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Methodological considerations for a new household panel survey

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Abstract

This paper identifies new opportunities for innovation and expansion on current survey practice in the design of a new household panel survey, including an increased use of new and mobile technologies, more frequent data collection, modified clustering, and use of non-traditional survey measures such as administrative data, planned missing/matrix sampling questionnaire design, real-time data collection, and biomarkers. These innovative data collection methods require rethinking traditional panel survey methods, but can help reduce respondent burden and expand on current social science knowledge. The paper concludes that a new household panel survey would improve knowledge about important social, economic and health issues facing the US, and would provide a useful test bed for new hypotheses and innovative methods of data collection.

Keywords: New household panel survey, survey methodology, survey design

1. Introduction

Panel surveys are a vital source of information about changes in what individuals, families, and households think, feel and do over extended time periods. Existing panel surveys include the Panel Survey of Income Dynamics (PSID), Health and Retirement Study (HRS), the National Longitudinal Study of Adolescent Health (Add Health), and the Survey of Income and Program Participation (SIPP). These studies have permitted investigation of topics such as intergenerational changes in household socioeconomic status (e.g. [74]), health trajectories in later life (e.g. [24]), changes in adolescent depression symptoms over time (e.g. [44]), and the length of time that individuals are in poverty (e.g. [62]).

Panel surveys are an important resource for scholars in a wide range of fields. At the time of this writing, the bibliographies for these surveys contained at least 2000 manuscripts each (PSID – over 3700 [54], HRS over 2500 [25], Add Health almost 5000 [47], SIPP almost 2000 [77]), including journal articles, books, conference proceedings, and dissertations. The information obtained from panel studies is so important that one survey – the PSID – is listed as part of the National Science

Foundation's "Nifty 50" inventions that are important in everyday lives (including other inventions such as the Internet and bar codes [49]).

Thus, a new household panel survey has the potential for contributing to a wide variety of fields and having a lasting effect on scientific knowledge. Yet developing a new household panel survey poses a wide variety of methodological challenges and decisions, including the topic, target population, mode of data collection, sample design, frequency of reinterviews, and methods to minimize attrition, among others. These methodological challenges of designing a new household panel survey are both exciting and daunting.

As a potential new resource for researchers in a wide range of disciplines, it is critical to consider many issues related to the design of a new panel survey. In this paper, we synthesize the methodological issues and decisions identified by the authors of the preceding papers in this journal issue. We identify the implications of these issues for design decisions in a new household panel survey. Then, we examine a variety of statistical and other design decisions that are critical to planning for a new household panel survey, including our recommendations.

Underpinning our discussion is the importance of error properties that can have a substantial effect on the utility of the estimates. In general, we support implementing design features that make the survey experience as easy for the respondent to complete as possible – that is, “respondent friendly” [18] to mitigate potential survey errors. Specifically, the instrument design must take the respondent into account by being relevant and reducing burden across multiple waves of data collection. We recommend that modern methods of data collection be implemented, in addition to the use of self-administered modes, to reduce respondent burden and increase data quality. Norman Bradburn [7] posited that survey burden was multifaceted. Among the contributors to survey burden include questionnaire length, mode, having multiple survey components, the amount of effort required by the respondent, having uncomfortable, sensitive or difficult topics, having a boring questionnaire, and being interviewed frequently. The respondent-friendly design is aimed to support the “social exchange” concept for increasing respondent participation and decreasing burden [19]. While monetary incentives are valuable and can enhance participation (e.g. [70]), we recommend having additional benefits to the respondent, including asking engaging questions and allowing them to experience the study as a benefit for society and themselves. We hypothesize that respondents who are attached to the study this way are more likely to persist and provide higher quality data.

2. Topic overview

One of the most important decisions for a new household panel survey is the survey's primary focus or topic. The topic of the survey drives a survey's identity. For example, the Health and Retirement Survey is about health and economic decisions in aging populations, the Survey of Income and Program Participation is about transfer

benefits for low income households, and the Panel Survey of Income Dynamics was (initially) about employment and income, although the scope has changed dramatically over time. A survey's identity, driven by the topic, helps identify potential funding sources, the end users of the data collected, how the survey is framed for respondents, and what the analytic goals are for survey. The topic also drives all other design decisions, including the target population, mode(s) of data collection, frequency of administration, and the usefulness of administrative records. This section synthesizes the topics considered by the preceding papers in this journal issue, and considers the implications for a new household panel survey.

All of the papers contained in this issue examine whether a new household panel survey is needed for their particular research questions. Of these papers, eight argue that a new household panel survey is needed, three argue that it may be needed, depending on the design, and four argue that enhancements of current data collection strategies would most facilitate research in their area. Interestingly, the four papers for which a new data collection was not seen to be needed are those related to economic issues of wealth [11], time use [28], household consumption [55], and income and poverty [85].

The other social issue-oriented topics, on the other hand, argued that a new survey was important or critical to advancing the field. From the manuscripts provided, the topics for which a new survey is needed fall into the general categories of *health, family and community*. In particular, the topics for which a new household survey were argued to be necessary included physical health and health behavior [1], genes [12], social networks and social capital [75], health and health care [37], family formation processes [40], human capital, education, achievement and learning [59], child and adolescent development [63], and family support processes from adolescence through later life [68], and – depending on the design – labor markets [5], disabilities, physical functions and cognitive abilities [45] and housing and neighborhoods [58].

We summarized all of the major constructs identified by the authors of the 15 articles prepared for the conference. This summary identified well over 300 major constructs that were of interest to be measured (contained in an online appendix to this paper). These constructs ranged from information on educational outcomes to employment to relationship quality to social networks to genetic information to health care to disability to crime and deviance. Importantly, there was a great deal of overlap in the general topics that were considered to be necessary to collect, even if the operationalization of the construct varied across papers. Furthermore, each of the authors emphasized the importance of having economic information such as wealth and income as contextual variables, even though the manuscripts for these topics did not identify a new survey as important.

Table 1 shows an incomplete list of these topic modules (listed along the left side). It also identifies the substantive manuscripts (listed across the top) that listed these to be important topics to collect. For example, information about educational background or outcomes was explicitly mentioned by the authors of the manuscripts on

physical health, labor markets, time use, disability, human capital, child development and adult development. Of course, a lack of an “X” in a cell of the table does not mean that the authors would not be interested in that information; it simply was not explicitly mentioned in the manuscript (perhaps because collection of the information – such as education level or number of people in a household – was taken for granted as part of any social science survey). Table 1 shows the tremendous amount of overlap in what was considered to be essential information for a new household panel survey across the wide range of substantive foci examined in the 15 manuscripts.

In addition to a standard asking of survey questions, a number of manuscripts were interested in collecting biological or genetic information or using alternative methods to obtain real time measurement. Collection of biological markers could come in the form of blood, saliva, or urine samples, as well as physical measurements of height, weight, waist circumference, and blood pressure. Real time measurements suggested included the use of GPS data for real time travel information, ecological momentary assessment methods to obtain real-time measures of how people are feeling, what they are doing, and who they are with, and sensors for physical behaviors.

The list of well over 300 potential topics, plus biological and other information, has great potential for advancing scientific knowledge about human populations. However, a survey that asked about over 300 topics would be impossibly long and burdensome. The challenge in this design is to identify which constructs are the most important, and thus require extensive batteries of questions to adequately measure the construct, and which constructs can be measured less precisely, with fewer questions. An additional challenge is frequency of measurement for these batteries of items, discussed below. Additionally, as pointed out in some of the papers, some of the topics are very difficult for people to have information about or to understand, thus limiting the value of these questions unless alternative methods of measurement are identified.

3. Questionnaire design

The survey topic is implemented through the questionnaire. In a panel survey, the question arises as to what should be collected in a baseline interview (wave 1) and what can be collected in follow-up interviews (wave 2 and beyond).

We recommend that the baseline interview collect retrospective information across multiple domains to establish information that must be “causally prior” for subsequent analyses. These domains, including education, employment, marital status/relationship, fertility, and residential history, could be collected using an event history calendar [4]. An event history calendar (EHC) allows the interviewer and respondent to draw across multiple domains for memory cues. For example, while answering questions about changes in employment status, the interviewer can probe about whether the employment change occurred before or after the birth of a child. Event

Table 1. Summary of select topical modules

Topical information requested	Paper topic														
	Physical health	Labor markets	Wealth	Genes	Social networks	Time use	Health care	Families	Disability	HH consumption	Housing	Human capital	Child development	Adult development	Income and poverty
Education	X	X				X			X			X	X	X	
Physical/Mental Health	X					X	X	X	X		X		X		
Cognitive/physical abilities	X	X					X		X			X	X		
Social networks	X				X				X	X	X		X	X	
Genes/Biomarkers	X			X			X						X		
Family/Household	X	X			X	X		X	X	X	X		X	X	
Time use		X				X			X	X	X	X	X	X	
Employment	X	X	X			X	X		X	X	X	X	X	X	X
Financial Resources/Assets/Hardship	X	X	X			X	X	X		X	X	X	X	X	X
Neighborhood/Housing	X	X			X		X	X		X	X		X	X	X

history calendars have been shown to improve retrospective recall of autobiographical events over individual questions for the same domains [3]. EHCs have been successfully implemented in longitudinal surveys such as the PSID and the SIPP.

We also recommend that the baseline interview obtain consent for such requests as links to administrative records, collection of biomarkers, physical measurements, genetic information, and real-time data collection methods. These sensitive and burdensome requests can be explained and collected by the interviewer, hopefully mitigating any risk of increased nonresponse at the baseline interview from these components. Face-to-face administration also permits the respondent to ask questions about the request, increasing the information they have for informed consent. Each component of a survey for which consent is required increases the risk of nonresponse to that component. Surveys must obtain separate consent to do physical measurements, to collect biomarkers, and to link data to administrative records (when the records are not the frame). It is not clear how having multiple survey components of different types contributes to nonresponse at wave one or later nonresponse in panel surveys. In current interviewer-administered surveys, consent rates to conduct anthropomorphic measurement are high (90–98% [64]). Consent rates to collect biomarker samples vary over type of biomarker (e.g., blood, saliva, urine) and range from 67 to 90 percent [64]. Linkage to administrative records also varies over surveys, with rates as low as 19% consenting to link records to 96.5% consenting in interviewer-administered surveys, and from 55% to 62% in web surveys [65]. Although biological and physical measurement increase burden for respondents, linkage to administrative records could decrease the number of questions asked in a survey and thereby decrease burden on the respondent.

Subsequent interviews can reduce the burden on respondents in two ways. First, dependent interviewing, in which information from prior waves is preloaded into questionnaires, and respondents are asked to evaluate whether changes have occurred, can both reduce the burden on the respondent and improve data quality [31]. Dependent interviewing, in particular, helps to reduce the “seam effect” [13], the substantial increase in changes in responses that occurs during the time periods covered in adjacent interviews rather than in the same interview. Second, a planned missing design (also called split questionnaires or matrix sampling), paired with multiple imputation, can reduce the length of a questionnaire while maintaining coverage of question domains of interest [20,21]. Planned missing designs work well when there is a strong covariance structure that can be used to impute missing values, such as in a scale or battery of questions. In a planned missing design, respondents are randomly assigned to be asked subsets of questions in a scale, rather than a full scale. This design permits coverage of a wide range of domains, but reduces the number of questions asked of any single respondent. In longitudinal research, this creates a challenge in that some households or respondents will not answer the same items from wave to wave. Yet designing planned missing questionnaires around individual scales with high reliability will allow changes in a latent construct to be evaluated, even without individual items [22].

Two major causes of measurement error in longitudinal surveys are panel conditioning or time-in-sample bias [34] and errors due to changes in mode [17]. Although it is not possible to eliminate errors from these sources, consideration in questionnaire design must be given to methods for reducing and controlling them. For example, practices that provide direct feedback (e.g., reports on savings for retirement or benefits available from government programs) may appear to be beneficial in terms of increasing response rates but they may increase bias in survey estimates if the panel conditioning bias is greater than the nonresponse bias.

4. Frequency of data collection

One question that arises in a new household panel survey is how frequently the questionnaire should be administered. We see this as strongly related to the topics and domains of interest. More frequent interviews permit a shorter recall period for some characteristics, reducing the amount of recall effort required to answer questions. Less frequent interviews require more retrieval time, but may be more appropriate for rarer or highly salient events.

Although it is unknown whether shorter questionnaires administered more frequently or longer questionnaires administered less frequently are less burdensome or more accurate, we believe there are substantial benefits associated with frequent, low-cost follow-ups. If the base wave is successful at “training” respondents to use a computerized instrument such as through the Internet and/or a smart phone for conducting these follow-ups, then frequent (perhaps monthly) collection could be a short set of items that takes no more than 5 to 8 minutes to complete, such as in the Longitudinal Internet Studies for the Social Sciences (LISS) panel in the Netherlands [66]. One benefit of this approach is better tracking of respondents, lowering attrition. Another potential benefit is that the frequent contacts can build rapport and attachment to the study.

Furthermore, with a new household panel survey, we recommend that the salience and rate of change of an event drive how frequently it is collected. For example, whether or not an individual has purchased a car could be evaluated annually or less frequently, whereas information about doctor’s visits could be evaluated more regularly (e.g., every three months). Additionally, we recommend that collection of information about some domains be timed around when information about the domain is most salient. For example, income information could be timed to coincide with tax season or when Social Security income statements are mailed. Information about health insurance plan options could be timed around open enrollment season when review of plans is most salient. Of course, different time frames for frequency of measurement of certain domains could introduce new challenges for data collection, and would require users to use more cross-wave data for analyses in different domains.

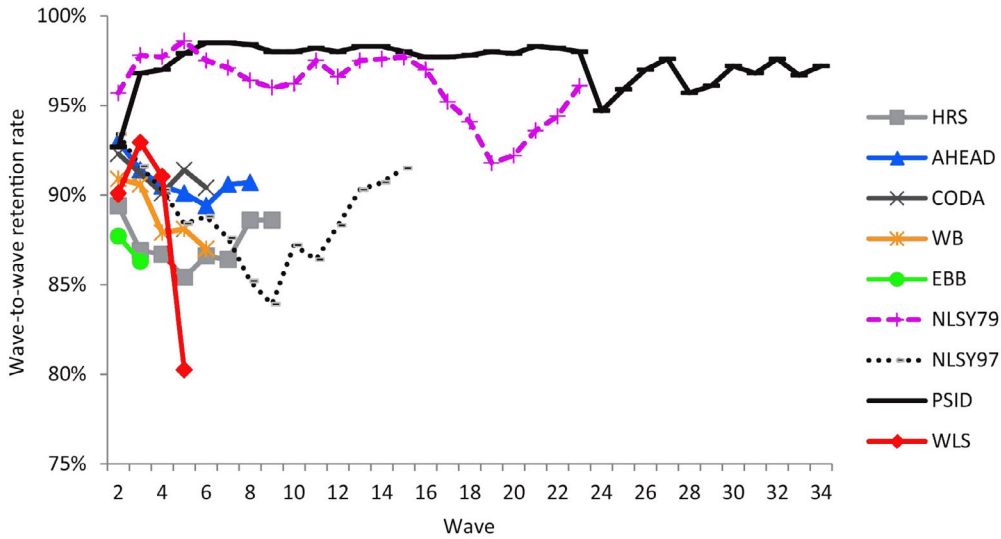


Figure 1. Wave-to-wave retention rates for US panel surveys.

Some longitudinal surveys are planned to be collected for a set period of years (e.g., the SIPP) whereas others are planned to be collected indefinitely (e.g., PSID, HRS). We do not anticipate that there are benefits to establishing a fixed term or expiration period for the study, assuming it is planned to cover many years. Many of the analysis goals stated include studying long-term effects such as inter-generational transfers. These kind of long-term outcomes require data collection over multiple decades.

As shown in Figure 1, when examining multiple panel studies, some studies experience a decrease in wave-to-wave response rates, whereas other surveys do not [51,67,82]. Thus, panel retention is more complex than simply the number of waves of data collection or the length of time between the panels.

5. Mode of data collection

A mixed mode approach to data collection is essential for a new household panel survey. Mixed-mode surveys are those in which some combination of face-to-face, telephone, mail, web, and other modes are used for data collection, either within a survey interview (different modes for different questions) or with changes in modes across waves (different modes at different times [14]). Given the length and complexity of the range of domains identified by the manuscripts, and the extensive amount of retrospective information that is of interest, the initial round of data collection would be facilitated through a face-to-face interview. Two approaches could be taken for the base wave interview. The first approach is a “traditional” approach in which an extensive amount of retrospective information is collected about each member in the housing unit, as well as information about what the respondent is currently

thinking, feeling, or doing. Interviews of this sort are often much longer than one hour in length and form the basic set of information that is traditionally repeated in subsequent waves of data collection.

The second approach is a more novel one. Here, the primary goals of the first wave are different from that usual approach of collecting a great deal of retrospective data about each household member. Instead, the first interview could have as its main objective gaining the participation of the household members and establishing a commitment to the study, with minimal “baseline” information. In a sense, the base wave prepares respondents for prospective data collection in subsequent waves that use lower-cost data collection methods. The first wave could also be used to collect needed physical measurements (e.g., respondent measurements, neighborhood observations). To minimize the burden in the first wave, particularly sensitive information could be delayed to later self-administered waves.

The other main objective of the base wave under the novel approach is to establish processes for the respondents to provide information in subsequent waves that is both convenient for them and reduces the time in the field, preferably using self-administered instruments. Subsequent rounds could be collected using telephone, web or mail surveys in addition to face-to-face interviews. The self-administered modes of web and mail permit more frequent collection of information. Telephone interviews can be used for topics requiring more clarification or probing than permitted through self-administered questionnaires.

One way to facilitate later data collection would be to provide devices such as smartphones or tablets that the respondents could use for their own purposes (i.e., as a non-monetary incentive) and for completing subsequent surveys. If respondents already have their own devices that are appropriate for this purpose and they are willing to use them, then alternatives that are more beneficial to the respondent – such as paying internet service plans or other in-kind payments – should be offered. Some respondents may not be willing to use Internet or smartphone devices, and for those households other mechanisms (e.g., scanners, paper instruments, or phone interviews) need to be allowed. This initial tailoring to the individual household’s situation is motivated through the idea of creating a “respondent-friendly” survey.

Regular face-to-face visits could be made for more extensive questionnaires, an update of physical measurements such as height, weight and blood pressure, or providing households with new data collection devices (e.g., tablets). The frequency of the face-to-face visits relative to other modes of data collection should be driven by the analytic goals of the survey and the frequency with which the information of interest changes.

The use of multiple modes in a longitudinal survey introduces new challenges. Changes in administration mode for particular sets of questions could confound real change in outcomes. As such, care should be taken to keep modes constant over waves for items that may be particularly sensitive to the mode of administration [16]. For example, reports of sensitive behaviors such as substance use or partner violence should be self-administered, whether in ACASI, web or paper modes, over waves.

Minimizing the number of changes in mode over waves for different sets of questions is recommended. Establishing and continuing to collect data in the same mode, or at least continuing self- or interviewer-administered methods, may reduce mode effects of change measures.

Issues related to mode are also complex when thinking about response and attrition rates and the risk of nonresponse bias. Although face-to-face surveys traditionally have higher response rates than any other mode, in today's survey climate, mail surveys obtain response rates as high as or higher than telephone surveys (e.g. [9]). Furthermore, tailoring mode of data collection to an individual's stated preferred mode does not necessarily yield a higher response rate than when offering a nonpreferred mode. For example, Olson, Smyth and Wood [53] found that people who self-report preferring a web mode in a prior wave of a survey participate at higher rates in a web survey than people who do not report preferring the web. However, all persons – including those who preferred the web mode – participated in mail and telephone surveys at higher rates than in web surveys. Catering to an individual's web preference would lower the overall response rate to the study, compared to offering the same person a mail survey. Thus, tailoring modes to individual preferences must be considered in conjunction with general trends in the population for participation across modes.

6. Target population

One challenge of designing a new household panel survey is identifying the target population for each construct. The papers in this issue identified a wide variety of possible target populations, including households, families, adults, children, parents, or persons who meet certain criteria (e.g., age range, employed, with disabilities). Identifying which constructs could be answered by household reporters and those that require self-response is challenging.

Prior research has shown that two adult household members may not agree on a wide variety of topics. In particular, self and proxy reports differ on topics including household membership [41], gun ownership [39], disability status [36], partner violence [10], childbearing desires [76], health events [42], smoking status [50], voting status [26], and victimization [46]. Information on income and employment status appear to be well reported by spouses, although it is not clear that this would hold for cohabiting or roommate households [46]. Given the difficulty in reporting for these different domains, we recommend having multiple adults per household and maximizing self-report to maximize data quality. Multiple adults per household (whether family members or not) would also facilitate intra-household analyses, a theme that resonated across multiple papers. Of course, some proxy interviews would be inevitable due to death, cognitive limitations, movement into an institution, or for children. Proxy reports could also be used to address nonresponse if the information gathered

by the proxy is deemed to be adequate enough to outweigh the potential decrease in data quality compared to self-reports.

Our main concern with having multiple reporters per household is the data collection burden, although the concept of household burden as distinct from person burden is not well understood. Our view is that if the analytic objectives require taking all adults and children within a household – and most of the papers in this issue indicate such analytic objectives – then the data collection protocol and procedures can be developed to allow this. On the other hand, if sampling one or more persons within household is sufficient, then this approach is attractive for minimizing burden to the household. Multiple other surveys have used this within household sampling approach.

7. Questionnaire length

There is no clear evidence that questionnaire length and being interviewed frequently are associated with cooperation rates [6,43,56,67]. In a review of studies on survey length and response rates across multiple modes, Bogen [6] found weak evidence that longer cross-sectional surveys yield lower response rates, but had no consistent findings for attrition in longitudinal surveys. Furthermore, in a study of farmers, McCarthy et al. [43] found no clear association between the number of surveys sent to an agricultural operation and survey cooperation, but in studies of students, Porter, Whitcomb and Weitzer [56] found some evidence of “survey fatigue.”

Incentives are often used as a tool to both increase response rates and reduce potential nonresponse bias [23,70]. The incentive literature is clear that incentives work to increase response rates. Furthermore, prepaid incentives are better than postpaid incentives, and cash is better than nonmonetary incentives in increasing response rates [70,71]. No negative effects of incentives in panel surveys have been observed, and in fact, monetary incentives at early waves may help with response at later waves [71].

Whether nonmonetary incentives that function as both data collection tools and provide a benefit to the respondent are a useful tool for survey retention is an open question. For example, if respondents are provided with tablet computers (e.g., iPads) for completing web surveys or physical activity monitors (e.g., FitBit) for real time measurements, and then permitted to keep these devices for their personal use, the data collection device may serve a dual function as an incentive and a data collection device. If the respondent or household already owns these devices, then nonmonetary incentives may have less value. Similarly, enrolling respondents in an expenditure monitoring system may be used for collecting data as well as helping the household monitor spending. The efficacy of this incentive, however, depends on the number of households that would find this service useful.

8. Sample design considerations

The authors of the papers provide a wide range of goals and objectives. The design issues associated with these objectives vary substantially. In this section, we discuss some of the statistical design issues in the context of a general household longitudinal survey, including the trade-offs involved in these design decisions. As with any sample design, identifying which trade-offs to make requires evaluating the specific survey objectives.

8.1. Households, following rules, and sample refreshment

Perhaps the first and most important point for beginning the discussion is that a longitudinal sample of households or families is not really feasible. Households are constantly changing. In 1970, 40.3% of US households were married couples with children, and only 18.8% of households were non-family households. That is, the concepts of household and family were largely coterminous. In contrast, by 2012, only 19.6% of households were married couples with children and 33.6% of households were non-family households [79]. This is important in terms of thinking about the target population at the baseline interview, but also for which respondents to follow as households dissolve, what new household members to bring in, and what kind of tracking information may be needed for following people across waves. That is, many of the households at time t will have different sets of members at time $t + 1$.

At the base or initial wave, households and families can be sampled and then members of those households or families can be followed over time. In any longitudinal survey, following rules need to be implemented that allow households or families of the members of the initial sample to be constructed over time. This following effort is resource-intensive, but necessary for understanding the dynamics of changes in household composition and its subsequent effects on social, health and economic outcomes longitudinally. These follow-up rules are especially important if all household members (adults and children) are enrolled as members of the study. A variety of follow-up or tracking mechanisms need to be developed with special attention as household members will move in diverse patterns over time. If the new household panel survey can anticipate such behaviors and be prompt in reacting to them (for example, through frequent collection of address information via a mobile device provided to each household member for data collection), then it may be more successful than many previous studies at collecting data during these transitional periods that are of high interest to researchers. For example, if a person's contact information is a work email and that email changes, this may indicate a change in employment status and may prompt other data collection that are more difficult to capture with typical retrospective questions.

Following rules for subsequent waves need to be carefully considered. In the most desirable, but most costly approach, all base year respondents who move are followed and all new members of previously sampled households are added to the survey

sample, potentially yielding dramatic increases in sample size. To add new household members, information on household composition changes must be collected. Alternatively, in- and out-movers can be subsampled to reduce the cost and size of the sample as necessary. Most longitudinal household surveys only follow household members who were present in the base wave or new family members such as children of the household members (e.g. [33]). As households become increasingly complex and the definition of family evolves (e.g. [57]), following rules about who should and should not be followed must be guided by the long term analytic goals of the survey in addition to the cost and ease of following these household members.

Rules for handling multiple waves of nonresponse by sampled members within households also need to be formulated. Some individual household members will attrite over time, whereas others will not. Additionally, if data collection is more frequent and shorter, different types of rules about what counts as attrition will have to be used compared to the methods used in existing longitudinal surveys. With limited resources for data collection to encourage sampled household members to participate, these decision rules are critical and should incorporate indicators for both nonresponse rates and nonresponse error (e.g. [80]).

With a long-term panel, refreshing the sample to include new entrants to the population is an important requirement. Including children of base year women into the study can enhance the sample of the domestic US population. Immigrants are more costly and difficult to sample, but excluding them is problematic for inference to the general US population at any given time period. A regular program of sampling immigrants every 10 or 15 years seems very worthwhile.

8.2. *Frame, stratification and clustering*

Large-scale longitudinal studies of households and its members entail large investments of increasingly scarce resources. Even though there has been some discussion of non-probability samples [2] and many epidemiological studies do not use probability samples [61], we believe a probability sample of households and its members is essential for the long-term usefulness of the study. Any additional costs associated with a probability sample are amortized over the life of a longitudinal survey [48] and the inferential risks for the broad range of possible analysis do not warrant considering any other type of sample in our opinion.

Similarly, some researchers have considered beginning with a sampling frame that is rich in terms of covariates even if it has incomplete coverage of the population. For a broadly representative sample of U.S. households and its members, such a design might begin with frames derived from credit records or other administrative records. The advantage of this approach is that nonresponse bias to the first or base wave survey can be investigated and better nonresponse adjustments to the survey weights can be implemented. Although this approach has some benefits for nonresponse, any sampling frame that does not cover the entire population well is a poor choice for this type of longitudinal household survey. Coverage bias is often a more serious source

of bias than nonresponse as suggested by Brick [8]. Furthermore, many of the objectives identified in the papers focus on households that are least likely to be covered by frames based on administrative records. Currently, the sampling frame derived from the U.S. Postal Service computerized delivery sequence files (CDSF) appears to have nearly complete coverage of households [30] and is our recommended sampling frame. Coverage improvement programs (e.g. [69]) should also be considered for the base wave of the survey to reduce undercoverage. Even with the CDSF, there are gaps in coverage such as those without a permanent household location and those moving in and out of institutions that are important for some purposes.

Stratification for multistage household samples nearly always results in important gains in precision by reducing the between first stage or primary sampling unit (PSU) variance. These contributions are very important. A more specific use of stratification is to obtain larger sample sizes for targeted groups such as those households with young children, low-income households, or Asians and Native Americans. Several of the papers discussed some of these subgroups. In this situation, stratification of areas to achieve more precise estimates for subgroups is generally not very effective [81]. At the address level, data can be appended to the CDSF frame, but the data are missing for a large proportion of the subgroups reducing the ability to use this type of stratification to improve precision [60].

Unless new data for stratifying at the area or address level for subgroups are developed, an alternative approach using multiple frames may be worth considering. Frames may be constructed from administrative records or other sources that can identify the subgroups accurately and have additional covariates that can be useful for other purposes such as nonresponse assessment and adjustment. These frames can be used to increase subgroup sample sizes and reduce data collection costs. For example, the HRS used both an area frame and the Health Care Financing Administration Enrollment Data Base to increase the number of older persons. The multiple frame approach is not likely to be very effective for increasing precision for the subgroups because most of the sources available do not include a large proportion of all members in the subgroup. On balance though, the multiple frame approach appears to have some benefits compared to stratification for subgroups if reasonably complete lists of the targeted groups can be identified.

A third household sampling issue is the extent of clustering of the samples. Clustering occurs at both the PSU level where the samples are concentrated in the geographic areas, and within households when more than one person is sampled per household. A general rule of thumb is that clustering reduces the precision of the estimates when the sampled units are more homogeneous within the cluster. For example, suppose all members of the household have the same characteristic, then the precision of the estimate for that characteristic does not increase when more than one person is sampled per household.

The loss in efficiency for estimating a sample mean due to clustering within PSU is called the cluster design effect [35] and can be written as

$$DEFF(\text{mean}) \cong 1 + \rho(\bar{m} - 1)$$

where ρ is measure of within PSU homogeneity (the cluster intraclass correlation

coefficient) and \bar{m} is the average number of households (or persons) sampled per PSU. This loss of precision due to clustering effect is likely to persist over time because those sampled within a cluster are likely to retain a high degree of homogeneity even if they later disperse geographically.

For subgroups, the size of the design effect is less problematic because is then the average subgroup sample per PSU within the cluster. That is, if the average cluster size is 50, and a subgroup of interest is women who are 50% of the population, then the average cluster size for the subgroup of women will be 25. The subgroup is smaller, thus reducing the design effect. Most analyses, especially over time, are conducted on subgroups. Furthermore, the clustering effect on statistics like regression coefficients is often lower than for means because the independent predictors account for some of the clustering effect [72]. Yet the clustering effect on regression coefficients is still positive and should not be underestimated [38].

A theme through some of the papers was to evaluate the effects of neighborhoods on outcomes of interest. For this analytic objective, multilevel regression with relatively large samples within a small cluster may be appropriate. Yet conceptualizing the meaning of a neighborhood over time for a set of sampled persons is challenging. We believe that many of these analytic objectives about neighborhoods may be best suited for cross-sectional surveys because the mobility of the population disrupts the original physical clustering that is the focus of the analysis. Furthermore, an extreme level of clustering has disadvantages for most other analyses in which the design effect would be increased substantially over a less clustered design, thereby increasing confidence intervals and decreasing the power of statistical tests.

An option that could be considered that might meet some of the analytic needs is to have a large number of relatively small PSUs rather than a smaller number of large PSUs. This design usually costs more to implement and rho typically increases as the PSUs get smaller [35], but these trade-offs might be acceptable if understanding the clusters themselves are important analytic components (e.g., for understanding neighborhood effects). The increase in costs associated with having more PSUs may also be controlled if the subsequent waves can be done predominately using low-cost self-administered modes.

As discussed above, we believe that measurement quality will be optimized by having multiple household reporters who self-report their behaviors, attitudes, and knowledge. The implications for this within-household sampling design decision on clustering effect on the precision of the estimates will be minimal. Most of the analyses of interest discussed in the papers in this issue rely on subgroup analyses (e.g., sex, age). Within households, these subgroup sample sizes are close to unity, thus alleviating any within-household clustering effects.

9. Administrative records

Administrative records such as tax records or health provider records are a valuable source of information that can and should be utilized to improve measurement

quality and enhance the respondent-friendly design of the study. Administrative records are created for purposes that are not always consistent with the measurement objectives of a scientific study, but may provide an opportunity for collecting types of data that respondents are either unable to recall or simply cannot answer for other reasons. We believe acquiring these data are essential, even though we are not suggesting that data from administrative records are error-free.

For many years, researchers have struggled to obtain consent from the respondent to acquire administrative data from the appropriate government agency or medical provider. For example, the National Immunization Survey obtains vaccination information from a child's medical provider [52] and the SIPP has asked for social security numbers to link to Social Security and Medicare administrative databases [29]. These efforts are often time consuming and fraught with difficulties because these records are rightfully personal and confidential.

Even when the respondent gives consent and an agency provides the data, the information may not be complete. Furthermore, consent often only pertains to accessing the record once and additional consents are needed to obtain updates to the administrative data later. Similarly, when accessing health records, it may be necessary to obtain consents for each medical provider and that consent is only valid for a relatively short period of time. Respondents may balk at frequent consents to access administrative records of various types as an invasion of their privacy.

One of the approaches we believe has potential to improve this situation is to avoid the consent process by asking the respondent to provide an electronic record that they personally have (if available), rather than getting the government agency or medical providers involved. Many administrative records of potential interest are now, or soon will be, available to respondents electronically. Rather than accessing an electronic record through a government agency, the respondent themselves could attach that record to a secure link to provide the data for the survey. For example, the IRS now offers a transcript of tax filings for individuals and the Social Security Administration allows individuals to obtain their statement of earnings and benefits through the SSA website [73]. Electronic health records are becoming more and more common, especially under the Affordable Care Act. In 2013, 78% of office-based physicians were estimated to have some kind of electronic health record system, although this rate varied substantially across states [27]. Just under half (44%) of hospitals had an electronic health record in 2012, with a rate that had tripled since 2010 [15]. Additionally, many HMOs have been allowing respondents to access their records for years now (100% of HMOs report having electronic health records [32]), although the rate of patient use of these records is much lower [83,84].

An additional and substantial benefit of using the respondent as the source of administrative records is that the data can be stored and accessed privately rather than being held inside of the government. A model that is appealing is university-based or perhaps a consortium of universities as the repository of the data. This university or consortium would be responsible for developing the structure to maintain and access the data while protecting the respondents from disclosure. We suspect this model

would allow greater and more flexible access and yet still provide strong protection for the privacy and confidentiality of the data.

The world is changing. It is very likely that more electronic access to records will be available and could be utilized to reduce burden on respondents. The two main challenges to fully using this methodology is making sure respondents are fully informed of what is being requested and providing appropriate safeguards to protect the privacy of the data. The good news is that these are areas of continued and active research in survey methodology (e.g. [65]). Of course, for households not fully participating in accessing data electronically, alternative methods of data acquisition (perhaps low-tech solutions such as copying and submitting hard copies) will be needed.

10. Discussion

Developing a new household panel survey has many challenges and many opportunities. We agree that a new household survey would provide new insights into a variety of phenomena that cannot be adequately addressed through existing data sets. A modern data collection system might also be less expensive and have higher quality than is possible from existing systems. We also agree that such a new survey requires careful planning to identify the analytic goals, with design decisions following from these goals.

The methodological challenges from a new household panel survey are many. We have identified issues here related to topic, questionnaire design, modes of data collection, frequency of data collection, use of incentives, sample design, stratification and clustering, and administrative records. Many of these issues are common to existing household surveys. However, we think that a new household survey could innovate on existing surveys especially in the areas of mode of data collection, use of planned missing designs, increased numbers of small area clusters, and frequency of data collection.

A new household panel survey provides the opportunity to anticipate needing to change or adapt to new methods or measures. Some of the methods that could be used in a new household panel survey are unconventional. Similarly, some constructs of interest have not been previously tested at all or in general population surveys. To account for this potential, we recommend the creation of an innovation panel, similar to that used in the UK Household Longitudinal Survey [78]. We envision that the innovation panel could begin by testing some of the more critical components of the design, such as the ability to encourage respondents to report by the Internet, and several years of experience in the development process may be required prior to full implementation of the survey.

In sum, a new longitudinal household survey would benefit the scientific community at large. It would also provide an opportunity for developing new and innovative methods for data collection that could translate to other surveys.

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References

- [1] N. Adler, C. Bachrach and A. Prather, Physical Health and Health Behavior, in: *Assessing the Need for a New Nationally Representative Household Panel Survey in the United States*, Washington, DC, 2014.
- [2] R. Baker, S.J. Blumberg, J.M. Brick, M.P. Couper, M. Courtright, J.M. Dennis, D. Dillman, M.R. Frankel, P. Garland, R.M. Groves, C. Kennedy, J. Krosnick, P.J. Lavrakas, S. Lee, M. Link, L. Piekarski, K. Rao, R.K. Thomas and D. Zahs, Research Synthesis: AAPOR Report on Online Panels, *Public Opinion Quarterly* **74** (2010), 711–781.
- [3] R.F. Belli, W.L. Shay and F.P. Stafford, Event History Calendars and Question List Surveys: A Direct Comparison of Interviewing Methods, *Public Opinion Quarterly* **65** (2001), 45–74.
- [4] R.F. Belli, F.P. Stafford and D.F. Alwin, *Calendar and Time Diary Methods in Life Course Research*, Sage Publications, Thousand Oaks, CA, 2009.
- [5] D.A. Black, L.J. Taylor, M. Zilora, Empirical Evidence in the Study of Labor Markets: Opportunities and Challenges for a New Household Survey, in: *Assessing the Need for a New Nationally Representative Household Panel Survey in the United States*, Washington, DC, 2014.
- [6] K. Bogen, The Effect of Questionnaire Length on Response Rates – A Review of the Literature, *Proceedings of the Survey Research Methods Section, American Statistical Association* (1996), 1020–1025.
- [7] N. Bradburn, Respondent Burden, *Proceedings of Survey Research Methods Section of the American Statistical Association*, (1978), 35–40.
- [8] J.M. Brick, The Future of Survey Sampling, *Public Opinion Quarterly* **75** (2011), 872–888.
- [9] J.M. Brick, D. Williams and J.M. Montaquila, Address-Based Sampling for Subpopulation Surveys, *Public Opinion Quarterly* **75** (2011), 409–428.
- [10] L.D. Brush, Violent Acts and Injurious Outcomes in Married Couples: Methodological Issues in the National Survey of Families and Households, *Gender and Society* **4** (1990), 56–67.
- [11] B. Bucks and K. Pence, Wealth, Pensions, Debt, and Savings: Considerations for a Panel Survey, in: *Assessing the Need for a New Nationally Representative Household Panel Survey in the United States*, Washington, DC, 2014.
- [12] D. Conley, Genotyping a New, National Household Panel Study, in: *Assessing the Need for a New Nationally Representative Household Panel Survey in the United States*, Washington, DC, 2014.
- [13] F.G. Conrad, L.J. Rips and S.S. Fricker, Seam Effects in Quantitative Questionnaires, *Journal of Official Statistics* **25** (2009), 339–361.
- [14] E. de Leeuw, To Mix or Not to Mix Data Collection Modes in Surveys, *Journal of Official Statistics* **21** (2005), 233–255.
- [15] C.M. DesRoches, M.W. Painter and A.K. Jha, Health Information Technology in the United States: Better Information Systems for Better Care, 2013, in: Robert Wood Johnson Foundation, 2013.
- [16] D.A. Dillman, Some Consequences of Survey Mode Changes in Longitudinal Surveys, in: P. Lynn (Ed.) *Methodology of Longitudinal Surveys*, John Wiley & Sons, Ltd., West Sussex, United Kingdom, 2009, pp. 127–140.
- [17] D.A. Dillman and L.M. Christian, Survey Mode as a Source of Instability in Responses across Surveys, *Field Methods* **17** (2005), 30–52.
- [18] D.A. Dillman, M.D. Sinclair and J.R. Clark, Effects of Questionnaire Length, Respondent-Friendly Design, and a Difficult Question on Response Rates for Occupant-Addressed Census Mail Surveys, *Public Opinion Quarterly* **57** (1993), 289–304.
- [19] D.A. Dillman, J.D. Smyth and L.M. Christian, *Internet, Mail and Mixed-Mode Surveys: The Tailored Design Method*, Third Edition, John Wiley & Sons, Hoboken, NJ, 2009.
- [20] C.K. Enders, *Applied Missing Data Analysis*, Guilford Publications, New York, 2010.

- [21] J.W. Graham, Planned Missing Data Designs I: The 3-Form Design, in: *Missing Data*, Springer New York, 2012, pp. 279–294.
- [22] J.W. Graham, B.J. Taylor and P.E. Cumsille, Planned missing-data designs in analysis of change., in: L.M.E.S. Collins, Aline G. (Ed) (Ed.) *New methods for the analysis of change. Decade of behavior.*, American Psychological Association, Washington, DC, 2001, pp. 335–353.
- [23] R.M. Groves, E. Singer and A. Corning, Leverage-Saliency Theory of Survey Participation: Description and an Illustration, *Public Opinion Quarterly* **64** (2000), 299–308.
- [24] S. Haas, Trajectories of functional health: The ‘long arm’ of childhood health and socioeconomic factors, *Social Science & Medicine* **66** (2008), 849–861.
- [25] Health and Retirement Study, Health and Retirement Study Online Bibliography, in, University of Michigan, Ann Arbor, 2014.
- [26] B. Highton, Self-Reported versus Proxy-Reported Voter Turnout in the Current Population Survey, *Public Opinion Quarterly* **69** (2005), 113–123.
- [27] C.-J. Hsiao and E. Hing, NCHS Data Brief No. 143: Use and Characteristics of Electronic Health Record Systems Among Office-based Physician Practices: United States, 2001–2013, in: National Center for Health Statistics (Ed.), US Department of Health and Human Services, Washington, DC, 2014.
- [28] E. Hurst, Measuring Time Use in Household Surveys, in: *Assessing the Need for a New Nationally Representative Household Panel Survey in the United States*, Washington, DC, 2014.
- [29] M. Huynh, K. Rupp and J. Sears, Working Paper 238: The Assessment of Survey of Income and Program Participation (SIPP) Benefit Data Using Longitudinal Administrative Records in, US Bureau of the Census, Washington, DC, 2002.
- [30] V.G. Iannacchione, The Changing Role of Address-Based Sampling in Survey Research, *Public Opinion Quarterly* **75** (2011), 556–575.
- [31] A. Jackle, Dependent Interviewing: A Framework and Application to Current Research, in: *Methodology of Longitudinal Surveys*, P. Lynn, ed., John Wiley & Sons, Ltd., West Sussex, United Kingdom, 2009, pp. 93–112.
- [32] E. Jamoom, P. Beatty, A. Bercovitz, D. Woodwell, K. Palso and E. Rechtsteiner, NCHS Data Brief No. 98: Physician Adoption of Electronic Health Record Systems: United States, 2011, in, National Center for Health Statistics, Washington, DC, 2012.
- [33] G. Kalton and C. Citro, *The Future of the Survey of Income and Program Participation*, in, National Academies Press, Washington, D.C., 1993.
- [34] D. Kasprzyk, G. Duncan, G. Kalton and M.P. Singh, *Panel surveys*, Wiley, New York, 1989.
- [35] L. Kish, *Survey Sampling*, John Wiley & Sons, Inc., New York, 1965.
- [36] S. Lee, N.A. Mathiowetz and R. Tourangeau, Perceptions of Disability: The Effect of Self- and Proxy Response, *Journal of Official Statistics* **20** (2004), 671–686.
- [37] H. Levy, Assessing the Need for a New Household Panel Study: Health and Health Care, in: *Assessing the Need for a New Nationally Representative Household Panel Survey in the United States*, Washington, DC, 2014.
- [38] S.L. Lohr, Design Effects for a Regression Slope in a Cluster Sample, *Journal of Survey Statistics and Methodology* **2** (2014), 97–125.
- [39] J. Ludwig, P.J. Cook and T.W. Smith, The Gender Gap in Reporting Household Gun Ownership, *American Journal of Public Health* **88** (1998), 1715–1718.
- [40] W.D. Manning, Family Formation Processes: Assessing the Need for a New Nationally Representative Household Panel Survey in the United States, in: *Assessing the Need for a New Nationally Representative Household Panel Survey in the United States*, Washington, DC, 2014.
- [41] E. Martin, Who Knows Who Lives Here? Within-Household Disagreements as a Source of Survey Coverage Error, *The Public Opinion Quarterly* **63** (1999), 220–236.
- [42] N.A. Mathiowetz and R.M. Groves, The Effects of Respondent Rules on Health Survey Reports, *American Journal of Public Health* **75** (1985), 639–644.
- [43] J.S. McCarthy, D.G. Beckler and S.M. Qualey, An Analysis of the Relationship Between Survey Burden and Nonresponse: If We Bother Them More, Are They Less Cooperative?, *Journal of Official Statistics* **22** (2006), 97–112.

- [44] S.O. Meadows, J.S. Brown and G.H. Elder, Jr., Depressive Symptoms, Stress, and Support: Gendered Trajectories From Adolescence to Young Adulthood, *J Youth Adolescence* **35** (2006), 89–99.
- [45] C.F. Mendes de Leon and V.A. Freedman, Measuring disability, physical functions and cognitive abilities of adults: Survey enhancements and options for a new panel study, in: *Assessing the Need for a New Nationally Representative Household Panel Survey in the United States*, Washington, DC, 2014.
- [46] J.C. Moore, Self/Proxy Response Status and Survey Response Quality: A Review of the Literature, *Journal of Official Statistics* **4** (1988), 155–172.
- [47] National Longitudinal Study of Adolescent Health (Add Health), Add Health Publications, in, UNC Carolina Population Center project Chapel Hill, NC, 2014.
- [48] National Research Council and Institute of Medicine, Design of the National Children’s Study: A Workshop Summary, The National Academies Press, Washington, DC, 2013.
- [49] National Science Foundation, Nifty 50, in, National Science Foundation, Arlington, VA, 2000.
- [50] A.M. Navarro, Smoking status by proxy and self report: Rate of agreement in different ethnic groups, *Tobacco Control* **8** (1999), 182–185.
- [51] National Longitudinal Survey of Youth: NLSY97, Retention & Reasons for Non-Interview, in, Bureau of Labor Statistics, no date.
- [52] NORC at the University of Chicago, National Immunization Survey: A User’s Guide for the 2012 Public-Use Data File, in, NORC at the University of Chicago, Chicago, IL, 2014.
- [53] K. Olson, J.D. Smyth and H. Wood, Does giving people their preferred survey mode actually increase survey participation rates? *Public Opinion Quarterly* **76** (2012), 611–635.
- [54] Panel Study of Income Dynamics, Panel Study of Income Dynamics Bibliography, in, University of Michigan, Ann Arbor, 2014.
- [55] L. Pistaferri, Household consumption: Research questions, measurement issues, and data collection strategies, in: *Assessing the Need for a New Nationally Representative Household Panel Survey in the United States*, Washington, DC, 2014.
- [56] S.R. Porter, M.E. Whitcomb and W.H. Weitzer, Multiple surveys of students and survey fatigue, *New Directions for Institutional Research* **2004** (2004), 63–73.
- [57] B. Powell, C. Bolzendahl, C. Geist and L.C. Steelman, Counted Out: Same-Sex Relations and Americans’ Definitions of Family, Russell Sage, New York, 2010.
- [58] L. Quillian and J. Ludwig, Housing and Neighborhoods and a New National Household Panel, in: *Assessing the Need for a New Nationally Representative Household Panel Survey in the United States*, Washington, DC, 2014.
- [59] C. Robinson, Human Capital, Education, Achievement and Learning, in: *Assessing the Need for a New Nationally Representative Household Panel Survey in the United States*, Washington, DC, 2014.
- [60] S.B. Roth, D. Han and J.M. Montaquila, The ABS Frame: Quality and Considerations, *Survey Practice* **6** (2013).
- [61] K.J. Rothman, S. Greenland and T.L. Lash, Modern Epidemiology, 3rd ed, Lippincott Williams & Wilkins, Philadelphia, 2008.
- [62] P. Ruggles and R. Williams, Longitudinal Measures of Poverty: Accounting for Income and Assets Over Time, *Review of Income and Wealth* **35** (1989), 225–243.
- [63] T.J. Sabol, P.L. Chase-Lansdale and J. Brooks-Gunn, Advancing the Science of Child and Adolescent Development: DoWe Need a New Household Panel Survey, in: *Assessing the Need for a New Nationally Representative Household Panel Survey in the United States*, Washington, DC, 2014.
- [64] J.W. Sakshaug, Using Paradata to Study Response to Within-Survey Requests, in: F. Kreuter (Ed.) *Improving Surveys with Paradata: Analytic Uses of Process Information*, John Wiley and Sons, Hoboken, NJ, 2013, pp. 171–190.
- [65] J.W. Sakshaug, M.P. Couper, M.B. Ofstedal and D.R. Weir, Linking Survey and Administrative Records: Mechanisms of Consent, *Sociological Methods & Research* **41** (2012), 535–569.
- [66] A. Scherpenzeel, Data collection in a probability-based internet panel: how the LISS panel was built and how it can be used, *Bulletin of Sociological Methodology/Bulletin de Méthodologie Sociologique* **109** (2011), 56–61.

- [67] R.F. Schoeni, F. Stafford, K.A. Mcgonagle and P. Andreski, Response Rates in National Panel Surveys, *The ANNALS of the American Academy of Political and Social Science* **645** (2013), 60–87.
- [68] J.A. Seltzer, Family Support Processes from Young Adulthood through Later Life: Do We Need a New National Household Panel Survey, in: *Assessing the Need for a New Nationally Representative Household Panel Survey in the United States*, Washington, DC, 2014.
- [69] B.E. Shook-Sa, D.B. Currivan, J.P. McMichael and V.G. Iannacchione, Extending the Coverage of Address-Based Sampling Frames: Beyond the USPS Computerized Delivery Sequence File, *Public Opinion Quarterly* **77** (2013), 994–1005.
- [70] E. Singer, The Use of Incentives to Reduce Nonresponse in Household Surveys, in: *Survey Nonresponse*, R.M. Groves, D.A. Dillman, J.L. Eltinge and R.J.A. Little, eds, John Wiley & Sons, Inc., New York, 2002, pp. 163–177.
- [71] E. Singer and C. Ye, The Use and Effects of Incentives in Surveys, *The ANNALS of the American Academy of Political and Social Science* **645** (2013), 112–141.
- [72] C.J. Skinner, Domain Means, Regression, and Multivariate Analysis, in: *Analysis of Complex Survey Data*, C.J. Skinner, D. Holt and T.M.F. Smith, eds, Wiley, New York, 1989, pp. 59–88.
- [73] Social Security Administration, <http://www.ssa.gov/myaccount/>, in: Social Security Administration, Washington, DC, 2014.
- [74] G. Solon, Intergenerational Income Mobility in the United States, *The American Economic Review* **82** (1992), 393–408.
- [75] L. Tach and B. Cornwell, Social Networks and Social Capital: New Directions for a Household Panel Survey, in: *Assessing the Need for a New Nationally Representative Household Panel Survey in the United States*, Washington, DC, 2014.
- [76] E. Thomson, Couple childbearing desires, intentions, and births, *Demography* **34** (1997), 343–354.
- [77] U.S. Bureau of the Census, About the SIPP Bibliography, in: US Department of Commerce, Washington, DC, 2014.
- [78] Understanding Society: The UK Household Longitudinal Study, Innovation Panel – A guide to the panel, experiments and research, in: Institute for Social and Economic Research, University of Essex, Essex, UK, 2014.
- [79] J. Vespa, J.M. Lewis and R.M. Kreider, America’s Families and Living Arrangements: 2012, in: US Census Bureau, U.C. Bureau, ed., Washington, DC, 2013.
- [80] J. Wagner, A Comparison of Alternative Indicators for the Risk of Nonresponse Bias, *Public Opinion Quarterly* **76** (2012), 555–575.
- [81] J. Waksberg, D. Judkins and J.T. Massey, Geographic-based oversampling in demographic surveys of the United States, *Survey Methodology* **23** (1997).
- [82] Wisconsin Longitudinal Survey. WLS, Retention and Response Rates of Wisconsin Longitudinal Survey 1957–2005, in, 2008.
- [83] A. Wright, E.G. Poon, J. Wald, J. Feblowitz, J.E. Pang, J.L. Schnipper, R.W. Grant, T.K. Gandhi, L.A. Volk, A. Bloom, D.H. Williams, K. Gardner, M. Epstein, L. Nelson, A. Businger, Q. Li, D.W. Bates and B. Middleton, Randomized Controlled Trial of Health Maintenance Reminders Provided Directly to Patients Through an Electronic PHR, *Journal of General Internal Medicine* **27** (2012), 85–92.
- [84] C.K. Yamin, S. Emani, D.H. Williams, S.R. Lipsitz, A.S. Karson, J.S. Wald and D.W. Bates, The Digital Divide in Adoption and Use of a Personal Health Record, *Archives of Internal Medicine* **171** (2011), 568–574.
- [85] J.P. Ziliak, Income, Program Participation, Poverty, and Financial Vulnerability: Research and Data Needs, in: *Assessing the Need for a New Nationally Representative Household Panel Survey in the United States*, Washington, DC, 2014.