Innovative Countermeasures for Driver Fatigue

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This presentation

• Austroads
• The Australian Road Research Board – ARRB Group
• Australian research on fatigue countermeasures:

Innovative Road Safety Measures to Address Fatigue: Review of Research and Results from a Treatment Trial
Austroads

- a forum for Australian and New Zealand road agencies to work together to achieve common objectives and promote harmonisation and consistency in their operations
ARRB Group

• ARRB was established in 1960 as Australia’s principal transport research centre
• Member based organisation:
  – Australian federal, state and local government road agencies
  – New Zealand Transport Agency
# Driving hours - Australia

<table>
<thead>
<tr>
<th>Option</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard hours</td>
<td>Basic work and rest limits</td>
</tr>
<tr>
<td>Basic fatigue management</td>
<td>Accredited more flexible work and rest hours</td>
</tr>
<tr>
<td>Advanced fatigue management</td>
<td>Based on accredited safety management system</td>
</tr>
</tbody>
</table>
Driving hours - Australia

Example – Standard hours:

<table>
<thead>
<tr>
<th>Time</th>
<th>Work</th>
<th>Rest</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 hours</td>
<td>10 hours</td>
<td>60 minutes rest (15 minute blocks)</td>
</tr>
<tr>
<td>24 hours</td>
<td>12 hours</td>
<td>7 hours continuous stationary rest</td>
</tr>
<tr>
<td>7 days</td>
<td>72 hours</td>
<td>24 hours continuous stationary rest</td>
</tr>
</tbody>
</table>

![Truck image](image-url)
Recent Australian Research on Fatigue

Fatigue is a major contributing factor to rural and remote crashes

Austroads commissioned ARRB to research:
• identification of innovative fatigue countermeasure treatments
• the effectiveness of these treatments
• practical treatment applications
Recent Australian Research on Fatigue

Categories of treatments identified included:

• provision of rest opportunities for drivers
• advising drivers of the need to rest
• reducing monotony for drivers
• alerting drivers to specific hazards
• helping to avoid departure from the roadway
• alerting drivers to their departure from the roadway
• protecting drivers if they do depart the road
Recent Australian Research on Fatigue

The literature review recommended the design and trial of a treatment in the “reducing monotony for drivers” category.

Factors to be assessed included:
• estimated effectiveness of the treatment
• evidence base for effectiveness
• estimated cost of implementation
• extent of prior use and evaluation as a fatigue countermeasure
Recent Australian Research on Fatigue

The key to such a countermeasure is: how to increase alertness without increasing distraction?

• Some recent research suggests that trivia questions can maintain alertness without distraction

WHAT’S THE CAPITAL OF ZIMBABWE?

a. Fremantle
b. Harare
c. Maputo
The ‘trivia questions’ approach had previously only been tested as an in-vehicle countermeasure. In this form it is:

- expensive
- has low uptake
- exposure must be self initiated

In the Austroads/ARRB project it was reconceptualised as a roadside sign. This makes it:

- cheap
- universal
- provide for guaranteed exposure
Example from Queensland
Example from Queensland

![Fatigue Zone Sign](image)
Example from Queensland
Example from Queensland

FATIGUE ZONE
KEEP PLAYING TRIVIA – IT MAY SAVE YOUR LIFE
Research findings

Evaluation involved surveys of road users:
• trivia signs were well received
• signs provided a positive message
• a practical and enjoyable means of maintaining alertness
• drivers did experience an increase in alertness
• drivers were more likely to stop and rest

However no measurable decrease in sleepiness for drivers

Possible causes:
• treatment effect was only transitory in nature
• selection bias – possible that only those drivers unaffected by fatigue may have stopped for the survey
• mean sleepiness level is close to ‘alert’
Conclusion

This project successfully developed and trialled an inexpensive fatigue countermeasure designed to increase a driver’s alertness and hence counteract driver fatigue.
The End
Appendices

Driver Age Distribution

<table>
<thead>
<tr>
<th>Age Category</th>
<th>Number of Drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-24</td>
<td>100</td>
</tr>
<tr>
<td>25-34</td>
<td>250</td>
</tr>
<tr>
<td>35-44</td>
<td>300</td>
</tr>
<tr>
<td>45-54</td>
<td>350</td>
</tr>
<tr>
<td>55-64</td>
<td>250</td>
</tr>
<tr>
<td>65 and over</td>
<td>200</td>
</tr>
</tbody>
</table>
Journey Duration at Survey Point

Duration (hours)

Number of Drivers

0-1 1-2 2-3 3-4 4-5 5-6 6-7 7-8 8-9 9-10
Sleepiness Across the Day

KSS (mean)

Time of Day

7.00 8.00 9.00 10.00 11.00 12.00 13.00 14.00 15.00 16.00
Sleepiness and Driving Duration

KSS (mean)

Driving Duration (hours)
### Table 7.1: Awareness of treatment signs (% drivers)

<table>
<thead>
<tr>
<th>Awareness</th>
<th>Before</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Treatment</td>
<td>Control</td>
</tr>
<tr>
<td>Yes</td>
<td>37.7*</td>
<td>37.7*</td>
<td>56.5</td>
</tr>
<tr>
<td>No</td>
<td>62.3*</td>
<td>62.3*</td>
<td>43.5</td>
</tr>
</tbody>
</table>

*significant (p < .05) standardised residuals.
Table 7.2: Effectiveness of treatment signs (% drivers)

<table>
<thead>
<tr>
<th>Effective</th>
<th>Before</th>
<th></th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Treatment</td>
<td>Control</td>
</tr>
<tr>
<td>Yes</td>
<td>60.2</td>
<td>63.0</td>
<td>61.6</td>
</tr>
<tr>
<td>No</td>
<td>39.8</td>
<td>37.0</td>
<td>38.4</td>
</tr>
</tbody>
</table>

*significant (p < .05) standardised residuals.
Table 7.3: Influence on stopping behaviour (% drivers)

<table>
<thead>
<tr>
<th>Influence</th>
<th>Control</th>
<th>Treatment</th>
<th>Control</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>16.5</td>
<td>17.2</td>
<td>13.1</td>
<td>10.6</td>
</tr>
<tr>
<td>No</td>
<td>83.5</td>
<td>82.8</td>
<td>86.9</td>
<td>89.4</td>
</tr>
</tbody>
</table>

*significant (p < .05) standardised residuals.*
<table>
<thead>
<tr>
<th>State</th>
<th>Before Control</th>
<th>Before Treatment</th>
<th>After Control</th>
<th>After Treatment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queensland</td>
<td>2.16</td>
<td>2.13</td>
<td>2.18</td>
<td>2.10</td>
<td>2.14</td>
</tr>
<tr>
<td>WA</td>
<td>2.11</td>
<td>2.16</td>
<td>1.95</td>
<td>1.95</td>
<td>2.05</td>
</tr>
<tr>
<td>Total</td>
<td>2.12</td>
<td>2.15</td>
<td>2.09</td>
<td>2.07</td>
<td>2.11</td>
</tr>
</tbody>
</table>

Table 7.4: Rated sleepiness (mean)