPOR 2004). All reported rates are field rates and calculated prior to data editing.

[9] For a partially complete interview, educational attainment must be reported for at least one person in the family. The educational attainment item resides in the family sociodemographic section, the next to last section of the family core interview.

number of unique concerns expressed by householders, and provides an early indication of the extent to which doorstep concerns affect interim and final refusals. The fourth model replaces the number of concerns measure with a series of dummy indicators of concern about privacy and burden followed by other doorstep concerns. Of primary interest is whether the addition of the doorstep concern indicators increases the predictive power of the earlier models, especially models one and two, by tapping into household-level predispositions that shape decisions to cooperate or not. The fifth and final model replicates the fourth model on a subset of households that expressed one or more unique concerns. By eliminating households that never expressed any concerns, this allows us to more fully assess the importance and explanatory power of the concern indicators relative to one another.

2.3.1. Dependent Variable: Response Propensity

The concept of response was operationalized as three mutually exclusive categories: those who were interviewed and never refused ("never refused," 86.5%); those who initially refused but eventually were interviewed ("interim refusal," 7.4%); and those who refused and were never interviewed ("final refusal," 6.2%).[10] In all three models, interim refusals and final refusals are compared to never refused.

2.3.2. Independent Variables: Environmental and Process Variables

The only environmental-level variables available from the sampling frame are region, whether the dwelling is located in a multiunit structure, and degree of urbanicity. The latter was delineated in three categories: units located in Metropolitan Statistical Area (MSA) central cities; units in MSAs, but outside central cities; and units in non-MSAs. A CHI-based indicator of whether the interviewer encountered a language barrier was also available.[11] We treated that indicator as an environmental variable since it might be indicative of larger linguistically-isolated enclaves.

Three process-level variables were available for all cases: total number of noncontacts, whether the mode of contact was primarily by personal visit, primarily by telephone, or split evenly between the two, and whether a health problem was recorded as a reason the interview could not be conducted or fully completed.

2.3.3. Independent Variables: Doorstep Concerns

The major independent variables in the analysis were based on the 17 categories of doorstep concerns checked by interviewers. The first variable explored was a categorical measure of the number of unique concerns (0, 1, 2–3, 4 +) expressed by households across all contact attempts. Dichotomous variables were then created at the case level

[10] Interviewers identified interim refusals on a screen in the CHI allowing them to indicate "respondent is reluctant" whenever contact was made with a sample member but an interview could not be conducted. This screen immediately precedes the screen interviewers use to record specific doorstep concerns.

[11] Although nonresponding households with a final disposition of "language problem" were excluded from the analysis, interviewed and final refusal households where interviewers indicated a "language barrier," via the CHI, were included.

indicating whether or not a household member had expressed a particular concern or behavior during *at least one* contact.

All analyses were unweighted and performed in SUDAAN (Research Triangle Institute 2004) to account for the complex sample design. Using unweighted data is a traditional method to study nonresponse when final weights are not available.

3. Results

The distribution of households expressing each of the 17 categories of concern is shown in Table 1. The three categories specifically involving privacy and burden concerns ("privacy concerns", "too busy", and "interview takes too much time") were among those most frequently selected by interviewers. Also near the top of the list, however, was "not interested/does not want to be bothered." Over one third of the households that said they were not interested ended up as interim or final refusals, whereas the majority of households expressing burden and privacy concerns ended up as completed interviews that never refused.

Tables 2–6 show the results of five multinomial logistic regressions. The environmental-level model (see Table 2) includes the following predictors: multi-unit status, region, urbanicity, and whether the interviewer encountered a language barrier.

Table 1. Percentage of households expressing doorstep concerns during at least one contact[a]

Doorstep concern	Never refused	Interim refusal	Final refusal	Overall
Too busy	72.8	16.9	10.3	23.9
Privacy Concerns	62.9	23.2	13.9	13.3
Not interested/Does not want to be bothered	33.7	32.2	34.1	12.7
Interview takes too much time	73.1	19.9	7.0	11.9
Scheduling difficulties	78.2	16.2	5.6	8.6
Survey is voluntary	37.3	32.8	29.9	6.6
Other[b]	75.2	14.0	10.7	6.2
Does not understand survey/Asks questions about survey	68.4	24.3	7.4	5.9
Anti-government concerns	48.8	25.8	25.5	4.0
Hang-up/slams door on FR	19.2	31.5	49.4	2.8
Breaks appointment (puts off FR indefinitely)	62.1	21.6	16.4	2.8
Talk only to specific household member	63.6	26.4	10.0	1.7
Family issues	58.9	21.7	19.4	1.6
Survey content does not apply	58.1	26.4	15.5	1.6
Other household members tell respondent not to participate	44.4	35.7	20.0	1.4
Hostile or threatens FR	22.8	21.8	55.5	1.2
No concerns	94.2	4.4	1.5	71.8
N	7,172	602	511	8,285

Notes: FR stands for Field Representative. [a] Entries are row percentages. For each attempt resulting in contact, the interviewer can record more than one doorstep concern, [b] For this analysis, cases coded as "other" were those where "Other-specify" was the only category selected during at least one contact.

Table 2. Odds ratios from multinomial logistic regression model predicting degree of response in 2005 NHIS: Social environmental variables (all households with at least 1 contact)

	Interim refusal vs. never refused		Final refusal vs. never refused	
Independent variables	OR	95% CI	OR	95% CI
Intercept	0.04	0.03–0.06	0.03	0.02–0.05
Multiunit structure				
Yes	0.79[a]	0.65–0.96	1.06	0.86–1.30
No[Ψ]	1.00	–	1.00	–
Region				
Northeast	1.67[c]	1.26–2.21	1.47[b]	1.10–1.95
Midwest	1.55[b]	1.20–2.01	1.08	0.81–1.42
South[Ψ]	1.00	–	1.00	–
West	1.21	0.91–1.60	1.20	0.93–1.57
Urbanicity				
MSA, central city	1.65[b]	1.17–2.32	1.65[a]	1.14–2.40
MSA, non-central city	1.81[c]	1.30–2.52	2.23[c]	1.58–3.15
Non-MSA[Ψ]	1.00	–	1.00	–
Language barrier				
Yes	1.63	0.98–2.70	0.56	0.27–1.16
No[Ψ]	1.00	–	1.00	–
Nagelkerke R-square = .0190				
Model Chi-square = 96.17, d.f. = 14				
Improvement Chi-square = 96.17, d.f. = 14	$N = 8{,}107$			

Notes: [a]$p < .05$, [b]$p < .01$, [c]$p < .001$; OR – odds ratio, CI – confidence interval, Ψ – reference category

Three of the four independent variables – multiunit structure, region and urbanicity – are significantly associated with the response outcomes. Households in multiunit structures, and households in the Northeast and Midwest, compared to the South, were more likely to be interim refusals. Households in the Northeast also had elevated odds of being final refusals. Level of urbanicity was a significant predictor of both interim and final refusals. Compared to non-MSA households, households in both MSA, central cities and MSA, non-central cities were more likely to be interim and final refusals. Language barrier was not a significant predictor of either interim or final refusals. Although several predictors were significant, the predictive power of the environmental model is very poor (Nagelkerke R-square = 0.019).

The second model (see Table 3) adds two variables that provide some description of the contact history with the sample unit: the total number of noncontacts, and whether most contacts with the household were by personal visit, by telephone, or split evenly between the two. We also added a flag to indicate cases where a health problem may have impeded the interview. Like the language barrier indicator, interviewers had an opportunity to select this category in situations where contact was made but an interview was not completed. Since the NHIS is a health survey, this indicator was of particular interest.

Table 3. Odds ratios from multinomial logistic regression model predicting degree of response in 2005 NHIS: Social environmental and process variables (all households with at least 1 contact)

	Interim refusal vs. never refused		Final refusal vs. never refused	
Independent variables	OR	95% CI	OR	95% CI
Intercept	0.04	0.03–0.07	0.02	0.01–0.03
Social environmental variables				
Multiunit structure				
Yes	0.77[a]	0.63–0.94	0.93	0.75–1.16
No[Ψ]	1.00	–	1.00	–
Region				
Northeast	1.54[b]	1.15–2.07	1.56[b]	1.17–2.07
Midwest	1.41[b]	1.09–1.82	0.93	0.71–1.23
South[Ψ]	1.00	–	1.00	–
West	1.21	0.91–1.59	1.23	0.95–1.61
Urbanicity				
MSA, central city	1.62[b]	1.14–2.29	1.55[a]	1.06–2.25
MSA, non-central city	1.77[c]	1.27–2.48	2.15[c]	1.53–3.01
Non–MSA[Ψ]	1.00	–	1.00	–
Language barrier				
Yes	1.62	0.98–2.70	0.59	0.28–1.24
No[Ψ]	1.00	–	1.00	–
Process variables				
Primary mode				
Telephone[Ψ]	1.00	–	1.00	–
Personal visit	0.75[a]	0.57–0.99	1.30	0.94–1.81
Equal modes	1.14	0.80–1.63	1.15	0.74–1.78
Total noncontacts	1.10[c]	1.07–1.13	1.18[c]	1.15–1.22
Health problem				
Yes	3.51[c]	2.32–5.31	2.97[c]	1.84–4.79
No[Ψ]	1.00	–	1.00	–
Nagelkerke R-square = .0620				
Model Chi-square = 319.95, d.f. = 22				
Improvement Chi-square = 223.78, d.f. = 8, $p < .001$	$N = 8{,}107$			

Notes: [a]$p < .05$, [b]$p < .01$, [c]$p < .001$; OR – odds ratio, CI – confidence interval, Ψ – reference category

The addition of the process variables increases the model's predictive power slightly. Compared to contact primarily by telephone, contact primarily by personal visit significantly reduced the odds of interim refusals. Primary mode of contact, however, had no significant impact on the likelihood of a final refusal. But with each additional noncontact recorded, the odds of an interim or final refusal (versus never refusing) increased by 10% and 18% respectively. Finally, households with health problems were significantly more likely to be both interim and final refusals compared to never refusing. The odds of health-problem households being final refusals were three times the odds of nonhealth-problem households, while the odds of health-problem households being interim refusals were 3.5 times the odds of nonhealth-problem households. While the

Table 4. Odds ratios from multinomial logistic regression model predicting degree of response in 2005 NHIS: Social environmental variables, process variables, and number of unique doorstep concerns (all households with at least 1 contact)

	Interim refusal vs. never refused		Final refusal vs. never refused	
Independent variables	OR	95% CI	OR	95% CI
Intercept	0.00	0.00–0.00	0.00	0.00–0.00
Social environmental variables				
Multiunit structure				
Yes	0.77[a]	0.62–0.96	0.96	0.75–1.22
No[Ψ]	1.00	–	1.00	–
Region				
Northeast	1.36[a]	1.00–1.85	1.37[a]	1.00–1.87
Midwest	1.17	0.87–1.56	0.78	0.57–1.05
South[Ψ]	1.00	–	1.00	–
West	1.13	0.83–1.55	1.19	0.88–1.60
Urbanicity				
MSA, central city	1.06	0.72–1.56	1.02	0.68–1.55
MSA, non-central city	1.05	0.72–1.53	1.32	0.91–1.93
Non-MSA[Ψ]	1.00	–	1.00	–
Language barrier				
Yes	0.87	0.50–1.50	0.33[b]	0.15–0.72
No[Ψ]	1.00	–	1.00	–
Process variables				
Primary mode				
Telephone[Ψ]	1.00	–	1.00	–
Personal visit	0.98	0.73–1.31	1.63[b]	1.18–2.26
Equal modes	1.11	0.76–1.61	1.12	0.71–1.76
Total noncontacts	1.03	0.99–1.06	1.12[c]	1.09–1.16
Health problem				
Yes	1.40	0.88–2.23	1.31	0.79–2.16
No[Ψ]	1.00	–	1.00	–
Doorstep concerns				
Number of unique concerns				
0[Ψ]	1.00	–	1.00	–
1	61.30[c]	21.95–171.15	23.28[c]	12.51–43.33
2–3	259.75[c]	94.09–717.03	59.24[c]	32.11–109.27
4 +	707.98[c]	254.31–1971.00	154.55[c]	80.35–297.25
Nagelkerke R-square = .3851				
Model Chi-square = 2230.08, d.f. = 28				
Improvement Chi-square = 1910.13, d.f. = 6, $p < .001$	$N = 8{,}107$			

Notes: [a]$p < .05$, [b]$p < .01$, [c]$p < .001$; OR – odds ratio, CI – confidence interval, Ψ – reference category

Table 5. Odds ratios from multinomial logistic regression model predicting degree of response in 2005 NHIS: Social environmental variables, process variables, and doorstep concerns (households with at least 1 contact)

	Interim refusal vs. never refused		Final refusal vs. never refused	
Independent variables	OR	95% CI	OR	95% CI
Intercept	0.02	0.01–0.03	0.03	0.02–0.05
Social environmental variables				
Multiunit structure				
Yes	0.76[a]	0.59–0.99	0.88	0.65–1.20
No[Ψ]	1.00	–	1.00	–
Region				
Northeast	1.35	0.96–1.89	1.24	0.82–1.88
Midwest	1.18	0.87–1.61	0.80	0.55–1.15
South[Ψ]	1.00	–	1.00	–
West	1.18	0.84–1.67	1.51[a]	1.05–2.16
Urbanicity				
MSA, central city	1.17	0.80–1.70	1.07	0.70–1.64
MSA, non-central city	1.18	0.82–1.70	1.51[a]	1.01–2.24
Non-MSA[Ψ]	1.00	–	1.00	–
Language barrier				
Yes	0.90	0.44–1.85	0.55	0.17–1.82
No[Ψ]	1.00	–	1.00	–
Process variables				
Primary mode				
Telephone[Ψ]	1.00	–	1.00	–
Personal visit	0.73	0.53–1.01	1.01	0.66–1.53
Equal modes	1.03	0.67–1.59	0.95	0.53–1.71
Total noncontacts	1.06[b]	1.02–1.10	1.18[c]	1.14–1.22
Health problem				
Yes	1.98[a]	1.13–3.45	1.85	0.81–4.23
No[Ψ]	1.00	–	1.00	–
Doorstep concerns [d]				
Not interested/Does not want to be bothered	10.03[c]	7.51–13.39	15.99[c]	12.16–21.03
Too busy	1.87[c]	1.44–2.44	0.90	0.68–1.19
Interview takes too much time	1.02	0.73–1.42	0.29[c]	0.20–0.41
Privacy concerns	2.20[c]	1.62–2.97	0.93	0.66–1.31
Breaks appointments	0.82	0.45–1.49	1.46	0.81–2.63
Scheduling difficulties	1.24	0.87–1.75	0.56[b]	0.37–0.87
Survey is voluntary	3.02[c]	2.05–4.44	3.65[c]	2.52–5.27
Anti-govt. concerns	1.22	0.77–1.93	1.24	0.74–2.07
Does not understand survey/asks questions about survey	2.11[c]	1.49–2.99	0.68	0.42–1.08
Survey content does not apply	0.90	0.40–2.01	0.79	0.35–1.79
Hang-up/slams door	10.30[c]	5.74–18.45	21.38[c]	11.96–38.21
Hostile or threatens FR	2.95[a]	1.20–7.26	8.71[c]	3.80–19.97
Other household members tell respondent not to participate	2.68[a]	1.18–6.09	2.33[a]	1.05–5.14
Talk only to specific household member	2.52[b]	1.31–4.86	1.57	0.68–3.61

Table 5. Continued

Independent variables	Interim refusal vs. never refused		Final refusal vs. never refused	
	OR	95% CI	OR	95% CI
Family issues	1.31	0.65–2.67	1.58	0.71–3.50
Other	2.64[c]	1.84–3.78	1.82[a]	1.15–2.88
No concerns	0.92	0.69–1.23	0.15[c]	0.10–0.21
Nagelkerke R-square = 0.5121 Model Chi-square = 3124.35, d.f. = 56 Improvement chi-square = 2804.40, d.f. = 34, $p < .001$[c]	$N = 8{,}107$			

Notes: [a]$p < .05$, [b]$p < .01$, [c]$p < .001$, [d]All of the doorstep concern indicators are dichotomous. The reference category for each indicator, concern not mentioned, is not shown, [e]Compared to model two; OR – odds ratio, CI – confidence interval, Ψ – reference category

Nagelkerke R-square is still quite low (.0620), this model is an improvement over the previous one (Improvement Chi-square[12] = 223.78, d.f. = 8, $p < .001$).

The third model (see Table 4) adds a measure of the number of unique concerns expressed by households. We treat the measure as categorical (0, 1, 2–3, 4 +) since the number of unique concerns expressed was highly skewed toward zero: 51.8% of households expressed no concerns across all contacts, 21.6% expressed one unique concern, 17.5% expressed two to three unique concerns, and only 9.1% expressed four or more concerns.

Results of the multinomial logistic regression reveal that concerns expressed by householders greatly increase the odds that an interviewer will encounter both interim and final refusals, and that the odds increase with the number of concerns expressed. The odds of one-concern households, two to three concern households, and four or more concern households being interim refusals were 61 times, 260 times, and 708 times the odds of no concern households. Furthermore, the odds of one concern, two to three concern, and four or more concern households being final refusals were 23 times, 59 times, and 155 times the odds of no concern households. This may partly result from the number of contacts itself, that is, the more contacts a household has, the greater the number of possible comments (and opportunities for the interviewer to record comments) and the greater the likelihood of interim and final refusals.[13]

The addition of the number of unique concerns measure also attenuated the effects of several social environmental and process variables. The significant associations between urbanicity and interim and final refusals disappear, as do the effects for

[12] Analogous to the F-change statistic in ordinary least squares regression, the improvement chi-square statistic indicates whether the variables entered into each step improved the fit of the model.
[13] We re-ran the model from Table 4 controlling for number of contacts and found that while the magnitude of coefficients for number of concerns decreased somewhat, they remained very large and significant.

Table 6. Odds ratios from multinomial logistic regression model predicting degree of response in 2005 NHIS: Social environmental variables, process variables, and doorstep concerns (households expressing one or more unique concerns)

	Interim refusal vs. never refused		Final refusal vs. never refused	
Independent variables	OR	95% CI	OR	95% CI
Intercept	0.05	0.03–0.09	0.02	0.01–0.04
Social environmental variables				
Multiunit structure				
Yes	0.76[a]	0.59–0.98	0.91	0.69–1.22
No[Ψ]	1.00	–	1.00	–
Region				
Northeast	1.29	0.91–1.81	1.08	0.73–1.61
Midwest	1.20	0.88–1.63	0.76	0.53–1.10
South[Ψ]	1.00	–	1.00	–
West	1.20	0.84–1.70	1.39	0.98–1.97
Urbanicity				
MSA, central city	1.09	0.73–1.62	1.08	0.71–1.66
MSA, non-central city	1.11	0.76–1.62	1.48	1.00–2.21
Non-MSA[Ψ]	1.00	–	1.00	–
Language barrier				
Yes	0.74	0.40–1.38	0.32[a]	0.11–0.94
No[Ψ]	1.00	–	1.00	–
Process variables				
Primary mode				
Telephone[Ψ]	1.00	–	1.00	–
Personal visit	0.84	0.61–1.16	1.39	0.91–2.12
Equal modes	1.06	0.69–1.61	1.11	0.62–1.99
Total noncontacts	1.05[a]	1.01–1.09	1.16[c]	1.12–1.20
Health problem				
Yes	1.59	0.96–2.64	1.25	0.62–2.51
No[Ψ]	1.00	–	1.00	–
Doorstep concerns[d]				
Not interested/does not want to be bothered	6.71[c]	5.25–8.57	14.37[c]	11.23–18.39
Too busy	1.12	0.89–1.42	0.64[c]	0.49–0.82
Interview takes too much time	0.93	0.71–1.22	0.32[c]	0.24–0.44
Privacy concerns	1.56[c]	1.21–2.00	0.88	0.66–1.19
Breaks appointments	0.92	0.56–1.50	1.29	0.78–2.13
Scheduling difficulties	1.04	0.78–1.38	0.54[b]	0.37–0.79
Survey is voluntary	2.76[c]	1.99–3.81	3.54[c]	2.55–4.91
Anti-government concerns	1.14	0.78–1.66	1.21	0.77–1.92
Does not understand survey/asks questions about survey	1.63[b]	1.22–2.18	0.61[a]	0.39–0.95
Survey content does not apply	0.90	0.47–1.75	0.79	0.37–1.66
Hang-up/slams door	6.49[c]	4.04–10.44	15.30[c]	9.27–25.23
Hostile or threatens FR	2.57[a]	1.18–5.60	6.60[c]	3.10–14.09
Other household members tell respondent not to participate	2.28[a]	1.20–4.31	2.13[a]	1.04–4.38
Talk only to specific household member	1.97[a]	1.15–3.39	1.23	0.63–2.38

Table 6. Continued

	Interim refusal vs. never refused		Final refusal vs. never refused	
Independent variables	OR	95% CI	OR	95% CI
Family issues	1.24	0.70–2.20	1.64	0.82–3.29
Other	1.53[b]	1.11–2.11	1.24	0.82–1.88
Nagelkerke R-square = .4352 Model Chi-square = 1651.82, d.f. = 54	$N = 3{,}928$			

Notes: [a]$p < .05$, [b]$p < .01$, [c]$p < .001$, [d] All of the doorstep concern indicators are dichotomous. The reference category for each indicator, concern not mentioned, is not shown; OR – odds ratio, CI – confidence interval, Ψ – reference category

households with a health problem. The significant associations between the total number of noncontacts and interim refusals, and households in the Midwest (compared to the South) and interim refusals are also reduced to non-significance. In turn, two significant associations emerge. First, households with a language barrier had considerably lower odds (odds ratio = 0.33) of being a final refusal than households without a language barrier. And second, households where the primary mode of contact was in-person had higher odds (odds ratio = 1.63) of being a final refusal than households contacted primarily by telephone.

In sum, the addition of the number of unique concerns measure greatly increased the explanatory power of the model. This is evidenced by the considerably larger Nagelkerke R-square (.3851) observed for this model compared to previous models. The Improvement Chi-square (1910.13, $p < .001$) also indicates a substantial improvement in the overall fit of the model.

While the number of unique concerns measure boosts the explanatory power of the model, it reveals nothing about which concerns pose serious problems for interviewers in gaining cooperation, and which concerns tend to be successfully countered. This is essential information for developing appropriate training regimens, and for making decisions in the field about when to transfer cases to more experienced interviewers. For the next model (see Table 5), therefore, we drop the number of concerns measure and replace it with a series of dummy variables for each of the 16 concerns.

Households that voiced privacy concerns had higher odds of being interim refusals (as opposed to never refusing), but not of being final refusals.[14] This was also true of households that said they were "too busy." For households that said the survey "takes too much time," the relationship with final refusal is negative. We hypothesize that this finding may be the result of statements made in the course of an interview rather than during the pre-interview interaction (recall that interviewers complete the CHI *after* the interview is completed in cases where a contact results in an interview). Households agreeing to

[14] In a model excluding the other doorstep concerns, privacy concerns significantly predict final as well as interim refusals. Data not shown.

participate in the survey may complain at some point about the time it takes to complete the interview. Thus, this utterance may be a by-product of participating rather than a doorstep concern predictive of refusals. If that were the case, such utterances might be predictive of partial rather than complete interviews.

To explore this speculation further, we focused on the burden indicators and restricted the analysis to interviewed cases. The dependent variable in this analysis was whether the resulting interview was partially or fully complete; the predictor variables were those in the model shown in Table 5. Based on previous research (Couper 1997; Stussman, Taylor, and Riddick 2004), we expected burden statements to be predictive of partial interviews, and indeed we found that both "too busy" and "interview takes too much time" were significant and positive predictors of partial interviews (odds ratios of about 1.7; data not shown but available on request). Interestingly, households where one household member told another not to participate were also more likely to end up as partial interviews (odds ratio = 3.91). We suspect these are cases where one member responded to the family section but discouraged another member from participating in the sample adult or child section.

Returning to Table 5, "not interested/does not want to be bothered" was significantly (and positively) related to final as well as interim refusal. Even when controlling for privacy concerns and the burden variables, the "not interested/does not want to be bothered" households were many times more likely to refuse, and this variable turned out to be one of the strongest predictors of final refusal. We return to this finding in the Discussion section.

As might be expected, overtly negative behaviors such as hanging up the phone, slamming the door, or making hostile or threatening remarks are all positively associated with the propensity of final refusal. Another noteworthy category is "survey is voluntary[15]." Even after controlling for the environmental and process variables and all the other categories of concerns, the odds that households expressing this concern ended as final refusals were 3.7 times the odds of households that did not express this concern.

Those who did not understand the survey or asked questions about it had higher odds of being interim refusals as opposed to never refusing. However, the coefficient for asking questions was *negative* when predicting final refusals (albeit not significant, with $p = .10$). The finding that asking questions is positively related to cooperation has been documented previously by Groves and Heeringa (2006) and Groves and Couper (1998: 263). These authors see the question-and-answer process as maintaining interaction between the interviewer and the respondent, which they consider crucial in gaining cooperation.

Like those households who reported concerns about the survey taking too much time, households reporting scheduling difficulties were significantly less likely to be final refusals. This is further evidence that time constraints do not necessarily translate into refusal, although they may lead to partial interviews.

As anticipated, as indicators reflecting household-level concerns are added to the model, the larger environmental measures become less important. The effects of urbanicity on interim refusals disappear, while only MSA, noncentral city is associated with final

[15] Some U.S. government surveys are mandated by law and carry a penalty for not responding (the NHIS is not).

refusals. Similarly, region is only predictive of final refusal. Like model three, the fourth model is an appreciably better fit than model two (Improvement Chi-square = 2,804.40, d.f. = 34, $p < .001$), and compared to both models two and three the Nagelkerke R-square is also markedly improved to 0.51.[16]

Finally, Table 6 presents results from a multinomial logistic regression that essentially replicates the model presented in Table 5 on a subset of households that mentioned at least one concern. (The "no concerns mentioned at one or more contacts" variable is dropped from the analysis.) Again, our goal here is to more fully assess the importance and explanatory power of the concern measures relative to one another.

Overall, the results suggest that the model operates similarly when applied to all households or just those households that mentioned one or more unique concerns. The most notable difference involves the "too busy" measure. While significantly and positively related to interim refusals in the previous analysis, the measure is now significantly and negatively related to final refusals (odds ratio = 0.64). These shifts in magnitude, especially the emergence of the significant negative association with final refusals, are consistent with the "partially complete interview" analysis and explanation we presented earlier. It is important to note that the signs of the "too busy" coefficients are consistent across this and the previous analysis. In other words, we observed a change in the magnitude but not in the direction of the effects.

In addition to the emergent association between "too busy" and final refusals, households where members asked questions about the survey had lower odds (odds ratio = 0.61) of being final refusals than households where members failed to ask questions. This is consistent with research suggesting that questions at the doorstep demonstrate a heightened level of respondent interest, allow the respondent-interviewer interaction to continue, and provide interviewers with additional cues for tailoring responses, all factors that bode well for eventual cooperation (Carton 2007; Groves and Couper 1996, 1998).

Beyond these findings, we observe a general diminution of effects when limiting the universe of households to those mentioning one or more concerns. For example, the significant effects of urbanicity and a health problem in the family on final refusals presented in Table 5 both disappear, and the associations between total noncontacts and interim and final refusals are slightly attenuated. Among the doorstep concerns, the magnitude of 15 of 16 odds ratios associated with significant effects in this and the previous analysis is diminished, and the prior significant effect of "other" concerns on final

[16] We were able to examine the relationship between doorstep concerns and interview outcomes on another survey conducted by the Census Bureau, the Consumer Expenditure Questionnaire, conducted for the Bureau of Labor Statistics. First-time-in-sample cases for April-December 2005 were analyzed, with the analysis restricted to interviewed cases plus refusals ($N = 6{,}618$). We then compared models predicting the likelihood of interim and final refusals (vs. never refusing) for the NHIS and the CEQ, using doorstep concerns as the only predictors. The Nagelkerke R-squares for the two models were substantial and very similar: 0.49 for the NHIS, and 0.55 for the CEQ. Looking only at the seven most frequently expressed concerns in both surveys, five – not interested/does not want to be bothered, too much time, privacy, anti-government sentiments, and statements that the survey is voluntary – exhibit the same relationships to interview outcomes in both, whereas two – too busy and broken appointments – show the same relationship with respect to either interim or final refusals, but not both. Replication of many of our findings on another survey gives us confidence that they are potentially generalizable to other surveys as well, although more research is clearly needed.

refusals disappears. Consistent with these results, the Nagelkerke R-square (.4352) reveals less explanatory power of the model when applied to this subset of households.

4. Discussion and Conclusions

This study of survey nonresponse takes advantage of newly collected paradata that capture respondents' questions, concerns, and behaviors as recorded by interviewers after each contact with a household. The primary advantage of this approach is that a rich set of measures on the predispositions of *both* responding and nonresponding households becomes available for study. The potential of these new data to expand our understanding of survey participation seems great since they are collected at every contact, across modes, and across several different demographic surveys for which the U.S. Census Bureau is the data collection agent.

Doorstep concerns added to models predicting response greatly improved their predictive power relative to models including only environmental variables and basic call history measures. At the same time, the significance of aggregate measures such as urbanicity diminished once the household-level predictors were included. This is similar to analyses reported by Groves and Couper (1998), who found no significant urbanicity effects on cooperation when household-level predictors such as tenure, race/ethnicity, age, and presence of children were accounted for.

Previous studies have found that privacy concerns play a small but significant role in the survey participation decision; the impact of burden is less clear. The current study finds that once we controlled for all types of doorstep concerns, concerns about privacy predicted interim refusals but not final refusals. This suggests that if interviewers can successfully respond to respondents' concerns about privacy or confidentiality, these concerns need not lead to final refusals. The opportunity for responding to such concerns is probably greater in face-to-face than in telephone interviews, as well as in surveys like the NHIS, which is government-sponsored and still enjoys very high public cooperation.

The effects of burden differed depending on the particular indicator used. Like those expressing privacy concerns, households that said they were "too busy" were significantly more likely to be interim but not necessarily final refusals. Those that said the interview "takes too long" were significantly *less* likely to be final refusals (perhaps because they made this statement as a result of being interviewed, not during the doorstep interaction). However, such concerns did predict partial vs complete interviews, with those who indicated time constraints less likely to complete the interview. "Scheduling difficulties," which on its face appears to be conceptually related to burden, behaved much like these two indicators.

We had originally considered the statement "not interested/does not want to be bothered" as another possible indicator of burden, but found that this variable behaved in a very different way. After controlling for other variables, we found that households making this statement had considerably higher odds of being final refusals than households not making the statement. Note, however, that this category is composed of two potentially different concerns: lack of interest, and a wish to be left alone. Research by Groves, Presser, and Dipko (2004) and by Groves et al. (2006) indicates that those persons who, on a priori grounds, are not likely to have an interest in the survey topic are much less likely to respond

to a request for participation. Their participation can be increased by the offer of a monetary incentive, which presumably compensates for the absence of interest in the topic. Whether this is also true of households that say they don't want to be bothered is not known.

In addition to "not interested/does not want to be bothered," impolite declinations such as slamming the door or hanging up the phone, or hostile or threatening behavior toward the interviewer, were also predictive of final refusals, though relatively few households expressed these. In a factor analysis using CHI data from a different survey (the 2005 Consumer Expenditure Survey), these same three items loaded highly on the same factor (Tan 2006). These analyses provide some insight into the meaning of "not interested/does not want to be bothered," but beg for additional research to better define the motivation underlying this expressed concern. To facilitate such research, it is crucial to separate and better define the two sentiments currently coded as a single category.

In addition to the impolite declinations already discussed, other, less obvious categories were also predictive of final refusals. Among them were "survey is voluntary" and "other household members tell respondent not to participate". The finding concerning "survey is voluntary" is largely consistent with findings from analyses of doorstep interactions in a British household survey (Campanelli, Sturgis, and Purdon 1997). While Campanelli and colleagues identified either positive or nonexistent associations between survey cooperation and questions about survey purpose, length, and the respondent selection process, a negative association emerged with questions about the voluntary or compulsory nature of the survey. Like "not interested," these statements appear to reflect a strong, genuine unwillingness to participate.

Although only the first item is predictive of final refusal, the cluster of "other household members tell respondent not to participate," "talk only to specific household member," and "family issues" suggests a broader theme of gate-keeping or control within a household regarding who acts as the spokesperson for that unit. Gaining household cooperation may require negotiating with that person.

5. Future Directions

Clearly, recording the concerns expressed by households about a requested interview greatly improves the ability to diagnose and predict the household's future behavior. Analysis of these concerns can aid the development of refusal aversion training protocols, tailored nonresponse follow-up materials, and targeted incentives. As shown, statements such as "too busy" and "privacy concerns," the two most frequently mentioned concerns, can be successfully countered by interviewers. *Systematically documenting* successful responses to these concerns should be a high priority for survey organizations and could facilitate interviewer training regimens (see, for example, Groves and Couper 1998; Groves and McGonagle 2001; Mayer and O'Brien 2001; O'Brien et al. 2002). The more difficult challenge is to develop strategies for addressing respondent concerns such as "not interested/does not want to be bothered." Unfortunately, interviewers cannot leverage the survey topic in these situations, and appeals to the authority of the sponsor (a tactic readily used with the NHIS and other government surveys) do not appear to be helpful. Other, more targeted, approaches are needed. Examples might include promotional materials demonstrating the indirect benefits of participation (e.g., changes in or the enactment of

health-related legislation based on NHIS data), or the use of monetary incentives, a practice not currently employed with the NHIS. Small-scale experiments with these approaches may be fruitful.

The analysis suggests a number of other research endeavors that should be undertaken. One possibility is to extend the current model by including a set of household(er) and interviewer characteristics. This would allow for a more complete application and assessment of the conceptual framework of survey cooperation proposed by Groves and Couper (1998), and would certainly enhance the fit and explanatory power of the current model. We hypothesize that the associations between the doorstep concerns and degree of response would be largely unchanged, and would continue to account for the bulk of explained variance in the dependent variable.

Two measures of interviewer experience are currently available: time spent working for the U.S. Census Bureau and time spent working on the NHIS. Adding measures of household(er) characteristics is more problematic. One approach would incorporate Census block group or tract-level measures (neighborhood indicators) as crude proxies of lower-level household and respondent characteristics (see Johnson et al. 2006). Examples might include the percent of residents indicating a minority racial/ethnic background, median household income of the tract, and the percent of residents with at least a bachelor's degree. Although aggregate-level variables, they might shed light on the type of households that indicate lack of interest in surveys or a preference to be left alone.

Finally, more work is needed on refining both the CHI and interviewers' use of the categories. Are the concerns mutually exclusive? Should some be combined to measure broad underlying constructs (e.g., those pertaining to household gatekeepers)? Does the pattern of categories selected have any explanatory power (see Bates and Piani 2005)? Should some be separated (e.g., not interested/don't want to be bothered)? How reliable is interviewers' use of the categories, both over time and among interviewers? Methodological improvements such as these would undoubtedly increase the usefulness of an already highly practical tool.

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