Methodological Considerations to Minimize Total Survey Error in the National Crime Victimization Survey

Andrew Moore, M.Stat., RTI International
Marcus Berzofsky, Dr.P.H., RTI International
Lynn Langton, Ph.D., BJS
Mike Planty, Ph.D. BJS

RTI International is a trade name of Research Triangle Institute.

Outline

- Overview of the National Crime Victimization Survey (NCVS)
- Response Bias and Measurement Error
  - Respondent Telescoping
  - Respondent Fatigue
  - Mode Effects
- Measurement Error and Non-response Bias
  - Interviewing Juveniles

National Crime Victimization Survey

- Nationally Representative Multi-Stage Household Survey
- Conducted by U.S. Census Bureau for the Bureau of Justice Statistics (BJS)
- Goal: Collect detailed information about the victims and consequences of crime
  - Allows estimation of annual counts and rates of personal and household criminal victimization
  - Permits comparisons of victimization over time and geographic and demographic characteristics

NCVS: Design

- Rotating Panel Survey
  - Samples of ~50,000 housing units, comprising ~80,000 persons, are fielded every six months with data being collected continuously since 1973
  - Households interviewed at 6 month intervals over a three year period for a total of 7 interviews
    - First interview conducted in person via CAPI whenever possible
    - Subsequent interviews administered by telephone whenever possible
  - All residents in a selected household age 12 or older are interviewed each wave
    - Replacement Households: Survey maintains contact with the address that was originally sampled, not necessarily the individuals.

NCVS: Instruments

- Control Card
  - Used to obtain basic household data
- Basic Screener Questionnaire
  - Administered to all respondents in the household
  - Asks about the potential types of crimes respondents may have experienced during the prior 6 months
  - One person chosen to serve as the household respondent
- Incident Report
  - Administered to those indicating a crime during the screener
  - Obtains detailed information about each incident
    - Location of incident (home, school, public locale)
    - Characteristics of offender (number of offenders, age, race, gender, etc.)
    - Characteristics of incident (presence of weapons, injuries, police involvement)

Response Bias and Measurement Error

- Respondent Telescoping
- Respondent Fatigue
- Changes in Mode

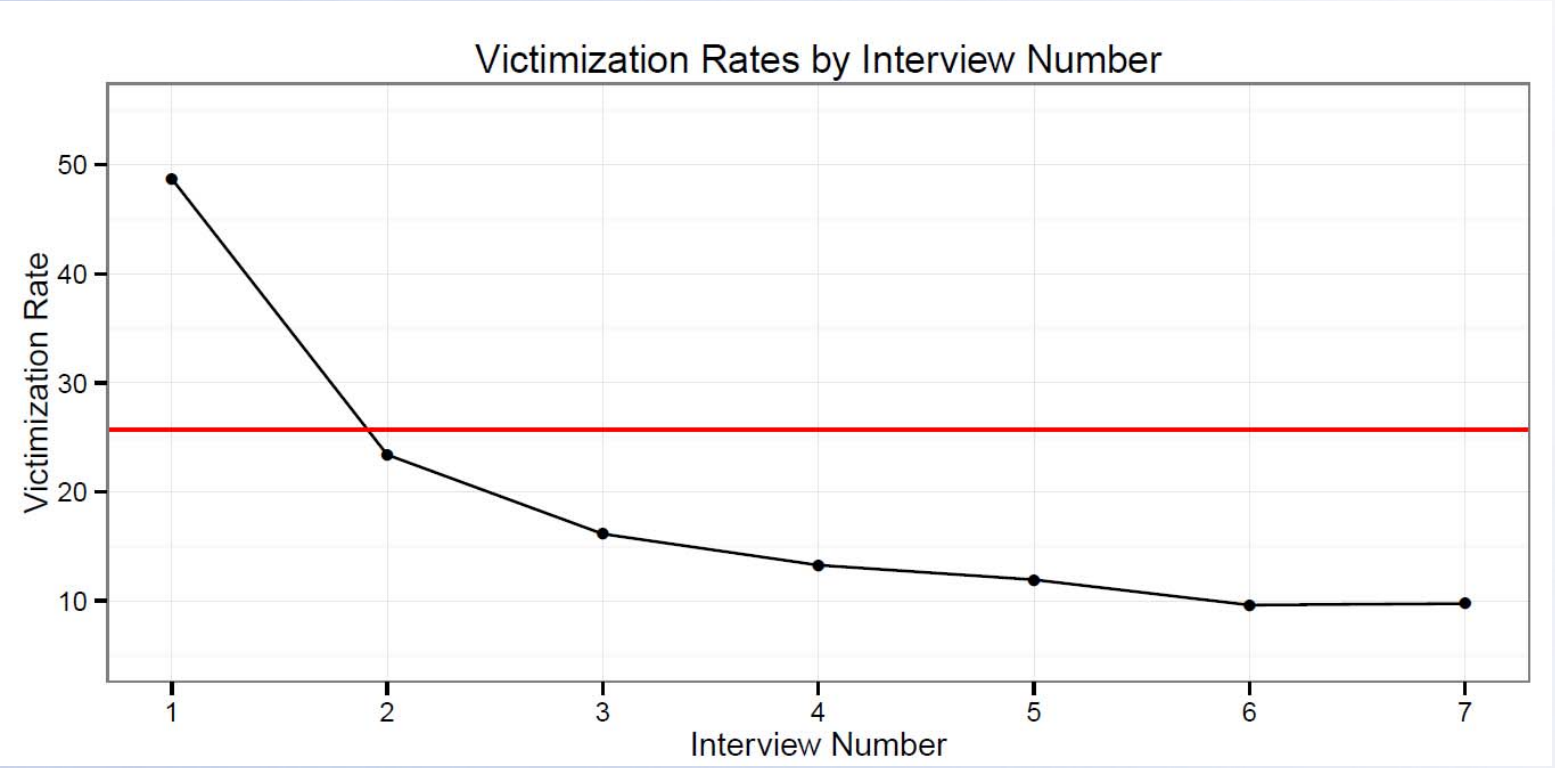
Respondent Telescoping

- Criminal victimization can be highly subject to recall errors, including when the victimization occurred
  - 6-month reference period
- Panel Design: previous interview provides the bounding for the following interview
  - The bounding interview provides information to interviewer that helps them determine whether or not respondent is telescoping a crime
  - No bounding for the first interview

Bounding Interviews

- Prior to 2006, the first interview served only as a bounding interview and was excluded from estimates and the annual data release in an effort to control for respondent telescoping
- Beginning in 2006, households that were new to the sample began having their first interview included
  - Helps maintain precision while controlling costs
- Result: Number of victimizations reported in first interview is significantly higher than the number reported in subsequent interviews

Violent Victimization Rate per 1,000 Persons by Interview Number



Interview Number	1	2	3	4	5	6	7	Total
Rate	48.7	23.4	16.1	13.3	11.9	9.6	9.8	25.7

Bounding Factor Adjustment

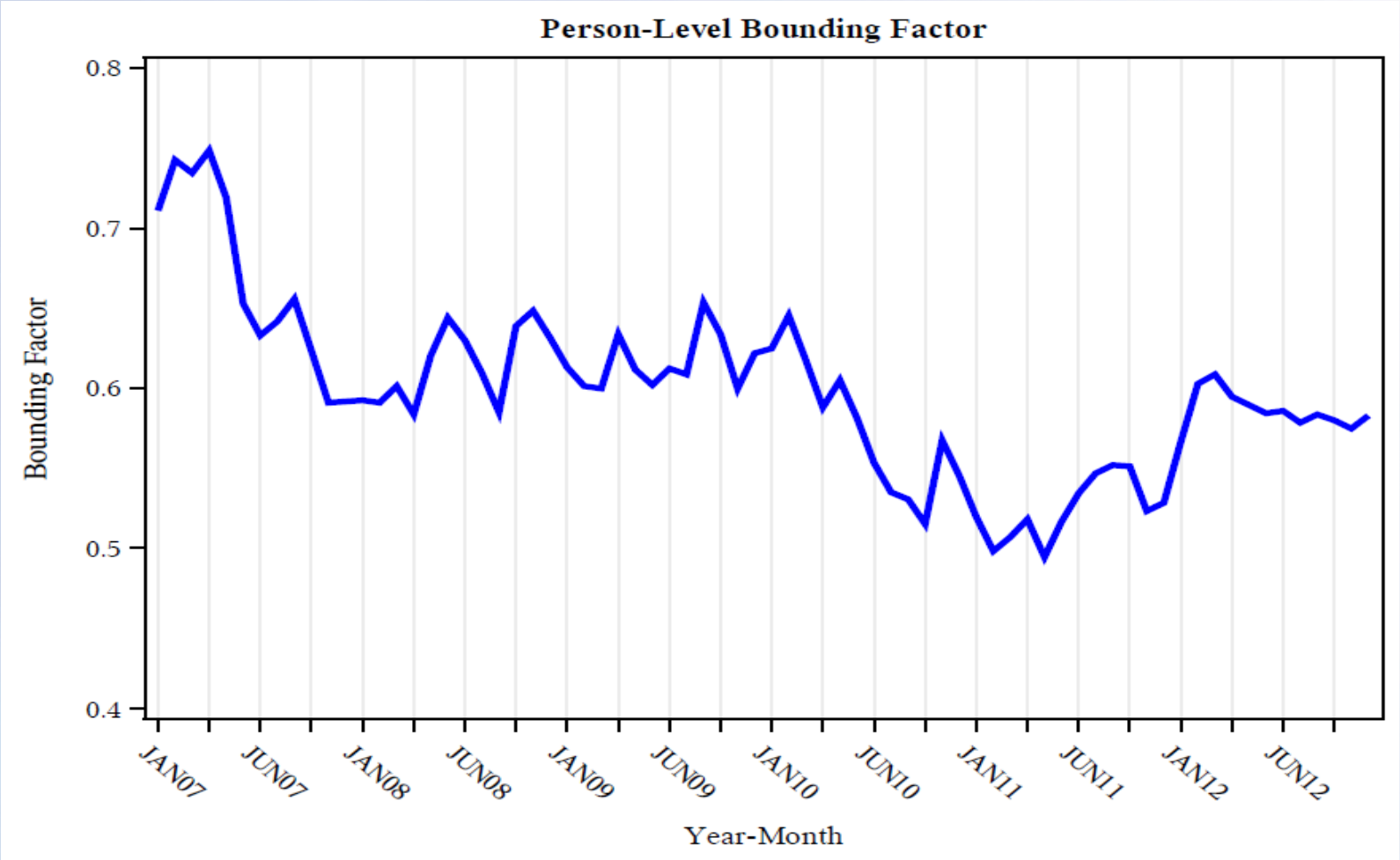
- Ratio adjustment applied to persons or households in their first interview to correct for potential telescoping

$$BF = \left[\frac{1}{6}\sum_{X=2}^{7} R_{TIS=X}\right] \Big/ R_{TIS=1}$$

Where R_{TIS}=Weighted victimization rate during prior 12 months for a given Time in Sample (TIS)

- Bounding factor calculated on a monthly basis
- Separate factors calculated for household and person

Current Bounding Factors: Person-Level



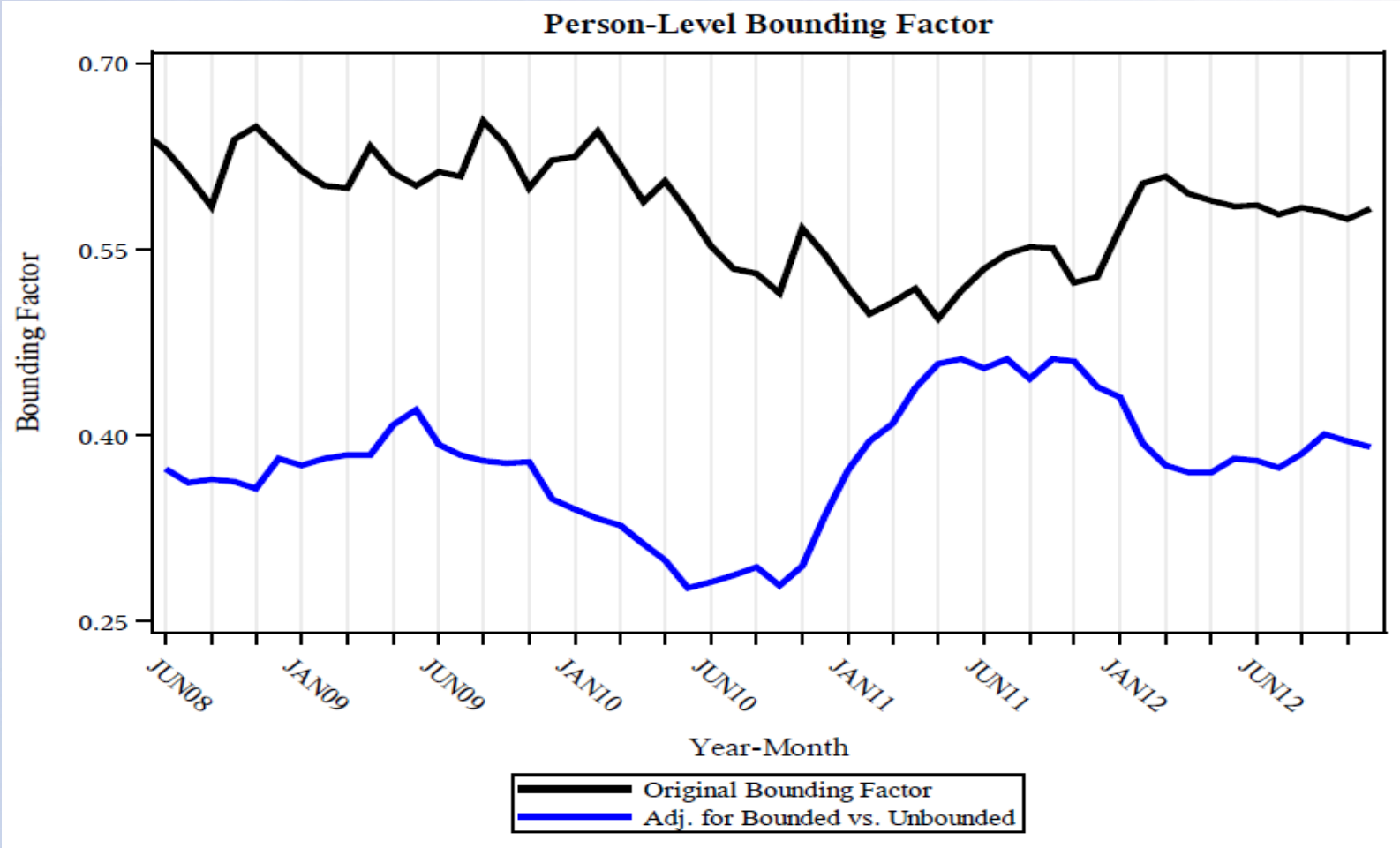
Effect of Bounding Factors on Victimization Rates

Year	Violent Victimization Rate, TIS=1		% Change
	Unadjusted Rate	Adjusted Rate	
2007	34.4	23.3	-32.3%
2008	33.1	20.4	-38.4%
2009	27.7	17.1	-38.3%
2010	28.7	16.5	-42.5%
2011	32.1	16.8	-47.7%
2012	35.3	20.7	-41.4%

Bounding Adjustment: Confounding Issues

- Interviews in TIS=2 – 7 may be unbounded (~15-20% per wave)
  - Nonresponse in previous wave
  - Replacement households
  - New eligible person in household
- Mode effect (Couzens, Krebs, & Berzofsky, 2014)
  - First interview typically uses a different mode than subsequent interviews
- Respondent fatigue
  - Significant attrition across the seven interviews
- Detailed crime type
  - More serious crimes likely to be telescoped more

Bounding Factors: Bounded vs. Unbounded



Bounding Adjustment: TSE Framework

- Create an adjustment factor for each of the three sources of non-sampling survey error
  - Recall Bias (Telescoping)
  - Respondent Fatigue
  - Mode of Interview

Alternative Approaches: Recall Bias

- Adjustment Approaches
  - Overall Ratio (current method)
  - Class Adjusted Ratio
  - Model Adjusted Ratio
- TIS Factor
  - Current approach uses TIS 2-7 as the “control”
  - Restrict control group to interviews in TIS 2-4 or TIS=2
    - Limits the influence of fatigue and attrition on the adjustment factor
  - Base adjustment on whether or not the interview was bounded or unbounded, regardless of the TIS
    - TIS 1-7 vs. TIS 1-4
- Time Period
  - 12, 24, or 36 months of previous interviews

Alternative Approaches: Respondent Fatigue

- Model-based approach (Poisson)
  - Separate adjustments for person crimes and household crimes
  - Separate adjustments for each combination of independent variables in the model
  - Based on the actual interview number rather than the TIS number
  - Dependent Variable: number of victimizations reported

Alternative Approaches: Interview Mode

- The mode effect is highly intertwined with the telescoping effect and to a lesser extent the fatigue effect
  - For the majority of cases, the interview mode changes from the first (in-person) to the second (telephone) interview
  - All first interviews are unbounded and the majority of subsequent interviews are bounded
  - The largest decrease in the number of reported incidents occurs between the first and second interviews
    - Telescoping in the first interview
    - Mode change from the first to the second interview
    - Fatigue from the first to the second interview
- Once telescoping and fatigue are taken into account is there still evidence of a mode effect?

Alternative Adjustment: TSE Framework

- Alternative Adjustment Approach
  - $BF_i = T_i * F_i * M_i$
- Telescoping (T) Effect
- Fatigue (F) Effect
- Mode (M) Effect

Measurement Error and Non-Response Bias – Assessment of Juvenile Data

- Non-Response Bias
  - Response rates are typically lower and declining for 12 to 17 year olds compared to other age groups
    - Parental Refusal
    - Inability to Contact
- Measurement Error
  - Accuracy issues related to privacy and the sensitive nature of some questions
    - Concern about responses being shared with parents
  - Proxy interviews
    - Respondent may be the offender
    - Victims may not share information with the proxy respondent

Interview Characteristics, 2007 – 2012

Interview Characteristic	12 - 17		18 +	
	Sample Size	Percentage	Sample Size	Percentage
Proxy Interview[a]	8,172	11.8**	24,393	3.0
In-Person Interview[a]	29,276	42.1	334,712	41.7
Presence of Others During Interview[b]	22,776	77.8**	176,936	52.9
Nonresponse[c]	26,917	27.9**	102,988	11.4

** Comparison statistically significant at 95% level of confidence
[a] Among respondents
[b] Among in-person respondents
[c] Among all eligible persons

Simple Assault Rate by Interview Characteristics, 2007 - 20012

Interview Characteristic		12-17		18+	
		Number of Victimizations[b]	Rate[b]	Number of Victimizations[b]	Rate[b]
Proxy Interview	Yes	84,000	29.1**	45,200	6.1
	No	722,100	32.9**	3,252,300	14.6++
Interview Mode	In-Person	384,600	36.5**	1,745,400	17.9
	Telephone	421,600	29.5**++	1,552,100	11.7++
Presence of Others[a]	Yes	268,900	32.9**	728,200	13.9
	No	115,700	49.2**++	1,017,200	22.4++

[a] Among In-Person Respondents
[b] Annual Average
** Comparison between age groups statistically significant at 95% level of confidence
++ Comparison within age group statistically significant at 95% level of confidence

Average Screen Time by Interview Wave, 2007 - 2012

Interview Wave[a]	12-17		18+	
	Number	Average Time[b]	Number	Average Time[b]
1	22,426	92.6	206,867	140.0**
2	15,855	88.7	161,780	128.5**
3	12,333	87.1	141,942	125.1**
4	8,254	85.5	107,322	124.0**
5	5,218	85.0	81,509	121.3**
6	3,180	84.4	61,892	123.0**
7	1,635	83.0	40,913	120.2**

[a] Based on when household first interviewed
[b] Time in seconds
** Comparison statistically significant at 95% confidence level

Interviewing Juveniles: Summary

- Respondents aged 12-17 are nearly 4 times as likely to have a proxy respondent as those over 18
  - Proxy respondents report fewer victimizations than self-respondents
- Respondents aged 12-17 are more likely to have others present during their interviews
  - Both age groups report fewer victimizations when others present
- Persons aged 12-17 are nearly 2.5 times as likely to be nonrespondents as those over 18
- When interviewed in-person, respondents in both age groups report higher rates of victimization
- Despite higher rates of victimization, respondents aged 12-17 spend less time on the screener than those over 18

Interviewing Juveniles: Summary

- Can data collection protocols for 12-17 year olds be improved to reduce non-response bias and measurement error?
- Can the lessons learned from 12-17 year olds be extended and applied to younger respondents to reduce coverage error?

References

- Couzens, G., Krebs, C., Berzofsky, M. (2014). Analyzing Potential Mode and Respondent Fatigue Effects in the National Crime Victimization Survey. Joint Statistical Meetings, Boston, MA.

Disclaimer

- The views expressed in this presentation are those of the author and do not represent the opinions of RTI or BJS.

More Information

Andrew Moore
Research Statistician
919.541.7063
amoore@rti.org

Marcus Berzofsky
Senior Research Statistician
919.316.3752
berzofsky@rti.org