What do we know for sure? Motorcyclist riding characteristics in stated preferences data

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Upward trend?

U.S. traffic deaths rose 7.2 percent in 2015: Transportation Dept.

Last year 35,092 people died in traffic crashes in the United States, a 7.2 percent year-on-year increase that runs counter to a five-decade trend of declining fatalities, the U.S. Transportation Department said.

U.S. officials said lower gasoline prices combined with job growth increased the number of miles driven last year by the highest rate in nearly 25 years. Distracted driving was cited in about a tenth of traffic fatalities in 2015, the U.S. DOT said.

Data "showed traffic deaths rising across nearly every segment of the population," the department said in a statement.

http://www.reuters.com/article/us-usa-traffic-casualties-idUSKCN11424F
Motorcycles are everywhere?

By Vehicle Registration

By Vehicle Miles Traveled (VMT)
Safety Ratings Sell Cars Not Motorcycles
Motorcyclists' attitudes and behavior
Motorcycle Crash
Number of motorcyclists in Florida traffic crashes by age for a three year period (Florida)

- Increased MC Crashes in Young Riders
- Increased MC Crashes in Aging Riders
Endorsements and Motorcycle Crashes in Florida (2005-2014)
How often have you ridden your motorcycle (in the past 12 months)? (n=3064)
How many miles have you operated a motorcycle in the past 12 months? (n=3118)
### How often vs. How many miles

<table>
<thead>
<tr>
<th>How often have you ridden your motorcycle (in the past 12 months)?</th>
<th>Almost Every Day</th>
<th>More than once per week</th>
<th>Once per week</th>
<th>A few times a month</th>
<th>A few times per year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I didn't ride in the past 12 months</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>110</td>
</tr>
<tr>
<td>1,000 or less</td>
<td>13</td>
<td>53</td>
<td>46</td>
<td>122</td>
<td>159</td>
<td>393</td>
</tr>
<tr>
<td>1,001 to 2,000</td>
<td>38</td>
<td>109</td>
<td>62</td>
<td>113</td>
<td>26</td>
<td>348</td>
</tr>
<tr>
<td>2,001 to 3,000</td>
<td>65</td>
<td>106</td>
<td>54</td>
<td>70</td>
<td>9</td>
<td>304</td>
</tr>
<tr>
<td>3,001 to 4,000</td>
<td>52</td>
<td>113</td>
<td>43</td>
<td>47</td>
<td>6</td>
<td>261</td>
</tr>
<tr>
<td>4,001 to 5,000</td>
<td>67</td>
<td>96</td>
<td>38</td>
<td>38</td>
<td>4</td>
<td>243</td>
</tr>
<tr>
<td>5,001 to 6,000</td>
<td>61</td>
<td>129</td>
<td>26</td>
<td>26</td>
<td>1</td>
<td>243</td>
</tr>
<tr>
<td>6,001 to 7,000</td>
<td>63</td>
<td>78</td>
<td>19</td>
<td>10</td>
<td>0</td>
<td>170</td>
</tr>
<tr>
<td>7,001 to 8,000</td>
<td>55</td>
<td>68</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>136</td>
</tr>
<tr>
<td>8,001 to 9,000</td>
<td>44</td>
<td>57</td>
<td>8</td>
<td>5</td>
<td>0</td>
<td>114</td>
</tr>
<tr>
<td>9,001 to 10,000</td>
<td>95</td>
<td>58</td>
<td>11</td>
<td>5</td>
<td>0</td>
<td>169</td>
</tr>
<tr>
<td>More than 10,000</td>
<td>375</td>
<td>149</td>
<td>9</td>
<td>7</td>
<td>0</td>
<td>540</td>
</tr>
<tr>
<td>Total</td>
<td>928</td>
<td>1016</td>
<td>322</td>
<td>449</td>
<td>206</td>
<td>3031</td>
</tr>
</tbody>
</table>
Increasing the Voluntary Use of Helmets
Motorcycle Helmet Law

http://www.iihs.org/iihs/topics/laws/helmetuse/mapmotorcyclehelmets
How to Measure the Use of Helmet

• Three common data collection methods for motorcycle helmet use
  – Stated-Preference (SP) surveys
  – Motorcycle crash data analysis
  – Observational surveys: Revealed Preference (RP)

[Example] 20 observed Motorcyclists – 60% helmeted
Add Other Information (VMT, socio-demographic factors, etc)

Annual Vehicle Miles Traveled (VMT)
Riding Frequency

Helmeted
Not Helmeted

Age
Classification Analysis (Example)

Vehicle Miles Traveled (VMT)
Riding Frequency

A1: 50%
A2: 50%
B1: 40%
B2: 100%

Helmeted
Not Helmeted

Age
Cluster Analysis (Example)

Annual Vehicle Miles Traveled (VMT)
Riding Frequency

A1: 40%
B1: 28%
B2: 100%
A2: 50%

Helmeted
Not Helmeted
<table>
<thead>
<tr>
<th>How often have you ridden your motorcycle (in the past 12 months)?</th>
<th>Almost Every Day</th>
<th>More than once per week</th>
<th>Once per week</th>
<th>A few times a month</th>
<th>A few times per year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>939</td>
<td>1029</td>
<td>326</td>
<td>464</td>
<td>299</td>
<td>3057</td>
</tr>
<tr>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Which of the following best describes your use of a motorcycle helmet in Florida?

- **I always wear a helmet when riding a motorcycle**
  - Almost Every Day: 530
  - More than once per week: 634
  - Once per week: 227
  - A few times a month: 325
  - A few times per year: 214
  - Total: 1930
  - Percentage: 56.4%

- **I wear a helmet most of the time**
  - Almost Every Day: 171
  - More than once per week: 170
  - Once per week: 46
  - A few times a month: 59
  - A few times per year: 46
  - Total: 492
  - Percentage: 18.2%

- **I wear a helmet on limited occasions (long distance trips, winter season, etc.)**
  - Almost Every Day: 144
  - More than once per week: 129
  - Once per week: 31
  - A few times a month: 52
  - A few times per year: 20
  - Total: 376
  - Percentage: 15.3%

- **I seldom or never wear a helmet**
  - Almost Every Day: 94
  - More than once per week: 96
  - Once per week: 22
  - A few times a month: 28
  - A few times per year: 19
  - Total: 259
  - Percentage: 10.0%
A hierarchical cluster analysis that used Ward’s method with squared Euclidean distance

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I always wear a helmet when riding a motorcycle</td>
<td>24</td>
<td>362</td>
<td>287</td>
<td>464</td>
<td>576</td>
<td>1713</td>
<td>64.6%</td>
</tr>
<tr>
<td></td>
<td>7.2%</td>
<td>63.7%</td>
<td>49.3%</td>
<td>89.7%</td>
<td>88.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I wear a helmet most of the time</td>
<td>48</td>
<td>128</td>
<td>150</td>
<td>45</td>
<td>53</td>
<td>424</td>
<td>16.0%</td>
</tr>
<tr>
<td></td>
<td>14.4%</td>
<td>22.5%</td>
<td>25.8%</td>
<td>8.7%</td>
<td>8.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I wear a helmet on limited occasions (long distance trips,</td>
<td>117</td>
<td>61</td>
<td>101</td>
<td>7</td>
<td>20</td>
<td>306</td>
<td>11.5%</td>
</tr>
<tr>
<td>winter season, etc.)</td>
<td>35.0%</td>
<td>10.7%</td>
<td>17.4%</td>
<td>1.4%</td>
<td>3.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I seldom or never wear a helmet</td>
<td>145</td>
<td>17</td>
<td>44</td>
<td>1</td>
<td>2</td>
<td>209</td>
<td>7.9%</td>
</tr>
<tr>
<td></td>
<td>43.4%</td>
<td>3.0%</td>
<td>7.6%</td>
<td>.2%</td>
<td>.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>334</td>
<td>568</td>
<td>582</td>
<td>517</td>
<td>651</td>
<td>2652</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>
In your opinion, how important is it for a motorcyclist to wear a helmet?

<table>
<thead>
<tr>
<th>Importance Level</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very important</td>
<td>11</td>
<td>364</td>
<td>241</td>
<td>451</td>
<td>592</td>
<td>1659</td>
</tr>
<tr>
<td>Fairly important</td>
<td>18</td>
<td>93</td>
<td>119</td>
<td>32</td>
<td>37</td>
<td>299</td>
</tr>
<tr>
<td>Important</td>
<td>62</td>
<td>80</td>
<td>143</td>
<td>32</td>
<td>21</td>
<td>338</td>
</tr>
<tr>
<td>Slightly important</td>
<td>114</td>
<td>20</td>
<td>54</td>
<td>2</td>
<td>2</td>
<td>192</td>
</tr>
<tr>
<td>Not important at all</td>
<td>121</td>
<td>7</td>
<td>20</td>
<td>0</td>
<td>0</td>
<td>148</td>
</tr>
</tbody>
</table>

Total: 326 | 564 | 577 | 517 | 652 | 2636 | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0%
Stated Preferences Data

• Response Bias
  – What time do you wake up?
    • 7:51 am, 8:13 am, 7:55 am >> 8 am

• Which of the following best describes your motorcycle helmet use?
  – Always (100% or 99%)
  – Almost (85% or 65%)
  – Sometimes (12% or …)
How many miles have you operated a motorcycle in the past 12 months?

- I didn't ride in the past 12 months: 6.00%
- 1,000 or less: 12.80%
- 1,001 to 2,000: 11.00%
- 2,001 to 3,000: 9.70%
- 3,001 to 4,000: 8.10%
- 4,001 to 5,000: 7.70%
- 5,001 to 6,000: 7.70%
- 6,001 to 7,000: 5.50%
- 7,001 to 8,000: 4.30%
- 8,001 to 9,000: 3.80%
- 9,001 to 10,000: 5.70%
- More than 10,000: 17.60%
# VMT vs. Helmet Use

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual VMT in the past 12 months-Ratio</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.4</td>
<td>1</td>
<td>1.3</td>
<td>1.2</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td><strong>I always wear a helmet when riding a motorcycle (90%)</strong></td>
<td>7.2%</td>
<td>63.7%</td>
<td>49.3%</td>
<td>89.7%</td>
<td>88.5%</td>
<td>64.6%</td>
</tr>
<tr>
<td><strong>I seldom or never wear a helmet</strong></td>
<td>43.4%</td>
<td>3.0%</td>
<td>7.6%</td>
<td>.2%</td>
<td>.3%</td>
<td>7.9%</td>
</tr>
<tr>
<td><strong>Selective Users Proportion (60%)</strong></td>
<td>49.4%</td>
<td>33.3%</td>
<td>43.1%</td>
<td>10.1%</td>
<td>11.2%</td>
<td>27.5%</td>
</tr>
</tbody>
</table>

( ) : Actual Use Rate
Understanding the Use of Motorcycle Helmet and ...

• 60 percent means
Preaching to the Choir
Conclusion

• Understanding motorcyclists' attitudes and behaviors is an essential step
  – Safety Ratings Sell Cars Not Motorcycles

• Combining RP and SP data can provide valuable insight
  – Response Bias

• Segmentation (Classification/Cluster analysis)
  – All motorcyclists are not created equal
Questions?
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813.974.5307