

# Measuring Nonresponse

OPRE Panel on Survey Nonresponse

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# Outline

- We know that nonresponse can lead to nonresponse bias in estimates. How do we measure it?
- Approaches to measuring nonresponse bias
  - Conceptual overview (adapted from Groves and Brick, 2005)
- Other considerations
- Main areas for recent and future development

# Why Measure Nonresponse Bias

## The more obvious

- Response rate is a poor indicator of nonresponse bias
- Low response rates provide greater threat of nonresponse bias

## The less obvious

- Inform confidence in inferences made from the data
- Inform changes in the survey design to reduce nonresponse bias
- Inform postsurvey adjustments

# Measuring Nonresponse Bias

- Nonresponse is a counterfactual problem
- Multiple methods to obtain estimates of nonresponse bias, none is perfect
  - Each method makes some assumptions that cannot be tested
- Ideally, employ multiple methods
- Groves and Brick conveniently categorized them

# 1.1 Comparisons to External Sources

- Need a survey(s) or Census that has:
  - Higher response rate, without other major deficiencies
  - Same survey estimates
- Directly compare weighted sample estimates to external estimates
- Consider the differences between the studies to evaluate the extent that differences in estimates can be attributed to nonresponse

# 1.1 Comparisons to External Sources

## Strengths

- Provides an independent estimate based on a different protocol

## Limitations

- Differences in estimates could be due to other sources of error
- Estimates from external source may be more biased

## 1.2 Experimental Comparison to a Superior Protocol

- Identify likely largest sources of nonresponse error
- Modify survey protocol to minimize the effect of these sources
- Conduct survey under current/intended and under modified protocols to sample replicates

## 1.2 Experimental Comparison to a Superior Protocol

### Strengths

- Differences can be better attributed to nonresponse
- Allows identification of causal factors affecting nonresponse
- Can inform improvements to the survey design (reduction in error)

### Limitations

- May not have identified or been able to manipulate the major factors
- Can be prohibitively expensive if a stand-alone experiment



## 2. Nonresponse Bias for Variables on Full Sample

- Directly compare respondents to nonrespondents on variables available for the entire sample
  - Sampling frame
  - Administrative data
  - Interviewer observations

## 2. Nonresponse Bias for Variables on Full Sample

### Strengths

- Direct estimate of bias for selected sample

### Limitations

- Seldom possible for key survey statistics
- Affected by other sources of error (e.g., register data, interviewer observations)
- These variables are often used in postsurvey adjustments

### 3. Nonresponse Bias for Variables Available for Subset

- Compute difference between respondents and nonrespondents for part of sample with auxiliary data
  - Earlier data collection (e.g., household screening)
  - Follow-up data collection (e.g., NRFU)

### 3. Nonresponse Bias for Variables Available for Subset

#### Strengths

- Provides sample-based estimate
- Often done for key survey statistics

#### Limitations

- Remaining uncertainty in nonresponse bias estimate

## 4. Outcomes Related to Nonresponse Bias

- Define assumptions about link between respondents and nonrespondents
  - Level of effort
  - Response rates by subgroups
- Examine variability in response outcome across groups/continuum

## 4. Outcomes Related to Nonresponse Bias

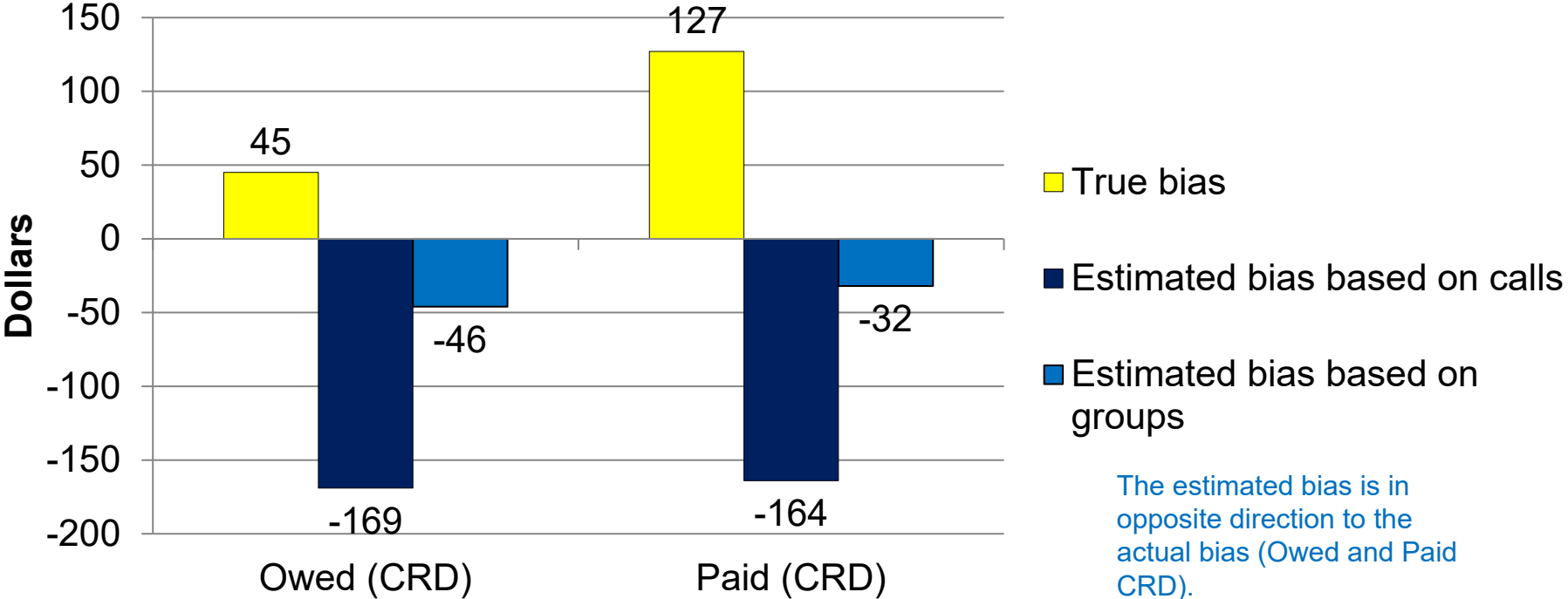
### Strengths

- Easy to perform
- Can inform about the potential for nonresponse bias

### Limitations

- Untestable assumptions

# 4. Effort - Number of Calls: Minnesota Parent Survey: Child Support Payments—Divorced Mothers Sample



Source: Lin and Schaeffer, 1995

The estimated bias is in opposite direction to the actual bias (Owed and Paid CRD).

## 5. Comparison of Alternative Adjustments

- Create adjustments that vary in the assumptions they make
  - Theoretically (e.g., initial refusals under a continuum of resistance model)
  - Empirically
    - Estimation method (e.g., propensity models)
    - Covariates used (e.g., interviewer observations)



## 5. Comparison of Adjustments

### Strengths

- Shows sensitivity/robustness to assumptions made about nonresponse
- Easy

### Limitations

- May not know which adjustment has the best estimate of nonresponse bias
  - All may be poor estimates
- Good if they agree, ambiguous interpretation if they do not agree

## 6. Comparison to Prior Survey Iterations

- Compute survey estimates from each implementation of a repeated cross-sectional survey
- Compute noncontact rates, refusal rates, response rates, for each implementation
- Summarize any correlates of nonresponse from each implementation

## 6. Comparison to Prior Survey Iterations

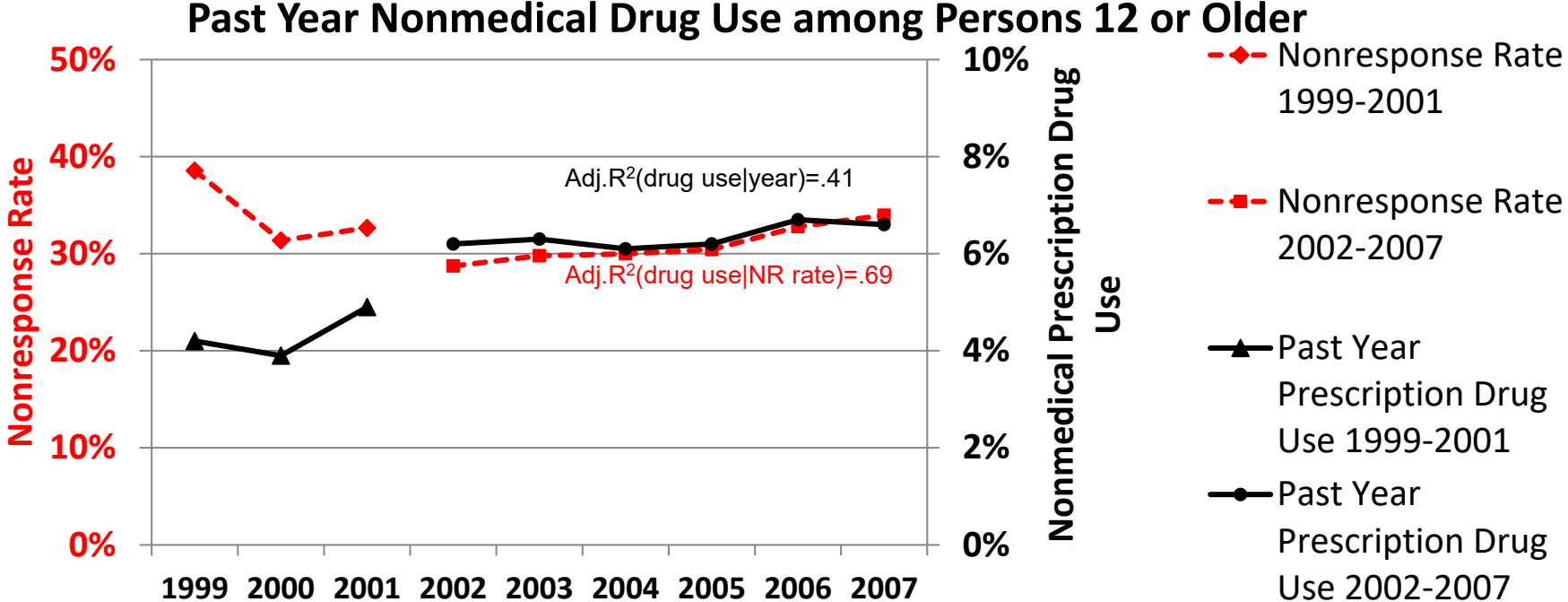
### Strengths

- Estimates produced (often) using replications of the same protocol
- Allows for estimation of nonresponse bias variance for stable characteristics

### Limitations

- Limited to indicate *changes* in nonresponse bias over time
- There could be a common cause for nonresponse and “true” survey values

# 6. Comparison to Prior Survey Iterations Example: National Survey of Drug Use and Health

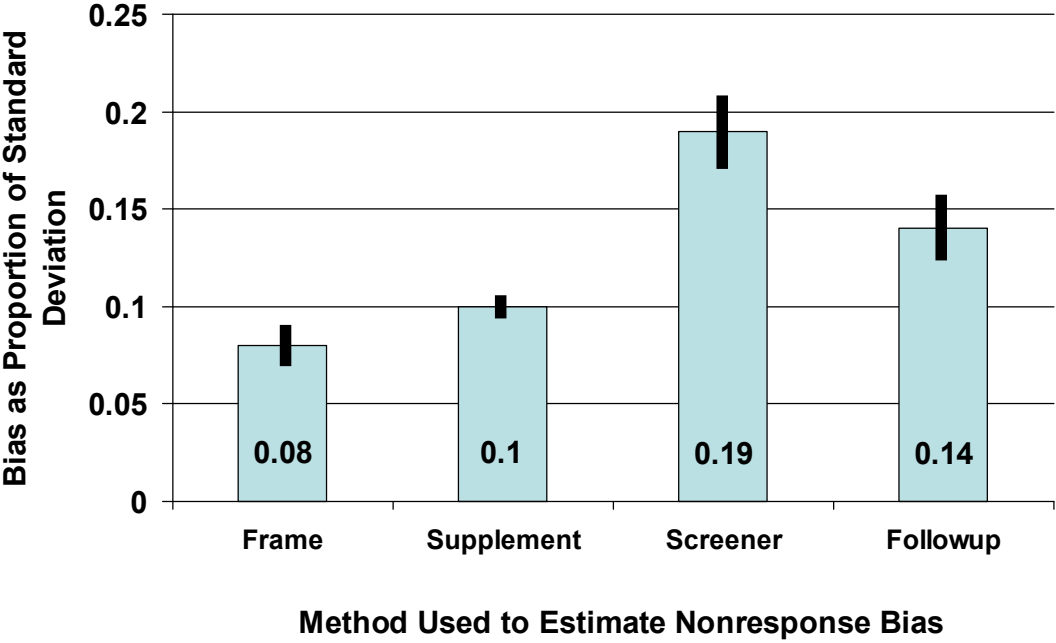


Source: Peytchev, A. (2013).

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# **OTHER CONSIDERATIONS**

# Nonresponse Bias by Method of Estimation



The magnitude of the estimated nonresponse bias seems associated with the method of nonresponse bias estimation

Source: Groves and Peytcheva, 2008

Note: Based on 566 standardized estimates from 44 studies

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# **FUTURE DIRECTIONS**

# Observations in Several Studies

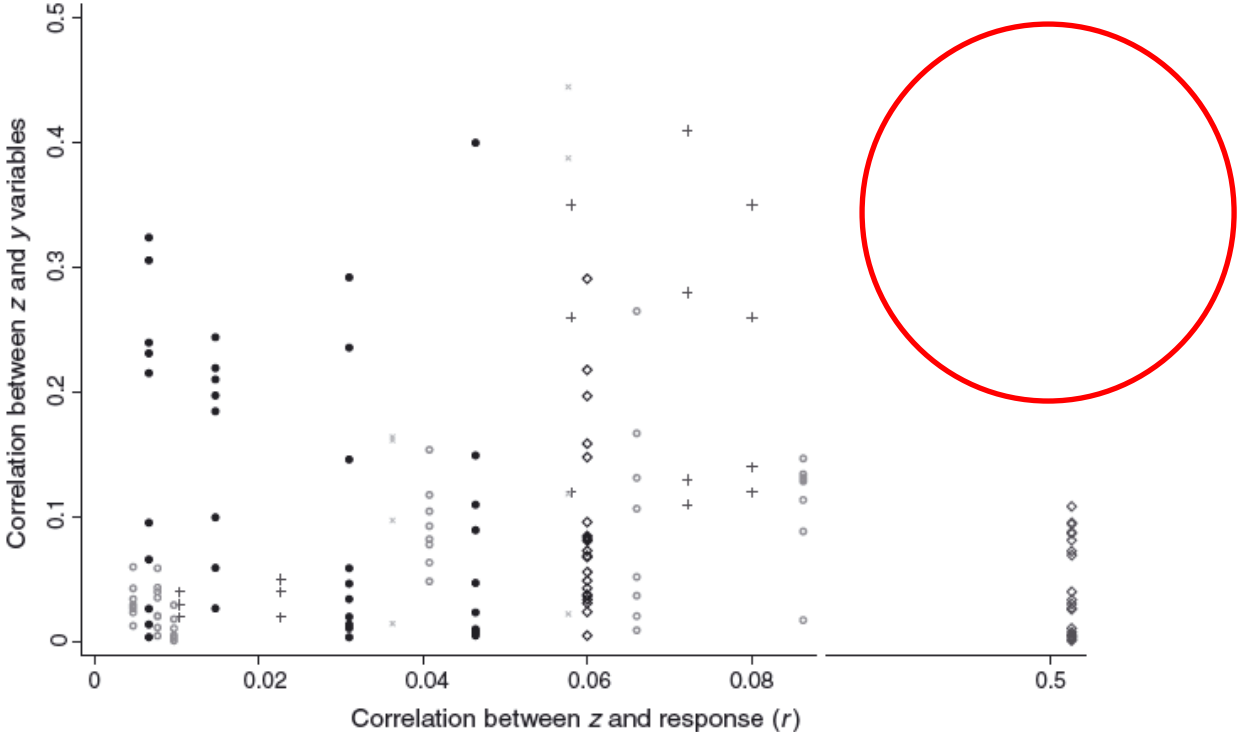


Fig. 1. Relationship between the correlation of z- and y-variables and correlation of z and response in five surveys (all correlations are shown as absolute values): +, UMTRI; x, MEPS; O, ESS; ◇, ANES; ●, NSFG



# Current and Future Needs

- Incorporate measurement of nonresponse bias into the study design
- Identify and collect more and relevant auxiliary information
  - Administrative data
  - Augment sampling frames
  - Design interviewer observations
  - Include measures at different stages of the study design
- Conduct periodic or concurrent studies to measure nonresponse bias
- Balance the need to measure nonresponse bias with the need to reduce it

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# Thank you

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