THE NATURALISTIC TEENAGE DRIVING STUDY: METHODS & SELECTED FINDINGS

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THE YOUNG DRIVER PROBLEM
Inexperienced Drivers of All Ages Have High Crash Rates

Twisk, Stacy, 2007
STUDY PURPOSES

Determine: variability in & predictors of novice teen driving risk.

Risk:
1. Exposure
2. Crash and Near Crash
3. Kinematic risky driving
4. Speeding

Predictors:
1. Gender
2. Personality, cognitions
3. Stress responsivity (cortisol)
4. Distraction
5. Driving conditions
STUDY DESIGN

- N = 42 teens and 54 parents, 18-months of driving; completed 9/2008
- Inclusion: <17 y.o.; license < 3wks; vehicle access; no ADHD, twins
- 20 males; 22 females; 92% white; mean age = 16.4
- Continuous data collection
- Instrumentation: accelerometers, GPS, cameras (no audio)
- Study Activities: test track at 0-12 months; vehicle instrumentation; stress test/cortisol; surveys at 0, 6, 12, 18 months; debrief
- Total for all participants: 102,000 trips, 500,000 miles/800,000 km; 5.1 terabytes of data
DATA ACQUISITION SYSTEM

- LINUX-based PC - storage
- GPS – mileage, location
- Transmission sensor – mileage
- Accelerometers – elevated g-force events
- Video: driver/passengers, ambient light, contributing factors
- Radar
DATA REDUCTION AND CODING

Kinematic triggers
- Crash/Near Crash (CNC) (Near Crash includes evasive maneuver, but no actual contact)
- Kinematic Risky Driving (elevated gravitation force events)
- Speeding (speed limit map)

Coding
- Trained coders in supervised lab
- Protocols
  - Trip files: occupants; time; seat belts, etc
  - CNC contributing factors (distraction, driving conditions)
- Inter-rater reliability; adjudication by senior staff
ANALYTIC ISSUES & METHODS

- Small sample with unusual data structure
  - Few participants
  - Many repeated measures
- Near Crashes combined with Crashes
- Data aggregated over time (e.g. quarters)
- Poisson distribution for count data
- Other unique approaches
## CRASHES & NEAR CRASHES

<table>
<thead>
<tr>
<th></th>
<th>Teens</th>
<th>Teens</th>
<th>Adults</th>
<th>Adults</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>M</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Crash</td>
<td>13</td>
<td>25</td>
<td>1</td>
<td>1</td>
<td>40</td>
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<tr>
<td>Near-Crash</td>
<td>118</td>
<td>117</td>
<td>19</td>
<td>16</td>
<td>270</td>
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</tbody>
</table>
TEEN & PARENT CRASH/NEAR CRASH Incidence Rate Ratios

IRR=3.91

Gravitational Force Events
“Kinematic Risky Driving”

<table>
<thead>
<tr>
<th>Acceleration Event</th>
<th>Gravitational Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>Longitudinal deceleration/hard braking</td>
<td>≥ -0.45 g</td>
</tr>
<tr>
<td>Longitudinal acceleration/rapid starts</td>
<td>≥ 0.35 g</td>
</tr>
<tr>
<td>Lateral/hard left or hard right turn</td>
<td>≥ -0.50 g</td>
</tr>
<tr>
<td>Yaw/Δ v between turn &amp; correction</td>
<td>+ 6 degrees w/i 3 seconds</td>
</tr>
</tbody>
</table>

alpha = .78 (teen); .68 (parent)

TEEN AND ADULT KRD
With and Without Adult Passengers

Kinematic Risky Driving Rates

- Parent driver
- Teen driver with no passengers
- Teen driver with adult passengers

OTHER NTDS ANALYSES

1. CNC variability (Dr. Guo)
2. Distraction (Dr. Klauer)
3. Psycho-social predictors of risk (Dr. Ehsani)
4. CNC prediction by cortisol responsivity (Dr. Ouimet)
5. Analytic challenges & opportunities (Dr. Albert)
# Selected Publications


Thank you!