

## **Memorandum**

**Date:** 25 March 2022

**To:** Margo Schwab, Desk Officer  
Office of Management and Budget

**From:** Emilda B. Rivers, Director  
National Center for Science and Engineering Statistics  
National Science Foundation

**Via:** Suzanne Plimpton, Reports Clearance Officer  
National Science Foundation

**Subject:** Request for approval to conduct a research study examining the feasibility of using a smartphone app

### **Background**

The National Center for Science and Engineering Statistics (NCSES) within the National Science Foundation (NSF) plans to conduct a research study examining the feasibility of using smartphone apps for survey data collection purposes. The research is designed to lay the groundwork for the possible future use of smartphone apps to complement current NCSES data collection options and will specifically study respondent interactions with an app under modularized and non-modular (traditional) designs. This research is the second phase of exploratory research on this topic, following a qualitative data collection effort in 2021 that used participatory design workshops to understand respondent preferences for app features and modular survey delivery. This research is conducted under the generic clearance for survey improvement projects (OMB number 3145-0174).

This research request is to conduct a split-ballot experiment comparing the effectiveness of three new app-based approaches (two of which are modularized) to that of a conventional web survey. The experiment will include a total of 600 participants (150 participants per experimental condition) who complete a survey with content similar to NCSES typical survey content (e.g., asking about employment). The participants will be U.S. adult iPhone users who are currently working for pay. The design is not intended to align with any specific survey population but roughly inform any of the NCSES education and workforce surveys.

### **Purpose of research**

Current NCSES surveys prompt respondents to complete the entire questionnaire in one sitting, which may be perceived as burdensome for lengthy surveys. There are potential benefits of dividing these surveys into shorter parts (or modules) so that respondents can complete the different parts of a survey at their convenience. To date, however, there have been very few studies conducted to examine the best practices for modularizing surveys.

The goals of this study are to develop a smartphone app that deploys two different types of modular surveys and one traditional (non-modularized) survey, and then compare them with a conventional web survey in a randomized experiment to evaluate respondent interactions with the app and gather feedback on the experience. A supplementary embedded experiment will test different voice input features. Results from the project will allow NCSES and other survey researchers to make informed decisions about how best to design modular surveys and collect open ended text responses successfully via a smartphone app.

## **Participants**

The participants for the study will be persons 18 years of age and older who speak English and are currently residing in the 50 states and the District of Columbia. In addition, participants must be iPhone users who are currently employed. The rationale for these eligibility criteria is as follows:

- The smartphone app for the study is being developed for a single device (in this case the iPhone). Using a uniform interface and platform (i.e., Apple iOS) standardizes the app across the experimental conditions and simplifies the experimental factors to one platform. We realize the use of an iPhone limits the generalizability of our results to other smartphone types but the benefit of the simplification of the experimental conditions at this research phase outweigh the generalizability. In order to download the app, participants need to use an iPhone.
- A large share of questions in the survey are about current employment and job duties. In order to answer these questions, participants must be currently working for pay or profit.

## **Data Collection Methodology**

Participants will be recruited from two separate sources.

- *Previous NCSES survey.* A set of respondents to a previous (but dormant) NCSES survey of adults with research PhDs will be invited to participate in this research. NCSES will send 1,500 recruitment emails to randomly selected individuals from the eligible respondent sample to request participation in the study. The target sample size from this source is 300 participants. To ensure that the number of participants does not exceed this number, NCSES will send recruitment emails in batches of 500 and recruitment will stop when the target sample size (of 300 participants) is reached or all recruitment emails have been sent, whichever comes first. The email message will notify the recipients that the information they provide in the smartphone app study is not protected by NCSES, but instead falls under the

University of Michigan and University of Maryland data protections (the study was approved by both institutions' IRBs). The content of this recruitment email can be found in Attachment A. This recruitment strategy is the same used for the participatory design research on this topic, conducted last year.

- *Forthright panel.* After recruiting participant from a previous NCSSES survey, the study will use *Forthright* (beforthright.com), an online panel service. This effort is intended to diversify the sample. The study will be set up in *Forthright* to recruit as many participants as needed to reach the overall target sample size of 600 participants (e.g., if the NCSSES sample yields 100 participants then the goal will be to recruit 500 participants from the *Forthright* panel). The study instructions for participants will indicate that it falls under the University of Michigan and University of Maryland data protections. The full set of instructions can be found in Attachment B.

People contacted from both recruiting sources will be directed to complete a short online screener survey hosted by the University of Maryland. The first page of the screener survey will collect essential information to determine the eligibility of the participants, like type of smartphone and if working. Eligible participants will be able to proceed to the next page. This page will be a digital consent form where consent is indicated by selecting a radio button. Those participants who provide consent will be able to proceed to the next page containing additional background questions. At this point they will be randomized into an experimental group. The final page will provide a hyperlink (and QR code for the app-based conditions) that is tailored to the experimental condition to which the recipient is randomly assigned. It will direct participants assigned to the web-based condition to a web survey and participants assigned to the app-based conditions will be directed to an app download page. This hyperlink will also be sent to participants via email when they complete the screener. As a reminder, it will be sent again to those who have yet to download the app approximately three days after completing the screener. This is the only reminder they will receive. The screener questions and consent form can be found in Attachment C. The reminder email message can be found in Attachment D.

In the experiment, participants will be randomly assigned to answer the same survey questions using one of four methods:

1. Modular, timed release of modules: Modular approach administered via a smartphone app, with one of 7 modules delivered every other day, in a specific sequence. Respondents will receive one module every other day over a period of two weeks via the survey app. All past modules will remain open as new ones become available.
2. Modular, all modules at once: Modular approach administered via the smartphone app, with all modules available at once. Respondents will receive all of the modules at once and be encouraged to complete them on their own schedule via the survey app.
3. Non-modular, smartphone survey: All questions at once administered via the app (i.e., not modularized). Respondents will be encouraged to complete the full survey in one

sitting via the survey app. They will be permitted to save their progress and come back and finish the survey before it closes, as is typical procedure for a web survey.

4. Non-modular, traditional web survey (control group): All questions at once administered via an online survey. Respondents will be encouraged to complete an online survey in one sitting via a web browser using their choice of device. They will be permitted to save their progress and come back and finish the survey before it closes, as is typical procedure.

In all conditions, the length of the data collection period is 16 days – participants have that amount of time to complete the main survey after being invited to participate in it.

In parallel to this experiment, a supplemental experiment investigating voice input features will be included. All respondents in the three app-based conditions will be randomly assigned to conditions that prompt them to answer three open-ended questions at the end of the main survey with either a) a regular text box, b) a dictation button to turn their voice into text, c) a record button to directly upload voice answers, or d) their preferred method (i.e., text box, dictation button, and record button). This experiment is conducted to evaluate survey respondents' willingness to use voice recording features in the app, as well as to examine the impact of voice features on response quality. Participants may choose to skip these questions if they wish. If they do submit an answer via the record button, their words will be transcribed to text in real-time by the smartphone app and stored as text. We will not audio record their voice. Therefore, no voice recordings will be collected or stored.

The study questionnaire will consist of approximately 65 questions adapted mostly from the National Survey of College Graduates (NSCG) and the General Social Survey (GSS). In the first two experimental conditions, the questions will be divided into 7 modules. The full survey is expected to take approximately 30 minutes in total, regardless of whether the questions are presented all at once or divided into modules. The questions are about topics such as occupation, work activities, salary, attitudes, and demographic information. The seventh and final module will include debriefing questions that inquire about participants' experience with the survey. Those participants in the app-based conditions who start the survey but fail to complete it will be sent an email inviting them to answer the debriefing questions via a web browser. The full questionnaire, showing the division of the questions into modules, is provided in Attachment E.

## **Analysis Plan**

A quantitative analysis will be performed to evaluate data quality and respondent behavior across the experimental conditions. The analysis will focus on the following metrics and indicators: completion rates, time spent responding, frequency of accessing the app, attrition, item missing rates, overall fraction of missing information, indicators of response quality (e.g., length of answers to open questions, straightlining on grid questions, rounding on questions that solicit numeric answers), and perceived ease and convenience of the survey. Analysis will be conducted overall, by experimental group, and by key demographics like education and smartphone usage.

The summary report will describe these results and provide an interpretation of how they might be used to inform the design of a smartphone app for data collection.

## **Burden Hours**

The study has an estimated total burden of about 511 hours. This is comprised of five components.

1. Contact burden – initial recruitment: Selected cases will receive a brief recruitment invitation that should take no more than 30 seconds to read. It is expected that no more than 3,000 sample members will receive and read the email. This results in a maximum of 25.0 burden hours  $((3000 * .5)/60)$ .
2. Screener survey burden: On average the screener survey and consent will take 3 minutes to complete. Recruitment activities will continue until 600 participants have completed the main survey. It is anticipated that recruitment can stop after about 800 individuals have completed the screener and consent (under the assumption that approximately 75% of them will eventually complete the main survey). This results in 40.0 burden hours  $((800 * 3)/60)$ .
3. Contact burden – invitation to main survey: The invited cases will receive two emails with a hyperlink to the main web survey or survey app. In addition, those participants in the app-based conditions who breakoff during the survey (estimated to be 50 participants) will be sent an email inviting them to answer the questions about their experience with the survey. Each of these emails may take approximately 1 minute to read. The total burden is estimated at 20.8 hours  $((600*1)+(600*1))+(50*1))/60)$ .
4. App download burden: Participants randomly assigned to the app-based conditions must download an app to their smartphones to participate in the study. The download process may take approximately 15 minutes. It is anticipated that the target sample size in the app-based conditions of 450 participants will be reached after 500 individuals have download the app (under the assumption that approximately 90% of them will eventually complete the main survey). This results in 125.0 burden hours  $((500 * 15)/60)$ .
5. Main survey burden: For those who complete the whole survey, it will take 30 minutes, resulting in at most 300.0 hours  $((600 * 30)/60)$ .

**Total Burden estimate** (hours):  $510.8(=25.0 + 40.0 + 20.8 + 125.0 + 300.0)$

## **Payment to Participants**

All participants will receive \$15 in compensation for completing the survey. Participants randomly assigned to the app-based conditions will be offered an additional \$10,

conditional on completing the survey, as compensation for the extra task of downloading the app as well as any cellular data used for the download.

The way the incentive payment is delivered will depend on how a participant was recruited. Those participants recruited from previous NCSES surveys will receive an electronic gift card. Those participants recruited from *Forthright* will receive payment directly through the *Forthright* platform, conditional on completing the full survey.

## **Informed Consent**

The online screener survey will display the full consent form and let people click a radio button to indicate consent to the following statement: “I confirm I am at least 18 years of age; I have read this consent form or have had it read to me; my questions have been answered to my satisfaction; and I voluntarily agree to participate in this research study.” Upon request, participants will receive a copy of the consent form for their records.

The consent form and project plan were approved by Institutional Review Boards at the University of Maryland and the University of Michigan .

## **Schedule**

The tentative schedule for the study is as follows:

<b>Proposed Date</b>	<b>Activity/Deliverable</b>
April 22, 2022	Start recruiting
May 20, 2022	Finish data collection
August 28, 2022	Final report and recommendations

## **Attachments**

Attachment A: Recruitment email

Attachment B: *Forthright* study instructions

Attachment C: Screener survey and digital consent form

Attachment D: Invitation and reminder emails to main survey

Attachment E: Main questionnaire