The Influence of Attrition Weights on the Evaluation of Measurement Reactivity in an Intensive Longitudinal Study

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Jamie Griffin
Megan E. Patrick

INSTITUTE FOR SOCIAL RESEARCH
UNIVERSITY OF MICHIGAN
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Young Adult Attitudes Study (1)

• Examine substance use across the transition to adulthood among young adults from 3 MI high schools
  – Substance use is highest during this time (Johnston et al., 2013; SAMHSA, 2013)
  – Differences by social role attainment (e.g., college attendance, marriage, parenting, etc.)
    • Greater alcohol use and less cigarette and marijuana use among college students vs. young adults not in college
Young Adult Attitudes Study (2)

- **Experimental design**

<table>
<thead>
<tr>
<th></th>
<th>Baseline 5/12</th>
<th>Wave 1 9/12</th>
<th>Wave 2 1/13</th>
<th>Wave 3 5/13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive Measurement (n=202)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Control (n=97)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

**Notes** — Baseline paper-and-pencil questionnaire, all else web. Post-paid incentives: $20 Waves 1 and 2; $25 Wave 3; $2 each diary day; $2 completing all days within burst.

- **Sample**
  - 299 12th grade students from 3 MI high schools (urban, suburban, rural)
Intensive Longitudinal Methods

• Advantages
  – Permit the study of daily-level, within-person associations (e.g., substance use and its predictors and consequences) in real-world settings

• Disadvantages
  – Burdensome for both researcher and participant → attrition
  – Measurement reactivity
Response Rates

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Wave 1</th>
<th>Wave 2</th>
<th>Wave 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive Measurement</td>
<td>45.1%</td>
<td>34.8%</td>
<td>34.2%</td>
<td></td>
</tr>
<tr>
<td>Group (n=202)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Group (n=97)</td>
<td>40.2%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>72.3%</td>
<td></td>
<td></td>
<td>36.1%</td>
</tr>
</tbody>
</table>

Notes – Response rate (RR2) = number of complete interviews divided by the number of eligible participants (The American Association for Public Opinion Research (AAPOR), 2009). The denominators incorporate previous wave refusals and current wave ineligibility due to age (<18).

• Nonresponse at Wave 3 (Griffin and Patrick, 2014)
  – Both groups disproportionately retained students whose parents had at least some college education
  – Intensive Measurement (IM) group underrepresented substance users (but overrepresented binge drinkers) and overrepresented females
Aim and Methods

• Aim
  – Evaluate measurement reactivity in the presence of attrition

• Methods
  – Examine response patterns
  – Estimate separate attrition weights for treatment and control groups using various propensity models
  – Examine estimated weighted differences in Wave 3 substance use estimates
Wave-Level Response Patterns

- **IM Group**
  - Complete Response: 24.8%
  - Attrition Nonresponse: 44.1%
  - Complete Nonresponse: 11.4%
  - Non-Attrition Nonresponse: 19.8%

- **Control Group**
  - Complete Response: 20.0%
  - Attrition Nonresponse: 40.0%
  - Complete Nonresponse: 59.8%
  - Non-Attrition Nonresponse: 40.2%
## Response Propensity Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Variables</th>
<th>IM Group (N=175)</th>
<th>Control Group (N=84)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic information</td>
<td>Gender, race, parental education, college plans</td>
<td>Gender (-) Race (+)</td>
<td>Parental education (+) College plans (+)</td>
</tr>
<tr>
<td>Baseline substance use</td>
<td>Alcohol use (including binge drinking), marijuana use, other illegal drug use</td>
<td>Binge drinking(+) 12-mo mar. use (+) Life. mar. use (-) Life. illegal drug use (-)</td>
<td>12-mo mar. use (+) Life. mar. use (-)</td>
</tr>
<tr>
<td>Use of electronics</td>
<td>Hours a day spent playing electronic games, texting on cell phone, talking on cell phone, visiting social networking sites</td>
<td>Electronic games (+) Talk on cell phone (-)</td>
<td>Nothing</td>
</tr>
<tr>
<td>Combined</td>
<td>All of the above</td>
<td>Gender (-) Binge drinking (+) 12-mo mar. use (+) Life. mar. use (-) Life. Illegal drug use (-) Electronic games (+) Talk on cell phone (-)</td>
<td>Parental education (+) College plans (+)</td>
</tr>
</tbody>
</table>
## Attrition Weights

\(N_{IM}=175, \; N_{CG}=84\)

<table>
<thead>
<tr>
<th>Response propensity models</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Median</th>
<th>Max</th>
<th>1+CV^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics only</td>
<td>3.17</td>
<td>1.51</td>
<td>1.56</td>
<td>3.27</td>
<td>7.39</td>
<td>1.23</td>
</tr>
<tr>
<td>Substance use only</td>
<td>4.20</td>
<td>6.24</td>
<td>1.29</td>
<td>2.56</td>
<td>60.20</td>
<td>3.21</td>
</tr>
<tr>
<td>Use of electronics only</td>
<td>3.03</td>
<td>1.64</td>
<td>1.52</td>
<td>2.49</td>
<td>12.30</td>
<td>1.29</td>
</tr>
<tr>
<td>Combined</td>
<td>5.99</td>
<td>10.30</td>
<td>1.06</td>
<td>2.92</td>
<td>82.12</td>
<td>3.96</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Response propensity stratification models (quintiles)</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Median</th>
<th>Max</th>
<th>1+CV^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics only</td>
<td>3.12</td>
<td>1.39</td>
<td>1.67</td>
<td>2.19</td>
<td>5.46</td>
<td>1.20</td>
</tr>
<tr>
<td>Substance use only</td>
<td>3.26</td>
<td>1.75</td>
<td>1.75</td>
<td>2.59</td>
<td>6.30</td>
<td>1.29</td>
</tr>
<tr>
<td>Use of electronics only</td>
<td>2.81</td>
<td>0.76</td>
<td>2.18</td>
<td>2.42</td>
<td>4.06</td>
<td>1.07</td>
</tr>
<tr>
<td>Combined</td>
<td>3.69</td>
<td>2.25</td>
<td>1.48</td>
<td>2.73</td>
<td>7.33</td>
<td>1.37</td>
</tr>
</tbody>
</table>
Estimated Weighted Differences
(N_{IM}=60, N_{CG}=38)

- Alcohol Use
- Marijuana Use

Demographics
Substance Use
Electronic Use
Combined

% Difference

Last 3 months

Estimated Weighted Differences
(N_{IM}=60, N_{CG}=38)
Estimated Weighted Differences
(N_{IM}=60, N_{CG}=38)

Demographics
Substance Use
Electronic Use
Combined

Alcohol Use
Marijuana Use

Last 3 months
Last 30 days
Drunk, last 30 days
Binge, last two weeks
Last 3 months
Last 30 days

% Difference

Estimated Weighted Differences
(N_{IM}=60, N_{CG}=38)
Discussion

• Predictors of Wave 3 response differed for treatment and control groups
  – Inclusion of baseline use of electronics (games and talking on cell phone) predicted later participation for IM group (but not control group)
• Quintile weights introduced smallest variability
• Weights based on combined model indicate absence of significant measurement reactivity, though patterns suggest lower substance use among IM group
• Future research
  – Explore alternative weighting or imputation methods
  – Replicate with larger data set
Contact

• JLGriff@umich.edu