



Are Women Taking More Risks While Driving? A Look at Michigan Drivers

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INTRODUCTION

Women's motor vehicle driving has been changing over time and is still changing. Much more driving is done by women today than in the past. More women are driving and they are driving more miles. They are also driving at older ages. Figure 1 (derived from FHWA Highway Statistics, and U.S. Census information) shows the trend in the proportion of female drivers to male drivers over the last 33 years. In 1963, there was no age group in which female drivers exceeded 75 percent of the number of male drivers. By 1975, the ratio of female drivers to male drivers exceeded 80 percent for all age groups from the youngest to 59 years of age. In 1994, the ratio of female to male drivers exceeded 90 percent for all age groups and 100 percent for the over 70 age group. The upper most curve represents the female to male population ratio in the United States in 1994. If this trend continues, the ratio of female to male drivers will more closely follow the population ratio and there will be further increases in the portion of elderly drivers that are women.

There has also been an increase in the number of miles driven by women over this time period. The U.S. Department of Transportation 1969 National Personal Transportation Survey (NTPS) reported that 73 percent of the nation's vehicle miles were made by male drivers and the average male drove 11,000 miles per year while the average female drove 5,400 miles per year. The 1990 NTPS reported that 65 percent of the nation's vehicle miles were driven by men and the average male drove 16,500 miles, while the average female drove 9,500 miles (Hu and Young, 1992).

Gender-related differences have also been observed in motor-vehicle crash involvement rates. Women have lower crash involvement rates than men. An analysis of 1990 NTPS data (Massie and Campbell, 1993) found that per mile driven, men had about 1.5 times the risk of women of experiencing a fatal crash. However, analyses of national crash trends show an increase in driver fatalities of women relative to men. For example, an analysis of national crash data (Cerelli, 1994) shows that female driver fatalities increased from 23.9% to 26% of all driver fatalities between 1990 and 1994.

Among the explanations offered for this increase is that women have increased their exposure, that is, women are at higher risk because there are more of them driving and they are driving more than in the past. Other explanations focus on increases in behavior that put the driver at risk, such as drinking and driving. Increases in alcohol-related crashes and alcohol-related crash rates for young female drivers have been noted and reported in the literature (e.g., Popkin, 1991; Moore, 1994). While drinking and driving is clearly risky behavior, other driving practices also put drivers at risk. Pioneering work by Evans and Wasielewski (1982; 1983) has established statistically reliable associations between crash involvement and observed risky driving practices, such as short following headways, high speed, and not using safety belts.

Research into the driving behavior of motorists has consistently found gender differences in behaviors involving risk-taking. For example, based on self-report, men drive at faster speeds, are less likely than women to use safety belts in their vehicles, and also have a higher likelihood of driving

under the influence of alcohol (e.g., Streff, Kostyniuk, Molnar, Hopp, 1995). However, if the portion of women in the driving population is increasing and driving more miles, while at the same time engaging in riskier driving practices, the level of safety on our roadways could be adversely affected.

Given that increased exposure for women is well documented, the purpose of this paper is to explore the possibility that increases in risky driving behaviors at least partially account for the increase in the share of Women's fatalities in motor vehicle crashes. The aspects of risky driving behavior selected for examination are short following headways, speeding, use of safety belts, and driving under the influence of alcohol. Because higher risk-taking is often associated with youth, examination by age is also included.

The approach of this study was to examine in a preliminary way, existing data sources for evidence of changes in the risk-taking aspects of women's driving. The Social and Behavioral Analysis (SBA) group at the University of Michigan Transportation Research Institute (UMTRI) has been conducting studies monitoring driver behavior and attitudes for over a decade and has a wealth of information on various aspects of driving behavior. Two of these multi-year studies, the Michigan Omnibus State Safety Survey of Traffic Safety Attitudes and Behaviors (Streff et. al., 1988; 1990; 1992; 1995), an ongoing study of opinions, attitudes and behaviors of adult Michigan residents, and the Michigan Direct Observation Studies of Safety Belt Use (Wagenaar et. al., 1988; Streff et. al., 1990; 1992; 1993; Eby et. al., 1994; 1995; 1996) were explored for evidence of changes in the driving behavior of women. These data, together with the Michigan State Motor Vehicle Crash records, served as the sources for our exploration of the question of change in the risk-taking in the driving behavior of women. In addition, much of the data in Evans' and Wasielewski's research into risky driving practices were collected in Michigan. Thus, their findings should be directly applicable to the population of drivers we are examining.

FOLLOWING HEADWAYS

In their investigations of whether drivers with high crash frequencies drive more dangerously than other drivers, Evans and Wasielewski (1983) looked at the length of the following headways of drivers in high flow freeway traffic and related this observed behavior to driver characteristics and driver crash records. They measured vehicular headways on a Michigan freeway on an outbound single interior traffic lane on weekday afternoons including peak commuting hours in good weather with near-capacity traffic that was generally flowing smoothly at average speeds of 65 miles per hour (mph). Short headways were considered indicative of a driver's willingness to accept risk, longer headways were indicative of more cautious driving, and very long headways were considered a consequence of non-interaction between the following and preceding vehicles.

Among the characteristics of the driver and vehicle obtained from a photograph of each vehicle were driver gender, age, safety belt use, and vehicle plate number. If the driver characteristics matched those of the registered owner of the vehicle, it was assumed that the driver was the owner of the vehicle and his/her driving record, including crashes and points on the license, was also obtained. The data consisted of 6,775 headway observations, of which 2,576 cases were matched with driving records.

The results of Evans and Wasielewski's study showed clear evidence that younger drivers tend to take more risks in everyday driving. Women were underrepresented at the shortest, risky headways but overrepresented at more cautious headways. Drivers with no crashes or points were less likely, on average, to be observed with short headways. Although these associations do not necessarily

imply causality, they do complement research based on crash frequency data that identified driver populations with high crash involvement.

Under some circumstances, vehicles following too closely cannot stop in time to avoid a collision with the leading vehicle. Such crashes are usually rear-end crashes and the following vehicle generally sustains damage on the vehicle front. We examined the crash records for the state of Michigan for 1987 and 1994 for such crashes by driver age and gender and calculated the striking vehicle crash rate per 1,000 licensed drivers. The results are shown in Table 1.

The rates in Table 1 clearly show that men more than women and younger more than older persons are driving the following vehicle in a rear-end collision. Changes in the crash rates between 1987 and 1994, shown in Table 2, indicate a very small increase in the overall driver involvement rate. The only increase of note is that for young drivers (almost three collisions per 1,000 licensed drivers) and this increase is relatively equal for both women and men.

If rear-end crashes can be assumed to be a consequence of following too closely, these findings support those of the headway study in that younger drivers more than older drivers and males more than females engage in this particular risky driving behavior. Furthermore, comparison of the rates of striking vehicle involvement between 1987 and 1994 indicates an increase in this involvement for young drivers that is not a function of gender.

Table 1
Driver of Striking Vehicle in Rear End Crash by Age and Gender
Michigan 1987 and 1994

	1987			1994		
	•Men	•Women	•Total	•Men	•Women	•Total
<25	26.64*	15.98	21.51	29.50	19.06	24.37
	16,480**	9,146	25,625	15,387	9,597	24,984
25-64	10.49	5.66	8.08	10.84	6.36	8.59
	23,195	12,433	35,628	24,995	14,884	39,879
65+	4.87	2.37	3.61	5.28	3.05	4.11
	1,877	933	2,810	2,355	1,480	3,835
Total	12.92	7.12	10.04	13.06	7.80	10.41
	41,552	22,512	64,064	42,737	25,961	68,698

* Rate per 1,000 licensed drivers

** Number of crashes

Table 2

Differences in Rate per 1,000 Licensed Drivers in Rear-End Crash Striking Vehicle by Age and Gender in Michigan 1987 - 1994

	Men	Women	Total
<25	2.86 *	3.08	2.86
25 - 64	0.35	0.70	0.51
65+	0.41	0.68	0.50
Total	0.14	0.68	0.37

* Difference in rate per 1,000 licensed drivers

SPEED

Traveling at excessive speeds can also be considered as a measure of drivers willingness to expose themselves to the risk of crash. In 1984, Wasielewski published an analysis of speeding as a measure of driver risk. In this study, speed of vehicles at a site in southeast Michigan with a posted speed limit of 45 mph was measured by radar. The site was a flat, straight two-laned road with 11-foot lanes, and gravel shoulders. Traffic signals were about one- half mile in either direction and there was little residential or commercial development along the roadside. The vehicle was photographed and driver and vehicle characteristics were derived from the photograph. As in the headway study described earlier, vehicle owner information was obtained from the Secretary of State and, if the owner’s age and gender matched that of the observed driver, the driver was assumed to be the owner. In this way driving records were obtained for a portion of the field observations.

Wasielewski found a statistically significant decline in travel speeds with age and noted that women were less likely than men to be among the drivers at very high or very low speeds. Analysis of driving records showed that drivers with the fastest driving speeds were more likely than others to have crashes or violations on their driving records.

We examined the 1987 and 1994 Michigan Motor Vehicle Crash files for vehicle crash records where speeding was identified as the hazardous action prior to the crash. Table 3 shows the frequency of occurrence and the incidence rate per 1,000 licensed drivers of these crashes by gender and age. The table shows clearly that younger drivers were more likely than older drivers to be speeding before a collision. Overall, men were about twice as likely as women to be speeding before a collision. There does not appear to be an overall increase in the average rate of incidence between 1987 and 1994. However, there was an increase of 1.3 collisions per 1,000 licensed drivers attributed to speeding for young female drivers.

Self-reported driving speeds on Michigan’s urban and rural freeways are collected as part of the Michigan Omnibus State Traffic Safety Survey. Respondents were asked, How fast do you generally drive on Michigan’s urban freeways. There were 740 valid responses in the 1995 survey. Collectively, nearly 90 percent of the respondents reported exceeding the 55 mph speed limit. In general, men reported driving faster than women and reported speeds decreased with age.

Table 3

Speeding as Hazardous Action Prior to Crash by Age and Gender, Michigan 1987 and 1994

	1987			1994		
	Men	Women	Total	Men	Women	Total
<25	19.51*	7.90	13.93	19.58	9.18	14.47
	12,071**	4,521	16,592	10,214	4,620	14,834
25-64	4.71	2.14	3.47	4.71	2.64	3.67
	10,601	4,703	15,304	10,858	6,185	17,043
65+	1.19	0.62	0.90	1.23	0.71	0.96
	495	243	702	549	347	896
Total	7.19	2.99	5.11	6.61	3.35	4.96
	23,131	9,467	32,589	21,621	11,152	32,773

* Rate per 1,000 licensed drivers

** Number of crashes

Table 4 shows the distribution of self-reported driving speeds by age and gender. Overall, 20 percent of men and 11 percent of women reported exceeding the speed limit by at least 15 mph. Of the youngest drivers, 43 percent of males and 26 percent of females reported routinely exceeding the speed limit by at least 15 mph.

Respondents were also asked, How fast do you generally drive on Michigan’s rural freeways. At the time of the survey the speed limit on all Michigan rural freeways was 65 mph. A total of 728 respondents gave valid responses to this item. Unlike the self-reported urban freeway driving speeds, less than one-half of respondents reported driving over the freeway speed limit. Table 5 shows the distribution of reported driving speeds on Michigan’s rural freeways by age and gender. Ten percent of men and two percent of women reported routinely driving over 75 mph on rural freeways. The distributions of reported driving speeds of male drivers in the young and middle age groups are very similar with about 10 percent exceeding 75 mph. The older male drivers reported driving at slower speeds. The distribution of reported speeds of women drivers, while showing overall slower speeds than male drivers, does show higher speeds for young drivers. However, only four percent of the young women drivers reported routinely exceeding 75 mph on rural freeways.

Table 4

Percentage Distribution of Self-Reported Speeds on Michigan Urban Freeways (Speed Limit 55 MPH) by Gender and Age in 1995

	<25		25-64		65+	
	Men	Women	Men	Women	Men	Women
<55 mph	8.54	6.10	3.47	6.91	13.86	19.33
55-59 mph	20.28	18.70	17.13	33.96	33.73	42.00
60-64 mph	5.87	10.34	27.79	22.36	15.06	21.33
65-69 mph	22.42	38.59	33.55	27.53	33.73	14.67
70+ mph	42.88	26.26	18.07	9.24	3.61	2.67

Table 5

Percentage Distribution of Self-Reported Speeds on Michigan Rural Freeways (Speed Limit 65 MPH) by Gender and Age in 1995

	<25		25-64		65+	
	Men	Women	Men	Women	Men	Women
<65 mph	44.84	51.47	41.96	65.79	68.55	74.00
65-69 mph	20.82	24.87	24.08	23.44	20.13	23.33
70-74 mph	24.20	19.65	22.60	8.23	11.32	2.67
75+ mph	10.14	4.01	11.36	2.54	0.00	0.00

All three analyses of driving speeds show a strong gender effect on speeds, with males selecting higher speed than females. There is a clear age effect evident for both men and women, with younger drivers being more likely to travel at faster speeds than the middle-aged or older drivers. While the rate of speed-related crashes remained fairly stable for the driving population of Michigan between 1987 and 1994, there was an increase in this rate for the group of youngest female drivers. The increase was not large and may indicate an actual increase in speeding behavior. On the other hand, it could simply reflect a greater willingness of police officers to note speeding when filling out crash reports for female drivers than in the past.

SAFETY BELT USE

Safety belts are designed specifically for reducing death and injuries from traffic crashes. They are only effective, however, if they are used. A lack of safety belt use has been shown to be positively correlated with high risk driving behavior. For example, Foss, Bierness, and Sprattler (1994) have shown that drinking drivers tend to use safety belts less frequently than other drivers. Evans and Wasielewski (1983) found low safety belt use among drivers following at very short risky headways. As in other driving-related high risk behaviors, safety belt use varies as a function of gender.

The SBA group of UMTRI has measured safety belt use in statewide direct observation surveys of safety belt use since 1984. Among other things, these direct observation surveys usually examined safety belt use by gender. We have also obtained self-reported safety belt use in the Omnibus State Traffic Safety Surveys since 1987.

Figure 2 shows the overall safety belt use rates by survey year and gender across all age groups, as determined by direct-observation. Several interesting trends are evident. This figure shows clearly that safety belt use among women has been consistently higher than men in every survey year. This result is supported by the latest Omnibus survey which showed that self-reported "always wear safety belt" was 78.1 percent for females and only 59.8 percent for males. Further, the direct observation belt use rates for men and women tend to follow the same trends. Safety belt use increased markedly for both men and women during July 1985. This peak was caused by the implementation of Michigan's mandatory safety belt law. Before implementation of the mandatory safety belt law, the difference in safety belt use rates between men and women was rather small. After safety belt use was required by law, this difference became much more pronounced. This finding suggests that the risk-taking behaviors of females are more greatly influenced by traffic safety laws than are the behaviors of males. The fact that the difference between belt use rates for males and females has remained relatively constant for the last ten year does not support the hypothesis that the frequency of risk taking behaviors for women is beginning to approach that of males.

Figure 1
Gender Trends in Licensing

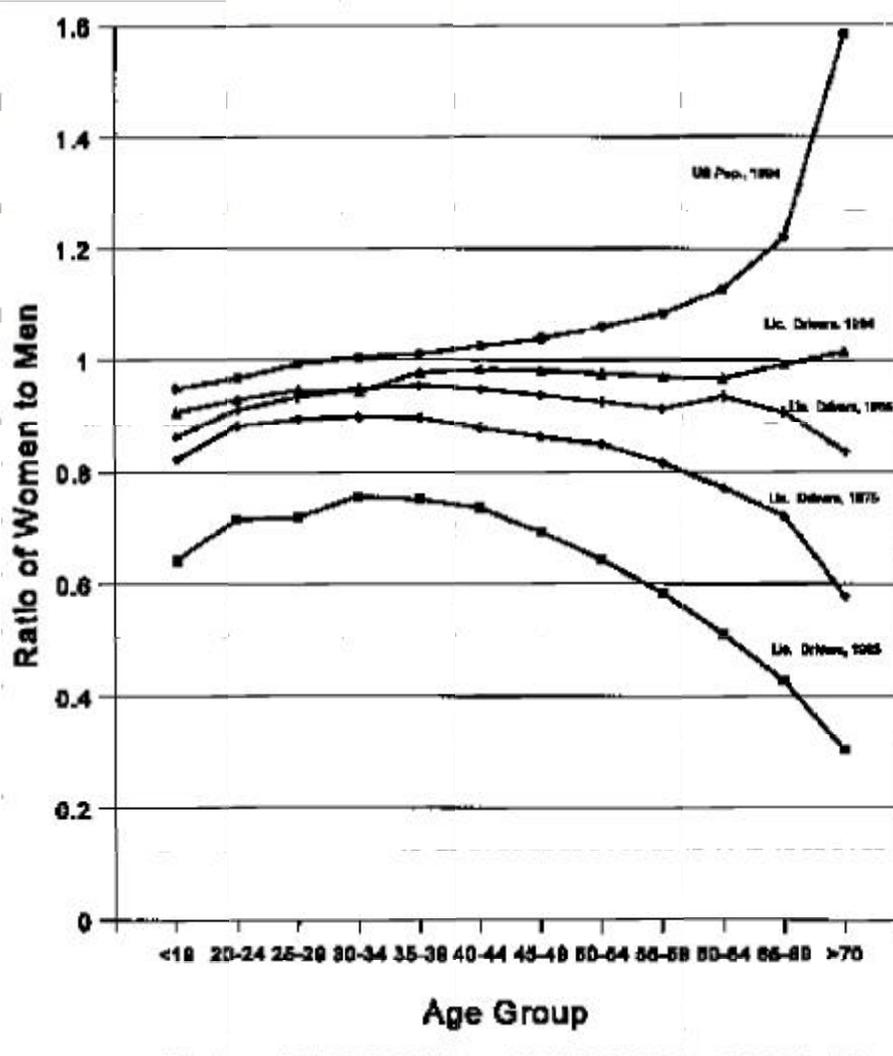
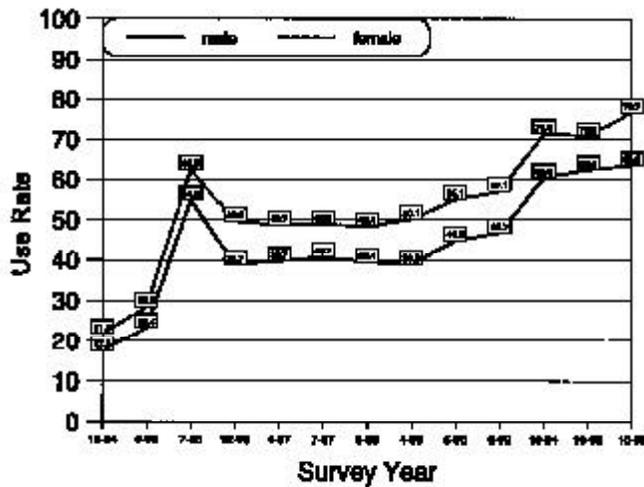


Figure 2
Safety Belt Use by Gender, Michigan, 1984-1996



In the last three direct observation surveys of safety belt use (1994, 1995, and 1996), belt use by both age and gender was collected, allowing the calculation of an estimated belt use rate as a combined function of these variables. Figure 3 shows safety belt use rates for passenger cars by age group, gender, and survey year. The results indicate that for all groups, males (solid lines) have lower use rates than females (dotted lines). Within each gender group, the 16 to 29 year old age groups shows the lowest belt use rates while the 60 years old and older age group shows the highest rates. Both trends are consistent over the survey years studied and are supported by the Omnibus age and gender results on self-reported safety belt use. Finally, the percentage point difference in belt use rates between gender groups is markedly different for the youngest age group. To more clearly illustrate this result, Figure 4, shows the percentage point difference of females to males by age group and survey year. Note that in every survey year, the 16 to 29 year old age group shows large use rate disparities between gender groups and that this gender difference is greatly reduced for the older passenger car occupants.

Collectively, these safety belt use results show that the overall use rates for both men and women are increasing at approximately equal rates, with women using safety belts more frequently than men. When the results are considered in light of the combined variables of age and gender, we find that for both gender groups, safety belt use increases with age. However, men under age 30 show the lowest use rate and the rate may be decreasing. This low use rate for young males and increasing use rate for young women resulted in a more than 21 percentage point difference in use rates between these groups. Thus, the safety belt use rate data from Michigan suggest that the risk-taking behavior of women decreases with age and, especially in the youngest age group, is much less frequent than men.

Figure 3
 Safety Belt Use by Age, Gender, and Year
 Passenger Cars in Michigan

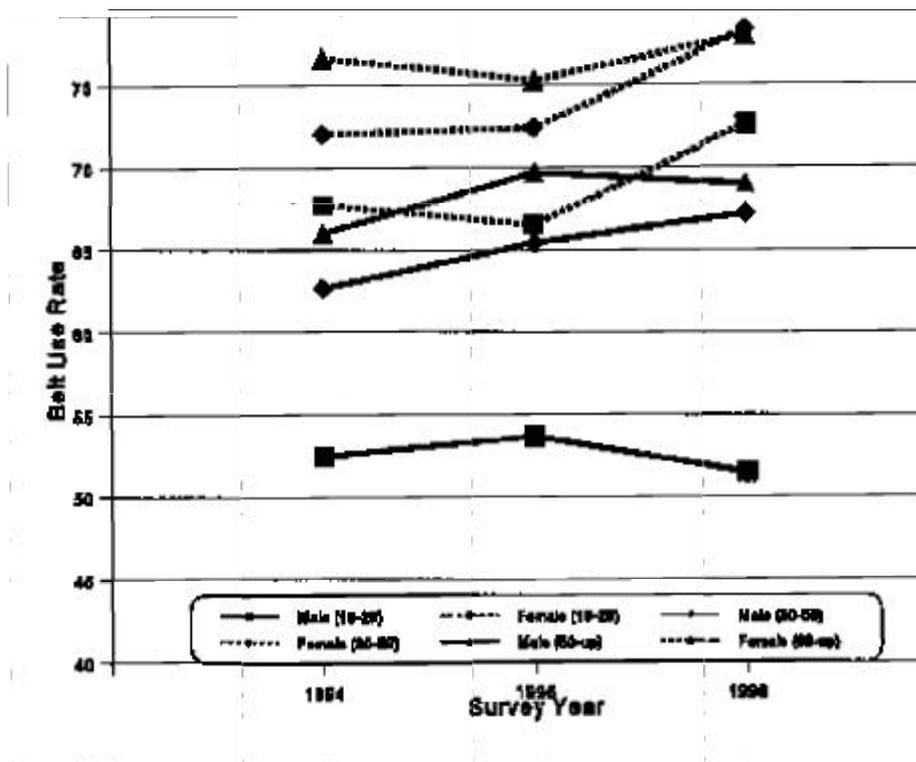
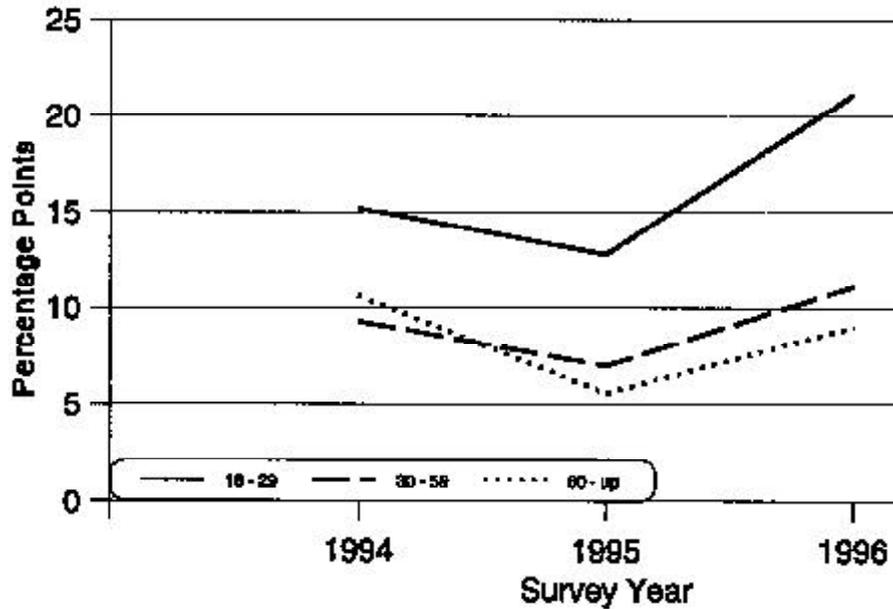


Figure 4
Gender Difference in Safety Belt Use Rates by Age and Year (percentage points)



DRINKING AND DRIVING

HAD BEEN DRINKING CRASHES

We explored drinking and driving in Michigan by examining 1987 and 1994 Michigan Motor Vehicle Crash files for vehicle crash records where a driver was reported to have been drinking (HBD) by an officer at the crash scene. Table 6 shows, by age and gender, the proportions of HBD crashes relative to all crashes, the rates of HBD crashes per 1,000 licensed drivers, and the number of HBD crashes in 1987 and 1994.

As can be seen in this table, the proportion of HBD crashes to all crashes, the HBD crash rates, and the total number of HBD crashes have declined from 1987 to 1994 for both men and women and all age groups examined. However, men continued to have higher numbers and rates of HBD crashes than women in 1994, and male HBD crashes comprised a greater proportion of all crashes involving males than the proportion of female HBD crashes. The magnitude of the declines in the proportion of HBD crashes and HBD crash rates for men and women by age group indicates that, overall, men and women experienced declines of about one third in the relative proportion of HBD crashes from 1987 to 1994. Collectively, these results show that the high-risk behavior of drinking and driving, as measured by HBD crashes, is becoming less frequent for men and women of all ages and that women are much less likely to drink and drive than men of the same age.

Table 6

Had Been Drinking Crashes by Age and Gender, Percentage of All Crashes, Rates per 1,000 Licensed Drivers, and Number of Crashes in 1987 and 1994

	1987			1994		
	Men	Women	Total	Men	Women	Total
<25	8.5%*	2.8%	6.4%	5.6%	1.6%	4.0%
	17.4**	3.7	10.8	9.4	1.9	5.7
	10,772***	2,133	12,905	4,915	940	5,855
25-64	8.5%	2.8%	6.2%	6.4%	2.2%	4.5%
	8.5	1.7	5.1	5.4	1.3	3.3
	18,721	3,793	22,514	12,508	2,978	15,486
65+	2.9%	0.6%	2.0%	2.1%	0.5%	1.4%
	1.7	.23	1.0	1.1	.17	0.6
	673	91	764	497	82	575
Total	8.2%	2.7%	6.0%	5.8%	1.9%	4.2%
	9.4	1.9	5.7	5.5	1.2	3.3
	30,166	6,017	36,183	17,920	4,000	21,920

* Proportion of all crashes

** Rate per 1,000 licensed drivers

*** Number of crashes

SINGLE VEHICLE NIGHTTIME CRASHES

Alcohol use in driving may be under-reported in HBD crash records because it is reported by police at the site of crash, often without the benefit of alcohol testing, and tends to be conservative. Single vehicle nighttime crashes are sometimes used as a proxy for alcohol involved crashes. We examined the frequency and rate of such crashes per 1,000 licensed drivers by age and gender (Table 7). The tables indicate that, although rates were higher for men than for women in every comparable age group in both 1987 and 1994, men experienced a decline between 1987 and 1994, while women experienced an increase in their single vehicle nighttime crash rate. An examination by age group shows that the single vehicle nighttime crash rate for both men and women less than 25 years of age declined between 1987 and 1994, but the decline in crash-rate was much smaller for the women. For the older age groups, the trends were opposite; that is, both men and women showed an increased involvement rate in single vehicle nighttime crashes between 1987 and 1994 and the increases were much larger for the women.

At first glance these results might suggest that older drivers of both genders were drinking and driving more frequently in 1994 than in 1987 and that the youngest drivers were drinking and driving less frequently. Such an interpretation is only supported by the previous data on HBD crashes (Table 6) for the youngest age group. An alternative explanation is that the increase in single vehicle nighttime crashes for drivers 25 years of age or older results from an increase in exposure. Without further analysis, neither explanation can be rejected, but if exposure partially accounts for the result, then the use of single vehicle nighttime crashes as a proxy for alcohol involved crashes may be inappropriate for older drivers.

Table 7
Single Vehicle Nighttime Crashes by Age and Gender Rates per
1,000 Licensed Drivers Number of Crashes in 1987 and 1994

<i>1987</i>				<i>1994</i>		
	Men	Women	Total	Men	Women	Total
	30.3*	11.8	21.4	26.9	11.6	19.4
<25	18,737**	6,739	25,476	14,032	5,849	19,881
	12.2	4.7	8.5	12.5	6.0	9.2
25-64	27,064	10,340	37,404	28,919	13,975	42,894
	2.9	.92	1.9	3.5	1.3	2.3
65+	1,118	363	1,481	1,556	634	2,190
	14.6	5.5	10.1	13.6	6.1	9.8
Total	46,919	17,442	64,361	44,507	20,458	64,965

* Rate per 1,000 licensed drivers

** Number of crashes

CONCLUSIONS

The purpose of this paper was to explore the possibility that increases in risky driving behaviors at least partially account for the increase in the proportion of women in all fatal motor vehicle crashes. The increased exposure of women to potential crashes has been well documented— more women are driving than ever before and they are driving more miles.

We examined several data sources in order to determine whether risky driving behaviors in women has been increasing. The evidence showed that certain risky driving behaviors of women have been increasing, while others have been decreasing. In general, for all risky driver behaviors examined, men showed higher risk in driving than women. The increased womens share of fatal motor vehicle crashes results partially from an increase in women risky driving practices at least for some age groups. Older women generally do not engage in the risk-taking behaviors examined. The various analyses showed that they are the group least likely to speed, follow too closely, and drink and drive. They also have the highest rate of safety belt use. However, there are more of them driving and they are driving more miles. Therefore, their increased presence in the single vehicle nighttime crashes is most likely due to increased exposure.

Our investigation of short-following headways showed that, overall, men had higher involvement rates than women, and young drivers had higher involvement rates than all older drivers. When comparing across years, we found that the greatest increase in the rate of involvement for this type of crash was for young drivers of both genders, with young women showing the greatest increase. While two points in time is not enough to make definite conclusions about trends, the results suggest that more young women are engaging in the high risk practice of “tailgating” than were in the past.

The analysis of driving speed showed a large gender effect, with males driving faster than females, and a large age effect, with the younger drivers more likely to travel at faster speeds than the middle-aged or older drivers. While the rate of speed-related crashes has remained fairly stable for the driving population of Michigan between 1987 and 1994, there was an increase in the rate for the group of youngest female drivers. While this increase was not large it indicates, as does the following headways data, that young women in 1994 were engaging in higher risk driving in 1994 than they were in 1987.

The investigation into safety belt use showed that use has increased overall between 1984 and 1996 and continues to increase. It also showed that women of all ages are more likely to use safety belts than men and that the difference in use rates has remained fairly stable over the years. Considering only the women, we find that the lowest use rate is for the youngest women. Inasmuch as safety belt use relates to other risky driving practices, these results show that both men and women are engaging in risky driving less frequently over time.

Examination of single vehicle nighttime crashes shows an increase in the rate of involvement of middle and older drivers, with a greater increase for women than men. While these crashes have been used as a proxy for alcohol-related driving in the past, when young males were over involved in this type of crash, the proxy relationship is probably no longer true. It appears more likely that the increase in the rate of these crashes among middle and older drivers, especially women, may be due to their greater exposure to these crashes.

The evidence examined in this study suggests that the increased presence of women in fatal crashes may be partially due to the fact that younger women are engaging in risky driving behaviors more than ever before. A similar argument cannot be made for middle-aged and older women who, in the behaviors examined, are either engaging in risky driving less frequently or the same amount than in the past. However, these two age groups of women drivers are showing up more frequently in single vehicle nighttime crashes. When this result is considered alongside the fact that the percentage of women in the driving population is increasing, especially for the older age groups (Figure 1), it can be argued that they are appearing more frequently in single vehicle nighttime crashes because of increased exposure. Thus, we suggest that the increased percentage of women in fatal motor-vehicle crashes results from two factors, increased risk-taking in younger women drivers and increased exposure in older women drivers.

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