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Evaluating High-Visibility Enforcement of Bicycle Passing Laws

Background

In the United States in 2019 there were 846 bicyclists and other non-motorized cyclists who died in traffic crashes (NCSA, 2020b) – a 36% increase over the last decade (NCSA, 2020a). Analyses of driver and bicyclist behaviors that lead to bicycle-involved motor vehicle crashes and bicyclist fatalities consistently reveal that a motorist overtaking a bicyclist from behind is the most frequent situation that results in a bicyclist fatality (Wright et al., 2019). To address this situation, laws have been passed at the State, county, and municipal levels requiring a minimum passing distance (e.g., 3 feet, 5 feet) when a motorist passes a bicycle. The need to obey these laws, especially when high-visibility enforcement (HVE) heightens awareness, might also prompt motorists to increase their search for bicycles and to leave more space when overtaking them.

The HVE countermeasure approach in which increased enforcement is coupled with intensive publicity to increase the effect of the enforcement and decrease undesirable behavior was used successfully by Van Houten et al. (2013) in an analogous situation: to improve motorists yielding to pedestrians at crosswalks. This study attempted to emulate the basic approach used in that study by testing the HVE approach to improve compliance with laws requiring motorists to pass a bicyclist at a minimum distance such as 3 feet or 5 feet.

Method

Site Selection

Researchers selected Grand Rapids, Michigan (5-feet local ordinance) and Knoxville, Tennessee (3-feet State law and local ordinance) for the study. Although the cities are in different regions of the country, the bicycle riding seasons and extent of bicycling are quite similar as are the demographics and socioeconomics. The cities are also similar with respect to bicyclist fatalities and injuries.

Enforcement

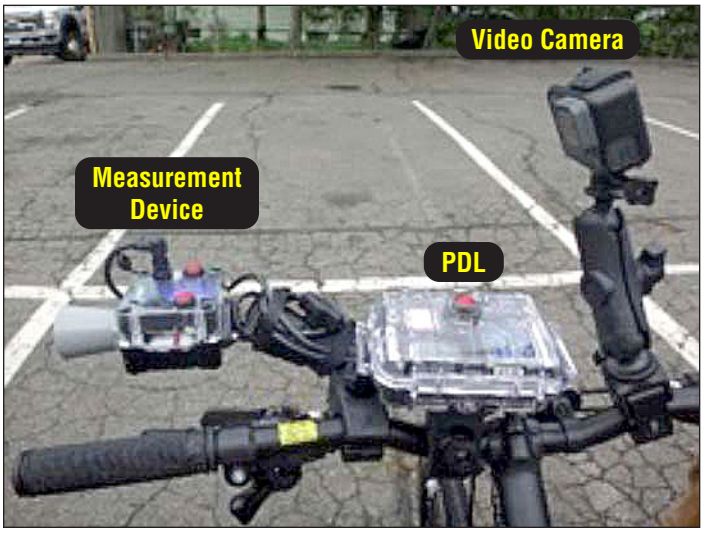
One essential component of an HVE program is the enforcement itself. Police needed an objective, reliable, safe, and legally acceptable way to determine the precise distance of a pass. The approach by the two cities was similar and used an ultrasonic distance measuring device (described below) and "decoy" police officers riding bicycles as the triggers for enforcement action. If a driver passed the decoy officer too closely, the officer would radio to a chase officer in a car or on a motorcycle who would then stop and warn or cite the driver.

Enforcement was focused on three routes in Knoxville and four in Grand Rapids, distributed across each city and selected because of high bicycle and motor vehicle traffic, potentially high passing-law violations, and the availability of safe places to pull violators over. Grand Rapids Police Department generally used two police bicycle riders and two chase motorcycles or cars for each enforcement operation. Knoxville Police Department used a single bicycle rider and chase car. During any traffic stops associated with the HVE, officers used discretion regarding whether to issue a ticket, verbal warning, or written warning. Warning flyers were given to all drivers who violated the passing-distance laws and were also widely distributed at the outset of the programs at city events. During the stops, officers used short, standardized scripts to tell the drivers about the seriousness of the problem, the correct driver behavior, and the existence of the ongoing HVE campaign.

Measurement of Passing Distance

Researchers used a commercially available, ultrasonic, distance measuring device used by police in both cities to determine if violations occurred. The device was paired with a video camera to document each violation. The device could be set for a violation distance of 36 in. (3-feet law in Knoxville) or 60 in (5-feet law in Grand Rapids). If a distance less than or equal to the set threshold was measured, the display would "freeze" at the actual measured distance, and an alert would sound. For additional non-police observations, a portable data logger was added as a data collection device to capture distance, time, and location.

Figure 1. Measurement and data collection system



Messages/Publicity

The second component of an HVE campaign consists of education in the form of publicity or messages concerning the existence and intensity of the enforcement, the high probability of getting caught, and the possibility of a significant sanction (fine and possible insurance repercussions) for committing the offense. The HVE program leaders at each site developed and disseminated the program publicity. Each city held a press conference and added details of its law and HVE program to its city's website. Grand Rapids also used lawn signs and feedback signs to alert drivers of the law. In addition to earned media, Knoxville distributed 58,852 informational flyers about the law and program.

Evaluation Design

The program evaluation in both cities consisted of pre- and post-program measures of the distance motorists gave to bicycles when they passed them on the roadway. The distance measures were collected using two different data collection approaches, each of which used the distance measurement device.

1. "Staged riders," who were expert bicyclists recruited at both sites to ride bicycles on the designated enforcement routes. This provided data specific to the enforcement routes and a look-over time at possible driver behavior change on the same routes.
2. "Volunteer riders," who were experienced bicyclists who used their bicycles as primary transportation and therefore rode all over town. This provided a more general citywide picture of behavior over time at each study site.

HVE Program and Evaluation Timelines

The baseline period began when collection of each evaluation measure started and ended with the initial press conferences. Since the countermeasures mounted by each site consisted of several separate interventions at different times after the press conference, the post- period was subdivided based on the start times of the major additional interventions at each site. In Grand Rapids the post period was divided into Post 1, Post 2, and Post 3. In Knoxville there were two periods of intervention defined: Post 1 and Post 2.

Results

Analyses examined changes in average passing distance, passes less than 5 feet, and passes less than 3 feet in both cities. The results are summarized in Table 1 and show that all of the observed changes, whether or not they reached statistical significance, were in the desired directions. Average passing distance increased, and violations decreased. This is precisely what the HVE programs were trying to accomplish.

Table 1. Summary of Passing Distance Results

Measure	Baseline		Last Wave*		Difference (% Change)	Significance**
	Mean	*Standard Deviation*	*Mean*	*Standard Deviation*		*p*
Knoxville Staged						
Average (in.)	76.26	17.92	77.35	15.08	1.09 (1.4%)	*ns*
< 5-ft (%)	17.63	38.11	11.87	32.36	-5.76 (-32.7%)	< .001
< 3-ft (%)	4.98	21.76	3.11	17.35	-1.87 (-37.6%)	*.017*
Knoxville Volunteer						
Average (in.)	77.76	15.60	79.21	15.15	1.5 (1.9%)	< .001
< 5-ft (%)	15.79	36.47	14.58	35.23	-1.21 (-7.7%)	*ns****
< 3-ft (%)	4.21	20.09	3.99	19.57	-0.22 (-5.2%)	*ns*
Grand Rapids Staged						
Average (in.)	77.66	14.32	79.93	13.85	2.27 (2.9%)	< .001
< 5-ft (%)	13.39	34.07	10.25	30.34	-3.14 (-23.5%)	.004
< 3-ft (%)	3.09	17.30	2.09	14.31	-1.00 (-32.3%)	*ns*
Grand Rapids Volunteer						
Average (in.)	75.38	19.72	79.24	18.06	3.86 (5.1%)	< .001
< 5-ft (%)	26.01	43.89	18.17	38.57	-7.84 (-30.1%)	< .001
< 3-ft (%)	8.86	28.43	6.45	24.58	-2.41 (-27.2%)	*ns*

Note: Linear regression used to test average. Logistic regression used to test violation rates.

*Post 2 Wave in Knoxville; Post 3 Wave in Grand Rapids.

**Comparing last evaluation wave to Baseline.

***Percent passes < 5 ft in Post 1 Wave was 18.32 and significant p=.003.

Discussion

This study showed that HVE programs directed at bicycle passing laws can increase compliance, which should improve safety. Average passing distance increased and violations of the prevailing law decreased at both sites. Thus, there is no clear-cut choice between the two passing distances based on just response to the HVE. It is worth noting, however, that securing passage of a 5-feet law may be more difficult than enacting a 3-feet law. In spite of the existence of a 5-feet ordinance in Grand Rapids and several other Michigan cities and consideration of 5-feet and 4-feet requirements, the Michigan State Legislature decided to pass a statewide 3-feet law. Thus, there appears to be a trade-off between attempting to pass a 5-feet law that may have slightly superior safety performance because of the greater buffer distance between the car and bicycle and a 3-feet law that still performs well and is easier to get accepted

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How to Order

Download a copy of *Evaluating High-Visibility Enforcement of Bicycle Passing Laws* (76 pages) at https://rosap.ntl.bts.gov/. Kristie Johnson, Ph.D., was the task order manager for this project.

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