Street Coaching for Pedestrians and Cyclists: Putting Laws into Practice on University Campus (University of Texas San Antonio Main Campus)

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This study focuses on a data set of pedestrian- or bicyclist-involved crashes at the University of Texas at San Antonio (Main Campus) over a span of 5 years (2018 – 2022). Due to the geographic nature of campus parking and student housing spread outside the defined boundaries of campus area (shown in Figure 1), additional crashes that were within a mile of campus, which is a reasonable biking and walking distance, were included in the analysis. Between 2018 – 2022, there were 62 pedestrian- or bicyclist-involved crashes reported at UT San Antonio (Main Campus) and the surrounding area. Of these, 36 were pedestrian-involved crashes and 26 were bicyclist-involved crashes. Those crashes include 36 pedestrians and 26 bicyclists. This crash analysis examines various factors and potential causes of these pedestrian- and bicyclist-involved crashes, stratified by all severity crashes and those in which someone experienced a fatality (K), suspected serious injury (A), or non-incapacitating injury (B), which is collectively categorized as KAB.

Figure 1. Campus map of the University of Texas San Antonio (Main Campus)

Severity of Crashes

The crash data involving pedestrian- or bicyclist-involved crashes was assessed over various categories of severity. The majority of the crashes were classified as non-incapacitating injury

crashes (n=25; 40%) and possible injury crashes (n=24; 39%). There was one (2%) fatal crash, four (6%) suspected serious injury crashes, and six (11%) crashes that did not result in an injury (see Figure 2).

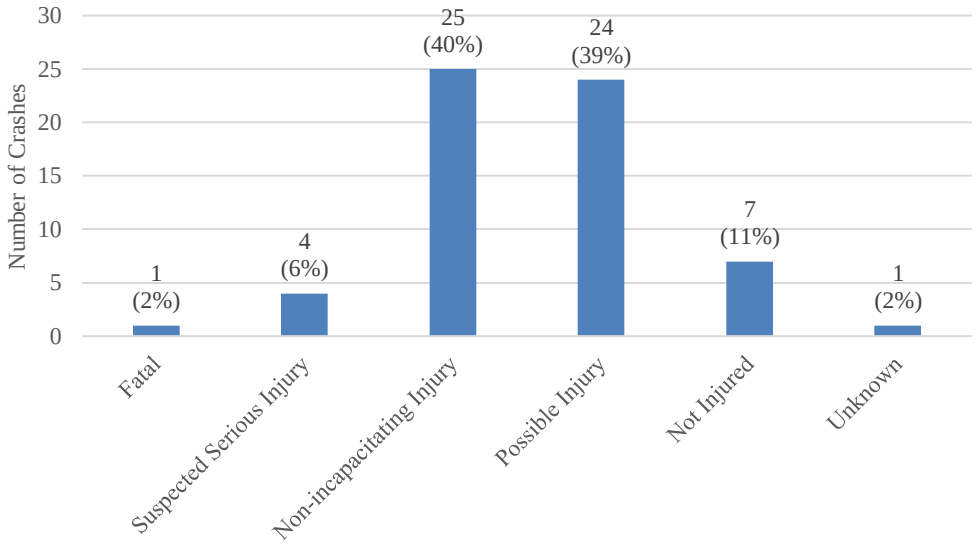

Figure 2. Crash Severity for Pedestrian- or Bicyclist-involved Crashes within/around the Vicinity of UT San Antonio, 2018-2022

Personal injury severity was assessed individually at pedestrian- or bicyclist-involved crashes (Figure 3). The comparison shows that the pedestrians involved were more likely to sustain a fatal injury (n=1; 2% of 36 pedestrians involved in a crash), suspected serious injury (n=3; 8%), non-incapacitating injury (n=16; 44%), or no injury (n=4; 11%), whereas the bicyclists involved in crashes were more likely to sustain a possible injury (n=13; 50% of 26 bicyclists involved in a crash).

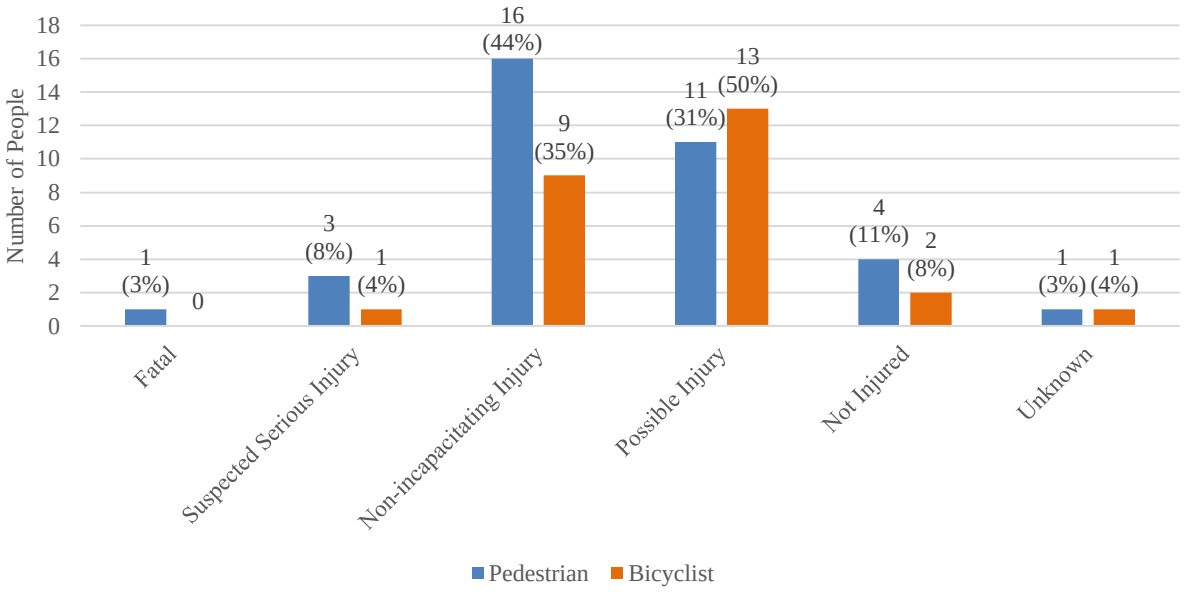

Figure 3. Severity Comparison Between Pedestrians and Bicyclists Involved in the Crashes within/around the Vicinity of UT San Antonio, 2018-2022

Collision Type

Pedestrian- or bicyclist-involved crashes most frequently occurred when a motor vehicle was going straight. This collision type accounted for 61 percent (n=22) of pedestrian-involved crashes and 65 percent (n=17) of bicyclist-involved crashes (see Table 1. Pedestrian- and Bicyclist-involved Crashes by Collision Type within/around the Vicinity of UT San Antonio, 2018-2022Table 1). For the crashes of fatal, suspected serious injury, and non-incapacitating injury classification, 70 percent (n=14) of pedestrian-involved crashes and 60 percent (n=6) of bicyclist-involved crashes were associated with the collision type "one motor vehicle going straight."

The next most frequent type at pedestrian-involved crashes was a collision when a motor vehicle was turning right. Notably, bicyclist-involved crashes more frequently occurred when a motor vehicle was turning left (pedestrian: n=2, 6%; bicyclist: n=5, 19%).

Table 1. Pedestrian- and Bicyclist-involved Crashes by Collision Type within/around the Vicinity of UT San Antonio, 2018-2022

Collision Type	Pedestrian-involved		Bicyclist-involved	
	All Severity	KAB	All Severity	KAB
One Motor Vehicle - Going Straight	22 (61%)	14 (70%)	17 (65%)	6 (60%)
One Motor Vehicle - Turning Left	2 (6%)	0 (0%)	5 (19%)	2 (20%)
One Motor Vehicle - Turning Right	10 (28%)	6 (30%)	3 (12%)	1 (10%)
Angle - Both Going Straight	1 (3%)	0 (0%)	1 (4%)	1 (10%)
Opposite Direction - Both Going Straight	1 (3%)	0 (0%)	0 (0%)	0 (0%)
Total	36 (100%)	20 (100%)	26 (100%)	10 (100%)

Demographic Factors

Gender

Assessment of crashes by gender and associated severity level shows that out of 62 pedestrians and bicyclists involved in crashes (all severity), 65 percent (n=40) were males and 35 percent (n=22) were females. For KAB severity crashes, 63 percent (n=19) were males and 37 percent (n=11) were females. Note that those values are not shown in figures.

A comparison of crash data was drawn between male and female pedestrians involved in the crashes (see Figure 4). Twenty-one (58%) pedestrians involved in the crashes were male and 15 (42%) pedestrians were female. For KAB severity crashes involving a pedestrian, there were 13 (65%) males and 7 (35%) females. A similar comparison for bicyclist involvement shows 19 (73%) bicyclists were male and 7 (27%) bicyclists were female (see Figure 5). For KAB severity crashes involving a bicyclist, there were 6 (60%) males and 4 (40%) females.

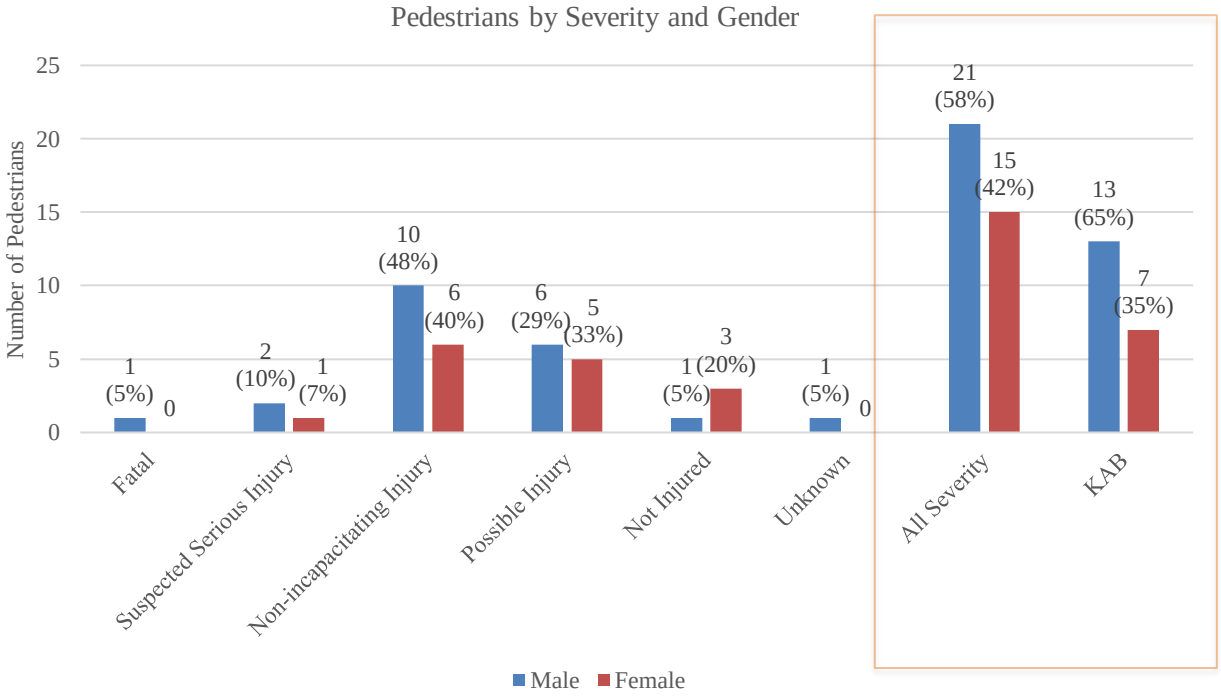

Figure 4. Severity Comparison Between Genders of Pedestrians within/around the Vicinity of UT San Antonio, 2018-2022

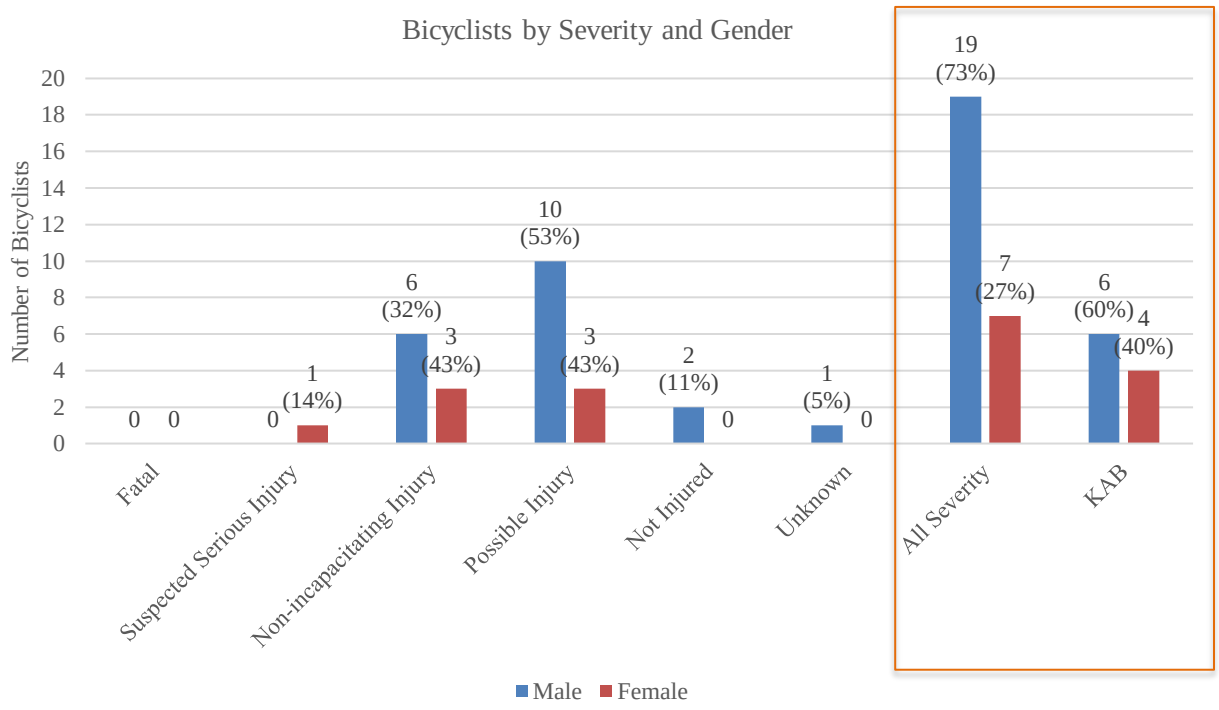

Figure 5. Severity Comparison Between Genders of Bicyclists within/around the Vicinity of UT San Antonio, 2018-2022

Age Group

The distribution of pedestrian-involved crashes across different age groups reveals that pedestrians aged 18 to 22 are involved in a relatively high number of crashes compared to other age groups (see Figure 6). Sixteen (46%) pedestrians within this age group were involved in the crashes, with ten (50%) pedestrians being involved in a fatal (K), suspected serious injury (A), or non-incapacitating injury (B) crash as shown in Figure 6. This may be due to the fact that this age range is typically associated with the undergraduate population. There were six pedestrians aged 51 and older involved in the crashes. Note that one pedestrian was excluded due to unknown age information.

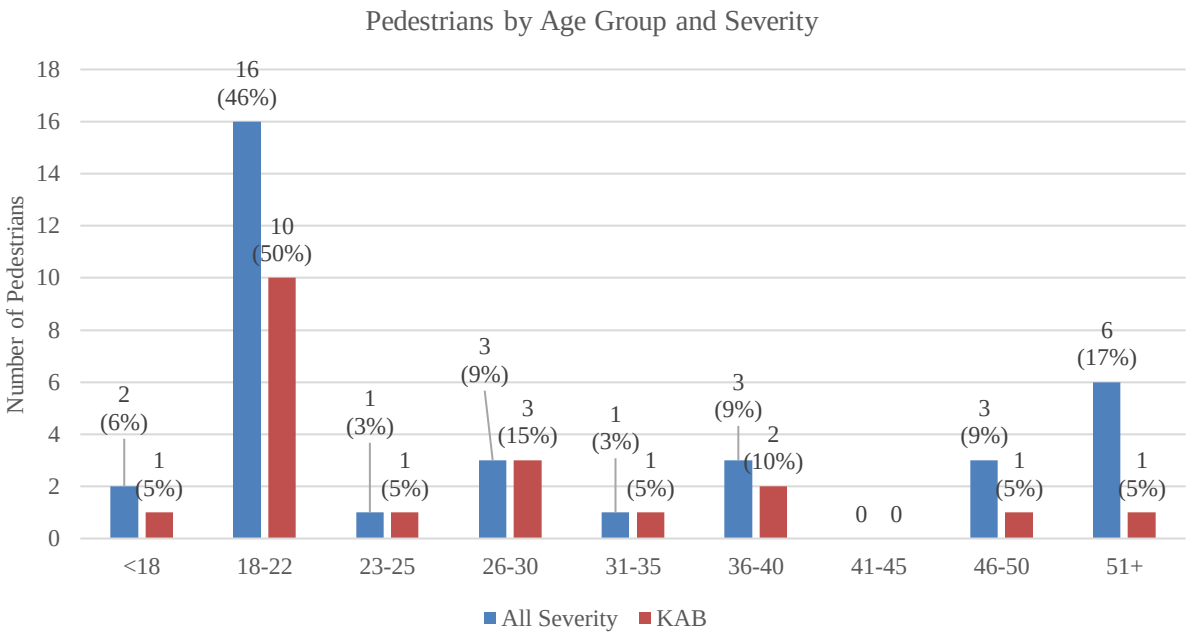

Figure 6. Age Category for Pedestrians Involved in the Crashes within/around the Vicinity of UT San Antonio, 2018-2022

A similar comparison drawn for bicyclists shows that bicyclists between the ages of 18 to 22 years old, that is typical age of an undergraduate, were most frequently involved in a crash. There were nine bicyclists involved in the crashes, which accounted for 38 percent of total bicyclist-involved crashes (see Figure 7). For KAB severity crashes, there were three bicyclists involved, which accounted for 38 percent of the injured bicyclists. Note that two bicyclists were excluded due to unknown age information.

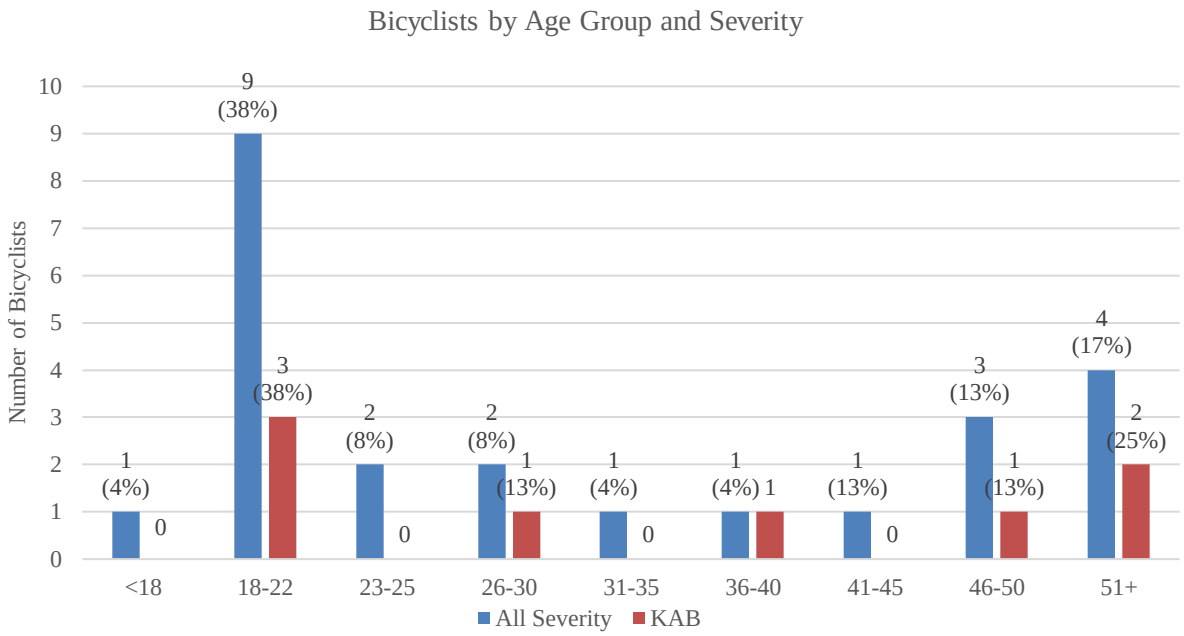

Figure 7. Age Category for Bicyclists Involved in the Crashes within/around the Vicinity of UT San Antonio, 2018-2022

Ethnicity

The largest percentage of pedestrians involved in a crash are classified as Hispanic. There were 17 (47%) Hispanic pedestrians involved in all severity crashes, with 12 (60%) Hispanic pedestrians in KAB severity crashes (see Figure 8). As the next most represented ethnicity, 12 (33%) White pedestrians were involved in all severity crashes and five (25%) of them were in KAB severity crashes.

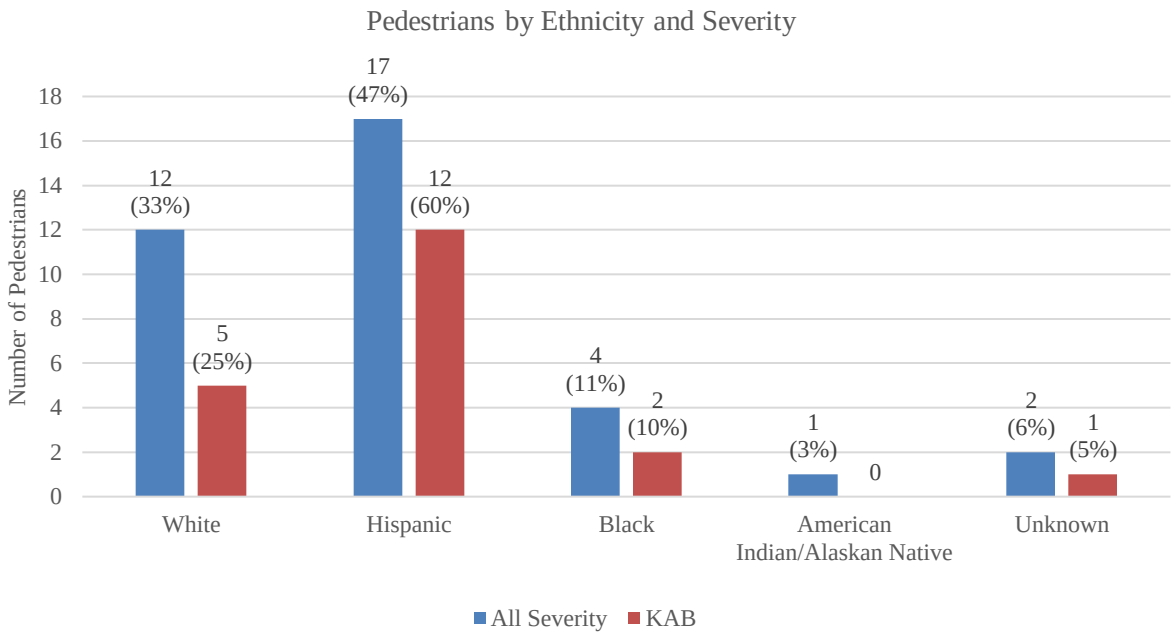

Figure 8. Ethnicity for Pedestrians Involved in the Crashes within/around the Vicinity of UT San Antonio, 2018-2022

Most of bicyclists involved in a crash were White (n=12; 52%) and Hispanic (n=6; 26%) (see Figure 9). For KAB severity crashes, four White (57%) bicyclists were involved.

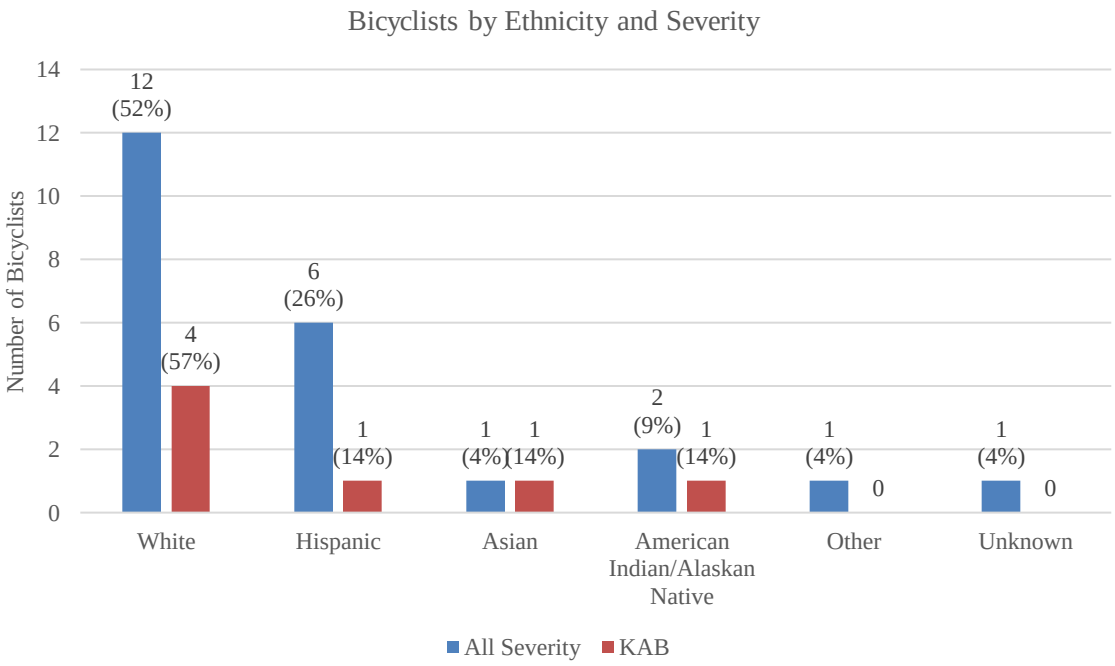

Figure 9. Ethnicity for Bicyclists Involved in the Crashes within/around the Vicinity of UT San Antonio, 2018-2022

Month of Year

Pedestrians and bicyclists were more likely to be involved in a crash during August and September rather than other months. Figure 10 and Figure 11 illustrate the percentage of pedestrians and bicyclists that were involved in the crashes by month, respectively.

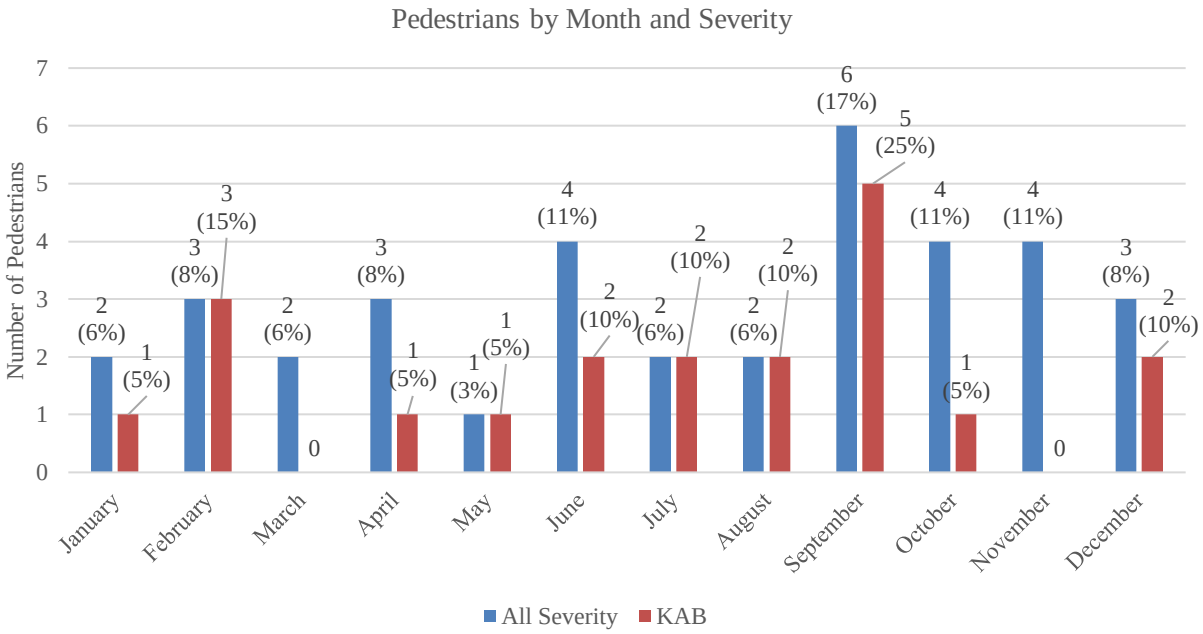

Figure 10. Comparison of Pedestrians Involved in the Crashes by Month within/around the Vicinity of UT San Antonio, 2018-2022

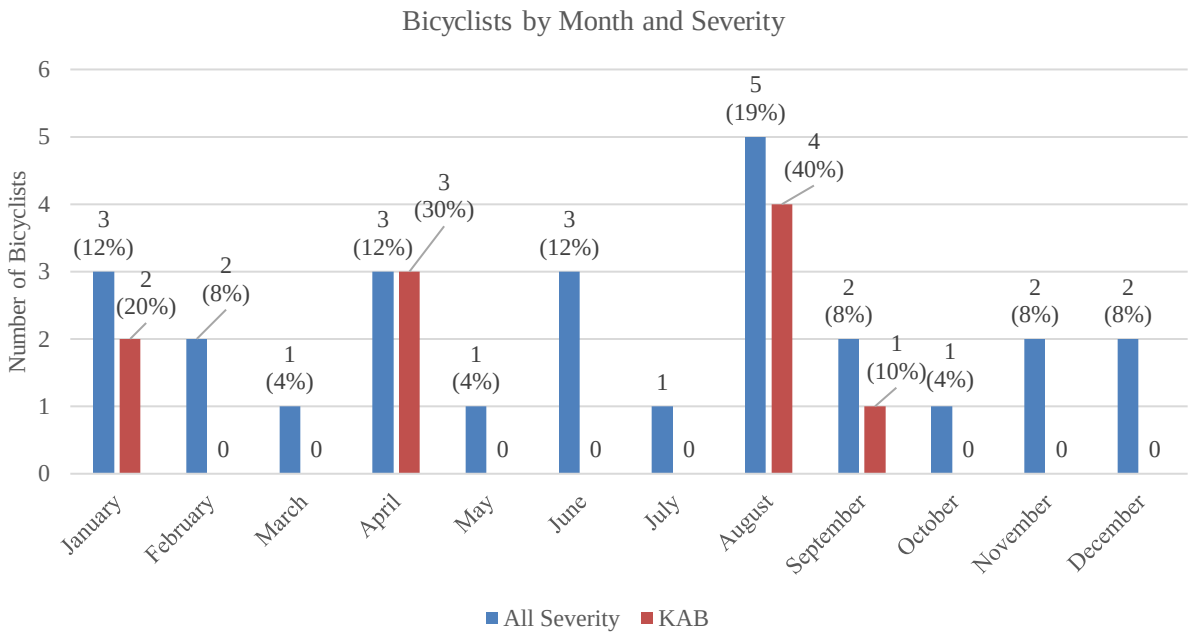

Figure 11. Comparison of Bicyclists Involved in the Crashes by Month within/around the Vicinity of UT San Antonio, 2018-2022

Day of Week

More pedestrians were involved in a crash of any severity on Tuesday and Friday than any other day. Friday was the day of the week with the highest percentage of pedestrians involved in KAB severity crashes. Figure 12 and Figure 13 present pedestrians and bicyclists involved in a crash by day of the week, respectively. More bicyclists were involved in a crash on Monday and Wednesday than any other day of the week.

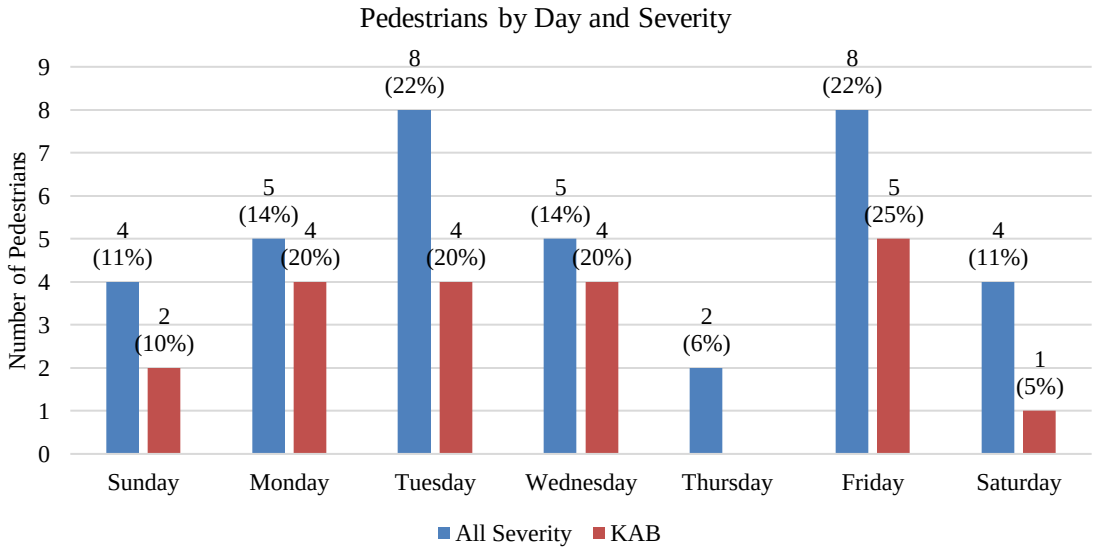

Figure 12. Comparison of Pedestrians Involved in the Crashes by Day of Week within/around the Vicinity of UT San Antonio, 2018-2022

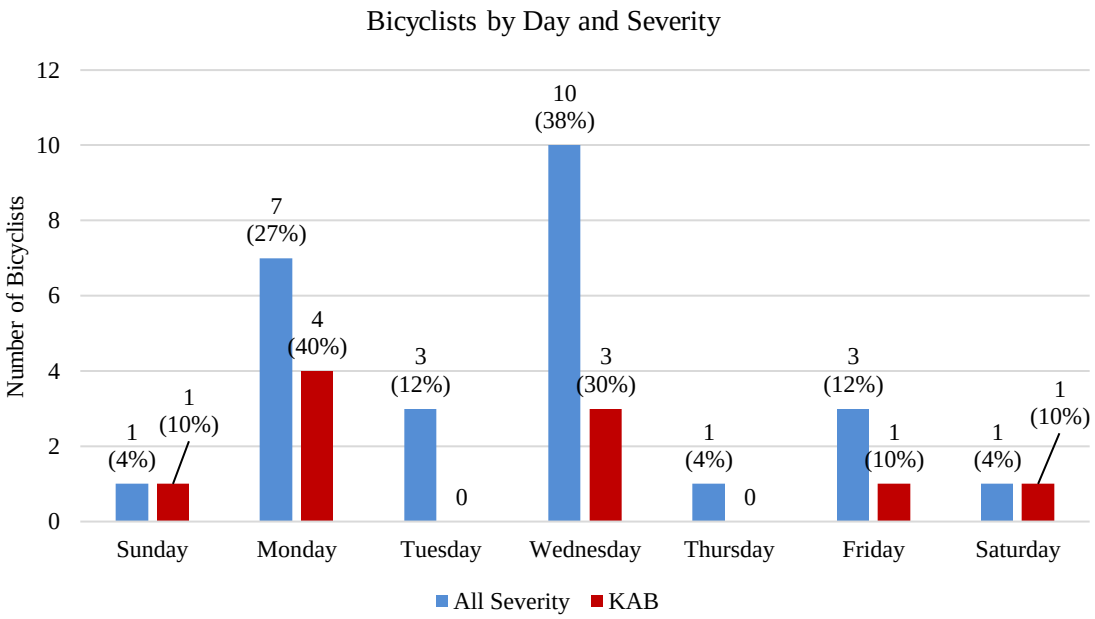

Figure 13. Comparison of Bicyclists Involved in the Crashes by Day of Week within/around the Vicinity of UT San Antonio, 2018-2022

Time of the day

Pedestrian-involved crashes were split by time of the day. Fourteen (32%) pedestrians were involved in a crash that occurred during 12:01 to 17:00, followed by the hours of 20:01 to 24:00 (n=9; 25%). For KAB severity crashes, 10 (50%) pedestrians were involved in a crash that occurred during 12:01 to 17:00, followed by the hours of 20:01 to 24:00 (see Figure 14). More bicyclist-involved crashes occurred during 12:01 to 17:00, followed by the morning hours of 07:01 to 12:00. There were 10 (38%) bicyclists and seven (70%) bicyclists involved in a KAB severity crash during the hours of 12:01 to 17:00 (see Figure 15).

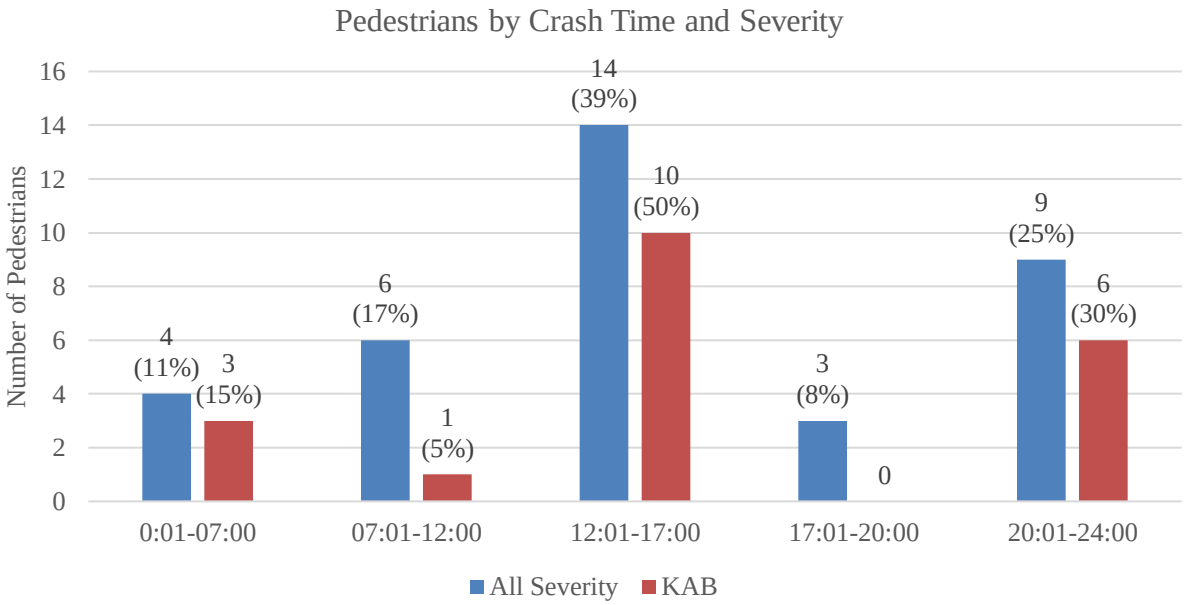

Figure 14. Comparison of Pedestrians Involved in the Crashes by Time of the Day within/around the Vicinity of UT San Antonio, 2018-2022

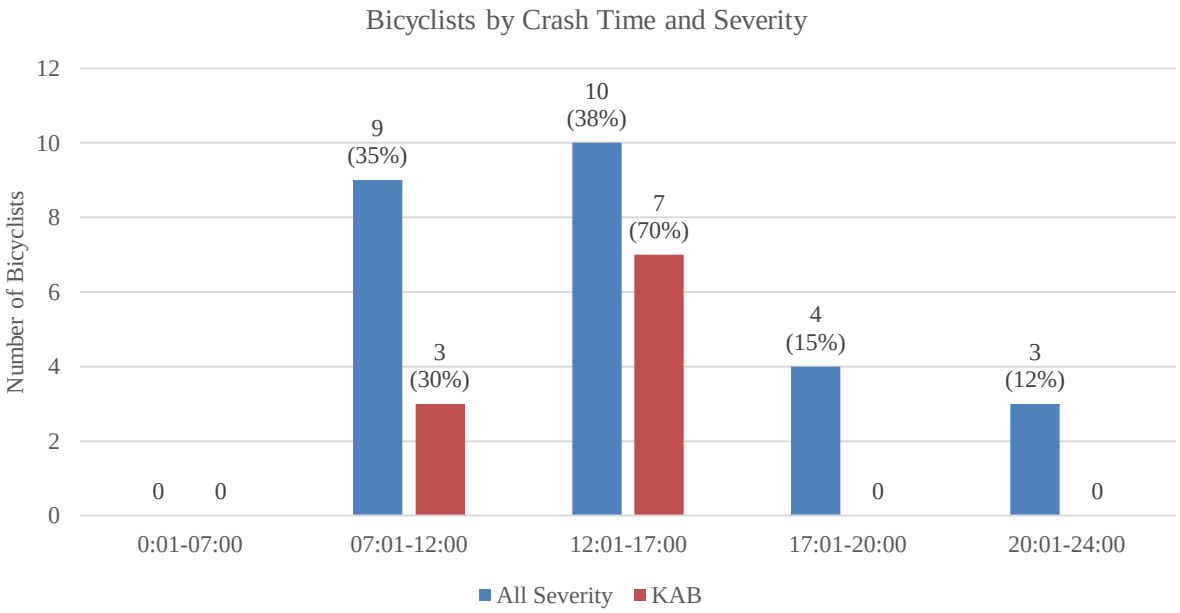

Figure 15. Comparison of Bicyclists Involved in the Crashes by Time of the Day within/around the Vicinity of UT San Antonio, 2018-2022

Pedestrians and bicyclists involved in a crash by individual hours between 12:01 to 17:00 and between 07:01 to 17:00 are shown in Figure 16 and Figure 17, respectively. Pedestrian-involved

crashes were more likely to occur during late afternoon, with 13 (36%) pedestrians involved in a crash between 14:01 to 17:00 (see Figure 16). Compared to pedestrian-involved crashes, bicyclist-involved crashes were more evenly distributed, although more crashes occurred between 08:01 to 09:00 (see Figure 17).

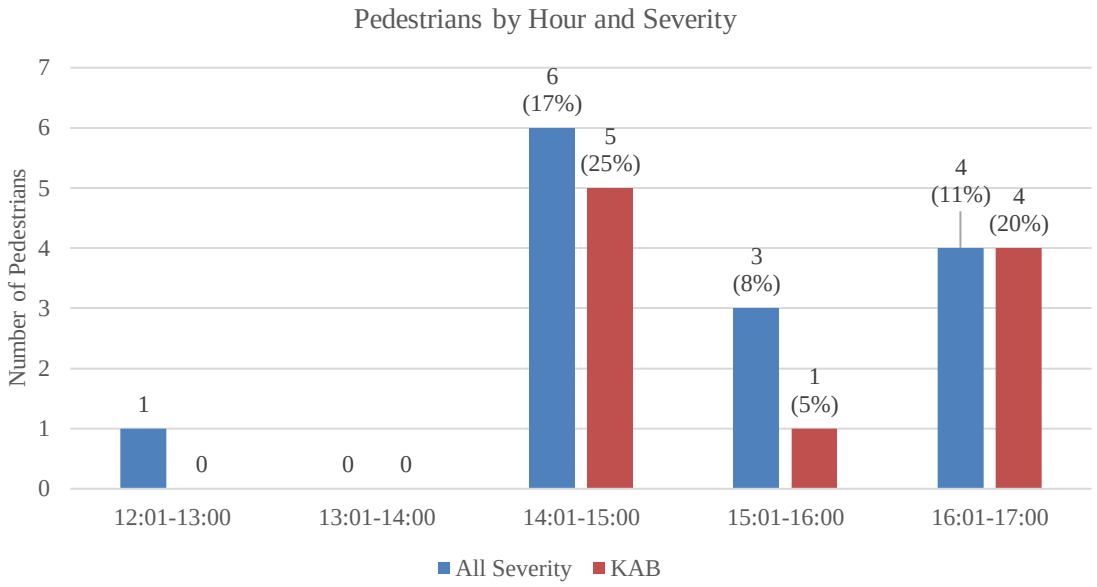

Figure 16. Comparison of Pedestrians Involved in the Crashes by Hours between 12 pm to 5 pm within/around the Vicinity of UT San Antonio, 2018-2022

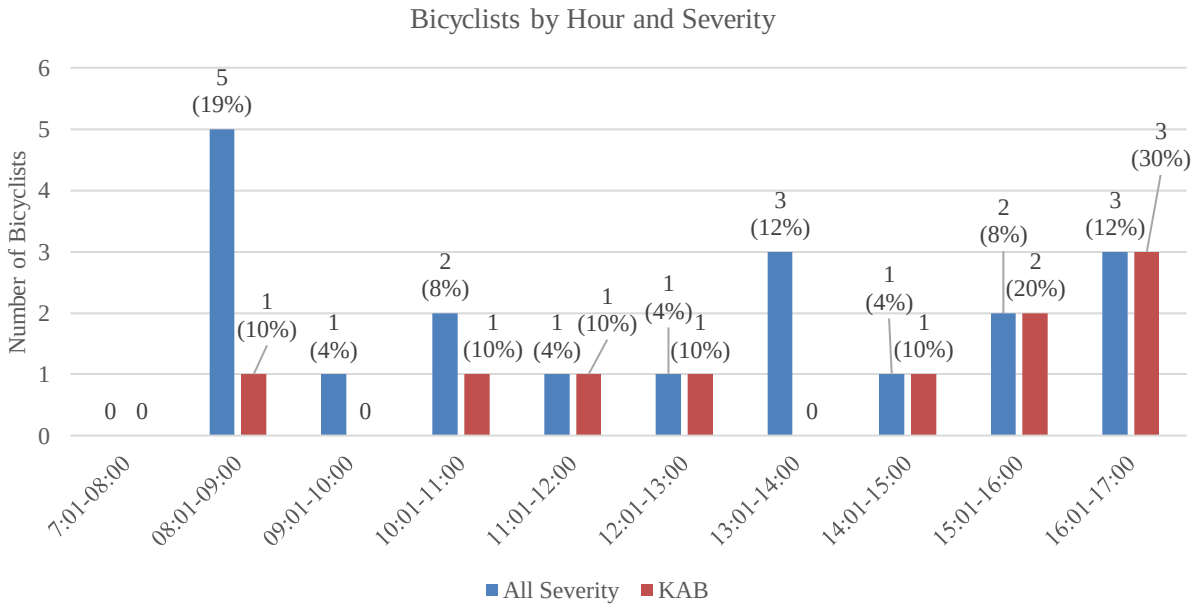

Figure 17. Comparison of Bicyclists Involved in the Crashes by Hours between 07 am to 5 pm within/around the Vicinity of UT San Antonio, 2018-2022

The number of pedestrians and bicyclists were broken down by quarter hour to investigate if the crash events closer to the top or bottom of the hour would indicate that the likelihood of the crash is nearer to the transitionary period where students are going to and from classes. For KAB severity crashes involving a pedestrian, the most frequent quarter hours were 14:30 to 14:45 and 16:30 to 16:45 (see Figure 18). KAB severity crashes involving a bicyclist were more likely to occur during 16:30 to 16:45 (see Figure 19). There is no clear relationship between the likelihood of the crash and the transitionary period of classes due to the low sample size of crashes.

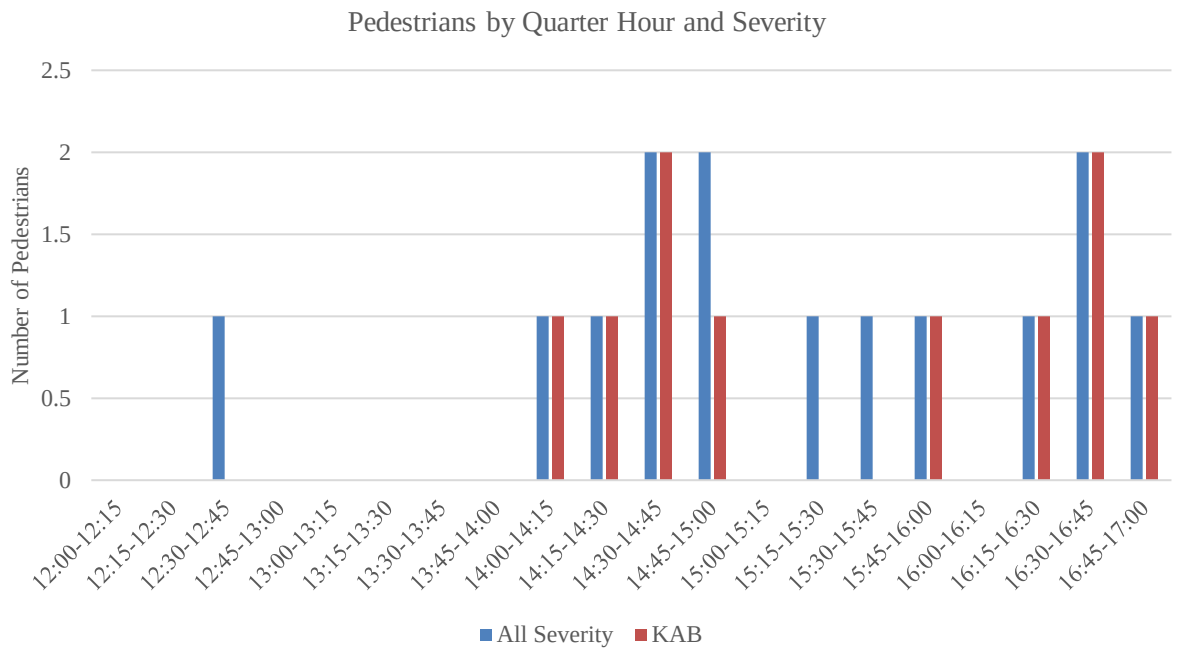

Figure 18. Distribution of Pedestrians Involved in the Crashes by Quarter Hour between 12:00 and 17:00

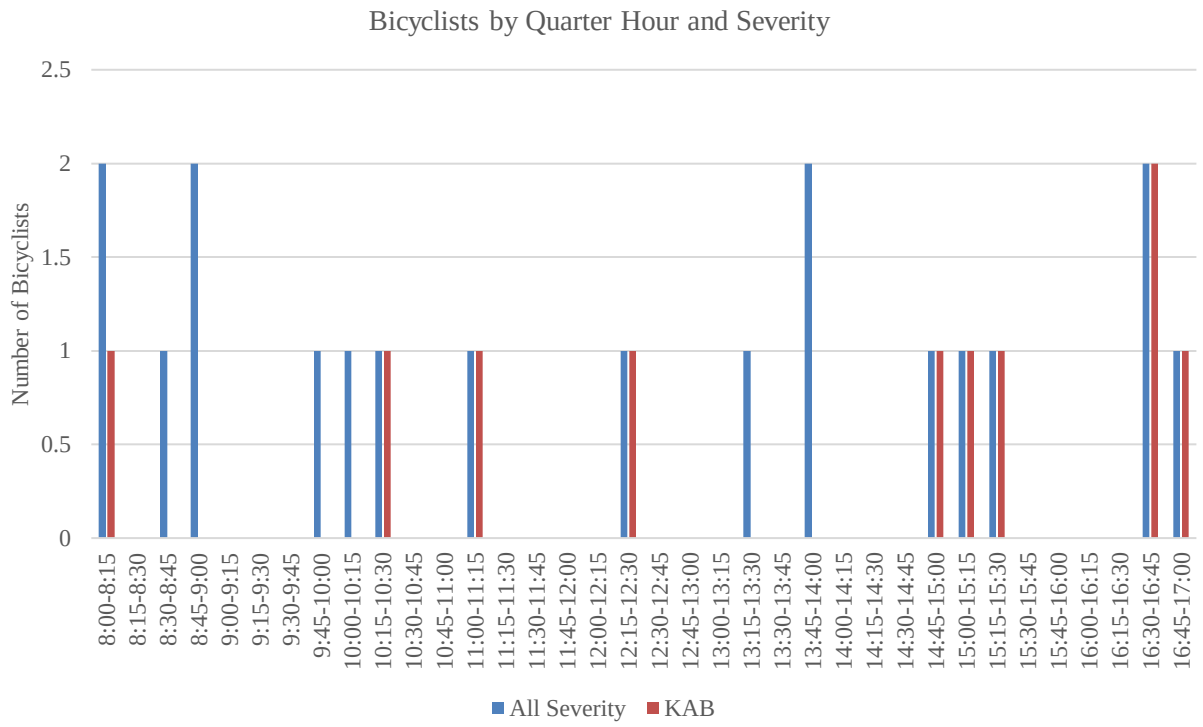

Figure 19. Distribution of Bicyclists Involved in the Crashes by Quarter Hour between 8:00 and 17:00

Helmet Use

At the bicyclist-involved crashes, 50 percent (n=13) of the bicyclists did not wear a helmet. At all severity crashes, the percentage of bicyclists who damaged a helmet was 15 percent (n=4), compared to 40 percent (n=4) of bicyclists in KAB severity crashes (see Table 2).

Table 2 Helmet Use at Bicyclist-involved Crashes within/around the Vicinity of UT San Antonio, 2018-2022

Helmet Use	All Severity		KAB	
	Bicyclist	Percentage	Bicyclist	Percentage
Worn, Damaged	4	15%	4	40%
Worn, Not Damaged	6	23%	1	10%
Worn, Unknown Damage	1	4%	0	0%
Not Worn	13	50%	5	50%
Unknown if Worn	2	8%	0	0%

Roadway Conditions & Environmental Factors

Weather Conditions

A comparison was made between bicyclist- and pedestrian-involved crashes for various weather conditions (see Figure 20 and Figure 21). According to the reported data for weather conditions at the time of the crash, it was found that the majority of pedestrians were involved in crashes that occurred in clear weather (n=29; 81%), followed by cloudy weather (n=15; 75%) (see Figure 20).

Clear conditions were present in seventy-three percent (n=19) of bicyclists involved in the crashes. Bicyclist were more likely than pedestrians to experience crashes in cloudy weather (bicyclists: n =6, 23%; pedestrians: n=5, 14%) (see Figure 21).

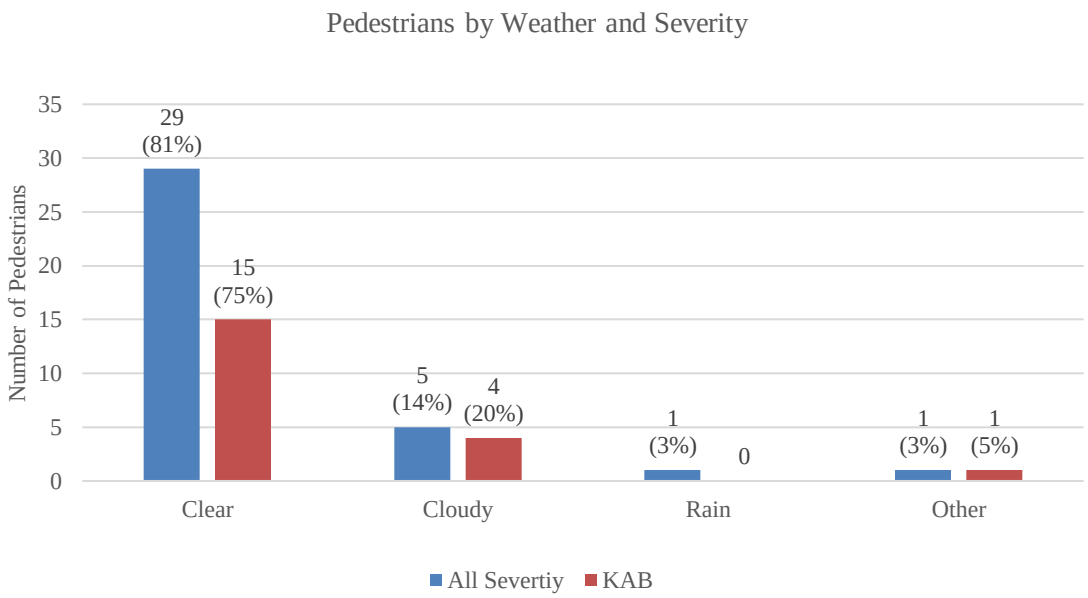

Figure 20. Weather Conditions of Pedestrians Involved in the Crashes within/around the Vicinity of UT San Antonio, 2018-2022

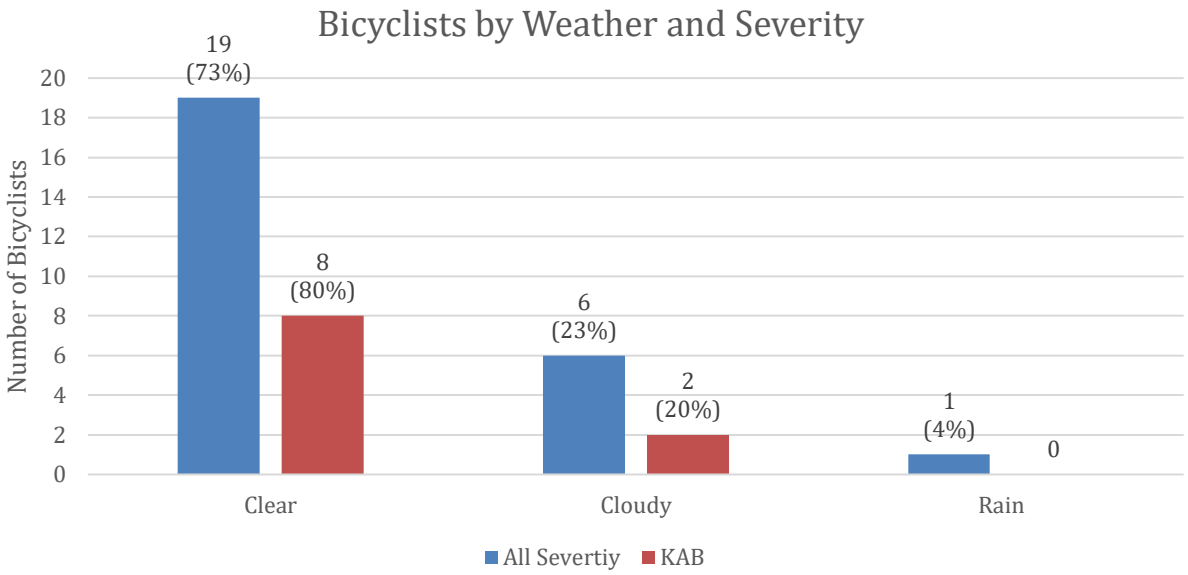

Figure 21. Comparison of Bicyclists Involved in the Crashes by Weather Conditions within/around the Vicinity of UT San Antonio, 2018-2022

Light Conditions

On observation of the light conditions reported in the crash data (see Figure 22 and Figure 23), it was found that the majority of bicyclist- and pedestrian-involved crashes occurred in daylight (pedestrian-involved: 61%, n=22; bicyclist-involved: 81%, n=21), while more pedestrian-involved crashes occurred in dark (4 (11%) pedestrians in dark not lighted and 10 (28%) pedestrians in dark lighted conditions).

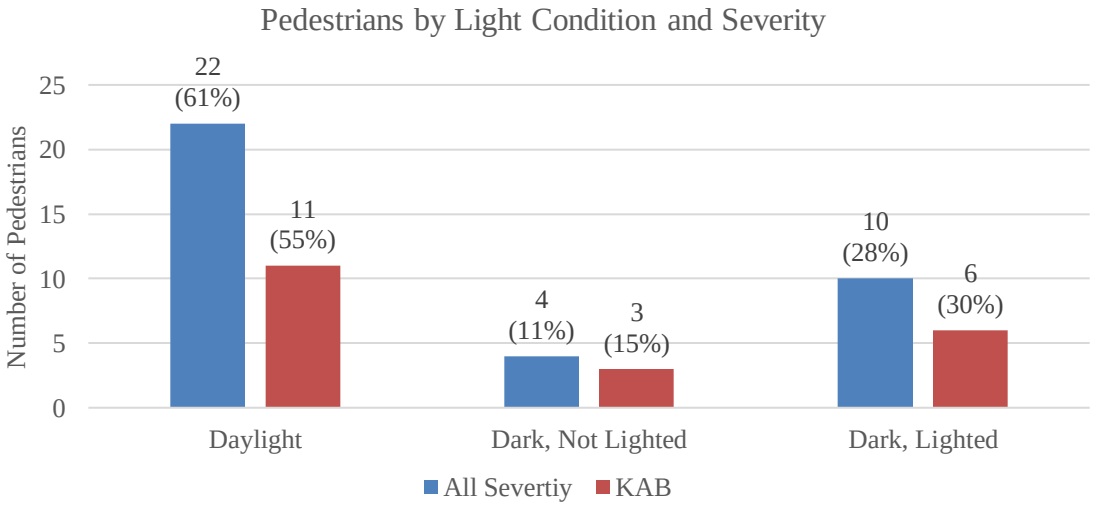

Figure 22. Comparison of Pedestrians Involved in the Crashes by Light Conditions within/around the Vicinity of UT San Antonio, 2018-2022

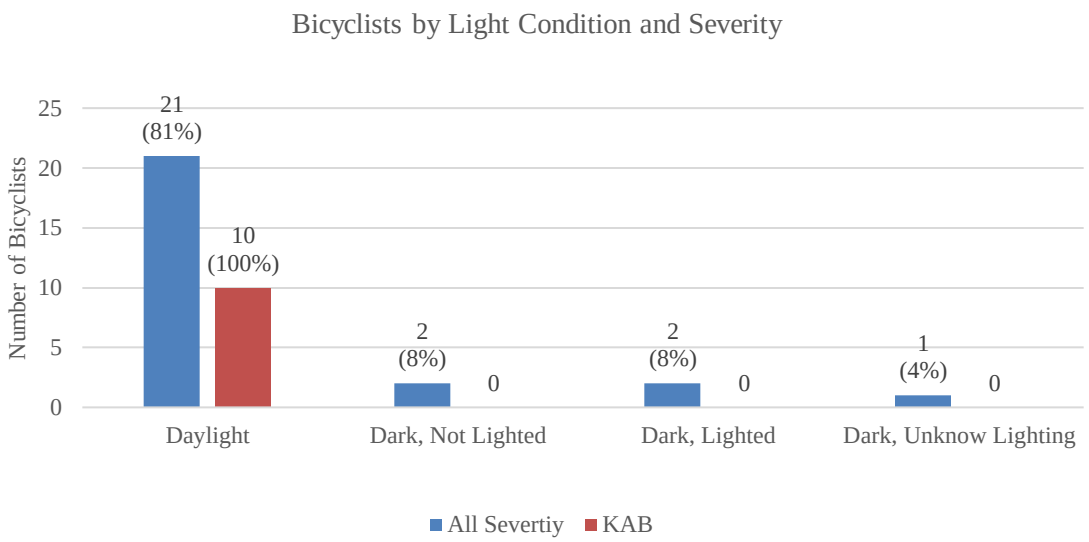

Figure 23. Comparison of Bicyclists Involved in the Crashes by Light Conditions within/around the Vicinity of UT San Antonio, 2018-2022

Surface Conditions

The majority of bicyclist- and pedestrian- involved crashes were associated with dry surface conditions (pedestrian-involved: 89%, n=32; bicyclist-involved: 92%, n=24) (see Figure 24 and Figure 25). Of KAB severity crashes, ninety percent (n=18) of pedestrians and one hundred percent (n=10) of bicyclists were involved in a crash that occurred when there was dry surface condition.

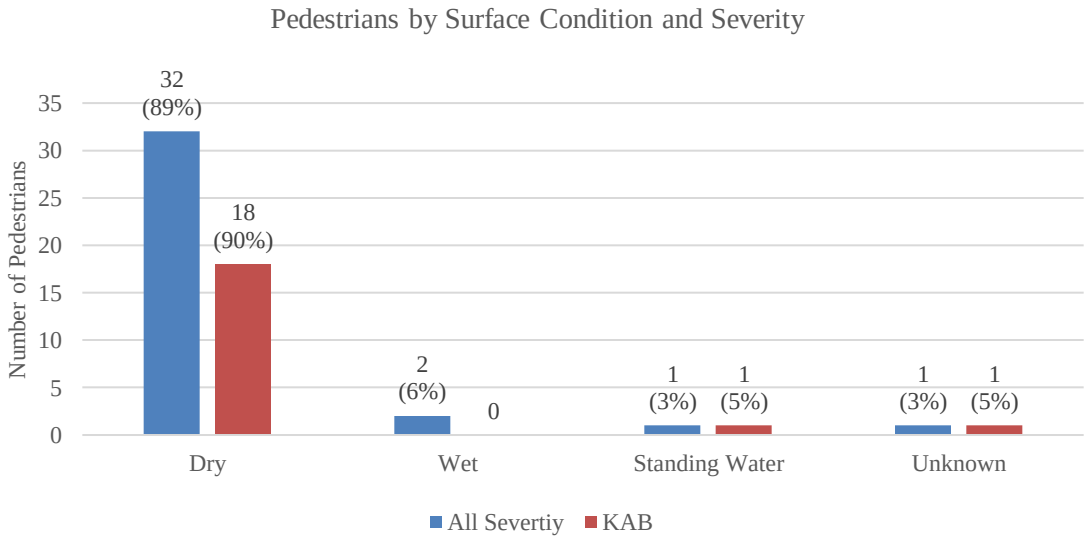

Figure 24. Comparison of Pedestrians Involved in the Crashes by Surface Conditions within/around the Vicinity of UT San Antonio, 2018-2022

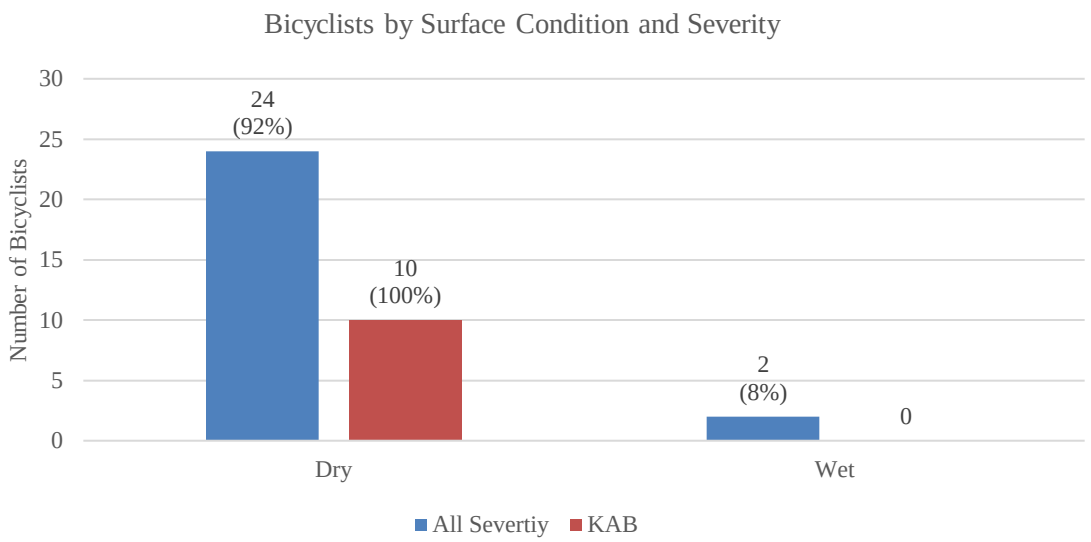

Figure 25. Comparison of Bicyclists Involved in the Crashes by Surface Conditions within/around the Vicinity of UT San Antonio, 2018-2022

Roadway Classification

In all severity crashes split over categories of roadways, the majority of pedestrians (n=28; 78%) and bicyclists (n=21; 81%) were involved in crashes that occurred on city streets as shown in Figure 26 and Figure 27. In KAB severity crashes, seventy percent (n=14) of pedestrians and eighty percent (n=8) of bicyclists were involved in crashes that occurred on city streets.

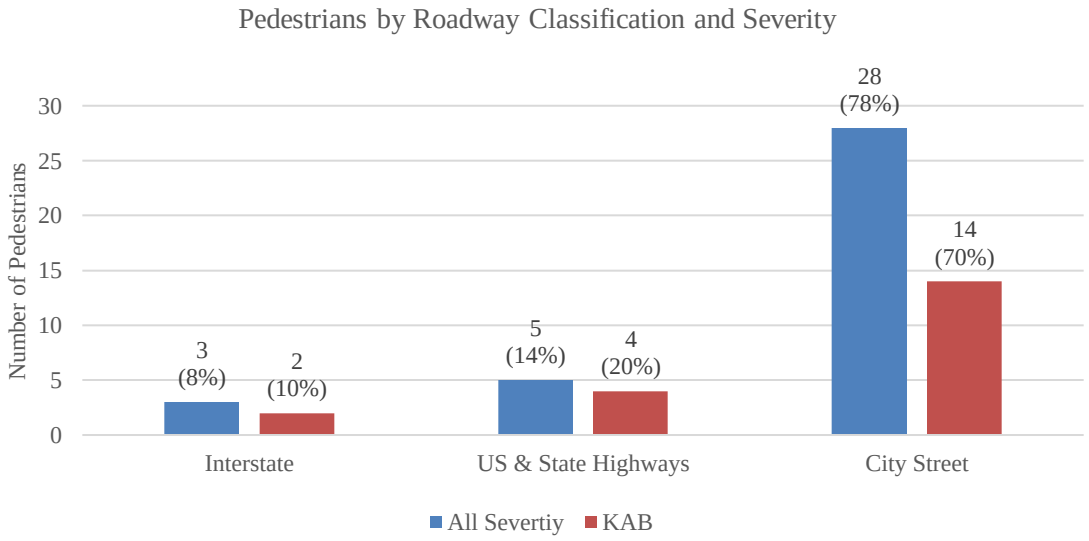

Figure 26. Comparison of Pedestrians Involved in the Crashes by Roadway Classification within/around the Vicinity of UT San Antonio, 2018-2022

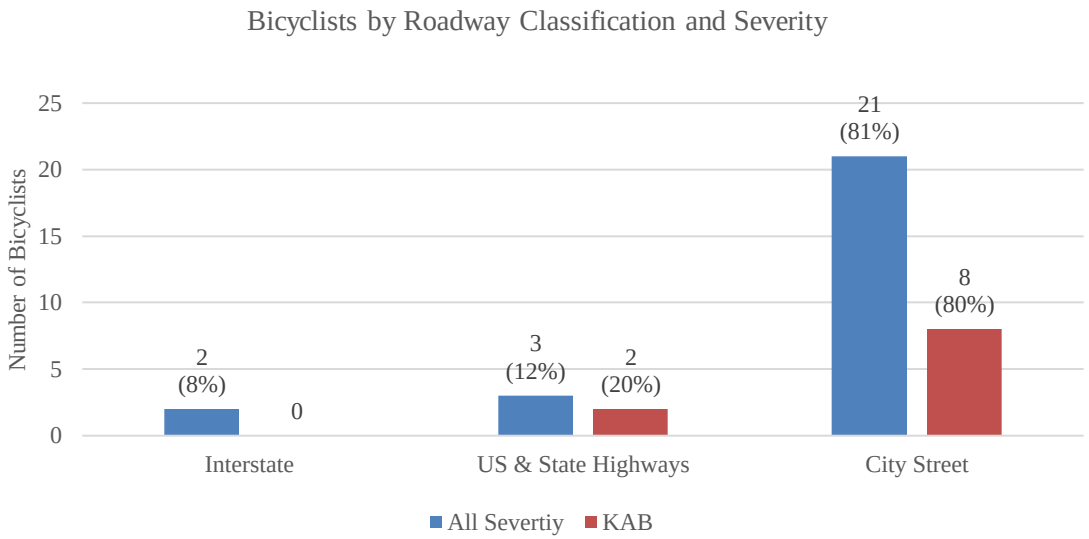

Figure 27. Comparison of Bicyclists Involved in the Crashes by Roadway Classification within/around the Vicinity of UT San Antonio, 2018-2022

Road Location

Crashes were examined by road location. Pedestrian-involved crashes were more likely to occur at non intersection areas, followed by intersection-related locations. There were 18 (50%) pedestrians involved in the crashes at non intersection locations and 15 (42%) pedestrians involved in the crashes at intersection-related locations (see Table 3). The majority of bicyclists were involved in crashes that occurred at intersection-related locations (n=17; 65%).

Table 3. Comparison of Pedestrians and Bicyclists Involved in the Crashes by Intersection-related

Road Location	Pedestrians		Bicyclists	
	All Severity	KAB	All Severity	KAB
Intersection	2 (6%)	0 (0%)	2 (8%)	2 (20%)
Intersection-related	15 (42%)	7 (35%)	17 (65%)	6 (60%)
Driveway Access	1 (3%)	1 (5%)	4 (15%)	1 (10%)
Non Intersection	18 (50%)	12 (60%)	3 (12%)	1 (10%)
Total	36	20	26	10

Traffic Control Type

The crashes were distributed over traffic control variables as shown in Figure 28 and Figure 29. Pedestrians were most frequently involved in the crashes that occurred on roadways with either

no traffic control device (n=8; 22%), signal lights (n=8; 22%) or marked lanes (n=8; 22%). Bicyclists were most frequently involved in the crashes that occurred on roadways with signal lights (n=8, 31%).

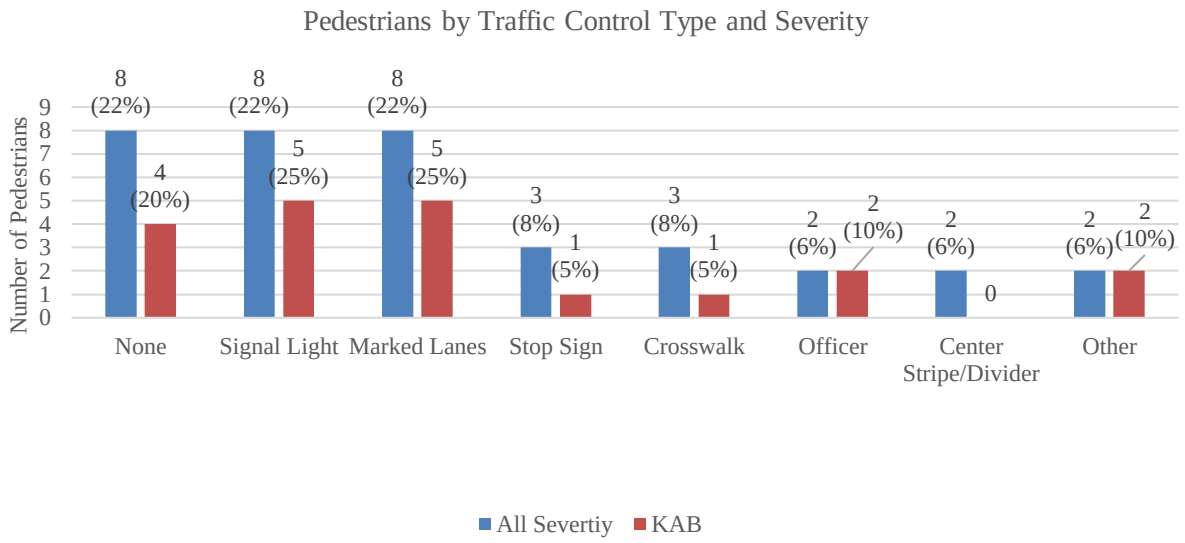

Figure 28. Comparison of Pedestrians Involved in the Crashes by Traffic Control Type within/around the Vicinity of UT San Antonio, 2018-2022

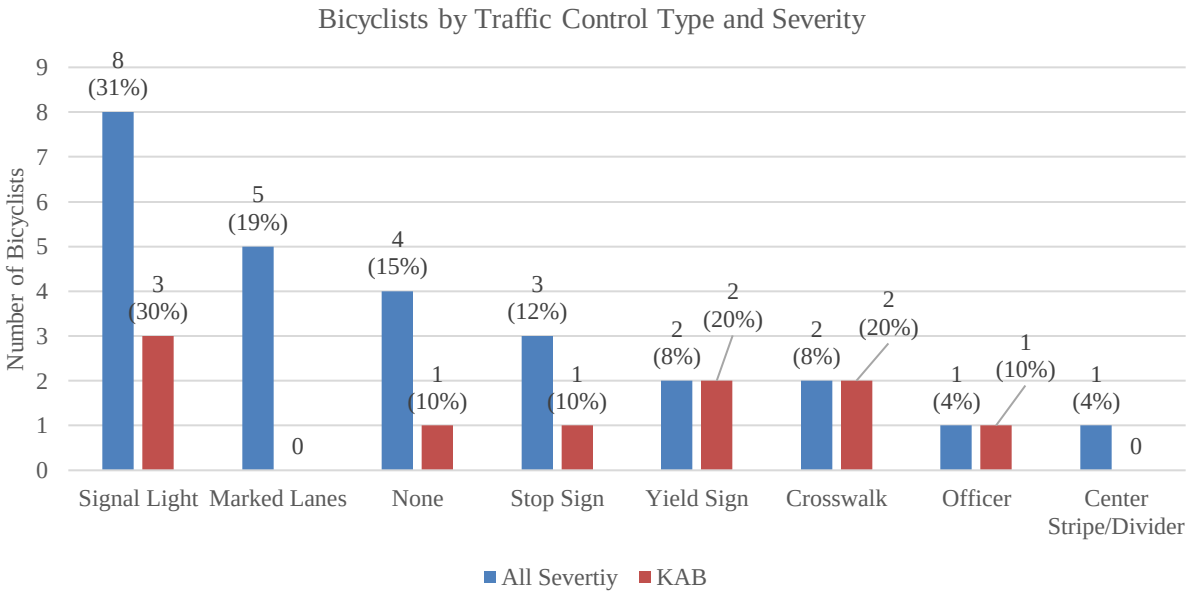

Figure 29. Comparison of Bicyclists Involved in the Crashes by Traffic Control Type within/around the Vicinity of UT San Antonio, 2018-2022

Road Alignment

Crashes were examined by road alignment and the data shows that 27 (75%) pedestrians were involved in all severity crashes on straight and level roads (see Figure 30). Most bicyclist-involved crashes (n=25, 96%) also occurred on straight and level roads (see Figure 31).

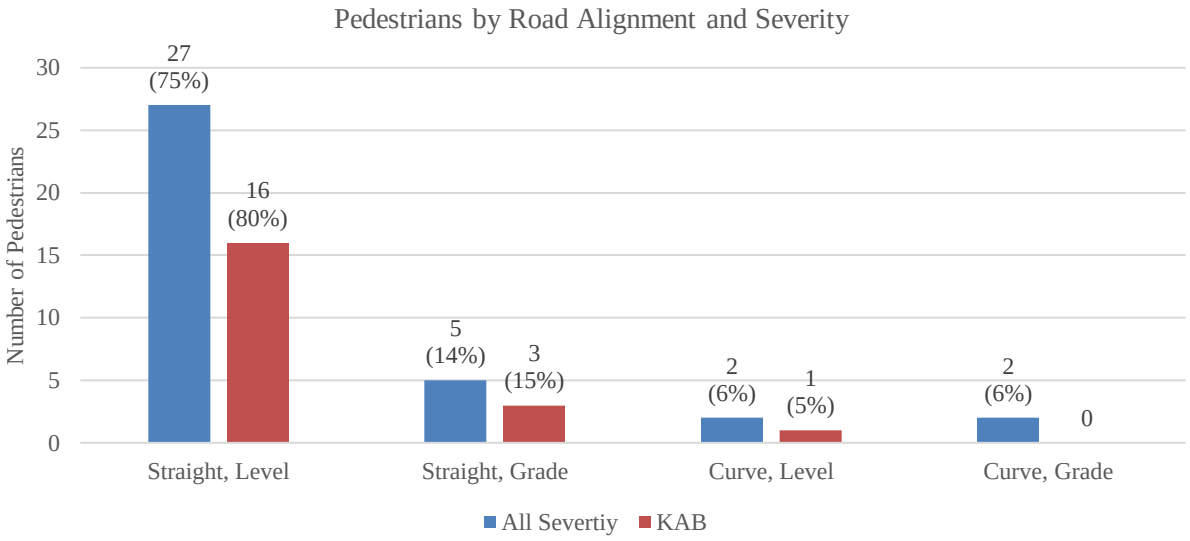

Figure 30. Comparison of Pedestrians Involved in the Crashes by Road Alignments within/around the Vicinity of UT San Antonio, 2018-2022

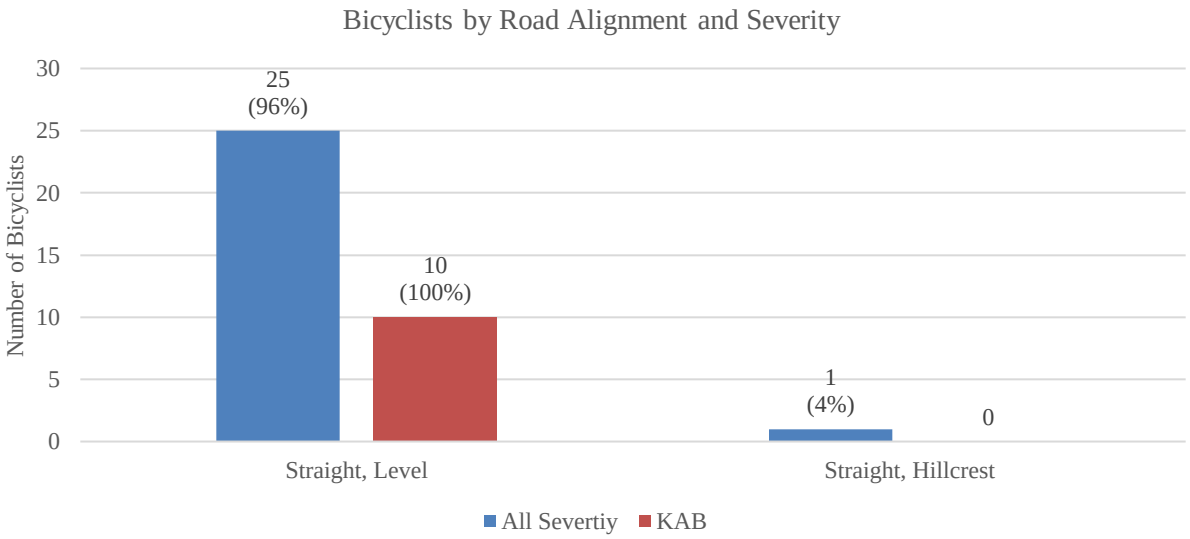

Figure 31. Comparison of Bicyclists Involved in the Crashes by Road Alignments within/around the Vicinity of UT San Antonio, 2018-2022

Posted Speed Limit

The majority of pedestrian- or bicyclist-involved crashes occurred with posted speed limits of 45 mile per hour or less. Eight-nine percent of pedestrians involved in all severity crashes and seventy-three percent of bicyclists involved in all severity crashes occurred on a roadway with a speed limit of 45 mile per hour or less (see Table 4).

Table 4. Comparison of Pedestrians and Bicyclists Involved in the Crashes by Posted Speed Limit

Posted Speed Limit	Pedestrian-involved		Bicyclist-involved	
	All Severity	KAB	All Severity	KAB
<25 mph	8 (22%)	4 (20%)	4 (15%)	2 (20%)
25 - 39	14 (39%)	8 (40%)	5 (19%)	2 (20%)
40 - 45	10 (28%)	6 (30%)	10 (38%)	4 (40%)
>45	2 (6%)	1 (5%)	1 (4%)	0 (0%)
Not Reported	2 (6%)	1 (5%)	6 (23%)	2 (20%)
Total	36	20	26	10

Road Construction-related

The majority of pedestrian- and bicyclist-involved crashes were not related to road construction. There was only one (3%) pedestrian and one (5%) bicyclist involved in the crashes related to road construction (see Table 5).

Table 5. Comparison of Pedestrians and Bicyclists Involved in the Crashes by Road Construction-related

Road Construction-related	Pedestrian-Involved		Bicyclist-Involved	
	All Severity	KAB	All Severity	KAB
Yes	1 (3%)	1 (5%)	1 (4%)	1 (10%)
No	35 (97%)	19 (95%)	25 (96%)	9 (90%)
Total	36	20	26	10

Contributing Factors

The crash contributing factors by person type (driver, bicyclist, and pedestrian) were analyzed (see Table 6). For drivers, the most frequent contributing factor was inattention, with 15 pedestrian-involved and 15 bicyclist-involved crashes related to this factor. The next most frequent factor assigned to drivers was the failure to yield right of way to pedestrian (n=5 pedestrian-involved; n=3 bicyclist-involved). For pedestrians, the factor “Pedestrian failed to yield right of way to vehicle” was the most frequent one. There were 11 crashes involving a

pedestrian due to this factor. For bicyclists, the most frequent contributing factor was bicyclist inattention (n=2).

Table 6. Top 3 Contributing Factors of Drivers, Bicyclists, and Pedestrians

Person Type	Crash Type	Severity	Top 1 Contributing Factor	Top 2 Contributing Factor	Top 3 Contributing Factor
Driver	Pedestrian-involved Crashes	All Severity	Driver Inattention (n=15)	Failed to Yield Right of Way - To Pedestrian (n=5)	Other (Explain in Narrative) (n=4)
		KABC	Driver Inattention (n=9)	Failed to Yield Right of Way - To Pedestrian (n=5)	Failed to Yield Right of Way - To Pedestrian (n=2)
	Bicyclist-involved Crashes	All Severity	Driver Inattention (n=15)	Failed to Yield Right of Way - Turn on Red (n=3)	Failed to Yield Right of Way - To Pedestrian (n=2)
		KABC	Driver Inattention (n=6)	Failed to Yield Right of Way - Turn on Red (n=1)	Failed to Yield Right of Way - To Pedestrian (n=1)
Pedestrian		All Severity	Pedestrian Failed to Yield Right of Way to Vehicle (n=11)	Other (Explain in Narrative) (n=5)	Disregard Stop Sign or Light (n=1)
		KABC	Pedestrian Failed to Yield Right of Way to Vehicle (n=7)	Other (Explain in Narrative) (n=3)	
Bicyclist		All Severity	Inattention (n=2)	Failed to Drive in Single Lane (n=1)	Failed to Yield Right of Way – Open Intersection (n=1)
		KABC	Inattention (n=2)		

Summary

The crash analysis focused on the data of pedestrian- and bicyclist-involved crashes within/around the vicinity of the University of Texas San Antonio at Main Campus from 2018 to 2022. Pedestrians and bicyclists were more vulnerable to fatalities and serious injuries than other road users. The crash data showed that almost half of the pedestrians and bicyclists involved in the crashes were killed or suffered suspected serious injuries or non-incapacitating injuries. There was just one fatality and 4 suspected serious injuries, yet there were 25 and 24 non-incapacitating and possible injuries respectively. During the period, the number of pedestrians and bicyclists sustained a fatality and suspected serious injury at a crash in the city of San Antonio accounted for twenty percent of total pedestrians and bicyclists. However, the number of pedestrians and bicyclists with a fatal or suspected serious injury within/around the vicinity of the Main Campus accounted for eight percent. This could potentially be attributed to the lower speed limits on roads surrounding the campus, which may have a positive impact on pedestrian and bicycle safety.

The pedestrian- and bicyclist-involved crashes that resulted in a fatality, suspected serious injury, or non-incapacitating injury were most often a result of a collision with a vehicle going straight, followed by a vehicle turning right for pedestrian-involved crashes and a vehicle turning left for bicyclist-involved crashes. Pedestrian-involved crashes were more likely to occur at non intersection locations with either no traffic control device, marked lanes, or signal lights while

bicyclist-involved were more likely to occur at intersection-related locations with signal lights. The majority of pedestrian- and bicyclist-involved crashes occurred in daylight. However, the percentage of pedestrian-involved crashes in dark conditions was higher than that of bicyclist-involved crashes.

More male pedestrians and bicyclists were involved in crashes than females. The ages of 18 to 22, that is a typical age group of an undergraduate, were involved in comparatively more crashes than other age groups. More pedestrians involved in the crashes were Hispanic, while more than half of bicyclists involved in the crashes were White. Helmet use for bicyclist safety is critical. However, half of bicyclists involved in the crashes were not wearing a helmet at the time of the crash. Failure to yield the right of way to a pedestrian was the primary contributing factor assigned to drivers. The most frequent contributing factor for pedestrians was the failure to yield the right of way to a vehicle, while inattention was the top contributing factor for bicyclists.