

## **Mixed-Mode Surveys**

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## Abstract

Mixing survey modes for data collection can have positive effects on response rates, sample balance, and survey costs. However, data collected in multiple modes may also suffer from mode measurement effects. In this Survey Guideline, we give an overview of empirical evidence related to the benefits and drawbacks of using multiple modes for data collection and outline some recommendations for the implementation of mixed-mode surveys. Finally, we provide a brief outlook on the perspectives of mixed-mode surveys in the survey landscape.

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## 1. Introduction

According to an early definition proposed by Dillman and Tarnai (1988, p. 511), mixed-mode surveys use “two or more methods to collect data for a single data set”.<sup>1</sup> As there are numerous combinations of all survey modes, surveys relying on multiple modes for data collection are highly diverse in their appearance. Moreover, mixed-mode surveys differ as to the sequence in which the modes are introduced. While in concurrent designs, respondents can choose to respond via multiple modes from the very beginning, in sequential mixed-mode surveys other modes for data collection are introduced at later stages of the survey (i.e., in subsequent contacts) (de Leeuw, 2018). Finally, there are some special cases of mixed-mode surveys that should be mentioned. This includes (1) Targeted mixed-mode designs in which persons with a high propensity to respond are allocated to the less expensive self-administered modes while reserving the costly face-to-face interviews for persons with a low response propensity (Lynn, 2017); (2) Cross-national surveys (like the World Values Survey), in which different countries pursuing different mode strategies due to country-specific data collection infrastructures and traditions; (3) Surveys in which a mode switch is realized during the response phase for certain questions.<sup>2</sup>

Although mixing modes for data collection can have positive effects on response rates, sample balance, and survey costs, data collected via mixed-mode surveys may suffer from mode measurement effects. These effects may result, for instance, from respondents processing and answering the same question in a different way just because questions and answering options are presented differently in the employed modes. In the following, we will first give an overview of empirical evidence related to the benefits and drawbacks of using multiple modes for data collection (section 2). In section 3, we will outline some recommendations for the implementation of mixed-mode surveys. Finally, we provide a brief outlook on the perspectives of mixed-mode surveys in the survey landscape.

## 2. Empirical evidence

In this section, we briefly report empirical evidence on the effects of mixing multiple modes for data collection on response rates, nonresponse bias, and survey costs. Moreover, we summarize empirical findings related to the most important drawback of mixed-mode surveys, namely mode measurement effects.

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<sup>1</sup> Some authors (Schouten et al., 2013; de Leeuw, 2018) broaden this definition to also include surveys that use other modes of contact than those used for data collection. However, we are in favor of the narrower definition because it excludes, for instance, single-mode face-to-face surveys that use mail announcements to initially contact their target persons or households to be counted as mixed-mode surveys (Tourangeau, 2017).

<sup>2</sup> A prominent example for this case is the Programme for the International Assessment of Adult Competencies (PIAAC) where respondents change to a self-administered mode for the assessment of their competencies (Zabal et al., 2014).

### Effects on Response Rates

Compared to single-mode surveys, using multiple modes for data collection is supposed to increase response rates since different modes are preferred by specific segments of the population (Olson, Smyth, & Wood, 2012). Experimental evidence on the response effect of a mixed- versus a single-mode survey for the general population is, however, rare and inconclusive. Mostly, this evidence stems from pilot studies implemented in large-scale surveys with the aim to increase fieldwork efficiency for future waves. Thus, in additional experimental groups the more costly interviewer-administered survey modes were either complemented or fully replaced by self-administered modes. For instance, in a national health survey in the US, Link & Mokdad (2006) tested mixed-mode conditions in which the mode sequence started with online or mail and was followed by CATI against the CATI-only baseline and found the mixed-mode conditions to substantially increase response rates. For the UK Household Longitudinal Study, however, Bianchi et al. (2017) found no differences in survey response when the web mode preceded the regular face-to-face interviews.

Most recently, several participating countries of the European Values Survey (EVS) tested a self-administered mixed-mode survey (web and mail) against the standard mode, namely face-to-face interviews. These studies yielded mixed, albeit remarkable results (Luijkx et al., 2020). While in Denmark, Finland, and Switzerland the face-to-face condition performed significantly better than the self-administered mixed-mode surveys in terms of survey response, the opposite held true for the Netherlands, Iceland, and Germany. In Germany, for instance, the response rate of the self-administered mixed-mode conditions (concurrent and sequential with varying incentives) was 35.3 percent and thus significantly higher than response in the face-to-face condition (28.0 percent).

Finally, there is experimental evidence on the performance of self-administered mixed-mode surveys compared to the mail-only mode. In five biennial surveys of the residential population of Oregon conducted between 2006 and 2014, Lesser et al. (2016) found consistently higher response rates for the mail-only as opposed to the web-and-mail-condition. Similarly, a meta-analysis including 19 studies conducted by Medway & Fulton (2012) concludes that offering the web and mail mode concurrently results in a significant reduction in the response rates with on average 3.8 percentage points. In contrast, when both modes are offered sequentially starting with the web mode, response rates do not differ from the ones in the mail-only condition (Millar & Dillman, 2011). To explain this phenomenon, Dillman, Smyth, & Christian (2014) and Tourangeau (2017) argue that offering target persons multiple options simultaneously makes things more complicated for them so that some target persons may be inclined to postpone their decision to participate. However, the most recent EVS experiments suggest the concurrent designs to perform slightly better in terms of survey response than the sequential ones, at least for Germany (Wolf et al., forthcoming).

### Effects on Nonresponse Bias

With regard to nonresponse bias, Cornesse & Bosnjak (2018) carried out a meta-analysis and found evidence that the realized samples in mixed-mode surveys are more representative for the target population than those in single-mode surveys. This conclusion is particularly intuitive for web-only versus mixed-mode surveys (including the web mode) since the former excludes certain segments of the population, especially the elderly. In line with this, data from the US suggest a better representation on demographic variables when the mail-mode is offered additionally (Messer & Dillman, 2011). In a similar vein, Bandilla, Couper, & Kaczmirek (2014) found for Germany that introducing the mail-mode brings the sample more in line with the (face-to-face) ALLBUS sample. These findings were also confirmed by Cornesse & Schaurer (forthcoming) for panel contexts. More precisely, this study suggests

that including the offline population either via offering the mail mode or providing the relevant equipment has a long-term positive effect on sample balance, especially with regard to formal education.

In the case of the web-mode complementing interviewer-administered survey modes, hardly any effects on sample composition were reported for the UK Household Panel (Bianchi et al., 2017). Finally, in a direct comparison of a face-to-face survey and a self-administered mixed-mode design, Wolf et al. (forthcoming) in the German EVS experiment found the face-to-face survey to perform slightly better than the self-administered mixed-mode survey (mail and online) in terms of representativeness.

### Effects on Survey Costs

Jäckle, Lynn & Burton (2015) evaluated the effects of the introduction of an additional web mode in the (face-to-face) UK household panel and reported substantial cost-savings since more than 20 percent of the households fully responded online. In the German EVS experiment, Wolf et al. (forthcoming) report that for the self-administered mixed-mode designs costs were less than half than costs for the face-to-face survey.

Cost-savings within self-administered mixed-mode surveys can also result when the modes are introduced sequentially, starting with the web mode (Millar & Dillman, 2011; Messer & Dillman, 2011). In a self-administered mixed-mode community survey recently carried out by GESIS, we experimentally tested the effects of the mode sequence and prepaid incentives on survey response and survey costs. While the response rates did not differ significantly between the concurrent and the sequential groups, we found the latter to reduce survey costs per realized case on average by roughly 15 percent. This is mainly due to the higher overall share of online participants in the sequential design (58 vs. 22 percent).

### Mode Effects

Mode effects can be a pitfall when data is collected in multiple survey modes (Fuchs, 2019). Mode effects have two components, namely mode selection- and mode measurement effects. Mode selection effects refer to respondents' preferences to respond in a particular survey mode. For instance, younger persons are more attracted by the online mode than the elderly so that in a mixed-mode survey offering the web mode as well as face-to-face surveys, we would expect the mean age of online participants to be significantly lower than for face-to-face respondents. Mode selection effects are *wanted* effects since it is precisely the declared objective to integrate different segments of the target population by offering multiple response modes (de Leeuw, 2018).

On the contrary, mode measurement effects are *unwanted* effects and result from different responses due to different modes (de Leeuw, 2018). To understand mode measurement effects, one can imagine the (counterfactual) situation in which the same respondent answers the very same question at the same time yet in different modes. In this situation, the mode measurement effect simply reflects the difference in the answers between the various modes. However, since each person only responds via a single mode, mode measurement effects cannot be directly observed (Vannieuwenhuyze & Loosveldt, 2012).

Mode measurement effects occur because the very same question is presented differently in different survey modes (Dillman, Smyth, & Christian, 2014). A prominent example is the primacy/recency phenomenon, which is related to the visual and oral presentation of a question and its effects on cognitive information processing. For instance, telephone surveys are likely to evoke recency-effects since respondents can better memorize the last-offered answer choices and thus show a higher likelihood of

choosing them (Schuman & Presser, 1981). In contrast, mail surveys are likely to produce primacy-effects since respondents tend to prematurely terminate the answering process as soon as they are faced with an answer choice that is acceptable for them (Krosnick & Alwin, 1987). Mode measurement effects are also common when the survey deals with sensitive topics or behaviour that is regarded as socially desirable. Here, empirical evidence suggests that social desirability and misreporting on sensitive issues is more pronounced in interviewer-administered surveys (e.g., Kreuter, Presser, & Tourangeau, 2009).

Of course, single-mode surveys also struggle with measurement effects. In mixed-mode surveys, however, mode measurement effects may confound with mode selection effects. For instance, if a mixed-mode survey (face-to-face and online) deals with criminal offending, younger sample units might only report higher levels of criminal behaviour because of their higher self-selection into the online mode (mode selection effect) that, in turn, promotes self-disclosure on sensitive topics (mode measurement effect). Vannieuwenhuyze & Loosveldt (2012) show that in such cases strategies to render respondents in both modes comparable (by calibration or matching procedures) violate certain assumptions and are thus not adequate to isolate mode measurement- from mode selection effects. Rather, in order to approach the extent and direction of mode measurement effects, additional data is needed, ideally stemming from a single-mode survey simultaneously carried out.

When it comes to empirical evidence regarding mode effects, the current state of research can be summed up in three statements. First, mode effects do exist but tend to be small in well-conducted mixed-mode surveys (de Leeuw, Hox, & Dillman, 2008; for further details, see section 3). Second, mode-effects vary between different types of survey questions. For instance, basic demographics are less sensitive to mode-effects than attitudinal questions (de Leeuw, 2005). Finally, mode measurement effects are particularly pronounced when self-administered and interviewer-administered modes are combined because of the very different contextual cues of those two types of administration (Tourangeau et al., 1997, Tourangeau & Yan, 2007). Thus, there is a lower risk of mode measurement effects when, for instance, the web and mail mode are mixed for data collection as opposed to a survey that offers a mail- and face-to-face option (de Leeuw, 2018).

### 3. Recommendations

Based on the empirical evidence summarized above, we will now give some recommendations on when (and when not) and on how to mix survey modes for data collection.

#### When and when not to mix modes for data collection

Generally speaking, mixing survey modes for data collection is advisable when researchers have good reasons to believe that using a single mode will result in unequal opportunities and/or preferences of the target population to respond (nonresponse bias). This is the case if, for instance, a researcher considers carrying out a web survey to draw inferences on the residential population of Germany. Apart from the problem to recruit their target persons online, mixing modes is advisable since empirical evidence suggests that, for example, older people are significantly underrepresented in web surveys (Dillman, Smyth, & Christian, 2014). Therefore, complementing the web mode with another survey mode (e.g., mail) is almost inevitable if heterogeneous populations (e.g., with regard to age) are to be surveyed.

In contrast, mixing self- and interviewer-administered modes for data collection is not recommended if the survey deals with sensitive issues or with topics that are prone for socially desirable responding. This

is because the effects of the absence or presence of an interviewer are known to be most pronounced for questions dealing with such issues, and thus mixing these modes may result in serious mode effects, which increase measurement bias (de Leeuw, Hox, & Dillman, 2008). However, a switch to a self-administered mode during the response phase of an interviewer-administered survey to collect data on these issues for all respondents in the self-administered mode is a viable option. The same holds true for mixing within the self- or interviewer-administered modes because the mode measurement error can be expected to be small when the employed modes share the presence or absence of an interviewer.

### Sequencing in a mixed-mode survey

Based on the empirical evidence reported above, we generally recommend offering survey modes to the target persons sequentially, starting with the least expensive one and introducing the more costly survey modes in subsequent contacts. For instance, when implementing a self-administered mixed-mode survey, it is advisable to solely offer the web mode in the first contact and to send the paper questionnaire in subsequent contacts. Moreover, we recommend not to communicate that additional modes will be introduced in subsequent contacts because this may result in similar (negative) effects on response rates as in a concurrent design. However, if, for instance, some target persons contact the survey management to explain that they are not able to respond online, it is, of course, reasonable and advisable to point out that another mode is to follow in the next contact (e.g., a paper questionnaire).

Although we generally recommend sequencing survey modes, concurrent designs may be more beneficial if the survey design includes prepaid incentives (Pforr, 2015). For some recipients, prepaid incentives evoke a moral obligation to comply with the survey request (Becker & Glauser, 2018). However, when prepaid incentives are offered in a sequential mixed-mode design, their intended effect on response rates may reduce the more sample units are faced with a survey mode in which responding is not easily manageable to them. In line with this, in our community survey, we found the effect of prepaid incentives given in the first contact on survey response to be more pronounced in the concurrent than in the sequential mixed-mode design, especially for older target persons. To play out both, the positive effects of prepaid incentives on survey response and the positive effects of a sequential design on survey costs, a targeted mixed-mode approach is a feasible option. In a self-administered mixed-mode survey with prepaid incentives, for instance, it might be promising to sequence survey modes for the majority of the sample while also offering the paper questionnaire to older target persons initially (Wolf et al., forthcoming).

### Questionnaire design in a mixed-mode survey

Generally speaking, when designing a mixed-mode survey, a researcher can pursue two different strategies: In the mode-specific design, the questionnaire is optimized for each mode separately in order to obtain the best possible data for each mode. This strategy is justified only if the researcher is interested in estimates for the entire sample (de Leeuw, Hox, & Dillman, 2008). However, if researchers want to compare subgroups, and group comparisons may be biased due to mode effects, Dillman & Edwards (2016) suggest pursuing the unified mode design. In this strategy, the overarching aim is to ensure measurement equivalence by reducing differences in the questionnaires as much as possible. This includes to employ the same question structure and wording across all modes but also to adapt differences in the question and answer process. For instance, de Leeuw & Berzelak (2016) recommend relying on the auto-advance or carousel question format instead of grid questions in web surveys when additional interviewer modes are used in which questions are read out sequentially. In the perspective of the unified mode design, only the instructions to the interviewer and/or to the respondent remain

"mode-specific" (for detailed guidelines for questionnaire construction in mixed-mode surveys, see Dillman, Smyth, & Christian, 2014, chap. 11). In a similar vein, when integrating the web mode, attention should also be paid to design the survey in a way to reduce differences in the presentation of questions and answer choices to a minimum across various devices (Beuthner, Daikeler, & Silber, 2019; Weiß et al., 2019).

## 4. Outlook

In line with Tourangeau (2017) and de Leeuw (2018), we believe that mixed-mode surveys will experience a growing popularity in the future. This is mainly because the web mode is very attractive in terms of survey costs, and internet penetration is approaching saturation at least in developed societies. Moreover, the generational change will result in more people who habitually use the Internet for various purposes. However, for representative surveys of the residential population, single-mode web surveys are not feasible because it lacks an adequate sampling frame that allows researchers to recruit participants online. Thus, researchers have to employ another mode for communication with the sample units if they want to integrate the web mode in a representative population survey – and this will mostly be mail. When researchers contact their target persons via mail to invite them for an online survey, the idea to additionally offer a paper questionnaire (at least in subsequent contacts) is rather obvious, especially because empirical evidence suggests that web-only surveys do not cover all segments of the target population. Finally, self-administered mixed-mode surveys have been proven (at least in Germany) to be a viable and considerably cheaper alternative to face-to-face surveys in terms of response rates, sample balance and data quality. Currently, this result is even more important since the ongoing corona pandemic requires physical distancing and thus complicates collecting data in face-to-face surveys (Kohler, 2020; Gummer et al., 2020; Sakshaug et al., 2020). In sum, we believe that especially self-administered mixed-mode survey will further increase in importance in the survey landscape.



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