

Identifying Factors That Predict Teen Driver Crashes

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In 2009, there were 140 fatalities and 4,462 injuries resulting from 17,673 traffic crashes in North Dakota (NDDOT 2009). Teen drivers are disproportionately represented in these numbers. The increased crash risk for teen drivers is well established. The goal of this research is to identify those crash risk factors exhibited by North Dakota teens which may be used to develop interventions aimed at reducing crashes and ultimately injuries and fatalities resulting from crashes.

Methods

The sample was limited to teen drivers, ages 14 to 17 holding a class D license. Only drivers who first passed their road test between January 1, 2006 and December 31, 2008, and did not re-take the test during the same timeframe, were selected for the analysis. The sample consisted of 20,392 drivers. These drivers were involved in a total of 317 crashes resulting in an injury or fatality during their first year of licensure.

North Dakota Teen Crashes

The population of currently licensed drivers was compared by age group to the crashes involving those drivers. Teen drivers are found to be disproportionately over-represented in the crashes. From Figure 1, we see that this over-representation exists in the 14- to-18 and the 19-to-24 age groups.

This over-representation persists when the data is limited to crashes that result in an injury or a fatality. Figure 2 shows that the two youngest groups are again over-represented in the crashes while the next two oldest age groups are roughly equally represented. The remaining age groups again are under-represented in the crashes.

Not only are North Dakota teens over-represented when comparing crashes to licensed drivers, but newly licensed teen drivers in North Dakota are also at increased risk of being in a crash. Analyzing crashes by months after licensure shows that the crash rates for the first seven months range from fewer than 70 per 10,000 to a high of 107 per 10,000 and represent the riskiest months for novice teen drivers (Figure 3). This rate drops after the seventh month and remains under 60 for the rest of the 24 month period. From the first month to the twenty-fourth month, the crash risk drops by just over 75%.

Breaking the crash rates down in Figure 4 by the type of crash yields similar-looking functions when compared to all crashes. Rates for both types of crashes drop considerably after the seventh month and remain low, again decreasing by just over 75% from the beginning until the end of the 24-month period after licensure.

Figure 1. Comparison of All Crashes to Licensed Drivers, 2006 to 2008.

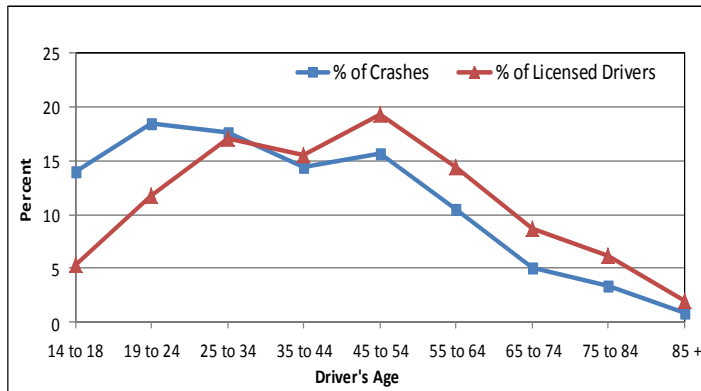


Figure 2. Comparison of Injury and Fatal Crashes to Licensed Drivers

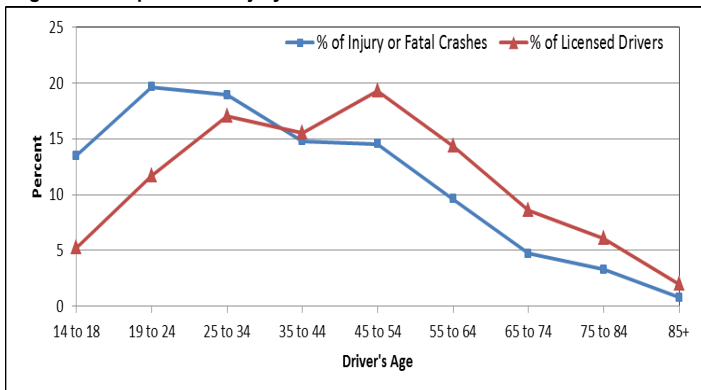


Figure 3. Crash Rates by Months since Licensure

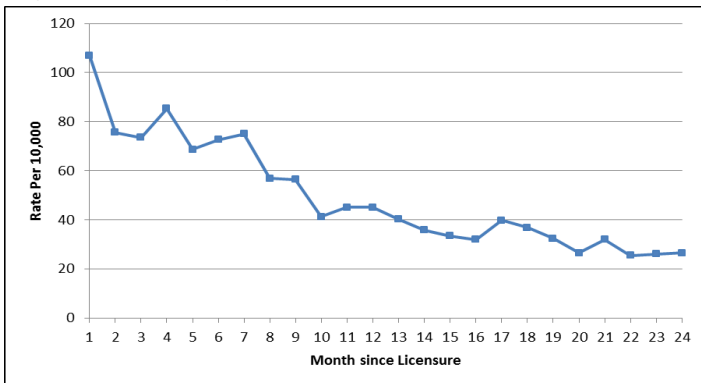
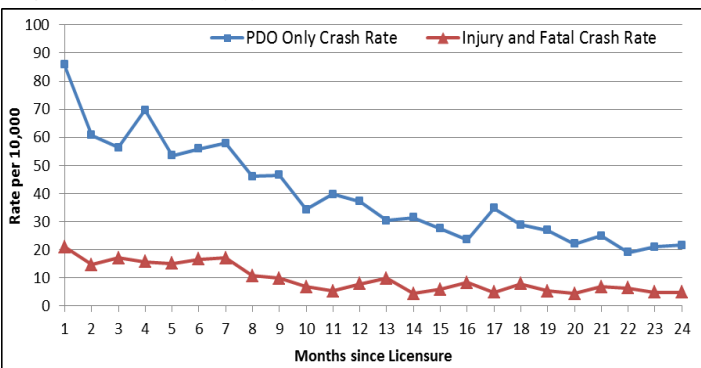


Figure 4. Crash Rates by Type of Crash and Months since Licensure



Predictor Variables

Of the 20,392 drivers in the dataset, 51.2% were male; however, females had a higher crash rate during the first year after licensure. The percentage of females that had a crash was 1.85% compared to 1.27% for males, which represents a statistically significant difference. Crash rates increase with age, from a low of 1.44% for age 14 to a high of 2.02% for age 17. There is no significant relationship between age at time of licensing and crash rates.

Of the drivers in the sample, 60% live in rural areas and 40% in urban areas (Fargo including West Fargo, Grand Forks, Bismarck, and Minot). The percentage of drivers involved in an injury or fatal crash in the first year after licensure is more than double in the urban areas compared to rural areas, 2.36% compared to 1.02%, respectively. This difference is statistically significant.

Previous property damage only (PDO) crashes have also been identified as predictive of future crashes. Among those drivers who did not have a prior PDO crash, the percentage having an injury or fatality crash was 1.49%, while 24.59% of drivers who had at least one prior PDO crash had an injury or fatality crash within the first year after licensure. The differences between at-fault and not at-fault drivers is not significant in predicting a subsequent crash.

Variable	Level	Model Name	Model Value	N	Crash %
Gender*	Female	Gender	0	9,948	1.85%
	Male		1	10,444	1.27%
Age 14 at Licensure	No	age14	0	14,848	1.60%
	Yes		1	5,544	1.44%
Age 15 at Licensure	No	age15	0	12,918	1.61%
	Yes		1	7,474	1.46%
Age 16 at Licensure	No	age16	0	15,242	1.54%
	Yes		1	5,150	1.61%
Age 17 at Licensure**	No			18,168	1.50%
	Yes			2,224	2.02%
Convictions**	0	conv	0	19,010	1.59%
	1+		1	1,382	1.01%
Risk Convictions	0	riskconv	0	16,818	1.57%
	1+		1	3,574	1.48%
Rural/Urban*	Rural	rur_urb	0	12,240	1.02%
	Urban		1	8,152	2.36%
Previous PDO Crash*	0	pdo	0	20,331	1.49%
	1+		1	61	24.59%
Previous At-Fault PDO Crash*	No	atfault	0	20,375	1.55%
	Yes		1	17	11.76%

Results

Four variables were found to be statistically significant. They are gender, previous convictions, rural/urban residence, and previous PDO crashes. The independent variables resulted in 60.4% concordance of predicted and observed dependent values. Males are almost 30% less likely to be involved in an injury or fatal crash in the first year after licensure, contrary to other crash research which suggests that males are more at risk of being in a crash than females. Having previous convictions is also shown to decrease a driver's odds of being in an injury or fatal crash by almost 50% which is also contrary to current thinking. These differences may be explained by the fact that only data from the first year after licensure is analyzed, while most of the literature disregards time since licensure. Males may be better drivers early on and getting a citation may serve as a warning to the teen drivers.

Teen drivers living in urban areas are almost 2.5 times more likely to be involved in an injury or fatal crash within the first year after licensure than those living in a rural area. This difference could be a matter of driving exposure with urban drivers driving more miles than rural drivers. Further research is necessary to better understand what is behind this difference. The most influential predictor of an injury or fatal crash is a previous property damage only crash. Drivers who have at least one PDO crash are more than 25 times more likely to be involved in an injury or fatal crash in the first year after licensure.

Conclusion

This research focuses on teen drivers, identifying several markers for predicting crashes including involvement in a previous PDO crash, gender, prior citations, and population density. These indicators provide a basis for future research and the development of strategies to target at-risk drivers and attempt to modify their behavior or driving experience. Possible interventions could include developing a graduated driver's license program, requiring additional parental supervision or some type of reinforcement or reminder letter after a teen driver receives a moving violation or is involved in an accident. These are ideal points in time to change a driver's behavior simply because they are easily identifiable markers and are shown here to predict more severe crashes down the road. This ability to predict crashes could one day lead to measures which save lives, prevent injuries, and reduce the severity of injuries.



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