Effects of Item Order Randomization in an Online National Drug Use Survey

Amioka EC¹, Black JC¹, Iwanicki JL¹,², Dart RC¹,²

¹Rocky Mountain Poison & Drug Safety - Denver Health, Denver, CO; ²University of Colorado Health Sciences Center - Denver, CO

Methods

- 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.
- Multiple levels of question block randomization are utilized in order to reduce order effects on endorsements of items while maintaining question flow.
- This analysis quantifies order effects and the consequences of lengthening survey questions using data collected during the 1st Quarter of 2019. These are important considerations for optimal design of an online survey instrument.

Survey Design:

- The NMURx Program 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.

- Respondents are asked if they have ever used a series of drugs and then asked follow-up questions based on skip logic.
- The order in which each of the following appears is randomized once per respondent:
  - Drug class (pain relievers, sedatives, stimulants, cannabinoids)
  - Active pharmaceutical ingredients (APIs) within each drug class

Analysis:

- The odds of drug endorsement based on position of appearance on the survey were modeled. Parameters were estimated by generalized estimating equations (GEE) using the SAS procedure GENMOD and an exchangeable working correlation matrix. All analyses were conducted using SAS 9.4 (Cary, NC).
- The position on the survey (indicating order of appearance) coefficient from these models was used to develop a naïve approach to estimating the loss in the number of endorsements as the length of the set of questions increases:

\[
(prevalence) \sum_{i=1}^{n} \left[ \sum_{j=1}^{n} \left( \exp(\beta_i + \beta_j + \beta_{ij}) / (1 + \exp(\beta_i + \beta_j + \beta_{ij})) \right) \right],
\]

where \(i\) = number of survey items, \(n\) = number of respondents

- Even with randomization, the first drug seen on the questionnaire was endorsed more often than the last (OR: 1.38; 95% CI 1.33, 1.43; p<0.001), regardless of drug type.
- Block randomization is useful in keeping together drugs with similar properties, but has the consequence of creating unequal probabilities of drugs being seen first.
- Assuming a baseline prevalence as ground truth, estimates of lifetime drug use asymptotically approach half of what the true prevalence is as the number of survey items increases.

Results (continued)

• The loss of endorsements estimation assumes a linear and uniform decrease in odds of endorsements for each one item increase in survey length. It also assumes an estimated baseline prevalence as truth.
• 10% of Americans do not use the internet, which represents a gap in the sampling frame