2022 Survey of Texans on Pedestrian and Bicycle Safety

Identifying Barriers to Understanding Pedestrian and Bicycle Safety Laws

(2022-TTI-G-1YG-0023)

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Introduction

The objective of this survey is to measure and track pedestrian and bicycle safety in Texas. This is the third year that this survey has been conducted; a similar survey was conducted in 2020 and 2021. The survey provides a snapshot of the pedestrian and bicycle safety issues in Texas, and this report summarizes the findings of the 2022 survey. Additionally, comparisons to the previous year's survey show how the issues are changing from year to year. This survey is conducted as part of the grant-funded project, Identifying Barriers to Understanding Pedestrian and Bicycle Safety Laws funded by the Texas Department of Transportation (TxDOT), to learn more about pedestrian and bicyclist behavior and knowledge, and to help identify barriers to the public's understanding of laws related to pedestrian and bicycle safety.

Methods

Survey Development

This survey was based on the survey conducted in the FY 2021 grant year with editing, addition and deletion of some questions and with the approval of TxDOT. The survey was submitted for review by the Texas A&M University Institutional Review Board (IRB) (IRB2022-0009M), and was given an exempt determination. Appendix A includes a copy of the approved survey. The survey included questions about frequency of walking and biking, behaviors associated with pedestrian and bike laws/safety, preferences for educational materials, and knowledge of state pedestrian and bicycle laws. The survey was designed to take five to ten minutes to complete.

Survey Distribution

The project team used Marketing Systems Group (MSG) to distribute the survey using an online panel. The survey was set up using Qualtrics software and distributed to the panel.

Survey Analysis

A total of 433 individuals in Texas completed the online survey. However, 12 surveys were removed because of missing data for most or all of their responses. Therefore, the total sample size was 421 respondents. To improve the validity of the results the survey was weighted to provide a statewide representative data set. The survey weighting methodology, conducted by MSG, is provided in Appendix B.

Descriptive analysis (e.g., counts and percentages) of the survey data was conducted for each question. In addition, the questions were analyzed to look at differences in relation to other variables such as gender, age, race and education. Noteworthy findings of these relationships are also included. Results from the 2022 survey, including the knowledge assessment, were compared to the 2021 survey results to look at changes over time.

Demographics

As Figure 1 shows, the majority of respondents were female at 55.2 percent, with males making up 42.7 percent of the respondents.

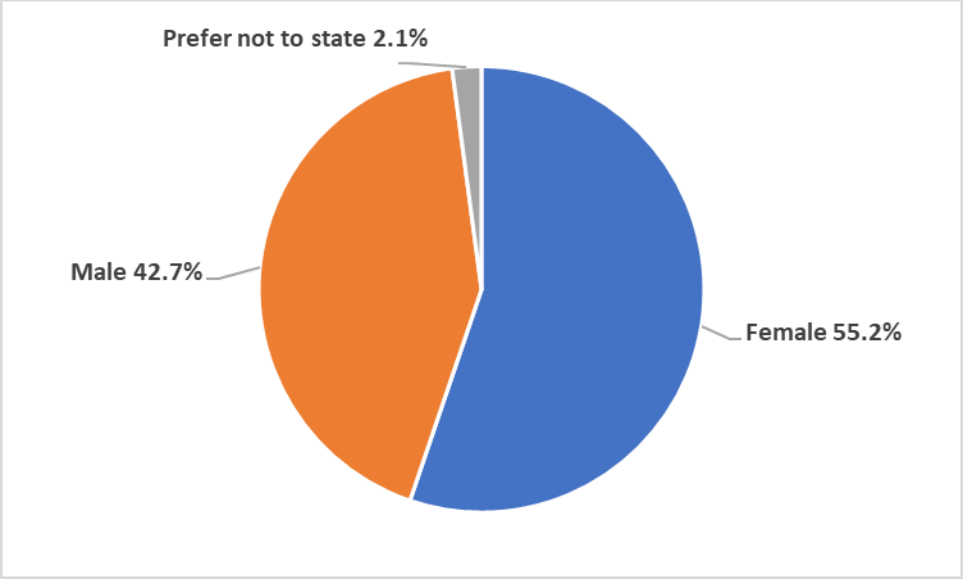

Figure 1. Respondent Gender

As Figure 2 shows, there was a variety of age groups represented in the sample.

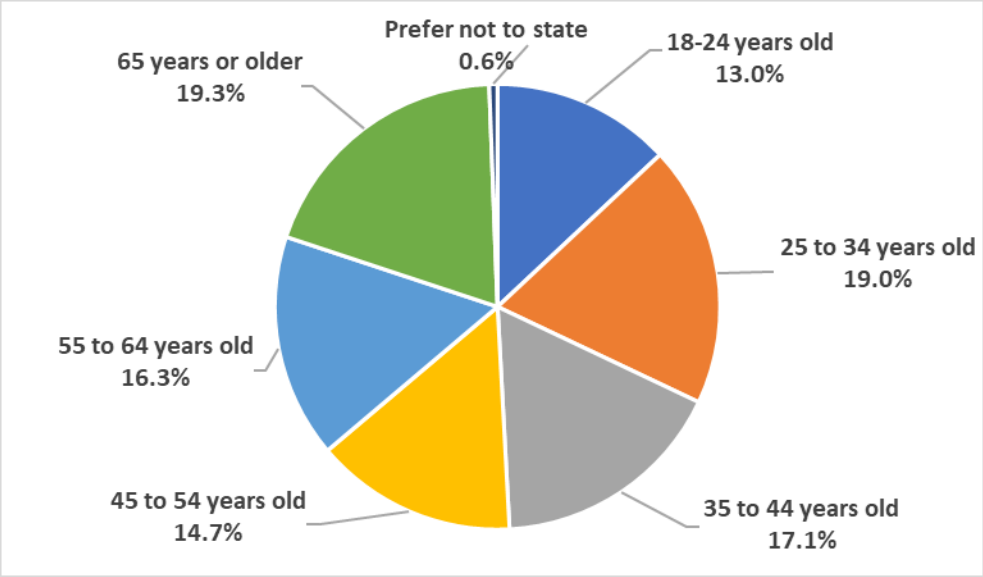

Figure 2. Respondent Age

Whites were the largest racial group at **41.2 percent** of respondents, followed by those of Hispanic or Latino origin and then Black or African American (see Figure 3).

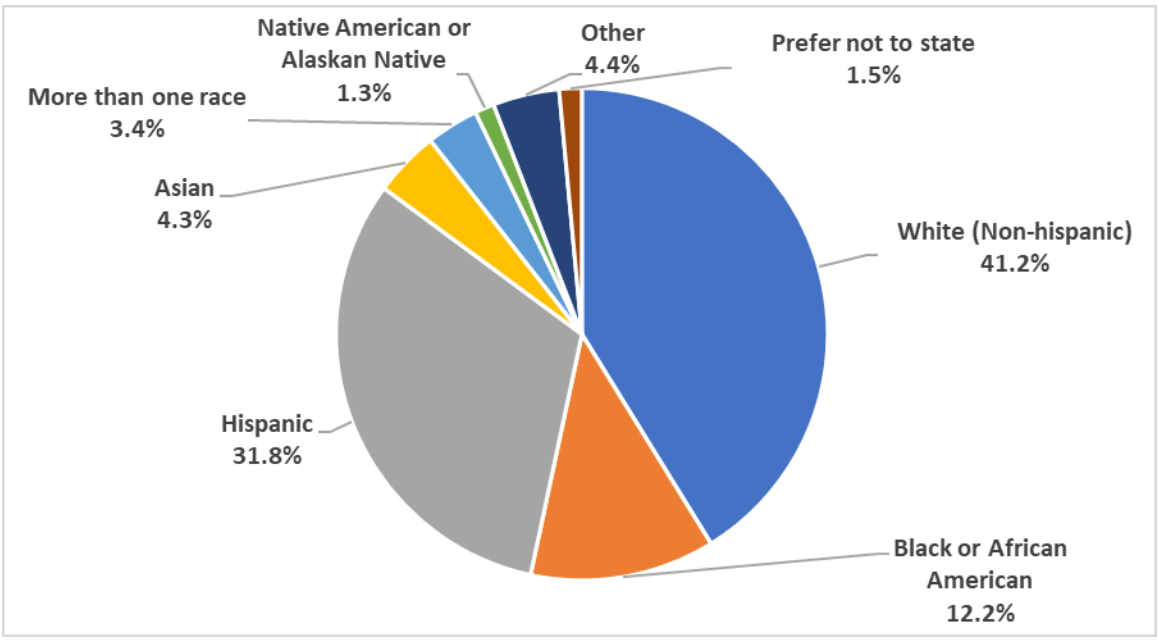

Figure 3. Respondent Race/Ethnicity

Most respondents were high school graduates (**91.9 percent**) and a little over one-third (**35.9 percent**) had some type of college degree (see Figure 4).

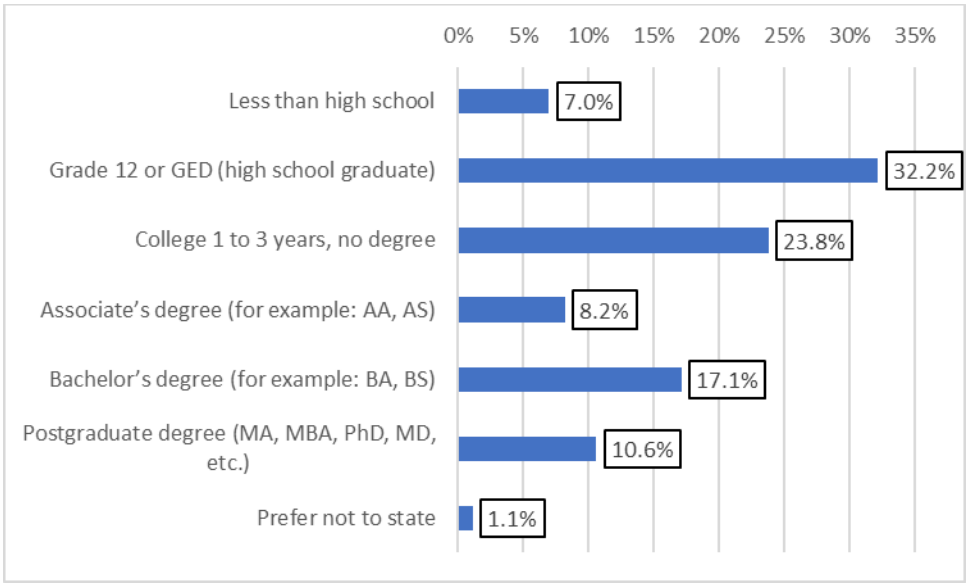

Figure 4. Respondent Education

Respondents were asked to self-identify the type of area in which they live. As Figure 5 shows, survey respondents were distributed across each of the location types, with the largest percentage being from suburban areas, followed by large cities and rural areas.

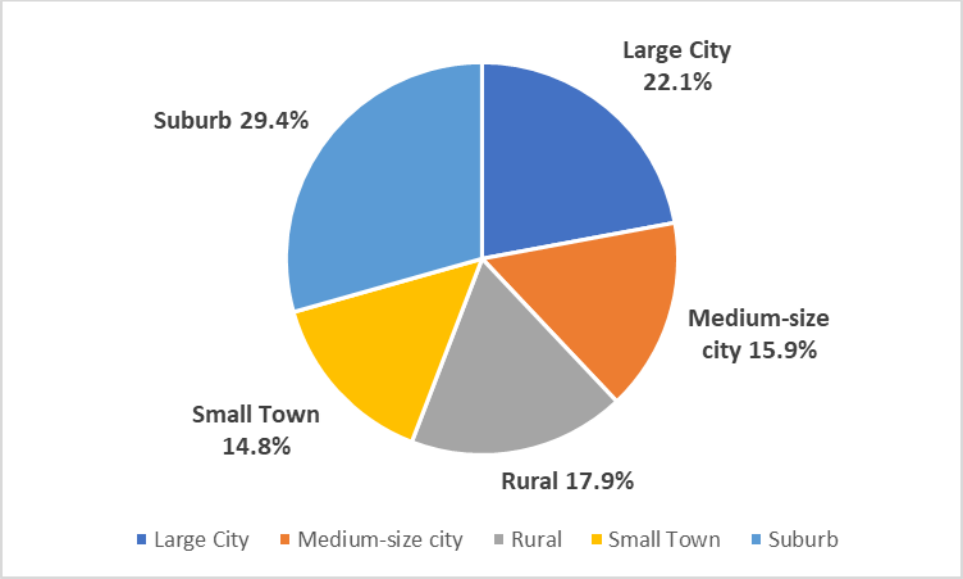

Figure 5. Location Type

Pedestrian Questions

Frequency and Purpose

First, respondents were asked about how frequently they walk on public roads or sidewalks (see Figure 6). The majority of respondents reported walking at least once per week (**61.0 percent**), with an additional **23.5 percent** reporting they do so a few times a month. There were **15.4 percent** of respondents who reported they never walked. Respondents who said they never walked were not presented with the following two questions regarding the reasons for walking or their walking behavior.

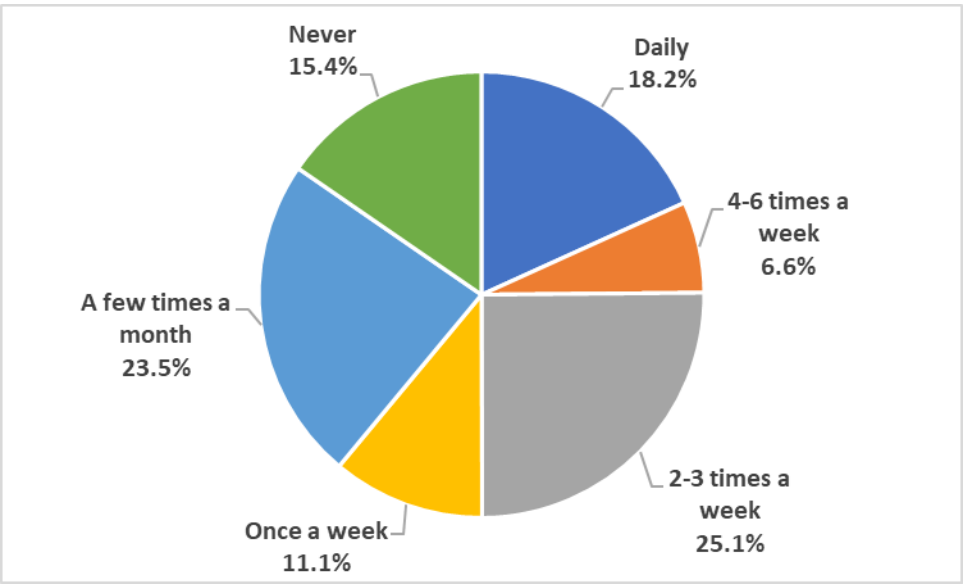

Figure 6. Walking Frequency

A higher percentage of males (**64.5 percent**) than females (**53.8 percent**) reported walking at least once per week, but this was not statistically significant. Of the age groups that reported walking at least once per week, as Figure 7 shows, respondents in the 18-24 and 25-34 age groups reported walking at higher rates than the other age groups. Figure 8 shows that never walking was more commonly reported in rural areas and walking daily was more commonly reported in large cities and small towns. Walking at least once per week was more commonly reported by respondents in large cities, small towns and suburbs than in medium-sized cities and rural areas.

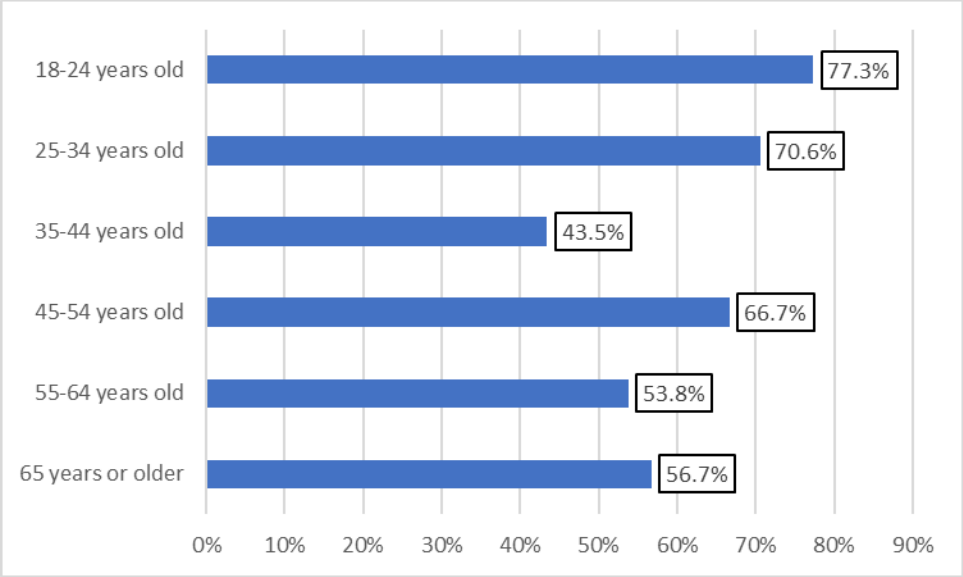

Figure 7. Walking at Least Once per Week by Age Group.

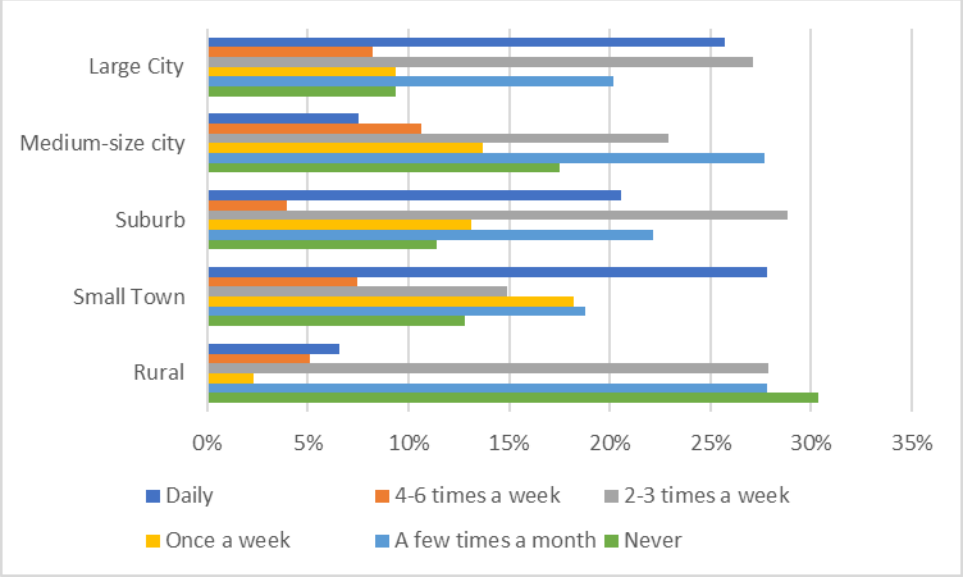

Figure 8. Walking by Location Type.

As Figure 9 shows, of those who said they walked, **68.7 percent** reported doing so for exercise or other health benefits, **38.9 percent** for leisure or fun, **19.7 percent** for social reasons and **19.9 percent** for transportation. **Two percent** of respondents said they walked for other reasons, which included: walking a dog and picking up mail. The total exceeds 100 percent since respondents could choose all options that applied to them.

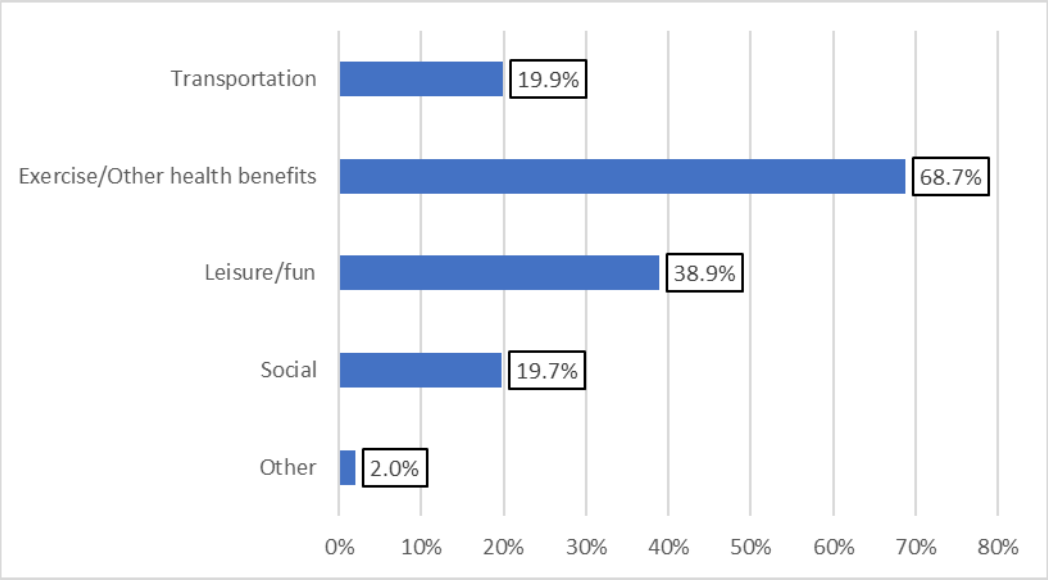

Figure 9. Walking Purpose

Pedestrian Behavior

Respondents were asked several specifics about their pedestrian behavior over the past year. Table 1 shows the results. While **46.0 percent** of respondents self-reported rarely or never crossing the road at a location other than a crosswalk, **19.0 percent** of respondents self-reported very often or always engaging in this risky behavior. When pedestrians cross the road outside of a crosswalk or intersection, they are required to yield the right-of-way to vehicles. The majority of respondents (**62.7 percent**) reported following pedestrian signals when available; however, **5.2 percent** reported they never do. At locations with pedestrian signals in use, pedestrian right-of-way is dictated by that signal. Just under half (**46.0 percent**) of respondents self-reported always or very often walking on the left side of the road facing traffic when there are no sidewalks, which is the law in Texas. Wearing reflective clothing at night (always or very often) was reported by **17.9 percent** of respondents, with an additional **27.4 percent** reporting doing so sometimes. Wearing reflective clothing at night is not required, but can increase the visibility of pedestrians at night, therefore increasing their safety.

When looking at pedestrian behavior by gender, as Figure 10 shows, a higher percentage of females reported following crossing signals always or very often which was statistically significant ($z=2.97$, $p < .01$). Females also reported wearing reflective clothing at a higher percentage and males reported crossing the road at a location other than an intersection or crosswalk at a higher percentage, but these differences were not statistically significant.

Table 1. Pedestrian Behavior

Pedestrian Behavior	Always	Very Often	Sometimes	Rarely	Never
How often do you cross the road at a location other than a crosswalk or intersection?	5.4%	13.6%	35.0%	34.9%	11.1%
How often do you follow pedestrian crossing signals when they are available?	32.6%	30.1%	17.5%	14.7%	5.2%
How often do you walk on the left side of the road, facing traffic, if no sidewalks are present?	21.7%	24.3%	29.8%	14.3%	9.8%
How often do you wear reflective clothing or use a light when walking at night?	8.7%	9.2%	27.4%	29.4%	25.3%

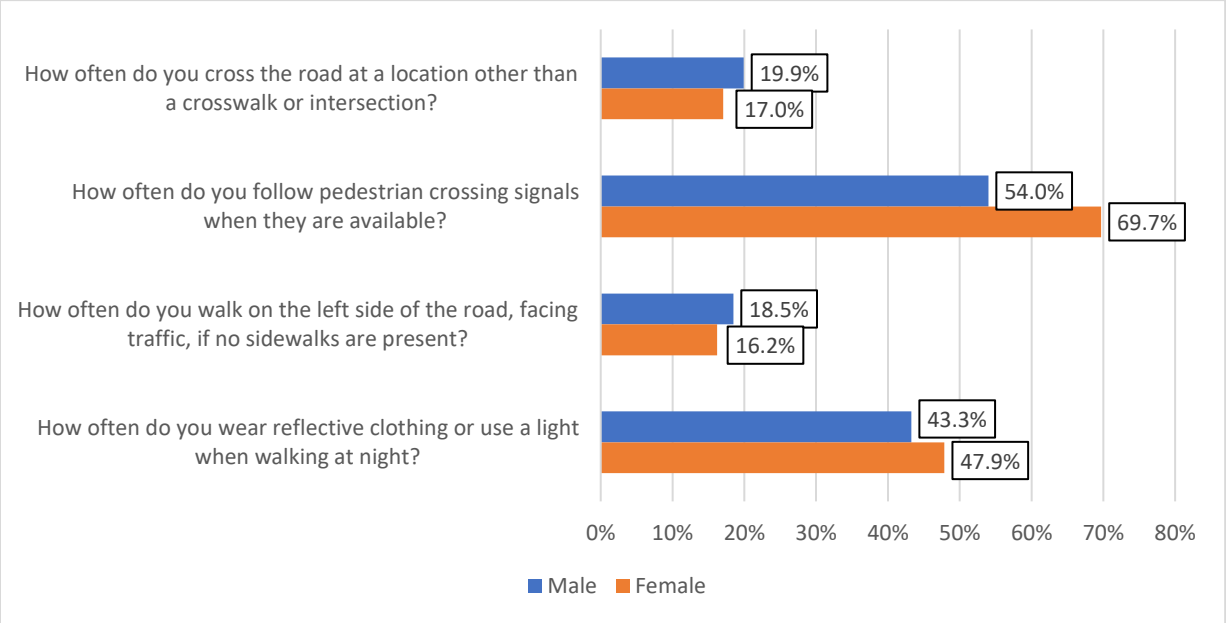

Figure 10. Pedestrian Behavior by Gender (Always or Very often).

Pedestrian Safety Features

Respondents were asked about pedestrian safety features available on the roads near where they live, and

Table 2 shows the results. Respondents reported a lack of availability of pedestrian safety features, with **20.3 percent** of respondents reporting pedestrian crossing signals at no locations, **14.4 percent** reporting sidewalks at no locations and **13.5 percent** reporting marked crosswalks at intersections at no locations.

Table 2. Pedestrian Safety Features

Pedestrian Safety Features	All Locations	More than Half of Locations	About Half of Locations	Less than Half of Locations	No Locations
Pedestrian Crossing Signals	19.5%	16.2%	23.7%	20.2%	20.3%
Sidewalks	21.7%	22.8%	24.9%	16.2%	14.4%
Street Lightitng/Illumination	24.7%	25.0%	26.4%	14.0%	9.9%
Marked Crosswalks at Intersections	21.1%	26.4%	24.7%	14.2%	13.5%

The location of pedestrian safety features is also a very important issue. Figure 11 shows the percent of respondents in each of the self-identified location types that reported having that safety feature at no locations. Not surprisingly, rural areas had the highest reported percentage of no locations with these safety features. However, it is noteworthy that respondents in large cities, medium-size size cities, and suburbs reported more locations without marked crosswalks at intersections than in small towns.

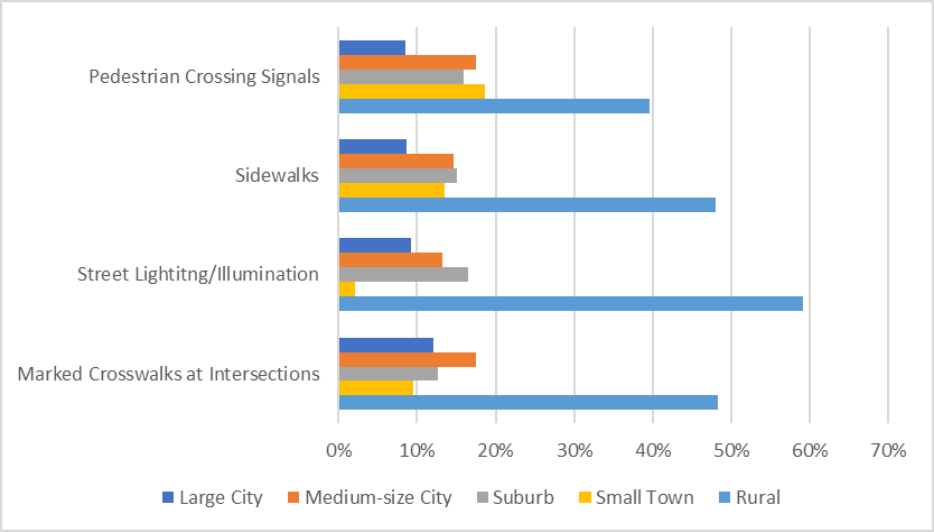

Figure 11. Pedestrian Safety Features Reported at No Locations by Location Type.

One issue of specific concern is regarding pedestrians having safe ways to cross higher speed roadways, which pose a significant safety risk to pedestrians. As Figure 12 shows, the majority of respondents (**61.6 percent**) reported that there are safe ways to cross these roadways at some or all locations. However, **22.0 percent** reported that there are not safe ways for people to cross high speed roadways.

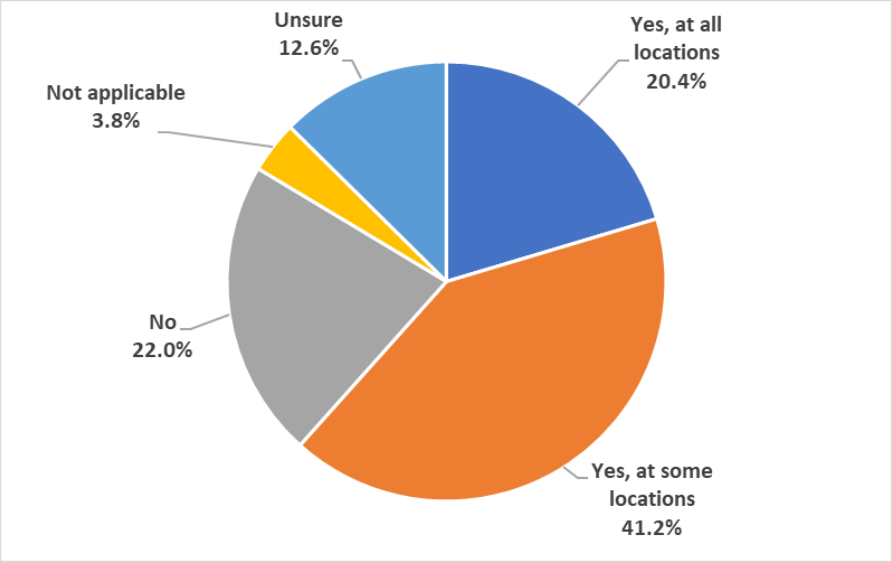

Figure 12. Safe Places to Cross Higher Speed Roadways as a Pedestrian

As Figure 13 shows, safe ways to cross higher speed roads were less commonly reported at all or some locations by respondents in rural areas.

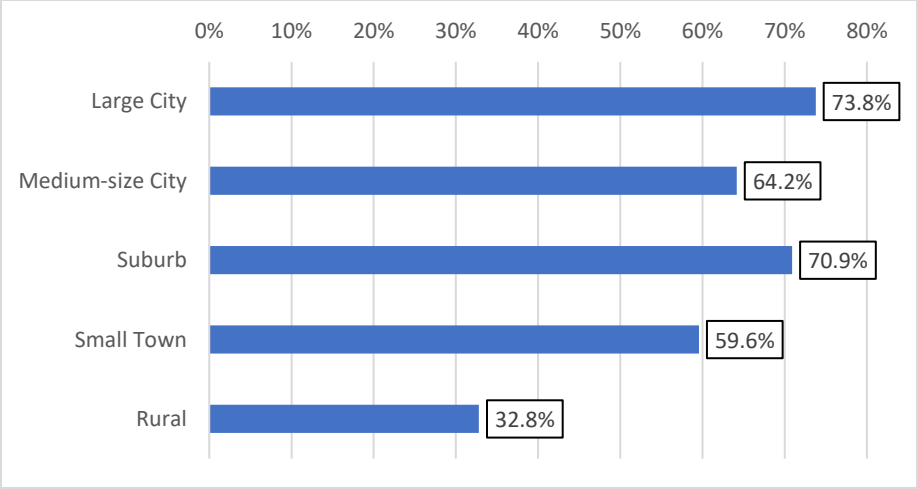

Figure 13. Safe Places to Cross Higher Speed Roadways as a Pedestrian by Location Type.

Additionally, respondents were asked if these crossings were convenient to use. Figure 14 shows that the overwhelming majority of respondents reported that these ways to cross higher speed roads are convenient to use.

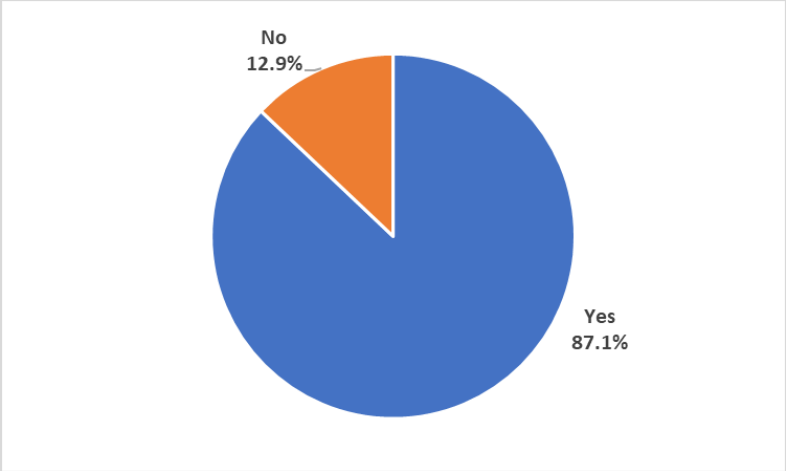

Figure 14. Convenience of Safe Pedestrian Crossings

Obstacles for Pedestrians

Respondents were asked about the obstacles that keep them from walking more often, and Table 3 shows the results. The biggest obstacle to walking more often reported by respondents was weather, which includes things like rain, snow, cold, and heat. Other issues checked by at least half of respondents as an obstacle included driver behavior, poor lighting, and lack of sidewalks.

Table 3. Pedestrian Obstacles.

Issue	Percent Cited as Obstacle
Time to get to destination	49.6%
Convenience	37.7%
Weather	69.5%
Lack of sidewalks	52.3%
Lack of crossing signals or signs	45.8%
Poor lighting	54.4%
Hard to navigate with a disability	33.4%
Poor roadway/sidewalk conditions	49.5%
Driver behavior	55.7%
Other sidewalk users	24.0%

Bicycle Questions

Frequency and Purpose

Figure 15 shows the reported frequency of biking among respondents. Approximately one-quarter (**25.3 percent**) of respondents reported biking at least once per week, with an additional **18.3 percent** reporting doing so a few times a month. Over half (**56.4 percent**) reported not biking. Any respondents who reported they never ride a bike were not presented with the next two questions regarding reason for biking or their biking behavior.

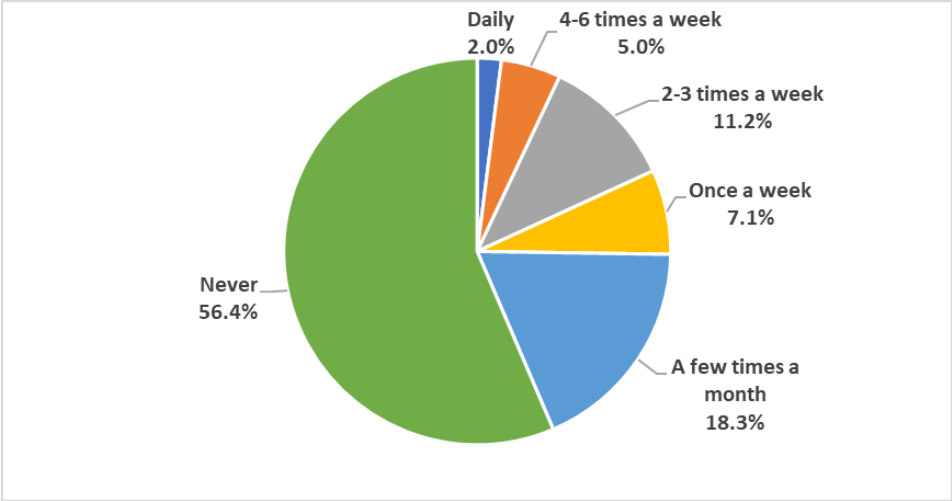

Figure 15. Biking Frequency

Females reported never biking at a higher percentage (**64.4 percent**) than males (**47.5 percent**), which was statistically significant (z= -3.31, p<.01).

Biking frequency by age group is shown in Figure 16. Biking was most often reported by respondents in the 18-24 year old age group (**56.6 percent**), and the 25-34 year old age group (**38.7 percent**).

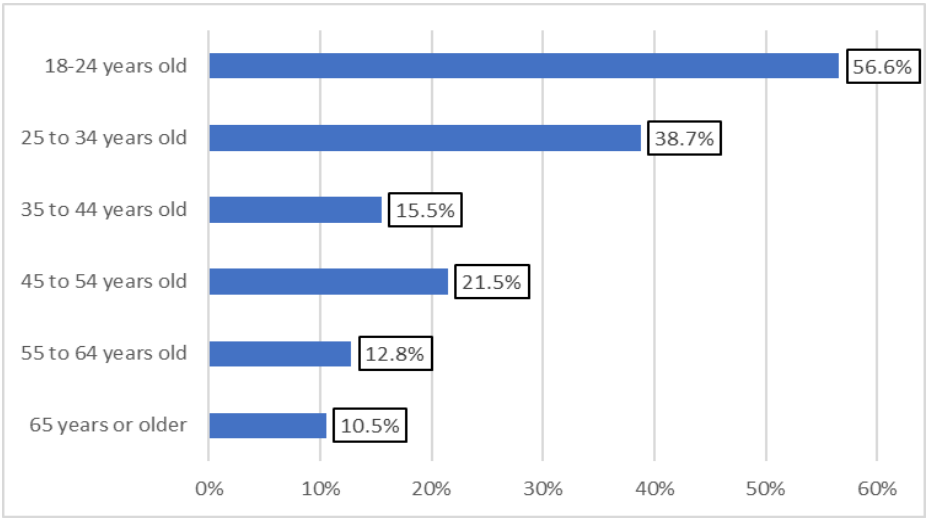

Figure 16. Biking at Least Once per Week by Age Group.

Frequency also differed by location type (see Figure 17). A higher percentage of respondents in rural areas reported never biking. Also, occasional biking (a few times a month) was reported by higher percentages of respondents in large cities and suburbs than other location types. The location type with the highest percentage of respondents who reported biking daily was in small towns.

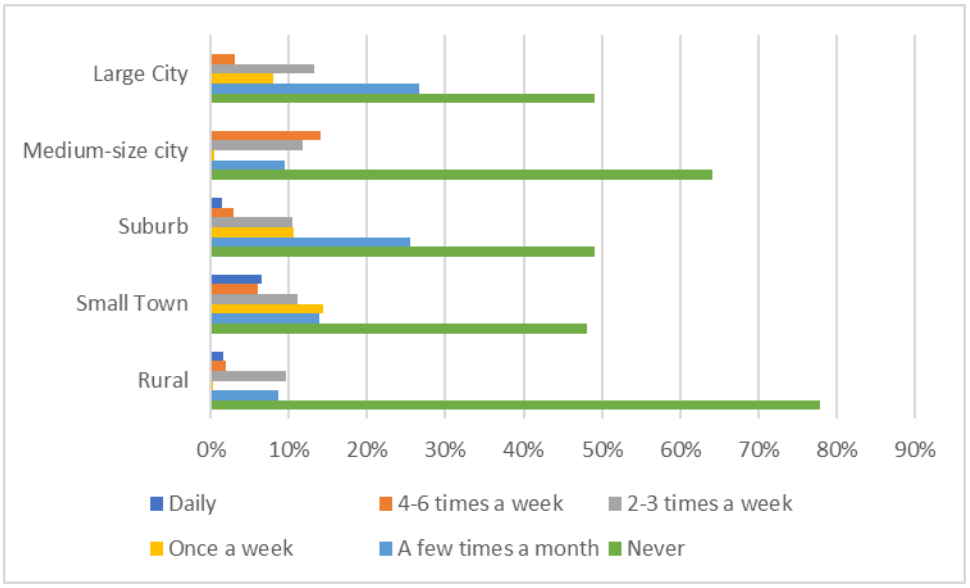

Figure 17. Biking Frequency by Location Type.

Figure 18 shows respondents reported biking mainly for exercise/other health benefits (**64.6 percent**) and leisure/fun (**44.7 percent**). Biking for social reasons was reported by **16.1 percent** and transportation was reported by **15.5 percent** of respondents.

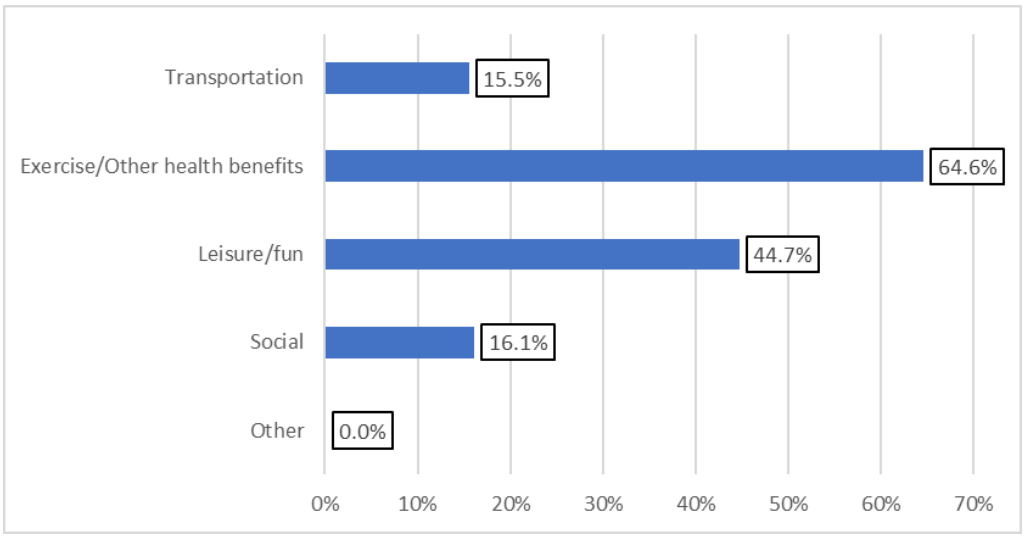

Figure 18. Biking Purpose

As Figure 19 shows, higher percentages of respondents in large cities, suburbs and rural areas reported using their bike for transportation purposes than in medium-sized cities and rural locations. Also, a higher percentage of respondents in suburban areas reported riding a bike for exercise or other health benefits. Riding for social reasons was less commonly reported in suburban areas than other location types.

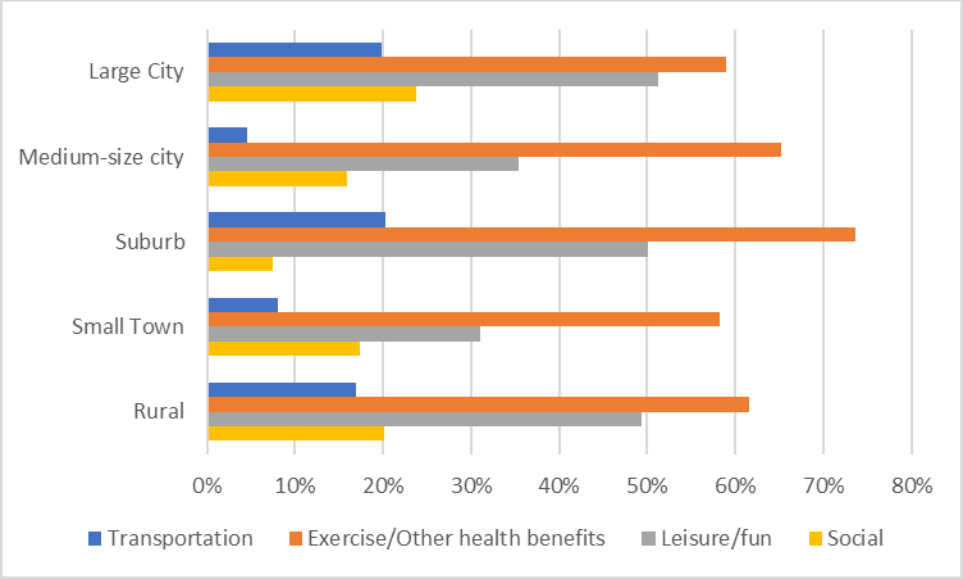

Figure 19. Biking purpose by Location Type.

Biking Behavior

Respondents were asked about their bicycling behavior over the last year (see Table 4). Riding against traffic in the road very often or always was reported by just over one-quarter (**25.3 percent**) of respondents, with **30.4 percent** reporting doing so sometimes and **22.9 percent** rarely. According to state of Texas laws, bicyclists should follow the same laws as motor vehicle drivers and therefore should ride in the same direction as traffic. Use of bike light at night was reported very often or always by **40.8 percent** of respondents. Approximately, one in five respondents reported never doing so. Use of a white bike light on the front and a red light or red reflector in the rear is required by state law. Frequent helmet use (very often or always) was reported by **43.3 percent** of respondents, with another **43.5 percent** reporting infrequent helmet use (rarely or never). Just under one-third (**31.4 percent**) of respondents reported wearing reflective clothing while biking very often or always. Bike helmets and reflective clothing are recommended for safety, but not required by state of Texas law.

Table 4. Bicyclist Behavior

Bicyclist Behavior	Always	Very Often	Sometimes	Rarely	Never
How often do you ride against traffic in the road?	9.9%	15.4%	30.4%	22.9%	21.4%
How often do you use a bike light on the front and a red reflector or light on the rear of your bicycle at night?	20.2%	20.6%	12.4%	28.6%	18.2%
How often do you wear a helmet when riding your	21.3%	22.0%	12.5%	22.4%	21.1%
How often do you wear reflective clothing when biking	17.7%	13.7%	18.9%	22.9%	27.5%

There were some differences in biking behavior by gender. As Figure 20 shows, there were higher percentages of males reporting using bike lights at night and wearing reflective clothing at night which was statistically significant (z=1.80, p<.10 and z=2.11, p<.05, respectively). However, a higher percentage of males reported the risky behavior of riding against traffic in the road, but this was not statistically significant. Males also reported slightly higher helmet use, but this was not statistically significant.

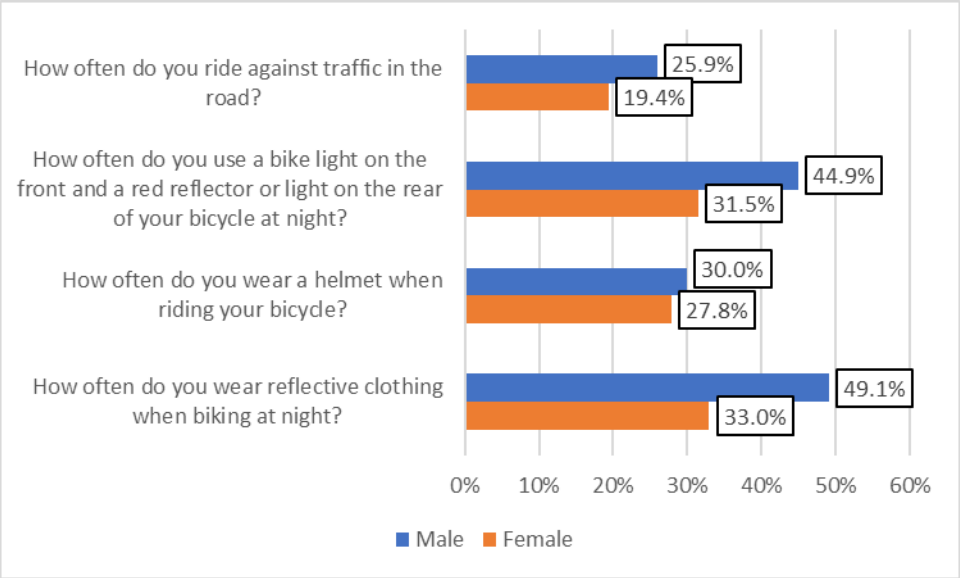

Figure 20. Bicyclist Behavior by Gender (Always or Very Often).

Bicycling Safety Features

Respondents were asked about bicycling safety features that were available in the area near where they live (see Table 5). Separate spaces for cyclist use were reported in at least half of locations by approximately half (**51.2 percent**) of respondents. About one in five respondents reported no locations near where they live with separate spaces for cyclists to use. Street lighting/illumination was reported at no locations by only **3.6 percent** of respondents.

Table 5. Bicycling Safety Features

Bicycle Safety Features	All Locations	More than Half of Locations	About Half of Locations	Less than Half of Locations	No Locations
Separate spaces for cyclist use	9.1%	9.2%	33.0%	28.3%	20.5%
Street Lightitng/Illumination	11.4%	33.5%	30.1%	21.4%	3.6%

As Figure 21 shows, approximately three-quarters (**74.5 percent**) reported safe places for bicyclists to cross higher speed roads at some locations near where they live. And as Figure 22 shows, **89.4 percent** reported that these crossings were convenient to use.

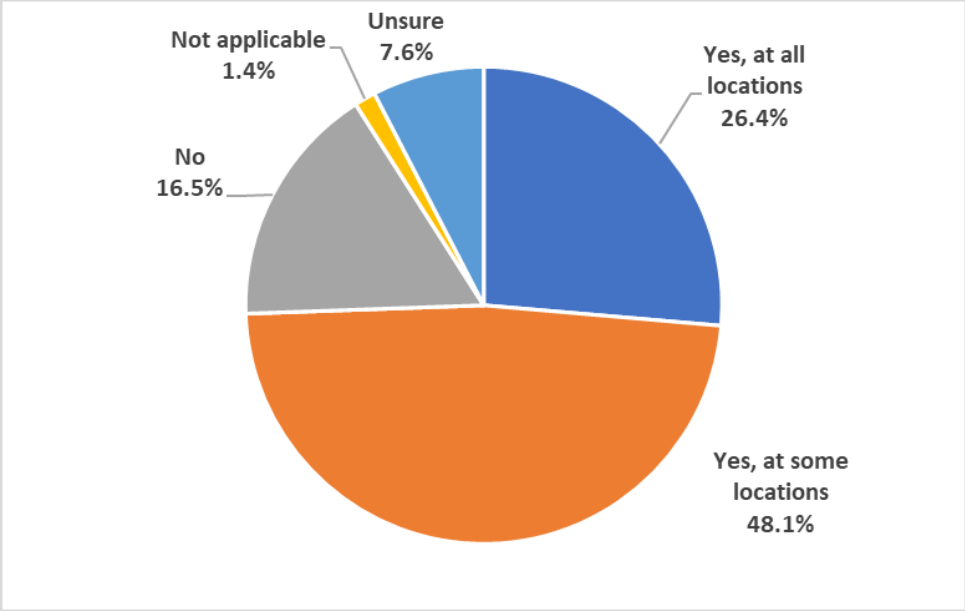

Figure 21. Safe Places to Cross Higher Speed Roads as a Bicyclist

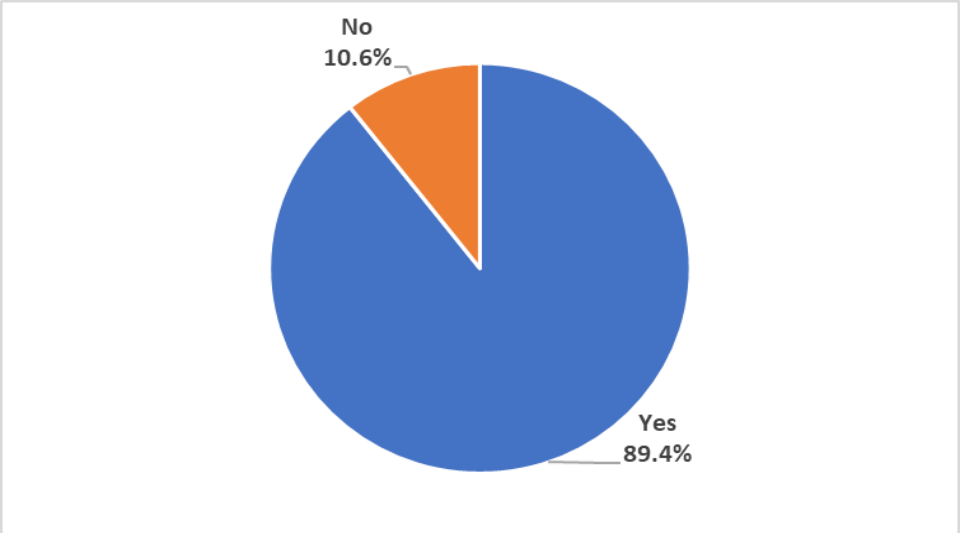

Figure 22. Convenience of Safe Bicycle Crossings

Obstacles for Bicyclists

Respondents were asked about obstacles to biking more often. As Table 6 shows, weather was the top obstacle to biking more often by respondents. However, this was closely followed by a lack of bike lanes or trails. Other obstacles checked by at least half of respondents were driver behavior and poor roadway or sidewalk conditions.

Table 6. Bicyclist Obstacles

Issue	Percent Cited as Obstacle
Time to get to destination	46.9%
Convenience	45.4%
Weather	64.8%
Lack of bike lanes/trails	64.0%
Lack of crossing signals or signs	49.5%
Poor lighting	47.9%
Poor roadway/sidewalk conditions	52.1%
Driver behavior	56.5%
Other sidewalk users	30.7%

Driver Questions

Driver Behavior

Respondents were asked about their driving behavior around pedestrians and bicyclists (see Table 7). The majority of respondents self-reported yielding to pedestrians very often or always. However, self-reported driver yielding always or very often at crosswalks not located at an intersection (**58.5 percent**) was lower than self-reported yielding at intersections (**62.9 percent**).

Very often or Always stopping before the crosswalk lines was reported by **63.7 percent** of respondents, with **2.3 percent** reporting never doing so. Approximately half (**50.1 percent**) reported always ensuring a safe passing distance, and an additional **24.7** percent reported doing so very often. This means that nearly three-quarters (**74.8 percent**) of respondents reported always or very often ensuring a safe passing distance when passing a bicyclist.

Table 7. Driver Behavior

Driver Behavior	Always	Very Often	Sometimes	Rarely	Never	NA (e.g., I do not drive)
How often do you yield to pedestrians crossing the road at an intersection where there is a stop sign or traffic signal?	49.1%	13.8%	14.8%	8.3%	5.7%	8.3%
How often do you yield to pedestrians crossing the road at a crosswalk NOT located at an intersection?	42.9%	15.6%	17.0%	9.2%	7.1%	8.2%
How often do you stop your vehicle before the crosswalk lines when stopping at a stop sign or red light?	40.2%	23.5%	18.2%	7.3%	2.3%	8.5%
How often do you ensure a safe passing distance between your car and a bicyclist?	50.1%	24.7%	9.1%	4.2%	2.0%	10.1%

As Figure 23 shows higher percentages of females reported always or very often yielding to pedestrians, which was statistically significant ($z= -2.73$, $p<.01$ at intersections and $z= -2.28$, $p<.05$ not at intersections). Females also reported stopping before the crosswalk lines and

ensuring a safe passing distance when passing a bicyclist at higher percentages, but this was not a statistically significant difference.

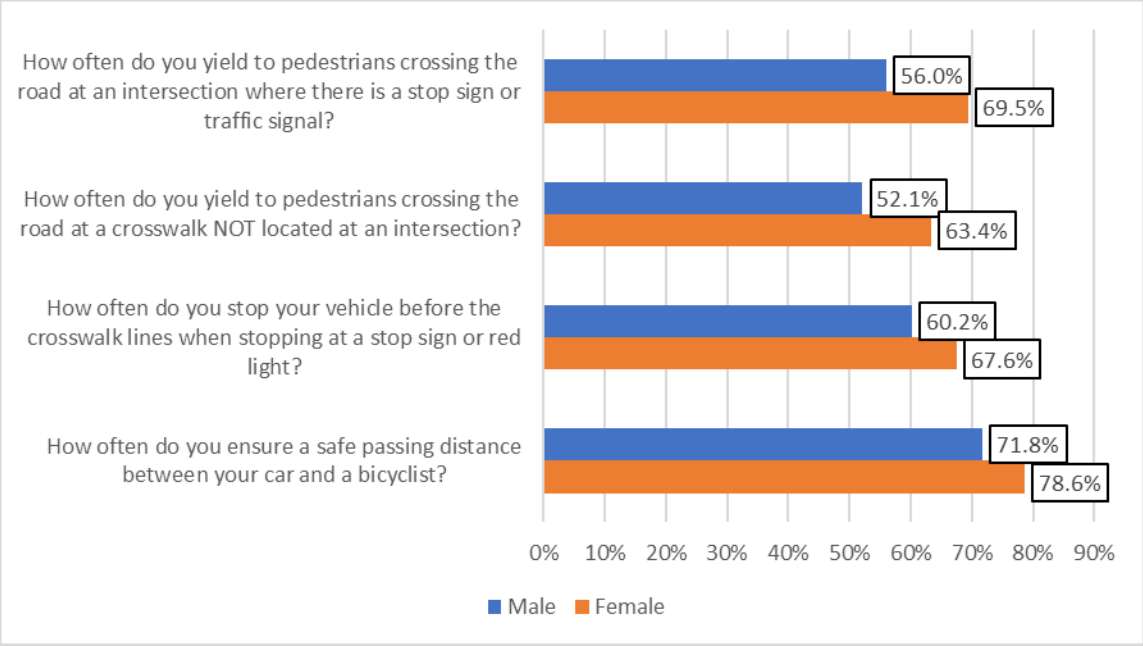

Figure 23. Gender and Driver Behavior (Always or Very Often).

As Figure 24 shows, self-reported yielding at both intersections and mid-block crossings generally increases with age, except that at 65 years of age and older, self-reported yielding to pedestrians and bicyclists decreased. The age group with the highest percentage of reported yielding is the 55-64 year old age group.

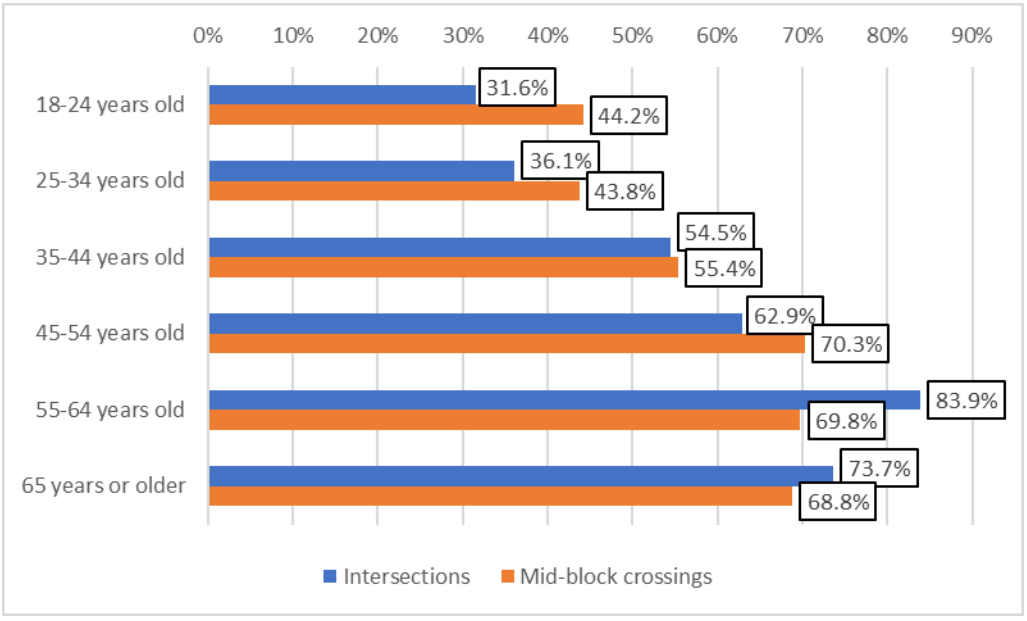

Figure 24. Age and Driver Yielding Behavior (Always or Very Often).

Enforcement, Laws and Methods for Education

Enforcement Efforts

Respondents were asked if they were aware of any traffic enforcement efforts by police in their area regarding pedestrian and bicycle safety in the past year. As Figure 25 shows, just under one-third (**31.2 percent**) of respondents reported an awareness of any such efforts.

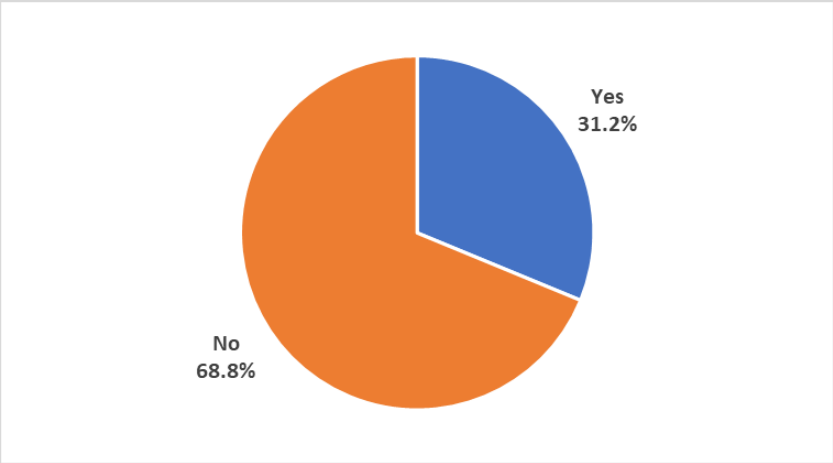

Figure 25. Traffic Enforcement Efforts

Respondents reported law enforcement efforts such as: working with cycling groups, monitoring motorist behavior, watching for jaywalkers, enforcing laws, issuing citations, and just being a presence to ensure safety.

Familiarity with Laws

As Figure 26 shows, more than half (**56.5 percent**) of respondents reported at least a moderate familiarity with pedestrian and bicycle safety laws and another **23.6 percent** reported being slightly familiar with these laws. Approximately, one in five respondents (**19.9 percent**) reported not being familiar with pedestrian and bicycle safety laws.

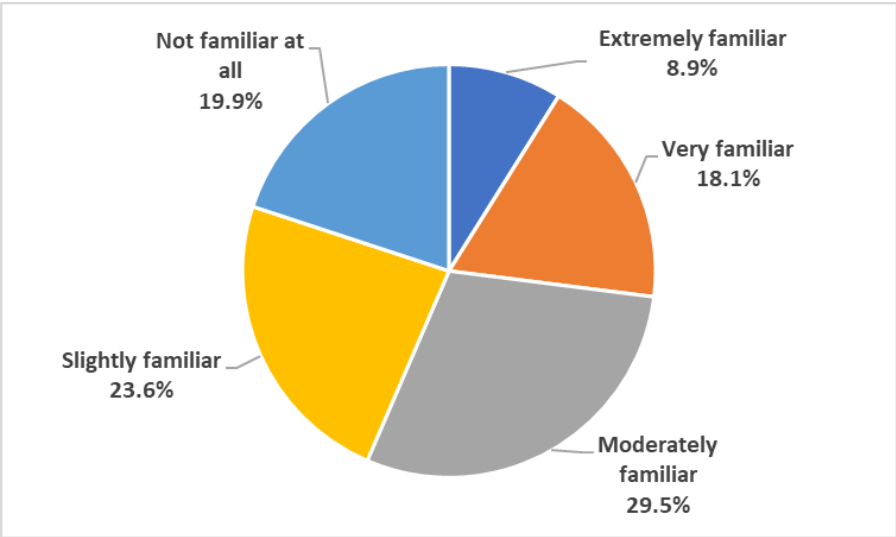

Figure 26. Familiarity with Laws

As Figure 27 shows, respondents with less than a high school education reported higher levels of familiarity with laws, especially those who reported being extremely or very familiar with them.

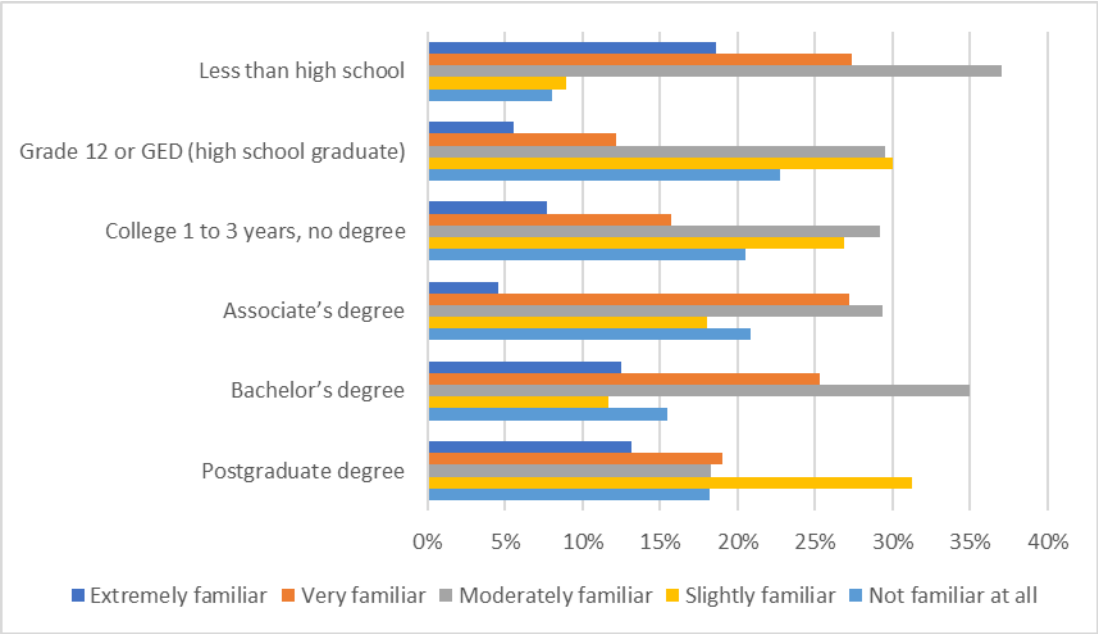

Figure 27. Familiarity with Laws by Education

Methods for Education

Roadway signs were the most commonly selected method of education by respondents (see Figure 28) as a recommended method of educating Texans on bike and pedestrian safety laws. Driver education curricula, public service announcements and dynamic messaging signs were also popular. Education in elementary and middle schools and media campaigns were less popular with **38.4 percent** and **35.2 percent** respondents, respectively, selecting those methods.

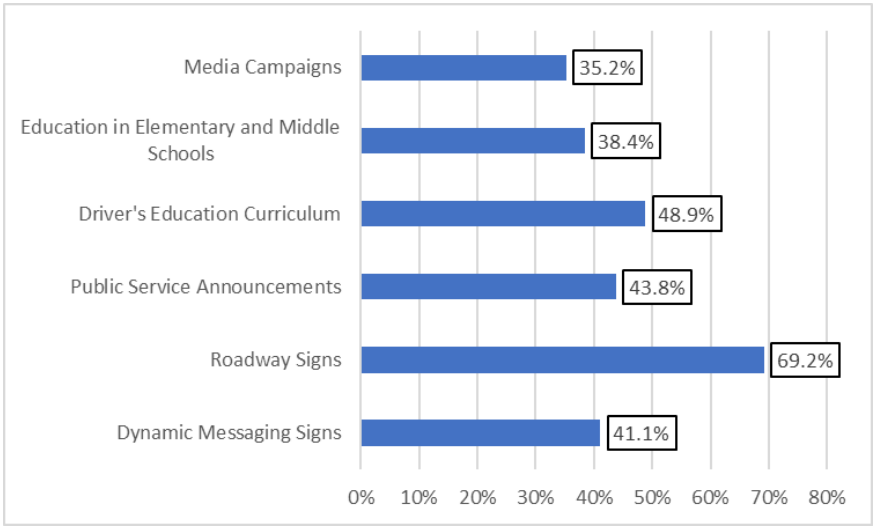

Figure 28. Methods for Education

Knowledge Assessment

The final section of the survey was the knowledge assessment. Respondents were asked to answer eight questions regarding pedestrian and bicycle safety laws. Seven questions were true/false and one question involved making a selection from a set of pictures.

Table 8 shows the results of the true/false questions, with the percent of respondents selecting each option shown and the correct answer highlighted in green.

There were two questions where less than half or respondents gave the correct answer. One was the question asking if bicyclists should ride as far to the left-hand side of the street as possible. The correct answer is false, they should ride as far to the right-hand side of the street as possible. Just under half (**49.3 percent**) of respondents correctly answered false. The other question where less than half of respondents gave the correct answer was regarding whether the pedestrian always has the right-of-way, where only **33.1 percent** of respondents answered correctly that this was false.

Average knowledge scores for males and females were very similar at **68.9 percent** and **69.5 percent,** respectively. As shown in Figure 29, respondents 65 years of age or older scored the highest, while those in the 25-34 year old age group scored the lowest.

Table 8. Knowledge Assessment Results

Question	TRUE	FALSE
A local authority may pass ordinances in addition to state statutes that address pedestrian and bicycle safety.	84.4%	15.6%
Bicyclists do not have the same rights and responsibilities as a motor vehicle on Texas roadways.	26.9%	73.1%
Bicyclists should ride as far to the left-hand side of the street as possible.	50.7%	49.3%
A bicyclist is required to use a light when riding at night.	84.6%	15.4%
As a pedestrian, if a sidewalk is available and accessible they must use it.	83.1%	16.9%
As a pedestrian, if a sidewalk is NOT available and accessible, they should walk on the left-hand side of the street – facing traffic.	74.3%	25.7%
The pedestrian always has the right-of-way.	66.9%	33.1%

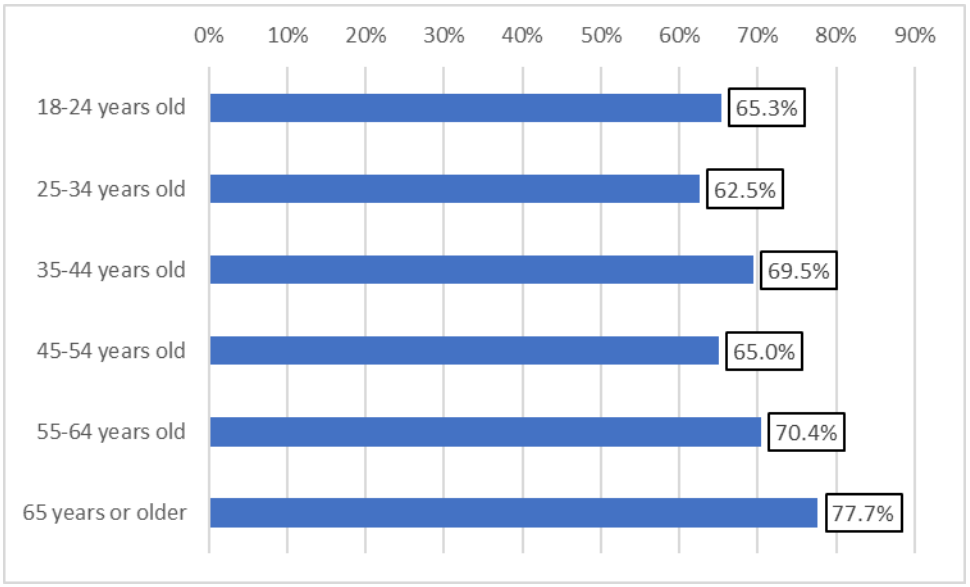

Figure 29. Knowledge Assessment Average Score by Age Group.

The final question on the assessment asked respondents to select the images that contained crosswalks. Figure 30 shows the images that were displayed to respondents. Figure 31 shows the percentage of respondents that selected each image. The vast majority of respondents (**84.8 percent**) correctly identified image D, the mid-block crossing as a crosswalk. However, the images of marked crosswalks at intersections, images A and B were only correctly identified by **46.1 percent** and **53.1 percent** of respondents, respectively. Only **7.6 percent** of respondents correctly identified image C as containing a crosswalk. Image C has what is known as unmarked crosswalks at an intersection where the connections of sidewalks on opposite sides of the road form a crosswalk, even if it's not marked with lines. These unmarked crosswalks are located at all 4-way intersections where there are sidewalks. Only three respondents in the survey correctly identified all images as containing a crosswalk. This also means that some respondents who correctly identified Image C as containing a crosswalk, did not mark any other image as containing a crosswalk.

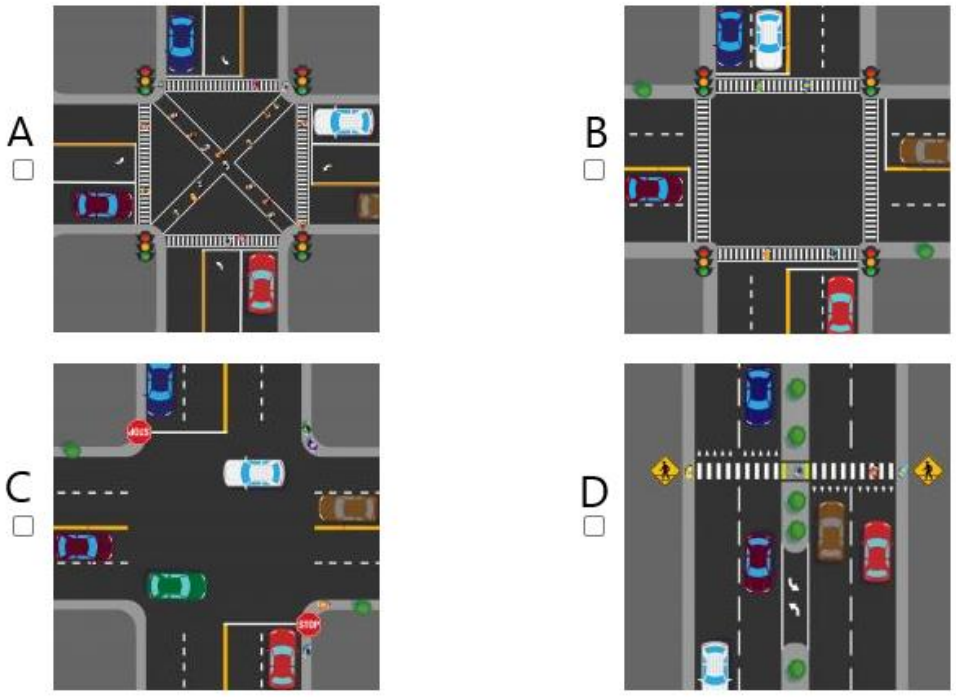

Figure 30. Crosswalk Images

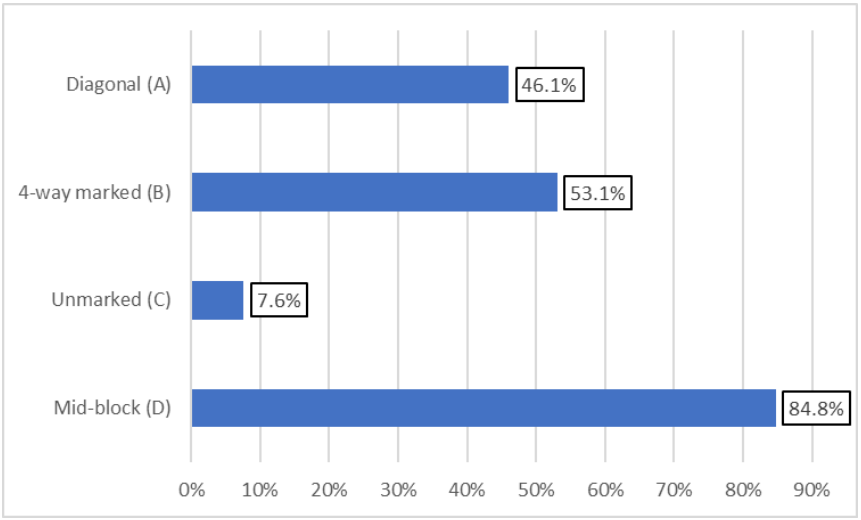

Figure 31. Identification of Crosswalks

Comparison to 2021 Survey

In this section comparisons to the same survey conducted in 2021 are included to provide a picture of how pedestrian and bicycle safety is changing in Texas.

Pedestrian Questions

In the 2022 survey **15.4 percent** of respondents reported never walking, compared to **13.1 percent** in 2021. The reasons for walking were largely the same, with exercise/other health benefits being the main reason for walking.

There is good news and bad news in terms of reported behavior while walking (see Table 9). The good news is that there was a small decline in the percentage of respondents that reported crossing a road outside of an intersection or crosswalk and a small increase in the percentage of respondents that reported walking on the left side of the road when there are no sidewalks available, but neither were statistically significant. In contrast, however, the percentage of respondents that reported following crossing signals declined as did the reported wearing of reflective clothing when walking at night, both of which were statistically significant ($z=4.02$, $p<.01$ and $z=1.82$, $p<.10$, respectively).

Table 9. Pedestrian Behavior, 2021 vs. 2022.

Behavior	2021	2022
How often do you cross the road at a location other than a crosswalk or intersection?	21.8%	19.0%
How often do you follow pedestrian crossing signals when they are available?	75.9%	62.6%
How often do you wear reflective clothing or use a light when walking at night?	23.1%	17.9%
How often do you walk on the left side of the road, facing traffic, if no sidewalks are present?	41.7%	46.0%

Table 10 shows the percentage of respondents who reported seeing these safety features at half or more of locations near where they live. A lower percentage of respondents reported seeing these safety features near where they live in 2022 compared to 2021, which is statistically significant ($p<.01$).

Table 10. Pedestrian Safety Features, 2021 vs. 2022.

Pedestrian Safety Features	2021	2022
Pedestrian Crossing Signals	66.7%	59.5%
Sidewalks	83.5%	69.4%
Street lighting/illumination	83.9%	76.1%
Marked Crosswalks	74.7%	72.3%

Table 11 shows the pedestrian obstacles reported by respondents in 2021 and 2022. Overall, a higher percentage of respondents in the 2022 survey reported each issue as an obstacle compared to the 2021 survey. The largest difference was with lack of sidewalks with **36.6 percent** reporting this as an obstacle in 2021, compared with **52.3 percent** in the 2022 survey – a **15.7 percentage point** difference. Statistically significant differences at $p<.01$ are marked with one asterisk (*), those at $p<.05$ are marked with two asterisks (**) and those marked with three asterisks (***) are statistically significant at $p<.10$. The other differences were not statistically significant.

Table 11. Pedestrian Obstacles, 2021 vs. 2022.

Issue	2021 Percent Cited as Obstacle	2022 Percent Cited as Obstacle
Time to get to destination **	41.4%	49.6%
Convenience	33.4%	37.7%
Weather *	60.0%	69.5%
Lack of sidewalks *	36.6%	52.3%
Lack of crossing signals/signs *	34.0%	45.8%
Poor lighting *	40.4%	54.4%
Hard to navigate with a disability *	23.9%	33.4%
Poor roadway/sidewalk conditions *	37.0%	49.5%
Driver behavior ***	49.4%	55.7%
Other sidewalk users *	14.5%	24.0%

Bicycle Questions

In the 2022 survey, **56.4 percent** of respondents reported never biking, compared to **63.0 percent** in the 2021 survey, a statistically significant difference ($z=2.03$, $p<.05$). The reasons for biking were largely the same in both years, with exercise or other health benefits being the top reason for biking.

As Table 12 shows, the percentage of respondents reporting riding against traffic in the road increased by over **5 percentage** points from 2021 to 2022, however this was not a statistically significant difference. The percentage of respondents reporting using a bike light at night was lower in 2022 compared to 2021, but was not statistically significant. Reported use of reflective gear and bicycle helmets remained relatively steady year to year.

Table 12. Bicyclist Behavior, 2021 vs. 2022.

Bicyclist Behavior	2021	2022
How often do you ride against traffic in the road?	19.2%	25.3%
How often do you use a bike light on the front and a red reflector or light on the rear of your bicycle at night?	44.3%	40.8%
How often do you wear reflective clothing when biking at night?	32.6%	31.4%
How often do you wear a helmet when riding your bicycle?	42.9%	43.3%

Similar to pedestrian safety features, biking safety features were reported by a lower percentage of respondents in 2022 compared to 2021 (see Table 13), but the differences were not statistically significant.

Table 13. Bicycle Safety Features, 2021 vs. 2022.

Bicycle Safety Features	2021	2022
Separate spaces for cyclist use	58.8%	51.2%
Street lighting/illumination	75.8%	75.0%

Table 14 shows the obstacles cited by survey respondents in 2022 compared to 2021. Almost all issues were reported as an obstacle by a higher percentage of respondents in 2022 compared to 2021. The one exception was driver behavior which dipped from **59.0 percent** of respondents in 2021 to **56.5 percent** in 2022. Statistically significant differences at p<.01 are marked with one asterisk (*), those at p<.05 are marked with two asterisks (**) and those at p<.10 are marked with three asterisks (***). The other differences were not statistically significant.

Table 14. Biking Obstacles, 2021 vs. 2022.

Issue	2021 Percent Cited as Obstacle	2022 Percent Cited as Obstacle
Time to get to destination **	39.2%	46.9%
Convenience **	36.8%	45.4%
Weather	62.2%	64.8%
Lack of bike lanes/trails ***	57.5%	64.0%
Lack of crossing signals or signs *	35.4%	49.5%
Poor lighting *	36.8%	47.9%
Poor roadway/sidewalk conditions **	45.1%	52.1%
Driver behavior	59.0%	56.5%
Other sidewalk users	25.8%	30.7%

Driver Questions

Table 15 shows that all of the positive driver behaviors (yielding to pedestrians at crosswalks, stopping before the crosswalk and passing bicyclists at a safe distance) were reported by a lower percentage of respondents in the 2022 survey compared to 2021. Most concerning is the lower percentage of respondents in 2022 that report not yielding to pedestrians that are crossing the road. All of the differences were statistically significant; differences at p<.01 are marked with one asterisk (*) and those at p<.05 are marked with two asterisks (**).

Table 15. Driver Behavior, 2021 vs. 2022.

Driver Behavior	2021	2022
How often do you yield to pedestrians crossing the road at an intersection where there is a stop sign or traffic signal? *	76.5%	62.9%
How often do you yield to pedestrians crossing the road at a crosswalk NOT located at an intersection? *	70.4%	58.5%
How often do you stop your vehicle before the crosswalk lines when stopping at a stop sign or red light? *	75.3%	63.7%
How often do you ensure a safe passing distance between your car and a bicyclist? **	80.7%	74.7%

Familiarity with Laws

Table 16 shows the self-reported familiarity with pedestrian and bicycle laws reported by respondents in 2021 vs. 2022. Higher percentages of respondents in 2022 reported being extremely or very familiar with the laws, compared to 2021, but this was not statistically significant. The decline in the percentage of respondents that reported being moderately familiar with laws from 2021 to 2022 was statistically significant ($z=2.42$, $p<.05$).

Table 16. Familiarity with Laws, 2021 vs. 2022.

Law Familiarity	2021	2022
Extremely Familiar	7.2%	8.9%
Very Familiar	15.0%	18.1%
Moderately Familiar	37.4%	29.5%
Slightly Familiar	22.0%	23.6%
Not Familiar at all	18.5%	19.9%

Knowledge

When comparing respondent knowledge question responses in the 2022 survey to 2021, the findings were mixed. While there was some minor improvement on the pedestrian related questions, the overall knowledge level is still low. Survey respondents in 2022 showed improvement on the rights and responsibilities of a bicyclist. On the other hand, knowledge about where a bicyclist should ride remained low, very close to 2021 numbers. The use of a bike light on a bike at night remained consistent from 2021 to 2022 and was the question with the highest percentage of 2022 respondents answering correctly. However, the only difference between the 2021 and 2022 knowledge assessment that was statistically significant was the increase in respondents that correctly said it was false that the pedestrian always has the right-of-way ($z= -1.85$, $p<.10$).

Finally, proper crosswalk identification remained low from 2021 to 2022. In 2022, only three respondents correctly answered that all four of the pictures contained a crosswalk, compared with six respondents in 2021.

Table 17. Knowledge Assessment, 2021 vs. 2022.

Question	Correct Answer	2021 Percent Correct	2022 Percent Correct
True/false. A local authority may pass ordinances in addition to state statutes that address pedestrian and bicyclist safety.	True	87%	84%
True/false. Bicyclists do not have the same rights and responsibilities as a motor vehicle on Texas roadways.	False	68%	73%
True/false. Bicyclists should ride as far to the left-hand side of the street as possible.	False	51%	49%
True/false. A bicyclist is required to use a light when riding at night.	True	85%	85%
True/false. As a pedestrian if a sidewalk is available and accessible they must use it.	True	79%	83%
True/false. As a pedestrian, if a sidewalk is NOT available and accessible, they should walk on the left-hand side of the street-facing traffic.	True	71%	74%
True/false. The pedestrian always has the right-of-way.	False	26%	33%

Summary

This section provides a summary of the survey results presented above. As in the rest of the document, we will describe results for each road user separately and then the questions regarding enforcement, familiarity with laws, methods for education and the knowledge assessment for the two groups combined.

Pedestrians

Walking daily was more commonly reported in large cities and small towns and never walking was more common in rural areas. Males and those ages 18-34 reported walking more often than other gender and age groups.

Most people are walking for exercise or other health benefits; however, nearly 20 percent walk for transportation.

Females follow crossing signals more often than males and also reported wearing reflective clothing at higher percentages than males. 2022 results compared with 2021 results indicate there were some small improvements in pedestrian behavior, as well as some declines.

Pedestrian safety features were less commonly seen in rural areas, with the exception of marked crosswalks at intersections, which were seen less often in large cities, medium-size cities and suburbs. Overall, lower percentages of respondents reported pedestrian safety features near where they live in 2022 compared to 2021. Additionally, while the majority of respondents reported safe ways to cross higher speed roads, **22 percent** reported that there are not safe ways to cross higher speed roads.

Obstacles to people walking more included weather, driver behavior, poor lighting and lack of sidewalks. In addition, all of the issues that could be potential obstacles had higher percentages of respondents reporting them as an obstacle in 2022 compared to 2021.

Bicyclists

Biking was reported more commonly among males, and higher percentages of females reported never biking. Also, biking was less common in rural areas, but common in large cities, suburbs and small towns. Biking is primarily for exercise or health benefits, but in some areas is also a means for transportation.

Approximately one in five respondents reported not using a bike light at night and just over half (**55.7 percent**) reported riding against traffic in the road at least some of the time. Compared to the 2021 survey, not using a bike light at night and riding against traffic on the road increased in 2022, an indication that more education on these behaviors is needed.

About one in five respondents reported no locations near where they live with separate spaces for cyclists to use. Overall, biking safety features were reported by a lower percentage of respondents in 2022 compared to 2021.

Weather was the top obstacle to biking more often at **64.8 percent** of respondents, but lack of bike lanes or trails was also chosen as an obstacle by **64.0 percent** of respondents. Driver behavior was the only issue that respondents reported at a lower percentage in 2022 compared to 2021.

Drivers

Female drivers were more likely than male drivers to say they always or very often yield to pedestrians, stop before the crosswalk lines, and ensure a safe passing distance when passing a bicyclist. Yielding to pedestrians increases with age. Compared to 2021, lower percentages of drivers in the 2022 survey reported yielding to pedestrians, stopping before the crosswalk lines and allowing a safe passing distance when passing a bicyclist.

Enforcement, Laws, and Methods for Education

Just under one-third (**31.2 percent**) of respondents were aware of any enforcement efforts to increase the safety of pedestrians and bicyclists. Slightly more than half (**56.5 percent**) reported at least a moderate familiarity with pedestrian and bicycle safety laws. Respondents selected roadway signs as the top recommended method for educating road users. Driver education curricula, public service announcements and dynamic messaging signs were also popular.

Knowledge

The average score on the knowledge assessment was **68.8 percent** for the true/false questions and less than **one percent** correctly identified all the crosswalks. The two questions with the lowest percent correct were: 1) If a bicyclist should ride as far to the left side of the road as possible, and 2) If the pedestrian always has the right-of-way. Both questions are false. When comparing the 2022 results with 2021, there was some improvement in the pedestrian questions and bicyclists rights and duties. The other bicycle questions remained relatively the same.

Appendix A: Survey Instrument

Ped/Bike Survey of Texans 2022

Introduction

The Texas A&M Transportation Institute is conducting this survey to learn more about walking and biking in Texas and what road users know about pedestrian and bicycle safety laws in Texas. This survey is sponsored by the Texas Department of Transportation.

Review the Study information sheet for more information on the survey.

By clicking on the arrow below, I agree to participate in this survey.

Q1 What is your zip code?

_____

Q2 Which best describes the area where you live?

- Rural (1)
- Small Town (2)
- Medium-size city (3)
- Suburb (4)
- Large City (5)

Q3 Gender

- Male (1)
- Female (2)
- Prefer not to state (3)

Q4 Select your age category:

- ○ 18-24 years old (1)
- ○ 25 to 34 years old (2)
- ○ 35 to 44 years old (3)
- ○ 45 to 54 years old (4)
- ○ 55 to 64 years old (5)
- ○ 65 years or older (6)
- ○ Prefer not to state (7)

Q5 Are you of Hispanic or Latino origin?

- ○ Yes (1)
- ○ No (2)
- ○ Prefer not to state (6)

Q6 Select your race.

- ○ Asian (1)
- ○ Black or African American (3)
- ○ White (4)
- ○ Native American or Alaskan Natvie (2)
- ○ More than one race (8)
- ○ Other (Please Specify): (5) _____
- ○ Prefer not to state (6)

Q7 What is your highest level of education?

- ○ Less than high school (1)
- ○ Grade 12 or GED (high school graduate) (2)
- ○ College 1 to 3 years, no degree (3)
- ○ Associate's degree (for example: AA, AS) (4)
- ○ Bachelor's degree (for example: BA, BS) (7)
- ○ Postgraduate degree (MA, MBA, PhD, MD, etc.) (5)
- ○ Prefer not to state (6)

Q8 Approximately, how many hours of television do you watch on an average day?

_____

Q9 In a typical week, about how many hours do you spend on the internet for personal use?

_____

Q10 Do you usually try new products before other people do?

- ○ Always (1)
- ○ Often (2)
- ○ Sometimes (3)
- ○ Never (4)

Q11 How often do you walk on public roads/sidewalks?

- ○ Daily (1)
- ○ 2-3 times a week (2)
- ○ 4-6 times a week (3)
- ○ Once a week (4)
- ○ A few times a month (5)
- ○ Never (6)

Q12 What are the primary reasons you walk? (Select all that apply)

- ☐ Transportation (1)
- ☐ Exercise/Other health benefits (2)
- ☐ Leisure/fun (3)
- ☐ Social (4)
- ☐ Other (please specify) (6) _____

Q13 Please answer the following questions about your walking behavior in the past year.

	Never (1)	Rarely (2)	Sometimes (3)	Very Often (4)	Always (5)
How often do you cross the road at a location other than a crosswalk or intersection? (1)	○	○	○	○	○
How often do you follow pedestrian crossing signals when they are available? (2)	○	○	○	○	○
How often do you wear reflective clothing or use a light when walking at night? (3)	○	○	○	○	○
How often do you walk on the left side of the road, facing traffic, if no sidewalks are present? (4)	○	○	○	○	○

Q14 How often are the following pedestrian safety features found along the roads near where you live?

	No Locations (1)	Less than Half of Locations (2)	About Half of Locations (3)	More Than Half of Locations (4)	All Locations (5)
Pedestrian Crossing Signals (1)	○	○	○	○	○
Sidewalks (2)	○	○	○	○	○
Street lighting/illumination (3)	○	○	○	○	○
Marked Crosswalks at intersections (4)	○	○	○	○	○

Q15 Are there safe ways to cross higher speed roads as a pedestrian where you live?

- ○ Yes, at all locations (1)
- ○ Yes, at some locations (3)
- ○ No (4)
- ○ Unsure (i.e. I haven't looked to see) (5)
- ○ Not applicable (i.e. there are no higher speed roads where I live) (6)

Q16 Are the crossings convenient to use?

- ○ Yes (1)
- ○ No (3)

Q17 How often do you ride a bicycle?

- ○ Daily (1)
- ○ 2-3 times a week (2)
- ○ 4-6 times a week (3)
- ○ Once a week (4)
- ○ A few times a month (5)
- ○ Never (6)

Q18 What are the primary reasons you ride a bicycle? (Select all that apply)

- ☐ Transportation (1)
- ☐ Exercise/ Other health benefits (2)
- ☐ Leisure/fun (3)
- ☐ Social (4)
- ☐ Other (please specify) (6) _____

Q19 Please answer the following questions about your biking behavior in the past year.

	Never (1)	Rarely (2)	Sometimes (3)	Very Often (4)	Always (5)
How often do you ride against traffic in the road? (1)	○	○	○	○	○
How often do you use a bike light on the front and a red reflector or light on the rear of your bicycle at night? (2)	○	○	○	○	○
How often do you wear reflective clothing when biking at night? (3)	○	○	○	○	○
How often do you wear a helmet when riding your bicycle? (4)	○	○	○	○	○

Q20 How often are the following bicycle safety features found along the roads near where you live?

	No Locations (1)	Less than Half of Locations (2)	About Half of Locations (3)	More Than Half of Locations (4)	All Locations (5)
Separate spaces for cyclist use, including bike lanes, trails/paths, paved shoulder, etc. (1)	○	○	○	○	○
Street lighting/illumination (3)	○	○	○	○	○

Q21 Are there safe ways to cross higher speed roads as a bicyclist where you live?

- ○ Yes, at all locations (1)
- ○ Yes, at some locations (3)
- ○ No (4)
- ○ Unsure (i.e. I haven't looked to see) (5)
- ○ Not applicable (i.e. there are no higher speed roads where I live) (6)

Q22 Are the crossings convenient to use?

- ○ Yes (1)
- ○ No (3)

Q23 Drag and drop each option to tell us if this is or is not an obstacle to you walking more often.

Obstacle	Not an Obstacle
_____ Time to get to destination (1)	_____ Time to get to destination (1)
_____ Convenience (e.g., easier to drive) (2)	_____ Convenience (e.g., easier to drive) (2)
_____ Weather (e.g., temperature, rain) (3)	_____ Weather (e.g., temperature, rain) (3)
_____ Lack of sidewalks (4)	_____ Lack of sidewalks (4)
_____ Lack of crossing signals/signs (5)	_____ Lack of crossing signals/signs (5)
_____ Poor lighting (e.g., no lights, lights not working) (6)	_____ Poor lighting (e.g., no lights, lights not working) (6)
_____ Hard to navigate with a disability (e.g., blind, wheelchair) (7)	_____ Hard to navigate with a disability (e.g., blind, wheelchair) (7)
_____ Poor roadway/sidewalk conditions (e.g., potholes) (8)	_____ Poor roadway/sidewalk conditions (e.g., potholes) (8)
_____ Driver behavior (9)	_____ Driver behavior (9)
_____ Other sidewalk users (10)	_____ Other sidewalk users (10)
_____ Other (please specify) (12)	_____ Other (please specify) (12)

Q24 Drag and drop each option to tell us if this is or is not an obstacle to you biking more often.

Obstacle	Not an Obstacle
_____ Time to get to destination (1)	_____ Time to get to destination (1)
_____ Convenience (e.g., easier to drive) (2)	_____ Convenience (e.g., easier to drive) (2)
_____ Weather (e.g., temperature, rain) (3)	_____ Weather (e.g., temperature, rain) (3)
_____ Lack of bike lanes/trails (4)	_____ Lack of bike lanes/trails (4)
_____ Lack of crossing signals/signs (5)	_____ Lack of crossing signals/signs (5)
_____ Poor lighting (e.g., no lights, lights not working) (6)	_____ Poor lighting (e.g., no lights, lights not working) (6)
_____ Poor roadway/sidewalk conditions (e.g., potholes) (7)	_____ Poor roadway/sidewalk conditions (e.g., potholes) (7)
_____ Driver behavior (8)	_____ Driver behavior (8)
_____ Other sidewalk users (9)	_____ Other sidewalk users (9)
_____ Other (please specify) (11)	_____ Other (please specify) (11)

Q25 Please answer the following questions about your driving behavior near pedestrians and bicyclists in the past year.

	Never (1)	Rarely (2)	Sometimes (3)	Very Often (4)	Always (5)	NA (e.g., I do not drive) (7)
How often do you yield to pedestrians crossing the road at an intersection where there is a stop sign or traffic signal? (1)	○	○	○	○	○	○
How often do you yield to pedestrians crossing the road at a crosswalk NOT located at an intersection? (2)	○	○	○	○	○	○
How often do you stop your vehicle before the crosswalk lines when stopping at a stop sign or red light? (3)	○	○	○	○	○	○
How often do you ensure a safe passing distance between your car and a bicyclist? (4)	○	○	○	○	○	○

Q26 Are you aware of any traffic enforcement efforts by police (i.e. issuing warnings or citations) in your area regarding pedestrian or bicycle safety in the past year?

- ○ Yes (1)
- ○ No (2)

Q27 If yes, please describe your experiences with law enforcement efforts regarding walking and biking safety.

Q28 How familiar are you with bike and pedestrian safety laws in Texas?

- ○ Extremely familiar (1)
- ○ Very familiar (2)
- ○ Moderately familiar (3)
- ○ Slightly familiar (4)
- ○ Not familiar at all (5)

Q29 What methods would you recommend for educating Texans on bike and pedestrian safety laws in Texas? Select all that apply

- ☐ Dynamic messaging signs (1)
- ☐ Roadway signs (2)
- ☐ Public service announcements (3)
- ☐ Driver's Education Curriculum (4)
- ☐ Education in Elementary and Middle Schools (7)
- ☐ Media campaigns (5)
- ☐ Other (please specify): (6) _____

Knowledge Section

This section focuses on your knowledge of pedestrian and bicycle safety laws. We will provide a link to the answers at the end.

Q30 Select if the following statements are true or false according to Texas law.

	True (1)	False (2)
A local authority may pass ordinances in addition to state statutes that address pedestrian and bicycle safety. (1)	○	○
Bicyclists do not have the same rights and responsibilities as a motor vehicle on Texas roadways. (2)	○	○
Bicyclists should ride as far to the left-hand side of the street as possible. (3)	○	○
A bicyclist is required to use a light when riding at night. (4)	○	○
As a pedestrian, if a sidewalk is available and accessible they must use it. (5)	○	○
As a pedestrian, if a sidewalk is NOT available and accessible, they should walk on the left-hand side of the street – facing traffic. (6)	○	○
The pedestrian always has the right-of-way. (7)	○	○

Q31 Which of these pictures contains a crosswalk? Select all that apply

- [ ] Image:Diagonal crossing
- [ ] Image:Unmarked crosswalk
- [ ] Image:Marked crosswalk
- [ ] Image:Midblock crossing

Q32 You may click here for the correct answers to the knowledge questions to see how you did. And then come back to finalize your survey.

Appendix B: Weighting Methodology

Texas A&M Transportation Institute Survey 2022

Sampling Design Overview:

This survey has secured a total of 433 adult respondents residing in Texas, using online panels for sample selection and survey administration. Upon examination, 12 respondents had to be excluded due to missing values for most of their survey responses.

Imputation of Missing Data:

When computing weights for survey respondents, it is necessary for all variables used in the weighting process to be free from missing values. Given that virtually all demographic variables for this survey had missing values, a *hierarchical hot-deck* imputation procedure was used to replace missing values with appropriate donors. For this purpose, the survey imputation procedure in SAS[1] was used for construction of imputation cells and donor selections.

Weighting Methodology:

The weighting process for this survey included three major steps. In the first step, pseudo design weights were assigned to each respondent as selection probabilities for online panels are incalculable. In the second step, design weights were adjusted to the geodemographic benchmarks of all adults in Texas[2]. As part of this step, calibration adjustments were also made with respect to the following three attitudinal and behavioral measures:

1. Average time spent watching TV each day;
2. Average time spent online for personal use each week; and
3. Propensity for being an early adopter.

All of the above adjustments were applied using the *WgtAdjust* procedure of SUDAAN[3] to balance the distributions of survey respondents against the various benchmarks simultaneously (tables 1 to 7). This procedure relies on a constrained logistic regression to predict the likelihood of responding vis-à-vis the explanatory variables used in the model (benchmark distributions). The resulting likelihood probabilities are then used to create adjustment weights that align respondents to their specified benchmark distributions.

In the final step, produced weights were examined to identify and ameliorate extreme values. Trimming extreme weights is a standard practice that is used to improve the efficiency of the weighting process and add stability to survey estimates. This important gain in precision, however, is achieved at the expense of introducing some minor diversions between weighted totals and their corresponding population benchmarks. For ease of application, trimmed weights were then scaled to aggregate to the total number of respondents (421) to produce the final analysis weights.

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[1] https://support.sas.com/resources/papers/proceedings16/SAS3520-2016.pdf

[2] Population benchmarks used for weighting were secured from the latest American Community Survey (ACS).

[3] RTI International (2012). *SUDAAN Language Manual, Release 11.0.* RTI International. www.rti.org/sudaan

Table 1. Population and Respondent Distributions by Age and Gender

Age	Male				Female			
	Universe		Respondents		Universe		Respondents	
18-24	1,455,389	13.7%	17	12.6%	1,372,863	12.5%	53	18.5%
25-34	2,156,693	20.3%	26	19.3%	2,080,612	18.9%	53	18.5%
35-44	1,994,165	18.8%	33	24.4%	1,979,659	18.0%	52	18.2%
45-54	1,756,002	16.5%	16	11.9%	1,791,641	16.3%	54	18.9%
55-64	1,590,485	15.0%	17	12.6%	1,683,839	15.3%	42	14.7%
65+	1,664,980	15.7%	26	19.3%	2,074,822	18.9%	32	11.2%
Total	**10,617,714**	**100.0%**	**135**	**100.0%**	**10,983,436**	**100.0%**	**286**	**100.0%**

Table 2. Population and Respondent Distributions by Gender and Ethnicity

Ethnicity	Male				Female			
	Universe		Respondents		Universe		Respondents	
Hispanic	3,931,759	37.0%	34	25.2%	3,935,149	35.8%	74	25.9%
Non-Hispanic	6,685,955	63.0%	101	74.8%	7,048,287	64.2%	212	74.1%
Total	**10,617,714**	**100.0%**	**135**	**100.0%**	**10,983,436**	**100.0%**	**286**	**100.0%**

Table 3. Population and Respondent Distributions by Gender and Race

Race	Male				Female			
	Universe		Respondents		Universe		Respondents	
White	7,888,797	74.3%	94	69.6%	8,103,614	73.8%	193	67.5%
Black	1,259,474	11.9%	25	18.5%	1,394,884	12.7%	47	16.4%
Others	1,469,443	13.8%	16	11.9%	1,484,938	13.5%	46	16.1%
Total	**10,617,714**	**100.0%**	**135**	**100.0%**	**10,983,436**	**100.0%**	**286**	**100.0%**

Table 4. Population and Respondent Distributions by Gender and Education

Education	Male				Female			
	Universe		Respondents		Universe		Respondents	
No College	4,614,207	43.5%	44	32.6%	4,371,035	39.8%	89	31.1%
Some College	2,396,096	22.6%	29	21.5%	2,613,509	23.8%	73	25.5%
Associate	707,461	6.7%	14	10.4%	853,158	7.8%	44	15.4%
Bachelor	1,887,276	17.8%	33	24.4%	2,108,873	19.2%	57	19.9%
Postgraduate	1,012,674	9.5%	15	11.1%	1,036,861	9.4%	23	8.0%
Total	**10,617,714**	**100.0%**	**135**	**100.0%**	**10,983,436**	**100.0%**	**286**	**100.0%**

Table 5. Population and Respondent Distributions by Average Daily TV Watching

Daily TV Watching	Universe		Respondents	
Less than 3 Hours	9,733,478	45.1%	97	23.0%
Three of More Hours	11,867,672	54.9%	324	77.0%

Total	**21,601,150**	**100.0%**	**421**	**100.0%**

Table 6. Population and Respondent Distributions by Average Weekly Internet Use

Weekly Online Time	Universe		Respondents	
Less than 10 Hours	11,662,461	54.0%	171	40.6%
Ten or More Hours	9,938,689	46.0%	250	59.4%
Total	**21,601,150**	**100.0%**	**421**	**100.0%**

Table 7. Population and Respondent Distributions by Early Adoption

Early Adopter	Universe		Respondents	
Never or Sometimes	18,736,838	86.7%	256	60.8%
Often or Always	2,864,312	13.3%	165	39.2%
Total	**21,601,150**	**100.0%**	**421**	**100.0%**

Variance Estimation for Weighted Data:

Survey estimates can only be interpreted properly in light of their associated sampling errors. Since weighting often increases variance of estimates, use of standard variance calculation formulae with weighted data can result in misleading statistical inferences. With weighted data, two general approaches for variance estimation can be distinguished. One is Taylor Series linearization, while the second method of variance estimation is replication.

An Approximation Method for Variance Estimation can be used to avoid the need for special software packages. Researchers who do not have access to such tools for design-proper estimation of standard errors can approximate the resulting variance inflation due to weighting and incorporate that in subsequent calculations of confidence intervals and tests of significance. With W_i representing the final weight of the i^{th} respondent, the inflation due to weighting, which is commonly referred to as *Design Effect*, can be approximated by:

$$\delta = 1 + \frac{\sum_{i=1}^{n} \frac{\left(W_i - \bar{W}\right)^2}{n-1}}{\bar{W}^2}$$

For calculation of a confidence interval for an estimated percentage, $\hat{p}$, one can obtain the conventional variance of the given percentage, multiply it by the approximated design effect, δ, and use the resulting quantity as adjusted variance. That is, the adjusted variance would be given by:

$$\hat{S}^2(\hat{p}) \approx S^2\left(\hat{p}\right)(\hat{p}) \times \delta = \frac{\hat{p} \times \left(1-\hat{p}\right)}{n-1}\left(\frac{N-n}{N}\right) \times \delta$$

Subsequently, the (100-α) percent confidence interval for P would be given by:

$$\hat{p} - z_{\alpha/2}\sqrt{\frac{\hat{p} \times (1-\hat{p})}{n-1}\left(\frac{N-n}{N}\right) \times \delta} \le P \le \hat{p} + z_{\alpha/2}\sqrt{\frac{\hat{p} \times (1-\hat{p})}{n-1}\left(\frac{N-n}{N}\right) \times \delta}$$

The overall design effect for this survey is estimated to be 1.85.