Examples of Responsive Design in the National Survey of Family Growth

James M. Lepkowski, Brady T. West, James Wagner, Nicole Kirgis, Shonda Kruger-Ndiaye, William Axinn, Robert M. Groves

Institute for Social Research
University of Michigan

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Overview: Production Purposes

A. Responsive design and paradata
B. NSFG (National Survey of Family Growth)
C. Intervention 1: 2-phase sampling
D. Intervention 2: Screener week
E. Intervention 3: Sample balance
F. Intervention 4: Randomized trials

Responsive design

- Uncertainty in data collection
  - Rates as well as time & cost constraints
  - Static v. dynamic design
- Groves & Heeringa (2006)
  - Pre-identify features affecting cost & error
  - Identify cost & error *indicators*
  - Monitor *indicators* in initial data collection
  - Alter survey design features at later phases based on *indicators*
  - Combine data across phases in single estimator

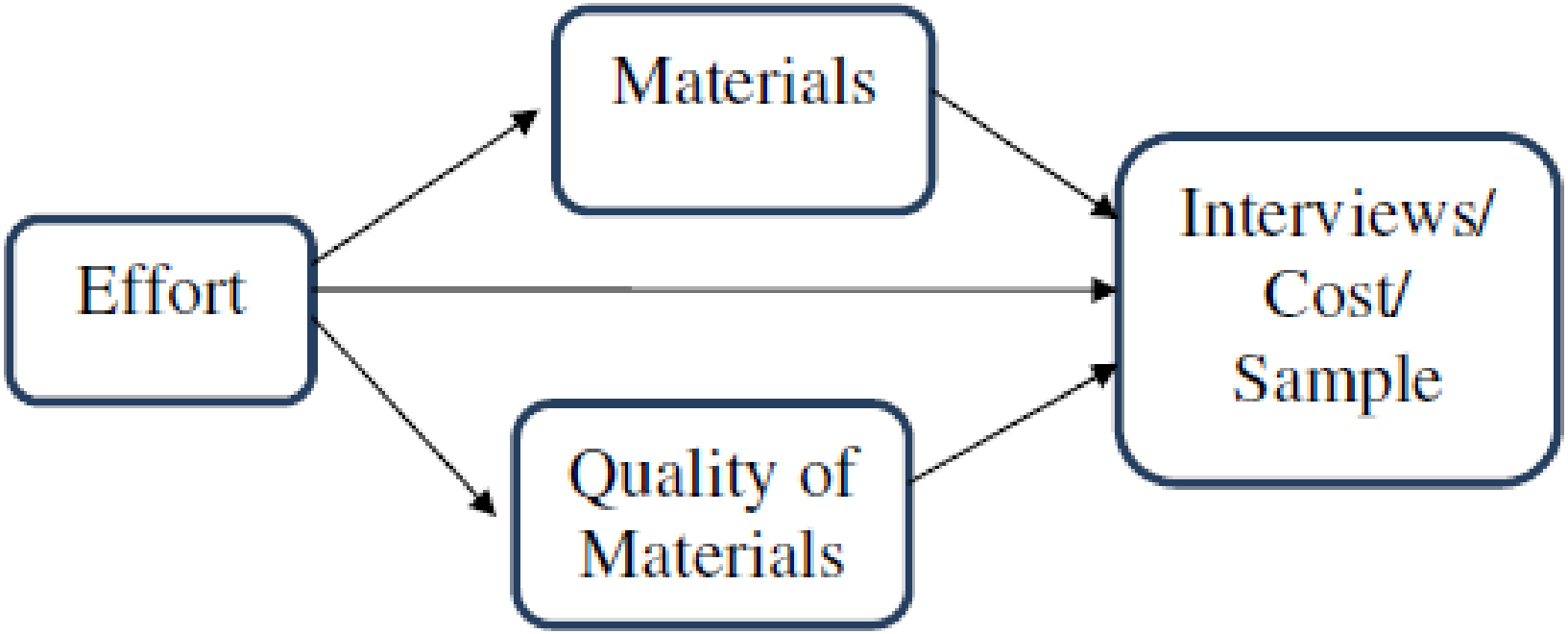
NSFG 2006-2010 Design Features

- Target population
  - Persons ages 15-44 years
  - Exclude institutionalized & military base residents
- Sample and data collection
  - Area probability sample of households
  - Face-to-face interviewing, CAPI & ACASI
- Estimates
  - Factors affecting fertility, birth rates, female and male health, parenting

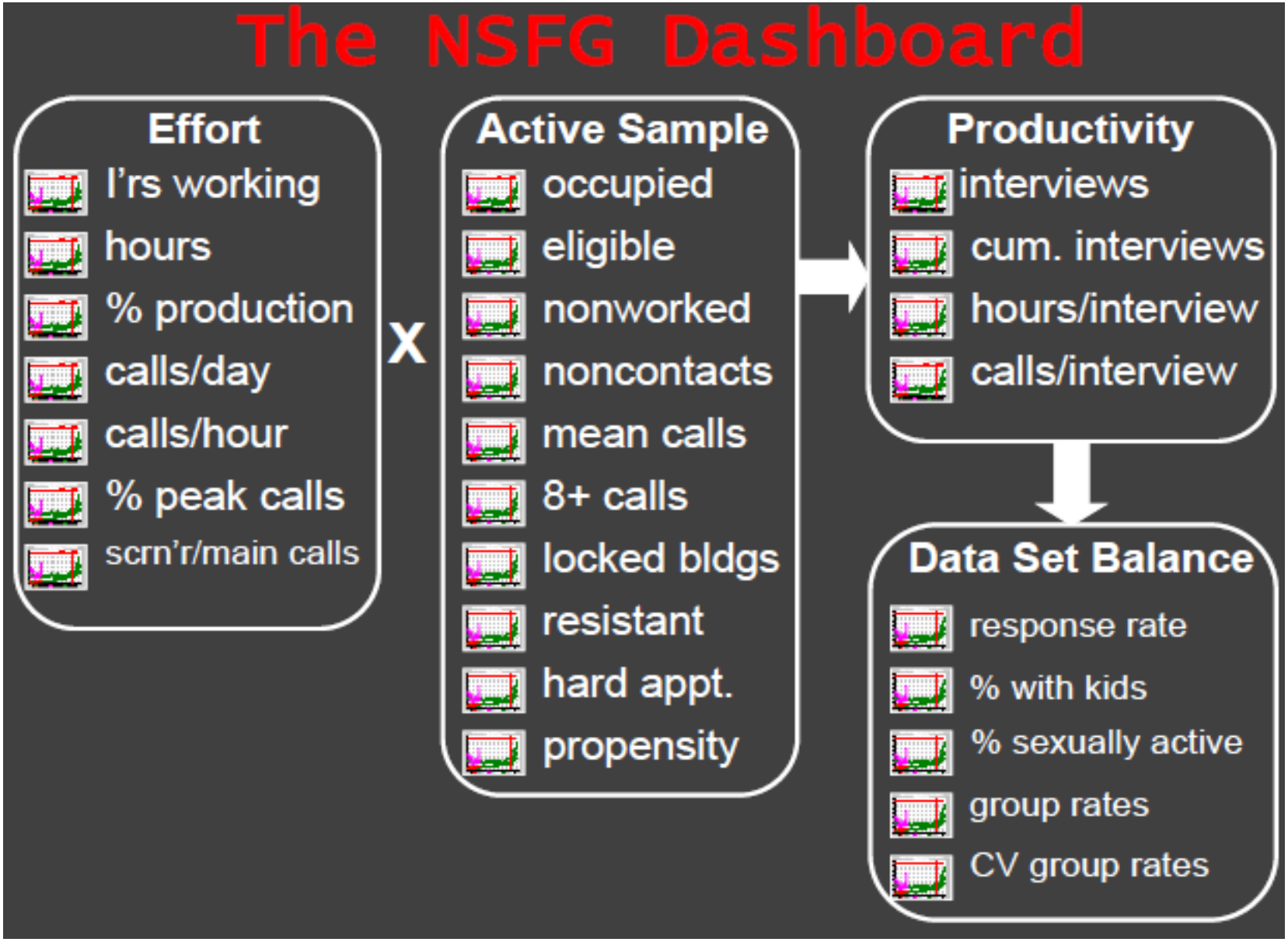
2006-2010 Continuous Design

- Interview throughout year
- Four samples/year
  - 12 week data collection period (quarters)
  - 2 phases, 10 & 2 weeks, respectively
- Daily activities
  - Uploads, data & production measures
  - Data processing
  - Progress monitoring
- Interventions annually, quarterly, weekly, daily

2006-2010 Production model



B. National Survey of Family Growth (NSFG)

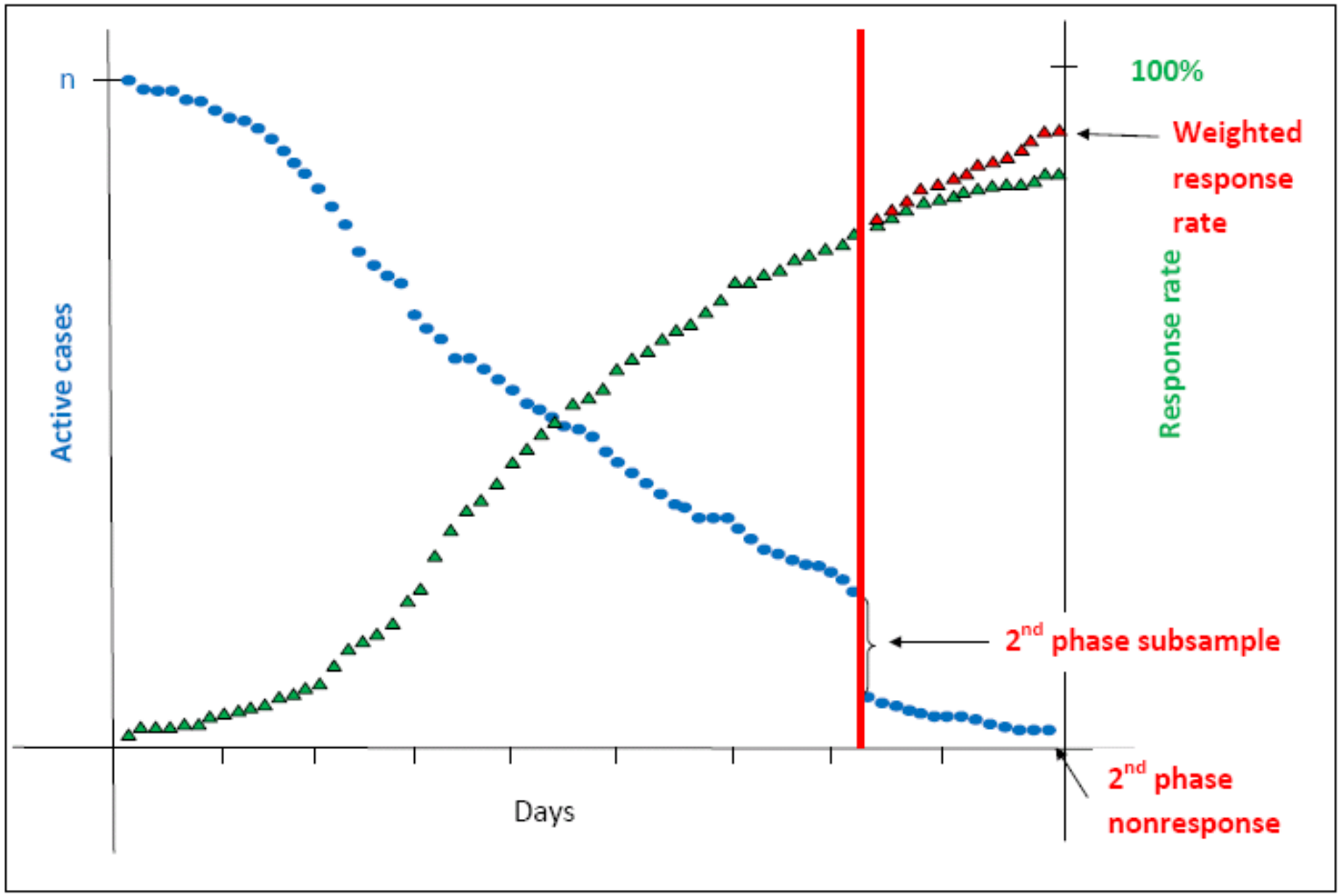


B. National Survey of Family Growth (NSFG)

2-phase Sampling for Nonresponse

- Deming, Hansen & Hurwitz (1947)
- Reduce nonresponse bias
  - Non-responding units at end of data collection
  - Select subsample using information available for each unit from data collection
  - Increase effort for each 2nd phase sample unit relative to 1st phase effort
  - Combine 1st and 2nd phase sample through weights to compensate for unequal probabilities of selection

2-phase sampling for nonresponse



C. Intervention 1: 2nd Phase Sample

2nd Phase Sample & Data Collection

- Stratify active cases at end of 1st phase
  - By likelihood of response
    - Calculate 'next day' response propensity using paradata
    - Oversample higher likelihood cases
    - Increase 2nd phase efficiency, number of completed interviews
  - By screener or main
- Change data collection protocols
  - Reduce case load, increase effort per case
  - Increase incentives for adults
  - Reduce controls on proxy screeners

2-phase design "trade-offs"

- Advantages
  - Reduces exponential cost inflation at survey end
  - Control over high effort cases
  - Control over costs
  - More effective use of interviewer effort
- Disadvantages
  - Weights to compensate for 2nd phase sample
  - Potentially higher sampling variance in estimates
  - Smaller number of respondents per unit cost
- Never achieves 100% response rate

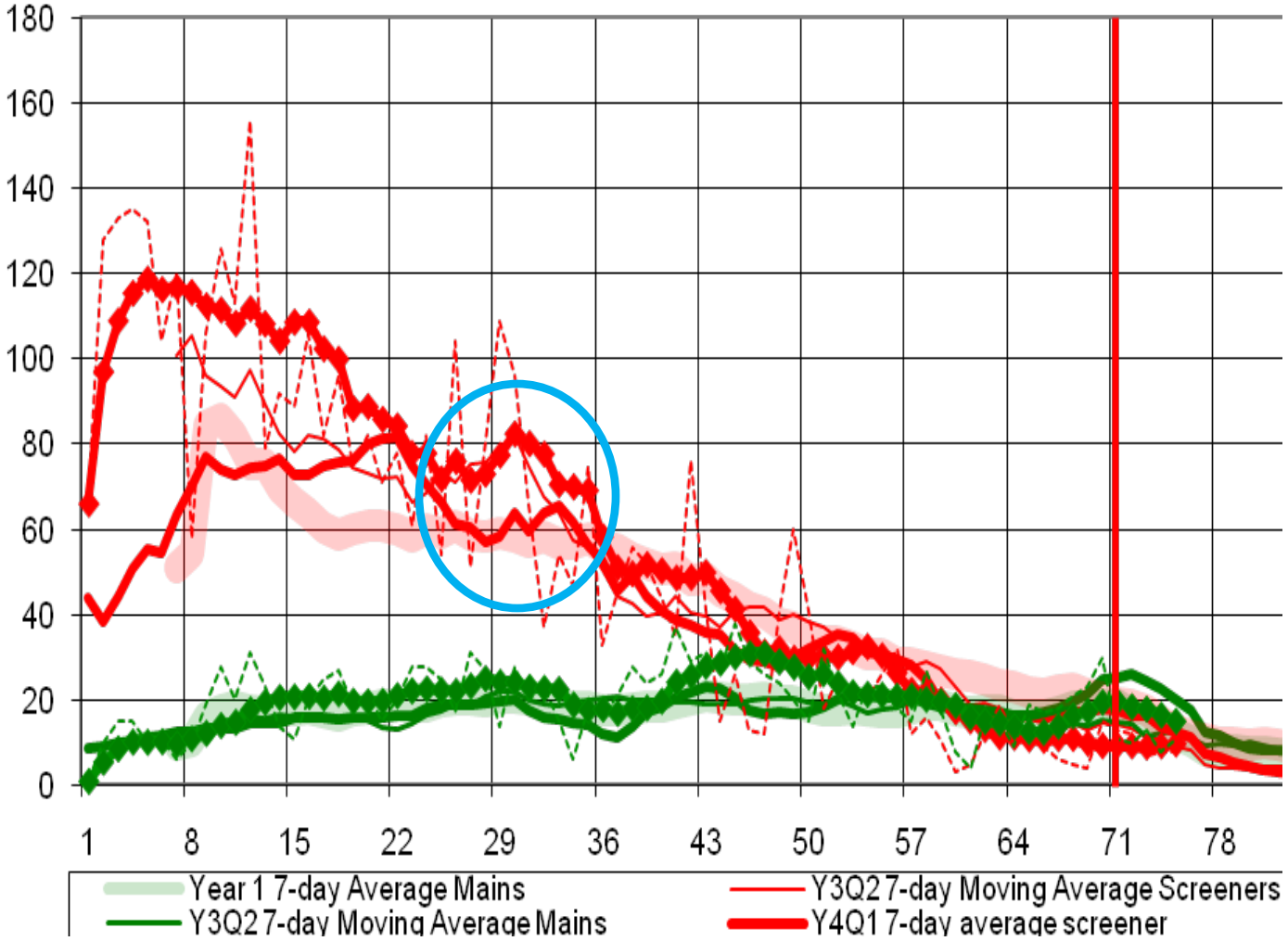
Responsive design

- Pre-identification: nonresponse, & cost efficiency
- Identification: nonresponse rate
- Monitoring: daily response & nonresponse
- Alteration: 2nd phase
- Combination: weighted phase 1 & 2 estimator

Screener v. main interview balance

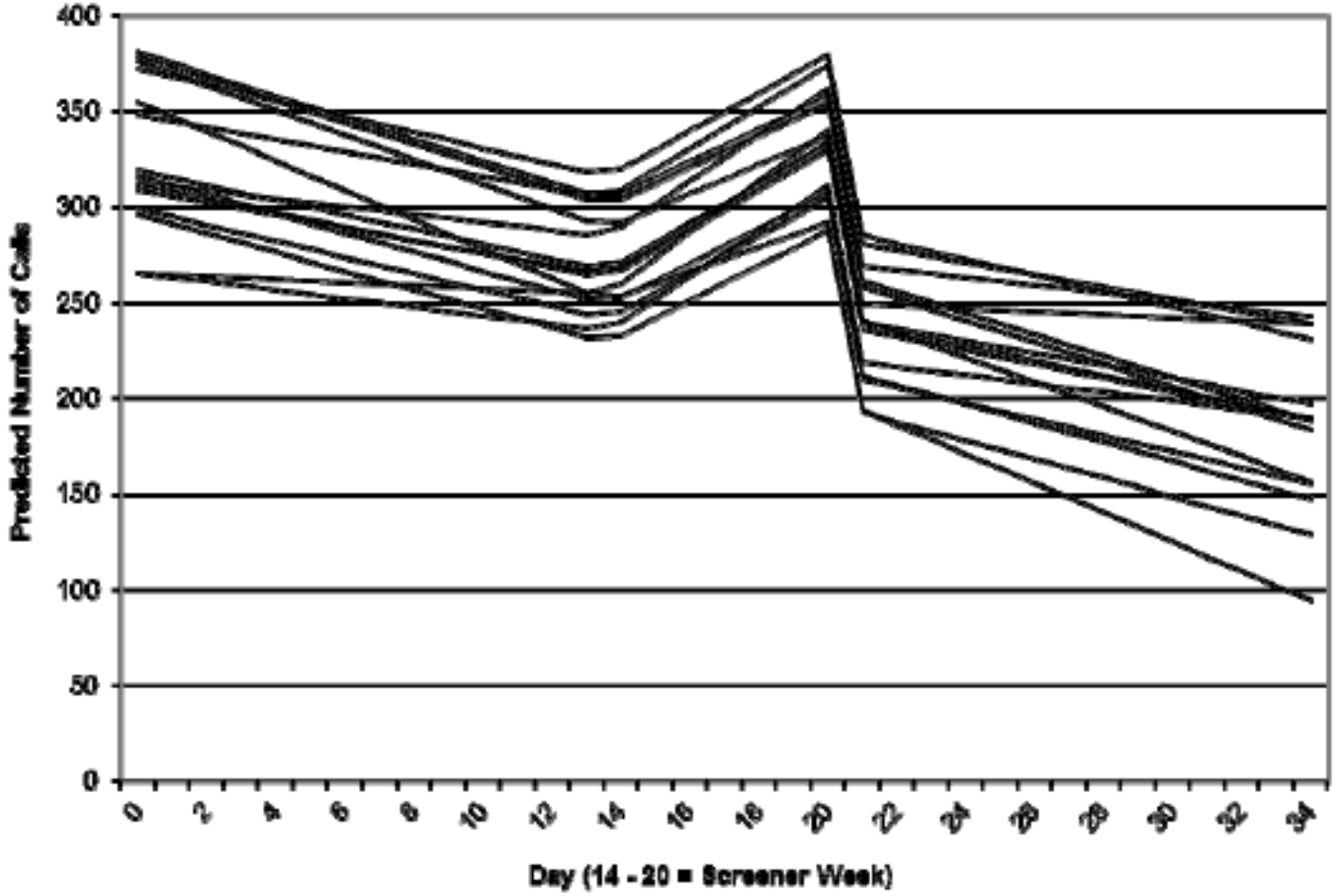
- NSFG 2002 paradata observation:
  - Interviewers favor main over screener
  - Larger than desired residual of screener cases remain at end of Phase 1
    - Main cannot be attempted until screener complete
  - Time constraint
    - Less time available to complete screener AND main
  - Response rate consequence
    - Final response rate product of screener & main rates
    - Lower response rate
    - Higher nonresponse bias?

Intervention: Screener week



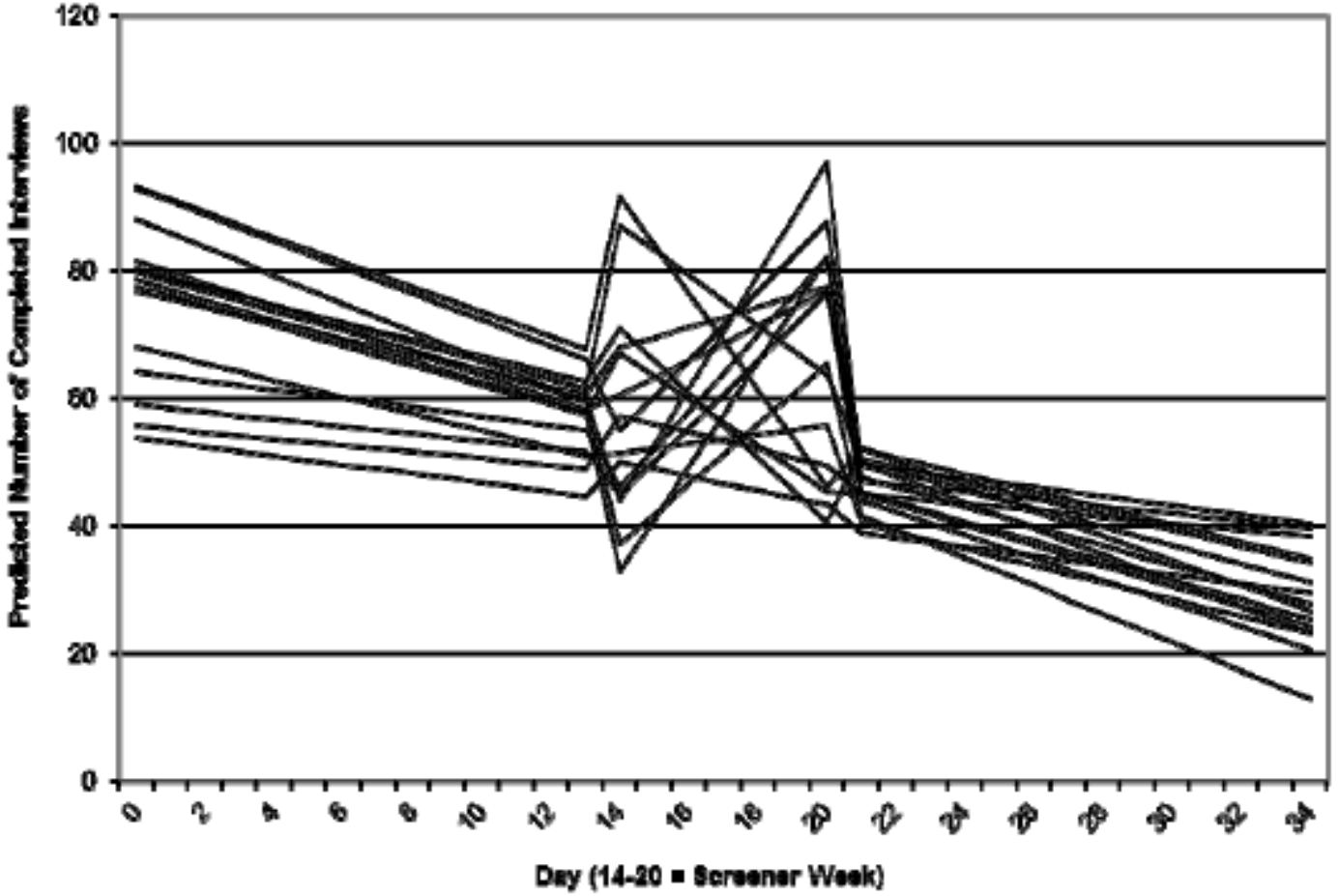
D. Intervention 2: Screener week

Smoothed estimated number of calls by day



D. Intervention 2: Screener week

Smoothed estimated number of completed interviews by day



D. Intervention 2: Screener week

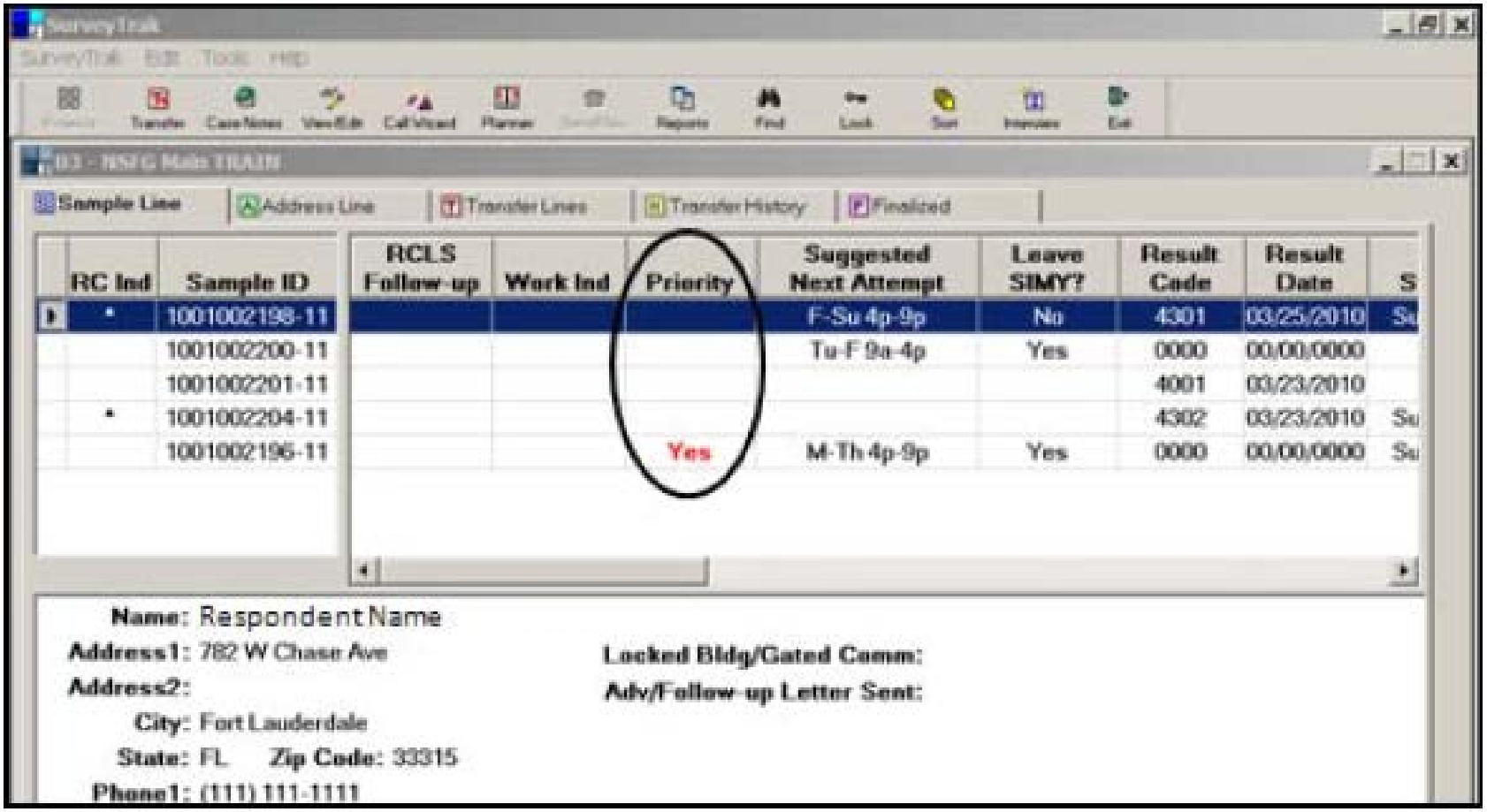
Responsive design

- Pre-identification: number of main interviews & nonresponse rate
- Identification: number of screener and main interviews
- Monitoring: daily counts
- Alteration: screener week
- Combination: no estimation alteration needed

Sample balance: Nonresponse rate variation

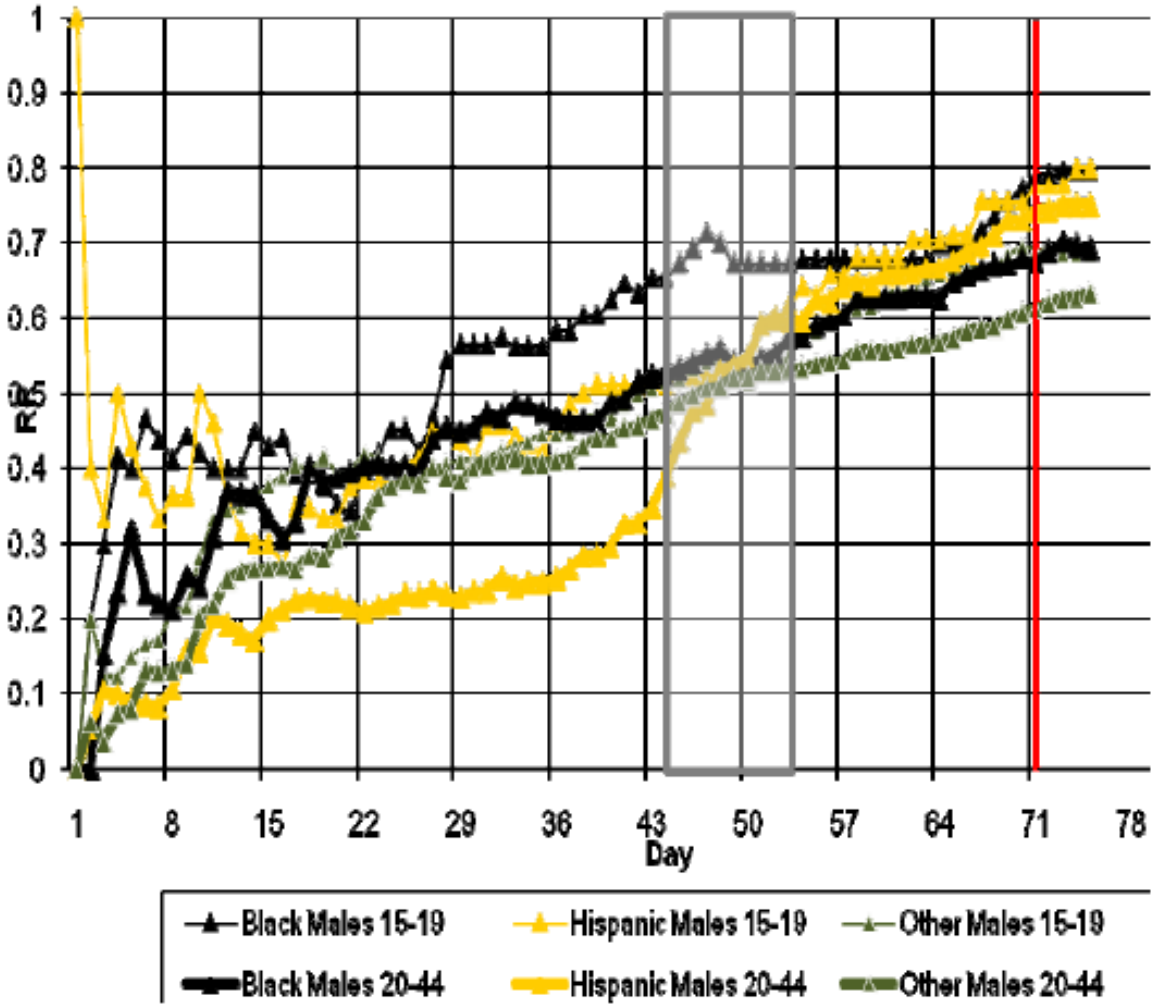
- NSFG key subgroups
  - Black teen females, Hispanic teen males
- Sponsor specified subgroup sample sizes
- Nonresponse rate variation effects:
  - Difficulty achieving subgroup sample size
  - Larger variability nonresponse adjustment weights
    - Post-stratify across key subgroups
  - Potential losses in precision due to weight variation

‘Flag’ subgroup intervention cases



E. Intervention 3: Sample balance

Sample balance: Hispanic older males



E. Intervention 3: Sample balance

Responsive design

- Pre-identification: nonresponse rate for key subgroups
- Identification: response rate by key subgroup
- Monitoring: daily counts
- Alteration: 'flag' subgroup cases
- Combination: reduced variation in nonresponse adjustment factors

Randomized interventions

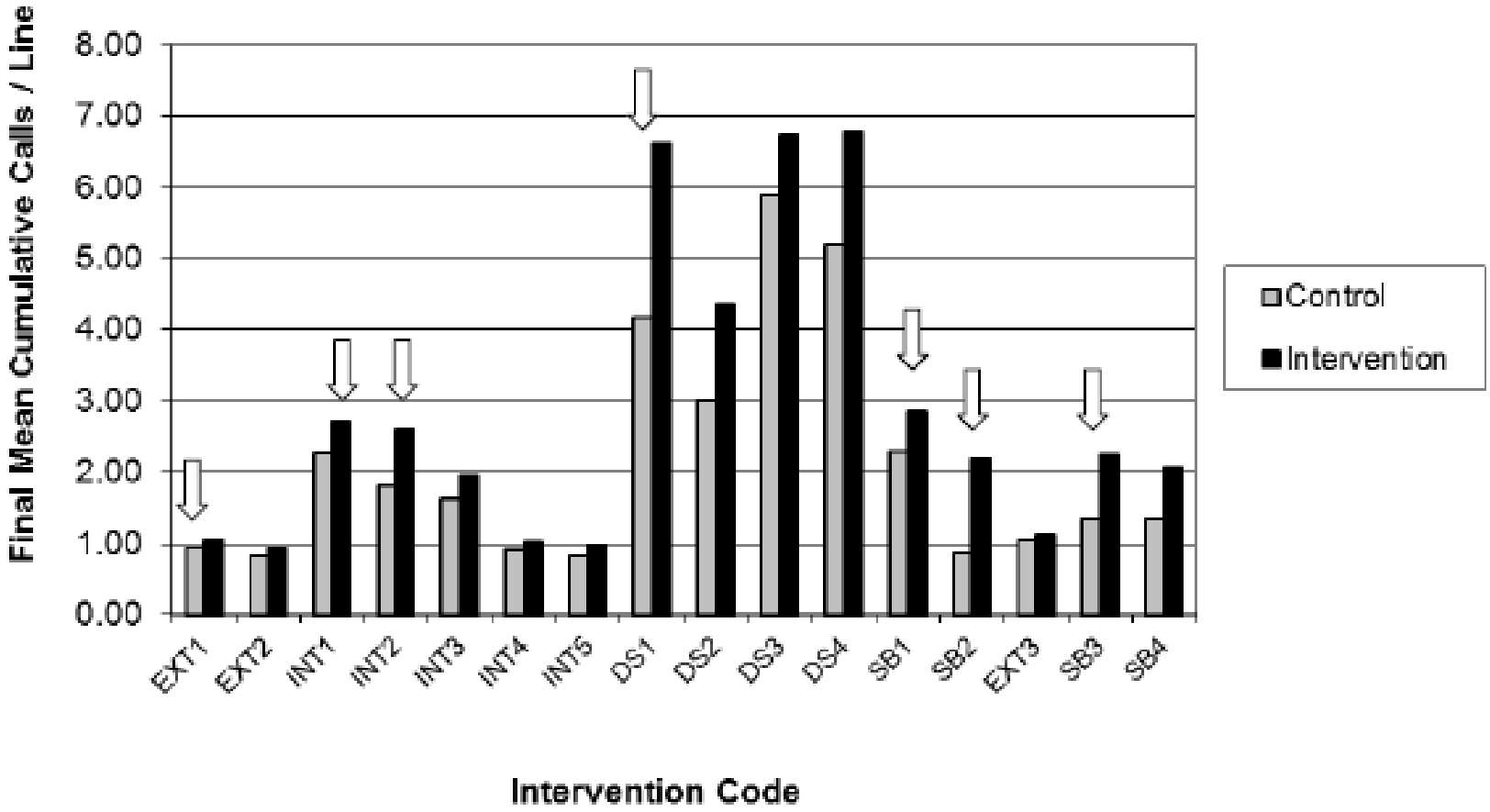
- Some survey design features untested empirically
- Thorough intervention evaluation requires experimental evidence
- Investigations –
  - Can management alter interviewer behavior?
  - Will altered behavior lead to reduction in error or cost?

Example NSFG randomized interventions

Intervention Type[a]	Description	Length (Days)	SAMPLE SIZE	
			Intervention	Control
EXT1	Active screener addresses matched with Experian data indicating household eligibility (at least one person age 20-44 in household)	11	759	755
EXT2	Active screener addresses matched with Experian data indicating household not eligible (no person age 20-44 in household)	11	637	624
EXT3	Active screener addresses with no Experian match (indeterminate household eligibility)	11	430	434
INT1	Active screener addresses with high predicted probability of eligibility (based on NSFG paradata)	13	204	165
INT2	Active main addresses with high predicted probability of response (based on NSFG paradata), no children, and high predicted probability of eligibility (based on NSFG paradata)	14	115	109[b]

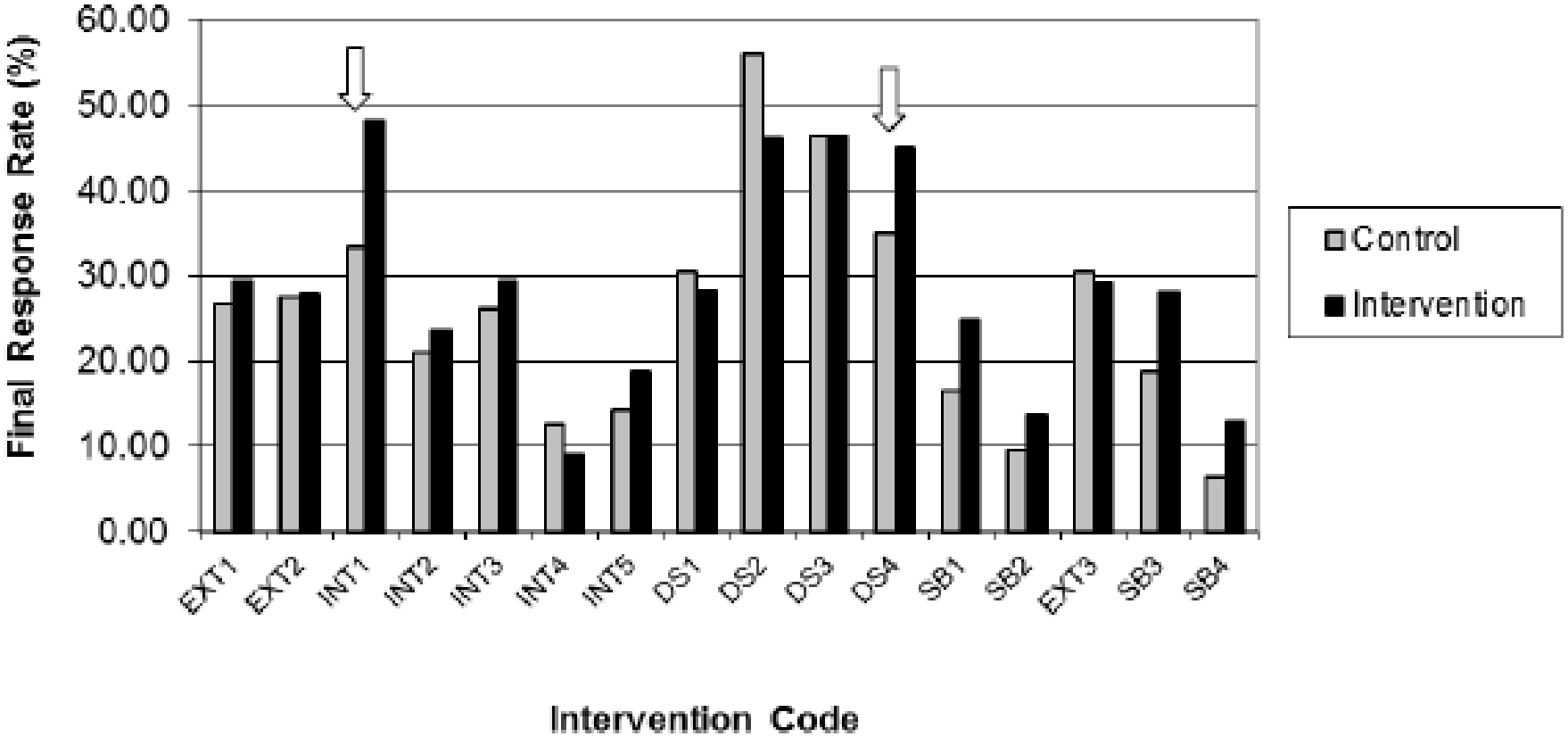
F. Intervention 4: Randomized trials

16 randomized interventions: change in interviewer behavior (calling)



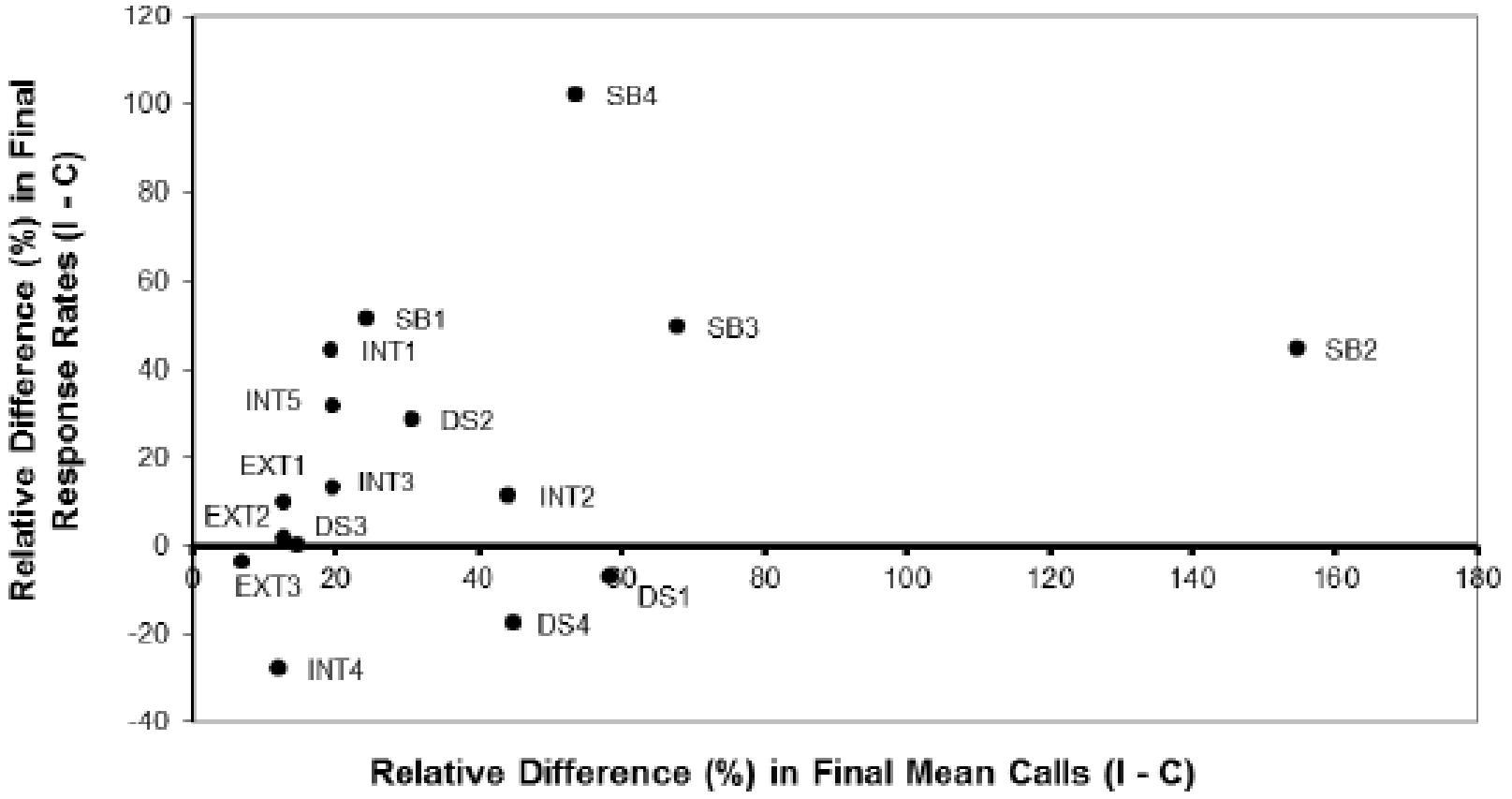
F. Intervention 4: Randomized trials

16 randomized interventions: change in error indicator (response rate)



F. Intervention 4: Randomized trials

16 randomized interventions: Change in calls v. change in response rate



F. Intervention 4: Randomized trials

Responsive design

- Pre-identification: error from various sources
- Identification: number of calls and response rates
- Monitoring: daily counts and response rates, and intervention and control counts/rates
- Alteration: ‘flag’ intervention cases
- Combination: no adjustment to estimation

Summary

- Four examples of responsive design intervention
- Each uses paradata and responsive design principles
- Lessons
  - Interviewer behavior can be altered
  - Change can be measured
  - Altered interviewer behavior does not necessarily lead to change in error indicators