IMPACT ANALYSIS OF BICYCLE SAFETY LAWS

LAW ENFORCEMENT & EDUCATION: PARTNERING FOR BICYCLE / PEDESTRIAN SAFETY

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AGENDA

▪ Background
▪ Methodology
▪ Results
▪ Limitations
▪ Discussion
▪ Conclusions
BACKGROUND

▪ More than 600 bicyclists killed each year since at least 1975, when national reporting became available through FARS.

▪ To help reduce risk of bicyclist injuries and fatalities many States have enacted bicycle traffic safety laws. Such laws:
  ▪ Restrict or punish certain motorist actions while driving in vicinity of bicycles
  ▪ Promote safer bicycling
  ▪ Or treat bicyclists as separate class of road user

▪ Research Objectives:
  ▪ Determine whether existing bicycle traffic safety laws protect bicyclists or create potentially harmful environments to them.
  ▪ Determine the need for laws that treat bicyclists as a separate class of road user.
METHODOLOGY

▪ Crash data
  ▪ Obtained from 34 States: 28 from NHTSA State Data System (SDS); 5 from public, State-run online portals; crash counts relevant to Idaho Stop law obtained from Idaho DOT.

▪ Exposure metrics
  ▪ Number of Bicycle Commuters (American Community Survey [ACS])
  ▪ Vehicle Miles Travelled (Federal Highway Administration)
  ▪ Length of Bikeable Roads (ACS)
    ▪ Urban arterial, collector, and local roads considered “bikeable” roads for this analysis. Extracted from ACS.
  ▪ Number of Intersections
    ▪ Estimated via intersection density metrics, converted to number of intersections per mile of bikeable roadway in each State.

▪ Legislative details
METHODOLOGY - CRASH DATA SOURCES
Fore more information, contact:

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METHODOLOGY - LEGISLATIVE DETAILS

- Mandatory Helmet Use
- Bicycling Under the Influence
- Safe Passing
- Where-to-Ride
- Sidewalk Riding

Not shown: Dooring, Idaho Stop
Dependent variables (DV$s) chosen as most relevant metrics for each law. Exposure variables included to prevent misattribution. Random factors allow different levels of DV by State and State-specific temporal trends. Law variables are of primary interest.
<table>
<thead>
<tr>
<th>Law</th>
<th>Safety Metric</th>
<th>Effect Attributed to Law</th>
<th>Effect Attributed to Each Year of Enforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe Passing (SP) and Where-to-Ride (WTR)</td>
<td>Number of crashes involving rear-end or sideswipe collisions not occurring at intersections, OR those which the motorist’s action was recorded as “passing” or “overtaking” a bicyclist.</td>
<td>SP Only: - 23% ↓</td>
<td>SP Only: + 11% ↑</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WTR Only: - 13% ↓</td>
<td>WTR Only: + 0.4% ↑</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Both: - 12% ↓</td>
<td>Both: + 5% ↑</td>
</tr>
<tr>
<td>Mandatory Helmet Use</td>
<td>Rate of reported helmet use among bicyclists &lt; 16yrs.</td>
<td>+ 20% ↑</td>
<td>+ 7% ↑</td>
</tr>
<tr>
<td></td>
<td>Number of fatalities and incapacitating injuries among bicyclists &lt; 16yrs.</td>
<td>None</td>
<td>- 2% ↓</td>
</tr>
<tr>
<td>Bicycling Under the Influence</td>
<td>Number of crashes involving an intoxicated bicyclist.</td>
<td>- 38% ↓</td>
<td>- 8% ↓</td>
</tr>
<tr>
<td>Idaho Stop</td>
<td>Number of crashes that occurred at intersections (stop-controlled or signal-controlled) and the bicyclist’s action is recorded as either a failure to obey traffic controls or a failure to yield the right of way.</td>
<td>Unknown</td>
<td>None</td>
</tr>
</tbody>
</table>
## RESULTS (2 OF 2)

<table>
<thead>
<tr>
<th>Law</th>
<th>Safety Metric</th>
<th>Effect Attributed to Law</th>
<th>Effect Attributed to Each Year of Enforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sidewalk Riding</td>
<td>Number of crashes in the roadway (regardless of relationship to intersection).</td>
<td>Prohibitive: Unknown</td>
<td>Prohibitive: Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Permissive: None Î±</td>
<td>Permissive: - 4% Î±</td>
</tr>
<tr>
<td></td>
<td>Number of crashes on the sidewalk (regardless of relationship to intersection).</td>
<td>Prohibitive: Unknown</td>
<td>Prohibitive: Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Permissive: None Î±</td>
<td>Permissive: None Î±</td>
</tr>
<tr>
<td></td>
<td>Number of fatalities and incapacitating injuries (regardless of location and relationship to intersection)</td>
<td>Prohibitive: - 29% Î­</td>
<td>Prohibitive: - 3% Î­</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Permissive: - 15% Î­</td>
<td>Permissive: - 2% Î­</td>
</tr>
<tr>
<td></td>
<td>Number of intersection-related crashes in the roadway.</td>
<td>Prohibitive: Unknown</td>
<td>Prohibitive: Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Permissive: - 94% Î­</td>
<td>Permissive: + 18% Î­</td>
</tr>
<tr>
<td></td>
<td>Number of non-intersection-related crashes in the roadway.</td>
<td>Prohibitive: Unknown</td>
<td>Prohibitive: Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Permissive: None Î±</td>
<td>Permissive: None Î±</td>
</tr>
<tr>
<td></td>
<td>Number of intersection-related crashes on the sidewalk.</td>
<td>Prohibitive: Unknown</td>
<td>Prohibitive: Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Permissive: + 656% Î±</td>
<td>Permissive: None Î±</td>
</tr>
<tr>
<td></td>
<td>Number of non-intersection-related crashes on the sidewalk.</td>
<td>Prohibitive: Unknown</td>
<td>Prohibitive: Unknown</td>
</tr>
<tr>
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<td></td>
<td>Permissive: None Î±</td>
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</tr>
</tbody>
</table>
LIMITATIONS

▪ True number of bicyclists cannot be measured as reliably as other metrics, such as VMT. The analysis used number of **commuters as a proxy** measurement for overall level of bicycling, but is imperfect.

▪ Relationships presented are **correlational** and not necessarily causal. Enacting bills to promote safety may be part of larger effort and thus may not be the full cause of change.

▪ Possibility of **regression toward mean** effects – tendency of time series to exhibit a value close to average after exhibiting an extreme value.

▪ **Dooring** laws (which address crashes involving motorists opening doors into path of oncoming traffic) required data not recorded by States included in analysis.
DISCUSSION

- Lack of **public awareness** may explain, at least in part, failure of some laws to improve safety.

- Where-to-Ride laws (found to have no impact on passing-related crashes) prescribe behavior that is consistent with **natural tendency** to ride toward right side of road.

- Sidewalk riding crash data could be biased by **lower-skilled bicyclists** that choose to ride on sidewalk.

- Timing of **Idaho Stop** law (implemented in 1982) and availability of historic data prevent thorough analysis of safety outcomes.
CONCLUSIONS

Do bicycle traffic safety laws protect bicyclists or create potentially harmful environments to them?

- **Mixed effects, including positive, negative, and neutral safety outcomes.**

Need for laws that treat bicyclists as separate class of road user?

- **Depends on type of law. Helmet use laws treat bicyclists as separate class while BUI laws treat bicyclists like motorists. Both approaches beneficial.**
Please evaluate this presentation using the Lifesavers Conference Mobile App.
SUPPORTING SLIDES
Actual and Estimated Annual Bicycle Commuters by State
SP and WTR laws: actual and estimated relevant crash counts
BUI laws: actual and estimated relevant crash counts
Permissive SR laws: actual and estimated crashes in the roadway

Permissive SR laws: actual and estimated crashes on the sidewalk
SR laws: actual and estimated fatal and incapacitating injuries