INDIANA 2011 TRAFFIC SAFETY FACTS

DRIVER HISTORY & CRASH OUTCOMES, 2011

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Introduction

Motor vehicle accidents are among the leading causes of death in the United States and the most common cause for people ages 5 to 34 (Centers for Disease Control and Prevention, 2010). Traffic crashes have been researched extensively. Results from these studies have led to measurable reductions in fatalities and serious injuries as we improve our understanding of how seat belt use, alcohol, speeding, and other factors contribute to injuries and deaths. However, unlike epidemiological studies in which patient histories are included as related factors to death itself, crash-induced fatalities and injuries are most often studied as events in isolation of the history of those involved. The behavioral factors of drivers in the crash are rarely (if ever) connected to the behavioral *history* that those drivers have prior to the crash.

This fact sheet links data from the official Indiana crash outcomes repository with data on convictions for traffic offenses among specific drivers involved in traffic crashes. In linking data for drivers rather than on aggregate trends of total convictions, we can understand how the history of driver behavior can predict crash outcomes and the contributing factors to them. Traffic crash data come from the Automated Reporting Information Exchange System (ARIES), an electronic repository for all police-reported crashes in Indiana. Data on traffic offense convictions for drivers involved in police-reported crashes come from the Indiana Bureau of Motor Vehicles (BMV) offense dataset. Driver-linked crashes occurring from 2009 through 2011 are used for this report. A driver is identified as having a "history of traffic offenses" if he or she was convicted for moving violations up to five years prior to the crash date.

About the data

A primary motivation for issuing tickets for traffic violations is to deter problematic and risky driving behavior. The extent to which tickets, license suspensions, and license revocations reduce risky driving (and by extension, the number of crashes caused by those factors) is a critical area for research. However, the driver-linked data are limited to individuals involved in traffic crashes so it is not possible to directly analyze the effectiveness of traffic citations. In other words, these data generally do not tell us whether convictions for offenses such as speeding, or operating while intoxicated (OWI) are effective in reducing crashes. It is not possible to determine which groups of driver are more or less likely to be involved in crashes after receiving traffic convictions. However, considering that the ARIES database contains comprehensive descriptions of collision circumstances, these data can answer questions such as:

- Are repeat-offender drivers more likely to be involved in crashes with serious bodily injury?
- Does severity of prior offenses (felony vs. misdemeanor vs. infraction) correlate with crash severity?
- Are younger drivers in crashes more likely to have a history of traffic convictions than older drivers?
- Of drivers that were alcohol-impaired in crashes, how many had prior convictions for OWI?

Among crash-involved drivers from 2009 to 2011:

- **37% had one or more prior traffic convictions**
- **Drivers ages 21 to 24 years are most likely to have prior convictions**
- **Male drivers are more likely than females to have prior convictions**
- **Drivers with higher estimated income levels are less likely to have prior traffic convictions than those with lower income**
- **Drivers with serious (misdemeanor and felony) prior offenses are more likely to be involved in serious injury crashes than drivers with minor offenses**
- **Over 15% of alcohol-impaired drivers had two or more prior OWI convictions**
- **Drivers with prior convictions for speeding are 29% more likely to have been speeding in the crash than those with no priors**

About the data *(continued)*

Traffic crashes in Indiana involve one or more vehicle drivers, the majority of whom are Indiana residents (89 percent of all involved). For Indiana resident drivers, the personally identifying information (name, birth date, driver license number) were used to match records from the BMV database.[1] Among the approximately 255,000 resident drivers involved in crashes each year, over 99 percent were BMV-matched. For each driver with matching records, traffic convictions for moving violations by specific offense type were compiled up to five years prior to the crash date. Using this timespan, 37 percent of all resident drivers involved in collisions between 2009 and 2011 had at least one traffic conviction prior to the crash and 26 percent had at least one conviction within one year of the crash date (Table 1).

Table 1. Traffic offense history of drivers involved in Indiana crashes, 2009-2011

Driver attributes	2009	2010	2011	'09-'11
Drivers involved, by state of residence:				
Indiana resident drivers	256,406	261,072	254,895	772,373
Drivers from other states	32,568	34,153	33,554	100,275
Total	288,974	295,225	288,449	872,648
% Indiana drivers	89%	88%	88%	89%
Indiana drivers, by availability of traffic offense data:				
Priors data available	253,646	258,250	252,431	764,327
No data available	2,760	2,822	2,464	8,046
Total	256,406	261,072	254,895	772,373
% With priors available	99%	99%	99%	99%
Indiana drivers with priors data available, by traffic offense history:				
With priors in last 5 years	93,453	91,284	99,289	284,026
In last 2 years	83,212	87,055	83,013	253,280
In last year	67,852	70,006	64,564	202,422
% with priors in last 5 years	*37%*	*35%*	*39%*	*37%*
% in last 2 years	*33%*	*34%*	*33%*	*33%*
% in last year	*27%*	*27%*	*26%*	*26%*

Sources: Indiana State Police; Indiana Bureau of Motor Vehicles

[1]The IU Public Policy Institute and Center for Criminal Justice Research are subject to a strict confidentiality policy through Indiana University with respect to conducting research on individual information. All personally identifying data are stored on secured database servers and are used only for matching purposes. No individual information is ever published.

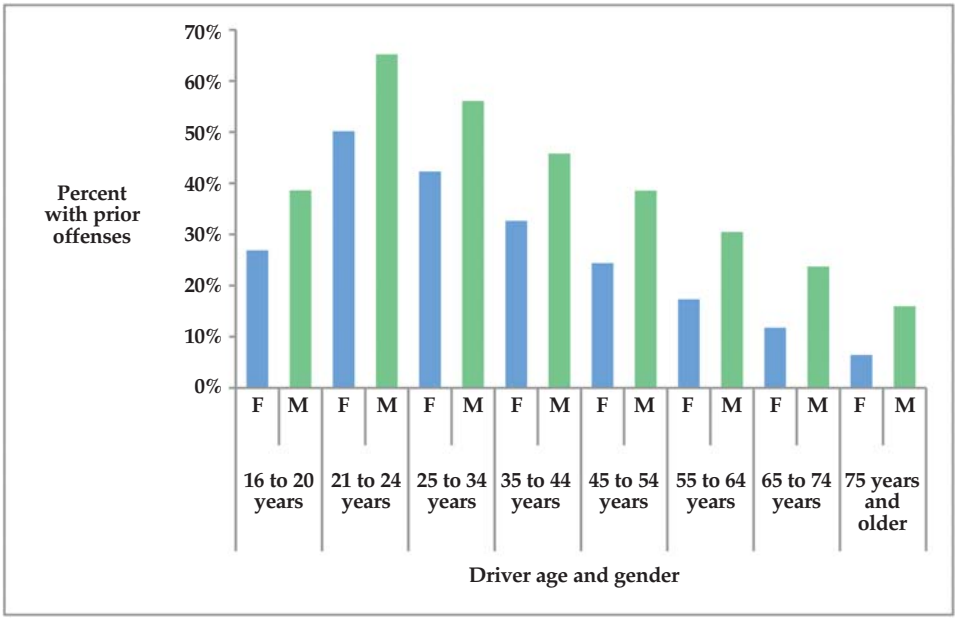
Driver characteristics

Differences in age and gender are significant predictors of various crash outcomes. Crashes that involve older drivers are often the result of driving skills related to cognitive awareness and inadequate perception of the driving environment, whereas younger drivers are often involved due to riskier patterns of behavior such as speeding, alcohol use, and aggressive driving (Elander, West, & French, 1993; Nagle, 2011).

Among Indiana resident drivers involved in crashes, younger drivers and male drivers (young male drivers, especially) are more likely to have had one or more traffic convictions prior to the crash date (Figure 1). Overall, 43 percent of male drivers and 30 percent of female drivers in Indiana crashes had prior convictions. In addition, younger drivers and male drivers are more likely to have had convictions for serious (misdemeanor or felony) offenses than older drivers and female drivers (not shown in figure). Ten percent of male drivers with prior convictions were for serious offenses, compared to seven percent for female drivers. In effect, compared to older drivers and female drivers, younger drivers and male drivers have higher rates of problematic driving history and that driving history is for more serious offenses.

Using estimates of household income at a localized (Census tract) level from the Census Bureau *American Community Survey,* lower income levels are associated with higher chances that a driver involved in a crash had prior traffic convictions (Figure 2). Using the median household income for the driver's home (Census tract) as an estimate of their economic status, 42 percent of drivers living in areas where the median household income is under $30,000 had prior traffic convictions. That rate is 10 percentage points higher than the rate for drivers from areas with median income above $75,000. Additionally, drivers estimated to have lower income levels are also more likely to have committed serious traffic offenses. Eleven percent from areas with income under $30,000 committed serious offenses prior to the crash, compared to seven percent coming from areas with income over $75,000.

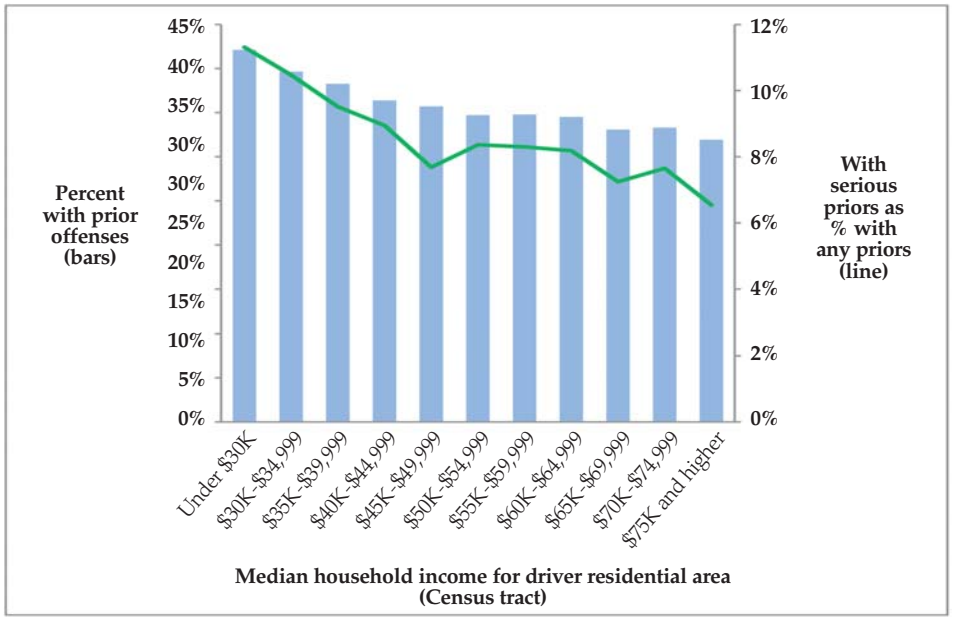
Figure 1. Indiana drivers with prior traffic offenses that were involved in crashes from 2009 to 2011, by age and gender



Sources: Indiana State Police; Indiana Bureau of Motor Vehicles

Note: Includes convictions for traffic offenses that occurred in the five years prior to the crash date.

Figure 2. Indiana drivers with prior traffic offenses that were involved in crashes from 2009 to 2011, by median household income



Sources: Indiana State Police; Indiana Bureau of Motor Vehicles; *American Community Survey,* 2006-10, US Census Bureau

Notes: Includes convictions for traffic offenses that occurred in the five years prior to the crash date; *Serious priors* include misdemeanor and felony offenses.

Crash risks

Drivers with a history of traffic convictions and those with convictions for major offenses are more often involved in serious injury crashes than drivers with no prior convictions (Table 2 and Figure 3). From 2009 through 2011, 43 percent of drivers in fatal crashes had prior convictions, compared to 37 percent for drivers in all crashes generally. Fifteen percent of drivers with prior convictions that were in fatal crashes had convictions for major (misdemeanor or felony) offenses, compared to nine percent for all crash severities. In fact, the likelihood of being involved in a crash with serious injuries is directly related to convictions for prior offenses. For those drivers with no traffic convictions in the five years prior to the crash, 1.7 percent were in crashes with serious bodily injury. For drivers with prior convictions, 2.2 percent were involved in serious bodily injury crashes. For drivers with felony convictions, the chances of being involved in serious injury crashes increases to 4.9 percent, or about one in every 20 drivers.

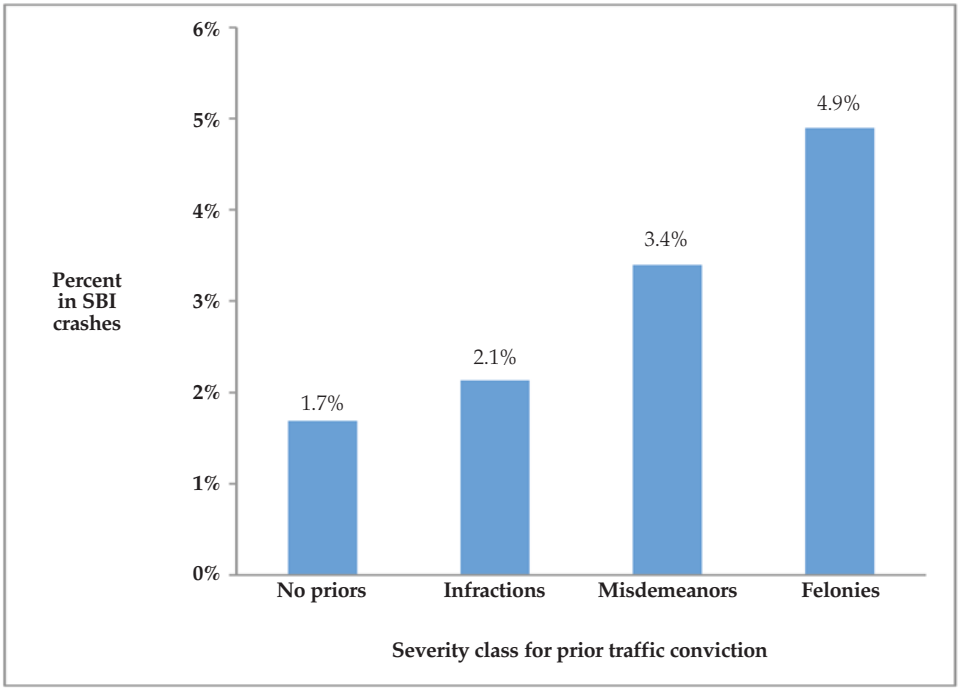
Table 2. Indiana drivers with prior traffic offenses that were involved in crashes from 2009 to 2011, by crash severity

Crash severity/driver history	2009	2010	2011	Total
Drivers in fatal crashes	823	930	827	2,580
With any priors	349	380	381	1,110
With serious (misdemeanor or felony) priors	60	44	66	170
% with any priors	*42%*	*41%*	*46%*	*43%*
Serious priors as % with any	*17%*	*12%*	*17%*	*15%*
Drivers in serious bodily injury crashes	4,569	4,870	4,794	14,233
With any priors	1,984	1,979	2,152	6,115
With serious (misdemeanor or felony) priors	286	253	324	863
% with any priors	*43%*	*41%*	*45%*	*43%*
Serious priors as % with any	*14%*	*13%*	*15%*	*14%*
Drivers in all crashes	253,646	258,250	252,431	764,327
With any priors	93,453	91,284	99,289	284,026
With serious (misdemeanor or felony) priors	8,586	7,599	8,952	25,137
% with any priors	*37%*	*35%*	*39%*	*37%*
Serious priors as % with any	*9%*	*8%*	*9%*	*9%*

Sources: Indiana State Police; Indiana Bureau of Motor Vehicles

Note: *Serious bodily injury* includes both *fatal* and *incapacitating* injuries as recorded on the Indiana crash report.

Figure 3. Indiana drivers in crashes occurring from 2009 to 2011 with serious bodily injury (SBI), by severity of prior offenses



Sources: Indiana State Police; Indiana Bureau of Motor Vehicles

Recidivism for specific driving behaviors

Crash outcomes can be associated with selected repeat-offending behaviors. Drinking and driving is one such example. Table 3 shows the number of injuries in alcohol-impaired crashes (i.e., crashes involving a driver with blood alcohol content result at or above 0.08 g/dL) and by involvement of drivers with a history of OWI convictions. From 2009 to 2011, among all fatalities in alcohol-impaired crashes, eight percent occurred when the impaired driver had one or more prior OWI convictions. In total, 12 percent of all injuries in alcohol-impaired crashes occurred when the impaired driver had prior OWI convictions.

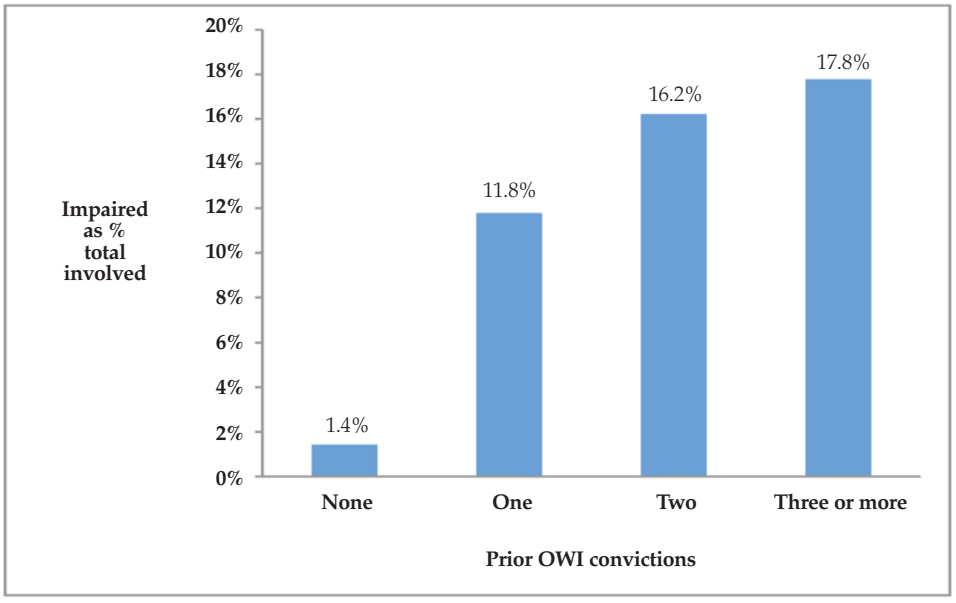
Among those crash-involved, are drivers with a history of drinking-and-driving more likely to have been impaired in the crash? From 2009 to 2011, only 1.4 percent of drivers with no prior OWI convictions were impaired in the crash (Figure 4). For drivers with one or more OWI convictions 12 percent were impaired in the crash. In other words, during the 2009 to 2011 time period, drivers with a history of OWIs were 8.4 times more likely to have been impaired in the crash compared to those with no priors. For drivers with three or more prior OWIs, nearly 18 percent were impaired in the crash, suggesting a considerable level of recidivism.

Table 3. Injuries in crashes involving an alcohol-impaired driver, by prior OWI convictions, 2009-2011

Injury status	2009	2010	2011	Total
Injuries in crashes involving an impaired driver				
Fatalities	126	135	140	401
Incapacitating injuries	153	264	225	642
Non-incapacitating injuries	1,496	1,819	1,751	5,066
Total	1,775	2,218	2,116	6,109
Injuries in crashes where impaired driver was an Indiana resident				
Fatalities	118	115	115	348
Incapacitating injuries	135	220	195	550
Non-incapacitating injuries	1,284	1,542	1,526	4,352
Total	1,537	1,877	1,836	5,250
Injuries in crashes where Indiana impaired driver had prior OWI convictions				
Fatalities	7	9	12	28
Incapacitating injuries	11	22	18	51
Non-incapacitating injuries	149	192	208	549
Total	167	223	238	628
Percent with prior OWI convictions				
Fatalities	5.9%	7.8%	10.4%	8.0%
Incapacitating injuries	8.1%	10.0%	9.2%	9.3%
Non-incapacitating injuries	11.6%	12.5%	13.6%	12.6%
Total	10.9%	11.9%	13.0%	12.0%

Sources: Indiana State Police; Indiana Bureau of Motor Vehicles

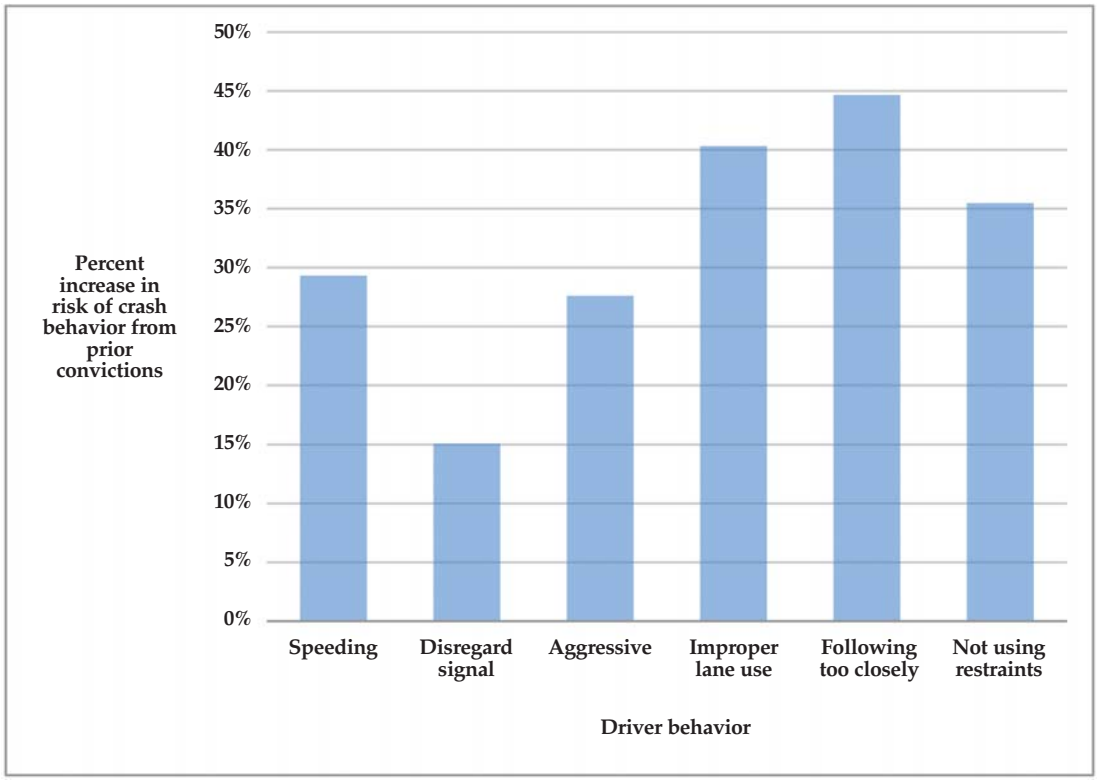
Figure 4. Percent of Indiana drivers in crashes that were alcohol-impaired, by prior OWI convictions, 2009-2011



Sources: Indiana State Police; Indiana Bureau of Motor Vehicles

Similar increases in risk are found for other problematic driving behaviors, although the magnitude increase is smaller than that for alcohol-impaired driving (Figure 5). Among the crash-involved, the chances of a driver speeding in the crash increase by 29 percent when that driver has one or more prior convictions for speeding. The increase in risk is even more pronounced for violations such as *improper lane usage, following too closely,* and for not using proper restraints. The chances of a driver following too closely in the crash increase by 45 percent when that driver has a history of *following too closely* convictions compared to drivers who had no history of traffic convictions for that violation

Figure 4. Increase in risk of drivers contributing to crash for problematic behaviors, based on prior convictions for those behaviors, 2009-2011



Sources: Indiana State Police; Indiana Bureau of Motor Vehicles

Note: "Increase in crash risk" is derived by comparing the probability of contributing to the crash for specific driving behaviors between drivers with a history of convictions for those behaviors and drivers with no prior history. For example, 7% of drivers that had prior speeding convictions were speeding in the crash. For drivers with no prior speeding convictions, 5.4% sped in the crash. The ratio of these probabilities (7% / 5.4%) = 1.30, indicating that drivers with a history of speeding convictions are 30% ((1.3 - 1)*100) more likely to have been speeding in the crash than drivers with no history.

Summary and directions for future research

This unique dataset that combines crash data with offense history for drivers involved provides insight into risks of injury associated with repeat-offender drivers. Generally, the data suggest that drivers with a recent history of problematic behavior are involved in more serious crashes than those without. The presence of a driver with a history of traffic convictions is not necessarily a direct causal factor in incapacitating or fatal injuries. Some of these drivers have convictions for minor moving violations, restraint use violations, or for failing to provide proof of financial responsibility (i.e., insurance). Fewer drivers have a record of more serious convictions, such as speeding, operating a vehicle while intoxicated (OWI), and reckless driving. The relationship between the circumstances of the crash and the history of drivers involved is an important one, but it does not necessarily imply a causal relationship. However, recidivism for particularly problematic behaviors such as alcohol-impaired driving, speeding, and aggressive driving present challenges for law enforcement.

It is important to recognize that there are confounding factors that may bias conclusions. For instance, exposure-to-enforcement might suggest that younger drivers are more likely to recidivate problematic driving behavior in crashes, when in fact interactions with law enforcement are more likely to occur than for older drivers, due to when and where young people drive and from specific enforcement initiatives. In addition, not all traffic violations are enforced in equal measure; some violations such as speeding and seat belt use are policy priorities and are more visible for detection.

While there are limitations to the data, future research should leverage its capabilities to better understand what types of enforcement are most effective in deterring problematic driving actions. Law enforcement uses various methods of deterring undesirable driving behaviors, including criminal, civil, and administrative legal sanctions. In the case of repeat offenders, the BMV uses a points-based system to impose license suspensions, revocations, and safety education programs as a means of deterring problematic driver behavior. The data analyzed in this fact sheet can also be used to better understand the effectiveness of license suspension mechanisms in place and how alternative remediation and intervention strategies might improve road safety.

References

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This publication was prepared on behalf of the Indiana Criminal Justice Institute (ICJI) by the Indiana University Center for Criminal Justice Research (CCJR). Please direct any questions concerning data in this document to ICJI at 317-232-1233.

This publication is one of a series of fact sheets that, along with the annual Indiana Crash Fact Book, form the analytical foundation of traffic safety program planning and design in the state of Indiana. Funding for these publications is provided by the ICJI and the National Highway Traffic Safety Administration.

An electronic copy of this document can be accessed via the CCJR website (www.ccjr.iupui.edu), the ICJI website (www.in.gov/cji/), or you may contact the Center for Criminal Justice Research at 317-261-3000.

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Traffic Safety Project

A collision produces three levels of data: collision, unit (vehicles), and individual. For this reason, readers should pay particular attention to the wording of statements about the data to avoid misinterpretations.

Designing and implementing effective traffic safety policies requires data-driven analysis of traffic collisions. To help in the policy-making process, the Indiana University Center for Criminal Justice Research is collaborating with the Indiana Criminal Justice Institute to analyze 2011 vehicle crash data from the Automated Reporting Information Exchange System (ARIES), maintained by the Indiana State Police. This marks the sixth year of this partnership. Research findings will be summarized in a series of fact sheets on various aspects of traffic collisions, including alcohol-related crashes, light and large trucks, dangerous driving, children, motorcycles, occupant protection, and drivers. An additional publication will provide information on county and municipality data and the final publication will be the annual Indiana Crash Fact Book. These publications serve as the analytical foundation of traffic safety program planning and design in Indiana.

Indiana collision data are obtained from Indiana Crash Reports, as completed by law enforcement officers. As of December 31, 2011, approximately 99 percent of all collisions are entered electronically through ARIES. Trends in collisions incidence as reported in these publications could incorporate the effects of changes to data elements on the Crash Report, agency-specific enforcement policy changes, re-engineered roadways, driver safety education programs, and other unspecified effects. If you have questions regarding trends or unexpected results, please contact the Indiana Criminal Justice Institute, Traffic Safety Division for more information.

The Indiana Criminal Justice Institute

Guided by a Board of Trustees representing all components of Indiana's criminal and juvenile justice systems, the Indiana Criminal Justice Institute serves as the state's planning agency for criminal justice, juvenile justice, traffic safety, and victim services. ICJI develops long-range strategies for the effective administration of Indiana's criminal and juvenile justice systems and administers federal and state funds to carry out these strategies.

The Governor's Council on Impaired & Dangerous Driving

The Governor's Council on Impaired & Dangerous Driving, a division of the Indiana Criminal Justice Institute, serves as the public opinion catalyst and the implementing body for statewide action to reduce death and injury on Indiana roadways. The Council provides grant funding, training, coordination, and ongoing support to state and local traffic safety advocates.

Indiana University Public Policy Institute

The Indiana University (IU) Public Policy Institute is a collaborative, multidisciplinary research institute within the Indiana University School of Public and Environmental Affairs (SPEA), Indianapolis. The Institute serves as an umbrella organization for research centers affiliated with SPEA, including the Center for Urban Policy and the Environment and the Center for Criminal Justice Research. The Institute also supports the Indiana Advisory Commission on Intergovernmental Relations (IACIR).

The Center for Criminal Justice Research

The Center for Criminal Justice Research, one of two applied research centers currently affiliated with the Indiana University Public Policy Institute, works with public safety agencies and social services organizations to provide impartial applied research on criminal justice and public safety issues. CCJR provides analysis, evaluation, and assistance to criminal justice agencies; and community information and education on public safety questions. CCJR research topics include traffic safety, crime prevention, criminal justice systems, drugs and alcohol, policing, violence and victimization, and youth.

The National Highway Traffic Safety Administration (NHTSA)

NHTSA provides leadership to the motor vehicle and highway safety community through the development of innovative approaches to reducing motor vehicle crashes and injuries. The mission of NHTSA is to save lives, prevent injuries and reduce economic costs due to road traffic crashes, through education, research, safety standards and enforcement activity.

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