Selection and Socialization Effects in Early Adolescent Alcohol Use: a Propensity Score Analysis

Matthew D. Scalco\textsuperscript{1}, Elisa M. Trucco\textsuperscript{2}, Donna L. Coffman\textsuperscript{3}, & Craig R. Colder\textsuperscript{1}

\textsuperscript{1}SUNY at Buffalo; \textsuperscript{2}University of Michigan; \textsuperscript{3}Penn State
Peer/Adolescent Alcohol Use (AU)

- Robust relationship (Leung, Toumbourou, & Hemphill, 2011)

- Direction of effect debated on temporal and theoretical grounds
  - Target AU $\rightarrow$ Peer AU (Selection)
  - Peer AU $\rightarrow$ Target AU (Socialization)

- Large literature, using diverse methods supports both
Friendship Ties

Target AU

Selection

Socialization

Change in Target AU

Friendship Ties
Adaptation from Bronfenbrenner, 1979

Distal Social Contact
- Outlets
- Attitudes about youth use

Proximal Social Contact
- Norms/Approval of Use
- Peer use/Delinquency
- Peers/Friends
- Media
- Poverty

Individual
- Pubertal Development
- Temperament
- Belief/Attitudes
- Psychopathology
- Substance Use

Family Environment
- Family stress
- Parental Use/Permission

Parenting

Elisa Trucco, Matt Scalco & Craig Colder

Adaptation from Bronfenbrenner, 1979
Selection and Socialization Within the Broader Context of Adolescence

- Few studies have controlled for the wide range of influences on Adolescent AU
  - Limited number of control variables that can be considered using statistical methods such as SEM, HLM, and social network analysis

- Systematically ruling out alternative hypotheses is critical to testing casual models in science (Holland, 1986; Popper, 1962; Rubin, 2005)
  - Ruling out alternative casual explanations

- Propensity Score Analysis (PSA) (Rosenbaum & Rubin, 1983; Rubin, 2005)
  - Simulate random assignment
Present Study

- Longitudinal 3-Wave design
- Perceived Peer AU and Peer Self-reported AU
  - Effects tend to be overestimated with only perception (Bauman & Ennett, 1996)
  - Perceived Peer AU is important regardless

Confounds

26

Peer Initiation
VS.
Peer Control

W2
Target Alcohol
Use

W3
Target Alcohol
Use
## Transition Groups and N

### Peer AU $\rightarrow$ Target AU (Socialization)

<table>
<thead>
<tr>
<th></th>
<th>W1 Peer AU</th>
<th>W2 Peer AU</th>
<th>Target Rep N</th>
<th>Peer Rep N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer Control</td>
<td>0</td>
<td>0</td>
<td>594</td>
<td>601</td>
</tr>
<tr>
<td>Peer Initiation</td>
<td>0</td>
<td>X</td>
<td>90</td>
<td>87</td>
</tr>
<tr>
<td>Peer Stable</td>
<td>X</td>
<td>X</td>
<td>31</td>
<td>28</td>
</tr>
<tr>
<td>Peer Desistance</td>
<td>X</td>
<td>0</td>
<td>19</td>
<td>49</td>
</tr>
</tbody>
</table>

### Target AU $\rightarrow$ Peer AU (Selection)

<table>
<thead>
<tr>
<th></th>
<th>W1 Target AU</th>
<th>W2 Target AU</th>
<th>Target Rep N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Control</td>
<td>0</td>
<td>0</td>
<td>635</td>
</tr>
<tr>
<td>Target Initiation</td>
<td>0</td>
<td>X</td>
<td>62</td>
</tr>
<tr>
<td>Target Stable</td>
<td>X</td>
<td>X</td>
<td>24</td>
</tr>
<tr>
<td>Target Desistance</td>
<td>X</td>
<td>0</td>
<td>17</td>
</tr>
</tbody>
</table>
Participants

- 2 community samples ($N = 378$ and $N = 387$) combined for analysis (total $N = 765$)
  - 3 close friend peers nominated (1 sampled)

Mean age of targets by wave:
- W1 = 11.8 (0.79); W2 = 12.9 (0.79); W3 = 13.9 (0.79)
- 54% female; 80% Caucasian

Mean age of peers by wave:
- W1 = 11.5 (1.15); W2 = 12.4 (1.27); W3 = 13.4 (1.18)
- 55% female; 80% Caucasian
Measures

- Peer and Target Self-reported AU
  - Lifetime AU at W1
  - Past Year frequency of AU at W2 and W3
    - Both “without parents permission”
    - Ordinal DVs: no use; few sips - 1 drink; > 1 but < 4 drinks; > 4

- Perception of Peer Alcohol Use
  - Tell whether or not your 3 close friends have ever used alcohol without parents permission (dichotomous: yes/no)

Rates of Alcohol Use

<table>
<thead>
<tr>
<th></th>
<th>W1</th>
<th>W2</th>
<th>W3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target Alcohol Use</td>
<td>6.9% (53)</td>
<td>11.6% (86)</td>
<td>25.3% (182)</td>
</tr>
<tr>
<td>Peer Alcohol Use</td>
<td>9.9% (70)</td>
<td>13.8% (91)</td>
<td>22.3% (139)</td>
</tr>
<tr>
<td>TR Peer Alcohol Use</td>
<td>6.9% (53)</td>
<td>16.5% (121)</td>
<td>26.2% (188)</td>
</tr>
</tbody>
</table>
Hypotheses

- Peer AU $\rightarrow$ Target AU (Socialization)
  - Peer Initiation v. Peer Control
    - Former Higher on W2 and W3 Target Alcohol use

- Target AU $\rightarrow$ Peer AU (Selection)
  - Target Initiation v. Target Control
    - Former Higher on W2 and W3 Peer Alcohol use

- Each transition group comparison run separately
  - Group comparisons balanced on 26 potential confounds
<table>
<thead>
<tr>
<th>Covariates</th>
<th>$\alpha$</th>
<th>Reporter</th>
<th>Abbreviations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descriptives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socioeconomic Index</td>
<td>NA</td>
<td>Parent</td>
<td>Socec</td>
</tr>
<tr>
<td>Age</td>
<td>NA</td>
<td>Parent</td>
<td>Age</td>
</tr>
<tr>
<td>Caucasian/minority</td>
<td>NA</td>
<td>Parent</td>
<td>Minority</td>
</tr>
<tr>
<td>Gender</td>
<td>NA</td>
<td>Parent</td>
<td>Gender</td>
</tr>
<tr>
<td>Marital Status</td>
<td>NA</td>
<td>Parent</td>
<td>Marital</td>
</tr>
<tr>
<td><strong>Temperament (Ellis &amp; Rothbart, 2001)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effortful Control</td>
<td>.89</td>
<td>Parent</td>
<td>EC</td>
</tr>
<tr>
<td>Negative Affect</td>
<td>.72</td>
<td>Parent</td>
<td>Neg Aff</td>
</tr>
<tr>
<td>Surgency</td>
<td>.84</td>
<td>Parent</td>
<td>Surg</td>
</tr>
<tr>
<td>Depressed Mood</td>
<td>.72</td>
<td>Parent</td>
<td>Dep Mood</td>
</tr>
<tr>
<td><strong>Reinforcement Sensitivity (Colder et al., 2011)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear (BIS)</td>
<td>.85</td>
<td>Parent</td>
<td>Fear (BIS)</td>
</tr>
<tr>
<td>Anxiety (BIS)</td>
<td>.62</td>
<td>Parent</td>
<td>Anx (BAS)</td>
</tr>
<tr>
<td>Reward Responsiveness (BAS)</td>
<td>.61</td>
<td>Parent</td>
<td>Rew (BAS)</td>
</tr>
<tr>
<td>Impulsivity/Fun Seeking (BAS)</td>
<td>.75</td>
<td>Parent</td>
<td>Imp (BAS)</td>
</tr>
<tr>
<td>Drive (BAS)</td>
<td>.69</td>
<td>Parent</td>
<td>Drive (BAS)</td>
</tr>
<tr>
<td><strong>Disruptive Behavior (Pillow et al., 1998)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DBD-Oppositional Defiant Disorder</td>
<td>.89</td>
<td>Parent</td>
<td>ODD</td>
</tr>
<tr>
<td>DBD-Conduct Disorder</td>
<td>.72</td>
<td>Parent</td>
<td>CD</td>
</tr>
<tr>
<td>DBD-ADHD-Impulsivity</td>
<td>.84</td>
<td>Parent</td>
<td>ADHD-imp</td>
</tr>
<tr>
<td>DBD-ADHD-Inattention</td>
<td>.91</td>
<td>Parent</td>
<td>ADHD-att</td>
</tr>
<tr>
<td><strong>Parenting (Kodl &amp; Mermelstein, 2004)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol Specific Parenting</td>
<td>.79</td>
<td>Parent</td>
<td>Alc Parent</td>
</tr>
<tr>
<td>Parenting Efficacy</td>
<td>.88</td>
<td>Parent</td>
<td>Parent Eff</td>
</tr>
<tr>
<td><strong>Parental Alcohol use (Miller, et al., 1995)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parental Alcohol Use</td>
<td>.90</td>
<td>Parent</td>
<td>Parent Alc</td>
</tr>
<tr>
<td>Parent Alcohol Consequences</td>
<td>.90</td>
<td>Parent</td>
<td>Par Alc Con</td>
</tr>
<tr>
<td><strong>Pubertal Status (Peterson et al., 1998)</strong></td>
<td>.70</td>
<td>Adolescent</td>
<td>Puberty</td>
</tr>
<tr>
<td><strong>TR Peer Delinquency (Fergusson et al., 1999)</strong></td>
<td>.74</td>
<td>Adolescent</td>
<td>Peer Delin</td>
</tr>
<tr>
<td><strong>Adolescent Alcohol Use (Elliott &amp; Huizinga (1983))</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol Use with Parental Permission</td>
<td>NA</td>
<td>Adolescent</td>
<td>T Alc w- per</td>
</tr>
<tr>
<td>W1 Lifetime Alcohol Use</td>
<td>NA</td>
<td>Adolescent</td>
<td>T Alc</td>
</tr>
<tr>
<td><strong>Peer Alcohol Use (Johnston et al., 2003)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W1 PR Peer Lifetime Alcohol Use</td>
<td>NA</td>
<td>Peer</td>
<td>P Alc</td>
</tr>
<tr>
<td>W1 TR Peer Alcohol Use</td>
<td>.85</td>
<td>Adolescent</td>
<td>P Alc</td>
</tr>
</tbody>
</table>
Propensity Score Models: 2 models

Model 1: Estimating Propensity Scores

- Logistic Model in which the transition groups (IV’s) are regressed on the 26 confounds
  - Save predicted probabilities of observed group
  - Generalized Boosted Modeling in R
    - Data mining technique: includes interactions between 26 confounds

- Use propensity scores to “simulate random assignment”
Socialization ex: Simulating Random Assignment

CONTROL GROUP (NO PEER USE)  PEER INITIATION GROUP

SMD's

Age
Sensation Seeking
Efforful Control
Parental Monitoring
Conduct Disorder
Parental Alcoholism
Prior Alcohol Use
Peer Delin

.67  .82  .91
.10  .96  .41
.22  .89  .36
Socialization ex: Simulating Random Assignment

“Balanced” on Covariates
Model 2: Weighted Path Model in Mplus v7

Peer Initiation VS. Peer Control

Unbalanced Confounds

W2 Target AU

W3 Target AU

Socialization Example
Groups Biased on Age, Gender, Marital Status, Neg Affect, Surgency, Depressed Mood, BIS Fear, BIS Anxiety, Conduct Disorder, Puberty, W1 Target AU, and W1 AU with Parents Permission.

Unbalanced Confounds

Peer Initiation VS. Peer Control

W2 Target Alcohol Use

R^2 = .36

ab = 1.5* (.87 – 2.22)

W3 Target Alcohol Use

R^2 = .61
Peer Self-Report
Peer Initiation v. Peer Control

Groups Biased on Age, Socioeconomic Status, Marital status, Effortful Control, Surgency, Fear, ODD, Alcohol-Specific Parenting, Puberty, and W1 Target Alcohol Use

Unbalanced Confounds

Peer Initiation VS. Peer Control

W2 Target Alcohol Use

R² = .12

W3 Target Alcohol Use

R² = .59

ab = .34* (.07 - .64)
Target Report

Target Initiation v. Target Control

Groups Biased on Age, Minority Status, BAS (Drive), Parental Alcohol Use, Pubertal Status, Target AU with Parents Permission, and W1 Peer AU

SMD

No Weights | Weighted

Unbalanced Confounds

Target Initiation VS. Target Control

W2 Peer Alcohol Use

R² = .47

.54*

.08

W3 Peer Alcohol Use

R² = .43

ab = .88* (.38 – 1.46)
Groups Biased on Age, Minority Status, BAS (Drive), Parental Alcohol Use, Pubertal Status, and Target Alcohol Use with Parents Permission
Contextualizing Results

- Generally supportive of previous literature
  - Longitudinal associations robust

- Peer self-report models = smaller effect sizes
  - Despite controlling for confounds known to predict misperception of peer AU

- Transition groups unbalanced on wide number of confounds (8-12)

- Similar effect sizes within reporter across paths
  - May suggest that socialization and selection equally important in early adolescence
Limitations

- Limited Temporal Resolution
  - 1 year between measurement occasions
  - So called “chicken and egg” dilemma
    - EMA

- Can’t control for everything
  - Unmeasured Confounders
  - Structural Social Network effects
    - Centrality
    - Density of users
Conclusions

- Reciprocal relationship robust
  - Reported effects in the literature are likely biased by confounders

- Comparable effect sizes for selection/socialization
  - Selection and Socialization processes may be mutually interdependent (Cruz et al., 2012; Mudnt et al., 2012)
  - If adolescents initiate and subsequently use together maintaining a strict dichotomy may not be valid

- Combining Social Network Models with Propensity Score Models may provide more precise estimates
Thanks!!!!!!!

- Special thanks to Craig Colder, Elisa Trucco, and Donna Coffman

- To the entire Colder lab for proving feedback on the paper and this presentation

- Questions??????

- Thanks to NIDA