Web-Face-to-Face Mixed-Mode Design and Attrition in Longitudinal Surveys

Some evidence from the UK Household Longitudinal Study

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Outline

Two issues related to the construction and use of longitudinal panels:

1. Introduction of sequential mixed-mode design

   Bianchi, A., Biffignandi, S. and Lynn, P. (2017), Web-CAPI sequential mixed mode design in a longitudinal survey: effects on response rates, sample composition and costs, *Journal of Official Statistics*, 33(2), 385-408.

2. Attrition that may threaten the validity of the estimates

   Bianchi, A. and Biffignandi, S. (2019), Social indicators to explain response in longitudinal studies, *Social Indicators Research*, 141, 931-957.

Introduction of sequential mixed-mode design

Background

- Combining modes within a survey opportunity to benefit from the strength of different modes (de Leeuw, 2005, Biemer and Lyberg, 2003)
- Inclusion of web in a mixed-mode design (Groves and Lyberg, 2010; Couper, 2011; Kreuter, 2013)

  - Cost and timeliness advantages

  - improve quality/sample composition

- Several issues may arise when using web in mixed-mode (MM) design

  - Participation rates are usually low for web surveys (Fan and Yan, 2010)

  - Effect on response rates of including web in a MM design not completely clear (Griffin et al., 2001; Janssen, 2006; Lagerstrom, 2008; Leesti, 2010, Martin and Lynn, 2011; Souren, 2012)

  - Differential measurement error: several studies have identified systematic differences in measurement between modes and in some contexts this has been shown to result in measurement differences between F2F single mode and web-F2F MM data collection

Background

- Opportunities for MM data collection with web appealing for longitudinal surveys
  - availability of contact information
  - targeting of particular mode strategies at specific subgroups
  - study of the effects of different mode strategies

- Other considerations
  - high response rates essential to allow longitudinal analyses
  - sample members have prior experience of the interview and prior knowledge of the survey content.

Research Aims & Design

- Main objective

  Investigate possible effects of a MM design including web in a longitudinal survey on

  - Response rates
  - Sample composition
  - Field cost

- Design

  - MM experiment in a longitudinal panel → comparison of single mode F2F vs MM (web+F2F) over three waves of a panel

Previous research

- Jäckle et al. (2015) report on effects at one wave only with reference to the same experiment we analyse

  - Individual response rates lower with the MM design

  - Several subgroups less likely to give an interview in the MM than F2F: men, white, in rural location, age 21-30, in a household with children, individuals who said they would definitely not do the survey by web

  - No subgroup where the reverse was true

  - Lower proportion of households in which all individuals responded

Subgroups of interest

- Time sample members have been in the panel

  - Wave-on-wave attrition rates are highest at the second wave and then decline over time (Lugtig, 2014; Schoeni et al., 2013; Uhrig, 2008)

  - Correlates of nonresponse may change over waves (Farrant and O'Muircheartaigh, 1991; Bianchi and Biffignandi, 2017)

  - Sample members who have been longer in the panel have more experience of the interview and prior knowledge of the survey content

- Previous wave outcome

  - Previous wave nonrespondents have lower response propensities in subsequent waves

  - An invitation to complete the interview by web offers the opportunity to at least make contact with some sample members hard to confact F2F

Research Questions (RQ1)

- In general MM design expected to achieve lower response rates than single mode designs with interviewer
- Time in sample: Jäckle et al. (2015) found lower proportion of interviews with MM for longer panel members and no difference by mode for more recent panel members
- Previous wave outcome: Jäckle et al. (2015) found amongst previous wave respondents higher proportion of refusals for MM than F2F
- Several subgroups less likely to give an interview in the MM than F2F (Jäckle et al., 2015)

Are there mode effect on response rates (cumulative or at each wave separately), overall or amongst important subgroups?

Research Questions (RQ2)

Heterogeneity across modes in response propensities suggests that MM designs could result in smaller compositional biases than single-mode designs.

- Voorpostel and Ryser (2011): in a web-F2F concurrent MM design for refusal conversion in a CATI panel survey (SHP) → the group that completed the web questionnaire tended to have slightly different characteristics from the CATI group
- Lynn (2013), Klausch et al. (2015): No significant differences in sample composition between sequential MM design and single-mode F2F

Does the MM design affect sample composition, compared to the F2F design? Does any such effect change over waves as attrition cumulates?

Research Questions (RQ3)

In the context of household panels where all household members need to be interviewed, significant cost-saving only when all household members respond by web

- Jäckle et al. (2015): one in five households fully responded online → potential for cost savings

To what extent does the MM design reduce field work costs over waves, compared to F2F design?

Understanding Society Innovation Panel

- Probability-based longitudinal panel
- Started in 2008
- Initial sample approximately of 1500 households
- Target population: population aged 16 or over resident in Great Britain
- Purpose: to enable methodological development and testing
- Face-to-face with in person interview once a year
- Topics: housing, economic activity, health, income, political attitudes, and several other topics
- Refreshment sample at W4 → sample has two components: original sample and refreshment sample

Mode Experiment

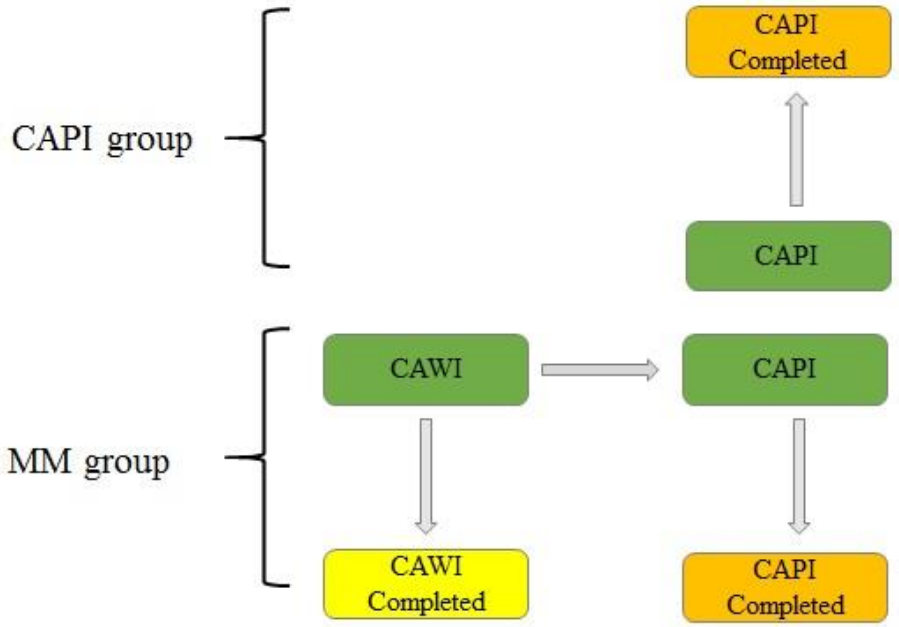
- At W5 (2012), randomized experiment carried out to inform decisions on whether and how the main Understanding Society Survey might move from F2F to MM including web
- Sample randomly allocated to two groups: One third allocated to F2F, two thirds allocated to MM
- All individuals in the same household received the same treatment
- Experiment continued in W6 (2013) and W7 (2014)
- Incentives provided in both treatment groups, with different levels reflecting the reality that sample members might require additional motivation in the absence of an interviewer
- Incentives: some differences between W5 and W6. W7 same strategy as W6.

Mode Experiment – Wave 5

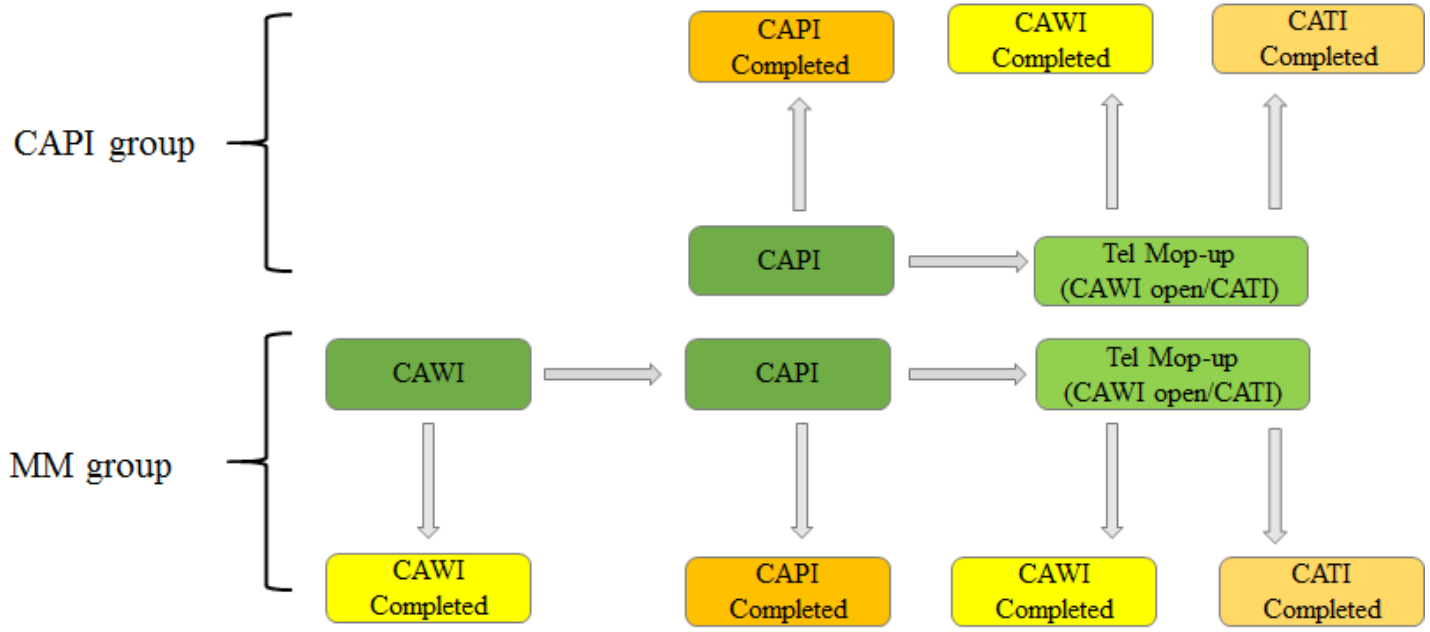
- **F2F group** → standard Understanding Society procedures
  - advance letter with an unconditional incentive
  - interviewers visit to attempt CAPI interviews
- **MM group** → sequential design:
  - adults first approached by letter with incentive (and email where possible) and asked to complete their interview on-line
  - two weeks later, those who did not respond on-line were then followed up by F2F interviewers
  - web survey open throughout fieldwork period

Same procedures applied in Waves 6 and 7 + mop-up telephone

Mode Experiment – Wave 5



Mode Experiment – Waves 6 and 7



Datasets

- Allocation of households to experimental groups in W5 and distributions in W6 and W7

		Wave 5		Wave 6		Wave 7	
Sample component	Previous wave outcome	F2F	MM	F2F	MM	F2F	MM
Original sample	Responded	321	615	292	544	277	544
	Did not respond	43	111	41	89	21	37
Refreshment sample	Responded	168	315	148	263	141	250
	Did not respond	-	-	17	29	12	15
Total	-	532	1,041	498	925	451	846

- Individuals dataset: sample persons aged 16 or over issued to the field at W5 and eligible in W5, W6, and W7. Sample size 2756.

RQ1 – Individual response rates

Response	F2F	MM	*P*
Waves 5–7 response			
3 full interviews	47.3	49.1	0.45
2 or 1 full interviews	32.9	31.3	0.57
0 full interviews	19.8	19.6	0.92
Wave 5 full interview	71.0	68.4	0.30
Wave 6 full interview	69.3	70.7	0.52
Wave 7 full interview	56.1	59.1	0.21
N	940	1,816	

- Cumulative response rates: no difference between MM and F2F
- RR in each wave: differences not statistically significant

RQ1 – Individual response rates

	Original Sample									Refreshment Sample		
	Total			Wave 4 responding			Wave 4 nonresponding			Total		
	F2F	MM	P	F2F	MM	P	F2F	MM	*P*	F2F	MM	*P*
Waves 5–7 response												
3 full interviews	46.5	47.0	0.86	61.0	61.9	0.81	8.4	13.4	0.11	49.0	54.0	0.30
2 or 1 full interviews	31.4	30.8	0.84	32.2	29.4	0.41	25.2	31.7	0.25	35.8	32.5	0.46
0 full interviews	22.1	22.2	0.97	6.8	8.7	0.39	66.5	54.9	**0.09**	15.2	13.5	0.61
Wave 5 full interview	68.6	64.4	0.16	85.2	80.3	0.12	20.6	26.3	0.21	75.8	77.6	0.67
Wave 6 full interview	67.3	68.6	0.65	84.1	83.5	0.79	20.0	32.9	**0.06**	73.2	75.5	0.56
Wave 7 full interview	55.2	57.9	0.37	68.7	71.3	0.46	18.7	28.0	**0.08**	57.7	61.9	0.39
N	630	1,268		454	858		155	350		310	548	

- Cumulative response rates: no difference between MM and F2F
- Amongst W4 nonrespondents: MM lower proportion of no interview over 3 waves than F2F

RQ1 – Individual response rates

	Original Sample									Refreshment Sample		
	Total			Wave 4 responding			Wave 4 nonresponding			Total		
	F2F	MM	P	F2F	MM	P	F2F	MM	*P*	F2F	MM	*P*
Waves 5–7 response												
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- W5: proportion of full interviews not significantly different
- W6 and W7: amongst W4 nonrespondents, MM higher proportion of full interviews than F2F

RQ1 – Individual response - subgroup

- Method: Logit model predicting full response over 3 waves using individual characteristics and interaction of those characteristics with treatment as predictors
- Covariates: gender, age, race, working status, urbanicity, webuser, email given, HH type, Web preference
- Original sample: The only significant interaction is between mode and **web preference**: respondents who said at W4 they would definitely/maybe respond to a web survey show higher probabilities to respond in the MM group

RQ1 – HH response rates (original sample)

	Wave 5			Wave 6			Wave 7		
	F2F	MM	*P*	F2F	MM	*P*	F2F	MM	*P*
HH response rate (complete+partial)	78.0	74.2	0.22	84.4	83.7	0.79	74.4	80.9	**0.03**
Complete HHs	58.2	51.1	**0.03**	63.4	65.2	0.59	51.3	61.8	**0.00**
Partial HHs	19.8	23.1	0.20	21.0	18.5	0.32	23.1	19.1	0.10
Non-contact	8.0	8.4	**0.08**	5.7	6.5	0.33	11.1	7.9	**0.07**
Refusal	11.3	15.8	**0.08**	8.1	8.4	0.89	13.1	9.1	**0.06**
Other nonresponse	2.7	1.5	0.24	1.8	1.4	0.63	1.3	2.1	0.49
N	364	726		333	633		298	581	

- HH response rate: not significantly different in W5 or W6; in W7 MM shows 6.5% higher participation than F2F

RQ1 – HH response rates (original sample)

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	F2F	MM	*P*	F2F	MM	*P*	F2F	MM	*P*
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- Complete HHs: in W5, 7.1% lower in MM than F2F and by W7 becomes 10.5% higher

RQ1 – HH response rates (original sample)

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- Non-contacts & refusals: in W5 higher in MM than F2F, not significantly different in W6 and lower in W7
- Refreshment sample: no difference detected (not shown)

RQ1 – answer

Individual participation:

- MM does not affect individual participation either overall or amongst who have been in the panel for longer or shorter periods (both cumulative response rate and response rate in each wave)
- MM appears to have a positive effect for those who had not responded at W4
- As for covariates, only expressed mode preference related to participation in the MM group

Household participation:

- Original sample: MM smaller proportion of HHs fully responding and higher proportion of non-contacts and refusals in W5. In W7 the situation was completely reversed
- Refreshment sample: no difference detected

RQ2 – sample composition

- Mode difference in whether sample that responded at 3 waves differs from the composition at the start of the experiment
- Method: Compare distribution of covariates. Statistical test performed by fitting a logistic model predicting response in which predictors are mode, variable, and their interaction → Wald test on interaction
- Variables considered: those expected to have the greatest chance of a mode difference (Jäckle et al., 2015)
- Respondents at W5: only HH type significant difference between MM and F2F
- Respondents at W5 and W6 and respondents at 3 waves: the only variable showing a mode difference in how sample composition differs from the composition at the start of the experiment is **expressed web preference**

RQ2 – sample composition

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RQ2 answer: Differences between the two treatment groups in sample composition are minimal

RQ3 – costs

- Sample HH not requiring interviewer visit in MM group
- Indicator of potential cost savings: proportion of HHs fully responding by web

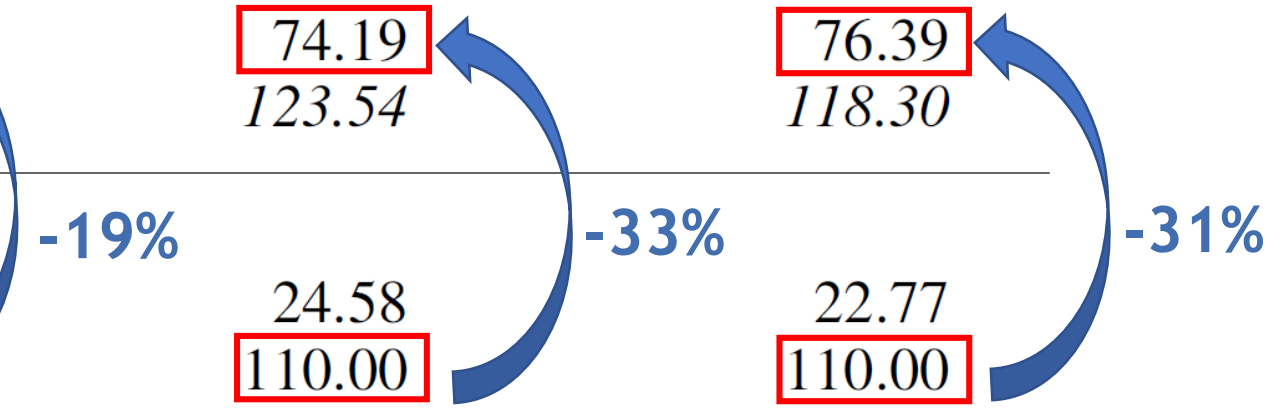
	Wave 5	Wave 6	Wave 7
Mixed-mode sample			
% fully responding by web (A)	23.8	37.1	35.1
% fully responding (B)	55.7	66.7	61.0
(A)/(B)	42.7	55.6	57.5
N	*1,041*	*925*	*846*
Face-to-face sample			
% fully responding	58.8	62.8	52.8
N	*532*	*498*	*451*

- The proportion of fully responding HHs who fully responded by web increased over time

RQ3 – costs

- Assuming field costs per issued sample HH (excluding incentives) to be GBP 110 with F2F and GBP 5 per HH for the web phase of MM
- Applying these unit costs to the response outcomes, we computed mean field costs per issued HH

	Wave 5 (GBP)	Wave 6 (GBP)	Wave 7 (GBP)
Mixed-mode treatment			
Incentives	29.74	49.35	41.91
Other	88.82	74.19	76.39
Total	*118.56*	*123.54*	*118.30*
Face-to-face treatment			
Incentives	29.70	24.58	22.77
Other	110.00	110.00	110.00
Total	*139.70*	*134.58*	*132.77*



RQ3 – costs

- Taking into account the mean cost of incentives per issued HH in each mode for each wave
- Cost differential between mode treatments reduces

	Wave 5 (GBP)		Wave 6 (GBP)		Wave 7 (GBP)
Mixed-mode treatment					
Incentives	29.74		49.35		41.91
Other	88.82		74.19		76.39
Total	*118.56*		*123.54*		*118.30*
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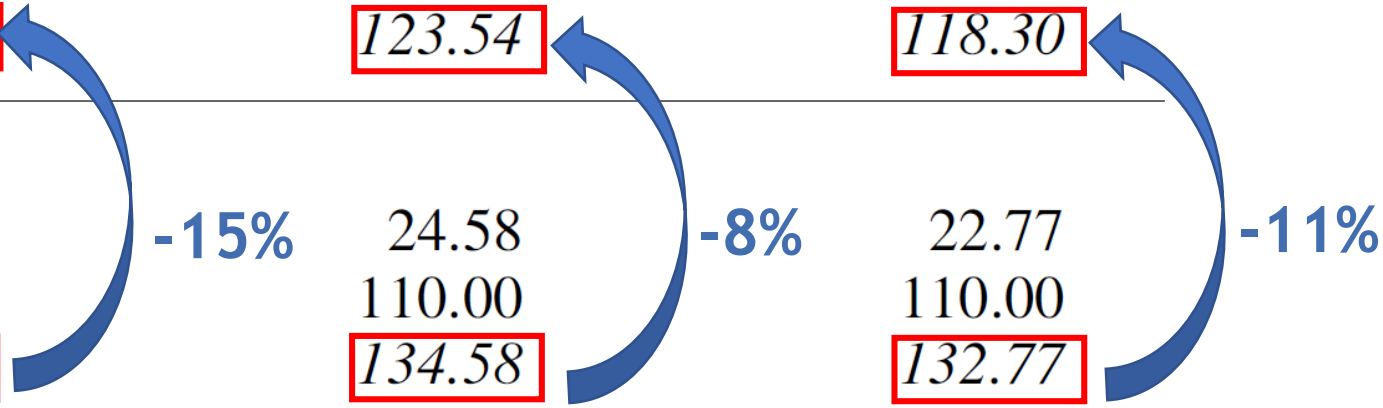

RQ3 – answer

- MM appears to have potential for cost savings
- Sizeable proportion of sample HHs in which all adult members completed the questionnaire by web
- At W6 and W7, more than one-third of HHs issued to the field fully responded by web
- Our estimate suggest possible field cost savings per issued HH around 10% compared to F2F

Summary and discussion

- This study paints a rather positive picture of the potential for MM data collection in panel surveys
- Possible Measurement difference not tackled
- Applicability to different survey contexts (different topics of questioning, different study populations, different levels of prior survey engagement, etc.).
  - Our findings broadly similar for the two different samples involved → degree of survey engagement does not have a strong influence
  - Similar results for several demographic subgroups → results might equally apply to different study population

Study of Attrition

Background

- One of the most important sources of non-sampling errors
- Attrition process similar to non-response in cross-sectional surveys, with some specific features:
  - those who drop out of a panel did participate in at least one wave of the study → wide range of information available
  - Sample units have prior experience of the interview and prior knowledge of the survey content
  - Problems related to tracking sample members who move and to respondents‘ fatigue
  - Non-response tend to accumulate over time
  - High response rates essential to allow longitudinal analyses → response rates more important in the longitudinal framework

Background

- Traditionally, response behaviour mostly related to a few core variables, use of incentives, and other design features
- Potential effect of social indicators and socio-psychological variables much less investigated, even though important:
  - expected to be related to aspects of the response process and possibly more explanatory power than socio-demographic
  - problematic in light of extensive recent use of longitudinal panels for research on well-being and personality development
- Studies investigating effects of socio-psychological variables on attrition in general do not examine components of the response process separately
- Extend analyses on different modes of data collection, different stages of the panel, different nations

Factors affecting attrition

- Location
  - Survey design features (n. panel waves, time between waves, topic of the survey between-wave contact efforts, tracking procedures)
  - HH and personal characteristics: age, n. years at a residence, HH tenure
  - Social aspects of community attachment (Lepkowski and Cooper, 2002)
- Contact
  - accessibility of the dwelling/use of answering machines
  - Survey design features (length of fieldwork period, interviewers‘ conitnuity and workloads, n. and timing of visits/calls)
  - Variables related to the likelihood of finding someone at home: age, sex, marital status, employment status, HH size and composition, presence of young children, long-standing illness
  - Willingness to be found related variables: variables describing the survey experience at previous waves

Factors affecting attrition

- Cooperation
  - Variables related to prior waves experience
  - Survey design features (incentives, survey topic, interviewer continuity, mode)
  - Respondent characteristics: sex, age, race/ethnicity, marital status, HH size and composition, education, income, employment status, urbanicity
  - Variables related to social integration (Lepkowski and Cooper, 2002)
- Some literature has examined the effect of personality traits and well-being related variables on response in longitudinal studies.
  - Results on possible effects of personality traits on participation not always consistent
  - As for well-being, few studies that report higher levels of well-being related to higher participation
  - None of these studies distinguished among different components of the response process

Research Aims & Design

- Main objective

  Understand factors associated with selective attrition in a longitudinal F2F study

  - Including social and socio-psychological factors

  - distinguishing effects of predictors on different steps of the response process

- Design

  - consider survey response as the occurrence of location/contact and cooperation given contact

Research Questions (RQ1) - contact

- Social aspects of community attachment may affect the likelihood of moving and hence making contact.
- Expectation: individuals engaged in civic activities less likely to move and, in case they move, easier to be traced (Lepkowski and Couper, 2002)

Are social indicators related to community attachment predictive of contact in later waves of a panel?

Research Questions (RQ2) - cooperation

- Social activities and social relations
- Expectation: the way one relates in the social world has an influence on response behaviour

Do social activities and relations contribute to explaining cooperation?

Research Questions (RQ3) - cooperation

- Personality traits
- Expectation: personality traits can explain some aspects related to survey cooperation

Do personality traits contribute to explaining cooperation?

Research Questions (RQ4) - cooperation

- Level of respondent well-being
- Expectation: Life satisfaction could influence an individual‘s interest in participating

Are self-reported levels of life satisfaction associated to cooperation in later waves of a panel?

Understanding Society – main survey

- Probability-based longitudinal panel
- Started in 2009
- Four sample components: **General Population Sample (GPS)**, Ethnic Minority Boost Sample (EMB), participants from BHPS, Immigrant and Ethnic Minority Boost Sample (IEMBS)
- Target population GPS: population aged 16 or over resident in UK
- Initial sample for GPS consisted of 49 920 addresses
- The overall RR at the first wave for GPS at HH level: 57.3%
- Face-to-face with interviews at 12-month intervals with the initial sample members and all members of the current HH of each sample person
- Topics: housing, economic activity, health, income, political attitudes, and several other topics (including objective and subjective indicators)
- Questions organized in topical modules appearing annually or rotated less frequently

Database

- Individuals aged 16 or over of the GPS sample issued to the field at W4 and eligible at W4, W5, W6
- Restrict to W3 main adult interview respondents (N=27 143)

Status	Wave 4	Wave 5	Wave 6
Full interview	24,908	23,603	21,325
Non-contact	823	951	1913
Refusal	1078	2158	3357
Other	334	431	548
Total	27,143	27,143	27,143

- Variables on personality traits contained in self-completion questionnaire of W3 (N=21 934)

RQ1 - contact

- Two categories for contact: those who were contacted in all 3 waves (N=24 134) and those who were never contacted or were contacted once or twice (N=3009)
- Method: logit model predicting contact in the 3 waves
- Covariates for community attachment:

  -whether repondents goes out socially

  - membership of an organization (general) and membership of specific organizations (political party, trade unions, environmental group, tenants/resident group, religious/church organization, voluntary services group, social/working man club, sports club)

RQ1 - contact

- Control for:

  - socio-demographics: gender, age, urbanicity, n. children, n. adults, marital status, in paid employment, housing tenure, country

  - mobility status: prefers to move, expects to move house next year

  - previous wave interview experience: being from partially responding HH, not returning self-completion questionnaire, item non-response at W3 for gross pay, level of cooperation, n. visits at last interview

RQ1 - contact

Variable	Category	Estimate
Community attachment		
Go out socially *(Ref. No)*		– 0.087
Member of an organization *(Ref. no)*		0.198***
Member of a political party *(Ref. no)*		0.257
Member of trade unions *(Ref. no)*		0.114
Member of an environmental group *(Ref. no)*		0.354*
Member of a tenants/resident group *(Ref. No)*		0.005
Member of a religious/church organization *(Ref. No)*		– 0.043
Member of a voluntary services group *(Ref. No)*		0.062
Member of a social/working man club *(Ref. No)*		– 0.140
Member of sports club *(Ref. No)*		– 0.099

- Those who are members of an organization show higher contact probabilities.
- Being member of an environmental group positively associated with the probability of making contact

RQ2-RQ4 - cooperation

- Restrict the sample to those contacted in all 3 waves
- Two cooperation models: adult main interview sample and self-completion questionnaire sample
- Three categories for cooperation given contact: those who never responded, those who responded once or twice, those who always responded
- Method: multinomial logistic regression (Class of those that always responded reference category
- Covariates:
  - Variables capturing the sense of belonging and attitute toward social relationships (going out socially, belonging to a social website, being member of an organization) and interest in politics (support a particular political party and level of interest in politics)
  - Big-Five personality traits scores: agreeableness, conscientiousness, extraversion, neuroticism, openness
  - Subjective weel-being: life satisfaction indicators related to health, income, leisure time, life overall

RQ2-RQ4 - cooperation

- Control for:
  - Same covariates used for contact
  - Education, general health, financial situation

RQ2-cooperation

Variable	Category	Main adult interview					
		Never responded			Responded once or twice		
		Estimate	*p* value (joint test)	OR	Estimate	*p* value (joint test)	OR
Social participation (sense of belonging)							
Go out socially		– 0.077		0.926	– 0.072		0.930
Member of an organization		0.020		1.020	– 0.139**		0.870
Belong to social website		– 0.203*		0.816	– 0.096**		0.909
Politics							
Supports a particular political party		– 0.067		0.935	– 0.028		0.972
Level of interest in politics	Fairly	0.102	0.490	1.108	0.149**	0.005	1.161
(Ref. Very)	Not very	0.128		1.136	0.107		1.113
	Not at all interested	0.248		1.281	0.261***		1.298

RQ3-RQ4 - cooperation

- The five personality traits variables are jointly not significant predictors of either never responding (p = 0.494) or occasionally responding (p = 0.547), after controlling for other variables in the model.
- Variables related to well-being are jointly not significant for both attriting classes (p = 0.451 and p = 0.134, respectively).

Summary and discussion

- Factors beyond demographic characteristics play a relevant role
- Contact: a part from traditional demographic variables and variables related to mobility, being member of an organization was found to be strongly significant
- Cooperation: with respect to social behaviour, greater propensity towards participation associated with higher cooperation in the panel. No effect detected for personality traits and well-being related variables

- Usefulness of gained information: (i) it can be used to prevent attrition using responsive and adaptive designs

  (ii) identified variables can be used in nonresponse weighting adjustments

  (iii) evidence that analysis of some social and psychological variables based on the UKHLS not biased with respect to selective attrition

Summary and discussion

- Limitations: in Understanding Society, many of the social indicators and psychological traits variables were asked in W3 only
  - → consider aggregated response outcomes over 3 waves
  - → restrict to adult main interview respondent sample and self-completion questionnaire sample in W3

The END!

Thank you for your attention!

Comments invited

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