Teen Driver Support System
Field Operational Test
Preliminary Results
(First 24 weeks)

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The U.S. Teen Driver Problem

Involvement Rate in Fatal Crashes per 100,000 Licensed Drivers (2011)

Traffic Safety Facts 2011 (DOT HS 811 754)
Factors that Can Increase Teen Driver Fatality Risk

- Speeding
- Not Using Seat Belt
- Teen Passengers
- Alcohol
- Aggressive Driving
- Distracted Driving
Parents Play a Key Role in Teen Driver Safety

• Parent involvement in teen driving… (CHOP, 2009)
  – Half as likely to crash
  – 50% more likely to buckle up
  – 30% less likely to use a cell phone when driving

• Parent driving behaviors influence teen driving behaviors (Lotan et al., 2010)
What Role Can Technology Play in Reducing Risk?

• Feedback (system coaches)
  – To teens while driving

• Reporting (parents coach)
  – To parents while teen is driving

• Prevention of risky behaviors
  – Functions that prevent driver from engaging in risky behavior, such as texting
The Teen Driver Support System

• A comprehensive technology application that employs
  – Real-time, in-vehicle visual and auditory alerts to teens about
    • Speed limits and upcoming curves
    • Speeding when over the posted limit
    • Stop sign running
    • Aggressive maneuvers (e.g., hard braking, turning)
    • Driver seat belt use
  – Prevention of calling and texting while driving
  – Reporting to parents (text, website) of certain monitored behaviors
TDSS Speed & Curve Notifications

- Graduated and persistent visual and auditory warnings for speeding violations
- Advance notifications of speed limit changes and upcoming curves (visual and auditory)

2.5-7 mph over >7 mph over Curve ahead
Aggressive Maneuvers & Stop Signs

• After event alerting to teen and report to parents

Hard cornering, braking, accelerating; taking curves too fast

Vehicle speed >5 mph through stop sign
Support of MN Graduated Driver Licensing Restrictions

• Curfew driving
  – Midnight- 5a.m.
  – Text to parents

• Call blocking
  – Illegal for drivers under age 18

• Text message blocking
  – Illegal for all MN drivers

• Blocking of other phone uses except 911
TDSS Reports to Parents

Text Messaging

Website & Weekly Email

• Weekly event summary
  – Unsafe and safe behaviors
  – Miles driven with TDSS
  – Rating of performance compared to other teens using the system

• Map of logged events
• Driving history
  – Customizable, over time
TDSS Field Operational Test (FOT)

• The TDSS is based on evidence of teen risk factors

• No other system has been tested that provides such comprehensive feedback to parents and teens

• Research supports the use of technology, particularly when the parents receive feedback
TDSS Field Operational Test (FOT)

- 300 teen-parent dyads recruited prior to teen’s driver test
  - Control Group (N=101; 4 withdrew)
    • Naturalistic driving
  - TDSS In-vehicle Group (N=100; 3 withdrew)
    • No reporting to parents
  - TDSS + Parent Feedback (N=99; 3 withdrew)
    • Reporting to parents
FOT Research Questions

• In the first year of driving…
  – What does risky driving behavior look like in each group?
  – Does in-vehicle feedback alone work in the earliest phase of driving?
  – What is the additional contribution of feedback to parents?

• Ideally, risky behaviors will be reduced in the TDSS groups.
Today’s Analysis

• First 24 weeks of data
  – Period 1: Weeks 1-4
  – Period 2: Weeks 5-8
  – Period 3: Weeks 9-12
  – Period 4: Weeks 13-16
  – Period 5: Weeks 17-20
  – Period 6: Weeks 21-24
## Participants

### 24-Week Data Analysis

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<tr>
<th>TEENS</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
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<tbody>
<tr>
<td>Control</td>
<td>45</td>
<td>52</td>
<td>97</td>
</tr>
<tr>
<td>TDSS</td>
<td>43</td>
<td>54</td>
<td>97</td>
</tr>
<tr>
<td>TDSS+Parent</td>
<td>46</td>
<td>50</td>
<td>96</td>
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</table>

<table>
<thead>
<tr>
<th>PARENTS</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>21</td>
<td>75</td>
<td>96*</td>
</tr>
<tr>
<td>TDSS</td>
<td>16</td>
<td>81</td>
<td>97</td>
</tr>
<tr>
<td>TDSS+Parent</td>
<td>34</td>
<td>61</td>
<td>95*</td>
</tr>
</tbody>
</table>

*two siblings from same family

- All teens were age 16-17 at the start of the study
- Average age of parents in each group was:
  - Control = 45.7
  - TDSS = 46.7
  - TDSS+Parent = 46
Average Miles Driven
Day: 5 a.m. – 9 p.m.

- Control
- TDSS
- TDSS+Parent

Period 1 to Period 6

Average Miles Driven
Red Zone Speeding by Group (Percent Miles Driven)
Calls Made Per Mile Driven

- Control
- TDSS
- TDSS+Parent

Periods:
- Period 1
- Period 2
- Period 3
- Period 4
- Period 5
- Period 6
Text Messages Sent Per Mile Driven

- Control
- TDSS
- TDSS + Parent

Periods 1 to 6 are shown with respective text messages sent per mile driven.
Control Group Calls & Texts

Rate (Per Mile Driven)

Period 1 Period 2 Period 3 Period 4 Period 5 Period 6

Texts

Calls
Curfew Alerts
(Midnight – 5 a.m.)

![Graph showing the number of curfew alerts over different periods for control, TDSS, and TDSS+Parent groups.](image-url)
Discussion

- Early results indicate a benefit of both the in-vehicle feedback, alone and in combination with parent feedback.
- Risky behaviors monitored by the system were reduced for the TDSS groups.
- Driving behaviors (e.g., mileage) appear different.
Further Analyses

• Aggressive maneuver data (hard braking, turning, cornering)
• Identification of group differences (e.g., reason for why Control drives more?)
• Qualitative analyses of teen and parent feedback on the system
Questions?