Red Light Running Cameras: Would Crashes, Injuries and Automobile Insurance Rates Increase If They Are Used in Florida?

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ABSTRACT
Running a red light can cause severe traffic crashes especially when one vehicle runs into the side of another. Red light cameras photograph violators who are sent traffic tickets by mail. Intuitively, cameras appear to be a good idea. However, comprehensive studies conclude cameras actually increase crashes and injuries, providing a safety argument not to install them. Presently, Florida statutes do not permit red light camera evidence to be used as the sole basis for ticketing drivers for violating the law. Legislation to permit camera citations has been proposed since the 1990s, but none has passed to date. This paper explains red light running trends in Florida; effective solutions to reduce red light running; findings from major camera evaluations; examples of flawed evaluations; the automobile insurance financial interest in cameras; and the increased likelihood of even higher crash and injury rates if cameras are used in Florida due to the high percent of elderly drivers and passengers. The theory behind red light cameras as potentially effective is that they rely on deterring red light running primarily through punishment of a specific driving behavior and secondarily by changing drivers' experience. Because the rigorous and robust studies conclude that cameras are associated with increased crashes and costs, any economic analysis of cameras should include these newly generated costs to the public. Indirect costs to the public are usually not considered in the calculation of total revenues and profits generated from red light cameras. Florida should be cautious in using traffic safety information from the automobile insurance industry. Insurance financial goals are to increase their revenues and profits, which do not necessarily include reducing traffic crashes, injuries or fatalities. Also, public policy should avoid conflicts of interest that enhance revenues for government and private interests at the risk of public safety.
***Florida Public Health Review,* 2008; 5: 1-7**

Introduction

Running a red light can cause severe traffic crashes especially when one vehicle runs into the side of another (i.e., an angle crash). Red light cameras photograph violators who are sent traffic tickets by mail. Intuitively, cameras appear to be a good idea. However, comprehensive studies conclude cameras actually *increase* crashes and injuries, providing a safety argument not to install them.

The National Motorists Association (NMA) represents driver interests and opposes cameras. In addition to concluding cameras do not improve safety, the NMA is concerned that local governments will not use effective methods to reduce red light running when earning money from cameras. For example, lengthening yellow light timings at traffic signals is effective in reducing red light running (NMA, 2008).

Nearly 80% of red light running occurs in the first second after the light changes (Office of the Majority Leader [OML], 2001). In addition, high-speed red light camera technology can identify split-second technical violations that are not visible to the human eye. Police in one community concluded that nearly 90% of infractions at a trial camera were split-second violations visible only to the camera lens, which would not result in a ticket from an officer (theNewspaper.com, 2006). The majority of the red light running safety issue can be resolved through inexpensive engineering remedies that address infractions in the first second after the light changes. Inexpensive interventions include lengthening yellow light timings and/or adding a brief all-red light interval, which permits traffic to clear the intersection prior to releasing cross traffic (Federal Highway Administration and National Highway Traffic Safety Administration [FHWA/NHTSA], 2003).

Camera fines have raised large amounts of money for cities and counties. San Diego, California, collected nearly $30 million in 18 months, with one camera alone generating almost $7 million. Smaller cities have also raised millions of dollars annually from cameras. Some jurisdictions have been accused of setting shorter yellow light traffic signal timings at camera intersections in order to increase tickets, thereby collecting more money from fines. Insufficient yellow light timings can create a dilemma zone where the distance is too short to stop, yet proceeding into the intersection results in running a red light (OML, 2001). Lending support to this concern, hundreds of camera citations in San Diego were dismissed after a judge concluded improper timings were set by the camera vendor (Fields, 2001).

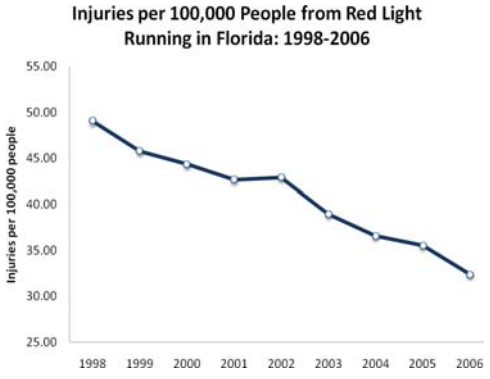
The primary advocate for cameras is the Insurance Institute for Highway Safety (IIHS, 2007; Federal Highway Administration, 2008). As the IIHS openly admits, they are wholly funded by automobile insurers. However, their major study, concluding cameras improve safety (Retting & Kyrychenko, 2002), has been criticized for research design flaws

and not actually measuring changes in crashes and injuries at camera intersections (Burkey & Obeng, 2004). While insurers may not set out to increase crashes and injuries, increases in crashes and injuries indirectly contribute to automobile insurance's performance as a growth industry. Increases in crashes can raise the risk rating of drivers in a community, which can lead to disproportionately higher automobile insurance premiums, and, subsequently, rising profits for insurers.

At present, Florida statutes do not permit red light camera evidence to be used as the sole basis for ticketing drivers for violating the law (Crist, 2005). Legislation to permit camera citations has been proposed since the 1990s, but none has passed to date. This paper explains a) red light running trends in Florida; b) effective solutions to reduce red light running; c) findings from major camera evaluations; d) examples of flawed evaluations; e) the automobile insurance financial interest in cameras; and f) the increased likelihood of even higher crash and injury rates if cameras are used in Florida due to the high percent of elderly drivers and passengers.

Is Red Light Running a Growing Problem in Florida?

Traffic fatalities due to red light running are not increasing and have averaged 110 per year since 1998, accounting for less than 4% of Florida's 3,000 annual traffic fatalities. Injuries from red light running crashes have steadily *decreased* since 1998, as have property damage-only crashes from red light running (Florida Department of Highway Safety and Motor Vehicles, 2006). More importantly, the injury rate from red light running crashes has plummeted by a third in less than a decade, as illustrated in the graph. The statistics and graph suggest red light running is declining in Florida in the absence of red light camera use.



What Solutions Are Effective in Reducing Red Light Running?

Whereas some red light running may be intentional, particularly in traffic congestion, it can also be unintentional and due to circumstantial factors. Contributing environmental factors include yellow light timings that are set too short at traffic signals, obstacles that block a driver's view of the traffic signal, and wet roads. The first recommended intervention at problem intersections is to conduct an engineering analysis, which will identify why red light running occurs. Intersection improvements should then be made in response to the findings (FHWA/NHTSA, 2003; Hemenway, 2001). For example, studies show that new traffic signals can reduce traffic fatalities by 50 percent, as they can increase visibility of the signal (TRIP, 2005). The following engineering countermeasures are recommended to reduce red light running (FHWA/NHTSA, 2003):

- Improve signal head visibility by increasing size or adding signal heads where one signal head is used for multiple lanes and may be blocked from view.
- Address east-west roads where sun angles silhouette the traffic sign head and add back plates to enhance visibility.
- Set appropriate yellow light time intervals that allow vehicles to clear the intersection or safely stop that is consistent with the speed limit, road grade and intersection width.
- Add a brief all-red light clearance interval to allow traffic in the intersection to clear prior to releasing cross traffic.
- Add intersection warning signs or advanced yellow flashing lights or reduce the approach speed to the intersection.
- Coordinate traffic signals to optimize traffic flow, eliminating interruptions.
- Remove on-site parking near intersections to increase visibility of pedestrians and cross traffic.
- Repair malfunctioning lights and avoid unnecessarily long cycle timings.

If a problem persists after intersection re-engineering, the FHWA and NHTSA (2003) advise the next steps are an education campaign and traditional police enforcement.

What Is Known About Cameras and Safety?

Major evaluations were conducted in Greensboro, North Carolina; Virginia; and the Canadian province of Ontario. The studies used multiple years of before-and-after data at camera intersections and comparison (no camera) intersections resulting in consistent findings. Camera

intersections were associated with a significant *increase* in crashes. Increased rear-end crashes were a particular problem and may occur as drivers attempt to stop abruptly in order to avoid a ticket. The studies also found cameras were associated with *increased* injury crashes or crashes with possible injuries.

The Greensboro evaluation was conducted by the Urban Transit Institute at the North Carolina Agricultural & Technical State University using 57 months of data (Burkey & Obeng, 2004). The study concluded that in many ways "the evidence points toward the installation of RLCs [red light cameras] as a detriment to safety." Cameras were associated with:

- A significant *increase* (40%) in accident rates;
- A significant *increase* (40-50%) in possible injury crashes;
- *No* decrease in severe crashes.

The Virginia Transportation Research Council (Garber, Miller, Abel, Eslambolchi & Korukonda, 2007) analyzed camera programs in five jurisdictions using seven years of data. The study concluded their findings "cannot be used to justify the widespread installation of cameras because they are not universally effective." They used a comprehensive statistical method of analysis (i.e., Empirical Bayes) that found cameras were associated with:

- A significant *increase* (29%) in total crashes;
- A significant *increase* (20%) in angle crashes;
- A significant *increase* (42%) in rear-end crashes, which did not decrease over time;
- A significant *increase* in injury crashes (18%), with the impact on injury severity reported as "too close to call";
- *Increases* crash costs.

A study conducted for the Ministry of Transportation in Ontario by Synectics Transportation Consultants (2003) evaluated two interventions (cameras and stepped-up police enforcement) in six jurisdictions following a public information campaign. Camera intersections had a:

- 16% *increase* in crashes, compared to an 8% increase at comparison intersections;
- 2% *increase* in injury or fatal crashes, compared to 10% and 12% decreases respectively at stepped-up police enforcement and comparison intersections.

Why Do Some Studies Conclude Cameras Reduce Crashes and Injuries?

All research studies are susceptible to design flaws, especially observational (i.e. non-experimental) studies. Some of the major studies concluding reductions in red light running have exhibited such design flaws. One of these was conducted by the Insurance Institute for Highway Safety (IIHS) and a second was funded by the Federal Highway Administration (FHWA). Both are explained below.

In the IIHS study, researchers compared Oxnard, California, which installed cameras, with three towns that did not. The first criticism of this study's design is that camera intersections were not separately analyzed. Instead, crash and injury counts at Oxnard's 11 camera intersections were added with all 125 signalized intersections in Oxnard (Retting & Kyrychenko, 2002). Thus, the study actually compared differences in crash and injury growth rates between intersections with and without traffic signals, and not between signalized intersections with and without cameras. A further criticism of this study is that the conclusions drawn from the statistical analysis were incorrectly reported. When the results were correctly analyzed for statistical significance, no change in total crashes could be substantiated (Burkey & Obeng, 2004; Kyrychenko & Retting, 2004).

The FHWA study (Council, Persaud, Eccles, Lyon and Griffith, 2005) evaluated seven jurisdictions in multiple states. The analysis concluded cameras were associated with decreased angle crashes and injures. The university professor who co-directed this study and provided the methodological ideas has also conducted research for the IIHS (Persaud, 2007; Persaud, Retting & Lord, 2001; Persaud, Hauer, Retting, Vallurupalli & Mucsi, 1997). The research design and reporting concerns are as follows.

- The researchers listed 15 geographic areas with camera programs. However, only seven areas were selected for the analysis because the researchers concluded "significant effects are likely for all crash severities" in these jurisdictions. The decision to selectively (non-randomly) choose among the 15 areas increases the chance of incorrectly favoring one conclusion over another (camera effectiveness or ineffectiveness). Three areas excluded by the researchers were included in the major studies from Virginia and Greensboro, North Carolina, which did not find reductions in angle crashes.

- The researchers called this a "before-and-after" study, yet it appears they did not compare crashes and injuries at intersections before *and* after cameras were installed. They did not report using the before period data in estimating expected crashes for the after period. Instead, the study made estimates of expected crashes and injuries for the period after cameras were installed using non-camera intersections. Also, counts of crashes and injuries from the before period were not reported in the results.
- In estimating crashes for the period after cameras were installed, the analysis excluded important factors that are known to affect intersection crashes. Changes attributed to cameras could actually occur from these excluded factors, such as differences in yellow light timings and speed limits.
- Although the Methods section identified six types of crashes (for example, red light running crashes), findings were reported for only angle and rear end crashes. Changes in crashes and injuries for the other types, including red light running crashes, and changes in total crashes and injuries were not revealed. This also renders the economic analysis incomplete since it did not include changes in total crashes and injuries.
- Instead of reporting the full results of the statistical analyses, only an example with made-up numbers was provided.
- Crash and injury counts were *not* reported by intersection or jurisdiction. As such, it is unknown where the favorable experiences attributed to cameras actually occurred. Correct reporting of research findings requires providing sufficient detail to allow other researchers to validate conclusions. It is impossible to replicate this study or to re-analyze the findings.

The public health policy implications are stark. People who are not trained in research methods are unlikely to identify methodological flaws. As such, these studies have been used in decision making. For example, the FHWA conclusions were presented in a legislative analysis of a Florida red light camera bill, along with IIHS research that referenced their Oxnard study (Florida House of Representatives Staff Analysis, 2007).

Of particular importance is the comparison of the research methods performed by the studies that find at best no benefit due to cameras, or at worst increased harm, since these studies did not have similar research design flaws. The studies finding no safety benefit to cameras more readily provided details of their methodology with their appropriate application. They provide sample data that were actually analyzed and reported, and not irrelevant and made-up. These studies correctly take into account statistical error rates and margins of error of their findings. Also, they tend not to pick and choose sample data that support their conclusions, while discarding data that may potentially dilute desired findings.

Another potential research design issue is crash data. Local governments have used changes in violations or profitability as proof of successful camera performance instead of using changes in crashes and injuries. This may occur because local governments do not have accurate counts of crashes before and after cameras are installed. For example, Florida law does not require law enforcement officers to write crash reports for most property damage-only crashes (Florida Statutes, 2007). This allows for large differences in the percent of crashes reported. If all crashes are not reported, it is not possible to correctly determine changes in crash rates associated with red light cameras. An Australian study completed by Andreassen (1995) concluded cameras offered "no demonstrated value as an effective countermeasure", but also identified concerns about the reliability of lists of accidents at camera sites. The importance of having good data was emphasized.

Why Might Insurers Support Cameras If They Increase Crashes and Costs?

More crashes lead to higher insurance premiums, leading to higher profits, which in turn lead to increases in insurance stock prices. In the absence of crashes, automobile insurance would become superfluous. This is not to say that automobile insurers actively seek to increase crashes, but to point out that an important component of insurance revenue growth is actual and perceived levels of "risk." Similarly, the tobacco industry has emphasized revenue growth by increasing cigarette sales while downplaying the impact on the public's health.

With automobile insurance, declining crash rates imply lower risk. In theory, insurance premiums should decline with fewer crashes, thereby reducing insurance revenues. Higher crash rates suggest higher risk; justifying higher premiums and profits. Due to the pricing methods used, automobile insurers do not have a financial incentive to lower crash rates or perceptions of risk.

Also, automobile insurance companies can profit if camera tickets are moving violations that add points to a driver's license. Moving violation tickets allow insurers to charge higher premiums while

incurring no additional cost. For example, if Florida's proposed camera legislation from 2005 or 2006 had passed, camera citations would be moving violations under the existing red light running statute. Cameras would have photographed the license plate of a vehicle violating a red light and then the vehicle owner would have received a $250 ticket plus 4-points on their driver's license (Florida House of Representatives [FHR], 2005; FHR, 2006). Even when tickets from red light cameras are not moving violations, an increase in moving violation tickets is still expected from the increase in crashes.

From 2000 to 2004, Florida moved up five spots to become the 6th most expensive state in which to insure a vehicle. A significant increase in moving violation tickets occurred from 2000 to 2004; along with a large increase in automobile insurance premiums. Statewide, automobile insurance premiums increased from $8.7 billion in 2000 to nearly $14 billion in 2004. Automobile insurers paid 73¢ on every premium dollar in 2000, versus 61¢ in 2004. This means the large increase in tickets was associated with increased insurance revenues and profits, while Florida's crash rate remained the same (Florida Statistical Abstract [FSA], 2001; FSA, 2006; National Association of Insurance Commissioners, 2004).

Are Any Camera Issues Unique to Florida?

Cameras could create an even larger increase in crashes and injuries in Florida since the state has the highest percent of elderly population in the U.S. The elderly have slower average reaction times and may be less likely to stop abruptly as other drivers do so at camera intersections. Further, the elderly are at greater risk for an injury or fatality when a crash occurs due to anatomic and physiologic changes that occur with aging and from the common use of blood thinners that increase the rate of bleeding. In the lower range of injury severity, the death rate for elderly patients hospitalized from a motor vehicle crash is three times higher (4.6%) than adults under 65 years of age (1.5%) (Pracht, Langland-Orban, Orban & Flint, 2007).

In 2001, Florida led the nation with the most older drivers killed in traffic crashes (268 fatalities), a 70% increase in just 10 years. In addition, Florida had the most traffic fatalities where an older driver was involved in the crash (456 fatalities). Among older drivers, 50% of traffic fatalities occur at intersections, which is more than twice the rate for younger drivers. Improved intersection design is known to reduce errors among older drivers. The Florida Department of Transportation (FDOT) is a leader in designing state roads that accommodate elderly drivers. The state's elder driver program has designed and re-constructed state highways and streets to improve safety for older drivers (TRIP, 2003). In 2006, the FDOT Secretary was asked to allow cameras on state roads. The Secretary responded that more research was needed due to the large increase in rear-end collisions and recommended engineering solutions (Stutler, 2006).

Conclusions and Recommendations

The theory behind red light cameras as potentially effective is that they rely on deterring red light running primarily through punishment of a specific driving behavior and secondarily by changing drivers' experience. By definition, the punishable behavior and resulting potentially harmful action will already have taken place when a ticket is issued. In other words, the crash, injury, and mortality risks do not change immediately, if at all. In contrast, the engineering solutions described above produce immediate reductions in red light running and potential crashes. Thus, even if red light cameras could be effective in the long run, which is debatable, they are associated with an added cost, consisting of fines, crashes and injuries that could have been avoided by using engineering solutions, which are effective in both the short term and the long run.

Because the rigorous and robust studies conclude cameras are associated with increased crashes and costs, any economic analysis of cameras should include these newly generated costs to the public. Indirect costs to the public are usually not considered in the calculation of total revenues and profits generated from red light cameras.

Cities and counties should follow the state's lead and likewise pursue engineering improvements to enhance intersection safety for all drivers and passengers. Proven engineering practices and counter-measures can reduce crashes and injuries due to red light running, as well as other causes of intersection crashes. A public health approach to improved intersection engineering is particularly needed since 26% of Florida's traffic fatalities occur at intersections (with and without traffic signals), in contrast to 18% nationally (NHTSA, 2005). This means that more than 22% of traffic fatalities in Florida occur at intersections for reasons other than red light running, as red light constitutes less than 4% of total traffic fatalities.

Further, red light cameras are an inefficient means to raise revenue for local and state governments and can disadvantage the state's economy. This occurs from the significant amount of funds, paid by local drivers, that ultimately accrues to private in-state and out-of-state special interests from camera use, rather than fully accruing to local and/or state governments.

If cameras are used in Florida, a portion of ticket fines (in essence, royalties) can accrue to the camera

vendors in perpetuity, which are located in other states and countries. Likewise, the increase in crashes and probable injuries would result in automobile insurance rate increases, which could affect all drivers in a community due to the pricing methods used by insurers. A portion of the insurance increase would be returned to certain business interests in the state; for example, in the form of higher insurance agency commissions and payments to automobile repair shops, hospitals, doctors, and rental car companies. However, a portion of the insurance increase would accrue to out-of-state interests, such as automobile parts manufacturers and, more importantly, to out-of-state insurance corporate accounts. Thus, red light cameras result in fines and insurance increases that would transfer disposable income from Florida drivers to private businesses in and out of the state, in addition to local and/or state governments. It is not surprising that out-of-state special interests, such as camera vendors and the Insurance Institute for Highway Safety, advocate for camera use.

Finally, cities, counties, and the state should be very cautious in using traffic safety information from the automobile insurance industry. Insurance financial goals are to increase their revenues and profits, which do not necessarily include reducing traffic crashes, injuries or fatalities. Also, public policy should avoid conflicts of interest that enhance revenues for government and private interests at the risk of public safety.

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