

# Addressing Alcohol/Drug Impairment among Pedestrians and Bicyclists on College Campuses

Texas A&M Transportation Institute  
Center for Transportation Safety

Project Technical Report



## TECHNICAL REPORT DOCUMENTATION PAGE

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<p>7. Abstract Researchers sought to understand and identify alcohol/drug impairment among college-aged pedestrians and bicyclists, which is an emerging concern in traffic safety. Researchers were interested in understanding whether college students believed impaired walking/biking was viewed as a safer alternative to driving impaired, the factors and circumstances that may lead to walking/biking impaired, and effective platforms for conducting outreach and education with college students. The research questions were addressed by conducting a survey, facilitating focus groups, and performing crash data analysis.</p> <p>Survey and focus group data supported anecdotal evidence that young people believe impaired walking/biking is a safer alternative to driving. Most participants did not believe that impaired walking/biking was a problem in their college campus communities. However, they supported the development and inclusion of initiatives that directly addressed impaired walking/biking into current impaired driving education campaigns.</p> <p>Crash data analysis demonstrated that an older cohort – primarily in their 40s – were more likely to be involved in impaired pedestrian/bicyclist injuries in 2019. The development of outreach and education initiatives with this older population was outside the purview of this project, but it is critical to ultimately reducing alcohol/drug impaired injuries.</p> <p>This report will be updated with completed project deliverables.</p>	
<p>8. Key Words: [Add 3 – 4 keywords] Impaired pedestrians, Impaired bicyclists, alcohol and pedestrian safety, alcohol and bicyclist safety, impairment and college students</p>	

# BACKGROUND

## RESEARCH PURPOSE STATEMENT

This is an education-awareness project focused on understanding and preventing college students from walking/biking impaired to ultimately help reduce alcohol/drug impaired injuries.

## THE PROBLEM

The issue of walking and biking impaired almost sounds laughable, at first, but it is no joking matter. According to a National Highway Traffic Safety Administration (NHTSA) report released in 2019, an estimated 32% ( $n = 1,903$ ) of fatal pedestrian crashes involved a pedestrian with a blood alcohol concentration (BAC) of 0.08 g/dL or higher in 2017 (the most recent year data were available). When fatal pedestrian crashes involving a pedestrian with a BAC greater than 0.00 g/dL were included, alcohol involvement in crashes that resulted in pedestrian fatalities rose to 36% ( $n=2,141$ ).<sup>1</sup> Similarly, an estimated 20% of fatal bicycling crashes had a pedacyclist with a BAC of 0.08 g/dL or higher in 2018. When BACs greater than 0.00 g/dL were included, that percentage rose to 25%.<sup>2</sup>

Educating pedestrians and bicyclists about impairment risks should be a focused effort in Texas. In fact, many Texas traffic safety stakeholders have recognized the impairment problem and have called for action. The 2018 Texas Strategic Highway Safety Plan (Texas SHSP) recommended the implementation of a campaign about drugged and drunk walking. It was suggested that future efforts identify alternatives to impaired walking and biking and working with the Texas A&M Transportation Institute U-in-the-Driver Seat (UDS) Program to create awareness around walking and biking issues for young drivers and pedestrians.<sup>3</sup>

Recognizing a traffic safety gap area, the Center for Transportation Safety (CTS) funded the project *Addressing Alcohol/Drug Impairment among Pedestrians and Bicyclists on College Campuses* in FY 2020. The project's major components included:

1. Administering a survey to identify impaired walking/biking attitudes and behaviors
2. Facilitating focus groups to discuss the factors and circumstances that can lead to impaired walking and biking
3. Conducting in-depth crash data analysis to characterize alcohol and drug involvement in pedestrian and bicyclist injuries

## RESEARCH QUESTIONS

Anecdotal evidence suggests that the public - especially young adults - have largely recognized the dangers and risks associated with driving impaired. And, the ubiquity of cellphones and ridesharing services like Uber and Lyft have made it easier than ever to make safe alternatives to driving impaired. However, one area that's not well understood is whether walking and biking impaired may be perceived as a safer alternative to driving impaired.<sup>4,5</sup>

The research team sought to answer the following questions:

1. Do college students believe impaired walking/biking is a:

- A. problem in their college campus communities?
- B. safer alternative to driving impaired?
- 2. What are the factors and circumstances that may lead college students to walking/biking impaired?
- 3. What are effective platforms for educating college students on the dangers and risks of walking/biking impaired?
- 4. Does Texas crash data support the State’s recommendations to develop prevention and awareness campaigns centered around impaired walking/biking?

## RESULTS

### SURVEY

The research team conducted an online survey of college-enrolled students concerning their attitudes and behaviors toward impaired walking/biking. The survey was completed by 153 participants. **Table 1** provides an overview of survey participant demographics and general walking/biking behavior.

**Table 1. Survey Participant Demographics and General Walking/Biking Behavior**

Survey Question	Most Common Survey Response	
<b>Gender</b>	55% were female	
<b>Ethnicity</b>	42% were Hispanic or Latino	
<b>Age</b>	63% were 21-24 years old	
<b>Walking/Biking Behavior</b>	53% walked daily	30% biked daily
<b>Hours Walking/Biking</b>	66% walked/biked between 8:00 AM – 5:00 PM	

Participants were asked to self-report walking/biking behaviors in the past 30 days. Some questions were asked to determine how often participants engaged in general pedestrian/bicyclist safety, like crossing at crosswalks and wearing a helmet. Other questions were asked to determine the involvement of alcohol and/or marijuana in their behaviors. **Table 2** contains selected self-reported walking/biking and driving/ridesharing behavior of survey participants in the past 30 days.

**Table 2. Selected Questions from Self-Reported Walking/Biking and Driving/Ridesharing Behavior in Past 30 Days**

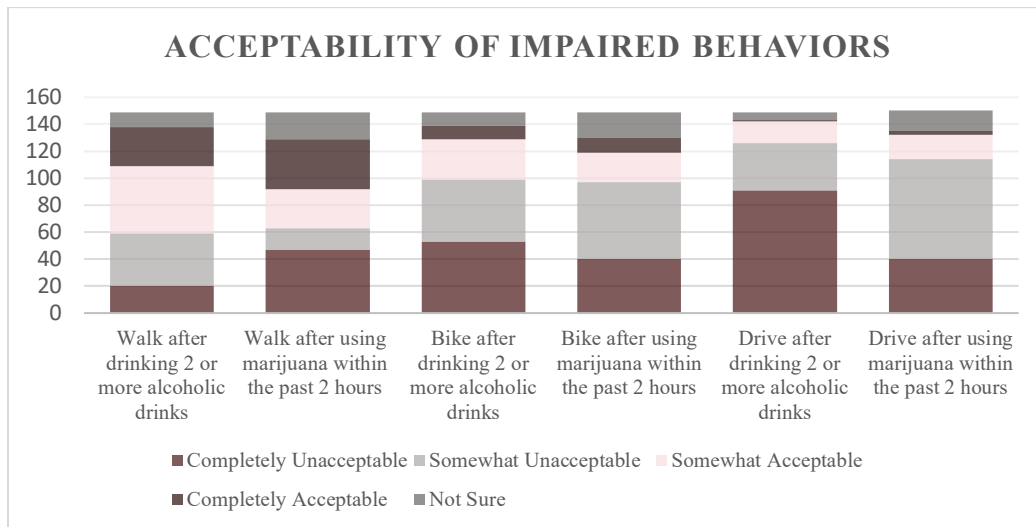
Behavior	Percent Who Answered “Very Often” or “Always”	Percent Who Answered “Sometimes”	Percent Who Answered “Not Often” or “Never”
<b>Walking</b>			
Walked after drinking 2 or more alcoholic drinks?	15%	29%	56%
Walked after using marijuana within the past 2 hours?	11%	23%	66%
Walked because you planned on drinking or using marijuana?	15%	21%	63%

Behavior	Percent Who Answered “Very Often” or “Always”	Percent Who Answered “Sometimes”	Percent Who Answered “Not Often” or “Never”
<b>Biking</b>			
Biked after drinking 2 or more alcoholic drinks?	9%	16%	74%
Biked after using marijuana within the past 2 hours?	13%	13%	74%
Biked because you planned on drinking or using marijuana?	10%	22%	68%
<b>Driving and Ridesharing</b>			
Drove after drinking 2 or more alcoholic drinks?	7%	26%	67%
Drove after using marijuana within the past 2 hours?	14%	6%	80%
Used alcohol and drugs at the same time?	13%	17%	70%
Used ridesharing or other transit services because you planned on drinking or using marijuana?	17%	25%	58%

Most participants did not report walking/biking or driving after drinking two or more alcoholic drinks; the same trend was seen for using marijuana within the past 2 hours. Among those who reported “very often” or “always,” participants were more likely to bike (23%) or walk (15%) than drive (7%) after drinking 2 alcoholic drinks. This data supports anecdotal evidence that college students perceive walking/biking is a safer alternative to driving impaired by alcohol.

Among those who reported “very often” or “always,” participants were more likely to drive (14%) versus bike (13%) or walk (11%) after using marijuana within the past 2 hours. This data supports anecdotal evidence that the public believes marijuana is not as impairing as alcohol.

Finally, participants were asked a series of questions concerning alcohol and drug acceptability. Most participants (61%) indicated it was “completely unacceptable” to drive after drinking 2 or more alcoholic drinks. Walking (19%) and biking (28%) were viewed as more acceptable behaviors after drinking 2 or more alcoholic drinks. Surprisingly, walking after using marijuana within the past 2 hours was viewed as more unacceptable than driving (32% vs. 27%, respectively). **Figure 1** is a breakdown of the acceptability of impaired behaviors.



**Figure 1. Acceptability of Impaired Behaviors**

## FOCUS GROUPS

The focus group activity included a total of 10 students who participated across two focus group sessions. Participants were at least 18 years old, enrolled at a Texas university, and had experience walking/biking through their respective campuses/communities. Some also had experience with impaired walking/biking.

Of the 10 participants, only 1 believed that walking/biking impaired was a problem on their college campus community. Several others indicated that while they did not consider walking/biking impaired to be problematic, they were “cognizant” that it was happening on a frequent basis. For instance, one participant indicated he received notifications about local DWIs and publication intoxication incidents. Although he only recalled reading 1 or 2 impaired walking/biking reports, he believed it was happening more often based on his own experience walking through the entertainment district on a given night.

All participants indicated some level of advance planning before departing for the night, ranging anywhere from 15 minutes - 2 hours in advance. What was less clear from the discussion is how often original plans were kept. Factors that contributed to a change in plans were:

- Own level of inebriation (i.e., if they anticipated drinking minimally, did they stick to it?)
- Friend group (i.e., has their safe ride home left early, or has a friend become sick?)
- Weather (i.e., is it storming?)
- Hunger pangs (i.e., taking a detour to “Taco Bell”)
- Surge pricing and availability of rideshare services

With the rise and ubiquity of cellphones and ridesharing services, participants were asked if there were times when they would not take Uber/Lyft to get home after a night out. Surge pricing and availability were the most common responses and cited by nearly all participants. One participant indicated that after drinking on a weekend night, he walks home because it will be “quicker and saves money” than waiting on a rideshare. Other less frequent responses included proximity to home, fear of unknown drivers, and phone or app issues (i.e., lack of battery/data, or the app not loading).

When participants were asked what would influence them to not walk/bike impaired, they cited controlled rideshare surge pricing and better availability, extended campus bus shuttle service on weekends and nights, and a general awareness of the walking/biking impaired problem.

## CRASH ANALYSIS

### 1.1.1 Pedestrians

From 2015-2019, there were 31,289 pedestrians injured in motor vehicle crashes. Of these, 6% (n=1,816) involved impaired pedestrians. In 2019, of the 354 impaired pedestrians injured, 72% (n=251) were killed. **Table 3** provides a descriptive summary of crash injury characteristics involving impaired versus unimpaired pedestrians in 2019.

**Table 3. 2019 Impaired and Unimpaired Pedestrian Crash Injury Characteristics**

Most Common Crash Injury Characteristics	Impaired Pedestrians	Unimpaired Pedestrians
Crash Injury Hour	9:00 PM	6:00 PM
Crash Injury Roadway System	Local Road/Street	Local Road/Street
Crash Injury County	Harris (27%)	Harris (22%)
Average Age of Pedestrian	43 years old	38 years old
Gender	Male (75%)	Male (59%)
Ethnicity	Hispanic (38%)	White (35%) & Hispanic (35%)
Average BAC (<0.00 g/dL)	0.19 g/dL	N/A
Average BAC (≤0.08 g/dL)	0.21 g/dL	N/A
% with a Positive Drug Result	51%	N/A
Average BAC of those with a Positive Drug Result	0.18 g/L	N/A

The impaired pedestrian crash rate per 100,000 people was calculated, as shown in **Table 4**. Kenedy County had the highest impaired pedestrian crash rate per 100,000 people, meaning an impaired pedestrian was more likely to be involved in a motor vehicle crash in Kennedy than in Harris County, the most populous county in Texas.

**Table 4. Top 10 Counties with Highest Impaired Pedestrian Crash Rate Per 100,000 People in 2019\***

County Rank	County	Impaired Pedestrian Crash Rate Per 100,000*
1.	Kenedy	242.7
2.	Culberson	46.4
3.	Hudspeth	27.4
4.	Red River	16.6
5.	Refugio	14.7
6.	Winkler	13.0
7.	Coleman	11.8
8.	Bexar	11.5
9.	Washington	11.2
10.	Eastland	10.9

*\*This list does not include counties where there were less than 3 pedestrian crashes*

### 1.1.2 Bicyclists

From 2015-2019, there were 12,543 bicyclists injured in motor vehicle crashes. Of these, 2% (n=194) involved impaired bicyclists. In 2019, of the 42 impaired bicyclists injured, 57% (n=24) were killed. **Table 5** provides a descriptive summary of crash injury characteristics involving impaired versus unimpaired bicyclists in 2019.

**Table 5. 2019 Impaired and Unimpaired Bicyclist Crash Injury Characteristics**

Most Common Crash Injury Characteristics	Impaired Bicyclists	Unimpaired Bicyclists
Crash Injury Hour	Tie - 6:00 PM & 9:00 PM (14%)	5:00 PM (9%)
Crash Injury Roadway System	Local Road/Street	Local Road/Street
Crash Injury County	Harris (26%)	Harris (21%)
Average Age of Bicyclist	47 years old	35 years old
Gender	Male (98%)	Male (82%)
Ethnicity	Tie - Hispanic & White (38%)	White (48%)
Average BAC (<0.00 g/dL)	.12 g/dL	N/A
Average BAC (≤0.08 g/dL)	.19 g/dL	N/A
% with a Positive Drug Result	43%	N/A
Average BAC of those with a Positive Drug Result	.07 g/dL	N/A
Helmet – Not Worn	98%	73%

The impaired pedestrian crash rate per 100,000 people was calculated, as shown in **Table 6**. **Table 4**. Matagorda County had the highest impaired bicyclist crash rate per 100,000 people, meaning an impaired bicyclist was more likely to be involved in a motor vehicle crash in Matagorda than in Harris County, the most populous county in Texas. Eastland County was the only county that also overlapped as having the highest impaired pedestrian crash rate per 100,000 people.

**Table 6. Top 10 Counties with Highest Impaired Bicyclist Crash Rate Per 100,000 People in 2019\***

County Rank	County	Impaired Bicyclist Crash Rate Per 100,000*
1.	Matagorda	5.48
2.	Eastland	5.43
3.	Aransas	4.34
4.	Kleberg	3.07
5.	Hale	2.94
6.	Fannin	2.83
7.	Hopkins	2.69
8.	Walker	2.66
9.	Caldwell	2.33
10.	Bastrop	2.27

*\*This list does not include counties where there were less than 3 pedestrian crashes*

The research team also reviewed 2019 crash narratives for fatal and suspected serious crashes involving impaired pedestrians/bicyclists. Among the 170 narratives, 89% were pedestrian, 10% were bicyclist, and 1% were driver or unknown. Analysis of the pedestrian crashes found that 63% involved an impaired pedestrian engaging in illegal roadway behavior, including failing to



yield right of way to a vehicle, crossing a highway where pedestrians are not permitted, or attempting to cross a road way outside of a crosswalk, as shown in **Table 7**.

Comparatively, 8% of bicyclists engaged in illegal behavior at the time of the crash. Illegal bicycling behavior was more difficult to determine based on local district ordinances, but generally it involved bicyclists located on expressways or highways, failing to yield right of way at a stop sign, crossing street cars having the green light, or riding in the center of a double yellow lane.

**Table 7. Impaired Pedestrians/Bicyclists Involved in 2019 Fatal and Suspected Serious Crashes**

Intentional Pedestrian/Bicyclist Involved in Illegal Behavior	Intentional Pedestrian/Bicyclist Involved in Legal Behavior	Unintentional Pedestrian	Law Enforcement/Other Unknown
N = 121	N = 23	N = 22	N = 4

## DISCUSSION

### APPLICATION TO REAL-WORLD SAFETY

The survey and focus group data supported evidence that college students perceived walking and biking to be safer alternatives to driving impaired. This was demonstrated by two series of survey questions: self-reported impaired behaviors taken in the past 30 days and the acceptability of impaired behaviors. In both series of questions, survey participants were less likely to drink and drive in the past 30 days than walk/bike, and they were more likely to consider drinking and driving unacceptable than walking/biking impaired.

Focus group participants also indicated that they didn't believe walking/biking impaired was a problem in their college campus communities although they could easily recall primary or secondary experiences. Focus group participants indicated they felt "more comfortable" walking/biking impaired because they had been walking/biking almost all of their lives and were "more in control" of their body (than a motor vehicle). It is well established that alcohol impairs cognitive functioning, affecting vision, speech, reaction times, memory, and the coordinated behaviors (like the ability to walk).<sup>6</sup> These results demonstrate that there is a significant need to educate young people on the dangers associated with walking/biking impaired.

Survey data also supported evidence that young people did not perceive marijuana to be as impairing as alcohol. Participants were twice as likely to indicate "very often" or "always" driving after using marijuana within the past 2 hours (14%) than after drinking 2 alcoholic drinks (7%) in the past 30 days. Surprisingly, walking after using marijuana within the past 2 hours was viewed more "unacceptable" than driving (32% vs. 27%, respectively).

This finding represents another education and outreach opportunity. In Texas, there are two intoxication definitions. The first is national standard of 0.08 g/dL (except in Utah, which is

0.05). However, the second and lesser known definition of intoxication is the loss of normal mental and physical faculties due to the introduction of alcohol, drugs, or any combination.<sup>7</sup> A common phrase repeated by impaired driving safety stakeholders is “impairment is impairment,” meaning that the substance that is doing the impairing is not as important as preventing the impairment from occurring in the first place, and if need be, enforcing the law.

Focus group participants indicated that universities could incorporate more bicyclist/pedestrian safety information into student orientation activities. This could include mandatory videos, interactive and informational outreach booths, discounts and incentives, and signage around campus. Additionally, participants encouraged partnerships between universities and prospective employers. For example, one participant suggested having a well-known employer host a symposium on “professionalism” and “not making dumb decisions, saying, “I would sit through a 30-minute seminar by a big engineering firm...to make those professional connections.”

Crash data analysis, however, supported that pedestrian and bicyclist injuries involving alcohol and/or drugs occurred more frequently among a slightly older population in 2019 – those in their 40s. However, this finding does not negate the need to educate young adults, so that they do not form unhealthy habits and behaviors that persist into older age. More research is needed to learn how to better incorporate educational messaging to the older cohort, which was outside the purview of this project.

## **HOW THE WORK STARTS TO ADDRESS THAT TRANSPORTATION SAFETY ISSUE.**

The project work serves as a preliminary step in better understanding alcohol and drug involvement in pedestrian and bicyclist crashes and injuries. This research demonstrates a significant need to further explore:

- (1) What, if any, education are universities currently providing to students concerning general pedestrian and bicyclist safety? What opportunities exist to incorporate impaired walking/biking safety messaging?
- (2) How can universities, prospective employers, and departments of transportation work together to encourage young people to make safe choices?
- (3) How can universities and ridesharing services work together to mitigate surge pricing on nights and weekends? What alternatives to ridesharing services exist in smaller, rural college communities?
- (4) How can national impaired driving campaigns incorporate walking/biking impaired safety messaging? How can current #planahead messaging be tweaked to include messaging about *keeping* safe plans? How should these outreach efforts differ from those targeted toward college students?

## **KEY STAKEHOLDERS**

Alcohol and drug involvement among pedestrians and bicyclists reach across several traffic safety areas, including:

- Colleges and Universities

- College Clubs and Student Organizations
- Employers
- Ridesharing Services
- Departments of Transportation and Paid Media Campaigns
- Community and Injury Prevention Coalitions
- General Public

## **TECHNICAL APPROACH**

The project involved three main activities: conducting a survey, facilitating focus groups, and performing crash data analysis. Below is a summary of how each activity was approached

### **SURVEY**

The research team developed a 9-question survey that could be completed in 10-15 minutes. The survey included a combination of demographic, behavior, and attitude/belief questions concerning pedestrian/bicyclist safety. Survey participant criteria included being at least 18 years old, enrolled at a Texas college or university, and must read/write English.

Due to the COVID-19 pandemic, the survey was conducted online. Targeted Facebook advertisements were used to recruit participants, who received a \$10 gift card to Amazon for participation. The ads were boosted in College Station, Austin, Houston, Arlington, San Marcos, Denton, and Lubbock – which are home to the largest universities and colleges in Texas.

### **FOCUS GROUPS**

The research team developed a 15-question focus group guide that would take 60-90 minutes. The focus group questions were centered around general walking/biking behaviors, alcohol and drugs and decision-making, impaired walking/biking, and effective education campaigns and platforms.

Targeted Facebook advertisements were used to recruit participants, who received a \$50 gift card to Amazon for participation. The ads were targeted in the same locations as for the focus group. All individuals were pre-screened for inclusion and notified of their rights prior to selection. The research team conducted 2 focus groups with college students which were held virtually July 27 and August 13, 2020.

### **CRASH DATA**

The research team pulled 2015-2019 impaired pedestrian/bicyclist crash data from the Texas Department of Transportation Crash Records Information System (CRIS) database. The data was reflective of CRIS as of August 28, 2020.

The term impaired has been used to describe any person involved in the crash who has met one or more of the following conditions:

- A blood alcohol concentration (BAC) greater than 0.00 g/dL

- Had a positive alcohol result
- Had a positive drug result
- Had a contributing factor flagged as:
  - Had Been Drinking
  - Taking Medication
  - Under Influence – Alcohol
  - Under – Influence Drug

Additionally, **the term *impaired* is used to describe individuals who had alcohol and/or drugs present in their system at the time of the crash.** However, especially in the context of drugs (other than alcohol), drug presence does not equate to *impairment*. The threshold for drug (other than alcohol) impairment is not well understood, and currently there is no standard terminology to refer to crashes and injuries where drugs were involved. Therefore, for the time being, the report continues to utilize the term *impaired*.

As part of the analysis, the research team pulled crash narratives for 2015-2019 impaired pedestrian/bicyclist fatal and suspected serious injuries (n=1,550). Due to several delays, analysis only focused on 2019 but plans have been made to conduct further analysis.

The research team used a method known as “text mining” to filter crash narratives based on key terms for specific categories, shown in **Appendix Table 1**. The crash narratives were reviewed to identify patterns and categories specifically flagged for the created ‘alcohol/drug’ category. This led to the identification of 30 additional narratives to ‘alcohol/drug’ and ‘pedestrian/bicyclist’. Another review of narratives identified 24 narratives that were unrelated in project scope, so they were removed from analysis. The project concluded the analysis with 170 crash narratives for 2019. Word clouds were also developed from words within the narratives but need further exploration to be utilized in project presentations (**Appendix Figure 1**).

## **TECHNOLOGY TRANSFER**

The project proposed to conduct the following outreach activities to educate CTS/TTI staff and the general public:

- Develop 2 intelligent infographics to distribute to college students
- Provide 1 brief presentation to present at a minimum of 1 college campus (and intended for further distribution to other college campus organizations)
- Submit 1 conference presentation abstract

All project activities required approval from the Texas A&M Institutional Review Board (TAMU IRB) prior to beginning work. Although the research team submitted appropriate paperwork in February 2020, it did not receive final approval to begin work until June 29, 2020 after 11 rounds of revisions requested by IRB. In addition, the COVID-19 pandemic impeded TAMU IRB review of applications for a short term.

The research team intends to complete the abovementioned activities before the end of April 2021. Once all project activities have been completed, the research team will update and resubmit this report.

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# APPENDIX

**Table 1. Text Mining Terms**

PERSON	Intersection-Related	FTYROW	Fault	Location	Behaviors	Alcohol	Drug
Pedestrian	Intersection	FTYROW	Cited	Crosswalk	Mid-block	alcohol	drugs
	Crossing	right-of-way			Illegally		
Bicyclist			Citation	Bike Lane	crossed	Impaired	impaired
	intersection-related	failed to yield	Ticket	Side Walk	jay walk	impairment	
		failed-to-yield	Fine	Road	jay walking	BAC	
		ROW	Penalty	Shoulder	helmet	labs	
			at-fault		idaho stop	substance	
					stepped		
			at fault		into traffic	drank	
			illegal		didn't see	drinks	
			fault		did not see	drink	
					not visible	toxicology	
					visibility	ethanol	
						Intoxicated	
						tested	
						positive	
						under the	
						influence	

**Figure 1: Word Cloud: Positive Drug Narratives**

