



INDOT Research

TECHNICAL *Summary*

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EVALUATION OF SAFETY ENFORCEMENT ON CHANGING DRIVER BEHAVIOR – RUNS ON RED (A Two-Volume Report)

Introduction

Twenty-two percent of crashes at urban signalized intersections are claimed to be caused nationwide by drivers who run red lights. To improve safety at signalized intersections, red-light-running countermeasures have been applied in twelve states. Currently, there are no specific countermeasures in Indiana nor is there an assessment of the red light running in Indiana. This research project was designed to assess the magnitude of red light running, evaluate selected countermeasures, and, finally, identify driver and road characteristics that are associated with excessive red light running in Indiana.

The project consisted of a telephone survey to assess Indiana drivers' perception of the presence and seriousness of red light running, observational studies at a cross section of intersections (in Tippecanoe County), the introduction of selected countermeasures, and the measurement of the effectiveness of the measures. In parallel, an analysis of Indiana crash data was conducted to determine the extent of red light running as reported by the investigating officers. Finally, the legal aspects of a red light running law were researched both as it relates to Indiana and the experience of other states.

The observational studies included two different approaches. One group of researchers focused on one intersection, using continuous video monitoring over extended period to measure

the frequency of red light running. The second research group developed a random selection process, utilizing a cross section of intersections in Tippecanoe County. Variables in the selection process included posted speed, number of lanes, presence of turn lanes, and different traffic signal controls, as examples. Randomly established observation times and days were determined. After the conclusion of the first round of studies, the experiment was repeated introducing different sites, dates, and times. As a result, over representation patterns of red light running were identified. Both groups then introduced the perceived risk of being stopped for violation of the law. This occurred through the involvement of local radio, television, and print media. This was followed by a period of police enforcement at the selected intersections. In the case of the intersection with continuous traffic monitoring, police enforcement was present during the red-light-running campaign and four months later, signs were installed at approaches to the intersections, advising drivers that photo monitoring of red light running was taking place at that intersection. The reduction in red light running was investigated. Both the groups measured the immediate and residual effects of the higher enforcement periods.

Findings

Indiana crash statistics for 1997-1999 indicates that 22 percent of signalized intersection crashes are caused by red light running supporting the national average for

urban areas. Fifty percent of all fatal crashes at these intersections were caused by red light runners. Red light running is perceived by two-thirds of the survey respondents as a problem in

Indiana. Ninety-five percent of the respondents indicated that they observed people running a red light in Indiana. Seventy-six percent of the respondents believed that a prime factor is drivers in a hurry, with 35 percent indicating driver inattention as a factor. Support for increased fines and enforcement was expressed by a clear majority. Seventy-eight percent of the respondents supported or strongly supported photo enforcement.

This research used two measures of red light running intensity: frequency and rate. The red light running frequency is a useful measure for planning effective enforcement while the red light running rate is useful in investigating driver behavior because the exposure effect (combination of frequency of red signals and volume) is removed. At the video-monitored intersection, the rate and frequency of red signal violations were detected and recorded prior to, during, and after police enforcement. A police patrol was present and ticketed violators for five days during the afternoon peak hours. The red light running rate did not change significantly during the one-week enforcement but decreased by 75 percent the next week following the enforcement period. One month later, the red light running reduction was still 37% of the original red light running rate. Four months later, the red light running rate was still lower which might indicate a long-lasting joint impact of the police presence and the red-light-running campaign.

Four months after the police enforcement, "Red Light Running Photo Monitored" signs were placed on all the approaches in advance to the instrumented intersection. They were a substitute for actual photo-enforcement. No ticketing took place during the signs presence. The signs were displayed for one week. The red light running dropped immediately during that week by 63 % but rose after the signs were taken out at the rate faster than after the police enforcement. The continuous monitoring of the instrumented intersection during periods with lower presence of students indicated lower red light running rates than during the periods with regular presence of students. This reduction in red light running when driving students are not present on

the road concurs with the past research findings that young drivers are more aggressive and violate traffic rules more frequently than other drivers.

The randomly selected sites measured not only frequency of red light running but also captured the offending driver's gender, estimated age group of driver, type of vehicle, the presence of other occupants, and the type of driving maneuver at the time of the red light violation (left, straight, or right hand turn). This data were contrasted against posted speed limit, roadway type, intersection design, and signal light configuration. From the initial round of sampling, over represented times of day and days of week were identified. Subsequent sampling rounds also further validated these trends. From the full set of results, no type of vehicle (such as SUVs, cars, pickup trucks, etc.) are over represented nor does race appear to be a factor. Gender, however, is a factor. Male drivers committed 64 percent of the red light running violations observed, while other studies (Indiana Annual State Wide Seatbelt Surveys) have shown male drivers representing 52.7 percent of the drivers in 2000, and 53.1 percent in 2001. Results also showed that left turns and straight through violations, considered the most dangerous, as far as crash severity, represented nearly 90 percent of the violations. Traffic volume also played into the equation as the frequency of violations increased with traffic volume, again, increasing the potential for more serious crashes. Finally, red light running peaked during the lunch hour, particularly during the latter part of the hour, when drivers would typically be returning from their lunch time. These results are also supported by an analysis of crash data for the county, which indicates the highest incidence of crashes occurring during the lunch hour time. While the observed incidence of red light running increased through the week (from Monday to Friday), a review of the crash data does not correlate with the above results.

In the randomly selected sites, neither media attention nor increased enforcement patrols affected red light running with the exception of when enforcement was highly visible to the majority of motorists at the intersection.

Implementation

This report begins to fill the gap in knowledge relative to red light running in

Indiana. The paper provides a review of current and past red light running programs as

implemented by other states, supported by FHWA, and potential alternatives for Indiana. It demonstrated that awareness through the media and general presence of law enforcement may not be effective tools to reduce red light running. The effectiveness of the police enforcement is possible if the enforcement is visibly intensified, persistent, and in conjunction with other methods such as increased media coverage and the installation of appropriate signage. Photo-

enforcement may be a viable and less resource-demanding alternative.

The project can be an effective tool for a community/county to use in assessing potential red light running issues within that area. It provides a methodology for the development of a red light running assessment program through identifying design criteria for use in a random sample study.

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