Highway Loss Data Institute Bulletin
Teen Crash Risk by Vehicle Type

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INTRODUCTION

Young drivers have higher collision claim frequencies than older drivers. This is true for both automobiles and motorcycles. Previous HLDI studies have shown that collision claim frequencies are highest for young drivers and decline with age. The purpose of this study is to determine if collision claim frequencies for 16-to-19-year-old drivers relative to 35-to-60-year-old drivers vary by vehicle type. The study will look at differences between automobiles and motorcycles overall and among automobile and motorcycle classes.

METHOD

Study vehicles included 2006-10 models during calendar years 2005-10. Two rated driver age groups were used for this study: 16 to 19 (teenagers) and 35 to 60 (hereafter referred to as prime age drivers). The rated driver is the driver who is considered to represent the greatest loss potential for the insured vehicle. In a multiple-vehicle/driver household, how a driver is assigned to a vehicle can vary by insurance company and state. A limitation of this study is that information on the actual driver at the time of a loss is not available in the HLDI database. Among the rated drivers within the study, teenagers represented just 1 percent of motorcycle, and 3 percent of automobile loss data. The primary metric used to evaluate differences in crash risk by vehicle type for teens relative to prime age drivers was the ratio of teenagers' collision claim frequencies over prime age drivers' collision claim frequencies. The use of these ratios provides a control for different usage patterns between vehicle types. In particular, this metric allows for meaningful comparisons between automobiles and motorcycles. Losses were reported for data points that have at least 1,000 insured vehicle years or 100 claims. Most motorcycle classes (chopper, dual purpose, scooter, sport touring, standard, touring and unclad sport) were combined into the class of "others" due to sparse data. For the study population, the collision claim frequency was 2.6 claims per 100 insured vehicle years for motorcycles, and 6.6 for autos. Motorcycle results were based on 1,725,124 insured vehicle years and 45,235 collision claims. Automobile results were based on 55,317,465 insured vehicle years and 3,641,540 collision claims.

RESULTS

Table 1 shows the exposure, claims and claim frequencies for the study age groups for motorcycles and automobiles. Teenagers represented less than 1 percent of motorcycle exposure, yet were responsible for over 3 percent of the collision claims. For automobiles, teenagers represented only 3 percent of exposure, and nearly 5 percent of the claims.

TABLE 1 COLLISION COVERAGE BY AGE GROUP AND VEHICLE TYPE, 2006-10 MODELS

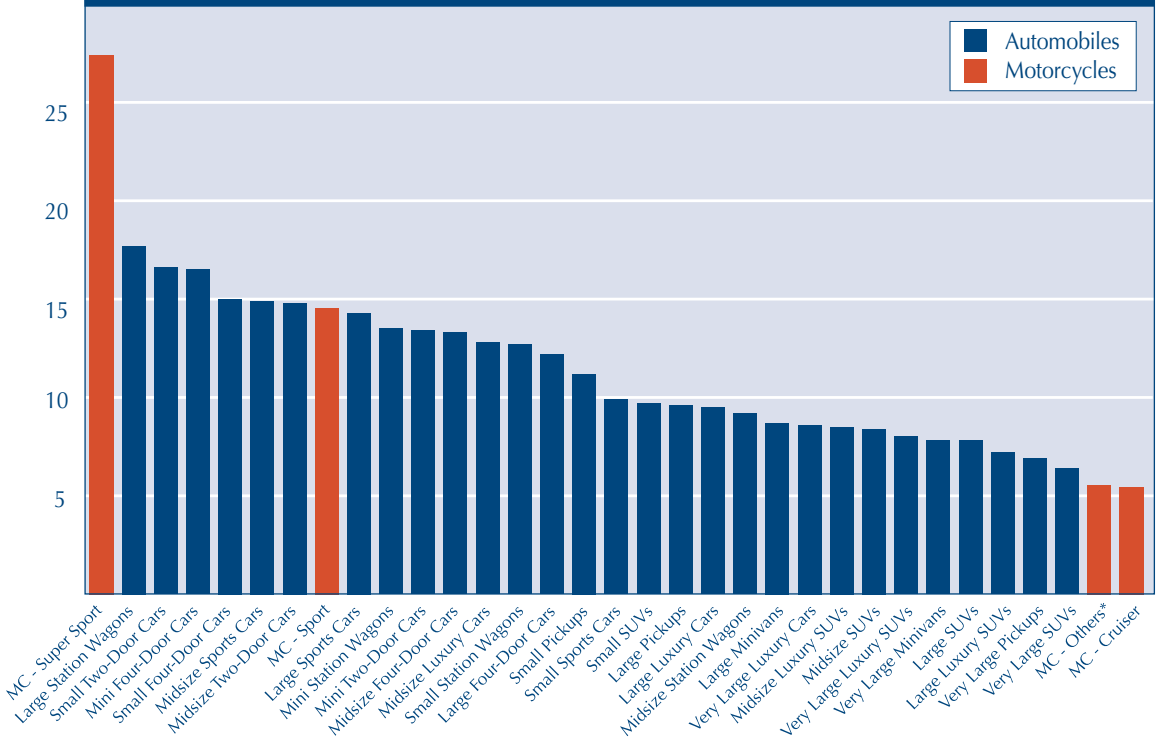
	TEENAGERS	PRIME AGE	TOTAL
Automobile Exposure	1,448,819	53,868,646	55,317,465
Automobile Claims	178,298	3,463,242	3,641,540
Automobile Claim Frequency	12.3	6.4	6.6
Motorcycle Exposure	9,592	1,715,532	1,725,124
Motorcycle Claims	1,387	43,848	45,235
Motorcycle Claim Frequency	14.5	2.6	2.6

Figure 1 shows collision claim frequencies for teenagers by vehicle type and class. Frequencies range from 27.4 for super sport class motorcycles (highest) to 5.4 for cruiser class motorcycles (lowest). The frequency for super sport motorcycles is five times higher than for cruisers. This simple comparison of claim frequencies by vehicle type and class seems to indicate that super sport motorcycles represent the highest crash risk for teens and that cruiser motorcycles represent the lowest crash risk. The problem with a direct comparison of claim frequencies for automobiles and motorcycles is that exposure, while measured the same way, is not necessarily the same. In September 2009, HLDI published a study titled, "Seasonal Variation in Crash Deaths and Collision Claims for Motorcycles and Automobiles" (Vol. 26, No. 6). That study clearly demonstrated that automobiles and motorcycles have different crash patterns. The study showed that motorcycles are more likely than automobiles to crash on weekends, holidays and in the summer months. This provides a strong indication that in general, motorcycles are used as secondary transportation. Put differently, it could be postulated that the number of miles driven per insured vehicle year is much lower for motorcycles than for automobiles.

Figure 2 shows collision claim frequencies for prime age drivers by vehicle type and class. There is less variation in the claim frequencies for prime age drivers than for teens. Frequencies range from 8.5 for small two-door cars (highest) to 2.2 for cruiser class motorcycles (lowest). The frequency for small two-door cars is nearly 4 times higher than cruiser motorcycles. It is interesting to note that many of the riskiest vehicle types for teens are also among the riskiest for prime age drivers. Additionally, the vehicles with the lowest frequencies for teens are also the vehicles with the lowest frequencies for prime age drivers; the motorcycle "other" class and the motorcycle cruiser class.

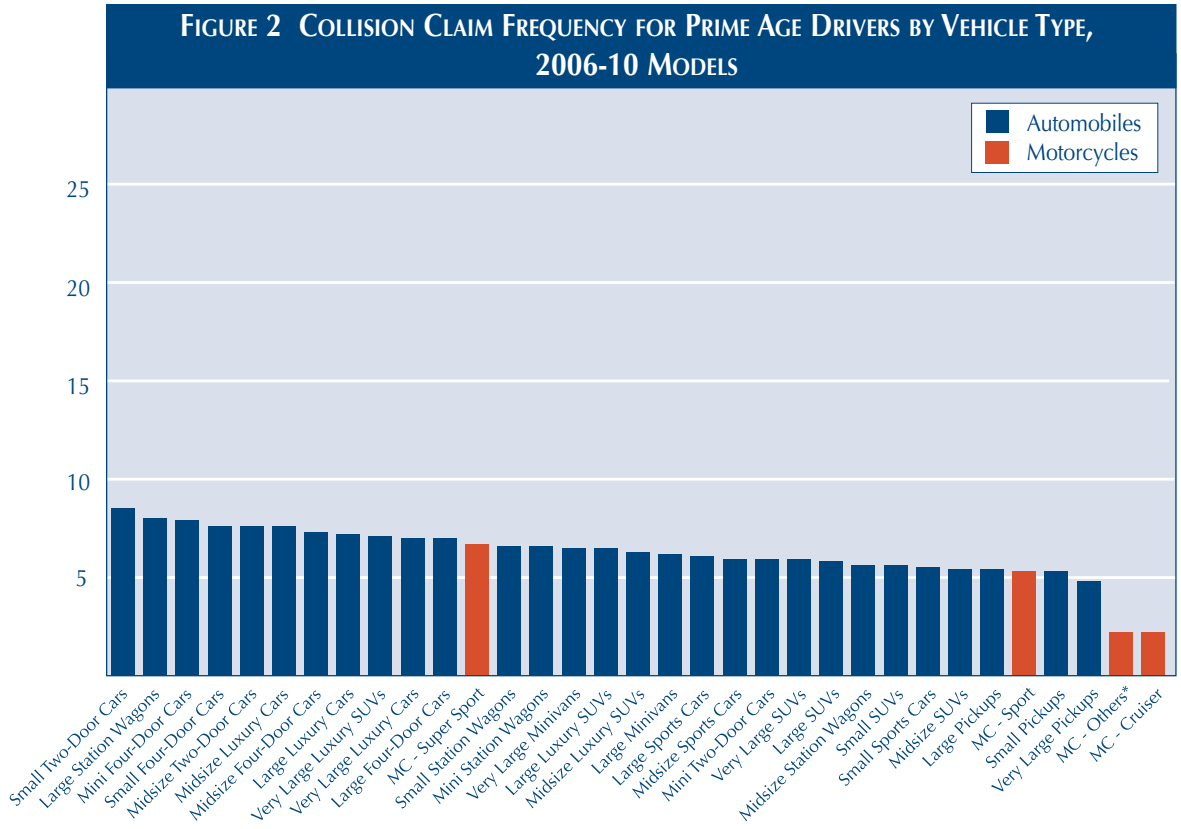
In order to allow for more meaningful comparisons between automobiles and motorcycles, the ratio of teenage claim frequency over the frequency for prime age drivers was used. The claim frequency for prime age drivers was used as an implicit control for risk factors not related to age such as different patterns of use.

Figure 1 Collision Claim Frequency for Teenage Drivers by Vehicle Type and Class 2006-10 Models



* Others = combined motorcycle classes (chopper, dual purpose, scooter, sport touring, standard, touring and unclad sport)

Figure 2 Collision Claim Frequency for Prime Age Drivers by Vehicle Type, 2006-10 Models



* Others = combined motorcycle classes (chopper, dual purpose, scooter, sport touring, standard, touring and unclad sport)

Figure 3 illustrates the collision claim frequency for autos and motorcycles for teenagers and prime age drivers. On motorcycles, teenagers had a claim frequency more than 5 1/2 times that of prime age drivers. For automobiles, teenagers had a claim frequency nearly twice that of older drivers. Teenagers on motorcycles have an 18 percent higher collision claim frequency than teenagers in automobiles. For prime age drivers, the inverse is true; the motorcycle collision claim frequency is 60 percent lower than automobiles.

FIGURE 3 MOTORCYCLE AND AUTOMOBILE COLLISION CLAIM FREQUENCY BY RATED DRIVER AGE GROUP, 2006-10 MODELS

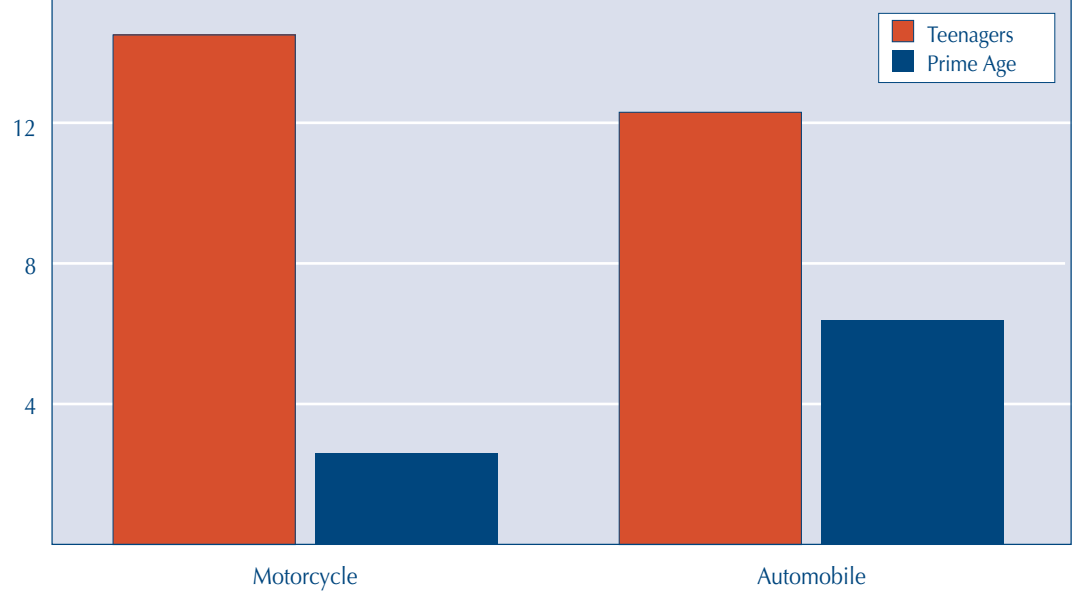


Figure 4 illustrates the collision claim frequency ratio of teenage rated drivers over prime age rated drivers for motorcycles and automobiles. The ratio for motorcycles was 5.7 (teenage claim frequency of 14.5 claims per 100 insured vehicle years / prime age claim frequency of 2.6 claims per 100 insured vehicle years). The ratio for automobiles was 1.9 (12.3 claims per 100 insured vehicle years / 6.4 claims per 100 insured vehicle years). The ratio for motorcycles is almost three times higher than the ratio for automobiles. This indicates that relative to prime age drivers, teens are at a much higher risk of crashing on a motorcycle than in an automobile.

FIGURE 4 COLLISION CLAIM FREQUENCY RATIO OF TEENAGE DRIVERS OVER PRIME AGE DRIVERS, 2006-10 MODELS

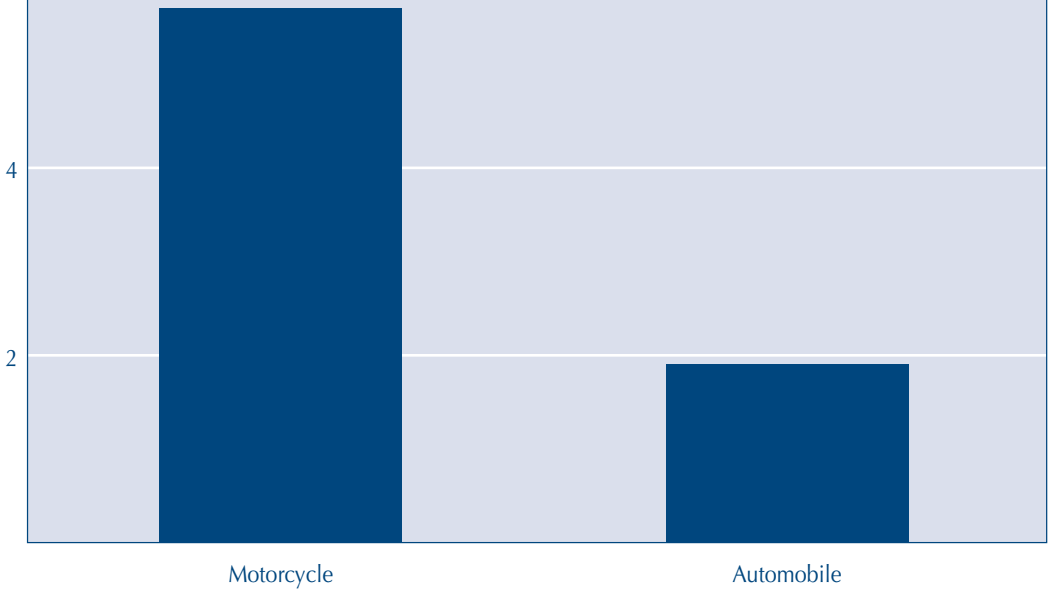
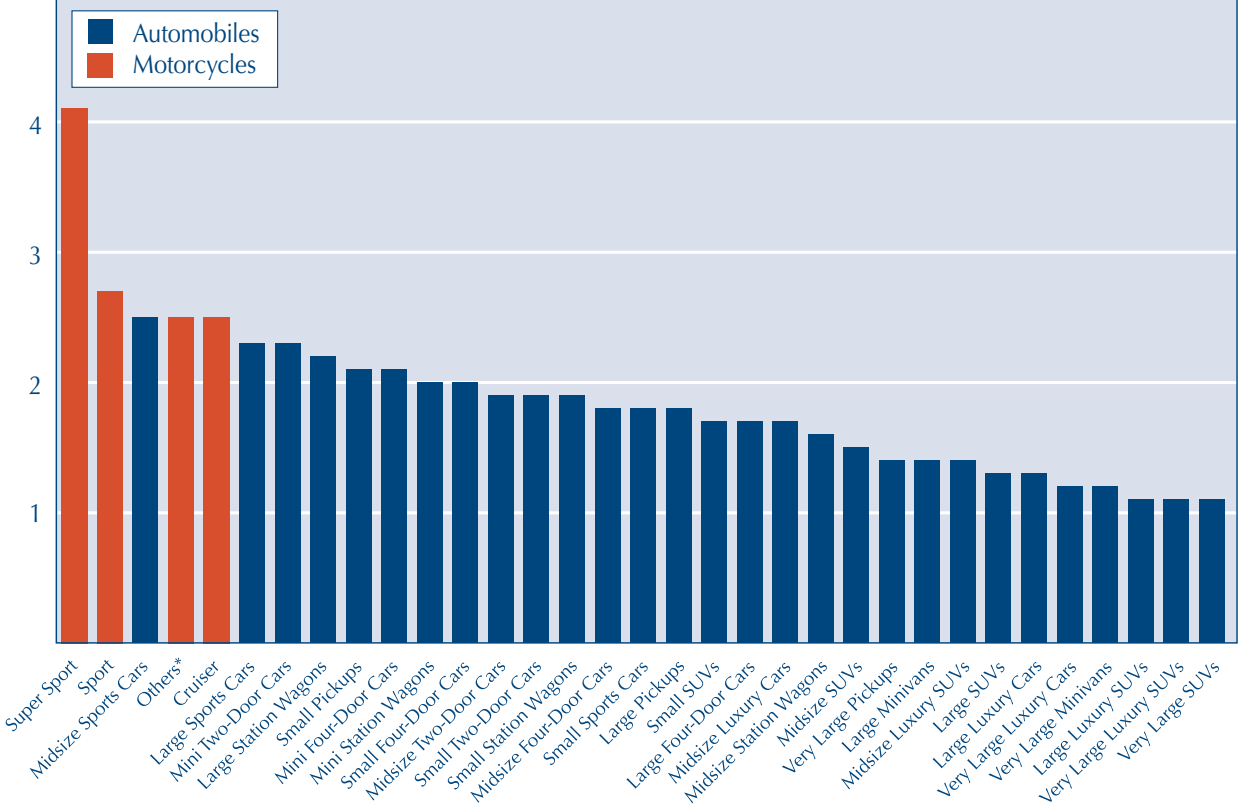


Figure 5 illustrates claim frequency ratios by vehicle type and class. For every category the teen claim frequency is higher than the frequency for prime age drivers; there is no ratio less than 1. The super sport motorcycle class had the highest ratio (4.1). This indicates that teens on super sport motorcycles are over 4 times as likely to crash than prime age riders on super sport motorcycles. At the other end of the spectrum very large SUVs had the lowest ratio (1.1). For automobiles, the most risky vehicle type (midsize sports cars) had a claim frequency ratio that was well over 2 times higher than the least risky vehicle type (very large SUVs). Of the 5 categories with the highest ratios, 4 were motorcycles.

The all-motorcycle frequency ratio of 5.7 is higher than the frequency ratios for any of the individual classes. This occurs because there are large differences in exposure by class for teens versus prime age motorcycle operators. These differences don't exist for automobiles. If the teens' ratios are reweighted to the prime age exposure distribution, the motorcycle frequency ratio would drop from 5.7 to 2.6 while the auto frequency would only change from 1.9 to 1.7

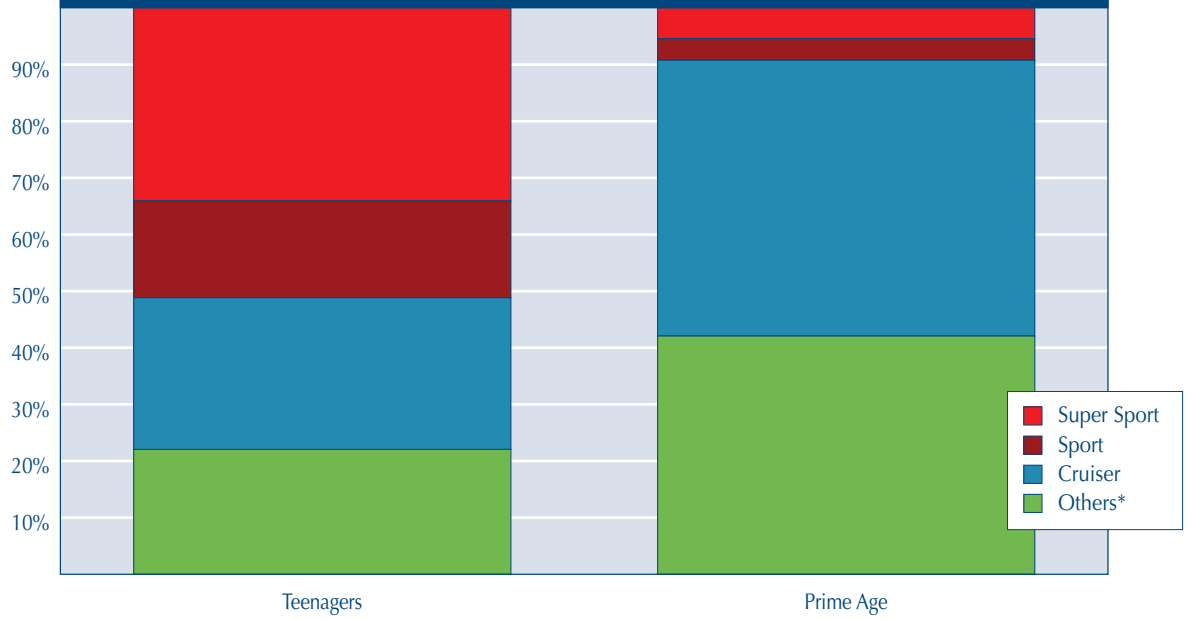
FIGURE 5 COLLISION CLAIM FREQUENCY RATIO OF TEENAGE DRIVERS OVER PRIME AGE DRIVERS BY VEHICLE TYPE AND CLASS, 2006-10 MODELS



* Others = combined motorcycle classes (chopper, dual purpose, scooter, sport touring, standard, touring and unclad sport)

Figure 6 illustrates the collision exposure distribution by motorcycle class for teenagers compared with prime age driver distribution. Over 51 percent of teen exposure is comprised of sport and super sport class motorcycles, which consistently have the highest collision claim frequencies. By comparison, sport and super sport class motorcycles comprised just over 9 percent of the exposure for prime age drivers. Cruiser class motorcycles, which consistently have one of the lowest claim frequencies, are only 27 percent of teenage drivers' exposure, while they make up nearly 50 percent of the prime age drivers' exposure.

Figure 6 Motorcycle Collision Exposure Distribution by Rated Driver Age Group and Class, 2006-10 Models



* Others = combined motorcycle classes (chopper, dual purpose, scooter, sport touring, standard, touring and unclad sport)

Figure 7 illustrates the collision exposure distribution by automobile size and class for teenagers compared with prime age driver distribution. Over 19 percent of teenage exposure is comprised of small four-door cars, which have the fourth highest automobile claim frequency for teenagers. Small four-door cars were only 9 percent of prime age driver exposure. Nearly 30 percent of teenage exposure is comprised of three of the highest claim frequency automobile size/class combinations (small two-door cars, mini four-door cars, and small four-door cars). Those same three size/class combinations represent only 12 percent of prime age driver exposure.

Figure 7 Automobile Collision Exposure Distribution by Rated Driver Age Group and Class, 2006-10 Models

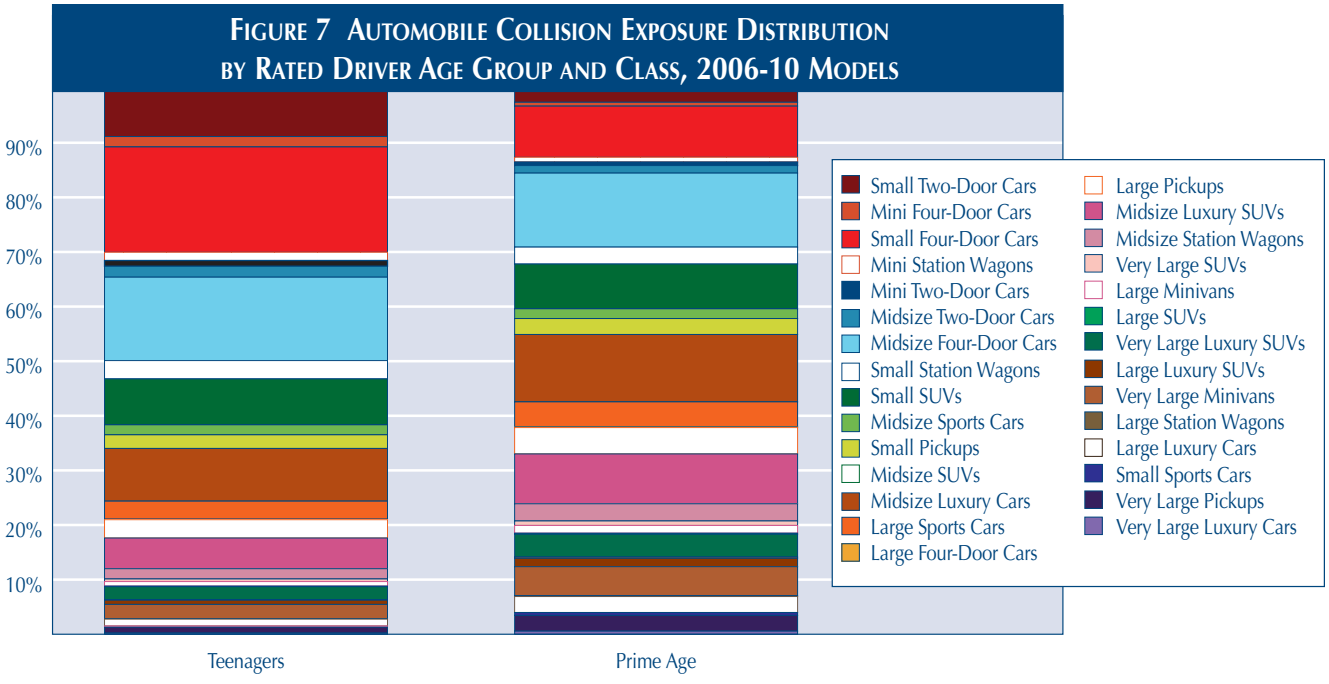


Table 2 contains the exposure, claims, claim frequencies per 100 insured vehicle years, claim frequency ratio of teens over prime age drivers, and rankings of those metrics by vehicle type for each rated driver age group. Vehicle types are listed in order of claim frequency ratios, from highest to lowest. With the exception of prime age drivers' claim frequency, super sport motorcycles were the worst for each metric. Small two-door cars, which have a claim frequency that ranked third for teens and first for prime age drivers, had only the 14th highest ratio. Cruiser and "others" motorcycle classes had the lowest claim frequency for both rated driver age groups despite ranking fourth and fifth, respectively, in claim frequency ratio.

Table 2 Collision Claim Frequency and Rank by Vehicle Type and Class, 2006-10 Models

Size and Class	Exposure		Claims		Claim Frequency			Claim Frequency Rank		
	Teenagers	Prime Age	Teenagers	Prime Age	Teenagers	Prime Age	Ratio	Teenagers	Prime Age	Ratio
MC - Super Sport	3,268	92,564	894	6,189	27.4	6.7	4.1	1	12	1
MC - Sport	1,639	65,731	238	3,511	14.5	5.3	2.7	8	29	2
Midsize Sports Cars	26,442	966,659	3,928	57,059	14.9	5.9	2.5	6	20	3
MC - Others*	2,115	721,759	117	15,955	5.5	2.2	2.5	32	32	4
MC - Cruiser	2,570	835,479	138	18,193	5.4	2.2	2.5	33	33	5
Large Sports Cars	1,453	76,405	208	4,678	14.3	6.1	2.3	9	19	6
Mini Two-Door Cars	15,310	357,865	2,058	21,000	13.4	5.9	2.3	11	21	7
Large Station Wagons	972	74,079	172	5,891	17.7	8.0	2.2	2	2	8
Small Pickups	36,281	1,572,828	4,047	82,895	11.2	5.3	2.1	16	30	9
Mini Four-Door Cars	27,490	379,466	4,539	29,803	16.5	7.9	2.1	4	3	10
Mini Station Wagons	21,711	464,258	2,927	30,605	13.5	6.6	2.0	10	14	11
Small Four-Door Cars	279,587	5,047,979	42,057	385,680	15.0	7.6	2.0	5	4	12
Midsize Two-Door Cars	28,960	744,765	4,299	56,786	14.8	7.6	1.9	7	5	13
Small Two-Door Cars	126,108	1,199,092	20,925	102,499	16.6	8.5	1.9	3	1	14
Small Station Wagons	48,552	1,671,087	6,184	110,269	12.7	6.6	1.9	14	13	15
Midsize Four-Door Cars	221,236	7,301,375	29,526	535,797	13.3	7.3	1.8	12	7	16
Small Sports Cars	3,159	291,188	313	16,126	9.9	5.5	1.8	17	26	17
Large Pickups	81,491	4,916,858	7,863	266,762	9.6	5.4	1.8	19	28	18
Small SUVs	121,891	4,410,016	11,834	246,257	9.7	5.6	1.7	18	25	19
Large Four-Door Cars	48,543	2,594,440	5,901	181,524	12.2	7.0	1.7	15	11	20
Midsize Luxury Cars	47,808	2,464,414	6,133	186,258	12.8	7.6	1.7	13	6	21
Midsize Station Wagons	6,969	441,181	639	24,812	9.2	5.6	1.6	21	24	22
Midsize SUVs	139,855	6,645,958	11,700	361,847	8.4	5.4	1.5	25	27	23
Very Large Pickups	15,586	1,549,501	1,080	74,677	6.9	4.8	1.4	30	31	24
Large Minivans	1,665	107,105	145	6,621	8.7	6.2	1.4	22	18	25
Midsize Luxury SUVs	27,225	1,695,207	2,313	106,333	8.5	6.3	1.4	24	17	26
Large SUVs	34,173	2,247,758	2,649	130,981	7.8	5.8	1.3	28	23	27
Large Luxury Cars	18,143	1,575,010	1,724	112,694	9.5	7.2	1.3	20	8	28
Very Large Luxury Cars	3,023	303,963	260	21,322	8.6	7.0	1.2	23	10	29
Very Large Minivans	38,081	2,873,112	2,953	187,966	7.8	6.5	1.2	27	15	30
Large Luxury SUVs	11,106	831,710	804	53,839	7.2	6.5	1.1	29	16	31
Very Large Luxury SUVs	1,760	125,980	140	8,981	8.0	7.1	1.1	26	9	32
Very Large SUVs	11,941	759,104	764	44,428	6.4	5.9	1.1	31	22	33
All Motorcycles	**9,592**	**1,715,532**	**1,387**	**43,848**	**14.5**	**2.6**	**5.7**			
All Automobiles	**1,448,819**	**53,868,646**	**178,298**	**3,463,242**	**12.3**	**6.4**	**1.9**			

*MC - Others = combined MC classes (chopper, dual purpose, scooter, sport touring, standard, touring and unclad sport)

DISCUSSION

Crash rates vary by vehicle type and even by size and weight within a group of similar type. This analysis shows that some of the crash rate differences are amplified for teen drivers compared with prime age drivers; how much higher depends on the type of vehicle a teen operates. Teens are more than 5 1/2 times as likely to crash a motorcycle and nearly twice as likely to crash an automobile as prime age drivers. A teen insuring a super sport class motorcycle, the most crash prone of motorcycle types, is over 4 times as likely to crash as a prime age driver insuring the same motorcycle. Teens in midsize sports cars are 2 1/2 times as likely to crash as prime age drivers. Horsepower may amplify teen risk. Sport class motorcycles and mid-sized and large sports cars, which typically have more horsepower than comparable vehicles, have the highest crash risk relative to prime age drivers. Aside from powerful vehicles mini and small vehicles represent a disproportionate number of the vehicle classes with teen crash risk that was high relative to prime drivers. Teens are more than 2 times as likely to crash mini 2-door or small 4-door cars as prime drivers. As with 2-wheels compared to 4-wheels, cars with shorter wheelbases are less forgiving of mistakes on the part of the driver. Having a teen drive a very large SUV puts teen driver crash risk nearer that of prime age drivers and would represent a 73 percent reduction compared with a super sport motorcycle, a 56 percent reduction compared with a midsize sports car or a 64 percent reduction compared to mini 2-door cars.

Unfortunately, the motorcycles and cars with the highest teen risk are also among those they're most likely to drive. Motorcycle exposure data show that teens are more likely to ride a super sport motorcycle than any other type of motorcycle. Similarly, mini and small cars, which also had high frequency ratios, tend to be popular with teen drivers. For example, small 2-door cars represent almost 8 percent of teen auto exposure while those vehicles are only 2.2 percent of prime age exposure. Motorcycles have little built-in crash protection and among cars the difference in size also is related to crash protection. In a recent evaluation of fatality rates by vehicle make and series conducted by the Insurance Institute for Highway Safety, these smaller vehicles tended to have higher death rates than larger vehicles (Status Report, Vol. 46, No. 5). For example, four-door minicars had a death rate of 82 deaths per million registered vehicle years compared with only 28 deaths per million registered vehicle years for SUVs. Thus, choosing small cars or motorcycles for young drivers not only increases their risk of crashing but also provides less crash protection when they do crash.

REFERENCES

Highway Loss Data Institute. 2009. Seasonal Variation in Crash Deaths and Collision Claims for Motorcycles and Automobiles. Loss bulletin Vol. 26, No. 6. Arlington, VA.

Insurance Institute for Highway Safety. 2011. Dying in a Crash. Status Report, Vol. 46, No. 5. Arlington, VA.

The Highway Loss Data Institute is a nonprofit public service organization that gathers, processes, and publishes insurance data on the human and economic losses associated with owning and operating motor vehicles.

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