



2018 Federal Committee on Statistical Methodology

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# Implications of Repeated Sampling in a Crime Survey

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# Outline

- Describe NCVS Companion Survey (NCVS-CS)
  - The Bureau of Justice Statistics' National Crime Victimization Survey (NCVS)—the nation's primary source of information on criminal victimization
  - CS developed as a low-cost approach for producing local-area victimization and community/policing estimates
- Evaluate effect of overlap on
  - Response rates
  - Outcomes
- Examine effect of overlap on estimates of change
- Discuss conclusions on usefulness of overlap

# Reasons for Repeated Sampling

- Key reasons for doing panel or longitudinal study include:
  - Examine spells, durations, and gross changes over time
  - Reduce sampling error for estimates of change over time
  - Reduce sampling costs
- Sampling error of change is reduced when retained units exhibit positive correlation
- The NCVS retains sample addresses for 7 rounds; the NCVS-CS retained address over 2 years

# NCVS-CS Design

- Low-cost probability sample of **households** designed to estimate crime victimization and community views on policing and safety
- Conducted in 2015 (Year 1) and 2016 (Year 2) by mail in 40 largest metropolitan areas (CBSAs)
- Randomized block design with experiments: **overlap**, **instrument** (ILS/PLS), incentive amount, mailing method
  - ILS=Incident-level survey; PLS=Person-level survey
  - Also, Form A (community questions first); Form B (last)
- Focus of this presentation is on the overlap experiment where some addresses were sampled for both years

# Overlap Design

- Overlap experiment restricted to those with common experimental condition in Year 1=Form A (50 percent of all Year 1 addresses)
- Randomly assigned 1/2 of cases (25 percent of all Year 1 addresses) to be retained regardless of Year 1 response
- All retained cases kept Year 1 instrument (ILS or PLS)
- Randomized within each CBSA so that overlap equally distributed by geography

# Response Rates

- Year 1 AAPOR RR1 = 44.2% (n=229,475)
- Year 2 AAPOR RR1 = 35.6% (n=217,250)
  - The lower rate in Year 2 is due to the testing of various cost reducing methods (e.g. lower incentives and mail protocols)
- Overlap treatment response rates for Year 2
  - No overlap RR1 = 37.3% (n=146,225)
  - Overlap RR1 = 33.2% (n=48,655)
- Overlap depressed response rates in Year 2 by 4.1 percentage points (statistically significant)

# Overlap Effect by Reporting Crime in Year 1

- Condition on those households responding in Year 1, examine Touched By Crime (TBC) reporting differences
  - TBC=HH or 1+ person experienced 1+ crime in prior year
- Households who were TBC in Year 1 were less likely to respond to the CS in Year 2 than those not TBC
  - Property crime: 7 percentage point lower Year 2 response rate for TBC than non-TBC
  - Violent crime: 14 percentage point lower Year 2 response rate for TBC than non-TBC
  - Small sample sizes (TBC is rare) limit power of this analysis, but in 80 percent of the CBSAs households, TBC in Year 1 had lower Year 2 response rates

# Overlap Effect on Reporting in Year 2

- The instrument structure also affected outcomes so results reported separately by instrument (ILS/PLS)
- Analyzed outcomes using paired t-test where difference between overlap and non-overlap sample computed for both instruments in each CBSA
- Computed differences for
  - Crime measures: TBC Property, TBC Violent, and TBC Serious Violent crime
  - Community measures: How safe is community, How often does fear of crime prevent you from doing things, Rate job police are doing

# Paired t-Test for TBC by Overlap in Year 2

TBC	Difference
<b>Incident-Level Survey</b>	
Property	-2.5*
Violent	-0.5*
Serious Violent	-0.4*
<b>Person-Level Survey</b>	
Property	-2.8*
Violent	-0.5*
Serious Violent	-0.4*

**Legend:** Property=TBC Property Crime;  
Violent=TBC Violent Crime;  
Serious Violent=TBC Serious Violent Crime  
p\* <0.05.

# Paired t-Test for Community Items by Overlap in Year 2

Item	Difference
<b>Incident-Level Survey</b>	
Safe	1.1*
Fear	1.2~
Rate	1.1~
<b>Person-Level Survey</b>	
Safe	1.5*
Fear	1.1~
Rate	1.1~

**Legend:** Safe=How safe is community;  
 Fear=How often does fear of crime prevent you from doing things;  
 Rate=Rate job police are doing

p\* <0.05.

p~ <0.1.

# Overlap Effect on Estimates

- Compared to new sampled addresses, retained addresses generally reported:
  - Fewer victimizations
  - Feeling safer
  - Higher ratings of local police actions
- These reporting patterns are consistent because people and households that have *not* been victimized tend to rate police higher than those who *have* been victimized

# Estimates of Change

- Computed difference from Year 1 to Year 2 by CBSA and averaged over the CBSAs to take advantage of the randomized block design
- Again, the instruments performed differently so we present the data separately by the ILS/PLS
- Estimates of change presented simply to show that changes between years were small; change estimates were not statistically significant

# Average Year 1 to Year 2 Change by Instrument

TBC	Change
<b>Incident-Level Survey</b>	
Property	0.5
Violent	0.3
Serious Violent	0.3
<b>Person-Level Survey</b>	
Property	-2.0
Violent	0.7
Serious Violent	0.2

Item	Change
<b>Incident-Level Survey</b>	
Safe	0.1
Fear	0.1
Rate	3.7
<b>Person-Level Survey</b>	
Safe	-0.1
Fear	-1.0
Rate	4.9

**Legend:** Property=TBC Property Crime;  
 Violent=TBC Violent Crime;  
 Serious Violent=TBC Serious Violent Crime

Safe=How safe is community;  
 Fear=How often does fear of crime prevent you from doing things;  
 Rate=Rate job police are doing

# Correlations—Touched by Crime and Community Items

TBC	Correlation	P value	Comm/Pol Item	Correlation	P value
<b>Incident-Level Survey</b>			<b>Incident-Level Survey</b>		
Property	0.81	<.01	Safe	0.73	<.01
Violent	0.17	.30	Fear	0.81	<.01
Serious Violent	0.13	.41	Rate	0.45	<.01
<b>Person-Level Survey</b>			<b>Person-Level Survey</b>		
Property	0.89	<.01	Safe	0.74	<.01
Violent	-0.0	.98	Fear	0.88	<.01
Serious Violent	0.02	.93	Rare	0.54	<.01

**Legend:** Property=TBC Property Crime;  
 Violent=TBC Violent Crime;  
 Serious Violent=TBC Serious Violent Crime

Safe=How safe is community;  
 Fear=How often does fear of crime prevent you from doing things;  
 Rate=Rate job police are doing

# Variance of Estimated Change Due to Overlap

- Effect of overlap computed using a ratio of variances
  - Variance of estimate based on overlap sample to expected variance if the samples were independent
- Ratios close to 1 indicate that the overlap *did not* improve the precision of the estimate very much. Small ratios imply overlap reduced variance of estimated change.

# Variance Ratios of Change Estimates

	25 <sup>th</sup> percentile	Median	75 <sup>th</sup> percentile
<b>TBC</b>			
Property	0.91	0.99	1.02
Violent	0.96	0.99	1.04
Serious Violent	0.96	1.00	1.02
<b>Community</b>			
Safe	0.97	1.04	1.10
Fear	0.92	0.99	1.07
Rate	0.83	1.01	1.07

- Most ratios are very close to 1, indicating that:
  - The overlap did not improve the precision of the estimates very much.
  - There was generally little variation within and across measures.

# Explaining the Effect of the Overlap

- The table shows that there is no advantage to retaining sample addresses for estimating TBC or even the community items. This result, especially for the community items, may be surprising given the relatively high correlation.
- The main explanation is that the expected variance for the independent sample is based on a larger sample because the response rate for the new addresses is considerably larger (14%) and this more than compensates for the positive correlation.

# Summary

- Retaining addresses in the sample from Year 1 to Year 2
  - Significantly reduces response rates
  - Differentially reduces responses from those who reported a victimization in Year 1
  - Results in lower reported victimizations in Year 2
  - Does not reduce the variance of estimates of change
- Retaining addresses in the sample for the NCVS-CS is not recommended



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# Thanks

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