# Leveraging Recent Technology for Data Collection


## Christopher Antoun

Assistant Professor
College of Information & JPSM
University of Maryland


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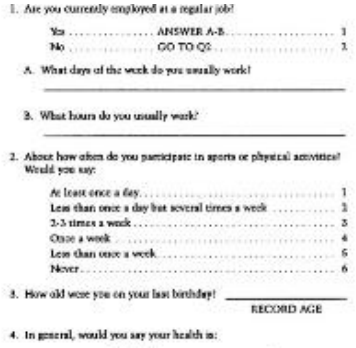
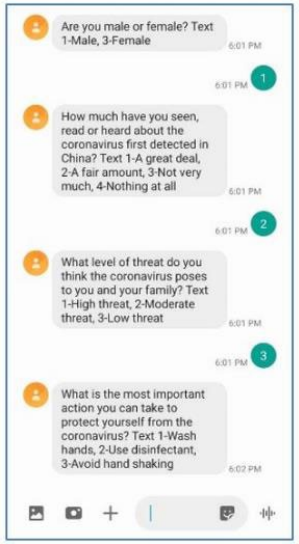
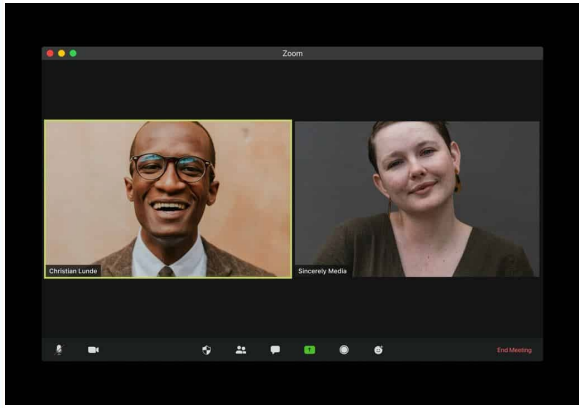
Plenary Session
Federal Computer Assisted Survey Information Collection (FedCASIC) Workshop

# Survey methods over time

- Over the years, surveys have adapted to marked changes in communication technology
- This can change **who responds**, **how they respond**, and **what can be measured.**



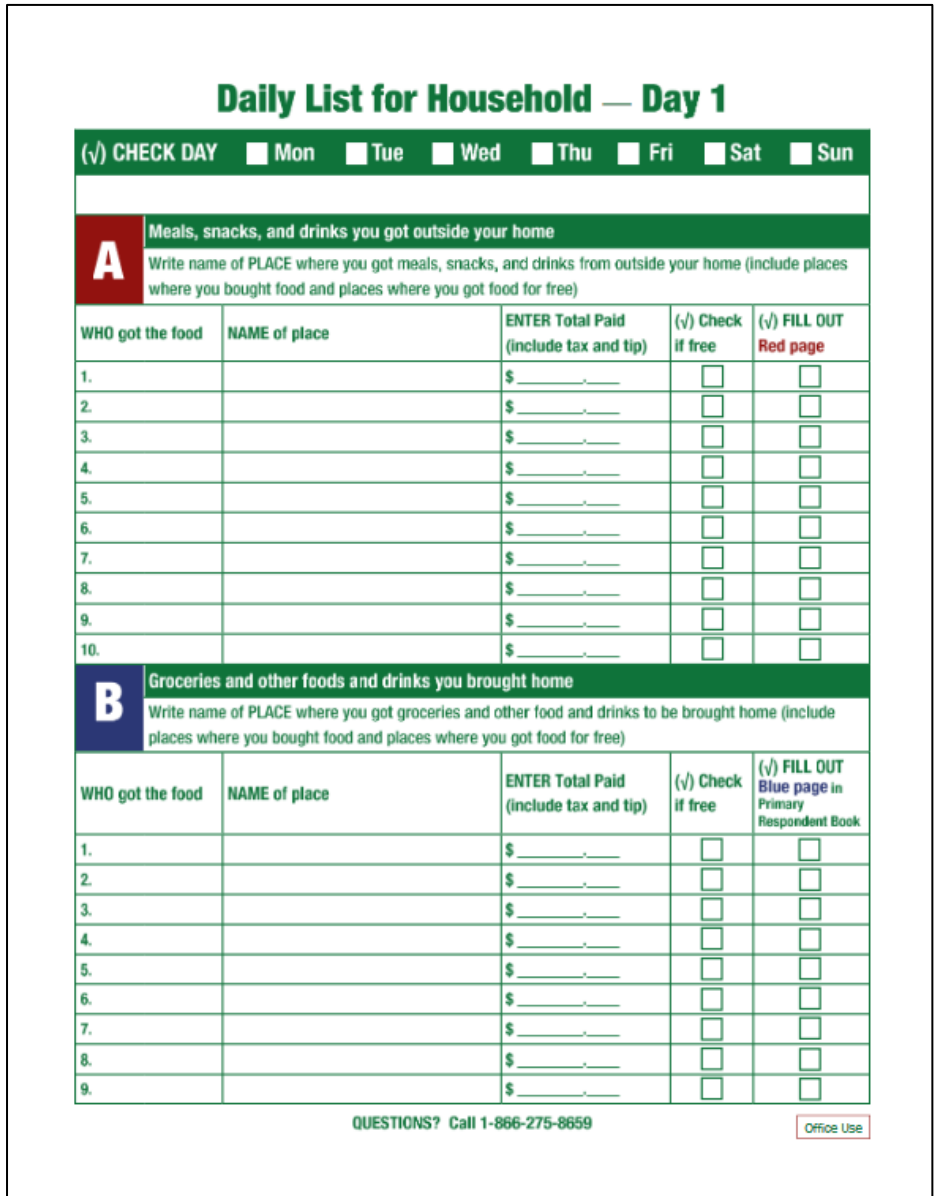



# Adapting to recent technology

- Key questions:
  - What communication technology are people using today, and how will it continue to develop?
  - What changes will this bring to survey data collection?
- Two relevant paradigms:
  - Technology “forcing” surveys to adapt to remain viable
  - Opening up opportunities to imagine something new

# Motivating example: National Household Food Acquisition and Purchase Survey (FoodAPS)



**Daily List for Household — Day 1**

(√) CHECK DAY ☐ Mon ☐ Tue ☐ Wed ☐ Thu ☐ Fri ☐ Sat ☐ Sun

**A** Meals, snacks, and drinks you got outside your home

Write name of PLACE where you got meals, snacks, and drinks from outside your home (include places where you bought food and places where you got food for free)

| WHO got the food | NAME of place | ENTER Total Paid (include tax and tip) | (√) Check if free | (√) FILL OUT Red page |
|---|---|---|---|---|
| 1. | | $ ____.____ | ☐ | ☐ |
| 2. | | $ ____.____ | ☐ | ☐ |
| 3. | | $ ____.____ | ☐ | ☐ |
| 4. | | $ ____.____ | ☐ | ☐ |
| 5. | | $ ____.____ | ☐ | ☐ |
| 6. | | $ ____.____ | ☐ | ☐ |
| 7. | | $ ____.____ | ☐ | ☐ |
| 8. | | $ ____.____ | ☐ | ☐ |
| 9. | | $ ____.____ | ☐ | ☐ |
| 10. | | $ ____.____ | ☐ | ☐ |

**B** Groceries and other foods and drinks you brought home

Write name of PLACE where you got groceries and other food and drinks to be brought home (include places where you bought food and places where you got food for free)

| WHO got the food | NAME of place | ENTER Total Paid (include tax and tip) | (√) Check if free | (√) FILL OUT Blue page in Primary Respondent Book |
|---|---|---|---|---|
| 1. | | $ ____.____ | ☐ | ☐ |
| 2. | | $ ____.____ | ☐ | ☐ |
| 3. | | $ ____.____ | ☐ | ☐ |
| 4. | | $ ____.____ | ☐ | ☐ |
| 5. | | $ ____.____ | ☐ | ☐ |
| 6. | | $ ____.____ | ☐ | ☐ |
| 7. | | $ ____.____ | ☐ | ☐ |
| 8. | | $ ____.____ | ☐ | ☐ |
| 9. | | $ ____.____ | ☐ | ☐ |

QUESTIONS? Call 1-866-275-8659

Office Use

- Collecting food acquisition data brings challenges
  - Nonresponse / attrition
  - Missing events and prices
  - Burden and recall error
- Can recent technology help?

# Workshop and special issue: Themes

## Editorial: Recent Advances in Survey Methods for Collecting Food Data

PDF Print

Elina T. Page, USDA Economic Research Service, USA
Christopher Antoun, University of Maryland, USA
Jeffrey Gonzalez, U.S. Bureau of Labor Statistics, USA
Linda Kantor, USDA Economic Research Service, USA
Florian Keusch, University of Mannheim, Germany
Lauren Miller, USDA Economic Research Service, USA
Alexander Wenz, University of Mannheim, Germany

20.11.2023

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- Newer technology and data types (smartphone apps, receipt scanning, in-store purchase data) bring exciting opportunities, but **need careful evaluation**
- **Different perspectives** are important: substantive researchers, data scientists, survey methodologists, privacy advocates…

# Survey design: multiple stakeholders with different needs

**Respondents**

(burden, accessibility, trust, privacy)

**Designers/Data producers**

(cost, time, operations)

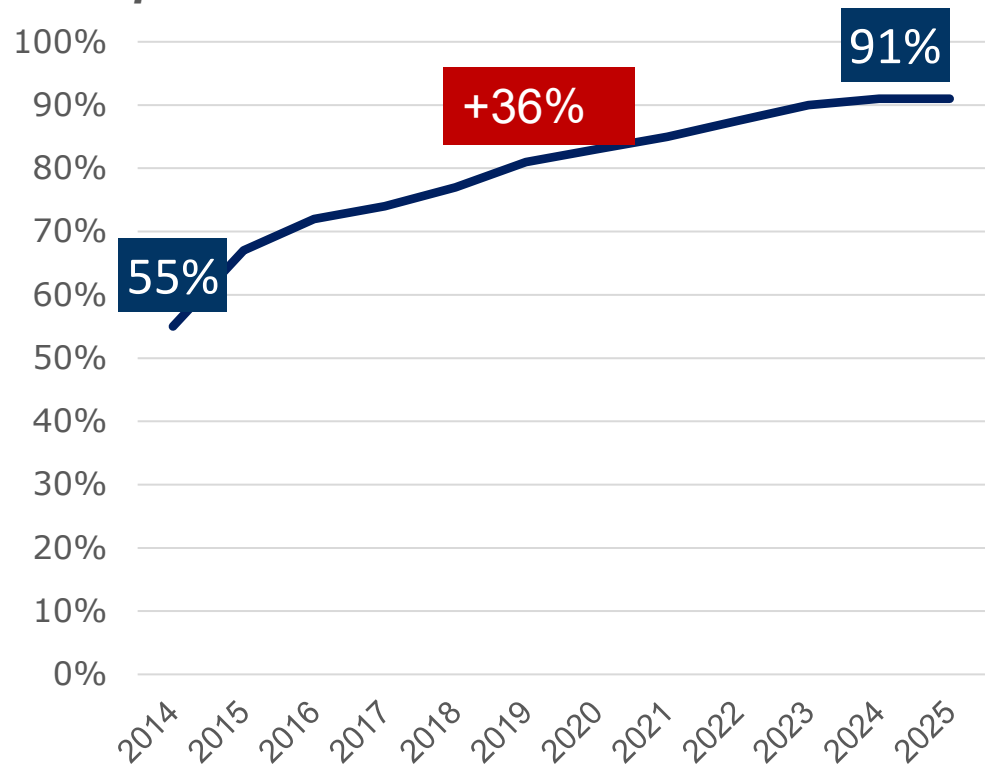
**Data users**

(quality)

# Why study smartphones specifically?

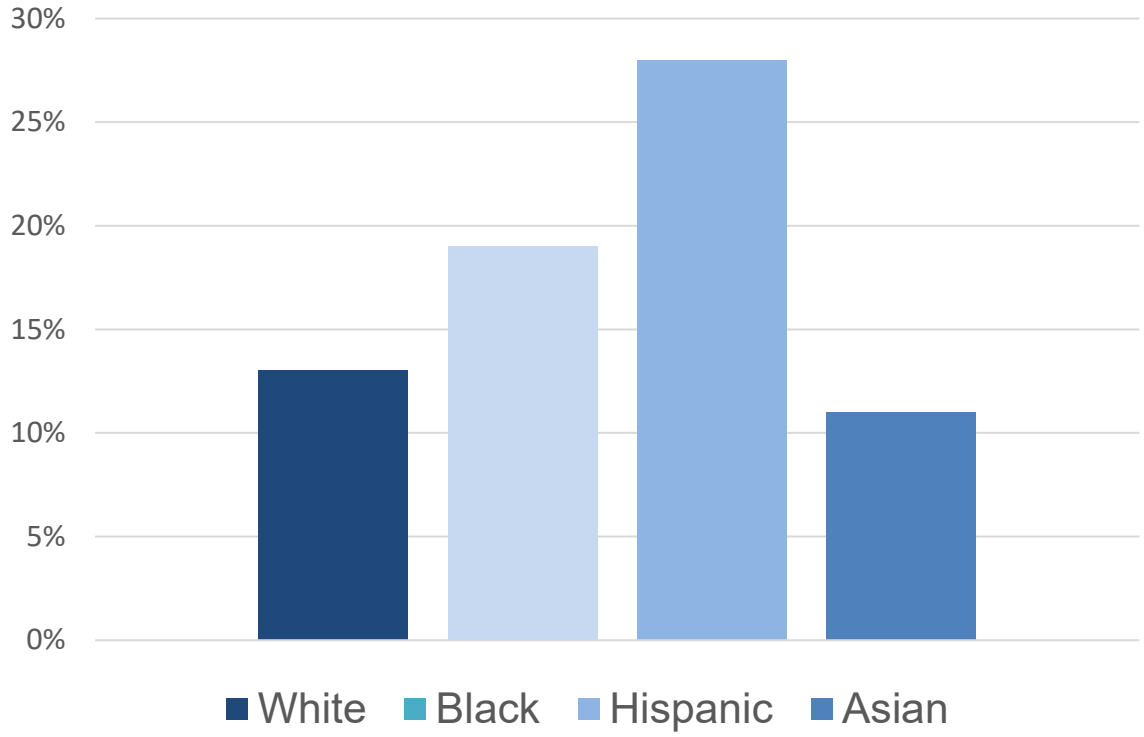
- Adoption is high and growing

*% of U.S. adults who use smartphones*




- Some groups are “smartphone-dependent”

*% of U.S. adults who are “smartphone-dependent”, by race and ethnicity (2025)*




Source: Pew Research Center Surveys of U.S. adults conducted 2014-2025.

# Four design decisions researchers face

1. **Device effects:** Can we trust web survey responses on smartphones?
2. **User interface design**: Which mobile UI choices measurably change input error/usability?
3. **Survey burden.** Should we modularize – what are impacts on data quality?
4. **In-the-moment:** How and when should we measure in real time (vs. retrospectively)?

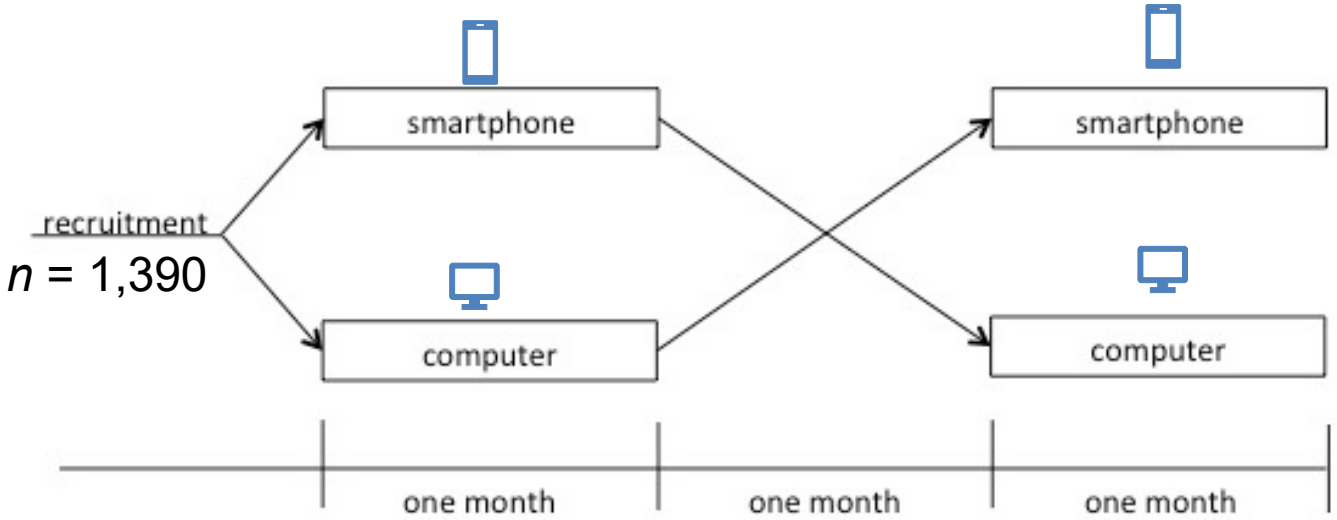
# Decision 1: Allow/encourage smartphone completion for web surveys?

- Key concerns:
  - Does mobile increase **satisficing** or reduce **disclosure**?
  - Does mobile change the **context of responding** (interruptions, multitasking)?
  - Are there other consequences (completion time, breakoff)?

# Project 1: Mobile vs PC web responses

(Antoun et al. POQ 2017, Antoun et al. JSSAM 2019, Antoun & Cernat SSCR 2020)

- **Methods:**
  - Two-wave crossover design in probability-based web panel (Dutch population)
  - Sensitive items (disclosure) + cognitively burdensome questions (satisficing)
  - Debriefing questions: context of use; Paradata: response times



# Project 1 findings

- Response quality was not “worse” on smartphones -- but completion times were longer and context differed.
  - **Quality:** no meaningful device differences in disclosure or satisficing (on average)
  - **Time:** smartphone completion **~1.4× longer** (especially for some formats, e.g., sliders)
  - **Context:** smartphone respondents more likely to be **around others** and **multitasking**

# Project 1 implications

- Allow mobile web completion -- but design for different context of use (fragmented attention, interruptions)
- Expect longer completion time on mobile, even for mobile optimized instruments; monitor time/breakoff by device
- Design the questionnaire with mobile users in mind

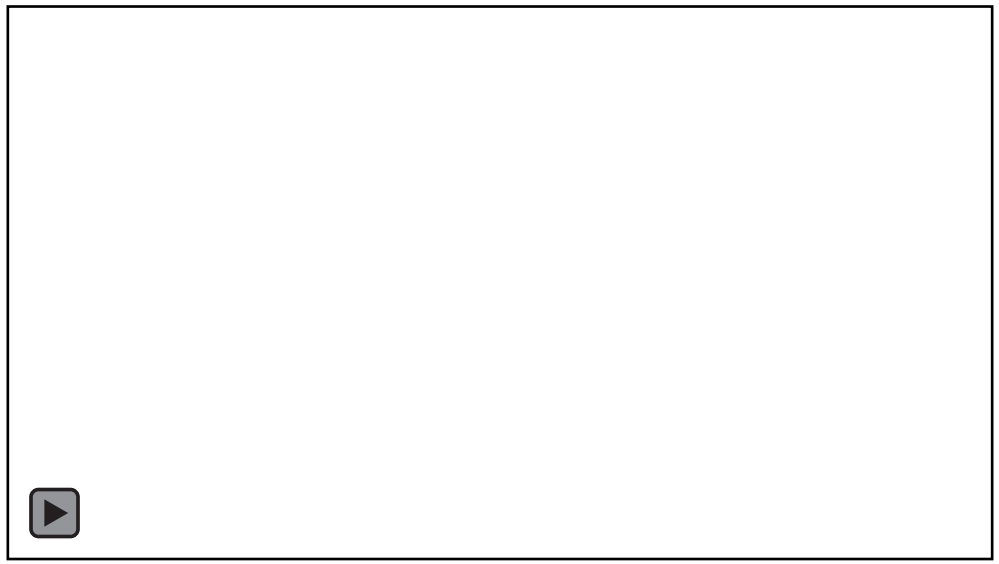
# Decision 2: How to design for mobile?

- Key concerns:
  - Small UI details can cause systematic **measurement error**
  - UI risk is often **differential** (older adults, motor/vision limitations, small screens).

# Project 2: What UI choices affect input error?

(Olmsted-Hawala et al. 2018; Antoun et al. 2020, Rivas et al. 2022; Wang & Mathew 2025)

- **Methods:**
  - Within-subjects experiment in a custom app
  - Many combinations for target size x spacing
  - Measures accuracy (touch success) + efficiency (touch time)
  - Sample of older adults (n= 52) recruited in-person at senior centers (mean age = 69)



# Project 2 findings

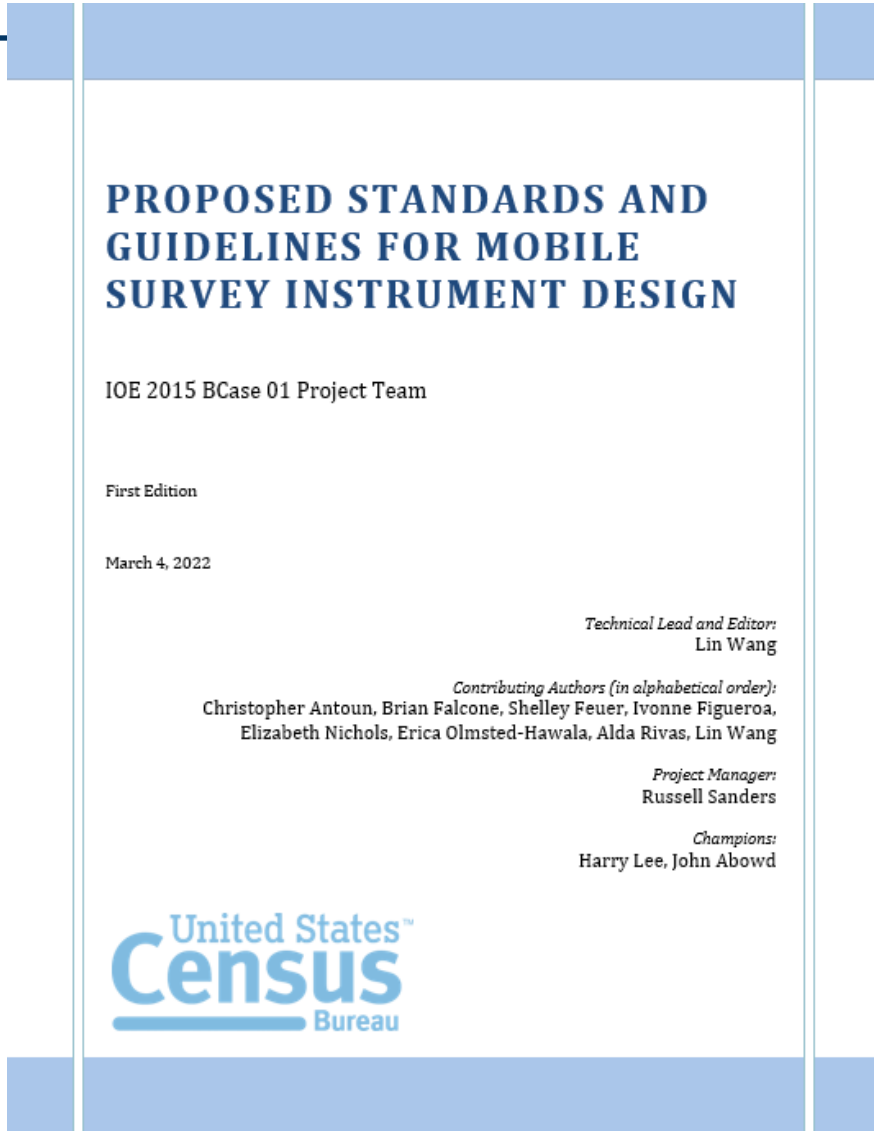
- Target size strongly affects accuracy and speed; change point ≈ 6mm.
  - As target size ↑ , touch time ↓
  - As target size ↑ , success rate ↑
  - Biggest gains to up ≈ 6mm; diminishing return after
  - No spacing effects detected

| Target Size (mm) | Target-touch Success Rate (%) |
|---|---|
| 2 | 18.5 |
| 3 | 35.9 |
| 4 | 53.9 |
| 5 | 75.0 |
| 6 | 86.8 |
| 7 | 90.4 |
| 8 | 92.7 |
| 9 | 94.6 |
| 10 | 97.7 |
| 11 | 99.6 |

***Implication:*** *set default targets ≥6mm for key inputs; treat smaller targets as a quality risk.*

# Project 2 implications

- Off-the-shelf mobile UI design might not be optimal for all respondent groups
- UI research in the context of surveys can provide empirical basis for design specs/standards
  - example: Census mobile standards
- The goal: make “mobile-optimized” specific and testable



PROPOSED STANDARDS AND GUIDELINES FOR MOBILE SURVEY INSTRUMENT DESIGN

IOE 2015 BCase 01 Project Team

First Edition

March 4, 2022

*Technical Lead and Editor:*
Lin Wang

*Contributing Authors (in alphabetical order):*
Christopher Antoun, Brian Falcone, Shelley Feuer, Ivonne Figueroa, Elizabeth Nichols, Erica Olmsted-Hawala, Alda Rivas, Lin Wang

*Project Manager:*
Russell Sanders

*Champions:*
Harry Lee, John Abowd

United States Census Bureau

# Decision 3: Should we modularize long surveys?

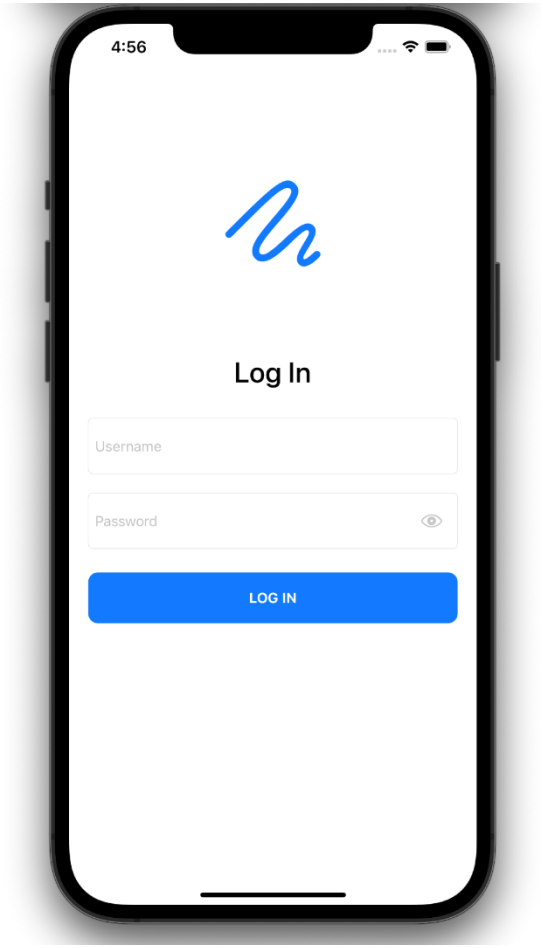
- Hypothesis:
  - Modularization can reduce perceived burden and satisficing…
  - …especially if delivered via an app…
- Risk:
  - …but may have unintended consequences (breakoffs).

# Project 3: Modular design

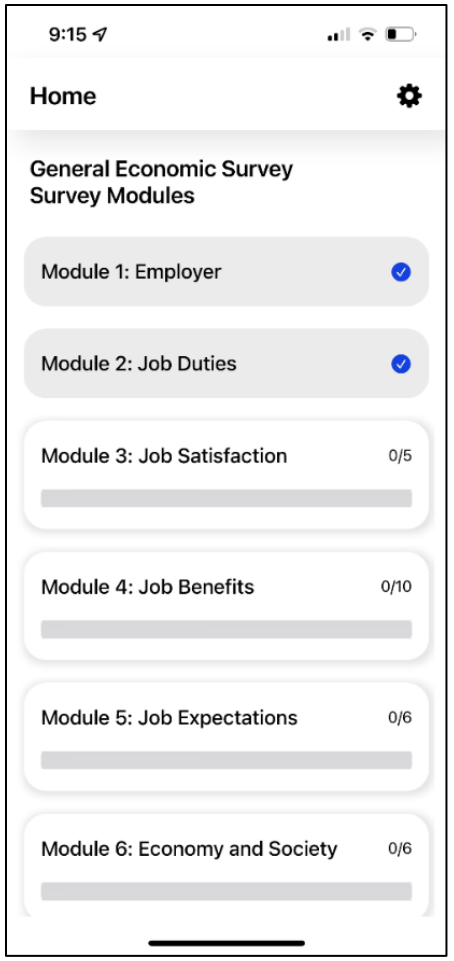
(Antoun et al. Field Methods 2025, Antoun et al. JSSAM 2025)

- Experiment (n = 664) comparing:
  - Web survey
  - App (not modular)
  - Modular app (modules available together)
  - Time-release modular app (modules released over time)
- Sample
  - Participants recruited from previous U.S. national survey (of PhD graduates) a nonprobability web panel
- Outcomes:
  - Perceived ease, satisficing indicators, breakoffs

# Project 3 – Screenshots of the app

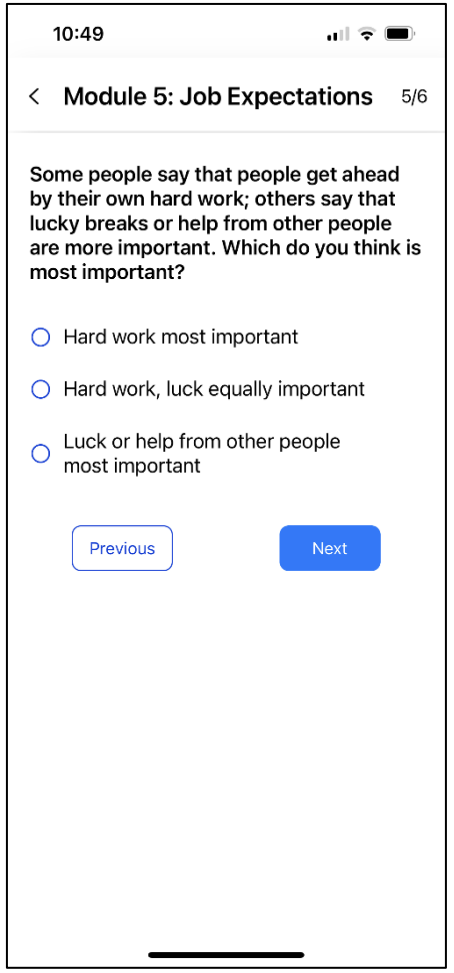



**Login**



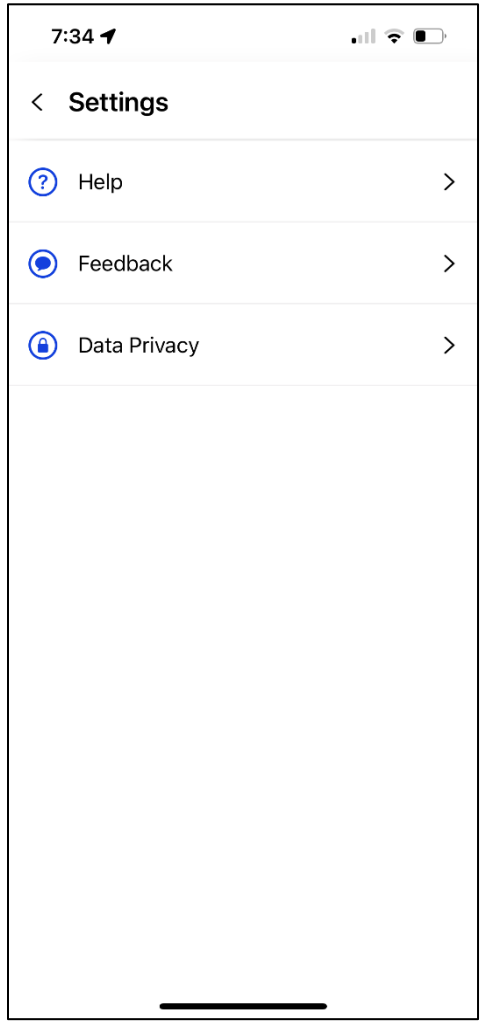

**Home**

Different versions of this screen use for experiment



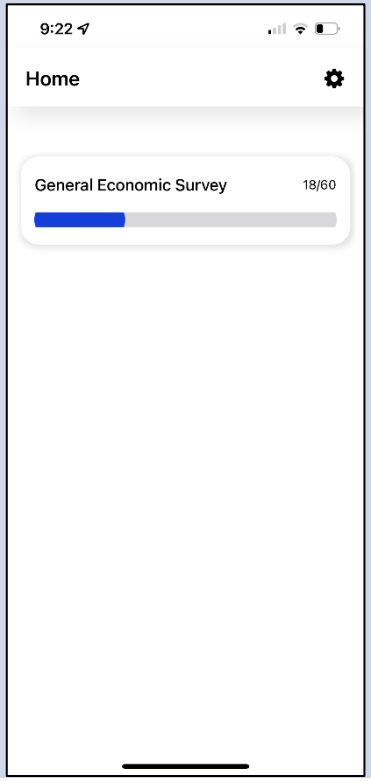
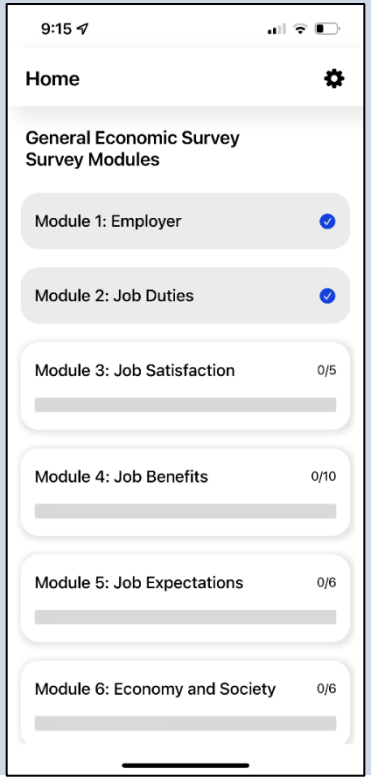
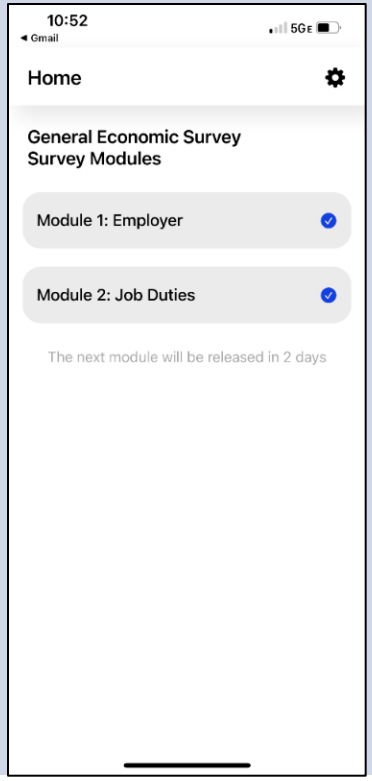

**Questionnaire**

58 Qs + debriefing Qs




**Help**

# Project 3 experimental design

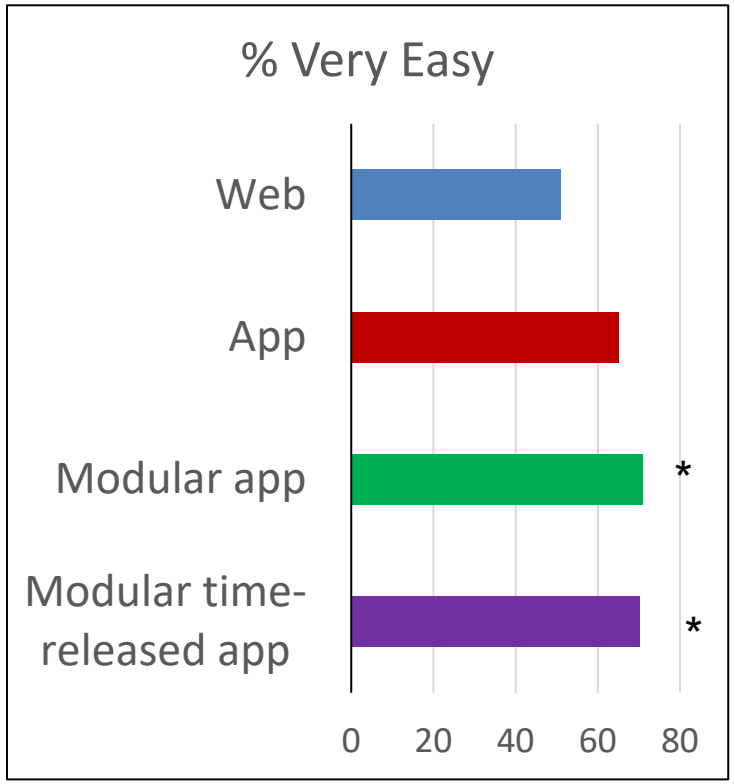
| C: Web survey | T1: App | T2: Modular app | T3: Modular time-released app |
|---|---|---|---|
| *Q*s not divided; administered in standard q'naire via the Web | Qs not divided; administered in standard q'naire via the app  | *Q*s divided into 7 parts; released together via the app  | *Q*s divided into 7 parts; released individually every other day via the app  |

# Project 3 findings

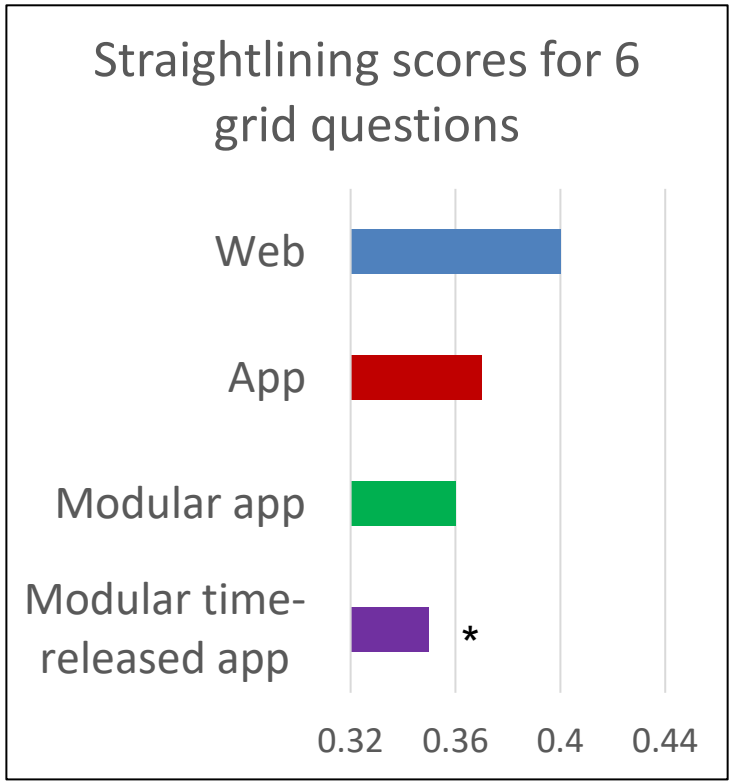
- Modularization creates a tradeoff. Compare to web:
  - Perceived ease ↑ (modules feel easier)
  - Satisficing ↓ (less straightlining, longer open text responses)
  - **But breakoffs** ↑ (especially in time-released modular condition)

# Project 3 findings: Modularization creates a tradeoff

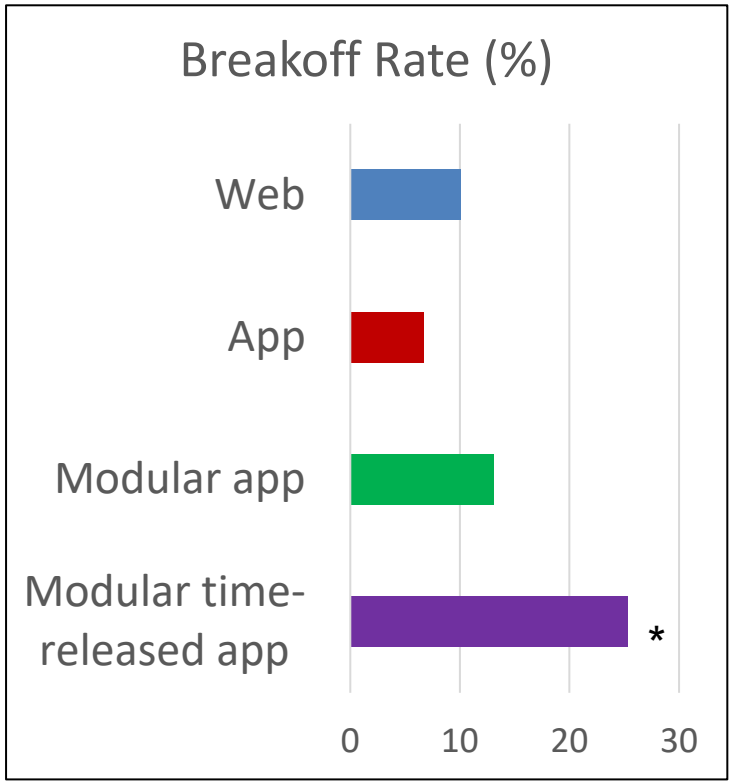
- Perceived ease ↑ (modules feel easier)
- Satisficing ↓ (better engagement)
- **But breakoffs** ↑ (in time-released modules)




Perceived ease of participating




Indicator of satisficing

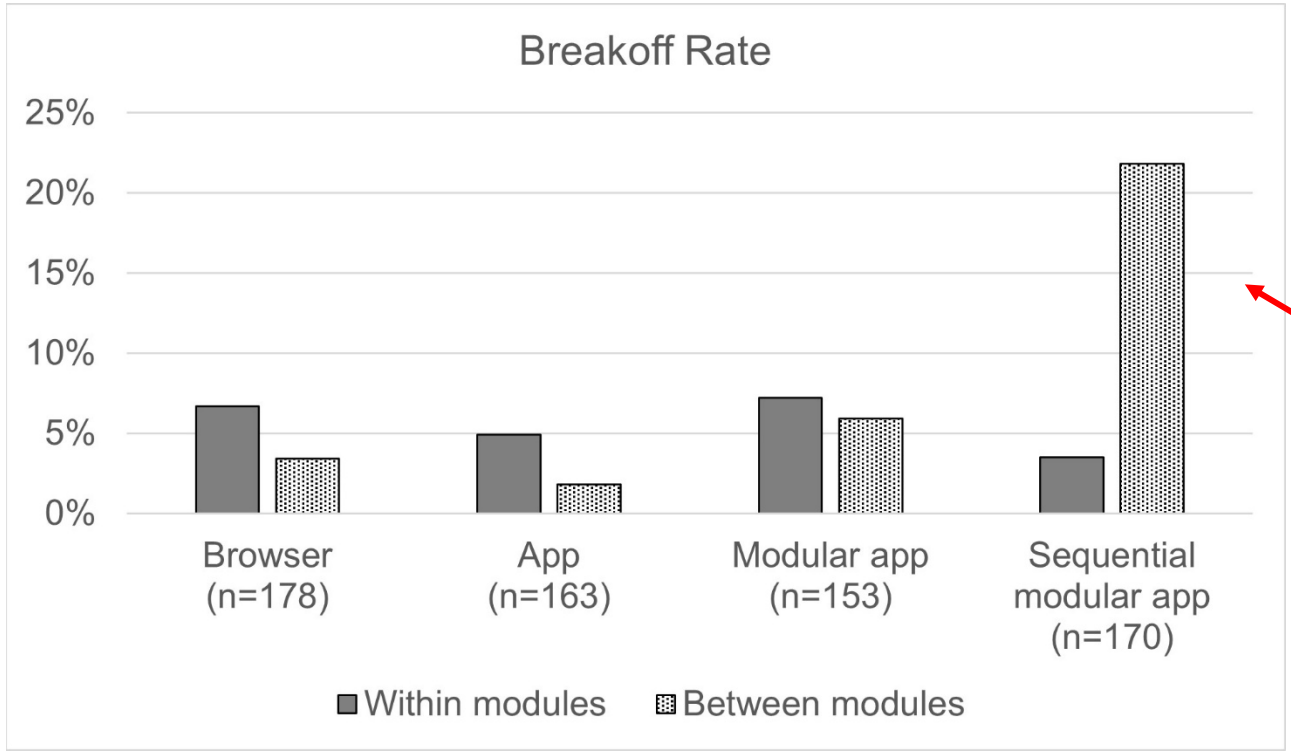





*significantly different from Web condition (p<.05) after applying a Bonferroni correction for multiple comparisons

# Project 3 findings cont'd

- Breakoffs happen mainly between modules after a pause




*Implication: modularization is promising only if respondents can be re-engaged.*

# Project 3 implications

- Consider modular design -- with modules that respondents can complete *at their convenience* -- when you have:
  - Lengthy survey
  - Reliable recontact method (push notification/email/SMS)
  - Low-friction return: one-tap resume, persistent login, saved state
- Design for return. For example:
  - Reminders/notifications, “snooze” option
  - Incentive structures that rewards returning

# Decision 4: When should we measure experiences in the moment (vs retrospectively)?

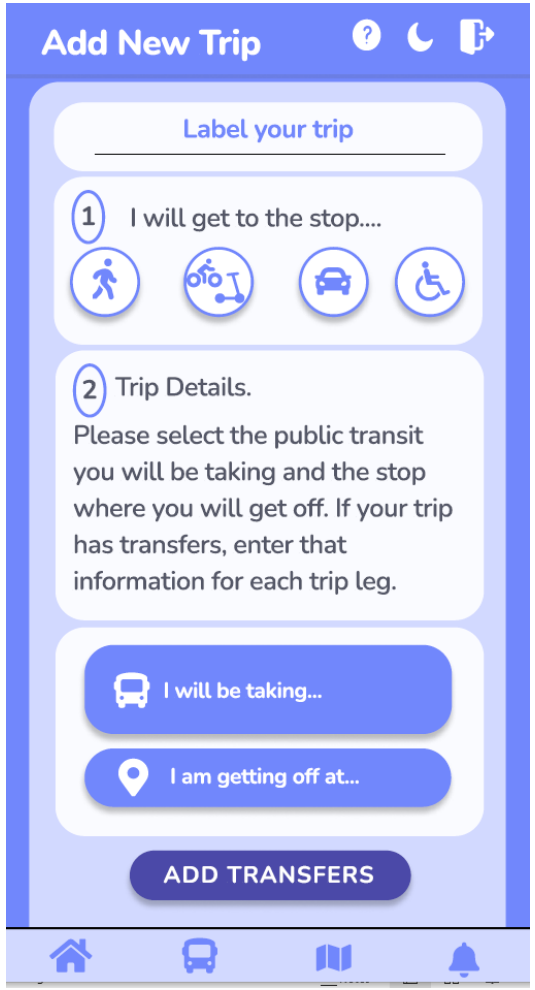
- Promise:
  - Captures event-specific context (e.g., healthcare visits, social interactions, or entering a predefined geographical area); reduces recall bias
- Challenges:
  - Participation over repeated prompts
  - Response quality
  - Privacy expectations for location-triggered prompts

# Project 4: In-the-moment surveys (public transit trips)

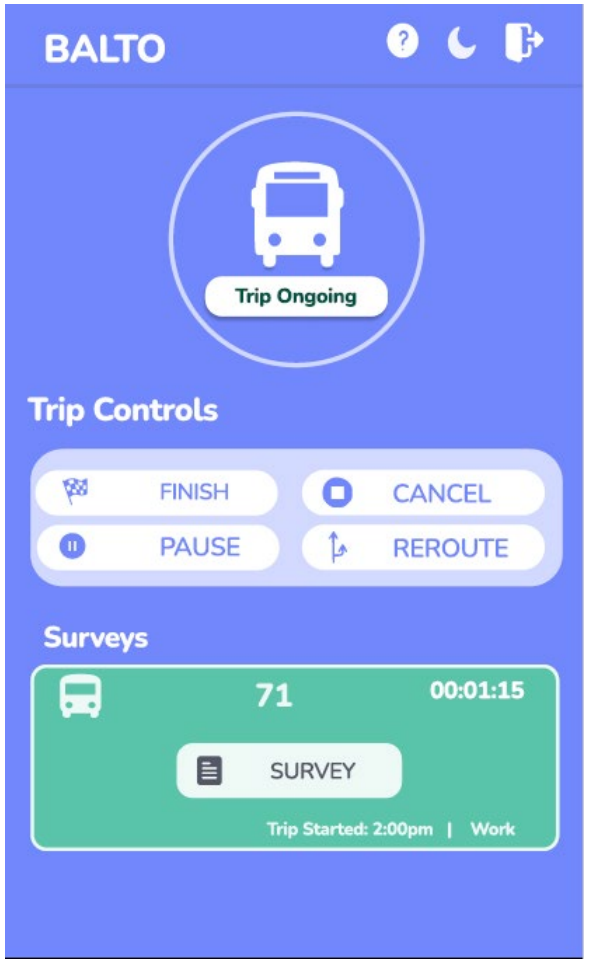
(Antoun et al. Behavior Research Methods *in press*)

- Android app for 2 weeks; **2×2 experiment**:
- Incentives: **per-survey** ($2) vs **daily** ($4) (capped at $56)
- Timing: **near-time post-trip** vs **in-situ during trip** (geo-triggered)
- Outcomes:
  - Participation: days with response, response rate
  - Quality: speeding, within-person differentiation across trips
- Sample flow: **610** enrolled/downloaded app; **226** recorded ≥1 trip; **175** completed ≥1 survey; **1,739** surveys triggered; **1,146** completed

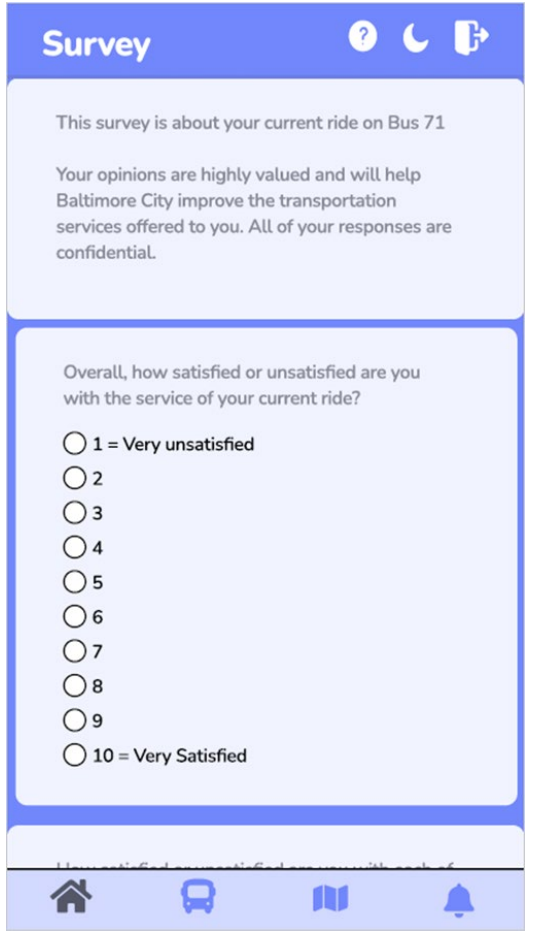
# Screenshots of the app

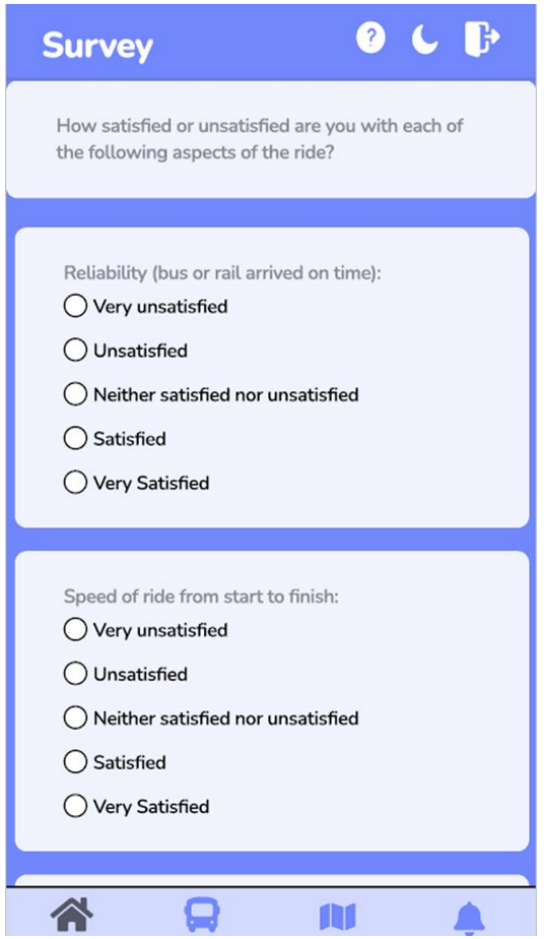



**Starting trip**




**Survey prompt**
(near the bottom of the screen)




**Questionnaire**
8 satisfaction Qs + “anything else?” Q

# Project 4 findings

- **Daily incentives > per-survey** for sustained participation (more days with ≥1 completion; slightly higher overall RR)
- **Real-time prompts > post-event** on response rate and quality indicators (higher RR; less speeding; greater within-person differentiation)
  - Response rate: 74.7% compared to 58.0%, Δ+16.7 pp. ($p<.05$)
  - Interpret greater trip-to-trip variation as more event-specific reporting—near-time answers may drift toward “typical trip” summaries even with only short delays.

# Project 4 implications

- Consider real-time measurement when:
  - the activity is interruptible (especially if people are already on their phone)
  - measuring the respondent's **immediate context** & specific details are prone to being quickly **forgotten**
- Interpretation of resulting data depends on timing (event-specific vs global evaluations)
- Design and implementation issues:
  - Privacy expectations for location-triggering
  - Platform limitations (Android-only, OS fragmentation)

# Synthesis

- Respondents can provide high-quality answers using smartphones— but mobile UI choices are consequential, especially for some subgroups → adopt evidence-based standards (e.g., touch targets ≥ 6mm).
- Respondents prefer breaking long instruments into shorter sessions — but modularization introduces a re-engagement problem → modularize only if you can engineer return (e.g., low-friction resume, reminders, completion incentives).
- In-the-moment prompts can produce high-quality, event-specific reports — but success depends on recruitment/coverage and interruptibility.

# Open problems

- Recruiting and retaining **representative** samples of app participants (coverage + consent + participation dynamics)
- Incorporating **direct** measures of measurement error into our mobile/app-based evaluations

# Revisiting two paradigms

- **Technology forcing surveys to adapt**
  - E.g., Allowing/encouraging smartphone completion with mobile-friendly questionnaires

- **Opening up new opportunities**
  - E.g., Using apps for passive data collection, modular surveys, in-the-moment surveys.

Technology will continue to develop. How can we use it to meet the needs of respondents, designers/data producers, and data users?

# Broader efforts

JOINT PROGRAM IN SURVEY METHODOLOGY

Online courses in survey and data science

https://jpsm.umd.edu/

SOCIAL DATA SCIENCE CENTER

Emphasis on new technologies and forms of social and behavioral data

https://socialdatascience.umd.edu/

- Benchmarking AI Models Using Surveys (Instructors: Bolei Ma & Frauke Kreuter)
- AI Assisted Surveys (Instructor: Mario Callegaro)

# In conclusion

- Surveys have successfully **adapted** over the years to how we communicate.
- **Let's keep it up! ☺ Innovative methods** are needed that adapt to how we communicate today and to open up new measurement opportunities. **Methodological research** can contribute to our understanding of the measurement properties of those methods and how they might be improved.

Thank You! Questions?

**Chris Antoun**

University of Maryland

antoun@umd.edu