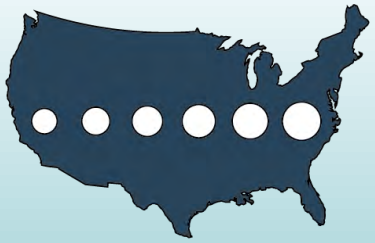

Add Health

The National Longitudinal Study of Adolescent to Adult Health

Ensuring Total Survey Quality when Transitioning a Longitudinal Survey from In-Person to Web-Mail Mixed Mode

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International Total Survey Error Workshop (ITSEW)

September 18, 2024

George Washington University, Washington, DC

Outline

- 1. Overview of National Longitudinal Study of Adolescent to Adult Health (Add Health) (from 1990s to present)
  - Transitioning from in-person to web-mail mixed mode at Wave V
- Potential survey quality impact of the transitioning
- Add Health – Wave V: ensuring total survey quality with a multi-sample, multi-phase responsive design
- Mode effect analysis and results at Wave V
- Nonresponse follow-up sample design at Wave VI
- Future research

National Longitudinal Study of Adolescent to Adult Health (Add Health)

Wave I (in-person)
- **1994-1995**
- Grades 7-12
- RR=79%,
- n_r=20,745

Wave II (in-person)
- **1996**
- Grades 8-12
- RR=89%, n_r=14,738

Wave III (in-person)
- **2001-2002**
- Young adults 18-26
- RR=77%, n_r=15,197

Wave IV (in-person)
- **2008-2009**
- Adults 24-32
- RR=80%, n_r=15,701

Wave V (mixed-mode)
- **2016-2018**
- Adults 33-43
- RR=72%, n_r=12,300

Funding limitation motivated mode change.

Wave VI (mixed-mode)
- **2022-2024**
- Adults 40-49

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Survey Quality Impact:
Switching from In-person Interviewing to Mixed-mode

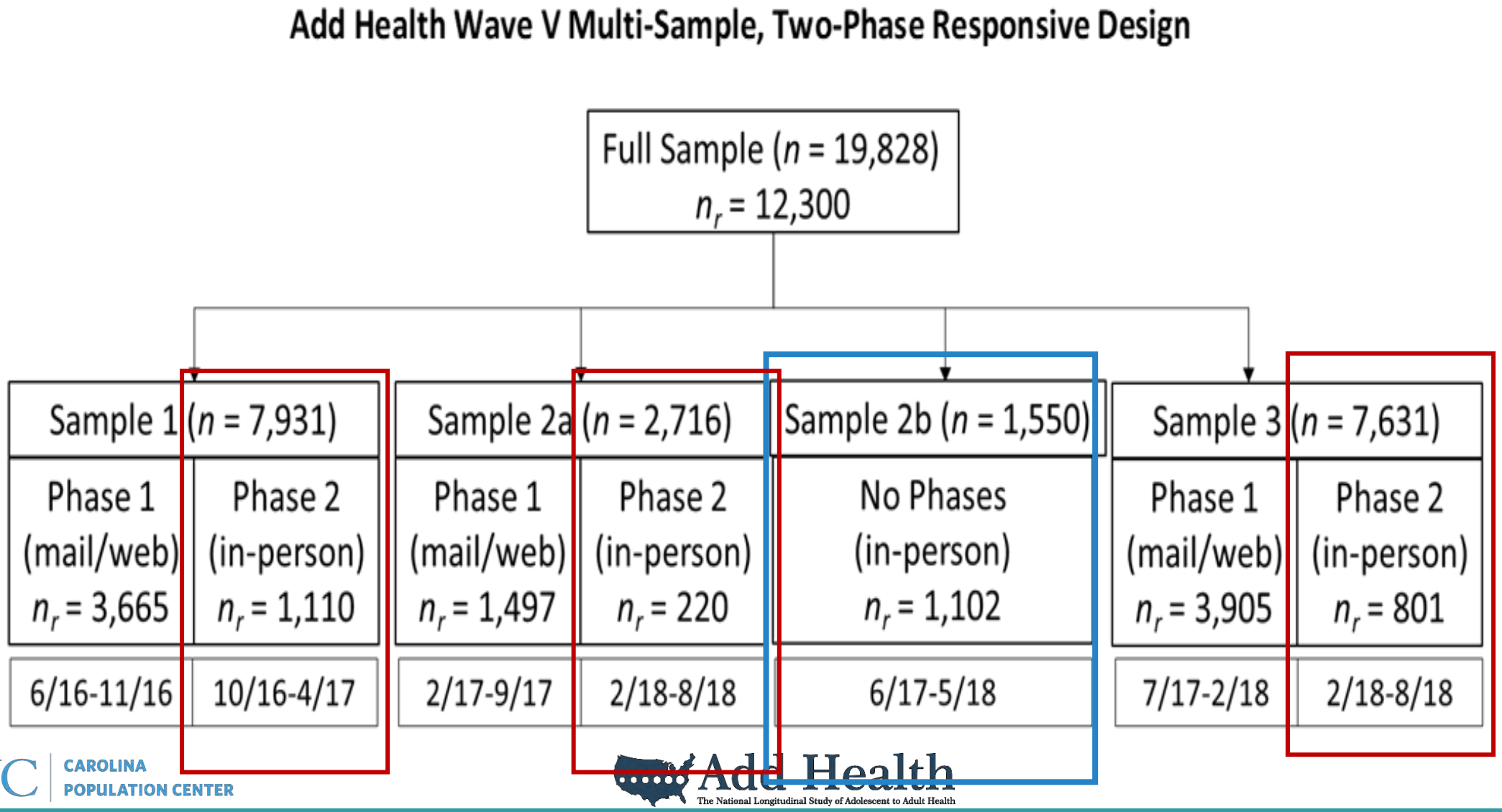
Pros

- Nonresponse Error
  - Greater flexibility to respond at their convenience
  - More follow-ups (with flexibility to incorporate incentive strategies)
- Measurement Error
  - Web/Mail surveys provide consistent delivery of questions, reducing interviewer-induced variability and measurement
- Survey Cost and Efficiency
  - Cheaper
  - More timely

Cons

- Nonresponse Error
  - Lower response rate
  - Underrepresentation of certain subpopulations due to technological barriers or mode preference
- Measurement Error
  - Loss of interviewer assistance: in-person surveys can also provide more accurate and complete responses
  - Survey fatigue
- Longitudinal Consistency
  - Nonresponse: A shift in data collection mode may cause panel attrition, where respondents who were comfortable with in-person interviews may drop out in the web-based phase.
  - Measurement: Switching modes between waves may lead to mode effects, where the same question elicits different responses depending on the mode.

Add Health – Wave V Design: Multi-Sample, Multi-Phase Responsive Design



Multi-Sample, Multi-Phase Responsive Design

Mitigation of Nonresponse Error (Panel Attrition)

- Nonresponse Follow-up (NRFU): For each subsample using a mixed-mode data collection protocol, a random subset of nonrespondents will be selected for follow-up, offering options for in-person interviews or prompting them to complete the web survey.

Mitigation of Measurement Error (Mode Effect)

- Sample 2b, as a parallel sample, was conducted by in-person interviewing designed to replicate the Wave IV protocol to the extent possible.

- With Sample 2b, mode effect analysis can be conducted to evaluate mode effects across different types of survey questionnaire variables.

Example Add Health Questionnaire Items Used in the Analysis

Item Wording	Original No. of Categories	Abbreviation	Recoded Item
In general, how is your health?	5	Goodhlth	In good health? 1(2) = yes(no)
Which of the following best describes your current health insurance situation?	14	Insure	Has insurance? 1(2) = yes(no)
In the past 12 months, have you had a dental examination by a dentist or dental hygienist?	2	Dental	1(2) = yes(no)
During the past 7 days, I felt that I could not shake off the blues, even with help from my family and friends.	4	Blue	Ever felt blue? 1(2) = yes(no)
During the past 7 days, I felt sad.	4	Sad	Ever felt sad? 1(2) = yes(no)
Have you ever had vaginal intercourse?	2	Intercourse	1(2) = yes(no)
Are you romantically attracted to females?	2	Att_Fem	1(2) = yes(no)
Are you romantically attracted to males?	2	Att_Mal	1(2) = yes(no)
Have you ever smoked cigarettes regularly—that is, at least one cigarette every day for 30 days?	2	CigUse	1(2) = yes(no)
During the past 12 months, have you ever seriously thought about committing suicide?	2	Suicide	1(2) = yes(no)

Note: Items in *italics* were collected by CASI in in-person mode to reduce the risks of social desirability effects (see, e.g., Tourangeau et al., 2000). Items not italicized were obtained by interviewers.

Mode Effect Analysis Part 1: DME & RDME

- **Differential Mode Effect (DME)**
  - A simple indicator of the existence of a Wave V mode effect is the DME defined as

$$\text{DME} = \bar{y}_{MM} - \bar{y}_{2b},$$

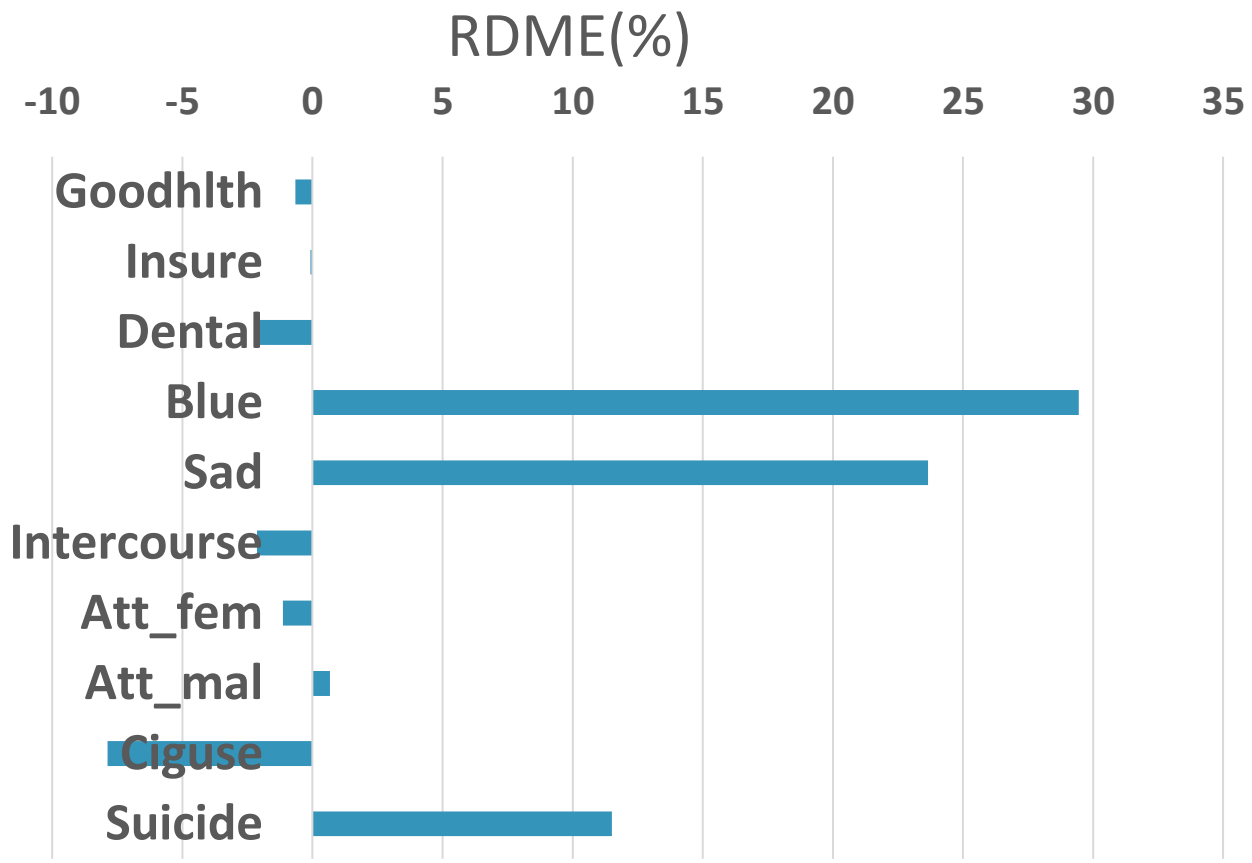
where $\bar{y}_{MM}$ is the mean of the combined mixed-mode sample (Sample MM), and $\bar{y}_{2b}$ is the mean of the in-person sample (Sample 2b).

- **Relative Differential Mode Effect (RDME)**

$$\text{RDME} = \frac{\text{DME}}{\bar{y}_V}$$

where $\bar{y}_V$ is the mean of the full Wave V sample (Samples MM+2b).

Comparing the Item-Level RDMEs Mail/Web (MW) and In-Person (IP) Modes



Hypothesis Testing Results

Tested three null hypotheses:

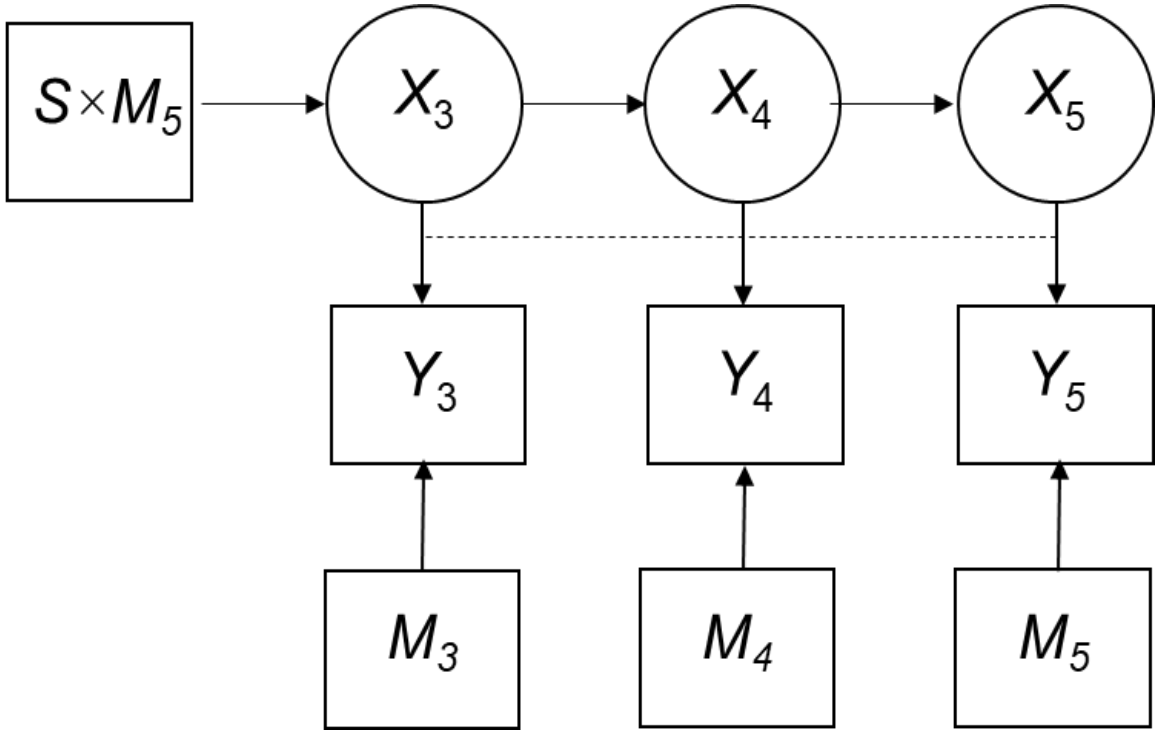
(a) |RDME| = 0

(b) |RDME| ≤0.05

(c) |RDME|≤0.10.

The absolute RDME significantly exceeds 10% for two items (Blue and Sad) and significantly exceeds 0 for one item (Intercourse).

Mode Effect Analysis Part 2: Path Diagram for the Basic MLCA Model Used for the Analysis

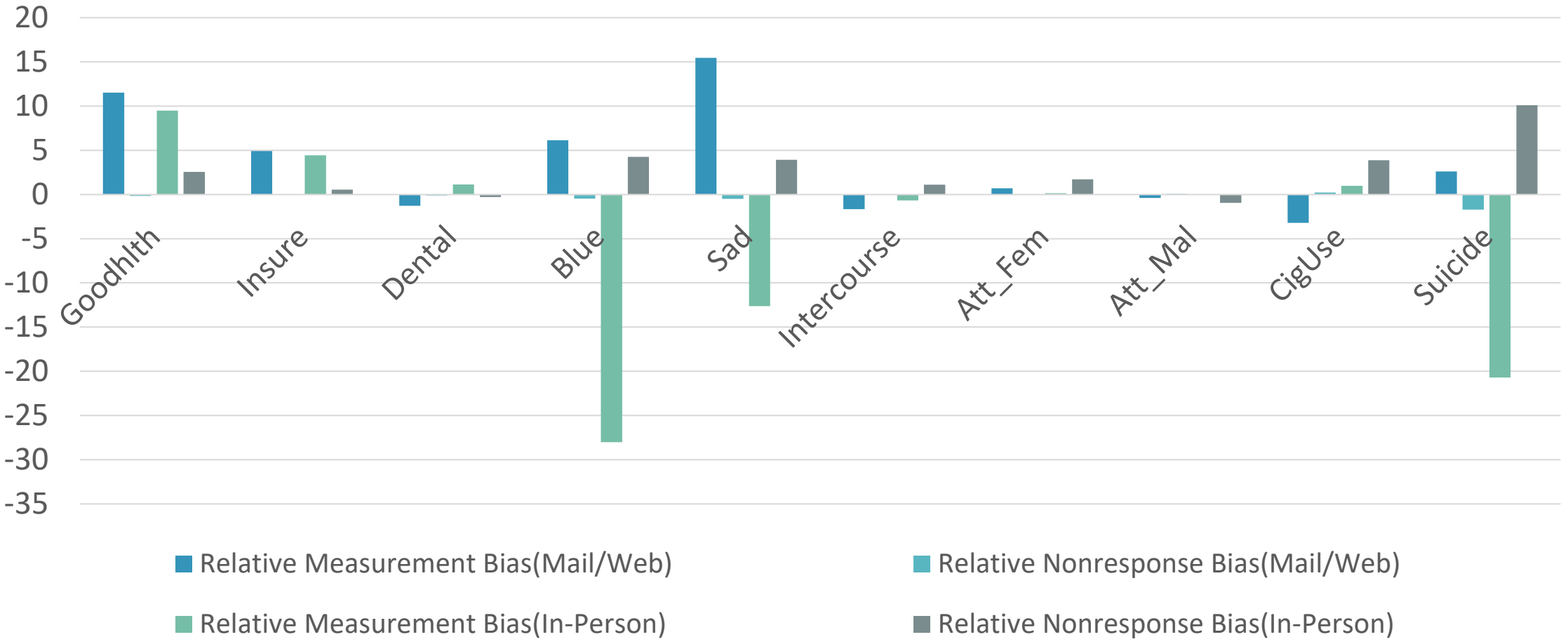


Notation

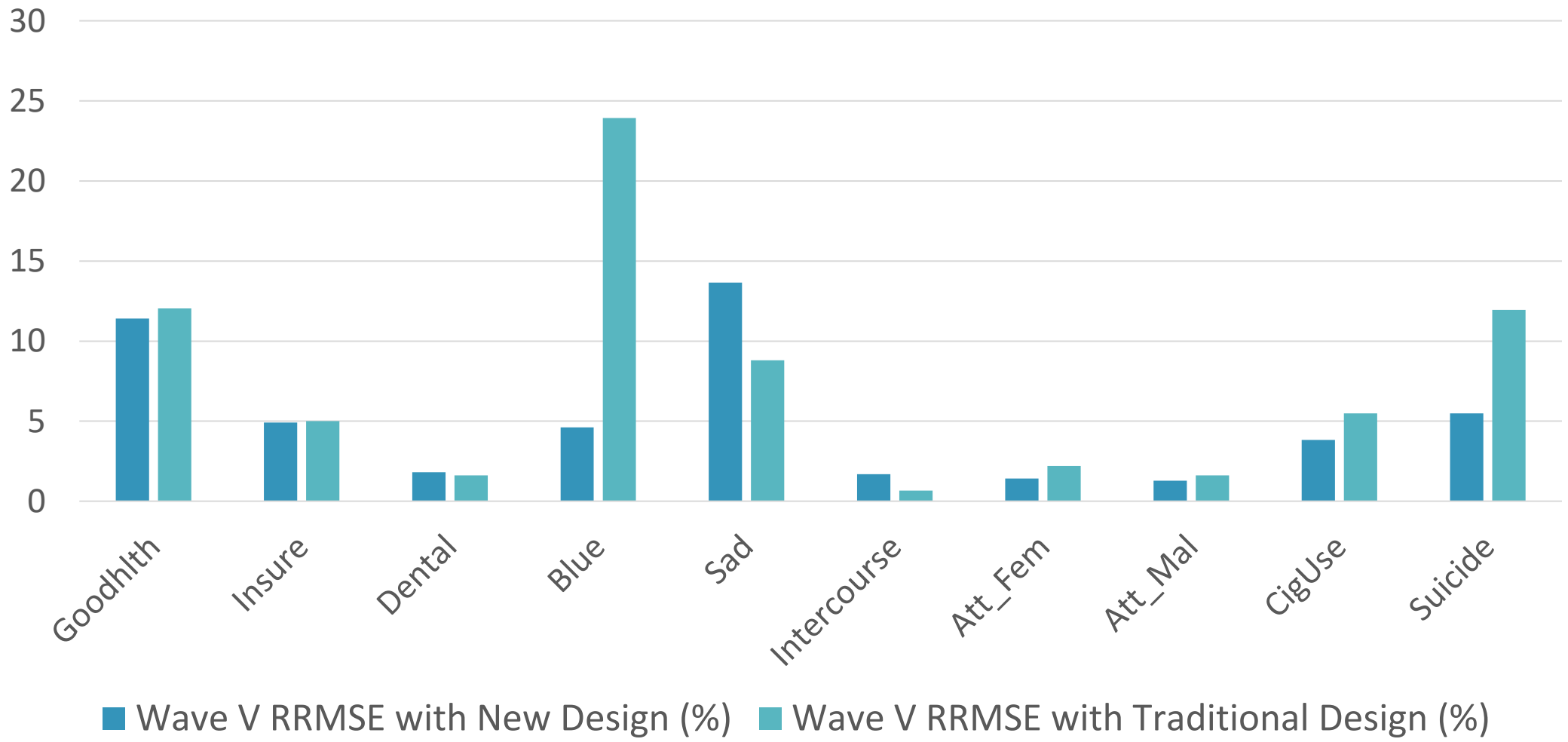
- **X_t : the latent construct at Wave *t***
- **Y_t : the corresponding survey indicator of X_t**
- **S : Sample**
  - S = 1 for MM (mixed-mode Sample)
  - S = 2 for Sample 2b (in-person Sample)
- **M_t : mode of data collection**
  - M_t=1 for mail/web mixed-mode
  - M_t=2 for in person
- **S× M_5 : the joint effect of the sample and mode**
  - (1,1): MM sample, Phase 1
  - (1,2): MM sample, Phase 2 (NRFU in person)
  - (2,2): Sample 2b, in person
- An **arrow** indicates a dependency on the variable at the head of the arrow
- The **dashed line** indicates that an equality constraint has been imposed on the dependencies at the line's intersections.

Another feature incorporated in the MLCA is a nonresponse component representing the random selection of Phase 1 nonrespondents for Phase 2 NRFU. Other Phase 1 nonrespondents were excluded from the analysis. Additional details of this modelling approach can be found in Biemer et al. (2021).

Mode Effect Analysis Part 2 MCLA Result: Biases



Part 2: MLCA Results: Relative Root Mean Squared Errors

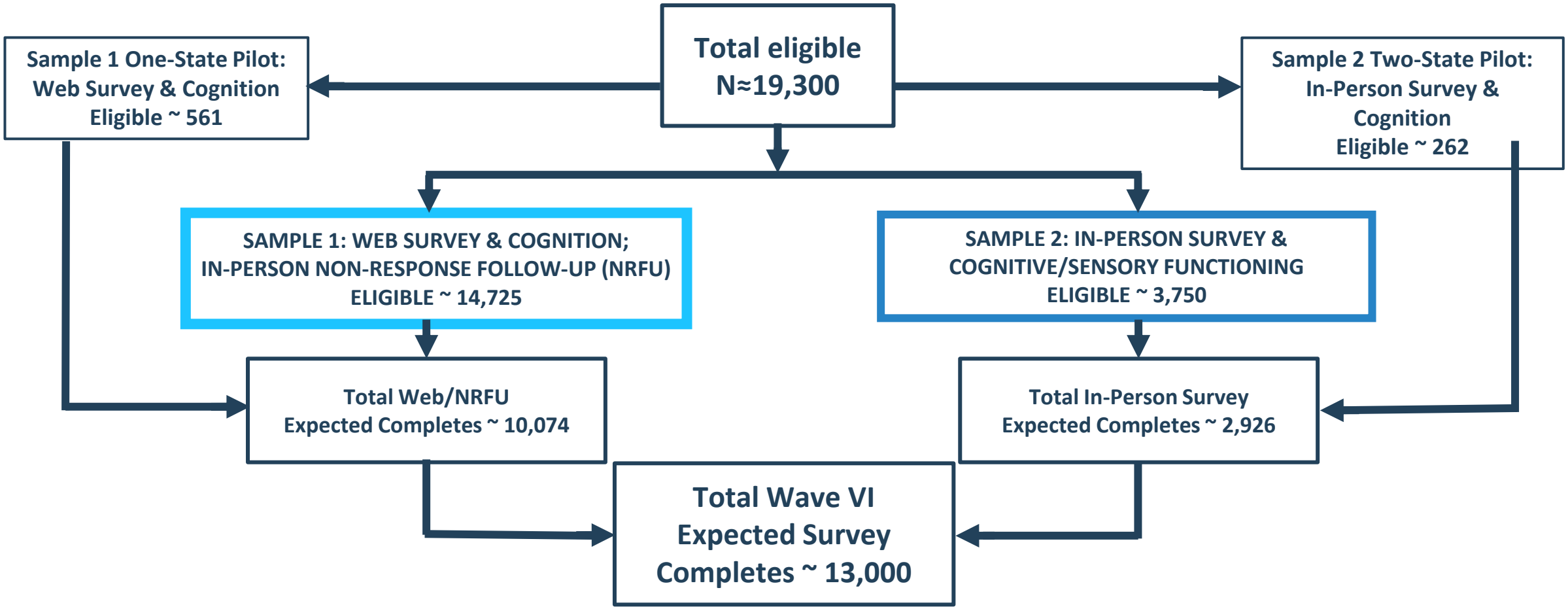


Summary of the Mode Effect Analysis Results

Bad News: the risk of mode effects when comparing Wave V and prior wave estimates is relatively high

Good News: in several important respects, the new two-phased, mixed-mode design out-performed the traditional design with in-person interviewing.

Wave VI Survey Design



Using in-Person NRFU to Supplement Mixed-Mode Data Collection

- Usually, only **a moderate proportion** of nonrespondents can be contacted due to cost consideration.

- The reduction in bias of estimates due to NRFU can be negated by the increase in sampling variance, leading a larger mean squared error (MSE).

- We are aiming to diversify our sample
  - Race/Ethnicity Groups
  - Education Level

NRFU Simulation Study Results: Reducing MSE While Diversifying Sample 1

- Choose NRFU sample of 3,500 to achieve 1,200 completes
  - To reduce weight variation, Probability Proportional to Size (PPS) sampling is used to select the NRFU sample, with the size measure determined by the Wave I base weight, estimated NRFU response propensity for each individual (based on Wave V experiences), and oversampling factor for minorities.
- Choose “reserve NRFU sample” of 1,500 in case needed
- Include all sample members with less than high school education into NRFU
- Oversample Black, Hispanic, & Asian sample members into NRFU by multiplying their original size measure (under PPS sampling) by k=10
  - k=10 achieves a balance between increasing sample sizes for minorities while not causing extremely large unequal weighting effects (UWE>4) for the overall sample

Future Research

Mode Effect Analysis for Wave VI	Consider repeating this analysis for a wider selection of survey questionnaire items using the Wave III-VI data to test the validity of the key assumptions and verify the reproducibility of the results from the current analysis**.**
	Examine the relationship between the type of survey items and the direction and magnitude of their mode effect. This analysis can offer further insight into which types of survey items may be more sensitive to mode changes and should be treated with caution when analyzing their longitudinal trends.
Evaluation of the Nonresponse Follow-up Sample Design	At the conclusion of Wave VI, use the final survey response status to assess the effectiveness of the current sample design in terms of expected response rates and the number of final completions by subpopulation, achieved through the oversampling strategy. Assess the impact of the NRFU sample on reducing nonresponse bias and its effect on the variance and mean squared error (MSE) of key survey outcomes.

For information on obtaining
Add Health data,
please visit our project website
https://addhealth.cpc.unc.edu

Acknowledgements

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- Add Health was originally designed by J. Richard Udry, Peter S. Bearman, and Kathleen Mullan Harris at the University of North Carolina at Chapel Hill. Add Health is currently directed by Robert A. Hummer; it was previously directed by Kathleen Mullan Harris (2004-2021) and J. Richard Udry (1994-2004).

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Thank you!

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