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Are the Measured Environmental Risks for Nicotine Dependence the same for Alcohol Dependence? Evidence from an Offspring of Twins Design

Jeffrey F. Scherrer (1,2); Hong Xian (2); Andrew C. Heath (1,2); Theodore Jacob (1); William R. True (1,3), Kathleen K. Bucholz (1,2)
• Genetic contribution to nicotine (ND) and alcohol dependence (AD) is correlated
• Family environmental contribution to offspring ND and AD:
  – Parenting
  – Parent-child relationships
  – Sibling relationships
  – Sibling substance use
• Unique environmental contributions to offspring ND and AD
  – Peer smoking, alcohol and drug use
OBJECTIVE

- Determine if genetic, socio-demographic, parenting, sibling substance use, sibling support and peer substance use contribute to offspring ND and offspring AD
METHODS

Sample derived from Children of Alcoholics study (1999-present)

- Fathers
  - 1464 twin fathers sampled from the Vietnam Era Twin Registry
  - All had at least 1 child 12-26 yrs old in 1999
  - Twin pairs either concordant or discordant for alcohol dependence. Controls were non-alcoholic twin pairs
  - 1,213 (83%) fathers responded to diagnostic telephone interview
- Mothers
  - 1,064 biological and/or rearing mothers were eligible
  - 862 (81%) eligible mothers responded to diagnostic telephone interview
- Offspring
  - 1,327 (85%) eligible offspring responded to diagnostic telephone interview
Measurements

• Twin father report
  – lifetime DSM-IV nicotine dependence
  – lifetime DSM-IV alcohol dependence

• Mother report
  – ND = Time to 1st morning cigarette
  – lifetime DSM-IV alcohol dependence

• Socio-demographics
  – age
  – Gender
  – Parent education
• Offspring report on:
  – Closeness to parents (very/somewhat vs. not very/not at all)
  – Parents more strict than other parents (a lot/little more/same vs. little less/lot less)
  – Sibling(s) understand offspring feelings (a lot/some vs. A little/not at all)
  – Sibling(s) are excessive drinker (yes/no)
  – % school peers who smoke, use alcohol, use drugs including marijuana (none, a few-quarter, one-half or more)
  – lifetime DSM-IV nicotine dependence
  – lifetime DSM-IV alcohol dependence
Analytic Approach

- Independent variables:
  - Parent, sibling and peer variables and sociodemographics

- Dependent variables:
  - DSM-IV ND, DSM-IV AD

- Analyses
  - Separate logistic regression models for ND and AD
    - stepwise selection
Twin 4 group ND risk design

• Grp 1: MZ and DZ twins with ND, high genetic/ high environmental risk
• Grp 2: MZ with no-ND, co-twin with ND, high genetic/ low environment
• Grp 3: DZ with no-ND, co-twin with ND, medium genetic/ low environment
• Grp 4: MZ and DZ twins with no ND, low genetic/ low environment
Twin 4 group AD risk design

- Grp 1: MZ and DZ twins with AD, high genetic/ high environmental risk
- Grp 2: MZ with no-AD, co-twin with AD, high genetic/ low environment
- Grp 3: DZ with no-AD, co-twin with AD, medium genetic/ low environment
- Grp 4: MZ and DZ twins with no AD, low genetic/ low environment
RESULTS
TABLE 1. Offspring ND by AD

<table>
<thead>
<tr>
<th>Row% (Column%)</th>
<th>No-AD (%)</th>
<th>AD (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-ND</td>
<td>91%</td>
<td>8%</td>
</tr>
<tr>
<td></td>
<td>92%</td>
<td>64%</td>
</tr>
<tr>
<td>ND</td>
<td>60%</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>8%</td>
<td>36%</td>
</tr>
<tr>
<td></td>
<td>Odds ratio (95% Confidence Intervals)</td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Grp 1 ND</td>
<td>3.1 (1.2-8.0)</td>
<td></td>
</tr>
<tr>
<td>Grp 2 ND</td>
<td>3.5 (0.999-12.3)</td>
<td></td>
</tr>
<tr>
<td>Grp 3 ND</td>
<td>1.7 (0.5-5.5)</td>
<td></td>
</tr>
<tr>
<td>Grp 1 AD</td>
<td>0.5 (0.2-1.0)</td>
<td></td>
</tr>
<tr>
<td>Grp 2 AD</td>
<td>0.4 (0.1-1.0)</td>
<td></td>
</tr>
<tr>
<td>Grp 3 AD</td>
<td>0.9 (0.3-2.4)</td>
<td></td>
</tr>
<tr>
<td>Mother ND</td>
<td>0.9 (0.7-1.2)</td>
<td></td>
</tr>
<tr>
<td>Mother AD</td>
<td>1.3 (0.5-3.3)</td>
<td></td>
</tr>
<tr>
<td>Close to father</td>
<td>0.4 (0.2-0.9)</td>
<td></td>
</tr>
<tr>
<td>Sibling excess drnk</td>
<td>2.6 (1.3-2.7)</td>
<td></td>
</tr>
<tr>
<td>Sibling drug use</td>
<td>1.8 (1.3-2.7)</td>
<td></td>
</tr>
<tr>
<td>school peer use drgs</td>
<td>2.1 (1.2-3.7)</td>
<td></td>
</tr>
<tr>
<td>≥ 18 years of age</td>
<td>2.2 (1.1-4.6)</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 3. Reduced Offspring AD model

<table>
<thead>
<tr>
<th></th>
<th>Odds ratio (95% Confidence Intervals)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grp 1 ND</td>
<td>1.02 (0.4-2.1)</td>
</tr>
<tr>
<td>Grp 2 ND</td>
<td>0.5 (0.1-1.1)</td>
</tr>
<tr>
<td>Grp 3 ND</td>
<td>1.2 (0.4-3.0)</td>
</tr>
<tr>
<td>Grp 1 AD</td>
<td>1.4 (0.6-2.9)</td>
</tr>
<tr>
<td>Grp 2 AD</td>
<td>1.2 (0.4-3.3)</td>
</tr>
<tr>
<td>Grp 3 AD</td>
<td>0.8 (0.2-2.4)</td>
</tr>
<tr>
<td>Mother ND</td>
<td>0.9 (0.7-1.2)</td>
</tr>
<tr>
<td>Mother AD</td>
<td>1.0 (0.4-2.7)</td>
</tr>
<tr>
<td>Mother educ.</td>
<td>1.8 (1.1-3.1)</td>
</tr>
<tr>
<td>Sibling drug use</td>
<td>1.6 (1.2-2.3)</td>
</tr>
<tr>
<td>school peer smoke</td>
<td>2.9 (1.6-5.3)</td>
</tr>
<tr>
<td>≥ 18 years of age</td>
<td>5.0 (2.2-11.4)</td>
</tr>
</tbody>
</table>
CONCLUSIONS

• Environmental factors associated with both ND and AD include age, sibling drug use.

• Risk factors specific for ND include high genetic and high environmental ND risk, sibling excessive drinking and school peer drug use.

• Risk factors specific for AD include mother education and school peer smoking.

• Father – child closeness was protective for offspring smoking behaviors.

• These preliminary analyses suggest specificity in the risk factors for ND and AD.