

**IMPAIRED DRIVING AMONG MOTORCYCLISTS
INVOLVED IN CRASHES IN
NEW YORK STATE**

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The Institute for Traffic Safety Management and Research
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INTRODUCTION

Because of the vulnerability of motorcyclists who share the road with much larger vehicles, motorcycle safety has long been a priority of New York’s highway safety program. Reinforcing the need for continued efforts to reduce crashes, fatalities and injuries among these roadway users is the increasing popularity of motorcycles that is reflected in upward trends in both motorcycle licenses and registrations over the last decade. Since 2001, the number of drivers with motorcycle licenses has increased by 22%, reaching over 666,000 in 2010, while the number of registered motorcycles has increased by 54% to over 340,000. These increases in motorcycle licenses and registrations have been accompanied by increases in the proportions of fatal crashes and personal injury crashes on New York roadways that involve motorcycles.

As shown in Table 1, between 2001 and 2010, the involvement of motorcycles in fatal crashes in New York State increased from 10% to over 16%. While the number of motorcycle crashes that involve personal injuries has been somewhat more consistent over the years, ranging between 3,700 and 4,500, the proportion of PI crashes that involve motorcycles has also been on an upward trend, increasing by more than 50% between 2001 and 2010 (2.4% vs. 3.7%). While New York has experienced improvements in many areas of traffic safety in recent years, similar progress has not been achieved in motorcycle safety largely due to the increased popularity of motorcycles as a mode of transportation and source of recreation.

TABLE 1
**Total Police-Reported Fatal and Personal Injury Crashes and
Motorcycle Crashes in New York State**

	Total Fatal Crashes	Fatal MC Crashes	% of Total	Total Personal Injury Crashes	Personal Injury MC Crashes	% of Total	Total F & PI MC Crashes	% of Total
2001	1,431	145	10.1%	172,174	4,190	2.4%	4,335	2.5%
2002	1,390	141	10.1%	157,477	3,803	2.4%	3,944	2.5%
2003	1,351	151	11.2%	140,936	3,788	2.7%	3,939	2.8%
2004	1,369	144	10.5%	131,945	3,958	3.0%	4,102	3.1%
2005	1,308	168	12.8%	127,273	4,314	3.4%	4,482	3.5%
2006	1,330	190	14.3%	122,881	4,094	3.3%	4,284	3.4%
2007	1,220	164	13.4%	124,812	4,515	3.6%	4,679	3.7%
2008	1,160	184	15.9%	121,413	4,380	3.6%	4,564	3.7%
2009	1,060	152	14.3%	120,359	4,111	3.4%	4,263	3.5%
2010	1,119	180	16.1%	121,062	4,498	3.7%	4,678	3.8%

Source: NYS Accident Information System (AIS)

Note: Data on property damage only motorcycle crashes are not included in this study because of changes in the collecting and reporting of data on these crashes over the past decade which resulted in wide variations in the data from year to year.

Since motorcyclists are especially vulnerable to serious or fatal injury when a crash occurs, any factors that contribute to the risk of crash involvement are of great concern. Alcohol is one factor that has been demonstrated to substantially heighten this risk. Research conducted by the National Highway Traffic Safety Administration (NHTSA) has shown that alcohol impairs critical elements of the motorcycle riding task (Creaser et al, 2007). Reaction time to hazards and the ability to position the motorcycle appropriately when stopping or maneuvering were affected even at a low blood alcohol concentration (BAC at 0.08 or less).

To address concerns raised by the increase in fatal motorcycle crashes in recent years and studies that have indicated that impaired driving may be a serious problem among motorcyclists, the NYS Governor's Traffic Safety Committee (GTSC) funded the Institute for Traffic Safety Management and Research (ITSMR) to conduct a study on motorcyclists and impaired driving. This document reports on the findings of this research which should be useful to the alcohol and highway safety community, in particular the GTSC, the NYS Advisory Council on Impaired Driving, DMV and DMV's Advisory Group on Motorcycle Safety, in the development of countermeasures that address the problem of impaired driving among motorcyclists in New York State.

RESEARCH METHODOLOGY

The primary objectives of the study were to determine the extent to which crashes on New York's roadways involve impaired motorcycle operators and identify the key characteristics of these impaired operators. Based on these objectives, the study addressed the following key research questions:

- What proportions of fatal and personal injury (F&PI) motorcycle crashes are alcohol-related? Have the proportions changed over the past five years? Are there identifiable differences in the proportions of F&PI motorcycle crashes that are alcohol-related by the level of crash severity (fatal and personal injury)?
- What are the characteristics (i.e., single vehicle, region of the state, month, time and day of week) associated with alcohol-related F&PI motorcycle crashes? Are there identifiable differences in these characteristics between alcohol-related and non-alcohol-related F&PI motorcycle crashes?
- What are the characteristics (i.e., age, gender, and helmet use) associated with the impaired motorcyclist? Have the characteristics of impaired motorcyclists changed over the past five years? Are there identifiable differences in age, gender and helmet use between impaired and non-impaired motorcyclists?
- In addition to alcohol, what other contributing factors are associated with motorcycle operators involved in F&PI crashes?

Data and Data Sources

The primary data source for the study was the NYS Department of Motor Vehicles (DMV) Accident Information System (AIS). With few exceptions, the AIS file contains a record of all police-reported crashes and a record of all crashes reported to the DMV by motorists involved in crashes. To address the research questions noted above, especially with respect to changes over time, the study focused on the five-year period, 2006-2010. Hence, data on all police-reported F&PI motorcycle crashes occurring during this five-year period were extracted from the AIS and analyzed.

Data Analyses

The study involved analyses of police-reported F&PI motorcycle crashes that occurred during the five years, 2006-2010. Two sets of analyses were conducted to answer the research questions. The initial set of analyses was conducted to 1) determine what proportion of motorcycle crashes are alcohol-related, 2) examine changes in this proportion over the five years, and 3) explore differences in the proportion of alcohol-related crashes by the severity of the crash (fatal and personal injury). The initial set of analyses also sought to examine specific characteristics related to alcohol-related F&PI motorcycle crashes, including single vehicle involvement, crash location (i.e., region of the state), month, day of week and time of day. Analyses were also conducted to examine differences between alcohol-related and non-alcohol-related motorcycle crashes.

The second set of analyses was designed to examine the characteristics of impaired motorcycle operators involved in crashes. These analyses examined the age, gender and helmet use of the impaired motorcycle operator at the time of the crash. Also examined were other factors associated with the impaired motorcycle operator that contributed to the crash, such as speeding and driver distraction. The analyses also sought to identify changes over time with respect to these variables. In addition, analyses were conducted to examine differences between impaired motorcycle operators and non-impaired motorcycle operators, as appropriate.

All of the data analyses were conducted by ITSMR project staff with the use of SAS software. The results of the analyses are presented below.

RESULTS OF ANALYSES

Fatal and Personal Injury (F & PI) Motorcycle Crashes

To answer the research questions noted above, various analyses of the data on F&PI motorcycle crashes were conducted for the five year period, 2006-2010. New York State defines an alcohol-related motor vehicle crash as one in which at least one of the following three factors is present: 1) "alcohol involvement" was noted as a contributing factor on the police crash report form, 2) a ticket for impaired driving was issued to one or more drivers involved in the crash or 3) a BAC was reported for the impaired driver, pedestrian or bicyclist involved. Based on this definition, the proportion of fatal motorcycle crashes in New York State involving alcohol has risen from 23% in 2006 to 32% in 2010 (Table 2). A different pattern is noted for personal injury crashes, with the proportion of alcohol-related crashes remaining constant in each of the five years at the much lower level of two to three percent.

TABLE 2
Fatal & Personal Injury Motorcycle Crashes

	2006	2007	2008	2009	2010	2006-10
Total F&PI Motorcycle Crashes	4,284	4,679	4,564	4,263	4,678	22,468
Non-Alcohol-Related	4,145	4,499	4,395	4,116	4,501	21,656
Alcohol-Related (A-R)	139	180	169	147	177	812
A-R Fatal Crashes	43	46	45	40	57	231
% of all fatal MC crashes	22.6%	28.0%	24.5%	26.3%	31.7%	26.6%
A-R Injury Crashes	96	134	124	107	120	581
% of all injury MC crashes	2.2%	2.8%	2.7%	2.5%	2.7%	2.7%

Source: NYS Accident Information System (AIS)

Characteristics of Alcohol-Related and Non-Alcohol-Related F & PI Motorcycle Crashes

A series of analyses were conducted to examine various characteristics associated with alcohol-related and non-alcohol-related F&PI motorcycle crashes. The variables examined included: single vehicle involvement, crash location (i.e., region of the state), month, day of week and time of day. Analyses of the data for these variables for each of the five years, 2006-2010, showed little variation among the years. Therefore, the data for these variables were aggregated for the five years and the results from the analyses are presented below.

Single Vehicle Crashes

As indicated in Table 3, over the five years 2006-2010, the proportions of fatal motorcycle crashes and personal injury motorcycle crashes that involved just the motorcycle (i.e., single vehicle and no pedestrian or bicyclist involvement) were similar, 40% and 43%, respectively. However, single vehicle fatal crashes were much more likely than single vehicle personal injury crashes to be alcohol-related (40% vs. 5%).

TABLE 3
Single Vehicle F & PI Motorcycle Crashes
Alcohol-Related vs. Non-Alcohol Related Crashes
2006 - 2010

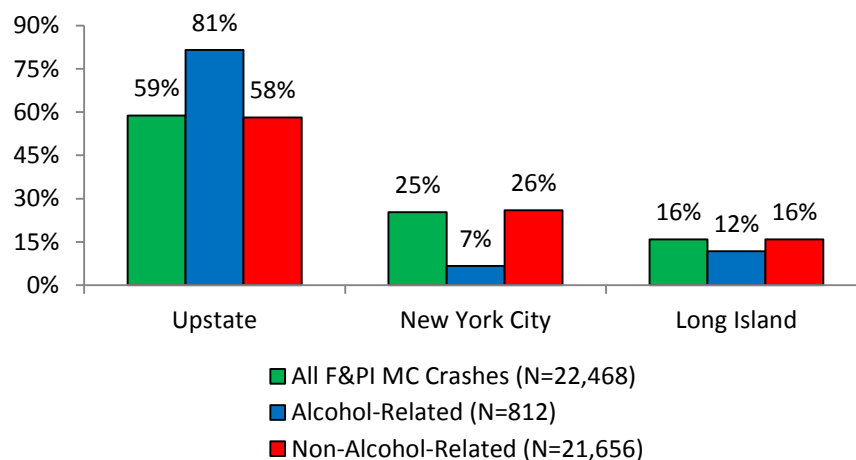
	Single Vehicle Crashes	Alcohol-Related	Non-Alcohol Related
Fatal Motorcycle Crashes	350	140	210
% of total fatal crashes (N=870)	40.2%	40.0%	60.0%
Personal Injury Motorcycle Crashes	9,301	437	8,864
% of total PI crashes (N=21,598)	43.1%	4.7%	95.3%

Source: NYS Accident Information System (AIS)

Region of the State

Analyses were also conducted to examine the distribution of alcohol-related and non-alcohol-related F&PI motorcycle crashes by area of the state. In analyzing crash data by area of the state, the state is typically divided into three regions: Upstate, Long Island and New York City. The Upstate region consists of the 55 counties north of New York City, the Long Island region includes the two counties of Nassau and Suffolk and the New York City region is comprised of five counties (Bronx, Kings, New York, Queens and Richmond). As Figure 1 shows, while 59% of all F&PI motorcycle crashes occurred in the Upstate region, a much larger proportion (81%) of the alcohol-related F&PI motorcycle crashes occurred Upstate. In comparison, only 7% of the alcohol-related crashes occurred in New York City and 12% on Long Island where 25% and 16% of the total F&PI crashes occurred, respectively.

FIGURE 1
F & PI Motorcycle Crashes by Region of the State
Alcohol-Related vs. Non-Alcohol-Related



Source: NYS Accident Information System (AIS)

Month, Day of Week and Time of Day

Additional analyses were undertaken by month of year, day of week and time of day to determine when alcohol-related motorcycle crashes are most likely to occur. As would be expected in New York State due to weather conditions, the motorcycle riding season extends primarily from May through September. Table 4 shows that approximately three-quarters of the F&PI motorcycle crashes in the years 2006-2010 occurred during this five-month period. The largest proportion of alcohol-related F&PI motorcycle crashes occurred in August (20%), followed by July (17%) and June (16%). Table 4 further shows that alcohol-related F&PI motorcycle crashes are more likely than non-alcohol-related crashes to occur during the two-month period of July and August (37% vs. 32%).

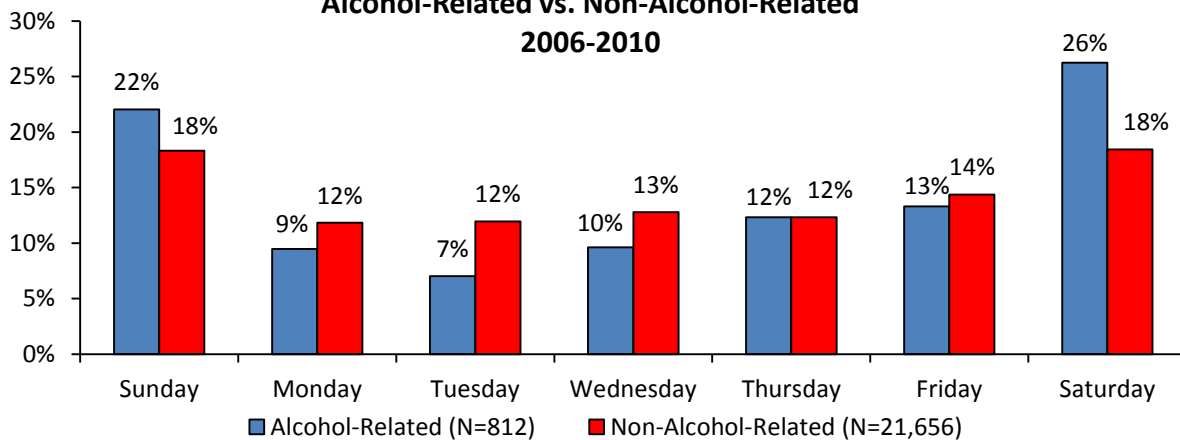
TABLE 4
F & PI Motorcycle Crashes by Month
Alcohol-Related vs. Non-Alcohol Related
2006 – 2010

	Alcohol-Related (N=812)	Non-Alcohol-Related (N=21,656)
January	0.5%	1.1%
February	0.4%	0.8%
March	2.2%	3.3%
April	9.6%	8.8%
May	12.4%	13.2%
June	15.8%	15.4%
July	17.1%	16.0%
August	19.8%	16.0%
September	10.7%	13.1%
October	8.1%	7.8%
November	2.8%	3.4%
December	0.5%	1.1%

Source: NYS Accident Information System (AIS)

As shown in Figure 2, alcohol-related F&PI motorcycle crashes were more likely to occur on weekends than non-alcohol-related F&PI motorcycle crashes (48% vs. 36%, respectively).

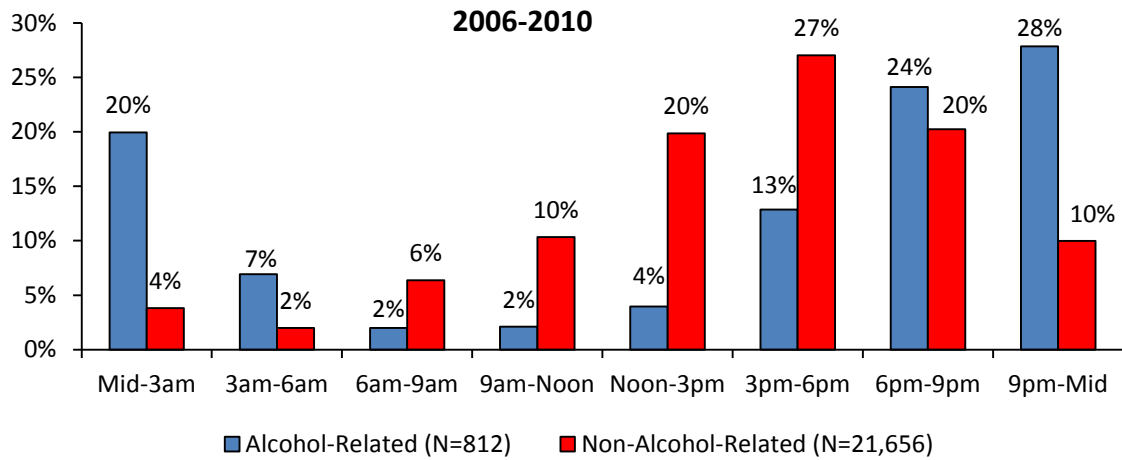
FIGURE 2
F & PI Motorcycle Crashes by Day of Week
Alcohol-Related vs. Non-Alcohol-Related
2006-2010



Source: NYS Accident Information System (AIS)

With regard to time of day, Figure 3 shows that alcohol-related F&PI motorcycle crashes were much more likely than non-alcohol-related crashes to occur between 9pm and 3am (48% vs. 14%, respectively).

FIGURE 3
F & PI Motorcycle Crashes by Time of Day
Alcohol-Related vs. Non-Alcohol-Related



Source: NYS Accident Information System (AIS)

Impaired Motorcycle Operators

The second set of analyses was designed to examine the characteristics of impaired motorcycle operators involved in crashes. These analyses examined the age, gender and helmet use of the impaired motorcycle operator at the time of the crash. Also examined were other factors associated with the impaired motorcycle operator that contributed to the crash, such as speeding and driver distraction. In addition, analyses sought to identify changes over time with respect to these variables and to examine differences between impaired motorcycle operators and non-impaired motorcycle operators, where appropriate.

The frequency of the involvement of impaired motorcycle operators in F&PI motorcycle crashes is small relative to the number of non-impaired motorcyclists in F&PI crashes. While 3% of the motorcycle operators involved in personal injury crashes each year, 2006-2010, were impaired, the proportion of operators impaired in fatal crashes has been on an upward trend, reaching the alarmingly high rate of 31% in 2010 (Table 5).

TABLE 5
Impaired and Unimpaired Motorcycle Operators Involved in F & PI Crashes

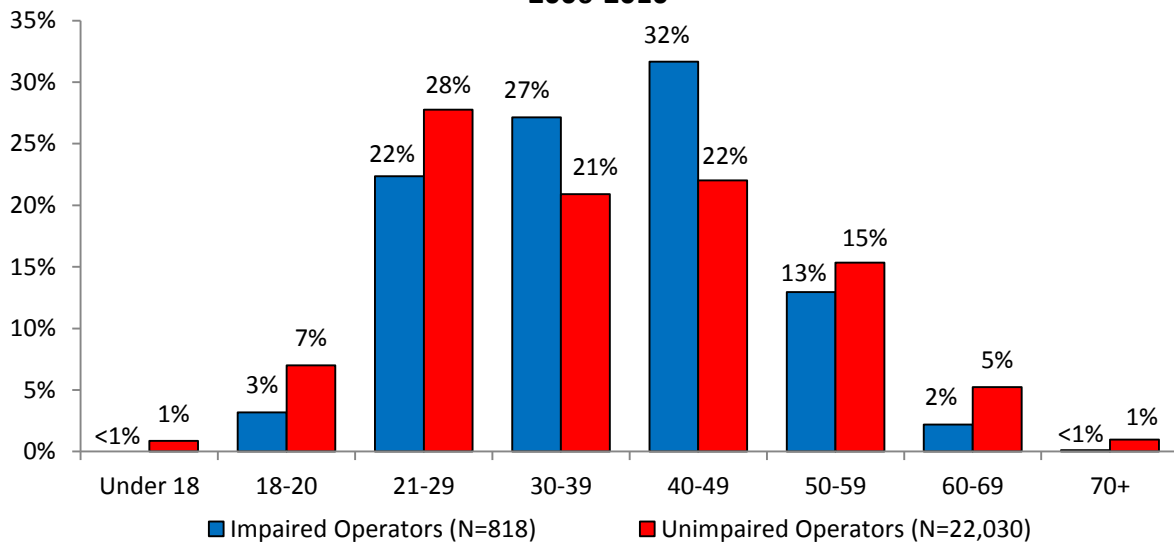
	2006	2007	2008	2009	2010	2006-10
Fatal MC Crashes						
# MC Operators	205	175	190	157	187	914
# Impaired MC Operators	43	47	45	40	57	232
% of Fatal MC Operators	21.0%	26.9%	23.7%	25.5%	30.5%	25.4%
Personal Injury MC Crashes						
# MC Operators	4,135	4,580	4,466	4,180	4,573	21,934
# Impaired MC Operators	98	134	126	107	121	586
% of PI MC Operators	2.4%	2.9%	2.8%	2.6%	2.7%	2.7%

Characteristics of Impaired and Unimpaired Motorcycle Operators Involved in F&PI Crashes

Age

Since the analyses by the age of motorcycle operators involved in F&PI crashes showed only small variations from year to year and the analyses by gender produced almost identical results for each year, the data were aggregated for the five years 2006-2010. The results are presented in Figures 4 and 5. With regard to age, Figure 4 shows that 59% of the impaired motorcycle operators were ages 30-49, compared to 43% of the unimpaired operators. The largest proportion of impaired operators were in the 40-49 age group (32%), while the largest proportion of unimpaired operators were in the 21-29 age group (28%).

FIGURE 4
Impaired and Unimpaired Motorcyclists in F & PI Crashes By Age
2006-2010

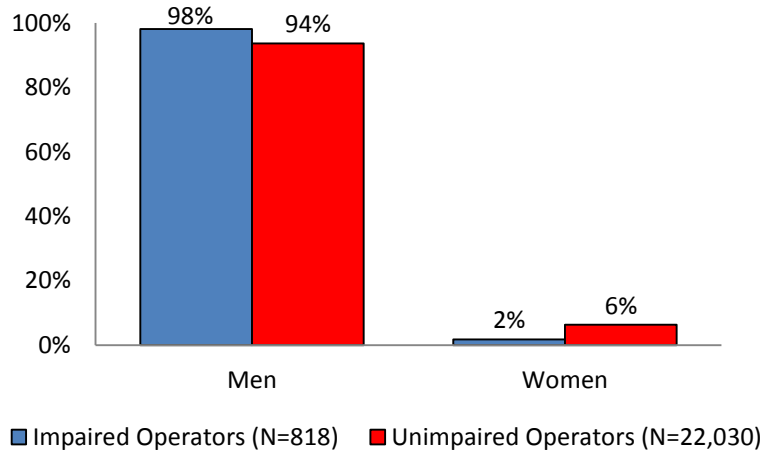


Source: NYS Accident Information System (AIS)

Gender

While almost all motorcycle operators involved in F&PI crashes were men, impaired operators were somewhat more likely than unimpaired operators to be men (98% vs. 94%, respectively) (Figure 5).

FIGURE 5
Impaired and Unimpaired Motorcyclists in F & PI Crashes
By Gender
2006-2010

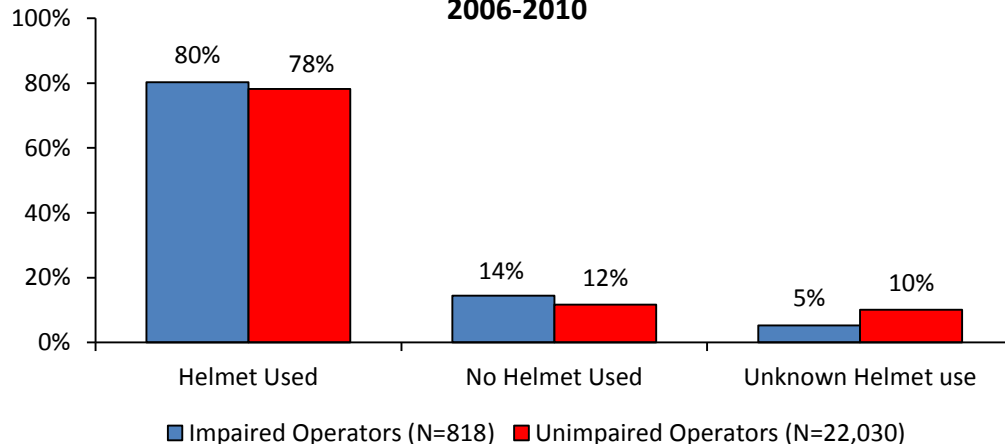


Source: NYS Accident Information System (AIS)

Helmet Use

In New York State, motorcyclists are required to use a helmet when riding. While a statewide observational survey of helmet use conducted by the Institute for Traffic Safety and Management in June 2008 found that almost all the riders (99%) observed were using a helmet, helmet use among motorcyclists involved in crashes is somewhat lower. Similar to the analyses by the age and gender of the operator, the analyses by helmet use showed that only small variations occurred from year to year. Therefore, the data were aggregated for the five years 2006-2010. As shown in Figure 6, eight out of ten of both the impaired and unimpaired operators involved in F&PI crashes were wearing a helmet (80% and 78%, respectively).

FIGURE 6
Impaired and Unimpaired Motorcycle Operators in F&PI crashes
by Helmet Use
2006-2010



Source: NYS Accident Information System (AIS)

Contributing Factors

Analyses were conducted to determine the extent to which other contributing factors were associated with the impaired motorcycle operators involved in F&PI crashes. Analyses were also conducted to identify differences between the contributing factors associated with impaired and unimpaired operators in F&PI crashes. The results of these analyses are summarized in Tables 6 and 7.

As shown in Table 6, the impaired motorcycle operators involved in F&PI crashes over the five years, 2006-2010, were three times as likely as the unimpaired operators to have unsafe speed reported as a contributing factor (44% vs. 15%). The table also shows that impaired motorcycle operators were more likely than unimpaired operators to have contributing factors related to passing/improper lane usage/unsafe lane changing (11% vs. 7%) and failure to keep right (6% vs. 2%) reported. In contrast, unimpaired motorcycle operators were more likely than impaired operators to have driver inexperience (9% vs. 5%) and following too closely (5% v 2%) reported as contributing factors.

TABLE 6
Selected Contributing Factors Reported
for Impaired and Unimpaired
Motorcycle Operators in F & PI Crashes
2006-2010

Contributing Factors	Operators in F & PI Crashes	
	Impaired (N=818)	Unimpaired (N=22,030)
Unsafe speed	43.9%	15.1%
Passing/improper lane usage/unsafe lane changing	11.3%	6.6%
Driver inattention/distraction	8.0%	7.2%
Failure to keep right	5.8%	1.6%
Driver inexperience	4.7%	8.6%
Following too closely	2.4%	5.4%

Source: NYS Accident Information System (AIS)

Table 7 presents the results of analyses conducted to examine differences in contributing factors between impaired and unimpaired motorcycle operators by the severity of the crash (fatal vs. personal injury). As indicated in Table 7, unsafe speed is reported even more often as a factor for both impaired and unimpaired motorcycle operators in fatal crashes, compared to personal injury crashes. Unsafe speed was attributed to more than half (51%) of the impaired motorcyclists and more than one-third (37%) of the unimpaired operators involved in fatal crashes, compared to 41% and 14%, respectively, of the operators involved in personal injury crashes.

TABLE 7
Selected Contributing Factors Reported for Impaired and Unimpaired
Motorcycle Operators
Fatal vs. Personal Injury Crashes
2006-2010

Contributing Factors	Operators in Fatal Motorcycle Crashes		Operators in Personal Injury Motorcycle Crashes	
	Impaired (N=232)	Unimpaired (N=682)	Impaired (N=586)	Unimpaired (N=21,348)
Unsafe speed	50.9%	37.4%	41.1%	14.4%
Passing/improper lane usage/unsafe lane changing	13.8%	10.3%	10.2%	6.5%
Driver inexperience	6.9%	9.5%	3.8%	8.5%
Driver inattention/distraction	5.2%	5.6%	2.6%	7.3%
Failure to keep right	4.7%	5.9%	6.1%	1.4%
Following too closely	1.3%	2.2%	2.9%	5.5%

Source: NYS Accident Information System (AIS)

SUMMARY

Although New York has seen improvements in many areas of traffic safety, similar progress has not been achieved in motorcycle safety. With the steady expansion of the motorcyclist population and the number of registered motorcycles over the past decade has come an increase in the role of motorcycles in the fatal and personal injury crashes that occur on New York's roadways. Because motorcyclists are more vulnerable to sustaining serious or fatal injuries in a crash and the risk of crash involvement is greatly heightened by driver impairment, this study focused on impaired motorcycle operators and the extent to which fatal and personal injury motorcycle crashes are alcohol-related. The key findings of the study are summarized below.

Alcohol-Related F & PI Motorcycle Crashes

- ❖ 4% of the combined total F&PI motorcycle crashes in 2006-2010 were alcohol-related.
- ❖ The role of alcohol in fatal motorcycle crashes is increasing; 32% of the fatal motorcycle crashes in 2010 were alcohol-related, up from 23% in 2006.
- ❖ The role of alcohol in personal injury motorcycle crashes has remained consistent; 3% of personal injury motorcycle crashes in 2006-2010 were alcohol-related.
- ❖ 40% of single vehicle fatal motorcycle crashes are alcohol-related compared to 5% of single vehicle personal injury crashes.
- ❖ Alcohol-related F&PI motorcycle crashes are much more likely to occur in the Upstate region (81% of alcohol-related vs. 59% of all F&PI crashes).

- ❖ New York City and Long Island are underrepresented in alcohol-related F&PI crashes (7% vs. 25% of total crashes and 12% vs. 16% of total crashes, respectively).
- ❖ 37% of alcohol-related crashes occur in July & August, compared to 32% of non alcohol-related crashes.
- ❖ 48% occur on weekends (Saturday & Sunday), compared to 36% of non alcohol-related crashes.
- ❖ 48% occur between 9pm and 3am, compared to 14% of non alcohol-related crashes.

Impaired Motorcycle Operators Involved in F&PI Crashes

- ❖ 31% of the motorcycle operators involved in fatal crashes in 2010 were impaired, compared to 21% in 2006.
- ❖ Impaired motorcyclists in F&PI crashes are most likely to be in the 40-49 age group (32%) or the 30-39 age group (27%); unimpaired motorcyclists are most likely to be in the 21-29 age group (28%).
- ❖ 98% of the impaired operators in F&PI crashes are men.
- ❖ Eight out of 10 impaired and unimpaired motorcycle operators in F&PI crashes were wearing a helmet .
- ❖ In addition to alcohol, 44% of the impaired operators had “unsafe speed” reported as a contributing factor, compared to 15% of the unimpaired operators; “unsafe speed” was reported even more frequently for both impaired operators and unimpaired operators in fatal crashes (51% and 37%, respectively).
- ❖ Impaired motorcycle operators were also more likely than unimpaired motorcycle operators to have “passing/improper lane usage/unsafe lane changing ” (11% vs. 7%) and “failure to keep right” (6% vs. 2%) reported as contributing factors.
- ❖ Non-impaired motorcycle operators were more likely than impaired operators to have “driver inexperience” (9% vs. 5%) and “following too closely” (5% vs. 2 %) reported as factors in crashes.

References

Creaser, J.I. et al. 2007. *Effects of Alcohol on Motorcycle Riding Skills*. Final Report (DOT HS 810 877). Washington DC: National Highway Traffic Safety Administration.