Crash Rates Among Young Drivers Diagnosed with Psychopathology

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Young drivers are a high-risk driving group

- Crashes accounted for ~1/4 of young adult deaths in 2016\(^1\)
- Young drivers are over-represented in crash statistics ~9% in 2016\(^2\)
- More vulnerable due to: inexperience, riskier behaviors \(^3,4\)

\(^1\) National Vital Statistics Reports 2018; \(^2\) CDC 2018; \(^3\) McCall et al., 2013; \(^4\) Curry, 2011
Background - Psychopathology & Driving

- Internalizing vs externalizing
- ADHD and driving
  - ADHD is associated with crash, traffic violations, etc.\(^1\)
  - Inconsistent reporting\(^2\)

\(^1\) Aduen et al., 2015; \(^2\) Jerome et al., 2006; \(^3\) DSM-5 2013
Background - Psychopathology & Driving

- Symptoms of depression and anxiety may include:
  - Psychomotor agitation
  - Fatigue, drowsiness
  - Difficulty concentrating
  - Depression/Anxiety and driving
    - Simulator: poorer performance
    - Older driving sample
    - Survey: self-reported injury only

1 Brunnauer et al., 2008; 2 Bulmash et al., 2006; 3 Aduen et al., 2015
Research Gaps

- Little is known about internalizing disorders & young drivers
- Many studies have relied on convenience samples
Research Questions

- What is the association between diagnosed psychopathology and safety critical events among young drivers?

- Compared to those with no psychopathology, do young drivers with psychopathology have higher crash rates?

- Do these associations vary by type of psychopathology?
Strategic Highway Research Program Naturalistic Driving Study (SHRP 2)

- Nationally-representative sample of 3600 licensed drivers
  - Drivers were sampled across 6 U.S. States
- DAS recorded vehicle kinematics, GPS, and video for 1-2 years per driver captured mileage and event data continuously
  - Elevated g-force events (>0.65g) flagged safety critical events
Psychopathology Groups

- **No Dx (n = 453)**
  - No diagnosed psychopathology indicated

- **ADHD (n = 37)**
  - ADD/ADHD/Tourette’s
  - Low prevalence of Tourette’s

- **Depression/Anxiety (n = 56)**
  - Depression (n = 18)
  - Anxiety or panic attacks (n = 20)
  - Both (n = 18)

- **ADHD & Depression/Anxiety (n = 18)**
  - ADD/ADHD/Tourette’s & Depression (n = 5)
  - ADD/ADHD/Tourette’s & Anxiety or panic attacks (n = 3)
  - All dx (n = 10)
Our sample included 564 participants (86.23% retention)

- Included any participants in groups
- N excluded = 15 (bipolar, psychotic, personality disorders & “other”)

<table>
<thead>
<tr>
<th>Psychopathology category</th>
<th>N (%)</th>
<th>Total Mileage</th>
<th>Total CNC</th>
<th>Total Crash</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Diagnosis</td>
<td>453 (80.32)</td>
<td>1556181</td>
<td>621</td>
<td>132</td>
</tr>
<tr>
<td>ADHD</td>
<td>37 (6.56)</td>
<td>436901</td>
<td>155</td>
<td>16</td>
</tr>
<tr>
<td>Depression/Anxiety</td>
<td>56 (9.93)</td>
<td>494902</td>
<td>201</td>
<td>27</td>
</tr>
<tr>
<td>ADHD &amp; Depression/Anxiety</td>
<td>18 (3.19)</td>
<td>156969</td>
<td>90</td>
<td>17</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>564</strong></td>
<td><strong>5273847</strong></td>
<td><strong>1674</strong></td>
<td><strong>272</strong></td>
</tr>
</tbody>
</table>
Analysis

- **Predictor**: Psychopathology category
- **Primary Outcomes**
  - **Safety Critical Events**: Crash/Near-crash
  - **Crash**: Crash events severity 1-3
- **Controlled Covariates**: age group, highest level of education & sex
- Negative binomial regressions yielded incidence rate ratios (IRRs)
  - Association of psychopathology grouping to primary outcomes
Safety Critical Event Rates per 10,000 mi by Psychopathology Category

- No Dx: 3.19
- Any Dx: 4.57
- ADHD: 4
- Depression/Anxiety: 3.93
- ADHD & Depression/Anxiety: 7.59
AIRRs for Safety Critical Events by Psychopathology Category
Crash Rates per 10,000 mi by Psychopathology Category

- No Dx: 0.61
- Any Dx: 0.75
- ADHD: 0.45
- Depression/Anxiety: 0.7
- ADHD & Depression/Anxiety: 1.5
AIRRs for Crash Events by Psychopathology Category
### Strengths

- Objective, naturalistic data
  - More accurate assessment of exposure
- Diagnosed comorbidity group; not interaction
- Large sample of young drivers
- Able to observe both CNC and Crash as outcomes

### Limitations

- Small psychopathology group categories
- Single-item measure of previously diagnosed psychopathology
- Other potential sources of variability (i.e. meds)
Conclusions & Implications

- ADHD & Depression/anxiety are associated with increased risky driving & crash rates
- Depression/Anxiety is associated with increased risky driving rates
  - Novel risk factor for safety critical events in young drivers
- ADHD alone was not associated with increased crash or risky driving rate
Thank you & Acknowledgements

Collaborators

Pnina Gershon
Jeremy W. Luk
Bruce G. Simons Morton

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