The University of Texas at Austin
Urban Information Lab (UIL)

Analysis of Motor Vehicle Crashes Related to Drinking and Driving in Travis County

Dr. Junfeng Jiao
Alizer Khowaja

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Overview

The UIL conducted a holistic analysis of drunk-driving crashes occurring in Travis County, Texas between 2012 and 2017. This report aims to highlight patterns among statistical, spatial, and temporal aspects of crash data received from TxDOT. Statistical analysis of this data uncovered a variety of unique findings about the nature of drinking related accidents relative to the built environment and human behavior.

Highlights of this analysis include the following: a steady rise in drinking related accidents, which are most likely front-end collisions, occurring along intersections of four and six lane roadways, with speed limits between 30 and 55 MPH, during the evening and night hours of the day.

Figure 1. Map of Drinking Related Crashes in Travis County, Texas
Figure 2. Relative Density Map of Drinking Related Crashes in Travis County, Texas
Statistical Analysis

Drunk-driving crash data collected for Travis County between 2012 and 2017 revealed 8,507 unique geographical points with 82,872 total accidents. Since the number of individuals involved is about 10 times higher than the number of unique geographical points, it can be concluded that there are several instances where many accidents occur at the same location and often due to similar contributing factors. To add on, the most common contributing factors of drunk-driving collisions (in order of frequency) are driver inattention, failure to yield or stop, and speeding. As the number of drinking related accidents continues to rise in Travis County (following the statewide trend), an apparent need exists for more effective measures to target the three key contributing factors mentioned above and reduce the frequency of drunk-driving crashes in the future.

![Figure 3. Crash Count by Severity](image1)

![Figure 4. Crash Count by Year](image2)

Drinking related crashes tend to occur near areas with moderate to high residential development suggesting that not everyone who drives while drunk will get into an accident. Though serious and fatal drunk-driving accidents occur sparsely across the region, they continue to pose a threat to other innocent drivers across Travis County during late night hours.
Four and six lane roadways (common along collector and arterial roadways) were major collision areas accounting for 41% of drunk driving accidents. Six lane roadways also have double the crash frequency compared to four lane roads. A similar pattern is also found between four and eight lane roads (urban interstates).

Speed limit data shown below in Figure 6 further supports the argument that drunk-driving accidents are more likely to occur on local roadways that carry moderate to high traffic volumes (in terms of average daily traffic) and have a speed limit most likely between 30 and 55 MPH. Because arterial and collector roads commonly have similar speed limits, it can be inferred that these roads primarily connect residential areas to high activity corridors. Reviewing the total length of roads by speed limit in Travis County further supported the previous statement as many roadways had speed limits between 30 to 55 MPH.
Figure 7 on the right suggests that the number of crashes at intersections are also very high (making up 63% of drunk-driving accidents). From these three key metrics [lane configurations, speed limits, and intersection flags], it is possible that prior to crashing, drunk-drivers take a cognizant approach to use arterial and collector roads and are unable to maneuver the complicated layouts of intersections due to the complications of intoxication.

From the bar chart below, it is even more evident that drunk-driving accidents are primarily caused by front-end collisions. This type of collision occurs at rate of 46% suggesting that it is intoxicated drivers who are at fault after collisions. Front-end collisions were categorized by direction to include 11, 12, and 1 O’CLOCK fields shown in Figure 8.

Figure 7. Crash Count by At Intersection Flag

Figure 8. Crash Count by Direction of Force During Accident
In *Figure 9*, the age distribution of drunk-driving accidents across Travis County illustrates a clear pattern. Crash frequency rapidly rises among people in late-teens and early-twenties. In the case of Travis County, crash frequency within a seven year period (2012 to 2017) peaks at age 22. After this peak, drinking related collisions then steadily fall as age increases. Additionally, the pattern in the bar chart below aligns strongly with published research conducted on the topic of age and its relation to drinking related accidents.

![Figure 9. Crash Count by Age of Driver](image-url)
Spatial Analysis

Using the spatial autocorrelation feature found in ArcMap, it was determined that drunk driving crashes within Travis County were highly correlated and statistically significant. According to the very low z-score of -3.95, the crash points are highly clustered along commonly used roads. According to published research conducted on the topic of drunk-driving accidents, a large conflict exists on whether these drunk driving accidents are correlated to places where alcohol is sold (bars, restaurants, hotels, etc). When comparing the percent of land use dedicated to commercial areas to the number of crashes in each block group, the r-squared value resulted in 0.14 indicating low significance in addition to an equally adverse p-value.

Further analysis of published literature revealed that drunk driving crashes significantly correlated to the presence of intersections, average daily traffic, gas prices, adverse weather, and residential areas.
Temporal Analysis

*Figure 11* reveals how drinking related accidents are more likely to occur during the evening and early night hours. This unexpected finding is interesting in the sense that it contradicts existing research that has been conducted regarding temporal features of drunk-driving accidents. To add on, many studies find drunk-driving accidents to occur at a greater frequency during the late night and early morning hours. Distinction between theoretical and experimental peak crash hours serves as an opportunity to further analyze drinking patterns of people in Travis County.

A local peak of crash frequency found in the one hour period following 2:00am is most likely explained by the “Last Call” law which forces Texas bars to close at 2:00am.

*Figure 11. Crash Count by Time (1-hour intervals)*
Citations


