Non-response in surveys of very old people

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Abstract

Very old people are known to participate less often in social surveys than younger age-groups. However, survey participation among very old people in institutional settings is understudied. Additionally, the focus of the literature is on response rates, which neglects the complexity of the process of survey participation. The present study uses standard definitions of the American Association for Public Opinion Research to give a detailed description of survey participation among very old people, including those in institutional settings. Data come from a German survey on quality of life and subjective well-being of persons aged 80–84, 85–89, and 90+ ($N = 1800$). The present study (a) estimates contact, cooperation, response, and refusal rates and (b) identifies associations of age, sex, and type of residence with each of these rates. Weighted outcome rates for the survey were: contact = 66.0%, cooperation = 39.6%, response = 26.1%, and refusal = 26.9%. Age, sex, and type of residence were not associated with the contact, cooperation, and response rate. Lower refusal rates were found for people aged 90+, men, and institutionalized people. Additional analyses showed higher rates of non-interviews due to health-related reasons for institutionalized people and those aged 90+. Overall, results indicate that institutionalized and non-institutionalized people showed similar levels of survey participation. Willingness to participate is a key factor for women and people in private households, while the ability to participate is more important for institutionalized people.

Keywords Population studies · Survey non-response · Institutional population · Very old age

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The original version of this article was revised due to the Table 3 was aligned incorrectly. Now the same has been formatted in this correction.

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Introduction

In many countries, response rates in social surveys are decreasing (Atrostic et al. 2001; Brick and Williams 2013; De Leeuw and De Heer 2002; Schnell 1997) and similar trends are observable for surveys of the older population (Gao et al. 2015). Moreover, it is well known that very old people participate less often in social surveys than younger age-groups (Herzog and Rodgers 1988; Klein et al. 2011; Kühn and Porst 1999). The accessibility of persons living in institutions is limited (Maas et al. 2002), and health problems or frailty may have the consequence that it is not possible to realize a complete interview (Hancock et al. 2003; Motel-Klingebiel et al. 2014). However, high levels of survey participation can be achieved in surveys that are tailored to the specific needs of older respondents (Corder and Manton 1991). Therefore, it is important to study the factors that are related to the non-response of older persons. Results can be useful for planning future surveys among older populations.

In the literature, comparison of non-response in surveys of older populations is hampered because individuals living in institutions (e.g., retirement homes, residential care facilities) are often excluded from the definition of the target population.

In addition, the definitions of contact outcomes and outcome rates vary across studies. Adherence to the standard definitions of response codes formulated by the American Association for Public Opinion Research (2016) (AAPOR) is likely to reduce this lack of comparability. Furthermore, the AAPOR codes allow detailed description of different steps of survey participation, namely contacting, cooperation, response, and refusal of target persons. A more detailed investigation of the challenges of each step may enhance the understanding of survey non-response among very old people.

The aim of the present study is to give a detailed description of survey participation among very old people by estimating contact, cooperation, response, and refusal rates. Special attention is given to variation in survey participation by individual characteristics such as age, sex, and type of residence. Data stem from a comprehensive feasibility study that was conducted as a part of the German research project “Survey on quality of life and subjective well-being of the very old in North Rhine-Westphalia (NRW80+).”

In the following, we first review survey participation rates in European aging studies. Then, we introduce a process model of survey participation and highlight the specific challenges that researchers may face at each step of the model when studying older people. Next, the standard definitions of response codes and outcome rates of the AAPOR are outlined. Finally, we examine factors related to the survey non-response of very old persons.

Review of survey participation rates in European aging studies

A number of aging studies report participation or non-response rates. For Germany, three social surveys of the older population are reviewed, namely the “German Ageing Survey” (DEAS), the “Interdisciplinary Longitudinal Study on Adult Development and Aging” (ILSE), and the “Berlin Aging Study” (BASE). The DEAS started in 1996 and offers a nationwide sample of persons aged 40–85 years. Further cross-sectional surveys were realized in 2002, 2008, and 2014. The participation rate dropped from 50.3% in 1996 to 27.1% in 2014 (Klaus and Engstler 2017). ILSE is a multidisciplinary longitudinal study designed to investigate the aging process of two German birth cohorts (1930–32 and 1950–1952) (Sattler et al. 2015). The survey started in 1993 and features four waves of data collection (1993–1996, 1997–2000, 2005–2008, and 2014–2016). At baseline, a stratified sample (by sex and birth cohort) of 1002 persons was obtained. The response rate from the initial sample of wave 1 was 42.3% (Martin and Martin 2000). Finally, BASE (Lindenberg et al. 2010) used an initial sample of 1908 people living in West Berlin with a minimum age of 70 years in 1990–1993 to collect detailed sociodemographic, psychological, and health-related information. The data were collected in three successive steps: a short initial assessment, an intake assessment, and an intensive protocol. Of the initial sample, 64% took part at least

in the short initial assessment, 49% at least in the intake assessment, and 27% completed the entire data collection, including the intensive protocol (Nuthmann and Wahl 2010).

Generally, aging studies in other European countries achieve similar (albeit sometimes slightly higher) participation rates. For the Netherlands, Huisman et al. (2011) report a response rate of 60% for the first wave (1992) of the “Longitudinal Aging Study Amsterdam” (LASA) of older adults aged 55–85 years. An additional cohort that was sampled from 2002 to 2003 had a response rate of 55%. Savva (2011) documents a response rate of 62.0% for the first wave of the “Irish Longitudinal Study on Ageing” (TILDA; minimum age 50 years). Using data on three birth cohorts (1926–1930, 1936–1940, and 1946–1950) from the “Good Ageing in Lahti region” (GOAL, Finland) research project, Nummela et al. (2011) report an overall response rate of 66%. Taylor et al. (2003) report a response rate of 67% for the initial wave of the “English Longitudinal Study of Ageing” (ELSA) that covers people aged 50 and over. The response rate for the German sample in the initial wave (2004/2005) of the European survey program SHARE (minimum age 50 years) exceeded the cross-country average: The overall response rate was equal to 61.8%, while it was 63.4% in the German sample (De Luca and Peracchi 2005).

Process model of survey participation

Survey participation in general is understood as a result of a four-step process: inclusion in the sampling frame, successful contacting by an interviewer, willingness to participate in the survey, and ability to participate or to give informed consent for a proxy interview (adapted from Schräpler 2000). As can be seen, each step is conditional on the success of the previous steps.

The sampling frame refers to the list that is used to identify all persons of the target population. Only persons that are included in the sampling frame can be selected into the sample (Groves et al. 2009). Not all of the survey programs mentioned in the previous section included institutionalized persons in their sampling frames (e.g., DEAS, TILDA). However, failure to include institutionalized persons has been shown to yield biased samples that underrepresent the most vulnerable groups: the oldest old, socially deprived, and those with pronounced levels of frailty (Kelfve et al. 2013; Gaertner et al. 2016). Kelfve (2017) shows that exclusion of these vulnerable and hard-to-reach groups results in underestimated prevalence rates for disability and mortality as well as biased estimates of health inequality. Consequently, inclusion of institutionalized and vulnerable older persons in the sampling frame is mandatory to give a complete picture of the living conditions of older persons.

Several specific barriers might prevent successful contacting of older persons. When trying to contact older persons, researchers are often confronted with gatekeepers (Davies et al. 2010; Motel-Klingebiel et al. 2014; Schnell 1997). In institutions, staff members

may regulate access to the patients—allowing only contact with patients that they assume to be able to participate. In cases where respondents live in private households, their partners or other relatives (e.g., children) may act as gatekeepers. Older respondents' health status also influences their accessibility as short-term hospitalization or relocation to a caring relative may inhibit successful contact at respondents' known address. However, a number of characteristics of very old people can be assumed to increase accessibility, such as reduced levels of residential mobility or the fact that they spend more time at home than younger age-groups.

Once contact has been established, target persons need to be willing to participate in the survey. Several factors have been linked to older people's willingness to participate: low levels of physical and mental health (Motel-Klingebiel et al. 2014), higher importance of personal interest in the survey topic (Kühn and Porst 1999), and more frequent misunderstandings concerning the survey's purpose (Schnell 1997). Correspondingly, Gaertner et al. (2016) find that "refusal to participate in scientific studies on principle," "being too ill," and "having no interest in the study" are the three most cited reasons for non-participation in their survey of 1481 German urban residents aged 65 years or older (for similar results, see Gao et al. 2015). From the perspective of the target person, low levels of physical and mental health are likely to increase the burden of survey participation, thereby decreasing the willingness to participate. Misunderstandings concerning the purpose of the survey can trigger the fear that survey participation might entail negative consequences (e.g., reduction in welfare benefits). Furthermore, misunderstandings and ambiguity concerning the topic of the survey are likely to decrease the personal interest of target persons. Both factors can lead older persons to decline participation. Greve (1998, 2000) and Greve et al. (2017) show that age is a strong predictor of precautionary behaviors, i.e., behaviors that are directed at minimizing the risk of victimization. Such behaviors possibly include refusing survey participation when the purpose of the study is unclear.

Lastly, low levels of physical health (e.g., hearing or visual impairments) and mental health (e.g., memory, cognitive capacity) frequently prevent older persons from participating in surveys (Motel-Klingebiel et al. 2014; Hancock et al. 2003). Researchers need to decide whether the target person is mentally and physically capable of participating as a respondent. If this is not the case, researchers may still seek informed consent to a potential proxy interview. However, difficulties to get respondents' informed consent often hinder survey participation among the most vulnerable respondents (Hall et al. 2009; Maas et al. 2002).

Standard definition of response codes

Comparison of survey non-response is hampered by varying definitions of contact outcomes and outcome rates across studies. Standard definitions of response codes are given by

the AAPOR (2016). In this study, the following codes are used for the description of survey non-response: All interviews with the target or proxy respondent are considered as complete *interviews* (I), irrespective of the amount of item non-response. Eligible cases for which no interview was obtained are considered as non-respondents. These cases are either refusals and break-offs, non-contacts or others. *Refusals and break-offs* (R) include those cases where the target or contact person declined participation and cases in which only a short non-responder interview could be conducted. A case is designated as a *non-contact* (NC) if the target person was unavailable during the field period (i.e., target persons could not be reached at housing unit or no appointment for an interview could be obtained during the field period). The category "*other*" (O) comprises cases where the target or contact person did not refuse the interview but indicated that the target person is mentally or physically unable to do an interview or unable to participate due to language problems. Unknown eligibility includes cases for which it is not known whether an eligible housing unit exists (*unknown household*) and cases in which a housing unit exists, but it is unknown whether an eligible respondent is present in the housing unit (*unknown, other*). Cases that were not contacted during the field period due to time limitations on the side of the interviewers are included in the unknown household category. For the sake of simplicity, we collapse the two subcategories in this article and refer to them as *unknown eligibility* (UE).

The response codes are used to describe the survey participation through the contact, cooperation, response, and refusal rate. The contact rate (CON) measures the proportion of successfully contacted target and contact persons of all eligible cases. It is computed by dividing the number of all cases reached during the survey (interviews, refusals and break-offs, and others) by the number of all eligible cases (interviews, refusals and break-offs, non-contacts, and others) as well as the cases of unknown eligibility:

$$\text{CON} = (I + R + O) / (I + R + O + \text{NC} + \text{UE}). \quad (1)$$

The cooperation rate (COOP) describes the proportion of all interviewed cases of all eligible cases ever contacted (interviews, refusals and break-offs, and others):

$$\text{COOP} = I / (I + R + O). \quad (2)$$

The response rate (RR) is the proportion of interviewed cases of all eligible cases (interviews, refusals and break-offs, non-contacts, and others) plus all cases of unknown eligibility:

$$\text{RR} = I / (I + R + O + \text{NC} + \text{UE}). \quad (3)$$

Finally, the refusal rate (REF) is the proportion of all cases in which a target person refuses to do an interview or breaks off an interview of all potentially eligible cases. It is calculated by dividing the number of refusals by the number of eligible

cases (interviews, refusals and break-offs, non-contacts, and others) as well as the cases of unknown eligibility:

$$\text{REF} = R / (I + R + O + \text{NC} + \text{UE}). \quad (4)$$

It is important to note that our approach of handling target persons that were not contacted due to time limitations during the field period has implications for the outcome rates. We treat these target persons as cases with unknown eligibility (UE). In the calculation of the outcome rates, these cases count as non-interviews. Hence, it is implicitly assumed that they would not have participated if they were contacted. An alternative approach would be to exclude these target persons from the calculation of the outcome rates since it is unclear how they would have behaved if they were contacted. Compared to our approach, this would decrease the denominator of the contact, response, and the refusal rate, resulting in higher estimates of these outcome rates. Our approach of handling unworked cases takes into account the limitations imposed by the short field period. The reported outcome rates represent the lower bound of estimates that could be obtained with our data.

Data and methods

Analyses are based on data from a feasibility study that was conducted as a part of the German research project “Survey on quality of life and subjective well-being of the very old in North Rhine -Westphalia (NRW80+).” A description of the research project can be found in Wagner et al. (2018).

Study design

The feasibility study used a multistage sampling design (TNS Infratest 2016). At the first stage, 3326 individuals from private households and institutional settings were randomly drawn from the resident registers of six communities in NRW (approx. 550 individuals per community). In the second step, a disproportional sampling strategy with stratification by age-group (80–84, 85–89, and 90+ years) and sex was used to select a sample of $N = 1800$ target persons (six “age-group * sex” cells with planned 300 target persons per cell). In order to obtain a sufficient number of cases in hard-to-reach groups, all target persons in institutional settings were included in the sample, irrespective of their age and sex. For some “age-group * sex” cells, the desired number of 300 target persons was not reached. In these cases, additional persons in other age-groups were sampled in such a way that the overall sex distribution of the sample remained balanced (900 male and female target persons, respectively). Table 1 displays the resulting sample and cell frequencies.

The fieldwork period extended from August 12 to October 3, 2016 (approx. 7 weeks). Initially, sampled target persons received an invitation letter that introduced the research project and assured the confidentiality of the collected data. Next, sampled target persons were contacted either personally or by telephone. Target persons should be contacted a minimum of four times before a final “non-contact” code was assigned. Due to the short field period, a total of 293 target persons were not contacted at all. For target persons living in private households, interviewers made an average of 2.0 and up to seven contact attempts before assigning a final response code. For target persons in institutional settings, an average of 1.7 and up to five contacts were necessary.

Interviews were either conducted as computer-assisted personal interview (CAPI) or by telephone (CATI). In cases where the target person was willing to participate, but mentally or physically unable to respond to the interviewer, the interview was conducted with an available proxy person. If the target person refused to participate, the interviewer tried to obtain a short non-response interview. Average interview length (minutes:seconds) differed by interview type (CAPI 28:34, CATI 20:19, proxy interview 9:44, non-response interview 6:07).

Measures

Target person characteristics

Information on target persons’ age and sex was provided from the population registers of the six communities. Target persons’ type of residence was derived from a database of retirement homes in Germany (<https://www.heimverzeichnis.de/>). Age was categorized into three groups: 80–84, 85–89, and 90+ years old. Sex was a dichotomous variable (0 male and 1 female). Type of residence differentiated between living in an institutional setting (=0) or a private household (=1).

Response codes

The definition of response codes followed the AAPOR (2016) guidelines outlined above, and corresponding dichotomous variables (0 = no, 1 = yes) are used in all analyses.¹

¹ Response codes were: I=Interview, R=refusal or break-off, O=other, NC=non-contact, UE=unknown eligibility. For the multivariate analyses, the following dichotomous variables (yes = 1, no = 0) were created from the response codes: contact (yes: I, R or O is true, no: otherwise), cooperation (yes: I is true, no: otherwise), response (yes: I is true, no: otherwise), refusal (yes: R is true, no: otherwise) and other (yes: O is true, no: otherwise). Cooperation only looks at target persons for which contact is true while response looks at all target persons.

Data analyses

In the first step, cross-tabulations of target persons' age, sex, and type of residence are used to give an account of the sample characteristics (Table 1). Additionally, AAPOR outcome rates are given for age-groups, sex, and type of residence (Table 2). In the second step, a series of logistic regressions (Table 3) are used to estimate the effect of age, sex, and type of residence on successful contacting, cooperation among successfully contacted target or proxy persons, survey participation, and refusal to participate. An additional model (Table 4) investigates whether being physically and/or mentally unable to participate or non-participation due to language problems are related to any of the aforementioned factors. In this model, we estimate the risk of having the final outcome code "other" compared to having one of the other outcome codes.

For each outcome, two models were estimated: a base model with just the main effects of target persons' characteristics and an extended model that included an interaction effect between sex * age-group. Interaction effects for sex * age-group were included to check whether target persons' sex and age-group have a combined effect on the examined rates (e.g., if the chance to successfully contact women is especially low in a particular age-group). However, only the base model is reported, because none of the age-group * sex interactions reached significance.

All reported models used design-weighted data. Design weights are computed based on ratios of sampled numbers of each cell in Table 1 ($N=1800$) in relation to corresponding numbers in the simple random sample ($N=3326$) from the entire population within communities. Taylor linearization was used to compute standard errors that take into account the complex survey design (Lehtonen and Pahkinen 2004). Since the use of sampling weights in (logistic) regression

analysis is not without controversy (Winship and Radbill 1994), unweighted models were also estimated. Results for weighted and unweighted models did not differ substantially. The only difference that emerged is discussed in the Results section.

The reported models were run on the sample of eligible target persons who were actually approached during the fieldwork period, excluding two non-eligible cases and the 293 cases that were not contacted due to time limitations. These 293 cases were included in the descriptive analyses of the outcome rates. However, the multivariate models were used to predict target persons' decision concerning survey participation. Therefore, the models should only be based on cases who were approached and actually had a chance to decide whether they participate in the survey or not ($N=1505$). The model for cooperation is based on cases who were contacted successfully at least once (interviews, refusals and break-offs, others; $N=1176$). All models were also estimated with the unrestricted sample that included target persons who were not approached due to time limitations. Results did not differ substantially. All results are available upon request from the authors.

Results

Sample characteristics

Table 1 displays the results of the two-stage sampling procedure. Achieving a random sample with extreme disproportionality (i.e., equally sized age-group * sex cells) compared to the actual distribution of age and gender in the respective population was very hard. Some cell frequencies had to be "explicitly shifted" across design cells to achieve

Table 1 Cross-tabulation of target persons' sex and type of residence by age-group

Design group	Type of residence					
	Institutional setting		Private household		Total	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Age-group = 80–84 (38.1% of total sample)						
Male	22	26.8	420	69.7	442	64.5
Female	60	73.2	183	30.4	243	35.5
Total	82	100	603	100	685	100
Age-group = 85–89 (37.1% of total sample)						
Male	24	21.6	343	61.7	367	55.0
Female	87	78.4	213	38.3	300	45.0
Total	111	100	556	100	667	100
Age-group = 90+ (24.9% of total sample)						
Male	6	5.3	85	25.4	91	20.3
Female	107	94.7	250	74.6	357	79.7
Total	113	100	335	100	448	100

Table 2 AAPOR rates by target persons' characteristics (sex, age, type of residence)

Variable	CON (%)	COOP (%)	RR (%)	REF (%)
Sex				
Male	63.6	42.1	26.8	23.7
Female	67.3	38.9	26.2	24.2
Age-group				
80–84	63.5	38.9	24.7	25.3
85–89	67.3	41.0	27.6	26.1
90+	65.5	42.1	27.6	18.6
Type of residence				
Institutional setting	61.4	36.7	22.5	13.7
Private household	66.2	41.2	27.3	26.0
Total	65.4	40.5	26.5	23.9

CON contact rate, COOP cooperation rate, RR response rate, REF refusal rate

comparable size at higher levels of the design hierarchy (see description of study design). In institutional settings, more women are sampled compared to men across all age-groups (e.g., in the 90+ age-group 107 women vs. 6 men).

Of the 1800 sampled target persons, two cases were identified during fieldwork as being not eligible because they relocated to a place outside of the study area. In total, 476 interviews were realized (386 with target person, 90 with proxy). No interview was obtained for 993 otherwise eligible cases (refusal/break-off 430, non-contact 293, other 270). For the remaining 329 sampled cases, eligibility was unknown due to the nonexistence of the address and non-residency of the target person ($n=36$) or non-contact due to the short field period ($n=293$). Details on the distribution of response codes across age, sex, and type of residence of target persons are given in Table 5 in the [Appendix](#).

Table 2 displays the AAPOR outcome rates for the whole sample and subgroups defined by age, sex, and type of residence. Outcome rates for the whole sample were also calculated with design weights. The contact rate for the whole sample is 65.4% (weighted 66.0%). The cooperation rate for the whole sample is 40.5% (weighted 39.6%). The response rate for the whole sample is 26.5% (weighted 26.1%). Lastly, the refusal rate for the whole sample equals 23.9% (weighted 26.9%). Looking at the outcome rates in specific subgroups reveals variation in survey participation by target persons' characteristics. First, there are differences in contact and cooperation between male and female target persons, while the response and refusal rates seem to be the same for men and women. Results suggest that women are easier to contact but that men are more likely to cooperate once they are contacted. Second, older age-groups (especially those aged

90+) show a higher contact, cooperation, and response rate than the youngest age-group. The refusal rate is lowest and the cooperation rate highest for those aged 90+. Lastly, all outcome rates are higher for persons who live in private households than for those in institutional settings. These results suggest that persons in private households are easier to contact and more likely to cooperate and respond but also more likely to actively refuse participation. However, Table 2 alone does not allow to assess the unique impact of subgroup characteristics on outcome rates. Therefore, we now turn to the multivariate results.

Factors related to survey participation in old age

The likelihood to successfully contact the target or proxy persons (Table 3) is not associated with any of the target persons' characteristics. Contrary to expectation, membership in older age-groups and living in an institutional setting show no negative effect on the accessibility of the target person. Once contact with a target or proxy person has been established, the likelihood that the person cooperates is not associated with any of the target persons' characteristics. Similarly, no significant effects of targets' characteristics on the likelihood of survey participation have been found. The likelihood to refuse participation is associated with type of residence, age, and sex. Women, persons in private households, and persons from the two younger age-groups are more likely to refuse.

In addition, the likelihood of not conducting an interview due to health-related reasons or language problems (Table 4) is related to a target person's type of residence and age: Persons in private households are less likely to be unable to participate than targets in institutional settings. Members of the two younger age-groups have a lower likelihood of being unable to participate. Differences between weighted and unweighted models emerged only in this last model: In contrast to the weighted model, the unweighted model did not show a significant effect of being in the youngest age-group on the risk of being unable to participate.

The findings for response and refusal rates are seemingly paradox: Age, sex, and type of residence are unrelated to the response rate but significantly related to the refusal rate. This pattern of findings can be explained with an example: The reported effect (odds ratio) of sex on the response rate is the ratio of the odds of interview versus non-interview between men and women. No effect of sex on the response rate is found if the ratio of interviews (I) to non-interviews (R, O, NC, and UE) is the same for men and women. Higher refusal (R) among women would usually lead to a sex effect because it decreases the odds of an interview for women compared to men. In the present case, however, lower rates of non-interviews for other reasons than refusal (O, NC, and UE) can compensate for the comparatively

Table 3 Logistic regression of contact, cooperation, response, and refusal rate on type of residence, age, and sex (base model, weighted)

Variable	Contact			Cooperation			Response			Refusal		
	OR	95% CI		OR	95% CI		OR	95% CI		OR	95% CI	
Type of residence (ref.: institutional setting)	1.2	0.84	1.71	1.04	0.72	1.49	1.22	0.88	1.71	2.3	1.58	3.34
Age-group (ref. 90+)												
80–84	1.07	0.74	1.55	0.77	0.54	1.11	0.82	0.59	1.14	1.84	1.29	2.62
85–89	1.36	0.94	1.96	0.93	0.67	1.3	1.02	0.75	1.39	1.73	1.24	2.42
Sex (ref. male)	1.22	0.89	1.69	0.85	0.63	1.13	0.91	0.7	1.2	1.45	1.10	1.92
Constant	1.62	0.9	2.92	1.31	0.73	2.35	0.55	0.32	0.96	0.06	0.03	0.11
<i>N</i>	1505			1176			1505			1505		
<i>F</i> (<i>df</i> , design <i>df</i>)	5.93 (9, 1496)			2.93 (9, 1167)			3.27 (9, 1496)			6.31 (9, 1496)		
Prob > <i>F</i>	< 0.001			0.002			< 0.001			< 0.001		

Models control for sampling points

OR, odds ratio; 95% CI, 95% confidence interval; *F* (*df*, design *df*) = *F* test of overall model fit; Prob > *F* = *p* value of the *F* test

Table 4 Logistic regression of non-interview due to health-related reasons or language problems (AAPOR response code “other”) on type of residence, age, and sex (base model, weighted)

Variable	Other		
	OR	95% CI	
Type of residence (ref.: institutional setting)	0.38	0.27	0.54
Age-group (ref.: 90+)			
80–84	0.63	0.42	0.95
85–89	0.64	0.44	0.93
Sex (ref.: male)	0.79	0.56	1.13
Constant	0.65	0.35	1.22
<i>N</i>	1505		
<i>F</i> (<i>df</i> , design <i>df</i>)	7.79 (9, 1496)		
Prob > <i>F</i>	< 0.001		

Models control for sampling points

OR, odds ratio; 95% CI, 95% confidence interval; *F* (*df*, design *df*) = *F* test of overall model fit; Prob > *F* = *p* value of the *F* test

high refusal rates of women. Put differently: Despite higher refusal rates among women, women’s overall response rate is not lower than that of men because women are less likely to produce a non-interview for other reasons. The same argument holds for the variables age and type of residence.

Discussion

In this article, we gave a detailed description of survey participation among old and very old persons by estimating contact, cooperation, response, and refusal rates. We checked whether these outcome rates vary by target persons’ characteristics and whether there are steps in the survey participation process that are especially crucial in surveying older populations.

Overall, the response rate of 26.5% (weighted 26.1%) in our sample is lower than that found in other German and European aging studies, many of which achieve response rates of over 50%. Minimum age for sample inclusion in these studies (often around 50 years) was substantially lower than in our sample. However, the 2014 wave of the DEAS achieved a similar response rate of 27.1% (Klaus and Engstler 2017).

Results indicate that age itself was not negatively related to contacting, cooperation, and response in our data. Instead, membership in older age-groups was found to be associated with a lower risk of active refusal. However, higher age was also associated with non-response due to health-related reasons. Thus, our results support the idea that a low health status inhibits survey participation among very old persons (Motel-Klingebiel et al. 2014).

Living in an institutional setting had no negative effect on successful contacting, contradicting the idea that interviewers might face a higher amount of uncooperative gatekeepers in institutional than in private settings (Davies et al. 2010). Target persons in institutional settings showed no significantly lower likelihood of cooperation

and response, while those in private households had a higher likelihood to actively refuse participation. However, institutionalized persons were found to have a higher likelihood to produce a non-interview for health-related reasons. One effect emerged for sex of the target persons: Women were more likely to actively refuse participation.

Further, seemingly paradox findings emerged in the multivariate models of the response and refusal rate: Age, sex, and type of residence were unrelated to the response rate but significantly related to the refusal rate. The substantive implication of these findings is that even though we find higher refusal rates for younger people, women, and those in private households, they do not have an overall lower chance of participating in the survey than their respective reference groups. This is due to the fact that they are less likely to produce a non-interview for other (e.g., health-related) reasons. Conversely, lower rates of refusal among those aged 90+, men, and institutionalized persons do not imply that these people are more likely to participate in the survey. Rather than actively refusing participation, persons in these subgroups are more likely to produce a non-interview because of health-related reasons.

Taken together, there is hardly any evidence from our feasibility study of problematic subgroups characterized by joint occurrence of low contact, cooperation, and response rates as well as high refusal rates. Based on our findings, we can nevertheless identify steps of the outlined process of survey participation that are of particular importance for specific subgroups in our sample. With respect to age, the willingness and the ability to participate seem to be such crucial steps: The two younger age-groups are more likely to actively refuse, and members of the oldest age-group are more likely to produce a non-interview due to health-related reasons or language problems. Similarly, the most crucial step for survey participation among target persons in private households and female target persons seems to be the willingness to participate. For institutionalized persons, the ability to participate plays a more important role in the participation process.

Conclusion

Our results generate new knowledge for the study of non-response in surveys of older populations. Overall, results indicate that institutionalized and non-institutionalized people show similar levels of survey participation. These findings lend support to the claim that it is not only mandatory (Kelfve et al. 2013) but also feasible to include institutionalized persons in surveys of older populations. Our analyses also highlight that it is useful to consider all steps of the survey participation process rather than to focus exclusively on response rates. Estimation of contact, cooperation, response, and refusal rates allows to identify not only crucial steps in the participation process but also variation in the participation process across subgroups of the sample. In the present sample, none of the target persons' characteristics was associated with the response rate. However, we were able to find considerable variation in the refusal rate that might have gone unnoticed if we had limited analyses to the response rate. This approach helps researchers to plan recruitment strategies for surveys of very old people by drawing attention to challenges of specific subgroups at specific steps of the participation process. For instance, knowing that persons in private households participate less often because they are more likely to refuse (e.g., not because they are harder to contact) helps to develop recruitment strategies that are tailored to this particular subgroup. Finally, we recommend adherence to AAPOR (2016) definitions of response codes and outcome rates because these standards facilitate comparison of survey participation across studies and provide a toolkit for describing the process of survey participation in detail.

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Appendix

Table 5 AAPOR codes by target persons' characteristics (sex, age, type of residence)

Group		Interview	Refusal and break-offs	Non-contact	Other	Unknown eligibility	Non-eligible	Total
Men	<i>n</i>	241	213	156	118	172	0	900
	%	26.8	23.7	17.3	13.1	19.1	0.0	100
Women	<i>n</i>	235	217	137	152	157	2	900
	%	26.1	24.1	15.2	16.9	17.4	0.2	100
80–84 years	<i>n</i>	169	173	121	93	129	0	685
	%	24.7	25.3	17.7	13.6	18.8	0.0	100
85–89 years	<i>n</i>	184	174	101	91	117	0	667
	%	27.6	26.1	15.1	13.6	17.5	0.0	100
90+ years	<i>n</i>	123	83	71	86	83	2	448
	%	27.5	18.5	15.8	19.2	18.5	0.4	100
Institutional Setting	<i>n</i>	69	42	58	77	60	0	306
	%	22.5	13.7	19.0	25.2	19.6	0.0	100
Private Household	<i>n</i>	407	388	235	193	269	2	1494
	%	27.2	26.0	15.7	12.9	18.0	0.1	100
Total	<i>n</i>	476	430	293	270	329	2	1800
	%	26.4	23.9	16.3	15.0	18.3	0.1	100

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