IS AGE A FACTOR IN CRASHES AT CHANNELIZED RIGHT-TURN LANEs?

An Exploration of Potential Relationships between Driver Age and Crashes

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OBJECTIVE

To identify the association between crashes and right turn lane design characteristics with a specific consideration of the age of the driver.
PROBLEM

Figure 33. Right-Turn Channelization Design

Source: FHWA 2014 *Handbook for Designing Roadways for the Aging Population*
IDEA – FOR A GIVEN FEATURE...

Number of Licensed Drivers or Number of Miles Driven

SIMILAR DISTRIBUTION
Number of Crashes

OVER REPRESENTATION BY OLDER DRIVERS
Number of Crashes

- Young
- Middle
- Old
GEOMETRIC DATABASE

Identify intersections

- Team knowledge and searching on aerial photographs
- Intersections with right-turn lane channelizing island on at least one approach
- Found intersections in almost every TxDOT district

Manual collection of geometric features

- Approach. Departure lane (yes/no)
- Corner Curve. Radius (ft)
- Intersection. Angle: right angle (near 90), close (between 90 and 75) or skew (75 or less)
- Intersection. Number of legs (either 3 or 4) and intersection traffic control (either signal [SG] or Stop sign [ST] control): 3SG, 3ST, 4SG, 4ST
RIGHT-TURN TREATMENT TYPE
(NUMBER OF APPROACHES)

• **SLwI** = Shared lane with island (524)
• **SLwIDL** = Shared lane with island and dedicated downstream lane (70)
• **RTLwI** = Right-turn lane with island (508)
• **RTLwIDL** = Right-turn lane with island and dedicated downstream lane (122)
• **SL** = shared lane (209)
CRASH DATABASE

6 years of crash data (2009-2014 inclusive)

TxDOT CRIS database:

• Crash file with all related crash characteristics
• Unit file with vehicle characteristics
  • Used to determine the approach for the crash
• Person file with collected characteristics for those involved in a crash
  • Used to determine driver age
JOINT DATABASE

Merged geometric and crash data

• When lat / long available…identify crashes within 300 ft radius from the center of intersections
• When lat/long not available…identify crashes using street names
• Merge with CRIS unit file and person file for a comprehensive database
• Remove: crashes where vehicle direction is not known, non-driver data, and when driver age is unknown
• Identify right-turn related (RTR) crashes using all filters where the manner of collision involved a vehicle turning right
MILES DRIVEN

2009 National Household Travel Survey (NHTS)

- Annual average miles driven by the interviewed drivers
- Average over 5-year increment
- Filtered on Texas drivers

US DOT, Office of Highway Policy Information

- Licensed drivers in Texas (2010)

Miles driven

- Combined average annual miles driven by Texans with number of licensed drivers to determine total annual miles driven
DRIVER AND MILES DRIVEN DISTRIBUTIONS

Age Group (Number is Youngest Age in the 5-yr Group)

Right-Turn Related Crashes (1433)
Intersection Crashes (1433)
Miles
DRIVER INVOLVEMENT RATE

Drivers/Approach/Miles Driven

Right-Turn Related Crashes (1433)
Intersection Crashes (1433)

Age Group (Number is Youngest Age in the 5-yr Group)
RIGHT-TURN TREATMENT TYPE RIGHT-TURN RELATED CRASHES

Distribution

0% 2% 4% 6% 8% 10% 12% 14% 16% 18% 20%

Age Group (Number is Youngest Age in the 5-yr Group)

15 20 25 30 35 40 45 50 55 60 65 70 75 80 >85

- RTLwI (508)
- RTLwIDL (122)
- SL (209)
- SLwI (524)
- SLwIDL (70)
- Miles
CORNER RADIUS (RTLwI, SLwI)
RIGHT-TURN RELATED CRASHES

![Graph showing the distribution of right-turn related crashes by age group.](image)

- **Age Group (Number is Youngest Age in the 5-yr Group)**
  - 25-60 (219)
  - 60-95 (529)
  - 95-130 (173)
  - >130 (111)

The graph indicates the percentage distribution of crashes across different age groups, with the youngest age in each group as follows:

- 25-60: 219 crashes
- 60-95: 529 crashes
- 95-130: 173 crashes
- >130: 111 crashes
DRIVER INVOLVEMENT RATES FOR CORNER RADIUS, RTR CRASHES

Radii with Number of Approaches in Parentheses (ft)

- 25-60 (219)
- 60-95 (529)
- 95-130 (173)
- >130 (111)
- Grand Total (1032)

Drivers/Approach/Miles Driven (1,000,000,000)

- 0.0000
- 0.0050
- 0.0100
- 0.0150
- 0.0200
- 0.0250
- 0.0300
- 0.0350

35-65 Age Group

> 65 Age Group
DOWNSTREAM DEDICATED LANE RIGHT-TURN RELATED CRASHES

Drivers/Approach/Miles Driven (/1,000,000,000)

Age Group (Number is Youngest Age in the 5-yr Group)

- With island and without downstream lane (1032)
- With island and with downstream lane (192)

0.0225
0.0172 (-4%)
0.0165
0.0252 (12%)
ISLAND WIDTH

Red line = width of right-turn channelizing island

If turning vehicle stops at crosswalk:

• Dark blue line = potential vehicle path
• Light blue line = upstream view (note tree may limit visibility)
ISLAND WIDTH, INTERSECTION CRASHES

Age Group (Number is Youngest Age in the 5-yr Group)

Distribution

0-39 (623)
40-79 (294)
80-119 (85)
120-159 (21)
160-199 (6)
>200 (3)

Miles
SUMMARY

Findings

• Younger drivers have disproportional number of intersection and right-turn related crashes
• Older drivers are slightly more involved in right-turn and intersection crashes as compared to middle-age drivers
• Right-turn characteristics
  • Downstream dedicated lane may help
  • Wide islands may not help

Future research needs

• Investigate findings from crash rates
• Before-after study methodology