

# Explaining item-nonresponse in open questions with requests for voice responses

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**Abstract.** Conducting smartphone surveys offers flexibility in collecting various types of responses. Among these various response modalities, voice responses stand out for their potential to facilitate deeper respondent engagement and expression. However, high item-nonresponse rates pose significant challenges to their large-scale use. Therefore, the objective of this study is to better understand whether and to what extent socio-demographic characteristics, technological skills, and survey-related aspects are associated with item-nonresponse. Our preliminary findings suggest that certain socio-demographic groups, including males and respondents with low to medium levels of education, as well as younger respondents (aged 19 to 30 years), exhibit lower item-nonresponse rates. Additionally, respondents with good smartphone skills and those expressing high levels of interest in the survey show lower rates of item-nonresponse. This similarly applies to respondents perceiving the survey as being easy, not long, and not intimate.

**Keywords:** Smartphone surveys, item-nonresponse, open voice questions, respondent characteristics.

## 1 Introduction

Survey agencies have been increasingly adopting web surveys due to their convenience and rapid data collection capabilities [1, 2]. A convenient way to complete web surveys is using a mobile device. Thus, the use of smartphones for web survey completion is increasing worldwide [3, 4, 5].

Smartphones introduce novel possibilities for web survey data collection, such as the acquisition of voice (or spoken) responses to open questions recorded through the built-in microphone. The use of voice input in web survey research is receiving increased attention, especially for its potential to gather detailed information that facilitate a deeper understanding of respondents' attitudes, beliefs, and behaviors [6].

Compared to traditional open text responses, open voice responses offer several advantages. Typing in text can be burdensome and time-consuming for respondents, requiring good literacy and writing skills. In contrast, voice responses require simply pressing a recoding button, enabling respondents to freely express themselves without

engaging in long information retrieval and text formulation processes [7]. Empirical studies comparing text and voice responses highlight the superior depth and richness of information gathered through voice responses [7, 8]. Schober et al. [9] show that voice responses result in notably higher data quality and increased reporting of sensitive information compared to traditional text responses. Similarly, Lütters et al. [10] show that voice responses result in more details, reduced completion times, and lower self-reported response burden than their text counterparts.

Despite the many advantages of requests for voice responses, there are some significant challenges. Voice responses are associated with comparatively high item-nonresponse rates: approx. 25% for voice responses to approx. 5% for text responses [6] and approx. 60% for voice responses to less than 5% for text responses [7]. In addition, Revilla and Couper [11] tested instructions explaining how to record voice responses in order to decrease item-nonresponse, but the authors did not find a decreasing effect. Item-nonresponse rates were still about 40%. Höhne [12] as well as Lenzner and Höhne [13] also show that respondents of younger age and higher survey interest are more willing to provide voice responses.

While existing efforts in the survey literature focus on investigating and improving instructions and technical aspects of voice responses [11], this study focuses on a better understanding of item-nonresponse when it comes to voice responses to open questions in smartphone surveys.

## 1.1 Research Questions

This paper is part of the initial phase of a comprehensive investigation of item-nonresponse in smartphone surveys with requests for voice responses to open questions. The objective of this study is to better understand whether and to what extent socio-demographic characteristics (e.g., age and gender), technological skills (e.g., smartphone skills and internet use), and survey-related aspects (e.g., interest and difficulty) are associated with item-nonresponse.

Through the examination of these factors, our research aims to provide novel insights into the determinants of item-nonresponse when it comes to voice responses. In doing so, we attempt to infer survey design recommendations and strategies for reducing missing data and improving data quality.

However, survey respondents can exhibit different item-nonresponse patterns. We therefore distinguish between *voice skippers* (i.e. respondents who did not respond to any of the open voice questions but to the rest of closed questions) and *voice engagers* (i.e. respondents who responded to at least one of the open voice questions). We address the following two research questions (RQs):

**RQ1.** *Do voice skippers differ from the full sample with respect to socio-demographic characteristics, technological skills, and survey-related aspects?*

**RQ2.** *What socio-demographic characteristics, technological skills, and survey-related aspects drive item-nonresponse in open voice questions when it comes to voice engagers?*

To address these research questions, we leverage data obtained from an experimental study comparing open questions with requests for text and voice responses. In this paper, however, we only focus on voice responses because item-nonresponse poses a much greater threat to voice than text responses (see [6, 7, 11]). A description of the methods and data is provided in the following section (Section 2). We then present our empirical findings in Section 3. Finally, in Section 4, we discuss the implications of our findings and outline avenues for future research.

## 2 Methods and Data

Data was collected in the Forsa Omninet Panel in Germany (November 2021). Forsa drew a cross-quota sample based on age and gender (3-by-2). They also drew three quotas on education. The email invitation included information on the device to be used (smartphone) and a survey link. The first page introduced the topic, outlined the procedure, and included a statement of confidentiality. Informed consent was obtained by Forsa and respondents received modest compensation for their participation.

In total, 1,022 respondents started the smartphone survey with open voice questions, of which 521 (or 51%) respondents dropped out. This leaves us with 501 respondents for analysis. These respondents were on average 48.7 (SD = 14.5) years old, and 48.3% of them were female. In terms of education, 31.2% had graduated from a lower secondary school (low education level), 42.5% from an intermediate secondary school (medium education level), and 26.3% from a college preparatory secondary school or university (high education level).

In this study, we consider eight open questions with requests for voice responses dealing with various topics, such as women at the workplace and media reports. Respondents could skip questions, but they were not provided with a non-substantive option, such as “don’t know.” The open voice questions were preceded by a voice response instruction. We used the open-source “SurveyVoice” [14] tool for recording voice responses. The tool resembles the voice input function of popular instant messengers, such as WhatsApp, and works on both iOS and Android smartphones.

## 3 Results

As this study serves as a preliminary investigation, we solely present descriptive results. More advanced analyses are planned for the full paper.

Our analysis begins by examining the item-nonresponse profiles of respondents who participated in the smartphone survey. Table 1 shows the percentages of respondents by the number of questions they responded to. About 29.5% of the respondents did not provide a response to any of the eight open voice questions. Thus, they fall into the group of *voice skippers*. Conversely, about 57.8% of the respondents responded to all questions or missed just one.

Although respondents’ motives for opting not to respond to any voice questions remains unclear, there are two possible explanations: 1) respondents’ decision may

stem from a change of mind regarding their willingness to respond through voice because it felt too intrusive or 2) some of the respondents may have faced technical difficulties in providing voice responses. Thus, these respondents were not willing and/or not able to respond.

Next, to address the first research question (RQ1), we compare individual characteristics based on the item-nonresponse profile (*voice skippers* and *voice engagers*).

**Table 1.** Percentage of respondents who responded to a certain number of voice questions.

Number of questions responded to	None	1	2	3	4	5	6	7	All
% of respondents	29.5	1.2	0.4	0.8	1.4	2.6	6.4	21.0	36.8

Table 2 compares socio-demographic characteristics, technological skills, and survey-related aspects across the full sample, *voice skippers*, and *voice engagers*. *Voice skippers* tend to be slightly younger, male, and have lower interest in the survey than the full sample.

Since these respondents (*voice skippers*) seem to represent a special subgroup, we exclude them from the subsequent analyses and plan to conduct a more in-depth examination of this group in the full paper. We thus proceed with a detailed analysis of the *voice engagers* to address the second research question (RQ2).

**Table 2.** Comparison of sample characteristics across respondent groups.

Variables	Full sample	Voice skippers	Voice engagers
Age	48.7	47.1	49.3
Gender: Female	48.3	37.8	52.7
Education: Medium	42.5	41.6	42.8
Education: High	26.3	26.4	26.3
Smartphone skills	5.6	5.5	5.6
Internet use	6.0	6.0	6.0
Interest	5.4	4.6	5.7
Difficulty	3.1	3.3	3.0
Length	2.6	2.8	2.6
Intimacy	4.6	4.6	4.6
<i>N</i>	501	148	353

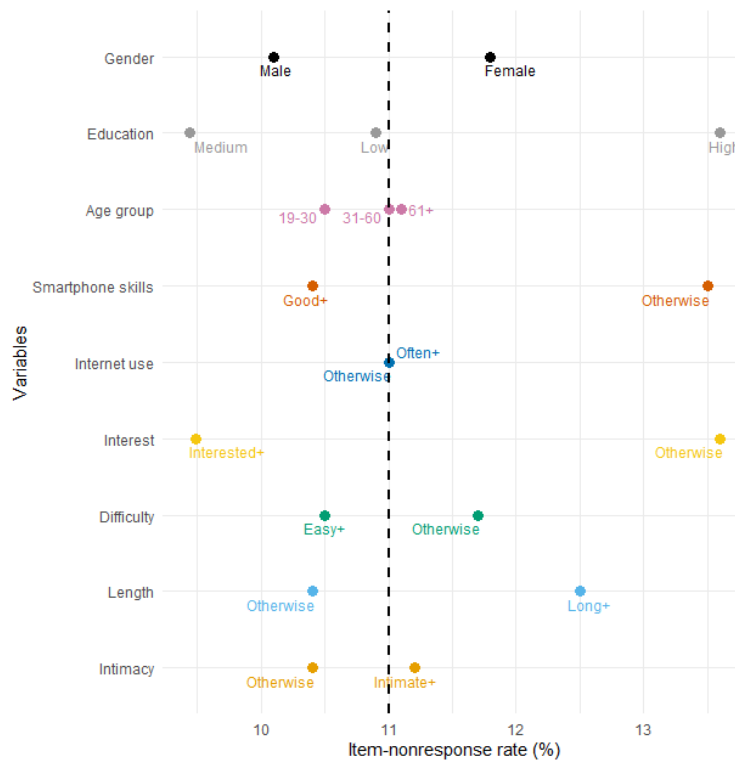
**Note:** We report means for age (in years), smartphone skills (1 “Very bad” to 7 “Very good”), internet use (1 “Not at all” to 7 “Very often”), survey interest (1 “Not interesting at all” to 7 “Very interesting”), survey difficulty (1 “Very easy” to 7 “Very difficult”), survey length (1 “Not long at all” to 7 “Very long”), and survey intimacy (1 “Not intimate at all” to 7 “Very intimate”). For gender (0 “Male” and 1 “Female”) and education (1 “Low,” 2 “Medium,” and 3 “High”), we report percentages instead.

Table 3 shows the item-nonresponse rates by question and topic. On average, item-nonresponse rates are higher for questions associated with respondents' emotions and feelings (Q1 and Q2) and probing questions associated with the understanding of the terms "global citizen" and "civil disobedience" (Q7 and Q8).

**Table 3.** Item-nonresponse rates (INR) for the voice engager group.

Question number	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
INR (%)	21.3	9.3	8.8	7.7	7.9	7.9	10.5	14.4
Question topic	<i>Emotion</i>	<i>Emotion</i>	<i>Refugees</i>	<i>Women</i>	<i>Media</i>	<i>Vaccine</i>	<i>Probe</i>	<i>Probe</i>

Next, we study how item-nonresponse varies across respondents' socio-demographic characteristics, technological skills, and opinions about the smartphone survey (survey-related aspects). For this purpose, we present some descriptive statistics of item-nonresponse rates in Figure 2.



**Fig. 1.** Average item-nonresponse rates in the voice engager group. The dashed vertical line is the average item-nonresponse rate across all eight voice questions.

Focusing on socio-demographic characteristics, we note that item-nonresponse rates tend to be lower among males, respondents with low to medium levels of education, and those who are younger (aged 19 to 30 years). In relation to technological skills, respondents with at least good smartphone skills exhibit lower item-nonresponse rates, while there is no difference with respect to internet use. Regarding survey-related aspects respondents expressing high level of survey interest and evaluate the survey as being easy, not being long, and not being intimate, tend to produce lower item-nonresponse rates.

## 4 Conclusions

In conclusion, this study enhances our understanding of item-nonresponse when it comes to open questions with requests for voice responses, offering novel insights into this complex phenomenon. By distinguishing between *voice skippers* and *voice engagers*, we examined which socio-demographic characteristics, technological skills, and survey-related aspects vary across these two respondent groups. Moreover, we delved deeper into the factors associated with item-nonresponse among *voice engagers* showing that this group only slightly differs from the full sample.

In the full paper, we aim to conduct further, more refined investigations to better understand the characteristics of *voice skippers* and *voice engagers*. We plan to carry out a more comprehensive assessment of item-nonresponse and its drivers including statistical tests in the form of multivariate analyses. This is accompanied by considering further variables, such as response length (or number of words), as a response quality measure.

By continuing our investigations, we aim to provide valuable insights that provide empirical-driven strategies for mitigating item-nonresponse in open voice questions. The findings will be of interest for survey researchers and practitioners potentially contributing to an enhancement of data quality in future smartphone surveys.

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