Variability in Crash and Near-Crash Risk among Novice Teenage Drivers

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Teen Driving Risk

- The initial period after licensure is most dangerous
- Typically followed by a quick decrease: Reflect improvement in safety
- Change happens around six months after licensure (Mayhew et al. 2003, Simons-Morton et al. 2011, Lee et al. 2011).

![Graph showing CNC Rate (CNC PER 10K KMT) for all drivers (N=42) over different months.]
Individual Risk Variation

- Crash and Near-Crash (CNC) rate varies substantially among drivers
- Will the risk decrease pattern be the same for all drivers?
Group Driver by Over CNC Rate

- Substantial variation in overall CNC rate
Group Driver by Over CNC Rate

- K-Mean Cluster Method: Three risk groups were identified.
Low-Risk Drivers: Stable Risk Over Time

- **Low-Risk Drivers (n=13):**

- **All Drivers (n=42):**

CNC rate (CNC per 10K KMT)

<table>
<thead>
<tr>
<th>Months 1-3</th>
<th>Months 4-6</th>
<th>Months 7-9</th>
<th>Months 10-12</th>
<th>Months 13-15</th>
<th>Months 16-18</th>
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</thead>
<tbody>
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<td>9.2</td>
<td>7.9</td>
<td>5.9</td>
<td>5.8</td>
<td>4.2</td>
<td>5.8</td>
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<tr>
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<td>2.1</td>
<td>1.8</td>
<td>2.2</td>
<td>0.4</td>
<td>1.0</td>
</tr>
</tbody>
</table>
Moderate Risk Drivers: Significant Decrease after 6 months

CNC rate (CNC per 10KKMT)

- Low-Risk Drivers (n=13)
- Moderate-Risk Drivers (n=16)
- All Drivers (n=42)
High Risk Drivers: High Fluctuation

- Low-Risk Drivers (n=13)
- Moderate-Risk Drivers (n=16)
- High-Risk Drivers (n=13)
- All Drivers (n=42)

CNC rate (CNC per 10KKMT)

- Months 1-3
- Months 4-6
- Months 7-9
- Months 10-12
- Months 13-15
- Months 16-18

- 19.8
- 14.4
- 11.5
- 15.9
- 11.5
- 15.5
- 9.2
- 7.9
- 5.9
- 5.8
- 4.2
- 5.8
- 9.2
- 8.8
- 7.9
- 5.9
- 5.8
- 4.2
- 5.8
- 2.0
- 2.1
- 1.8
- 0.8
- 2.2
- 3.2
- 0.4
- 1.0
Remove 2 Outliers: No Decrease Over Time for High Risk Drivers

![Graph showing CNC rate (CNC per 10KkM) for Low-Risk Drivers (n=13), Moderate-Risk Drivers (n=16), and High-Risk Drivers (n=13) over different months.]

- **Low-Risk Drivers (n=13)**
  - Months 1-3: 8.8
  - Months 4-6: 7.9
  - Months 7-9: 5.9
  - Months 10-12: 5.8
  - Months 13-15: 4.2
  - Months 16-18: 5.1

- **Moderate-Risk Drivers (n=16)**
  - Months 1-3: 11.5
  - Months 4-6: 10.7
  - Months 7-9: 10.5
  - Months 10-12: 12.7
  - Months 13-15: 11.5
  - Months 16-18: 10.8

- **High-Risk Drivers (n=13)**
  - Months 1-3: 19.8
  - Months 4-6: 14.4
  - Months 7-9: 11.5
  - Months 10-12: 15.9
  - Months 13-15: 11.5
  - Months 16-18: 13.9

CNC rate (CNC per 10KkM)
Summary and Discuss

• Statistical inference using Poisson longitudinal model: Only moderate risk group showed significant decrease in risk.

• The decrease in risk is driven by a subgroup of moderate risk drivers.

• How to improve safety of high risk drivers is the key to improve teen driver safety.

• Early predictive high risk group is critical.

• Longer observation period will provide more insight.
Next Step

- Calendar time is not an accurate measure of driving experience:
  - driving time
- 3 month cluster is subjective and could be too coarse:
  - recurrent event modeling
- 3 risk groups predefined
  - Each driver as own group
Thanks!

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