Literature Review and Survey Results of Bicycle and Pedestrian Treatment Safety Assessments

Georgia DOT Research Project RP13-17

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** Big Question **

How should state and local agencies decide bicycle and pedestrian safety treatments and locations?

Highway Safety Manuel Requirements

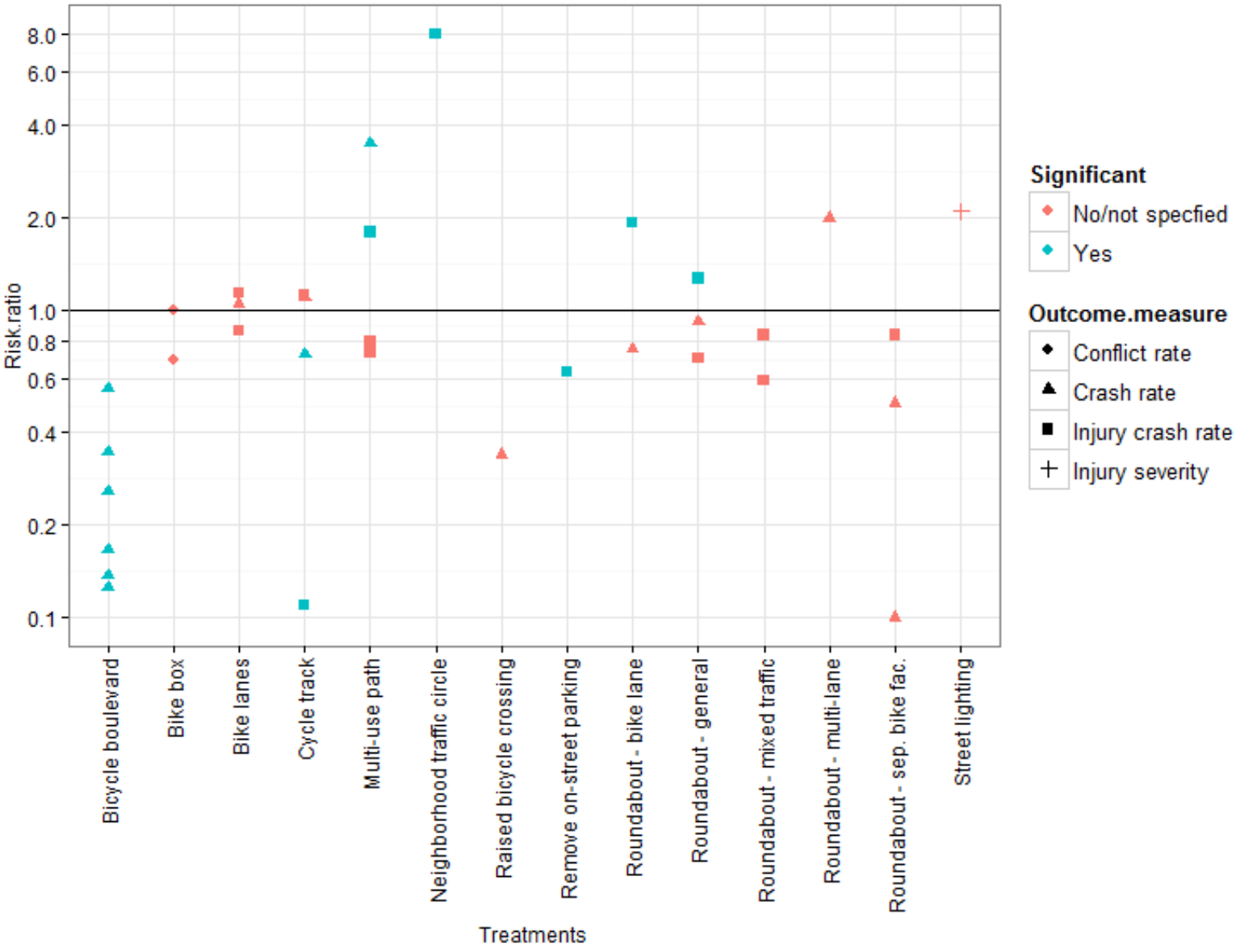
1. Define a “standard” set of conditions and activity factors that will be used for assessing bicycle and pedestrian safety.
2. Assessing the risk of crashes, injuries or fatalities (adverse events) to bicyclists and pedestrians under these “standard” conditions (i.e. developing a SPF)
3. Measuring the activity of bicyclists and pedestrians
4. Understanding how departures from “standard” conditions, including safety treatments, influence the risk of an adverse event.

Method

- Literature Review
  - 22 bicycle treatments
  - 35 pedestrian treatments
- Survey of Agencies
- Development of Tool

** Lit Review Major Findings **

- Very little research to date about impact of bike and ped treatments
- Knowing the number, type, and severity of crashes is a significant problem
  - Accurate crash data is often lacking due to problems of underreporting and reporting bias
- Lack of standardized, transferable exposure data
- Insufficient statistical rigor
  - Very simple methodologies with few controls
  - Too few sites in varying locations
  - Not robust enough to draw broad conclusions


8.0
6.0
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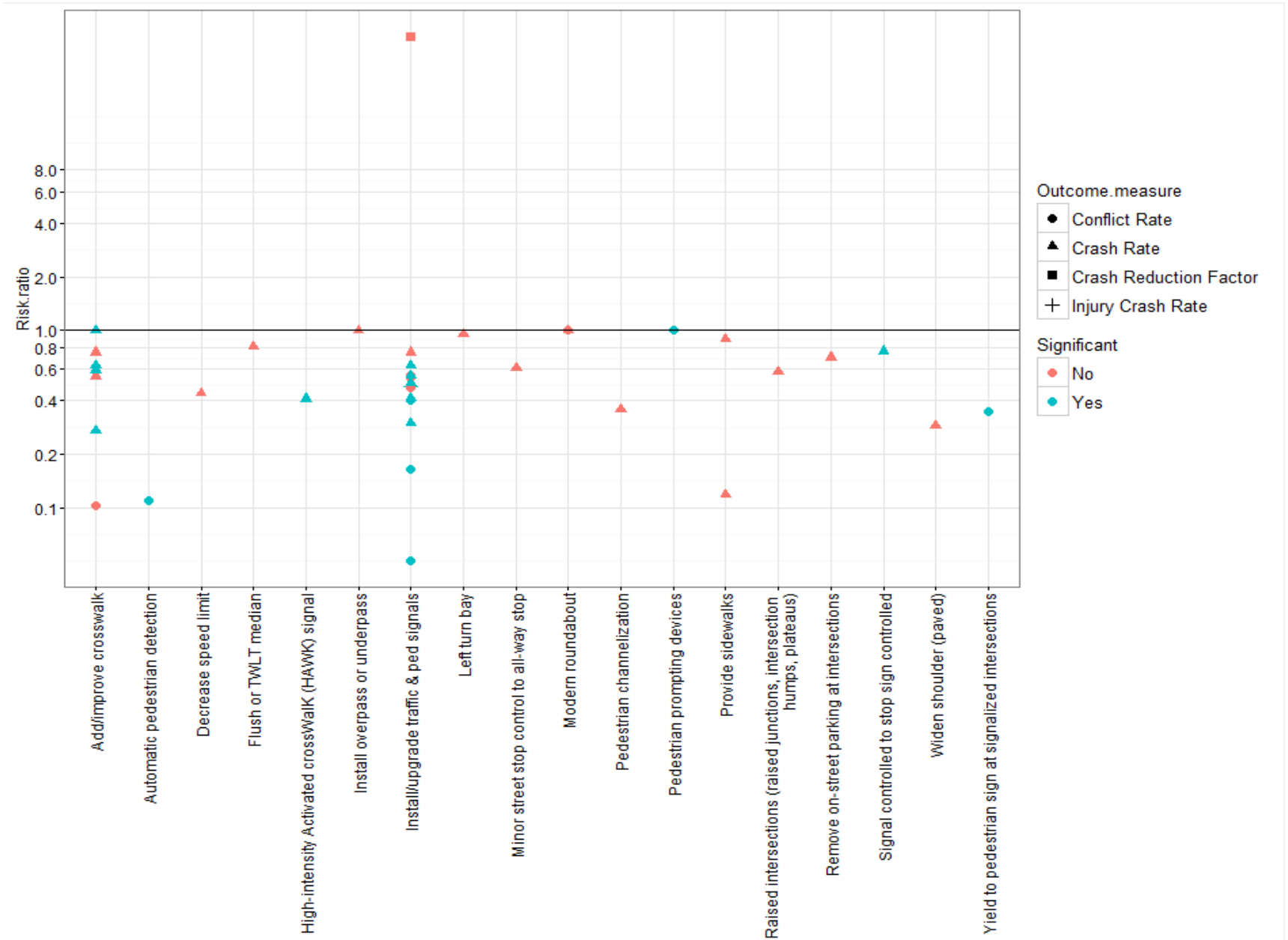
0.1
Risk.ratio
Bicycle boulevard
Bike box
Bike lanes
Cycle track
Multi-use path
Neighborhood traffic circle
Raised bicycle crossing
Remove on-street parking
Roundabout - bike lane
Roundabout - general
Roundabout - mixed traffic
Roundabout - multi-lane
Roundabout - sep. bike fac.
Street lighting
Treatments
Significant
No/not specfied
Yes
Outcome.measure
Conflict rate
Crash rate
Injury crash rate
Injury severity


Risk.ratio
8.0
6.0
4.0
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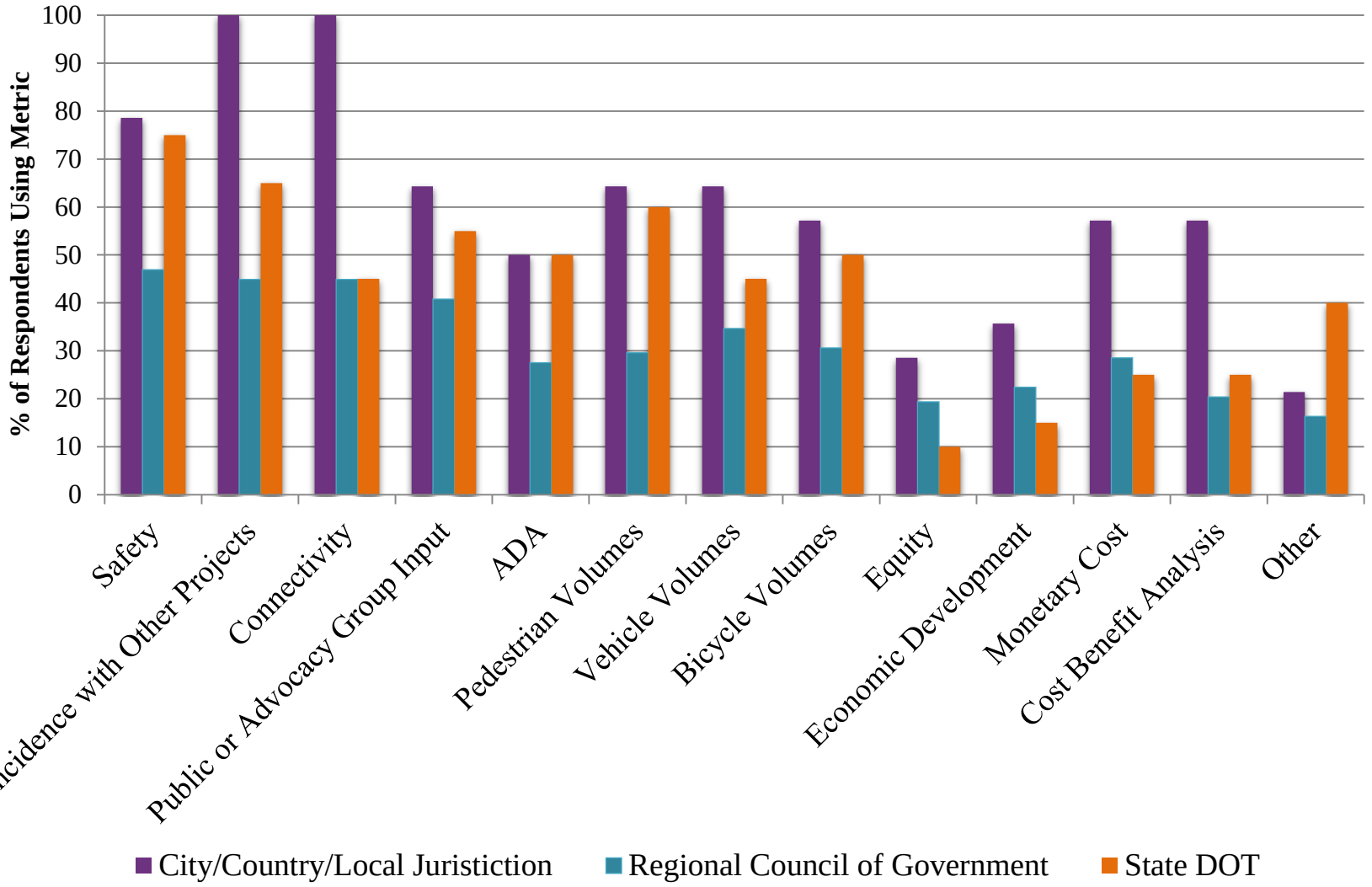
0.8
0.6
0.4
0.2
0.1
Add/improve crosswalk
Automatic pedestrian detection
Decrease speed limit
Flush or TWLT median
High-intensity Activated crossWalK (HAWK) signal
Install overpass or underpass
Install/upgrade traffic & ped signals
Left turn bay
Minor street stop control to all-way stop
Modern roundabout
Pedestrian channelization
Pedestrian prompting devices
Provide sidewalks
Raised intersections (raised junctions, intersection humps, plateaus)
Remove on-street parking at intersections
Signal controlled to stop sign controlled
Widen shoulder (paved)
Yield to pedestrian sign at signalized intersections
Outcome.measure
Conflict Rate
Crash Rate
Crash Reduction Factor
Injury Crash Rate
Significant
No
Yes

** Survey Major Findings **

- 133 responses from sample of 699 MPO / State DOT reps
- 19% response rate

- Very wide range of data availability and planning techniques among agencies
- Most value *safety* as key component of decisions, but most *do not* collect enough *exposure and crash data* to adequately assess safety impacts

Variables in Identifying Treatments



Before and After Studies

- Only 29% of the agencies have completed one or more before and after study
- Majority only measured once before and after
- Important to collect data multiple times as use and effectiveness can change rapidly over the first few months of usage

Bike and Ped Counts

- About one third (43 out of the 133) of the responding agencies stated that they *did not* collect any type of permanent or temporary bicycle or pedestrian counts.
- Only 4 agencies counted more than 200 locations per year.
- Exposure is a fundamental variable necessary to understand crash rates.

** Recommendations **

- Improve crash data collection
- Enhance activity data collection (counts)
- Always conduct before-after analysis

Bike and Pedestrian Crashes are Underreported

- Bicyclists and pedestrians in particular are less likely than other users to report crashes (Cryer et al., 2001; Maas and Harris, 1984)
- Elvik and Mysen (1999)
  - Fatal crashes reported about 95% of time
  - Serious injuries reported 70% of time
  - Slight injuries reported 25% of time
  - Very slight injuries 10% of time
- Using hospital data
  - 44% of pedestrian crashes and 52% of bike crashes unreported (Stutts and Hunter, 1998)
  - 21% of bike crashes unreported in San Francisco (Sciortino et al, 2005)
- Another study using self-report data found less than 10% of crashes were reported (Loukaitou-Sideris, 2014).

Enhanced Activity Data

- Need quantifiable exposure data
- Comprehensive data collection programs needed to obtain data necessary for developing crash modification factors.

Before-After Analysis

- Absence of data or past research to evaluate treatment
- If treatments are implemented experimentally, site-specific before-and-after data collection and analysis should be done to gather data for future decisions

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