



**Street Coaching for Pedestrians and Cyclists:
Putting Laws into Practice
on University Campus
(Texas Southern University)**

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Texas A&M Transportation Institute

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This study focuses on a data set of pedestrian- or bicyclist-involved crashes within/around the vicinity of Texas Southern University (TSU) for five years (2018 – 2022). Due to the geographic nature of student housing spread outside the defined boundaries of the campus area (highlighted in red in Figure 1), additional crashes that were approximately a mile from campus (highlighted in yellow in Figure 1), which is a reasonable biking and walking distance, were included in the analysis. Between 2018 and 2022, 101 pedestrian- or bicyclist-involved crashes were reported at TSU and the surrounding area. Of these, 70 were pedestrian-involved crashes, and 31 were bicyclist-involved crashes. Those crashes include 75 pedestrians and 31 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 a pedestrian or bicyclist experienced a fatality (K), suspected serious injury (A), or suspected minor injury (B), which is collectively categorized as KAB.

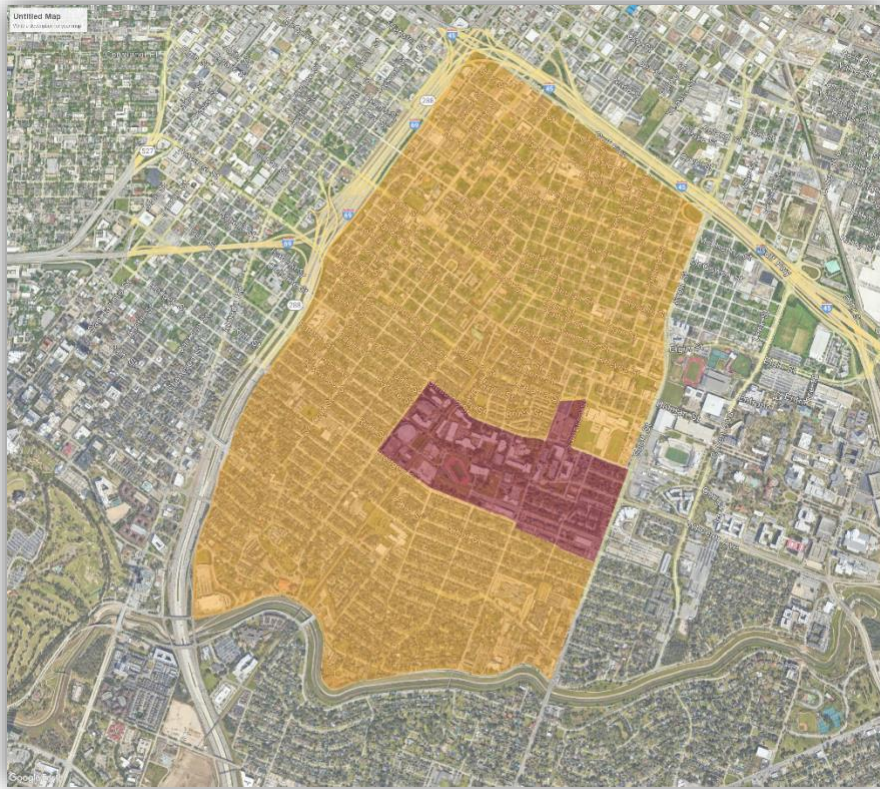


Figure 1. Campus and Vicinity Map of the Texas Southern University (TSU)

Severity of Crashes

The crash data involving pedestrian- or bicyclist-involved crashes was assessed over various severity categories. The majority of the crashes were classified as possible injury crashes (n=42; 42%) and suspected minor injury crashes (n=36; 36%). There were three (3%) fatal crashes, 18

(18%) suspected serious injury crashes, and 2 (2%) crashes that did not result in an injury (see Figure 2).

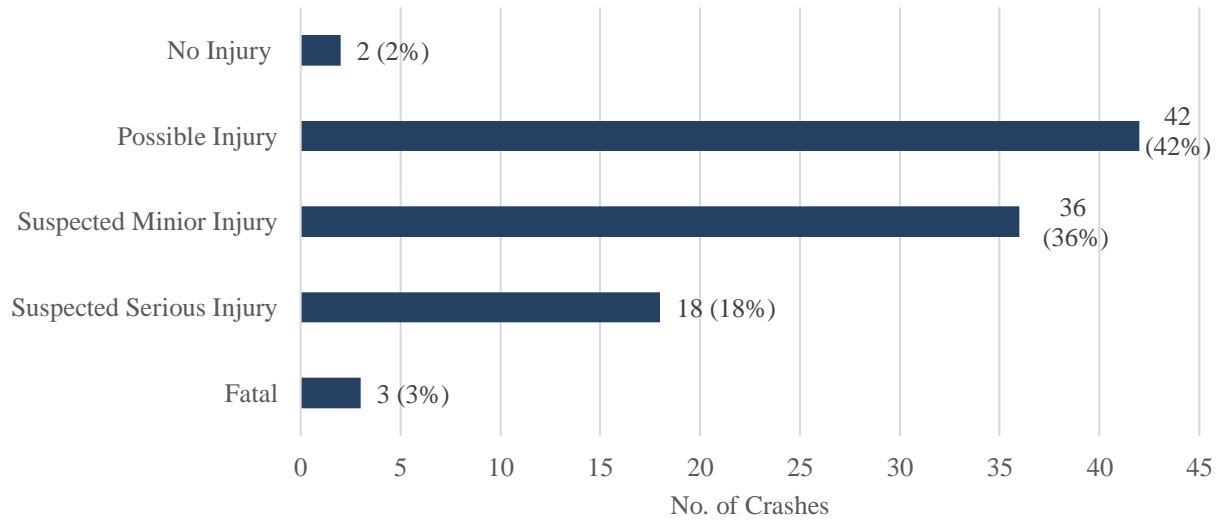


Figure 2. Crash Severity for Pedestrian- or Bicyclist-involved Crashes within/around the Vicinity of TSU, 2018-2022

Personal injury severity was assessed individually at pedestrian- or bicyclist-involved crashes (see Figure 3). The comparison shows that pedestrians involved were more likely to sustain a suspected minor injury (n=28; 37%) than bicyclists (n=9; 29%), whereas bicyclists involved in crashes were more likely to sustain a possible injury (n=14; 45%) and suspected serious injury (n=6; 19%) than pedestrians (possible injury: n=30 (40%); suspected serious injury: n=12 (16%)).

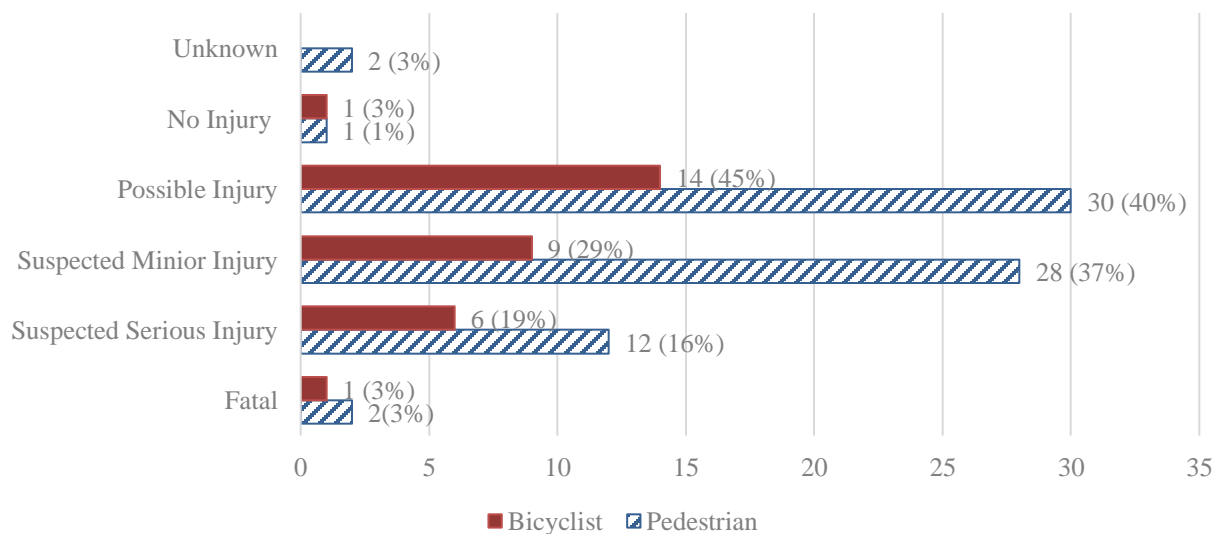


Figure 3. Severity Comparison Between Pedestrians and Bicyclists Involved in the Crashes within/around the Vicinity of TSU, 2018-2022

Collision Type

Pedestrian- or bicyclist-involved crashes most frequently occurred when a motor vehicle was going straight. For all severity crashes, this collision type accounted for 73 percent (n=51) of pedestrian-involved crashes and 84 percent (n=26) of bicyclist-involved crashes (see Table 1. Pedestrian- and Bicyclist-involved Crashes by Collision Type within/around the Vicinity of TSU, 2018-2022 For the crashes of fatal (K), suspected serious injury (B), and suspected minor injury (C) classification, 66 percent (n=27) of pedestrian-involved crashes and 75 percent (n=12) of bicyclist-involved crashes were associated with the collision type “one motor vehicle going straight.”

The next most frequent type was a collision when a motor vehicle was turning left. Notably, 10 of 12 pedestrian-involved crashes associated with this collision type were related to KAB severity (see Table 1).

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

Collision Type	Pedestrian-involved		Bicyclist-involved		Combined	
	All Severity	KAB	All Severity	KAB	All Severity	KAB
One Motor Vehicle - Going Straight	51 (73%)	27 (66%)	26 (84%)	12 (75%)	77 (76%)	39 (68%)
One Motor Vehicle - Turning Right	3 (4%)	3 (7%)	2 (6%)	2 (13%)	5 (5%)	5 (9%)
One Motor Vehicle - Turning Left	12 (17%)	10 (24%)	3 (10%)	2 (13%)	15 (15%)	12 (21%)
One Motor Vehicle - Backing	3 (4%)	(0%)	(0%)	(0%)	3 (3%)	0 (0%)
Angle - Both Going Straight	1 (1%)	1 (2%)	(0%)	(0%)	1 (1%)	1 (2%)
Total	70 (100%)	41 (100%)	31 (100%)	16 (100%)	101 (100%)	57 (100%)

Demographic Factors

Gender

Assessment of crashes by gender and associated severity level shows that out of 106 pedestrians (n=75) and bicyclists (n=31) involved in crashes (all severity), 69 percent (n=73) were males, and 31 percent (n=33) were females. For KAB severity crashes, 74 percent (n=43) were males, and 26 percent (n=15) 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). Forty-six (61%) pedestrians involved in the crashes were male, and 29

(39%) were female. There were 27 (64%) males and 15 (36%) females for KAB severity crashes involving a pedestrian. A similar comparison for bicyclist involvement shows 27 (87%) bicyclists were male and four (13%) bicyclists were female (see Figure 5). For bicyclist KAB severity, they were all males.

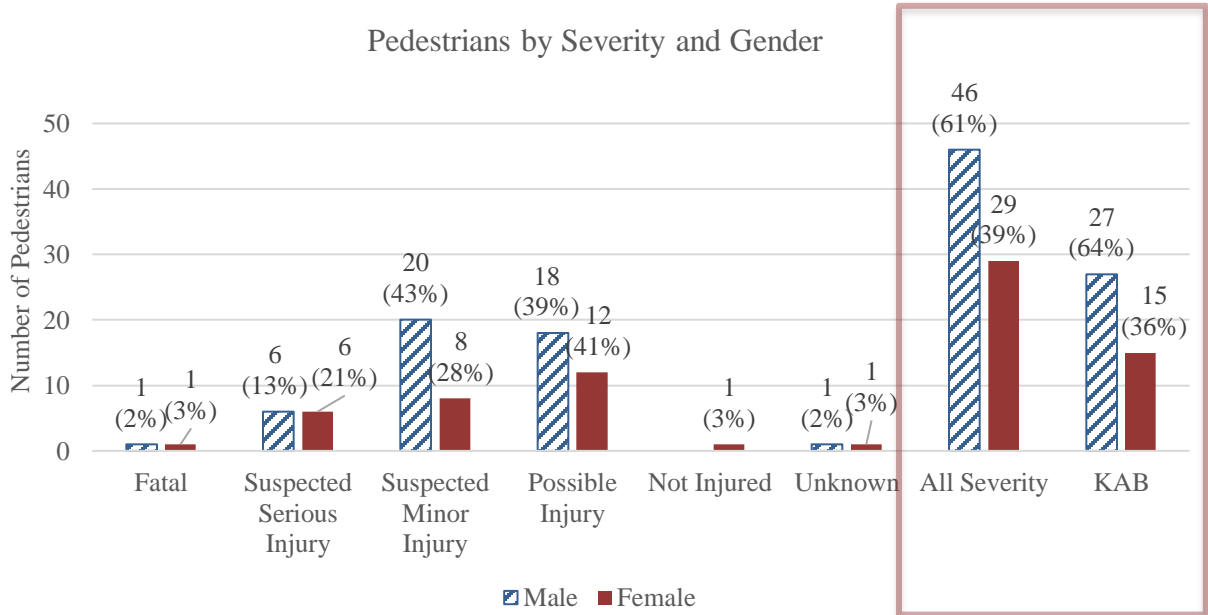


Figure 4. Severity Comparison Between Genders of Pedestrians within/around the Vicinity of TSU, 2018-2022

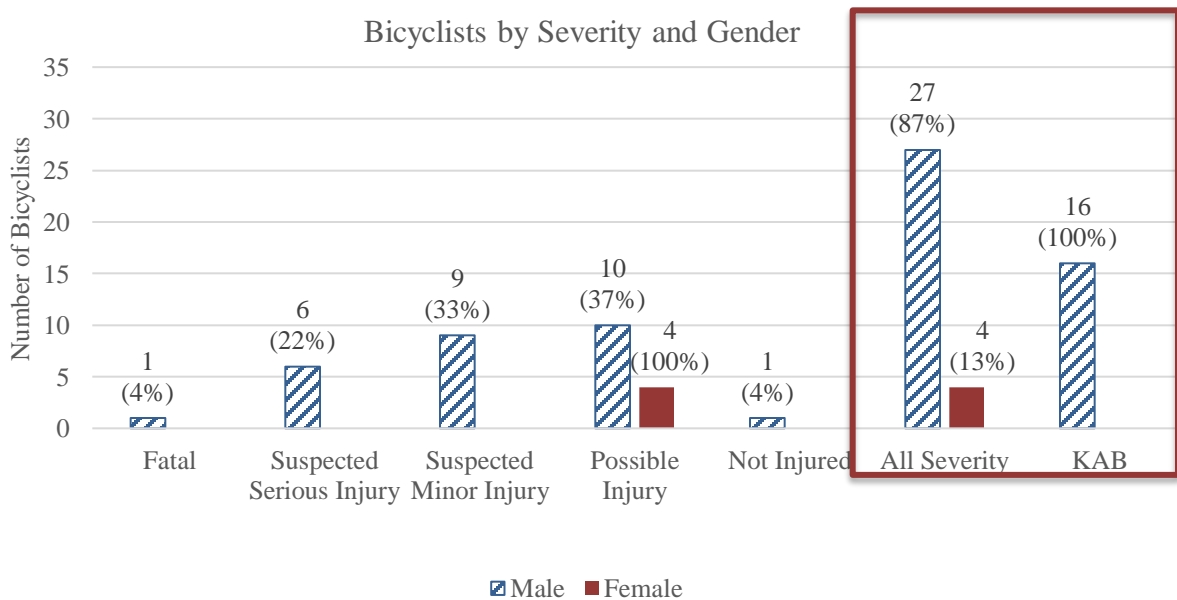


Figure 5. Severity Comparison Between Genders of Bicyclists within/around the Vicinity of TSU, 2018-2022

Age Group

The distribution of pedestrian-involved crashes across different age groups reveals that pedestrians aged 51 and older are involved in a relatively high number of crashes, followed by the age group of 18 to 22 years old (see Figure 6). Twenty-two (33%) pedestrians in the age group of 51 years and older were involved in the crashes, with 12 (32%) pedestrians involved in a KAB crash, as shown in Figure 6. Ten pedestrians were involved in the crashes for the age group of 18 to 22 years old.

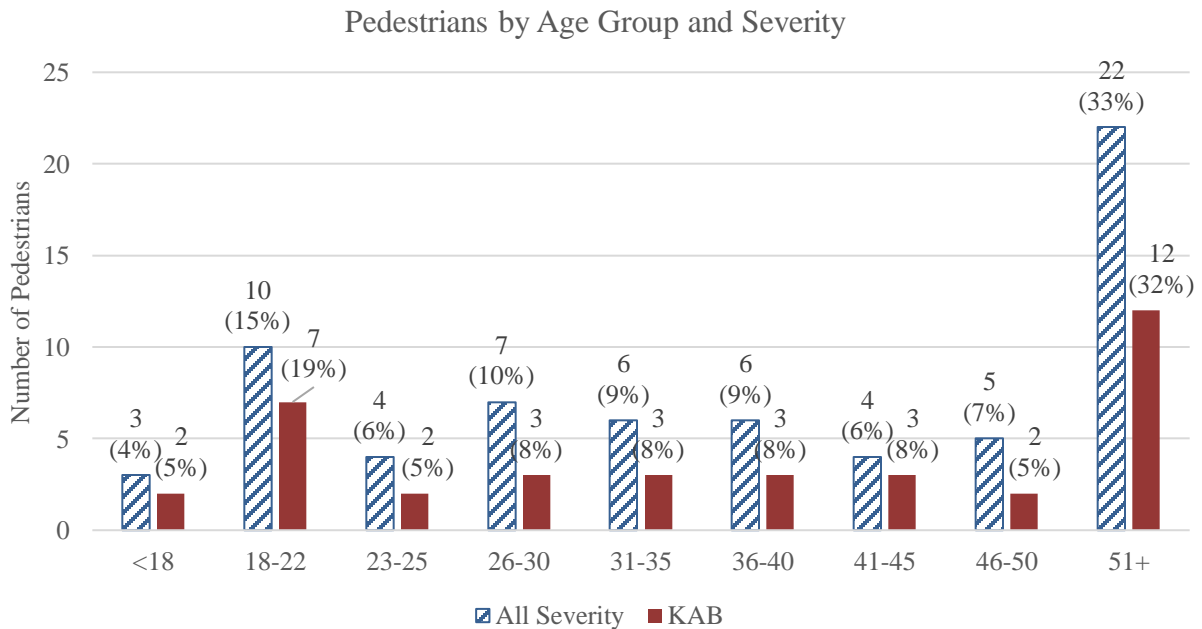


Figure 6. Age Category for Pedestrians Involved in the Crashes within/around the Vicinity of TSU, 2018-2022

A similar comparison drawn for bicyclists shows that bicyclists aged 51 and older were most frequently involved in crashes. There were 12 bicyclists involved in the crashes, which accounted for 40 percent of total bicyclist-involved crashes (see Figure 7). For KAB severity crashes, eight bicyclists were involved, accounting for 50 percent of the injured bicyclists.

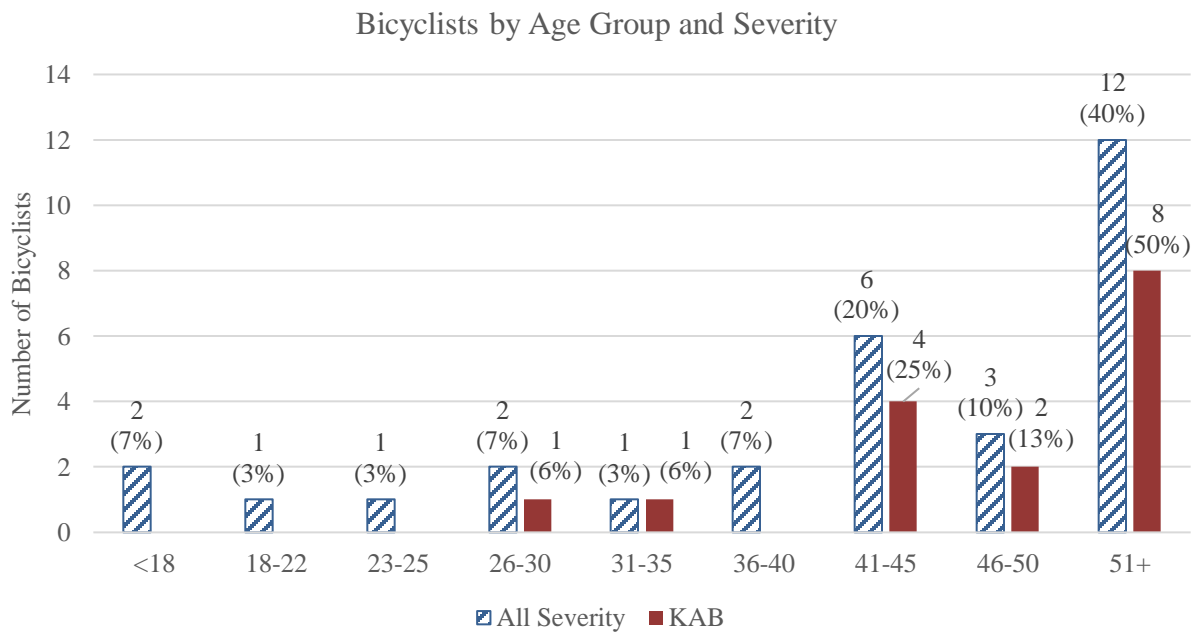


Figure 7. Age Category for Bicyclists Involved in the Crashes within/around the Vicinity of TSU, 2018-2022

Ethnicity

The most significant percentage of pedestrians involved in a crash are classified as Black. There were 63 (84%) Black pedestrians involved in all severity crashes, with 35 (83%) Black pedestrians in KAB severity crashes (see Figure 8). As the next most represented ethnicity, seven (9%) White pedestrians were involved in all severity crashes, and four (10%) of them were in KAB severity crashes.

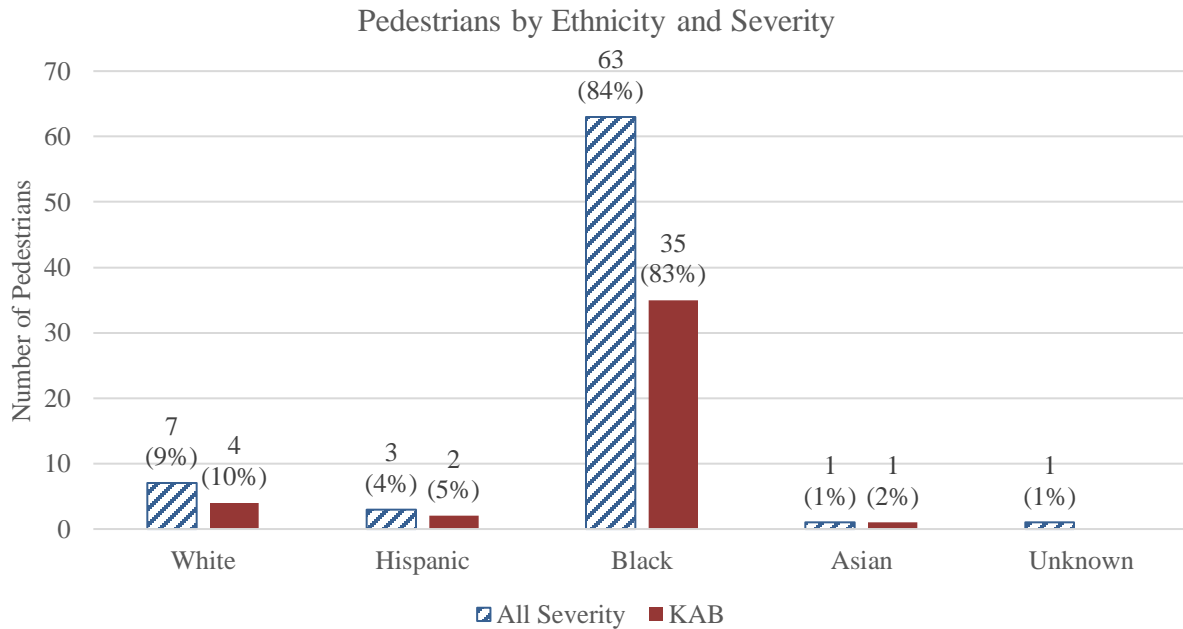


Figure 8. Ethnicity for Pedestrians Involved in the Crashes within/around the Vicinity of TSU, 2018-2022

Most of the bicyclists involved in a crash were Black (n=24; 77%) and White (n=5; 16%) (see Figure 9). For KAB severity crashes, 13 Black (81%) bicyclists were involved.

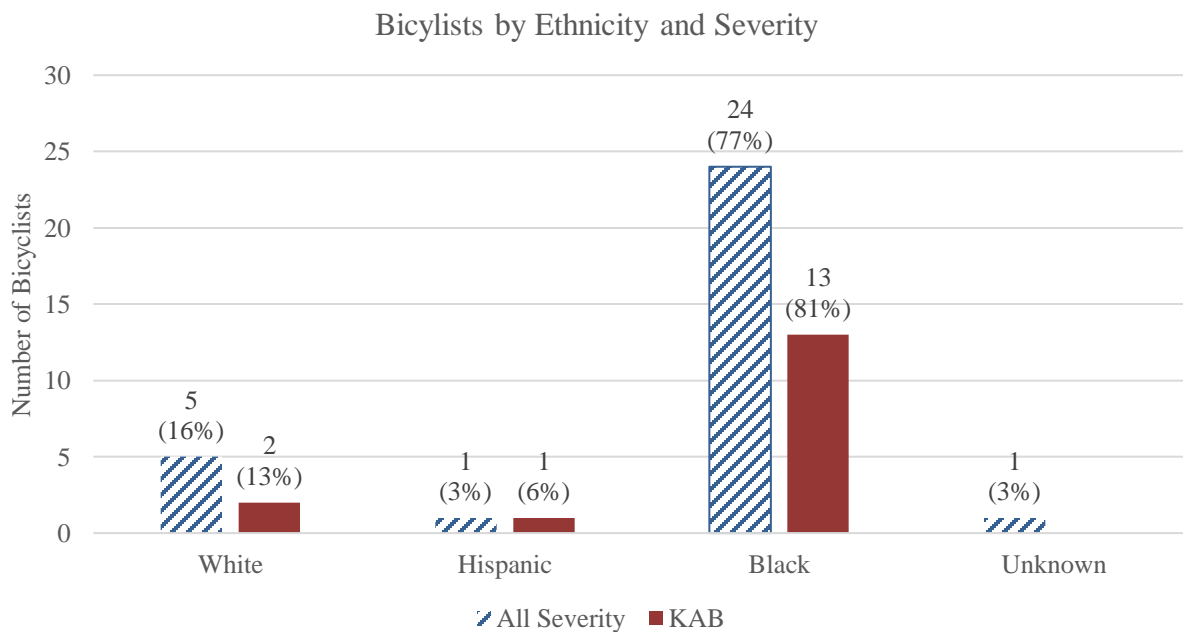


Figure 9. Ethnicity for Bicyclists Involved in the Crashes within/around the Vicinity of TSU, 2018-2022

Month of Year

Figure 10 and Figure 11 illustrate the percentage of pedestrians and bicyclists involved in the crashes by month, respectively. Pedestrians were more likely to be involved in a crash in semester months (February, May, September, and October) (Figure 10). More bicyclists were involved in a crash in April (Figure 11).

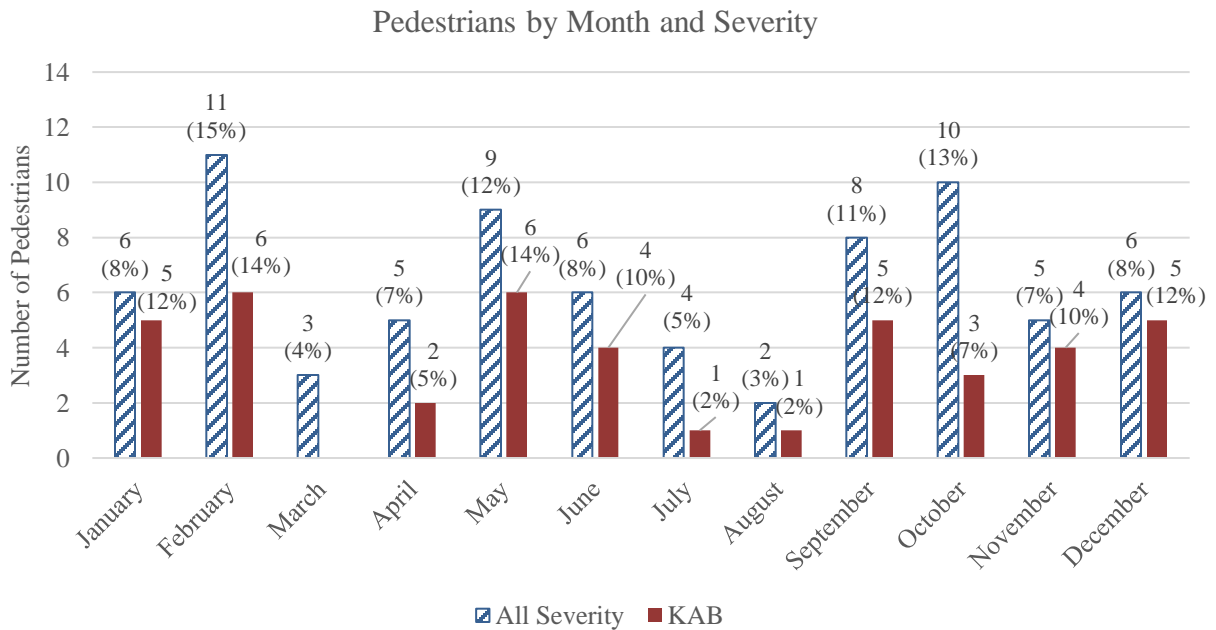


Figure 10. Comparison of Pedestrians Involved in the Crashes by Month within/around the Vicinity of TSU, 2018-2022

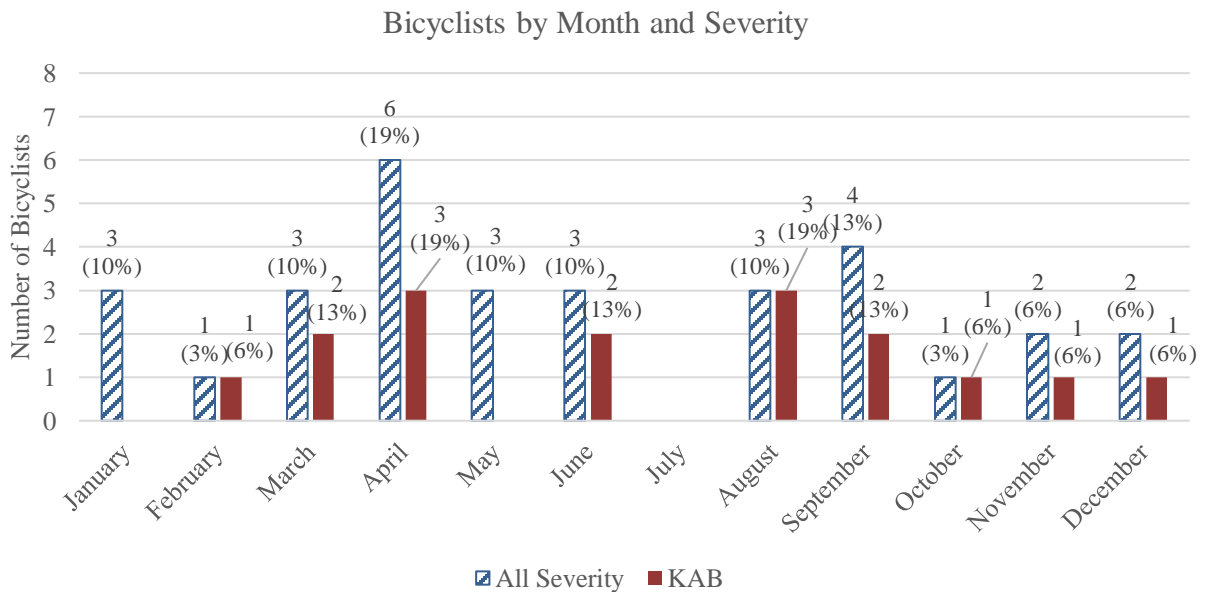


Figure 11. Comparison of Bicyclists Involved in the Crashes by Month within/around the Vicinity of TSU, 2018-2022

Day of Week

More pedestrians were involved in a crash of any severity on Thursday 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 Wednesday and Thursday than any other day.

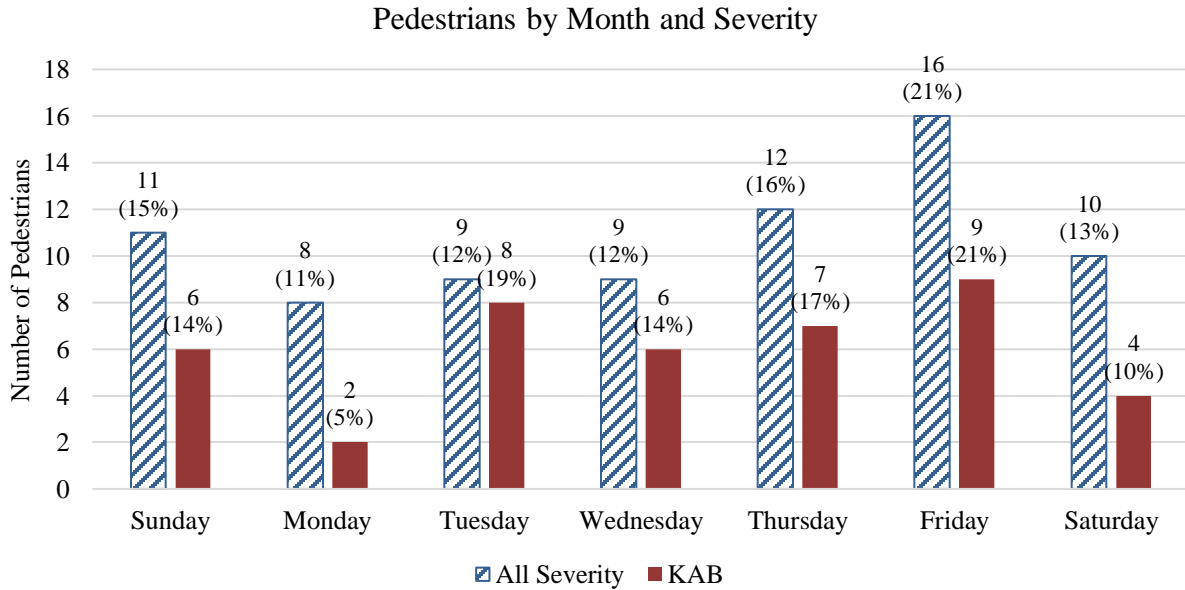


Figure 12. Comparison of Pedestrians Involved in the Crashes by Day of Week within/around the Vicinity of TSU, 2018-2022

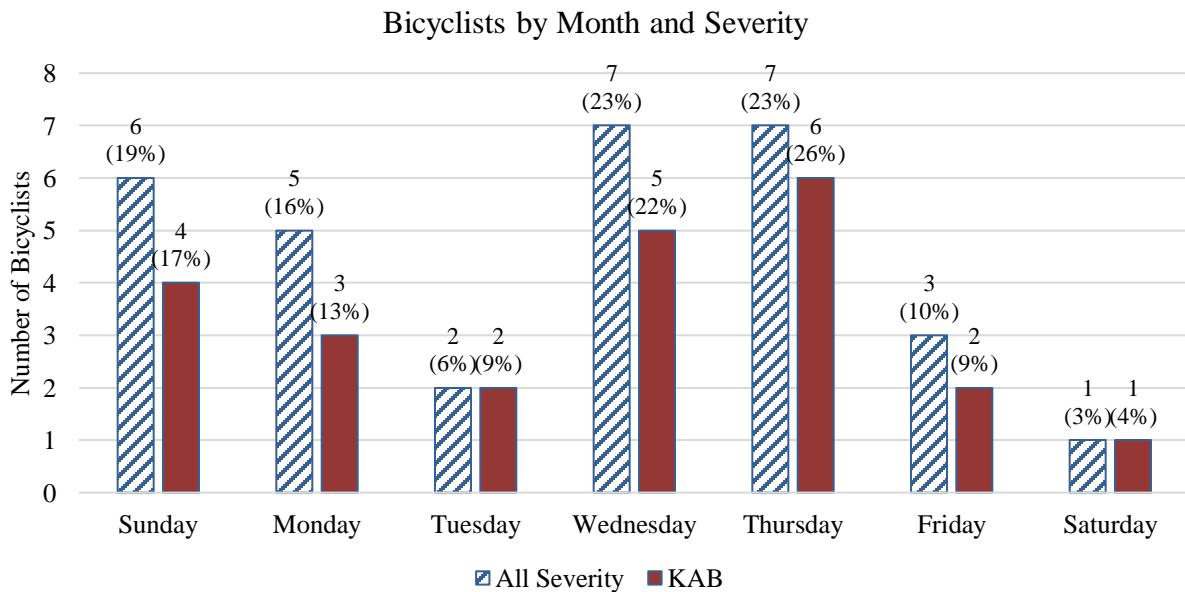


Figure 13. Comparison of Bicyclists Involved in the Crashes by Day of Week within/around the Vicinity of TSU, 2018-2022

Time of the day

Pedestrians involved in a crash were split by time of the day. Seventeen (23%) pedestrians were involved in a crash from 07:00 to 11:59, followed by the hours of 12:00 to 16:59 (n=16; 21%). For KAB severity, 11 (26%) pedestrians were involved in a crash from 12:00 to 16:59, followed by 07:00 to 11:59 (see Figure 14).

More bicyclists were involved in a crash from 17:00 to 19:59, followed by the hours of 20:00 to 23:59. There were 11 (35%) bicyclists in all severity crash and five (31%) bicyclists involved in a KAB severity crash during the hours of 17:00 to 19:59 (see Figure 15).

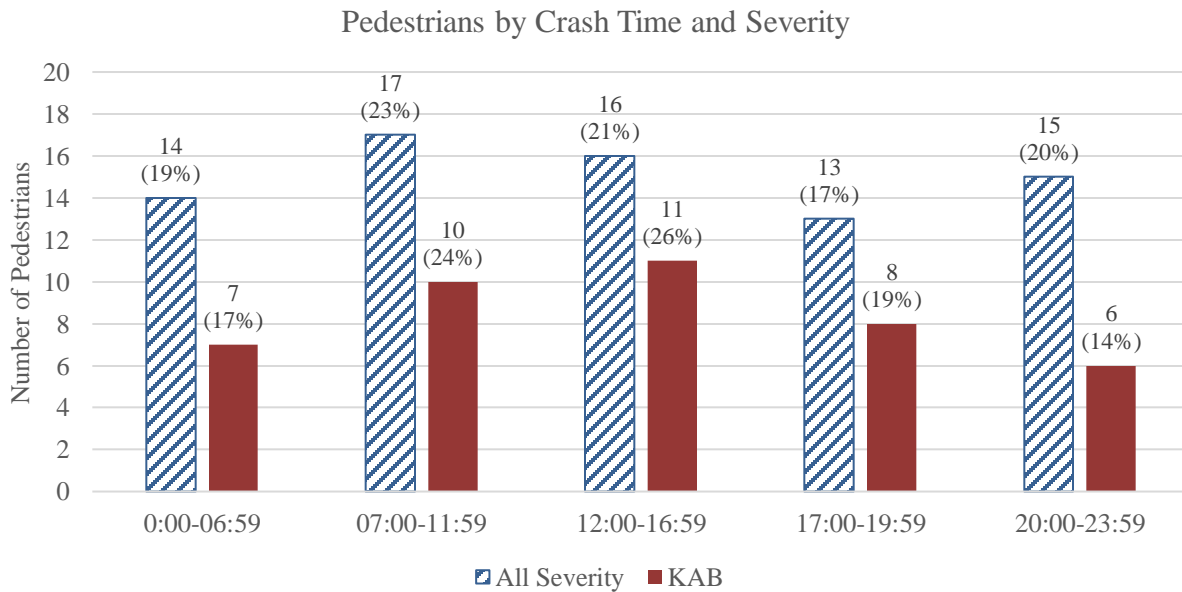


Figure 14. Comparison of Pedestrians Involved in the Crashes by Time of the Day within/around the Vicinity of TSU, 2018-2022

Bicyclists by Crash Time and Severity

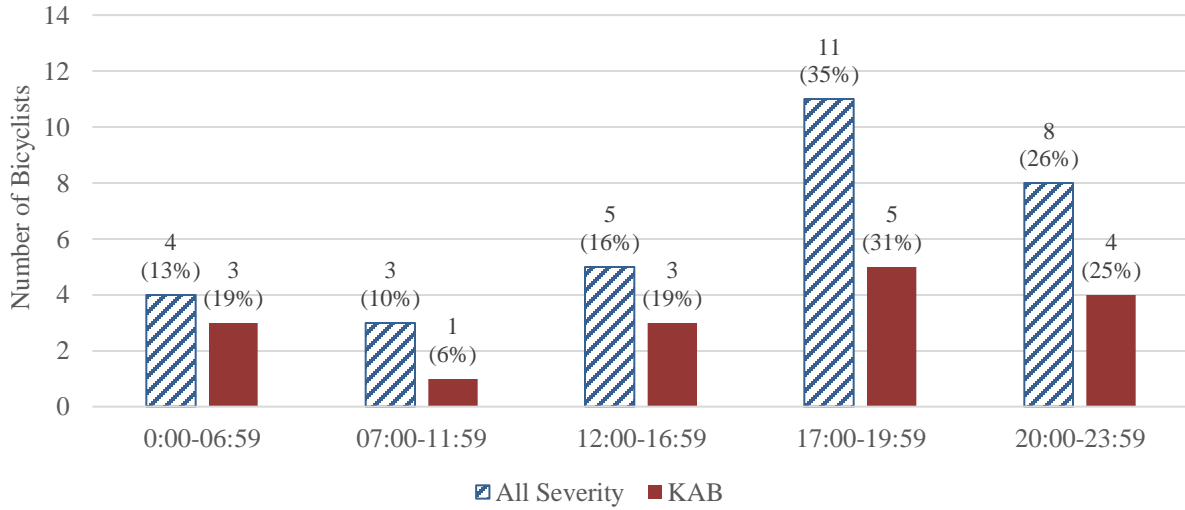


Figure 15. Comparison of Bicyclists Involved in the Crashes by Time of the Day within/around the Vicinity of TSU, 2018-2022

Pedestrians and bicyclists involved in a crash by individual hours between 07:00 - 16:59 and between 17:00 - 23:59 are shown in Figure 16 and Figure 17, respectively. Although more pedestrians (n=6; 8%) were involved in a crash from 9:00 to 9:59, the number of pedestrians involved in a crash was evenly distributed from 10:00 to 15:59 (see Figure 16). More bicyclists were involved in crashes from 17:00 to 17:59 and 19:00 to 19:59 (see Figure 17).

Pedestrians by Hour and Severity

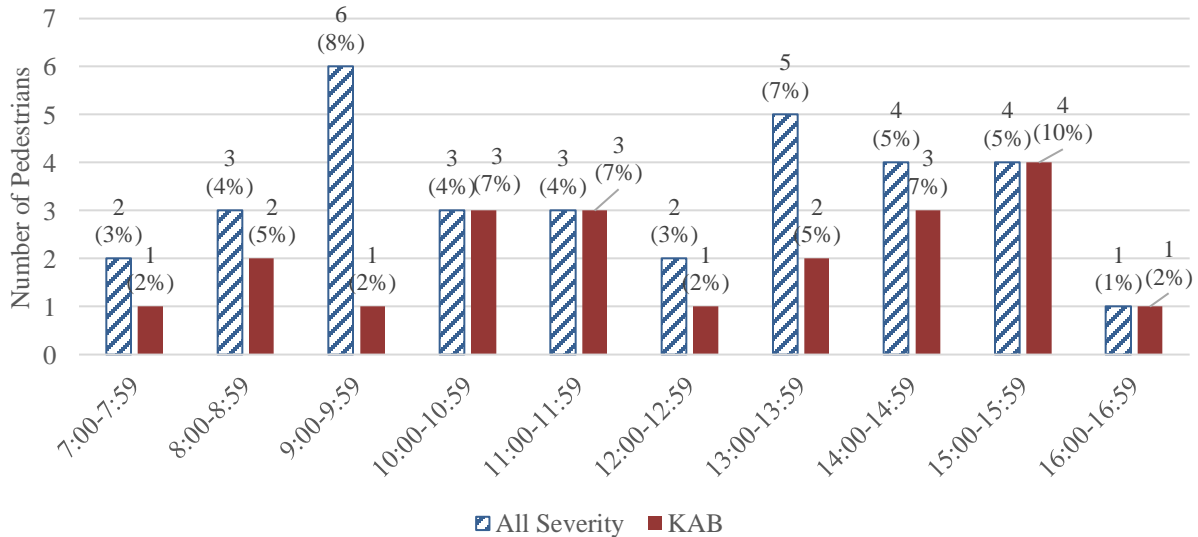


Figure 16. Comparison of Pedestrians Involved in the Crashes by Hours between 7 am and 5 pm within/around the Vicinity of TSU, 2018-2022

Bicyclists by Hour and Severity

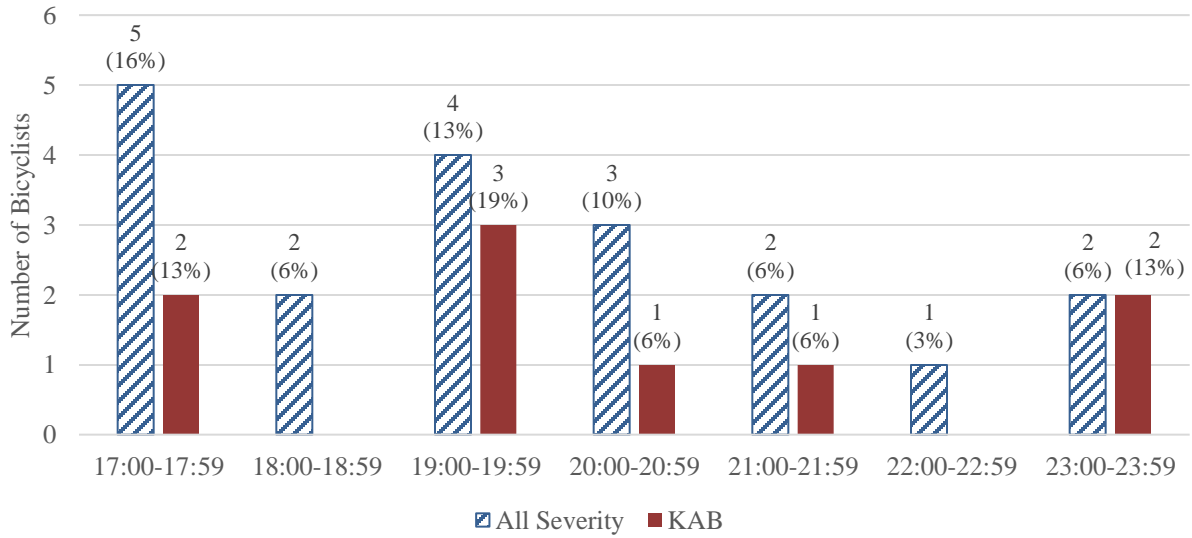


Figure 17. Comparison of Bicyclists Involved in the Crashes by Hours between 5pm and midnight within/around the Vicinity of TSU, 2018-2022

The number of pedestrians and bicyclists was broken down by quarter-hour from 08:00 to 19:59 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 transitional period where students are going to and from classes. Pedestrians were more likely to be involved in a crash during the quarter hour, hh:45:00 to hh:59:59 (see Figure 18). Note that the time format is hh:mm:ss. For bicyclists, the most frequent quarter hours were hh:30:00 to hh:44:59 and hh:45:00 to hh:59:59 (see Figure 19). Both pedestrians and bicyclists were more likely to be involved in a crash 15 minutes before the hour between 8 am to 8 pm..

Pedestrians by Quarter Hour and Severity

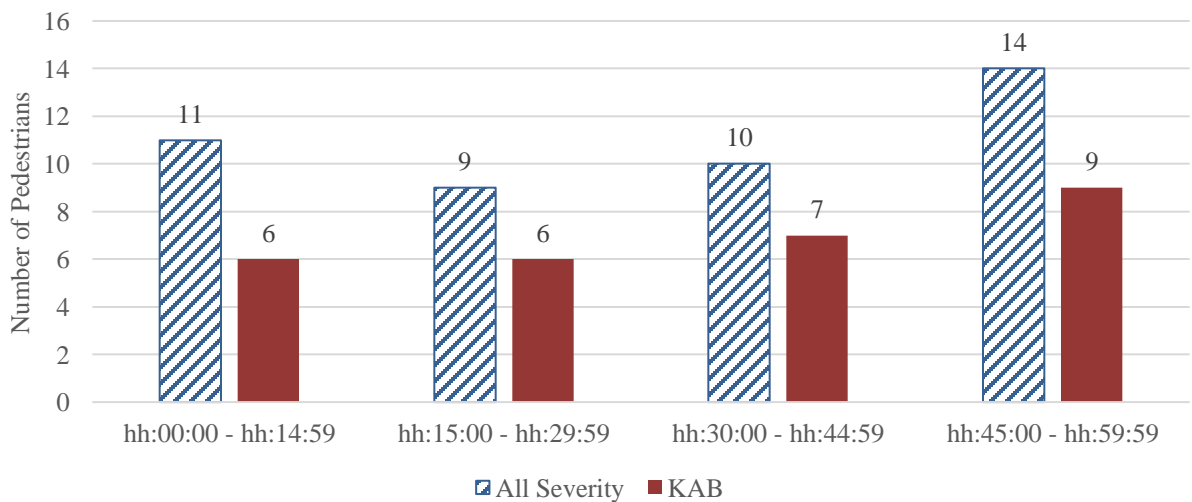


Figure 18. Distribution of Pedestrians Involved in the Crashes by Quarter Hour between 8 am and 8 pm

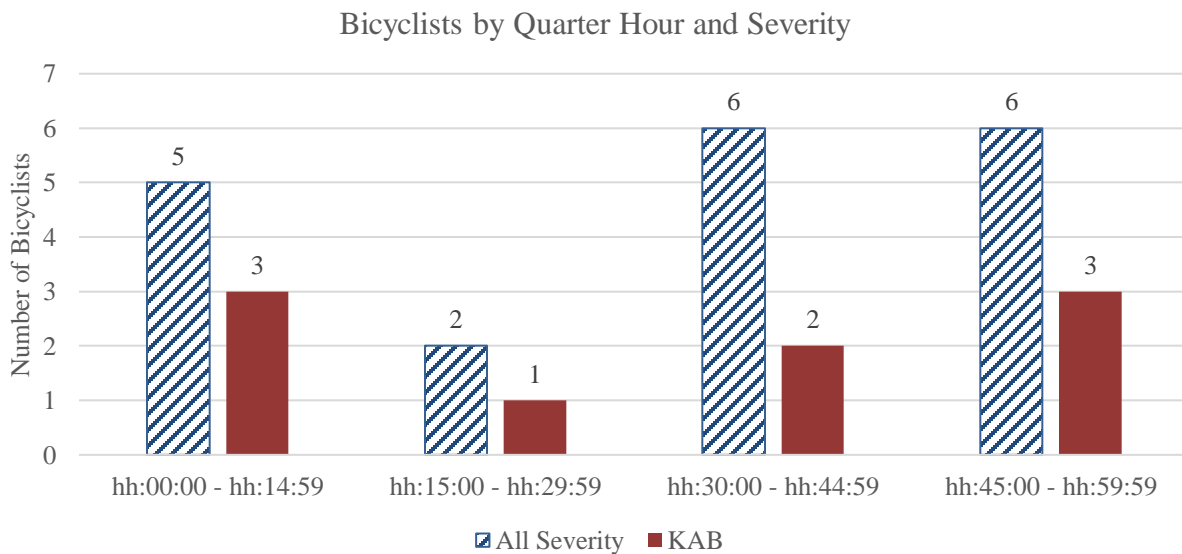


Figure 19. Distribution of Bicyclists Involved in the Crashes by Quarter Hour between 8 am and 8 pm

Helmet Use

At the crashes, 87 percent (n=27) of the bicyclists did not wear helmets. At all severity crashes, there were two bicyclists who wore a helmet. However, no bicyclist wore a helmet in KAB severity crashes (see Table 2). It represents that wearing a helmet could prevent severe injury.

Table 2. Helmet Use at Bicyclist-involved Crashes within/around the Vicinity of TSU, 2018-2022

Helmet Use	All Severity		KAB	
	Bicyclist	Percentage	Bicyclist	Percentage
Worn, Damaged	0	0%	0	0%
Worn, Not Damaged	1	3%	0	0%
Worn, Unknown Damage	1	3%	0	0%
Not Worn	27	87%	14	88%
Unknown if Worn	2	6%	2	13%
Total	31		16	

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 pedestrian-involved crashes occurred in clear weather (n=53; 76%), followed by cloudy weather (n=9; 13%) and rain (n=8; 11%) (see Figure 20). In terms of KAB severity crashes, more pedestrian-involved crashes occurred in rainy weather (n=6; 15%) than in cloudy weather (n=5; 12%). Clear conditions were present in seventy-four percent (n=23) of bicyclist-involved crashes. The percentages of bicyclist-involved crashes in cloudy weather are higher than that of pedestrian-involved (bicyclist-involved: 23% (all severity) and 31% (KAB); pedestrian-involved: 13% (all severity) and 12% (KAB)) (see Figure 21).

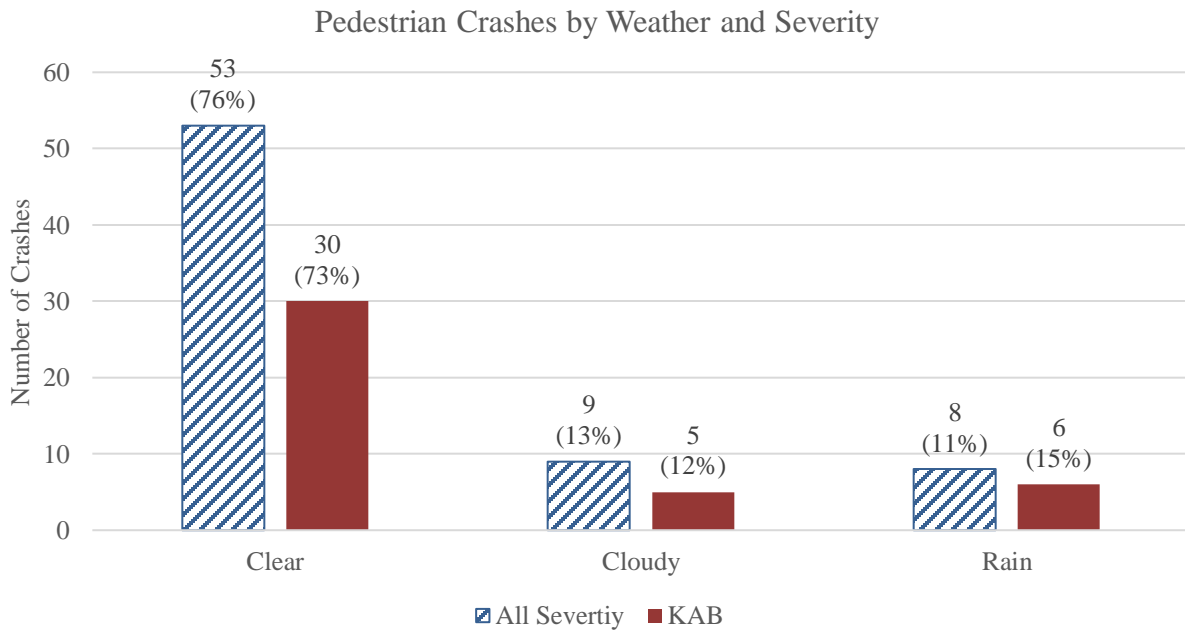


Figure 20. Weather Conditions of Pedestrian-involved Crashes within/around the Vicinity of TSU, 2018-2022

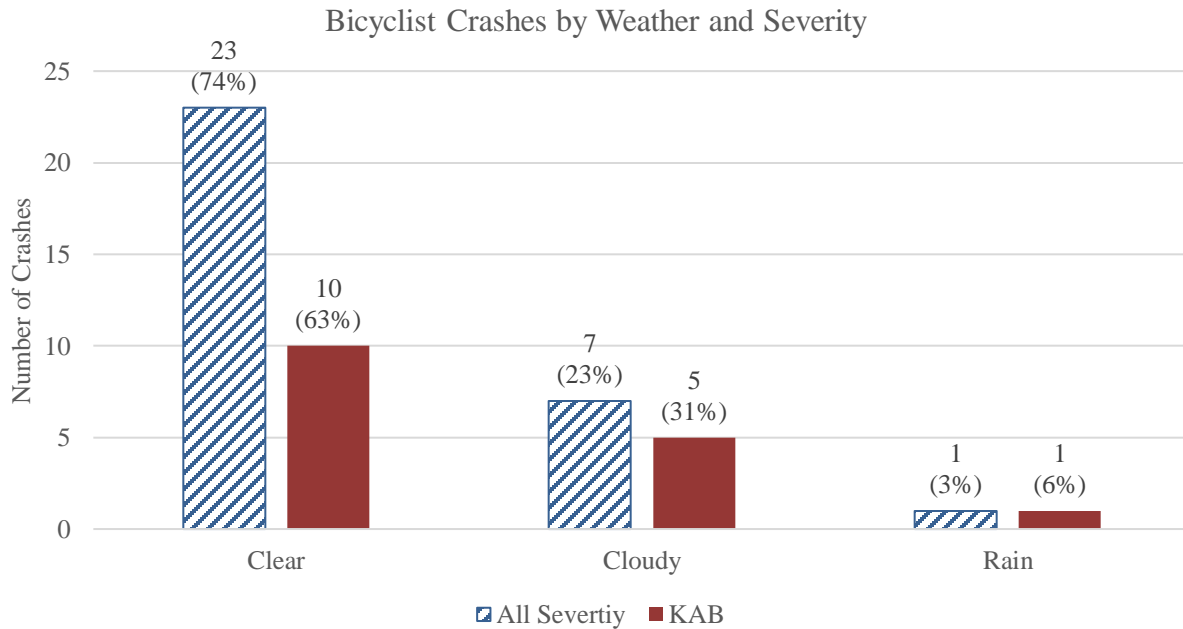


Figure 21. Comparison of Bicyclist-involved Crashes by Weather Conditions within/around the Vicinity of TSU, 2018-2022

Light Conditions

On observation of the light conditions reported in the crash data (see Figure 22 and Figure 23), it was found that more than half of bicyclist- and pedestrian-involved crashes occurred in daylight (pedestrian-involved: 51%, n=36; bicyclist-involved: 52%, n=16). In the dark (including lighted and not lighted) conditions, 31 pedestrian-involved (44%) and 14 bicyclist-involved (45%) crashes occurred. Of them, 17 pedestrian-involved (41%) and seven bicyclist-involved (44%) crashes were associated with a KAB severity.

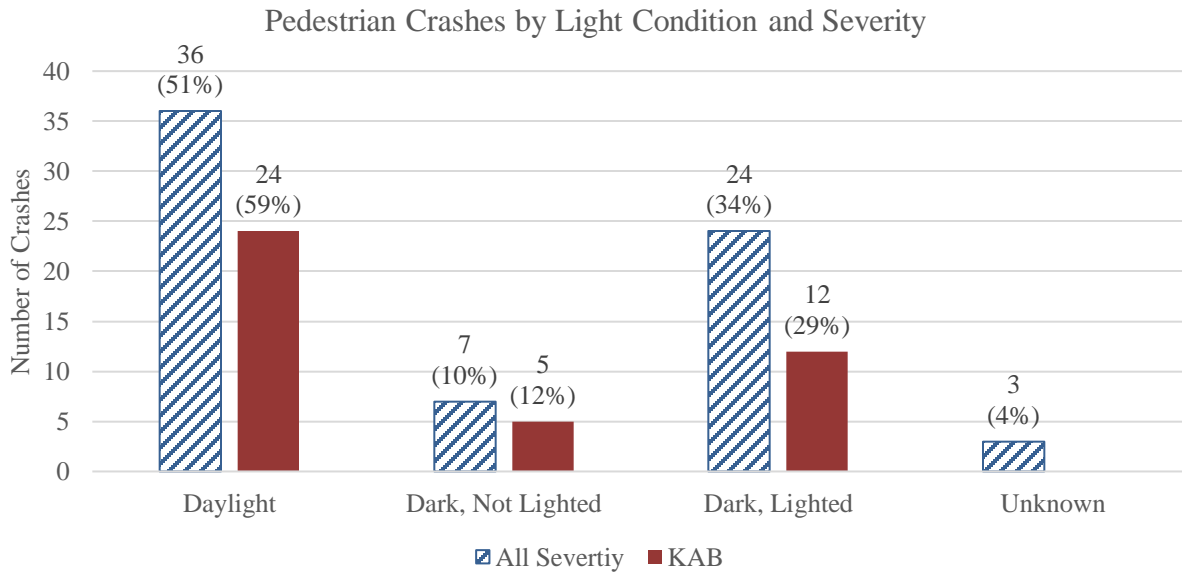


Figure 22. Comparison of Pedestrian-involved Crashes by Light Conditions within/around the Vicinity of TSU, 2018-2022

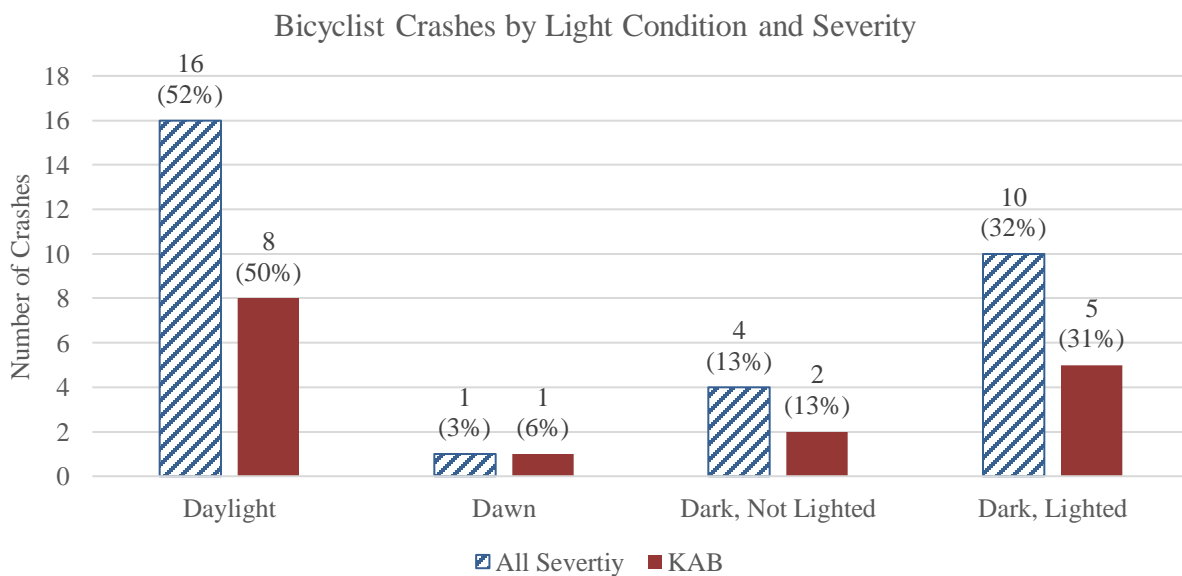


Figure 23. Comparison of Bicyclist-involved Crashes by Light Conditions within/around the Vicinity of TSU, 2018-2022

Surface Conditions

Most bicyclist- and pedestrian-involved crashes occurred on dry surface conditions (pedestrian-involved: 84%, n=59; bicyclist-involved: 97%, n=30) (see Figure 24 and Figure 25). Of KAB severity crashes, 85 percent (n=35) of pedestrian-involved crashes and 96 percent (n=22) of bicyclist-involved crashes occurred during dry surface conditions.

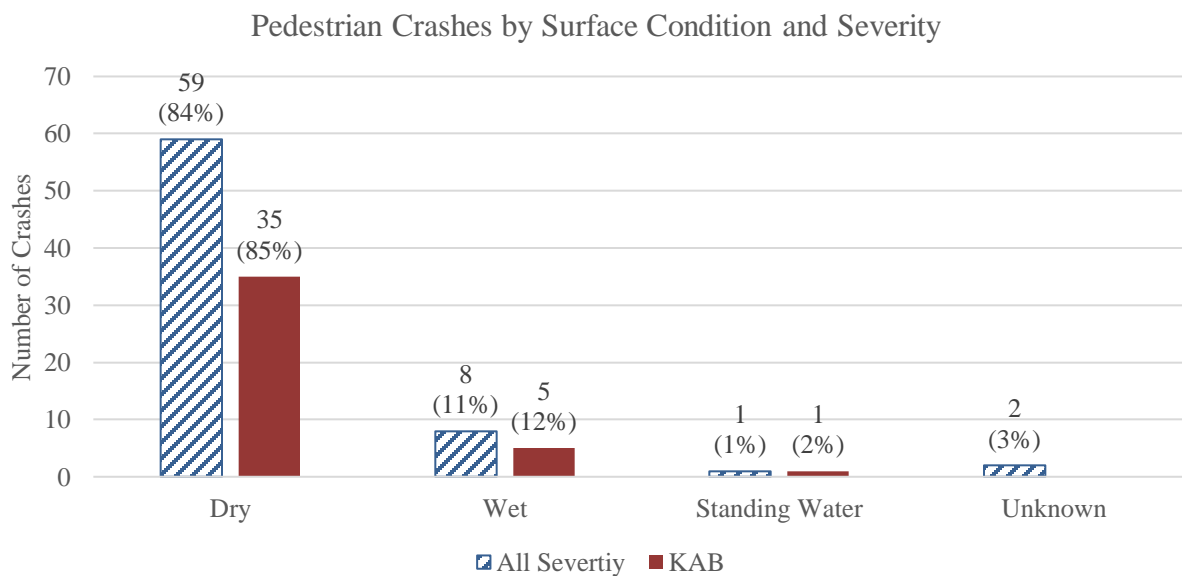


Figure 24. Comparison of Pedestrian-involved Crashes by Surface Conditions within/around the Vicinity of TSU, 2018-2022

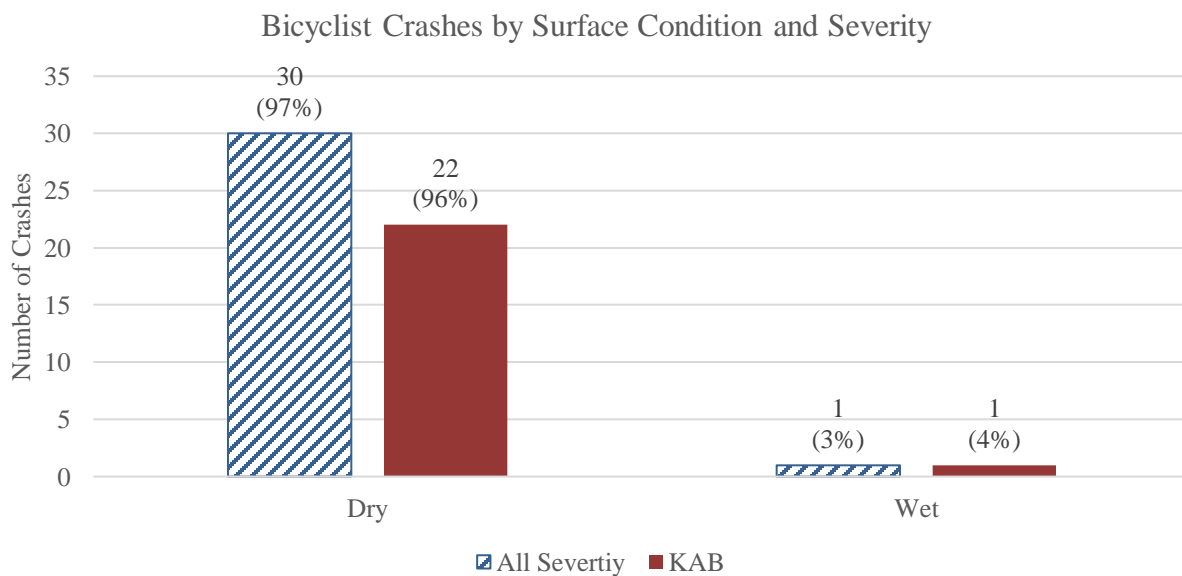


Figure 25. Comparison of Bicyclist-involved Crashes by Surface Conditions within/around the Vicinity of TSU, 2018-2022

Roadway Classification

In all severity crashes split over categories of roadways, most pedestrian-involved (n=67; 96%) and bicyclist-involved (n=30; 97%) crashes occurred on city streets, as shown in Figure 26 and Figure 27. In KAB severity, 98 percent (n=40) of pedestrian-involved crashes and 100 percent (n=16) of bicyclist-involved crashes occurred on city streets.

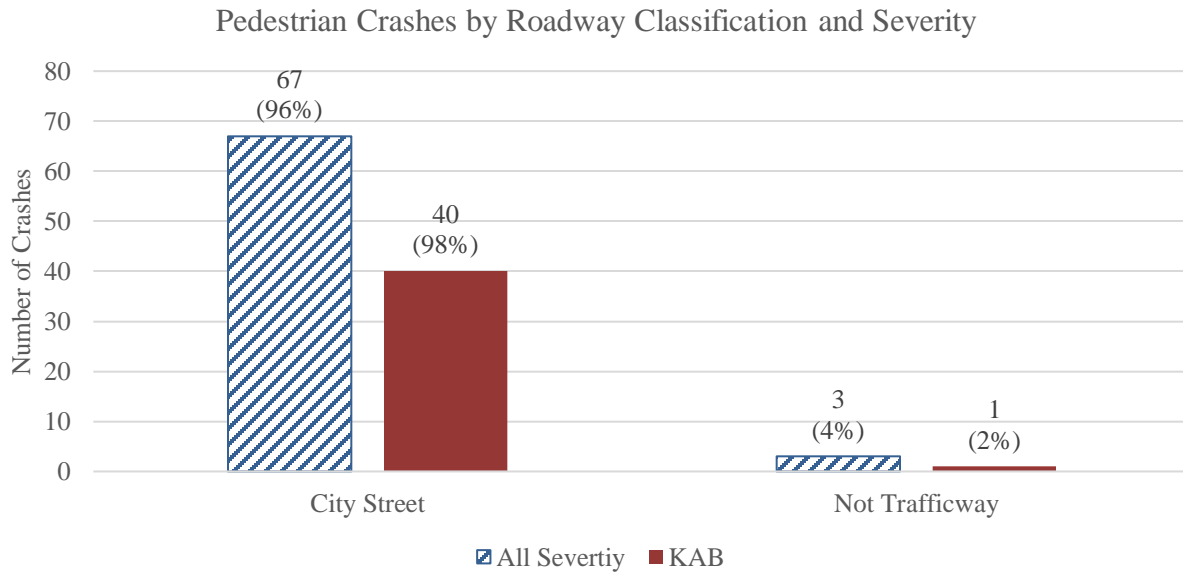


Figure 26. Comparison of Pedestrian-involved Crashes by Roadway Classification within/around the Vicinity of TSU, 2018-2022

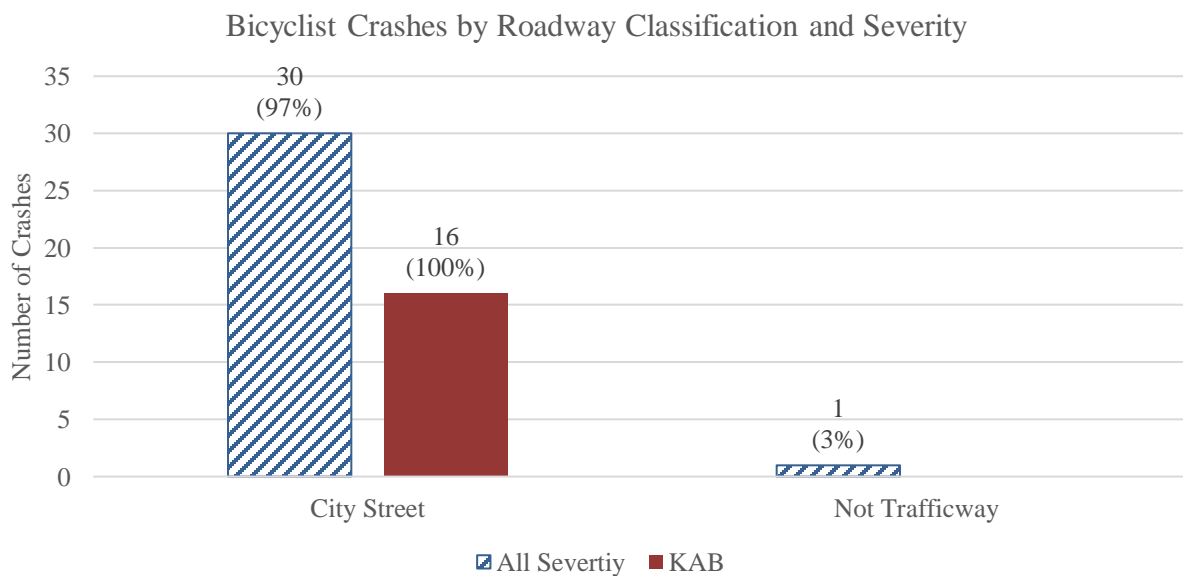


Figure 27. Comparison of Bicyclist-involved Crashes by Roadway Classification within/around the Vicinity of TSU, 2018-2022

Road Location

Crashes were examined by road location. Pedestrian-involved crashes were more likely to occur in non-intersection areas, followed by intersection-related locations. Forty-three (61%) pedestrian-involved crashes occurred at non-intersection locations, and 21 (30%) crashes at intersection-related locations (see Table 3). The majority of bicyclist-involved crashes occurred at intersection/-related locations (all severity: n=26 (84%); KAB: n=16 (100%)).

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

Road Location	Pedestrian-involved		Bicyclist-involved		Combined	
	All Severity	KAB	All Severity	KAB	All Severity	KAB
Intersection	5 (7%)	3 (7%)	16 (52%)	10 (62%)	21 (21%)	13 (23%)
Intersection-related	21 (30%)	13 (32%)	10 (32%)	6 (38%)	31 (31%)	19 (33%)
Driveway Access	1 (1%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)	0 (0%)
Non-Intersection	43 (61%)	25 (61%)	5 (16%)	0 (0%)	48 (48%)	25 (44%)
Total	70	41	31	16	101	57

Traffic Control Type

The crashes were distributed over traffic control variables, as shown in Figure 28 and Figure 29. Pedestrian-involved crashes were more likely to occur on roadways with marked lanes (n=33; 47%), no traffic control device (n=14; 20%), and signal lights (n=11; 16%). Bicyclist-involved crashes were more likely to occur on roadways with stop signs (n=16, 52%).

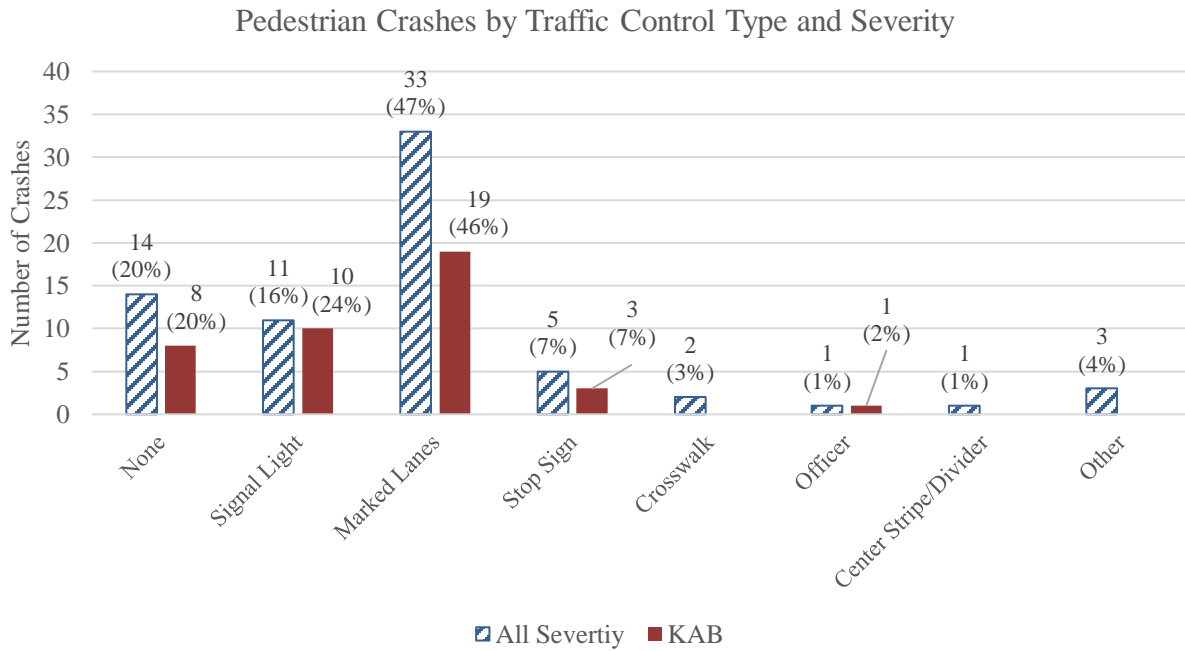


Figure 28. Comparison of Pedestrian-involved Crashes by Traffic Control Type within/around the Vicinity of TSU, 2018-2022

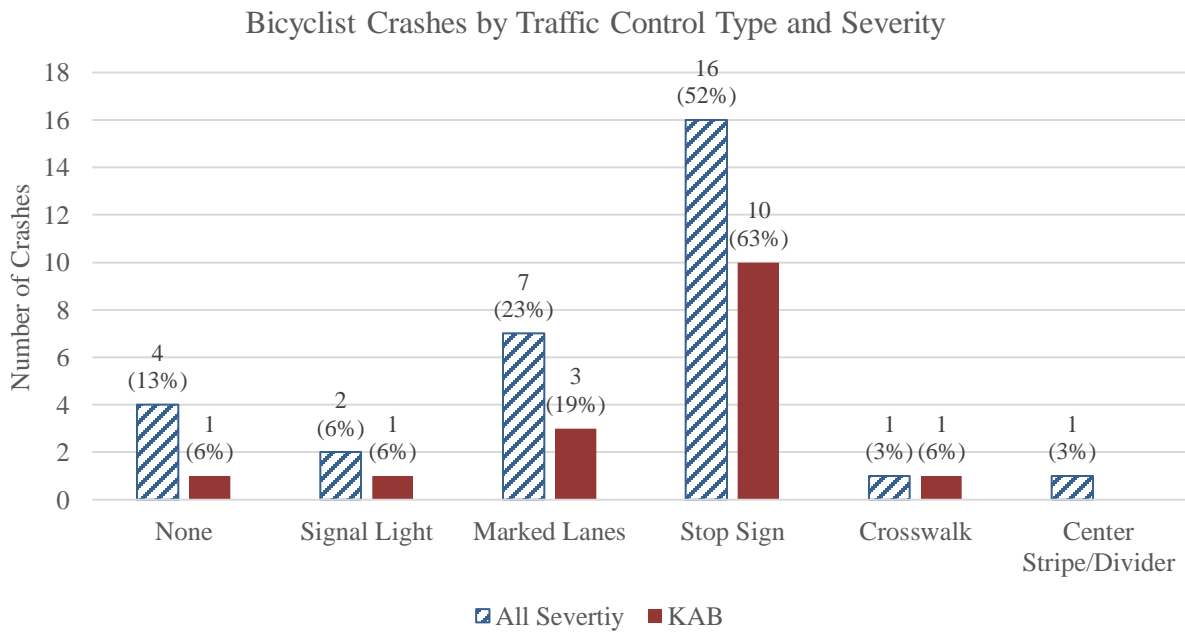


Figure 29. Comparison of Bicyclist-involved Crashes by Traffic Control Type within/around the Vicinity of TSU, 2018-2022

Road Alignment

Crashes were examined by road alignment, and the data shows that there were 68 (97%) pedestrian-involved all severity crashes on straight and level roads (see Figure 30). All bicyclist-involved crashes (n=31, 100%) occurred on straight and level roads (see Figure 31).

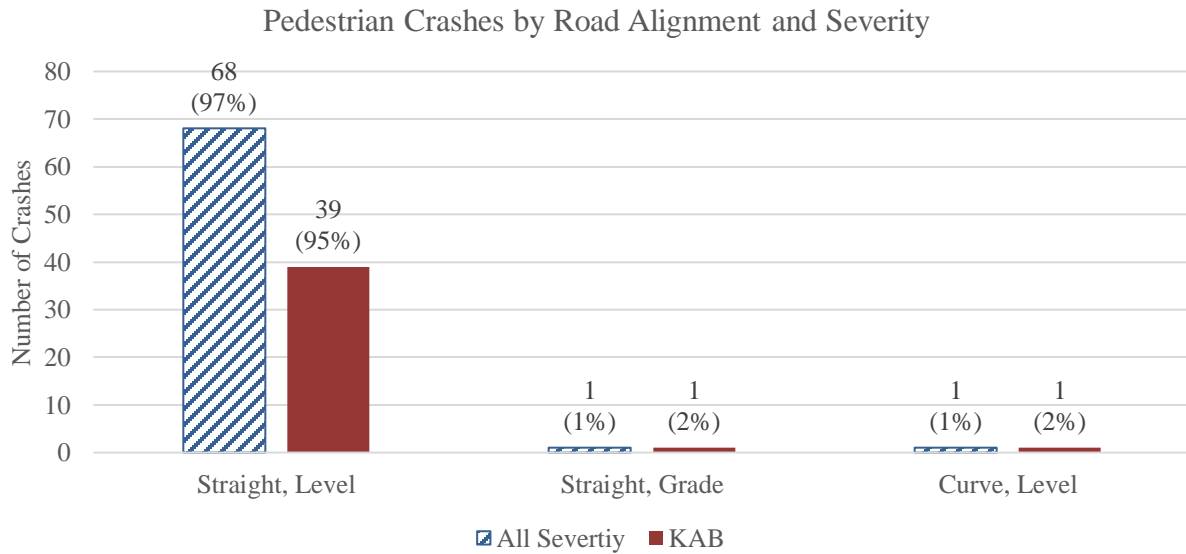


Figure 30. Comparison of Pedestrian-involved Crashes by Road Alignments within/around the Vicinity of TSU, 2018-2022

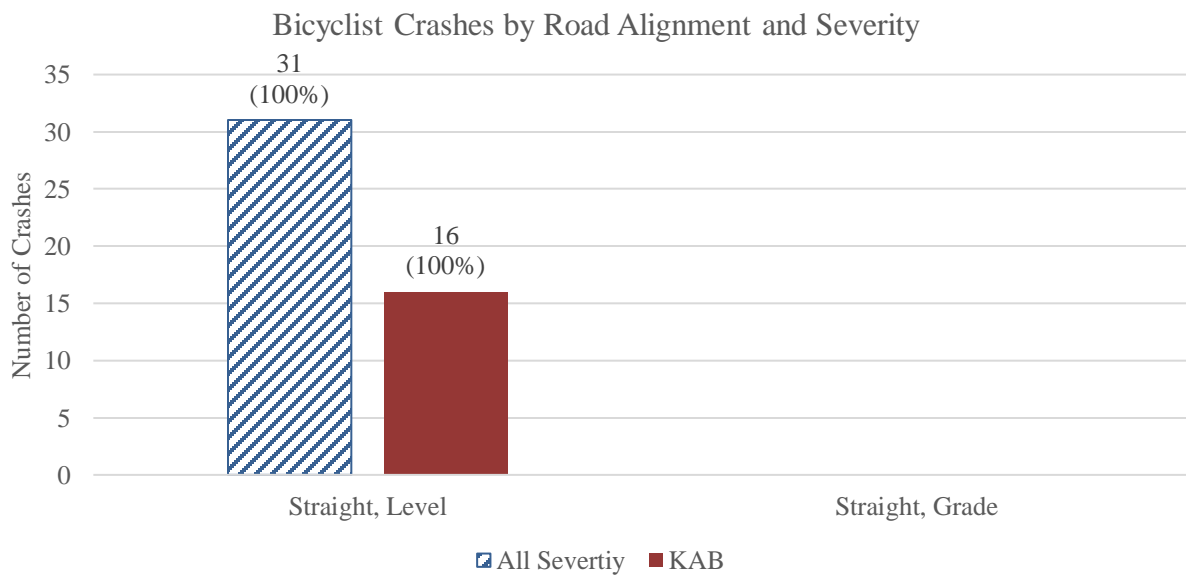


Figure 31. Comparison of Bicyclist-involved Crashes by Road Alignments within/around the Vicinity of TSU, 2018-2022

Posted Speed Limit

Most pedestrian- or bicyclist-involved crashes occurred with posted speed limits between 25 and 39 miles per hour. Ninety percent of pedestrian- and bicyclist-involved all severity crashes occurred on a roadway with a speed limit between 25 and 39 miles per hour (see Table 4).

Table 4. Comparison of Pedestrian- and Bicyclist-involved Crashes by Posted Speed Limit

Posted Speed Limit	Pedestrian-involved		Bicyclist-involved	
	All Severity	KAB	All Severity	KAB
<25 mph	4 (6%)	1 (2%)	2 (6%)	1 (6%)
25 - 39	63 (90%)	38 (93%)	28 (90%)	15 (94%)
40 - 45	3 (4%)	2 (5%)	0 (0%)	0 (0%)
>45	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Not Reported	0 (0%)	0 (0%)	1 (3%)	0 (0%)
Total	70	41	31	16

Road Construction-related

Most pedestrian-involved and all bicyclist-involved crashes were not related to road construction. There was only one (1%) pedestrian-involved crash related to road construction (see Table 5).

Table 5. Comparison of Pedestrian- and Bicyclist-involved Crashes by Road Construction-related

Road Construction-related	Pedestrian-Involved		Bicyclist-Involved	
	All Severity	KAB	All Severity	KAB
Yes	1 (1%)	1 (2%)	0 (0%)	0 (0%)
No	69 (99%)	40 (98%)	31 (100%)	16 (100%)
Total	70	41	31	16

Contributing Factors

The crash contributing factors by person type (driver, pedestrian, and bicyclist) were analyzed (see Table 6). For drivers, the most frequent contributing factor to pedestrian-involved crashes was the failure to yield the right of way to pedestrian (n=19) and inattention (n=4) at bicyclist-involved crashes. For pedestrians, the factor “Pedestrian failed to yield the right of way to vehicle” was the most frequent. There were 22 crashes involving a pedestrian due to this factor. For bicyclists, the most frequent contributing factor was related to the factor “Explain in Narrative (n=4)”, and the factors “Failed to yield the right of way – open intersection (n=2)” and “Failed to yield the right of way – stop sign (n=2)” followed.

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	Failed to Yield the Right of Way - To Pedestrian (n=19)	Other (Explain in Narrative) (n=8)	- Driver Inattention (n=5) - Failed to Drive in Single Lane (n=5)
		KABC	Failed to Yield the Right of Way - To Pedestrian (n=10)	Other (Explain in Narrative) (n=3)	- Driver Inattention (n=3) - Failed to Drive in Single Lane (n=3)
	Bicyclist-involved Crashes	All Severity	Driver Inattention (n=4)	Failed to Control Speed (n=3)	- Failed to Yield the Right of Way – Stop Sign (n=3) - Other (Explain in Narrative) (n=3)
		KABC	Other (Explain in Narrative) (n=3)	Driver Inattention (n=2)	Failed to Yield the Right of Way – Stop Sign (n=2)
Pedestrian	All Severity	Pedestrian Failed to Yield the Right of Way to Vehicle (n=22)	Other (Explain in Narrative) (n=9)	Disregard Stop and Go Signal (n=2)	
	KABC	Pedestrian Failed to Yield the Right of Way to Vehicle (n=19)	Other (Explain in Narrative) (n=3)	Disregard Stop and Go Signal (n=2)	
Bicyclist	All Severity	Other (Explain in Narrative) (n=4)	Failed to Yield the Right of Way – Open Intersection (n=2)	- Failed to Yield the Right of Way – Stop Sign (n=2) - Disregard Stop Sign or Light (n=2) - Changed Lane When Unsafe (n=2)	
	KABC	Failed to Yield the Right of Way – Open Intersection (n=2)	Failed to Yield the Right of Way – Stop Sign (n=2)		

Summary

The crash analysis focused on the data of pedestrian- and bicyclist-involved crashes within/around the vicinity of Texas Southern University from 2018 to 2022. Pedestrians and bicyclists were more vulnerable to fatalities and injuries than other road users. The crash data showed that more than half of the pedestrians and bicyclists involved in the crashes were killed or suffered suspected serious injuries or minor injuries. There were three fatalities and 18 suspected serious injuries, 37 suspected minor injuries, and 44 possible injuries from 2018 to 2022. During the period, the number of pedestrians and bicyclists who sustained a fatality and suspected serious injury at a crash in the city of Houston accounted for 25 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 TSU accounted for about 20 percent. This could be attributed to the lower speed limits on roads surrounding the campus, which may positively impact pedestrian and bicycle safety.

The pedestrian- and bicyclist-involved crashes that resulted in a fatality, suspected serious injury, or suspected minor injury were most often a result of a collision with a vehicle going straight,

followed by a vehicle turning left. Pedestrian-involved crashes were more likely to occur at non-intersection locations with no traffic control device, marked lanes, or signal lights, while bicyclist-involved were more likely to occur at intersection-related locations with stop signs. More pedestrian- and bicyclist-involved crashes occurred in daylight. However, the percentage of crashes in dark conditions was more than 40 percent.

More male pedestrians and bicyclists were involved in crashes than females. The ages of 18 to 22 is a typical age group of an undergraduate. However, pedestrians and bicyclists aged 51 and older are involved in a relatively high number of crashes because this safety assessment includes pedestrian- and bicyclist-involved crashes that occurred in the campus's vicinity (residential area). The majority of pedestrians and bicyclists involved in the crashes were Black. Helmet use for bicyclist safety is critical. However, most 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. Top contributing factors for bicyclists also included failure to yield right of way, as well as failure to stop at stop sign/light and changing lanes when unsafe.