Teenage Drivers: Secondary task engagement, Visual Inattention and Crash Risk

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For teens:

• 9% of the teens fatal crashes attributed to distracted driving

• 76% of teens rear-end crashes involved engagement in secondary task

Data from 2015 (NHTSA, 2017); Carney et al., 2016
Distraction and Crash Risk

Visual inattention:

- Visually demanding tasks are associated with increased crash and near-crash risks
- When engaging in complex tasks novice teens have longer eyes-off-road compare to experienced drivers

<table>
<thead>
<tr>
<th>Crash Risk</th>
<th>Task</th>
<th>Driver</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type and amount of resources needed</td>
<td>Experience and other characteristics</td>
<td>More or less tolerant to distraction</td>
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</tbody>
</table>
Research Goal

Determine the extent visual inattention during secondary task engagement contributes to teens crash risk

Research questions:

1. What is the prevalence of secondary tasks engagement among teen drivers?

2. Which secondary tasks are associated with increased crash risk?

3. What is the role of eyes-off-road in the association between high-risk secondary tasks and crash risk?
Supervised Practice Driving Study Data

**Crashes:** (n=71) any physical contact between the driver’s vehicle and other object

**Baselines:** (n=1,196) random sampled trip segments that representing “normal” driving

**Secondary tasks:**
- Identified and coded in both crashes and baselines datasets
- 41 types of secondary tasks mapped into 9 categories
- Total duration of eyes-off-road (TEOR): the sum of time the driver’s gaze was not on the forward road
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Prevalence of secondary tasks engagement among teen drivers

![Graph showing the prevalence of secondary tasks engagement among teen drivers. The x-axis represents different types of secondary tasks, such as interaction with passengers, handling objects, talking/singing, external distraction, personal hygiene, and food and drink intake. The y-axis represents the proportion (%). The bars indicate the baseline and crash scenarios.](image)
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The effect of visual inattention

Secondary task

Manual cellphone use 2.67 (1.1, 4.8)
Reaching 6.88 (2.6, 18.6)

Crash
The effect of visual inattention
Manual Cellphone Use, Visual Inattention and Crash Risk

(ACME = 0.025, 95% BootCI= 0.006, 0.051, p=.01)

Indirect effect

Eyes-off-road

Direct effect

(ADE = 0.039, 95% BootCI= -0.026, 0.139, p=.32)

Proportion mediated 40%

The model uses logit link function as such the estimate is on a logarithmic scale
Reaching, Visual Inattention, and Crash Risk

- Indirect effect
- Direct effect

Proportion mediated 11%

The model uses logit link function as such the estimate is on a logarithmic scale.
Discussion and Conclusions

• Secondary task engagement was highly prevalent among novice teen drivers
  • Prevalence is not indicative of increase in crash risk

• Understanding the mechanism of influence and quantifying the effect is essential in adopting effective interventions to decrease distraction.
Take Home Message

• Identify which tasks increase crash risk and **WHY**
  • Educate young drivers
  • Adapt effective legislation
  • Develop appropriate safeguards to counteract inattention
Thank You!

Collaborators

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- Sheila G. Klauer, Virginia Tech Transportation Institute
- Tom Dingus, Virginia Tech Transportation Institute

Thank you for staying engaged!

Questions?