LABOR AND POPULATION

The RAND American Life Panel

Technical Description

Michael Pollard, Matthew D. Baird

For more information on this publication, visit www.rand.org/t/RR1651

Published by the RAND Corporation, Santa Monica, Calif.
© Copyright 2017 RAND Corporation

RAND® is a registered trademark.

Limited Print and Electronic Distribution Rights

This document and trademark(s) contained herein are protected by law. This representation of RAND intellectual property is provided for noncommercial use only. Unauthorized posting of this publication online is prohibited. Permission is given to duplicate this document for personal use only, as long as it is unaltered and complete. Permission is required from RAND to reproduce, or reuse in another form, any of its research documents for commercial use. For information on reprint and linking permissions, please visit www.rand.org/pubs/permissions.

The RAND Corporation is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest.

RAND's publications do not necessarily reflect the opinions of its research clients and sponsors.

Support RAND

Make a tax-deductible charitable contribution at
www.rand.org/giving/contribute

www.rand.org

Preface

This report describes the methodology behind the RAND American Life Panel. This research was undertaken within RAND Labor and Population. RAND Labor and Population has built an international reputation for conducting objective, high-quality, empirical research to support and improve policies and organizations around the world. Its work focuses on children and families, demographic behavior, education and training, labor markets, social welfare policy, immigration, international development, financial decisionmaking, and issues related to aging and retirement, with a common aim of understanding how policy and social and economic forces affect individual decisionmaking and human well-being.

For more information on RAND Labor and Population, contact

Krishna Kumar
Director
RAND Labor and Population
1776 Main Street, P.O. Box 2138
Santa Monica, CA 90407-2138
(310) 393-0411
or visit www.rand.org/labor

Contents

Preface iii
Tables vii
Acknowledgments ix
Abbreviations xi

1. Background 1

2. Recruitment 3
Monthly Survey Internet: University of Michigan Internet-Panel Cohort, 2005 4
Monthly Survey Computer-Assisted Telephone Interviewing: University of Michigan Phone-Panel Cohort, 2005 4
Stanford: National Survey Project Cohort, 2009 5
Vulnerable Population: Vulnerable Population Cohort, 2011–2012 5
Random-Digit Dialing: Random-Digit Dialing Cohort, 2014 5

3. Data-Collection Procedures 7

4. Methods to Maximize Response Rates and Deal with Nonresponse 9
Response Rates 10
Attrition and Retention Rates 11
Completion Rates 12

5. Sample Weights 15

6. Contact Information 21
General Questions 21
American Life Panel, Multimode Interviewing Capability, and Hosting Questions 21
Mailing Address 21

7. Papers Using American Life Panel Data 23

Appendix 25

Bibliography 27

Tables

2.1. American Life Panel Recruitment Cohorts 3
4.1. Reasons for Attrition Among Those Who Attrit, Through 2015 11
4.2. Aggregate Attrition Rates 12
4.3. Average Annual Retention Rates, as Percentages 13
4.4. Completion Rates in 2015 14
5.1. Estimated Means and Design Effects 18
5.2. Gender by Working Status by Income Distribution: Current Population Survey Versus Weighted Reference Sample 19
5.3. Gender by Working Status by Age Distribution: Current Population Survey Versus Weighted Reference Sample 20

Acknowledgments

We would like to thank our anonymous reviewers for their outstanding reviews and many helpful suggestions and Lisa Bernard for her editing of this document. We would also like to thank Krishna B. Kumar, David M. Grant, Alerk Amin, and Joy S. Moini for their reviews of the draft document and Marco Angrisani and Erik Meijer for information about early recruitment cohorts.

Abbreviations

AAPOR	American Association for Public Opinion Research
ALP	RAND American Life Panel
CATI	computer-assisted telephone interviewing
COMR	survey completion rate
CPS	Current Population Survey
CUMRR2	cumulative response rate 2
HRS	Health and Retirement Study
MS	monthly survey
RDD	random-digit dialing
RDS	respondent-driven sampling
RECR	recruitment rate
RETR	retention rate
SE	standard error
SRC	Survey Research Center

1. Background

The RAND American Life Panel (ALP) is a probability sample–based panel of approximately 6,000 active, regularly interviewed respondents, ages 18 and older, linked via the Internet. A team at the RAND Corporation built and maintains the panel. The ALP is a survey resource available to RAND and the external research community that can provide quick and accurate information on a broad array of social research questions. Since January 2006, the ALP has fielded more than 450 surveys, in such areas as financial decisionmaking; inflation expectations; joint retirement decisions; retirement preferences; health decisionmaking; Social Security knowledge and expectations; measurement of health utility; numeracy; presidential and midterm elections; and the effects of political and social events, as well as policy changes, on self-reported well-being. Data collected from the ALP are made available to the research and policy communities.

The majority of the panel members have their own Internet access. RAND has ensured Internet access for the remaining panel members by providing a laptop or an Internet service subscription or both.[1] This allows the Internet panel to be nationally representative and reduces an important source of bias. Panel members can also take surveys on their mobile devices, such as cell phones or tablets. Each respondent regularly receives an email with a request to visit the ALP website and fill out questionnaires on the Internet. The ALP pays panel members quarterly for their participation. It also offers technical support and assistance to panel members via a telephone help desk in both English and Spanish.

Participants in the ALP have been recruited in several waves, with the first group recruited in 2002. Initially, they were recruited for a project that started in 2003 that compared Internet interviewing with telephone interviewing. The ALP as it operates in its current form started in 2006. At that point in time, the first household information survey (also referred to as the *household box*) was conducted, asking panel members a wide range of demographic questions on a quarterly basis (as is still the case today). Importantly, this first household information survey was modeled after the demographic questions asked for the Current Population Survey (CPS), which the U.S. Census Bureau conducts for the U.S. Bureau of Labor Statistics).[2] This close alignment of demographic content allows extrapolation estimates based on the ALP to

[1] RAND has provided approximately 10 percent of the active sample with hardware or an Internet subscription. The Pew Research Center indicated that 85 percent of the population ages 18 and older used the Internet in 2013 (Pew Research Center, 2013) and that 73 percent owned a desktop or laptop computer in 2015 (Anderson, 2015).

[2] The ALP household information questions are consistently modeled after the contemporaneous questions in the CPS. There have been minor changes in CPS questions over time—most notably, changes in the way the CPS has collected information about income and employment pre- and post-2010. The weighting procedures discussed in Section 5 were adjusted accordingly at the time.

the U.S. population at large. It also allows generation of survey weights for obtaining nationally representative estimates. Since its start, the ALP has expanded significantly and, as of January 2017, comprised approximately 6,000 active respondents from approximately 4,500 U.S. households who have filled out the household information survey at least once during the past year. The household box information continues to provide information relevant for estimating survey weights for each survey.

2. Recruitment

Current participants in the ALP were recruited from multiple representative probability samples of the U.S. population, as well as nonprobability samples. Several cohorts can be distinguished based on their sources or types of recruitment. ALP users can specify which cohorts or types of samples they are interested in surveying. Table 2.1 lists these cohorts chronologically.

Recruitment has occurred across several years. Panel refreshment is important as the panel ages and new members at the youngest ages need to be added to replace this age group over time. Although conditioning effects on Internet-panel participants are thought to be low

Table 2.1
American Life Panel Recruitment Cohorts

Recruitment Group	Description	Year of Recruitment	February 2017 Sample Size in Active ALP
MS Internet[a]	University of Michigan Internet-panel cohort	2002	1,963
MS CATI[a]	University of Michigan phone-panel cohort	2002	21
Stanford[a]	Stanford University National Survey Project cohort	2009	351
Snowball	RAND respondent-referred sample	2009	329
ALP mail-out	RAND experimental postal mail recruitment	2010	21
ALP cold call	RAND experimental telephone recruitment	2010	6
ALP Hispanic recruitment	RAND, primarily an experimental RDS approach through social networks	2011–2013	253
Vulnerable population[a]	RAND address-based sample from ZIP Codes with high percentages of Hispanic or low-income households	2012	1,223
Added member	RAND ALP intrahousehold recruitment by the primary respondent	2006–2014	609
Intergenerational	RAND ALP family member referrals (including outside the household)	2013–2014	219
RDD[a]	RAND RDD (landline and cell phone)	2014	782

NOTE: MS = monthly survey. CATI = computer-assisted telephone interviewing. RDS = respondent-driven sampling. RDD = random-digit dialing.

[a] Probability sample.

(Toepoel, Das, and van Soest, 2008, 2009),[1] the addition of a significant number of new, inexperienced members is an added benefit in order to minimize any conditioning that does take place.

Here, we briefly describe the probability-based panel cohorts; additional information about the nonprobability samples is available in the appendix. The primary probability-sampled cohorts are the University of Michigan cohorts, the Stanford cohort, the vulnerable population cohort, and the RDD cohort, totaling approximately 4,200 respondents. The other cohorts are either small, experimental cohorts or nonprobability samples; these latter samples are not randomly selected or representative of U.S. residents, as are used mainly for pilot tests of surveys or experiments for which a representative sample is not needed.

Monthly Survey Internet: University of Michigan Internet-Panel Cohort, 2005

University of Michigan MS Internet-panel cohort respondents are those recruited among people ages 18 years and older who had responded to the MS of the University of Michigan's Survey Research Center (SRC). The MS is the leading consumer-sentiment survey, incorporating the long-standing Surveys of Consumers, and is used to produce the widely used Expectations Index. Each month, the MS interviews approximately 500 households, 300 from an RDD sample and 200 reinterviewed from the RDD sample surveyed six months previously. SRC also screened MS respondents for the ALP, asking whether they would be willing to participate in a long-term research project (with approximate response categories "no, certainly not"; "probably not"; "maybe"; "probably, yes"; and "definitely"). Respondents answering anything but "no, certainly not" were told that the University of Michigan was undertaking a joint project with RAND. Interviewers then asked respondents whether they would object to SRC sharing information about them with RAND so that RAND researchers could later ask them whether they would be willing to actually participate in an Internet survey. Respondents who did not have Internet were told that RAND would provide them with free Internet. Respondents who initially refused were interviewed again and told of a reward of $20 for each half-hour interview.

Fifty-one percent of the Michigan referrals agreed to be considered for the ALP, and 58 percent of these participated in at least the household information survey. That is, about 30 percent (58 percent of 51 percent) of the Michigan recruits became ALP participants (between December 2003 and September 2008). Originally, the ALP included only respondents 40 years of age and older. Since November 2006, it has included respondents 18 years of age and older.

Monthly Survey Computer-Assisted Telephone Interviewing: University of Michigan Phone-Panel Cohort, 2005

University of Michigan phone-panel cohort respondents are those who originally were part of a phone panel comparing CATI with Internet interviewing and were initially recruited in the

[1] *Panel conditioning* refers to the bias introduced when answering questions in one wave of a longitudinal survey alters respondents' answers to parallel questions in subsequent waves (Warren and Halpern-Manners, 2012).

same MSs as the MS Internet panel. The sampling and recruitment of this cohort is the same as for the MS Internet cohort, but, after recruitment, they split for the duration of the initial CATI project and then were recombined. After that study was completed in 2005, researchers invited them to join what became the ALP, forming the MS CATI cohort.

Stanford: National Survey Project Cohort, 2009

National Survey Project cohort respondents are former members of a 1,000-person panel originally recruited by researchers at Stanford University and Abt SRBI. After August 2008, the University of Michigan decided to use MS respondents for one of its own projects, so the ALP no longer received new respondents from the University of Michigan. Instead, in the fall of 2009, ALP researchers recruited participants from the Face-to-Face Recruited Internet Survey Platform (FFRISP) panel. The FFRISP was a National Science Foundation–funded panel conducted by researchers at Stanford University and Abt SRBI. From June to October 2008 in a multistage procedure based on address lists, Stanford and Abt researchers selected a representative sample of respondents who were at least 18 years old, resided in households in the contiguous United States, and were reportedly comfortable speaking and reading English. Additional details about the FFRISP sampling are available in Sakshaugh et al., 2009.

When the Stanford panel was terminated after September 2009, the 1,000 participants were offered the opportunity to join the ALP under the same conditions (laptop, high-speed Internet, monetary compensation) as the original Stanford incentives. From these 1,000, 457 agreed to join the ALP.

Vulnerable Population: Vulnerable Population Cohort, 2011–2012

RAND expanded the ALP with 2,496 panel members drawn from vulnerable groups and minorities. This addition includes a subsample of approximately 150 households for which the interview language is Spanish. The expansion was conducted between April 2011 and August 2012, from a sample of 5,872 eligible households (one respondent per household). RAND recruited these respondents from an address-based sample in ZIP Code areas with high percentages of Hispanics or low-income households. We mailed potential panel members letters (including prepaid incentives) and made follow-up phone calls to those who did not respond to the mailed invitation; 42.5 percent of contacted households agreed to participate in the ALP.

Random-Digit Dialing: Random-Digit Dialing Cohort, 2014

In 2014, the ALP was expanded with panel members ages 18 and older drawn from an RDD recruitment using a dual-frame sampling design, through a subcontract with ORC International. This means that the sample was drawn from two independent sample frames—one for landlines (60 percent) and one for cell phones (40 percent). Use of a dual-frame sample design including cell phones is essential in order to appropriately reach all age groups (Blumberg and Luke, 2014). Respondents were initially contacted through RDD, given a brief description of the ALP, and asked whether they were interested in participating. If a respondent agreed to

participate, he or she was either contacted via email to complete an initial survey online or, if the respondent did not have an email address, mailed a paper survey. At the end of the initial survey, respondents were invited to become permanent ALP members. People without Internet access were offered a laptop and Internet subscription paid by RAND.

The RDD recruitment supplemented the existing ALP sample with a scientific random refreshment sample of approximately 900 respondents (13.1 percent of contacted households). Although 36.8 percent of contacted households agreed to participate, budgetary constraints limited the number of invitations that could be (randomly) extended.

3. Data-Collection Procedures

Respondents in the panel either use their own computers, smartphones, or tablets to log on to the Internet or are provided a laptop with built-in wireless that allows them to access the Internet.

In addition to quarterly household information survey update requests, each respondent regularly receives an email with a request to visit the ALP member portal to fill out questionnaires on the Internet. Typically, an interview will not take more than 30 minutes. Respondents are paid an incentive based on length of the survey. Many respondents (about half) respond within one week, and the vast majority within three weeks. To further increase response rates, reminders are sent each week. For any given project, survey sponsors can receive data in real time during the field period so that preliminary analysis can begin before the field period has ended.

The incentives paid to ALP members are in line with other large social science surveys, such as the Panel Study of Income Dynamics ($60 per 77-minute interview) (McGonagle et al., 2012) and the Health and Retirement Study (HRS) ($80 per roughly two-hour interview) (Cheshire et al., 2011). Providing incentives to panel members is a survey industry best practice, and there is ample evidence that it helps to limit attrition (see, e.g., Göritz, 2006, and Millar and Dillman, 2011). Moreover, the evidence suggests that incentives have a positive effect on representativeness and data quality (see, e.g., Mack et al., 1998). Singer and Kulka, 2001, presents evidence suggesting that the use of incentives in panel studies can be quite effective in reducing subsequent attrition. Limiting attrition both improves representativeness (e.g., Michaud et al., 2011) and reduces the added cost of sample recruitment. There is evidence that using incentives increases Internet response rates (Singer and Ye, 2013).

Researchers at and outside RAND may use the ALP for data collection. Researchers can select characteristics of the specific sample in which they are interested, such as probability or nonprobability, size, demographic characteristics (e.g., only men ages 50 and older), or whether respondents have previously answered specific questions. Researchers can also specify how long they would like the survey to be left in the field. The ALP charges researchers based on the number of respondents and length (in estimated survey-minutes) of surveys. Surveys can be limited to include only people considered randomly sampled in order to represent a proper scientific sample of the U.S. adult population. When the purposes of the survey are experimental or pilots, researchers can choose to also include nonrandomly sampled people.

4. Methods to Maximize Response Rates and Deal with Nonresponse

As noted above, participants are paid for their time. Once in the ALP, most participants tend to remain in the panel over time, which is reflected in low attrition rates from the overall pool of ALP respondents. It should be noted that most panel members do not give formal notification about their intent to leave the panel. Rather, they simply stop participating in surveys over a prolonged period of time. Initially, to avoid having such members remain in the panel indefinitely, at the beginning of each year, we attempted to contact these members to ask them whether they were still interested in participating and, if contact attempts failed, removed them from the ALP. For example, at the beginning of 2008, we removed respondents who were not active in 2007 from the panel. In 2010, we suspended this practice, and the ALP has expanded efforts to reengage inactive panel members rather than dropping members from the panel too quickly. In 2013, the RAND Survey Research Group attempted to recontact inactive panel members via telephone (this was in addition to email prompts from the ALP team), to invite them to take a new survey. In April 2015, we again sent a letter to any inactive panel member who had not answered a survey in the previous two years, inviting that member to take a refresher survey. Of the 1,158 panel members the ALP attempted to contact, 96 completed the survey. Currently, the remaining inactive panel members are being targeted for telephone recontact based on number of surveys already completed, with the specific aim of reengaging those with the most accumulated survey waves. We acknowledge that, in the interim, prior to the majority of inactive panel members getting dropped, they might be selected for survey samples that they are unlikely to complete, which will reduce the overall response rate of any particular survey. For this reason, individual sample pulls typically invite a larger number of respondents than is desired for the final sample size. Research on a similar panel survey (the HRS) indicated that the selection effects resulting from dropping temporary nonrespondents were much larger than when temporary nonrespondents were included (Michaud et al., 2011).

Samples are drawn based on the selection criteria applicable to the survey (i.e., customized to match the goal of the research). Typically, ALP members considered eligible at the time of the survey (i.e., those who have not been formally removed from the sample) are used for sample selection. Samples can also be drawn only from active members if requested. A member is considered to be active if he or she participated in the household information survey within one year prior to the fielding date of the survey. For example, for a survey fielded on April 15, 2015, a member is considered *active* if he or she responded to the household information survey in the period April 15, 2014–April 14, 2015. If that member did not respond to the household information survey in that period, he or she is considered *inactive* at the time of the survey and is not part of the selected sample. As described in the previous paragraph, inactive users

are periodically contacted in an attempt to make them active again (i.e., have them complete a refresher survey).

Response Rates

The ALP is composed of people recruited from multiple sources over the course of a decade—as a result, it is difficult to compute a precise standardized response rate beyond the completion rate for any particular survey. However, following American Association for Public Opinion Research (AAPOR), 2016, and Callegaro and DiSogra, 2008, estimates of the cumulative response rate 2 (CUMRR2) for various recruitment cohorts can be derived.[1] These calculations show how many of the initially sampled people agreed to participate in the ALP (recruitment rate, or RECR), how many actually joined the panel (profile rate), how many people completed surveys they were invited to take (completion rate, or COMR), and, importantly for longitudinal panel response-rate calculations, how many people remain active since initial recruitment (retention rate, or RETR). As of the end of 2016, we estimate, CUMRR2 is 3.9 percent for the MS Internet and MS CATI cohorts, 12.1 percent for the Stanford cohort, and 16.3 percent for the vulnerable population cohort.

We can compare the cumulative response rates of the ALP with those of other similar Internet surveys. A recent survey (the Survey of Household Economics and Decisionmaking) conducted on the GfK KnowledgePanel, a nationally representative Internet survey, had a reported CUMRR2 of 2.0 percent (Buchholz and Larrimore, 2016). The American Trends Panel, created by Pew Research Center and managed by Abt SRBI, is a nationally representative Internet panel with a reported CUMRR2 of 1.4 percent for wave 14.5 conducted in 2016 (Mitchell et al., 2016).

Some studies have been carried out to compare the quality of probability-based Internet panels with response rates similar to that of the ALP to representative telephone surveys and convenience or opt-in Internet surveys (which typically have much larger numbers of respondents but unknown selection probabilities). For Chang and Krosnick, 2009, the authors simultaneously administered the same questionnaire (on politics) to an RDD telephone sample, an Internet probability sample similar in design to the ALP, and a nonprobability sample of people who opt in to do Internet surveys for money. The probability Internet sample exhibited more random measurement error than the nonprobability sample (but less than the telephone sample) and less bias than the nonprobability Internet sample. On balance, the probability Internet sample produced the most-accurate results. For Yeager et al., 2009, the authors conducted a follow-up study comparing one probability Internet sample, one RDD telephone sample, and seven nonprobability Internet samples and a wider array of outcomes. Their con-

[1] We calculate CUMRR2 as the initial recruitment rate (RECR) × retention rate (RETR) × survey completion rate (COMR). For these calculations, RECR = 18.4 percent (MS cohort), 23.9 percent (Stanford), and 42.5 percent (vulnerable population); RETR = 26.9 percent (MS), 62.4 percent (Stanford), and 48.8 percent (vulnerable); and COMR = approximately 78 percent (MS), 81 percent (Stanford), and 78 percent (vulnerable). An extended description of how to compute response metrics for online panels is found in Callegaro and DiSogra, 2008. Equivalent calculations for the 2014 RDD cohort are made difficult by incompleteness of information about initial RECR, although 36.8 percent of screened respondents agreed to join the ALP, 31.8 percent were successfully added (profile rate) (because of budgetary limitations, we did not invite all who initially agreed to participate), and 94.1 percent were retained through 2016 (RETR), with a COMR of 78.8 percent.

clusions are the same: Both the telephone sample and the probability Internet sample showed the least bias; reweighting the nonprobability samples did not help (for some outcomes, the bias gets worse; for others, better). They also found that response rates do not appear critical for bias.

Attrition and Retention Rates

The ALP records indicate whether a previously recruited person has been removed from the panel (dropped) and an indication of the reason the person was dropped. Additionally, people can be classified as (temporary) nonparticipants if, for example, they are traveling or moving overseas for a prolonged but (expected) finite period of time. For the current computations, we define someone as being in the panel in a given year if he or she was (1) recruited during or before the calendar year in question, (2) was not dropped before the start of this year, and (3) was not a nonparticipant during this whole year. We can define attrition between two consecutive panel years as being in the panel in one year and not being in the panel in the next year. This treats nonparticipants who did not return in the same or the next year as people who attrit.

Table 4.1 shows the reasons for attrition among those who formally leave the panel for reasons other than inactivity. The vast majority of these types of people who attrit are people who signed up for the panel but never actually participated; once active, people are much less likely to leave the panel. Note that ineligibility and death should generally not be considered attrition. Rather, these people should be removed from both the numerator and the denominator of the attrition rates. Given their small numbers, their inclusion does not noticeably affect the computed rates.

For potential users of the panel who want to conduct longitudinal studies, aggregate attrition rates (that is, attrition rates not distinguished by the separate cohorts) that also consider

Table 4.1
Reasons for Attrition Among Those Who Attrit, Through 2015

Reason	Number	Percentage
Ineligible for the panel	19	0.3
Died	96	1.6
Unable to contact or recontact or moved	11	0.2
Never participated	5,531	92.5
Asked to be removed	219	3.7
Health, cognition, claims to be too old	28	0.5
No time, busy	17	0.3
Other	58	1.0
Total	5,979	100.1

NOTE: Because of rounding, percentages do not sum precisely.

inactive panel members as people who attrit might be more informative. Such aggregate attrition rates are calculated as follows:

1. Compute the number of people who participated at least once in the household information survey in a given base period.
2. Compute how many of those people participated at least once in the household information survey in a later comparison period.
3. Calculate the attrition rate over that period as (a – b)/a.

Using this calculation leads to the attrition rates shown in Table 4.2 for the ALP since 2007.

To illustrate, let us look at the attrition rate among respondents who filled out the household information survey in 2014. Of the 6,317 people who filled out the household information survey at least once, 5,819 people did so again in 2015. Thus, the attrition rate in that group was about 7.9 percent.

Table 4.3 presents the average retention rates for the various cohorts for the past four years. The weighted annual retention rates range between about 80 and 95 percent.

Completion Rates

For every survey, some panel members are invited by email to participate in the survey. Generally, for survey-specific eligibility criteria or budget reasons, not all panel members are invited for a survey. Callegaro and DiSogra, 2008, and AAPOR, 2016, define the COMR of a survey as the number of panel members who delivered a complete or partial interview, divided by the number of panel members who were invited to participate in the survey. AAPOR, 2016, also mentions break-offs and includes a discussion of rules of thumb of how one might define complete, partial, and break-off.[2] In ALP surveys, almost all panel members who start surveys also finish them, and item nonresponse is very low, so the computation of completion rates is insensitive to alternative definitions. For the current computations, we define a partial inter-

[2] A break-off is a refusal some time after an interview has commenced.

Table 4.2
Aggregate Attrition Rates

Base Period	Comparison Period	Active in Base Period	Active in Comparison Period	Percentage Active	Percentage Attrition
2007	2008	1,409	1,371	97.3	2.7
2008	2009	2,428	2,355	97.0	3.0
2009	2010	3,119	2,977	95.4	4.6
2010	2011	3,209	3,015	94.0	6.0
2011	2012	4,431	4,161	93.9	6.1
2012	2013	5,838	5,248	89.9	10.1
2013	2014	5,637	5,298	94.0	6.0
2014	2015	6,317	5,819	92.1	7.9

Table 4.3
Average Annual Retention Rates, as Percentages

Cohort	2012	2013	2014	2015	Weighted Across Years
MS Internet	93.9	93.1	93.1	90.0	92.6
MS CATI	95.4	82.2	86.5	91.2	88.7
Snowballs	96.6	90.3	92.6	90.6	92.6
National Survey Project	93.3	92.1	91.8	89.8	91.8
Mailing experiment	90.6	97.1	94.3	85.3	91.8
Phone experiment	61.5	100.0	87.5	85.7	80.6
Vulnerable population	87.4	85.9	86.0	84.8	86.1
RDS	93.5	96.3	89.3	88.3	91.7
ALP intergenerational				79.8	79.8
RDD				94.1	94.1
Unassigned			75.0	80.5	80.0
All	91.5	90.0	89.9	88.4	89.9

view as one that was started but not finished, a complete interview as one that was finished, and a nonresponse as someone who was invited to participate in the survey but did not start it. We do not make a distinction between break-offs and partial interviews.

We computed survey completion rates for all 21 surveys that were both opened and closed in 2015 (the field dates were completely within 2015). These numbers differ from the attrition rates in Table 4.2 in that they designate what fraction of surveys the respondents completed, not whether they stayed involved in the ALP overall (independent of their completion of surveys). See ALP, undated (c), for the list of ALP surveys. Table 4.4 provides a summary of the completion results. The number of partial interviews is 1 percent of the number of invites, which confirms the minor role that partial interviews play. The completion rates are approximately 62 percent taken over all surveys. (There is considerable variation across surveys, though.)

Table 4.4
Completion Rates in 2015

Sample		Invited	Nonresponse	Partial (P)	Complete (I)	Completion Rate (COMR)
MS Internet + MS CATI	N	28,623	10,764	256	17,859	
	%		37.6	0.9	62.4	63.3
National Survey Project	N	8,119	2,848	95	5,176	
	%		35.1	1.2	63.8	64.9
Vulnerable population	N	33,925	16,236	418	17,271	
	%		47.9	1.2	50.9	52.1
RDD	N	10,603	2,248	57	8,298	
	%		21.2	0.5	78.3	78.8
Added member	N	9,520	3,469	105	5,946	
	%		36.4	1.1	62.5	63.6
Snowball	N	4,364	1,453	66	2,845	
	%		33.3	1.5	65.2	66.7
Intergenerational	N	2,073	599	12	1,462	
	%		28.9	0.6	70.5	71.1
Experimental	N	880	390	5	485	
	%		44.3	0.6	55.1	55.7
Hispanic recruitment	N	3,589	1,279	49	2,261	
	%		35.6	1.4	63.0	64.4
Probability samples	N	81,270	32,096	826	48,604	
	%		39.5	1.0	59.8	60.8
Nonprobability samples	N	20,426	7,190	237	12,999	
	%		35.2	1.2	63.6	64.8

5. Sample Weights

As for most surveys based on scientific sampling methods, the composition of the ALP sample does not necessarily match the reference population. Hence, sample weights can be generated and applied to the data in order to derive population estimates. RAND constructs such weights to allow for generalization to the population it intends to represent.

The reference population for the ALP is the civilian, residential population ages 18 and older. The weighting procedure that RAND has adopted allows targeting specific subpopulations depending on the sample selection criteria of a specific survey (e.g., the population of people in a certain age bracket).

The ALP surveys are weighted to population distributions from the CPS Annual Social and Economic Supplement (administered in March of each year). This choice follows common practice in many other social science surveys, such as the HRS.

Three weighting methods have been implemented for the ALP: cell-based poststratification, logistic regression, and raking. After experimentation, over time early in the history of the ALP, raking was found to give the best results among these different methods. Raking did the best job of accurately matching the weighted ALP to the reference population across finer categories. It also allows finer categorizations of variables of interest (in particular, age and income) than cell-based poststratification while still accurately matching benchmark distributions of such variables.

The weighting procedure consists of two steps. In step 1, individual demographic characteristics are matched to the same characteristics of ALP members, and selected weighting variables are recoded into strata (or categories). Recategorization applies to both CPS and ALP variables when weighting variables are continuous (e.g., income) or take values in a finite but relatively large set (e.g., educational attainment). In step 2, the raking algorithm is implemented and sample weights are generated by matching the proportions of predefined strata in the ALP to those in the CPS. Below, we list the default set of demographic characteristics that are matched in the weighting algorithm. These are used in the majority of cases (more than 95 percent of the time); however, for certain surveys, additional factors can be introduced because of the interests of the survey. Examples include past voting behavior and health insurance status. For most studies, we weight on the following two-way marginal discrete distributions:

- gender × age (12 categories)
  - (1) male, 18–30
  - (2) male, 31–40
  - (3) male, 41–50

  - (4) male, 51–60
  - (5) male, 61–74
  - (6) male, 75+
  - (7) female, 18–30
  - (8) female, 31–40
  - (9) female, 41–50
  - (10) female, 51–60
  - (11) female, 61–74
  - (12) female, 75+.
- gender × ethnicity (six categories)
  - (1) male, non-Hispanic white
  - (2) male, non-Hispanic African American
  - (3) male, Hispanic or other
  - (4) female, non-Hispanic white
  - (5) female, non-Hispanic African American
  - (6) female, Hispanic or other.
- gender × education (six categories)
  - (1) male, high school or less
  - (2) male, some college or bachelor's degree
  - (3) male, more than a bachelor's degree
  - (4) female, high school or less
  - (5) female, some college or bachelor's degree
  - (6) female, more than a bachelor's degree.
- gender × household income (eight categories)
  - (1) male, <$35,000
  - (2) male, $35,000–$59,999
  - (3) male, $60,000–$99,999
  - (4) male, $100,000+
  - (5) female, <$35,000
  - (6) female, $35,000–$59,999
  - (7) female, $60,000–$99,999
  - (8) female, $100,000+.
- household income × number of household members (six categories)
  - (1) single, <$60,000
  - (2) single, $60,000+
  - (3) couple, <$60,000
  - (4) couple, $60,000+
  - (5) 3+ members, <$60,000
  - (6) 3+ members, $60,000+.

The above strata are defined such that none of them contains less than 5 percent of the ALP sample. This rule of thumb is commonly adopted (DeBell and Krosnick, 2009) in post-stratification weighting. It aims at preventing very small cells and, therefore, extremely large weights. Unless specifically requested, very large weights are not automatically trimmed.

Sample weights are necessary to correctly infer population parameters, but their use also requires estimation techniques that take *design effects* into account in order to accurately cal-

culate the variance of an estimate. This is a crucial step to enable valid statistical inference and is necessary because the ALP is not a simple random sample of the reference population. Over the years, ALP members have been recruited from several sources, including some targeting specific populations (e.g., the vulnerable population sample); therefore, the ALP is considered a complex sample and the sample design must be accounted for to correctly calculate variance of an estimate (the standard error, or SE). The design effect (*deff*) measures the extent to which the sampling design (as described by the sample weights) influences the computation of any statistic of interest. It is defined as the ratio of the variance of the statistic from the weighted sample (complex survey design) to the variance of the statistic from an equally weighted sample (simple random sample) with the same number of observations. A simple random sample has a *deff* of 1, and the amount that *deff* deviates from 1 indicates the degree to which the use of sample weights decreases the precision of estimates (not the magnitude of the estimate itself, but the precision, or uncertainty associated with the estimate) (more deviation indicates less precision). For analyses of the ALP, standard formulas for the variance of estimates should be appropriately amended.

Suppose, for instance, that we are interested in the population mean of a variable x. After computing the weighted sample average, $\bar{x}$, a 95-percent confidence interval for the population mean of x will be given by

$$\bar{x} \pm 1.96 \times SE(\bar{x}) \times \sqrt{deff},$$

where $SE(\bar{x})$ is the SE of $\bar{x}$. Analogous formulas apply to other estimators, such as regression coefficients.

In Table 5.1, we present mean estimates and corresponding design effects for a number of individual demographics. We compare estimated quantities across different samples: the 2015 CPS sample of people ages 18 and older and the ALP sample.

The results show that weighted sample means in the ALP are in line with their CPS counterparts. Moreover, the increase in the variance that sample weights introduce, as measured by the design effect, is modest. Also note that weighting techniques can correct for observed differences between the sample and the population, but there is no correction available for unobserved differences between the sample and the population (such as specific preferences or tastes).

In Tables 5.2 and 5.3, we assess the extent to which sample weights correct for over- or underrepresentation of strata by comparing weighted distributions in the reference sample (ALP) with those in the CPS. For this purpose, we form strata by interacting gender, age, working status, and income. The chosen combinations are different from those used to generate sample weights because they feature (1) working status (which is not used in the weighting procedure) and (2) age and income categories based on the quartiles of the 2011 CPS age and income distributions, respectively. The results show a satisfactory alignment of the proportions across strata, once sample weights are applied.

Table 5.1
Estimated Means and Design Effects

Variable	Sample	Minimum	Maximum	Mean	SE	Design Effect
Male	ALP	0	1	0.48	0.006	1.03
	CPS	0	1	0.48	0.002	1.00
White	ALP	0	1	0.65	0.006	1.03
	CPS	0	1	0.65	0.002	0.96
Age[a]	ALP	18	97	47.45	0.216	1.15
	CPS	18	85	47.08	0.057	1.07
Education[b]	ALP	2	16	10.56	0.031	1.13
	CPS	1	16	10.32	0.009	0.97
Income[c]	ALP	1	15	10.73	0.053	1.05
	CPS	1	15	10.90	0.012	1.01

[a] Top-coded to match the CPS. Specifically, 80 means 80–84 and 85 means 85+.

[b] Education categories: 1 = less than first grade; 2 = first, second, third, or fourth grade; 3 = fifth or sixth grade; 4 = seventh or eighth grade; 5 = ninth grade; 6 = tenth grade; 7 = 11th grade; 8 = 12th grade with no diploma; 9 = high school diploma or the equivalent; 10 = some college but no degree; 11 = associate's degree in college occupational or vocational program; 12 = associate's degree in college academic program; 13 = bachelor's degree; 14 = master's degree; 15 = professional school degree; 16 = doctorate degree.

[c] Income categories: 1 = <$5,000; 2 = $5,000–$7,499; 3 = $7,500–$9,999; 4 = $10,000–$12,499; 5 = $12,500–$14,999; 6 = $15,000–$19,999; 7 = $20,000–$24,999; 8 = $25,000–$29,999; 9 = $30,000–$34,999; 10 = $35,000–$39,999; 11 = $40,000–$49,999; 12 = $50,000–$59,999; 13 = $60,000–$74,999; 14 = $75,000–$99,999; 15 = $100,000 or more.

Table 5.2
Gender by Working Status by Income Distribution: Current Population Survey Versus Weighted Reference Sample

Gender	Working	Income, in Dollars	CPS	ALP Weighted	ALP
Female	Not working	<30,000	9.83	9.84	11.61
Female	Not working	30,000–59,999	6.91	6.59	7.10
Female	Not working	60,000–99,999	4.02	4.16	4.57
Female	Not working	100,000+	3.61	3.06	2.55
Female	Working	<30,000	5.10	5.03	7.02
Female	Working	30,000–59,999	7.49	8.31	10.76
Female	Working	60,000–99,999	7.10	7.26	8.33
Female	Working	100,000+	7.75	7.58	6.93
Male	Not working	<30,000	6.59	6.14	5.58
Male	Not working	30,000–59,999	5.14	4.45	4.67
Male	Not working	60,000–99,999	2.91	2.54	2.62
Male	Not working	100,000+	2.17	2.86	2.58
Male	Working	<30,000	5.10	5.59	4.23
Male	Working	30,000–59,999	8.67	8.87	7.29
Male	Working	60,000–99,999	8.19	8.26	6.80
Male	Working	100,000+	9.43	9.47	7.34

NOTE: In the CPS, ALP weighted, and ALP columns, we report the fraction of people in each stratum.

Table 5.3
Gender by Working Status by Age Distribution: Current Population Survey Versus Weighted Reference Sample

Gender	Working	Age, in Years	CPS	ALP Weighted	ALP
Female	Not working	18–32	5.35	4.69	3.04
Female	Not working	33–44	3.20	3.13	4.00
Female	Not working	45–57	3.82	3.94	4.98
Female	Not working	58+	12.00	11.87	13.82
Female	Working	18–32	7.95	8.61	6.46
Female	Working	33–44	6.97	6.90	9.01
Female	Working	45–57	7.95	7.95	10.46
Female	Working	58+	4.57	4.72	7.12
Male	Not working	18–32	4.13	2.87	1.08
Male	Not working	33–44	1.56	1.50	1.10
Male	Not working	45–57	2.32	2.59	2.38
Male	Not working	58+	8.80	9.03	10.90
Male	Working	18–32	9.10	10.37	4.49
Male	Working	33–44	8.18	8.41	6.78
Male	Working	45–57	8.94	8.57	8.25
Male	Working	58+	5.17	4.84	6.14

NOTE: In the CPS, ALP, and ALP weighted columns, we report the fraction of people in each stratum.

6. Contact Information

If you are interested in obtaining a quote for hosting, programming, or using the ALP for your research, please fill out the online request form (RAND Corporation, undated). For additional information, please contact us by email: mmic@rand.org.

Answers to frequently asked questions about the ALP and its data dissemination can be found at ALP, undated (b).

General Questions

Krishna Kumar
Director
RAND Labor and Population
Krishna_Kumar@rand.org
310.393.0411 x7589

American Life Panel, Multimode Interviewing Capability, and Hosting Questions

David Grant
Director, American Life Panel and chief survey methodologist
David_Grant@rand.org
310.393.0411 x7150

Karen Edwards
Project manager, RAND ALP and Multimode Interviewing Capability
Karen_Edwards@rand.org
310.393.0411 x6508

Mailing Address

1776 Main Street
Santa Monica, CA 90407

7. Papers Using American Life Panel Data

The ALP tries to keep track of papers that use ALP data. See ALP, undated (a); if you are aware of papers that have used ALP data and are missing, please let us know by sending an email to mmic@rand.org.

Appendix

Snowball: Snowball Cohort, 2009

RAND recruited a subset of respondents through a so-called snowball sample. The snowball cohort resulted when researchers gave respondents the opportunity to suggest friends or acquaintances who might want to participate. We then contacted these people and invited them to participate. Because this snowball sample is not randomly selected or representative of U.S. residents, it is used mainly for pilot tests of surveys or experiments, in which a representative sample is not needed. However, they also participate in some regular surveys when researchers specifically request them. No new snowball respondents have been permitted to join the ALP since May 2009.

American Life Panel Mail-Out and American Life Panel Cold Call: Mailing- and Phone-Experiment Cohorts, 2010

RAND recruited a mailing-experiment cohort and a phone-experiment cohort as part of an experiment to test different recruitment methods for the ALP. We approached people in the mailing experiment via postal mail and people in the phone experiment by phone. In both cases, we drew the participants randomly from nationally representative samples. The mailing-experiment cohort was added in April 2010, while the phone-experiment cohort was added between May and September 2010. Because relatively little additional information is available about these small cohorts, they are not typically considered to be part of the larger probability sample, despite being based on nationally representative samples.

Respondent-Driven Sampling

RAND experimented with an RDS approach to sample populations through social networks with a resulting cohort of roughly 400 respondents (Heckathorn, 1997, 2002, 2007). In RDS, each respondent recruits a fixed number of friends in the target population who, in turn, become the next generation of respondents. Once sample equilibrium has been reached, sample proportions for a given variable of interest no longer change. However, these sample proportions in equilibrium will be different from proportions in the population because respondents with larger social networks will be overrepresented. Biases can be corrected to derive unbiased population estimates (Heckathorn, 2002).

Respondent Referrals, 2006–2014

Between 2006 and 2014, the ALP also invited (adult) household members of the sampled panel members to join, thus allowing intrahousehold comparisons. These panel members are identifiable in the data because their unique identifier variables will end in numeric values greater than 1 (e.g., identifier 10017494:2) in the data. These household referrals are not randomly recruited, so, in many cases, they cannot be included in a survey or analysis that depends on the random recruitment of the sample. For this reason, the ALP cannot be used as a household survey panel per se and should be considered primarily a panel of individuals.

Like the snowball sample, these cohorts are typically used for experiments or piloting survey content.

American Life Panel Intergenerational: American Life Panel Intergenerational Cohort, 2013–2014

Between August 2013 and March 2014, we invited members of the Michigan, Stanford, and vulnerable population cohorts to ask family members, potentially outside the household, to join the panel as a means to determine the feasibility of setting up a panel for intergenerational research. We added roughly 300 respondents.

Although we obtained the initial panel members from probability samples, the intergenerational cohort was not randomly recruited and represents a type of snowball sample more than a probability sample. For this reason, the intergenerational cohort is typically included on surveys only at the specific request of researchers.

Bibliography

ALP—*See* RAND American Life Panel.

American Association for Public Opinion Research, *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*, 9th ed., 2016.

Anderson, Monica, "Technology Device Ownership: 2015," Washington, D.C.: Pew Research Center, October 29, 2015. As of April 20, 2017:
http://www.pewinternet.org/2015/10/29/technology-device-ownership-2015/

Blumberg, Stephen J., and Julian V. Luke, *Wireless Substitution: Early Release of Estimates from the National Health Interview Survey, January–June 2014*, Division of Health Interview Statistics, National Center for Health Statistics, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services, December 2014. As of April 19, 2017:
https://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201412.pdf

Buchholz, David, and Jeff Larrimore, *Survey of Household Economics and Decisionmaking*, Urban Institute, January 21, 2016. As of April 19, 2017:
http://www.urban.org/sites/default/files/urban_institute_data_talk_scf_shed_combinedv2.pdf

Callegaro, Mario, and Charles DiSogra, "Computing Response Metrics for Online Panels," *Public Opinion Quarterly*, Vol. 72, No. 5, December 2008, pp. 1008–1032.

Chang, Linchiat, and Jon A. Krosnick, "National Surveys via RDD Telephone Interviewing Versus the Internet: Comparing Sample Representativeness and Response Quality," *Public Opinion Quarterly*, Vol. 73, No. 4, Winter 2009, pp. 641–678.

Cheshire, Hayley, Mary Beth Ofstedal, Shaun Scholes, and Mathis Schröder, "A Comparison of Response Rates in the English Longitudinal Study of Ageing and the Health and Retirement Study," *Longitudinal and Life Course Studies*, Vol. 2, No. 2, 2011, pp. 127–144.

Couper, Mick P., Arie Kapteyn, Matthias Schonlau, and Joachim Winter, "Noncoverage and Nonresponse in an Internet Survey," *Social Science Research*, Vol. 36, No. 1, March 2007, pp. 131–148.

DeBell, Matthew, and Jon A. Krosnick, *Computing Weights for American National Election Survey Data*, Ann Arbor, Mich.: American National Election Studies, Technical Report nes012427, September 1, 2009.

Duffy, Bobby, Kate Smith, George Terhanian, and John Bremer, "Comparing Data from Online and Face-to-Face Surveys," *International Journal of Market Research*, Vol. 47, No. 6, 2005, pp. 615–639.

Göritz, Anja S., "Incentives in Web Studies: Methodological Issues and a Review," *International Journal of Internet Science*, Vol. 1, No. 1, 2006, pp. 58–70.

Heckathorn, Douglas D., "Respondent-Driven Sampling: A New Approach to the Study of Hidden Populations," *Social Problems*, Vol. 44, No. 2, 1997, pp. 174–199.

———, "Respondent-Driven Sampling II: Deriving Valid Population Estimates from Chain-Referral Samples of Hidden Populations," *Social Problems*, Vol. 49, No. 1, February 2002, pp. 11–34.

———, "Extensions of Respondent-Driven Sampling: Analyzing Continuous Variables and Controlling for Differential Recruitment," *Sociological Methodology*, Vol. 37, No. 1, December 2007, pp. 151–207.

Loosveldt, Geert, and Nathalie Sonck, "An Evaluation of the Weighting Procedures for an Online Access Panel Survey," *Survey Research Methods*, Vol. 2, No. 2, 2008, pp. 93–105.

Mack, S., V. Huggins, D. Keathley, and M. Sunduckchi, "Do Monetary Incentives Improve Response Rates in the Survey of Income and Program Participation?" *Proceedings of the Section of Survey Research Methods*, American Statistical Association, 1998.

Malhotra, Neil, and Jon A. Krosnick, "The Effect of Survey Mode and Sampling on Inferences About Political Attitudes and Behavior: Comparing the 2000 and 2004 ANES to Internet Surveys with Nonprobability Samples," *Political Analysis*, Vol. 15, No. 3, July 2007, pp. 286–323.

McGonagle, Katherine A., Robert F. Schoeni, Narayan Sastry, and Vicki A. Freedman, "The Panel Study of Income Dynamics: Overview, Recent Innovations, and Potential for Life Course Research," *Longitudinal and Life Course Studies*, Vol. 3, No. 2, 2012, pp. 268–284.

Michaud, Pierre-Carl, Arie Kapteyn, James P. Smith, and Arthur van Soest, "Temporary and Permanent Unit Non-Response in Follow-Up Interviews of the Health and Retirement Study," *Longitudinal and Life Course Studies: International Journal*, Vol. 2, No. 2, 2011, pp. 145–169.

Millar, Morgan M., and Don A. Dillman, "Improving Response to Web and Mixed-Mode Surveys," *Public Opinion Quarterly*, Vol. 75, No. 2, 2011, pp. 249–269.

Mitchell, Amy, Jeffrey Gottfried, Michael Barthel, and Elisa Shearer, *The Modern News Consumer: News Attitudes and Practices in the Digital Era*, Washington, D.C.: Pew Research Center, July 2016. As of April 19, 2017:
http://www.journalism.org/files/2016/07/PJ_2016.07.07_Modern-News-Consumer_FINAL.pdf

Pew Research Center, "How Americans Go Online," September 25, 2013. As of April 20, 2017:
http://www.pewinternet.org/2013/09/25/how-americans-go-online/

RAND American Life Panel, "All Papers," undated (a). As of May 26, 2017:
https://alpdata.rand.org/index.php?page=papers

———, "Frequently Asked Questions," undated (b). As of May 26, 2017:
https://alpdata.rand.org/index.php?page=faq

———, "Welcome to the ALP Data Pages," undated (c).

RAND Corporation, "MMIC and American Life Panel (ALP) Request Form," undated. As of April 27, 2017:
http://www.rand.org/labor/mmic/mmic_request.html

Sakshaugh, J., R. Tourangeau, J. A. Krosnick, A. Ackermann, A. Marka, M. DeBell, and C. Turakhia, *Dispositions and Outcome Rates in the 'Face-to-Face Recruited Internet Survey Platform' (the FFRISP)*, paper presented at the 64th annual conference of the American Association for Public Opinion Research, Hollywood, Fla., May 2009.

Schonlau, Matthias, Arthur van Soest, Arie Kapteyn, and Mick Couper, "Selection Bias in Web Surveys and the Use of Propensity Scores," *Sociological Methods and Research*, Vol. 37, No. 3, 2009, pp. 291–318.

Singer, E., and R. A. Kulka, "Paying Respondents for Survey Participation," in Michele Ver Ploeg, Robert A. Moffitt, and Constance F. Citro, eds., *Studies of Welfare Populations: Data Collection and Research Issues*, National Research Council, Division of Behavioral and Social Sciences and Education, Committee on National Statistics, Commission on Behavioral and Social Sciences and Education, Panel on Data and Methods for Measuring the Effects of Changes in Social Welfare Programs, 2001, pp. 105–128.

Singer, Eleanor, and Cong Ye, "The Use and Effects of Incentives in Surveys," *Annals of the American Academy of Political and Social Science*, Vol. 645, No. 1, 2013, pp. 112–141.

Taylor, H., "Does Internet Research 'Work'? Comparing On-Line Survey Results with Telephone Surveys," *International Journal of Market Research*, Vol. 42, No. 1, 2000, pp. 51–63.

Toepoel, Vera, Marcel Das, and Arthur van Soest, "Effects of Design in Web Surveys: Comparing Trained and Fresh Respondents," *Public Opinion Quarterly*, Vol. 72, No. 5, 2008, pp. 985–1007.

———, "Relating Question Type to Panel Conditioning: A Comparison Between Trained and Fresh Respondents," *Survey Research Methods*, Vol. 3, No. 2, 2009, pp. 73–80.

Vehovar, Vasja, Katja Lozar Manfreda, Zenel Batagelj, "Web Surveys: Can the Weighting Solve the Problem?" *Proceedings of the Survey Research Methods Section*, American Statistical Association, 1999, pp. 962–967. As of April 19, 2017:
http://ww2.amstat.org/sections/srms/Proceedings/papers/1999_168.pdf

Warren, John Robert, and Andrew Halpern-Manners, "Panel Conditioning in Longitudinal Social Science Studies," *Sociological Methods and Research*, Vol. 41, No. 4, 2012, pp. 491–534.

Yeager, David S., Jon A. Krosnick, Linchiat Chang, Harold S. Javitz, Matthew S. Levendusky, Alberto Simpser, and Rui Wang, *Comparing the Accuracy of RDD Telephone Surveys and Internet Surveys Conducted with Probability and Non-Probability Samples*, Stanford University, working paper, 2009.