

Methods for Identifying Careless Responses in Online Survey Data

Amioka EC¹, Black JC¹, Forber A¹, Rockhill KM¹, Dart RC¹
¹Rocky Mountain Poison & Drug Center - Denver Health, Denver, CO

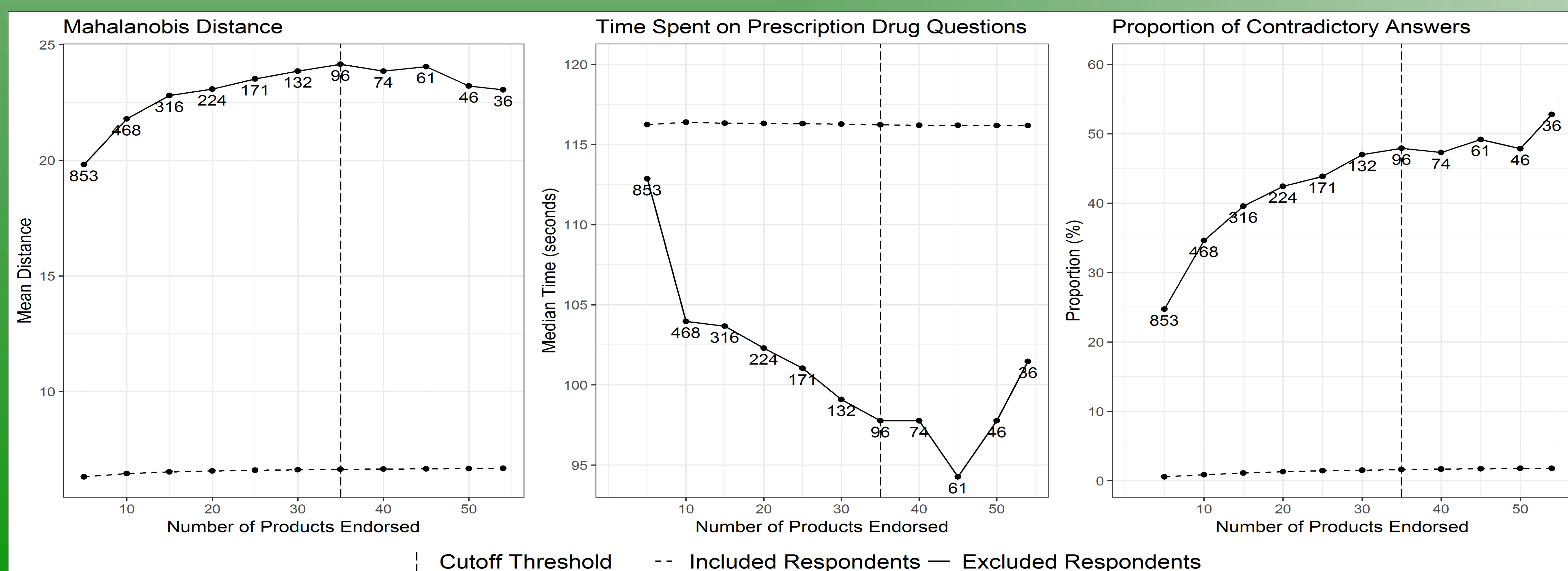
Introduction

- The Survey of Non-Medical Use of Prescription Drugs (NMURx) Program deploys a national survey designed to provide accurate and timely estimates of prescription drug non-medical use (NMU) among the general population.
- Validity of responses is often a concern for anonymous online surveys, and NMURx is further challenged by collecting information on rare outcomes which are disproportionately affected by careless responses and related to behaviors that may encounter social stigmas.
- In order to improve data quality and key outcome estimates, careless response exclusion criteria were applied to data collected in 3rd Quarter 2018 in the United States.

Methods

- NMURx deploys a cross-sectional, anonymous, opt-in online questionnaire via a company that utilizes survey panels to contact respondents who complete the questionnaire in their own settings on their own devices.
- Several literature-based and data-driven methods for identifying careless respondents were considered.
- Final careless response exclusion criteria were based on the following:
 - Total completion time for the first 8 questions seen by all respondents before skip logic was introduced
 - Long-string analysis of prescription drug lifetime use questions that all respondents answered
 - Even-odd consistency (Pearson correlation calculation for answers between all even and odd prescription drug lifetime use and illicit drug lifetime use questions)
 - Outlier analysis of the total number of products endorsed (the survey asks about 300 total unique products)
- Cutoffs for even-odd consistency and the total number of products endorsed (Figure 1) were evaluated and decisions were based on the metrics' distributions against the following internal validation measures: Mahalanobis distance, median question completion time, and contradictory answers.

Figure 1: Cutoffs for Number of Products Endorsed



Results

Figure 2: Distribution of Careless Response Patterns

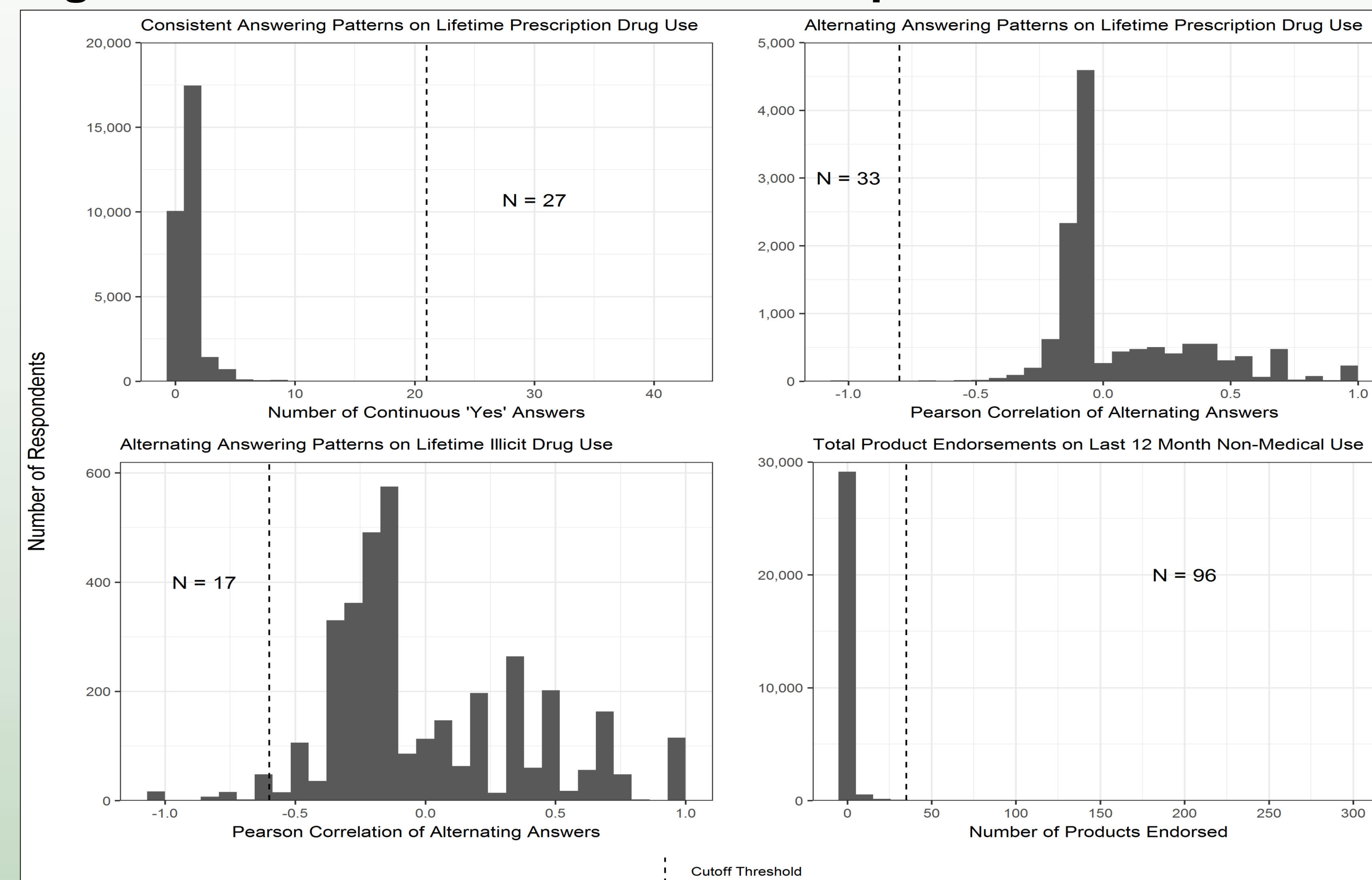


Table 1: Respondent Demographics

Characteristic	Inclusions	Exclusions
Sex		
Male (%)	53.8%	79.0%
Median Age	53	33
Region		
Northeast	17.5%	21.0%
Midwest	21.7%	21.7%
South	38.5%	39.5%
West	22.3%	17.8%

Results (continued)

Table 2: Changes to Key Outcome Drug Counts

Units Dispensed Rank	Outcome	No Exclusions Applied	All Exclusions Applied	% Decrease
--	Pain Reliever Use	9,757	9,607	-1.5%
1	Hydrocodone NMU	905	855	-5.5%
2	Sedative NMU	1,477	1,344	-9.0%
3	Oxycodone NMU	762	708	-7.1%
4	Stimulant NMU	829	716	-13.6%
5	Morphine NMU	320	264	-17.5%
6	Hydromorphone NMU	157	114	-27.4%
7	Oxymorphone NMU	150	111	-26.0%

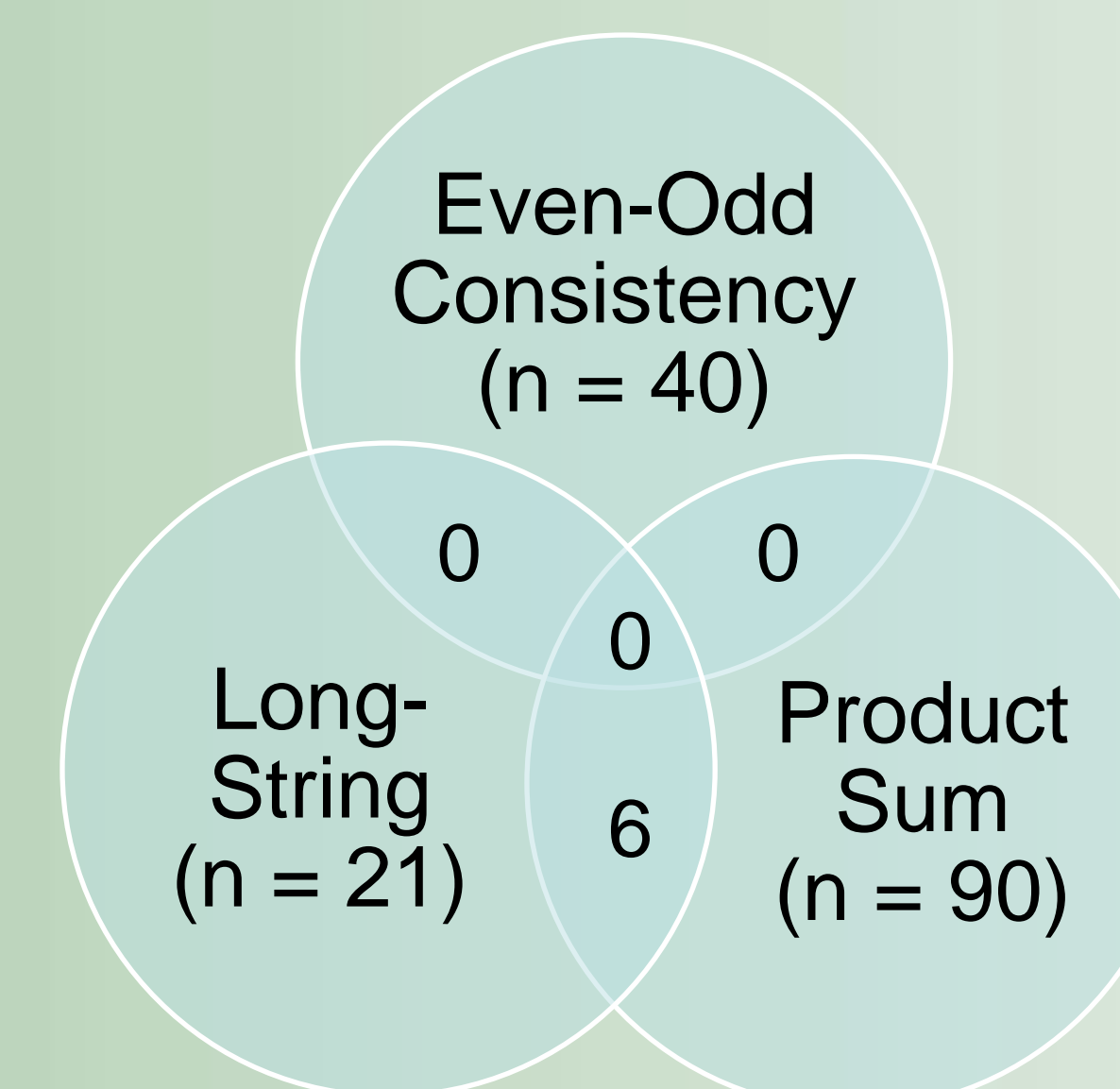
- 157 of all 29,998 respondents (0.5%) and 157 of 19,788 respondents who endorsed at least one active pharmaceutical ingredient (API) for lifetime use (0.8%) were removed based on the careless response exclusion criteria.
- 74 of 157 of careless respondents (47.1%) provided contradictory answers.
- Median time spent on drug use questions was significantly lower among careless respondents ($p < 0.0001$).

Conclusions

- Internally consistent results and little overlap in criteria indicate that diverse behaviors were identified in respondents that should be removed.
- Low volume drug groups and rare behaviors were impacted most by careless respondents.
- Exclusion criteria and the application of other methodological best practices optimize this non-probability survey.

Limitations

- 3 of 5 final exclusion criteria were based on dichotomous metrics.
- 4 of 5 final exclusion criteria were based on respondents who endorsed use or NMU.
- 10% of Americans do not use the internet, which represents a gap in the sampling frame



The RADARS System is supported by subscriptions from pharmaceutical manufacturers, government and non-government agencies for surveillance, research and reporting services. RADARS System is the property of Denver Health and Hospital Authority, a political subdivision of the State of Colorado. Denver Health retains exclusive ownership of all data, databases and systems. Subscribers do not participate in data collection nor do they have access to the raw data.

