2023 Survey of Texans on Pedestrian and Bicycle Safety

Identifying Barriers to Understanding Pedestrian and Bicycle Safety Laws

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Introduction

The objective of this survey is to measure and track pedestrian and bicycle safety in Texas. This is the fourth year that this survey has been conducted; a similar survey has been conducted since 2020. The survey provides a snapshot of the pedestrian and bicycle safety issues in Texas, and knowledge of laws. This report summarizes the findings of the 2023 survey. Additionally, comparisons to the previous years of the 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 is based on the survey conducted in 2022 with the addition of some new 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 about 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. Anyone who is a current resident of Texas and at least 18 years of age was eligible to participate in the survey.

Survey Analysis

A total of 414 individuals in Texas completed the online survey. 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. Results from the 2023 survey, including the knowledge assessment, were compared to previous years of the survey to look at changes over time.

Summary of Key Findings

Pedestrian Questions

- More people reported walking daily in 2023, **24.4 percent** in 2023 compared to **18.2 percent** in 2022.

- Like 2022, a majority of 2023 respondents reported walking for exercise or leisure, but there was an increase in those walking for transportation from **19.9 percent** in 2022 to **23.9 percent** in 2023.
- One concerning finding is an increase in the percentage of respondents who say they always or very often cross the road at a location other than a crosswalk or intersection in the 2023 survey. In 2022, **19.0 percent** reported doing so very often or always compared to **22.0 percent** in 2023.
- There was a **6.5 percentage point** increase in respondents who reported "Always" following pedestrian crossing signals; from **32.6 percent** in 2022 to **39.1 percent** in 2023.
- A majority of Texans are rarely or never wearing reflective clothing or using a light at night when walking. In 2023, a higher percentage of respondents reported "Never" using reflective clothing or a light (**25.3 percent** compared to **32.0 percent**).
- The pedestrian safety features respondents say are lacking most are pedestrian crossing signals and marked crosswalks at intersections.
- **20.3 percent** reported sidewalks at less than half of locations.
- Notably, driver behavior increased as an obstacle for pedestrians in 2023, from **55.7 percent** of respondents in 2022 to **62.0 percent** in 2023.
- Poor roadway and sidewalk conditions also increased slightly from 2022 to 2023 as an obstacle to walking more.

Bicycle Questions

- The percentage of respondents that reported never bicycling in 2023 increased by **10 percentage points** as compared to 2022 which means that a higher percentage of people are not bicycling.
- Of those that bicycle, about a quarter (**23.8 percent**) of them indicated that they bicycle for the purpose of transportation. The most reported reasons for bicycling, however, were for exercise/health (**70.6 percent**) or leisure/fun (**50.2 percent**).
- Respondents mostly reported safer behaviors when bicycling in 2023 as compared to the prior two years. A lower percentage is riding against traffic, and a higher percentage is making themselves visible at night by using bike lights/reflectors and wearing reflective clothing. However, the percentage of respondents who said that they wear a helmet decreased.
- The percentage of respondents who said that there are no separate places to bicycle decreased in 2023 as compared to 2022 and 2021, indicating that a higher percentage of respondents have access to separated bicycle facilities.
- The most mentioned reason that respondents do not bicycle was because of a lack of bike lanes/trails. This reason was ranked second in 2022 and third in 2021.

- Behind a lack of bike lanes/trails, weather and driver behavior were the second and third most cited reasons respondents do not bicycle. These three reasons were in the top three in all three years that this survey has been conducted.

Driver Questions

- The majority of drivers report yielding to pedestrians and bicyclists and passing bicyclists at a safe distance very often or always.
- Overall, reported driver yielding to pedestrians in 2023 was highest of the three survey years.
- Reported driver yielding to pedestrians at mid-block locations was lower than at intersections, which is true for all three survey years.

Enforcement

- The percentage of respondents reporting awareness of any traffic enforcement efforts by police regarding pedestrian and bicycle safety has remained around **25-30 percent** over the past three years.
- Respondent sentiments about law enforcement reflected the spectrum of responses from positive to negative, with others stating that infrastructure would improve safety more than ticketing.

Laws & Messaging

- The percentage of respondents that reported being at least moderately familiar with pedestrian and bicycle laws has remained just over half during the three years of the survey.
- "Roadways Signs" remains the method of messaging selected by the highest percentage of respondents, in 2023 (**73.1 percent**).
- Support for "Dynamic messaging signs" fell from **38.8 percent** in 2021 to **35.3 percent** in 2023.

Knowledge of Laws

- A strong majority of respondents correctly answered that local authorities may pass ordinances in addition to the state laws (**87 percent** in 2023, compared to **84 percent** in 2022 and **87 percent** in 2021), and that bicyclists are required to use a light when riding at night (**86 percent** in 2023, **85 percent** in 2022 and 2021).
- Just over half (**53.2 percent**) of respondents provided a correct answer ("false") to the true-false statement "Bicyclists should ride as far to the left-hand side of the street as possible." This percentage has fluctuated only slightly from 2022 (**49 percent**) and 2021 (**51 percent**).
- In 2023 and 2022, **83 percent** of respondents answered correctly that pedestrians are required to walk on the sidewalk if one is available and accessible, compared to **79 percent** in 2021.

- Only **27 percent** of respondents correctly identified "The pedestrian always has the right-of-way" as a false statement in 2023; this compared to **33 percent** in 2022 and **26 percent** in 2021.
- In 2023, **74 percent** of respondents correctly answered that it was false that bicyclists do not have the same rights and responsibilities as motorists on Texas roadways, compared to **73 percent** in 2022 and **68 percent** in 2021. This may indicate an increase in the understanding of this law among Texas road users.
- The percentage of respondents who answered correctly that a pedestrian should walk on the left-hand side of the street if a sidewalk is unavailable or inaccessible was **76 percent** in 2023, an increase over 2022's **74 percent** and 2021's **71 percent**.
- Overall, respondents in 2023 identified **42.9 percent** of all the marked crosswalks, compared to respondents in 2022 (**30.5 percent**) and 2021 (**38.2 percent**). Identification of unmarked crosswalks at an intersection remained very low in 2023 (**2.2 percent**), though slightly higher compared to 2022 (**0.6 percent**) and 2021 (**1.2 percent**).

Only **42 percent** of respondents stated that they were familiar with the new "stop and yield" law.

Demographics

Respondents were asked to self-identify the type of area in which they live. As Figure 1 shows, respondents came from a variety of location types, with just over half being from a large city or suburban location (**54.8 percent**), **16.6 percent** from a medium-size city and the remainder from small towns (**9.8 percent**) and rural areas (**18.8 percent**).

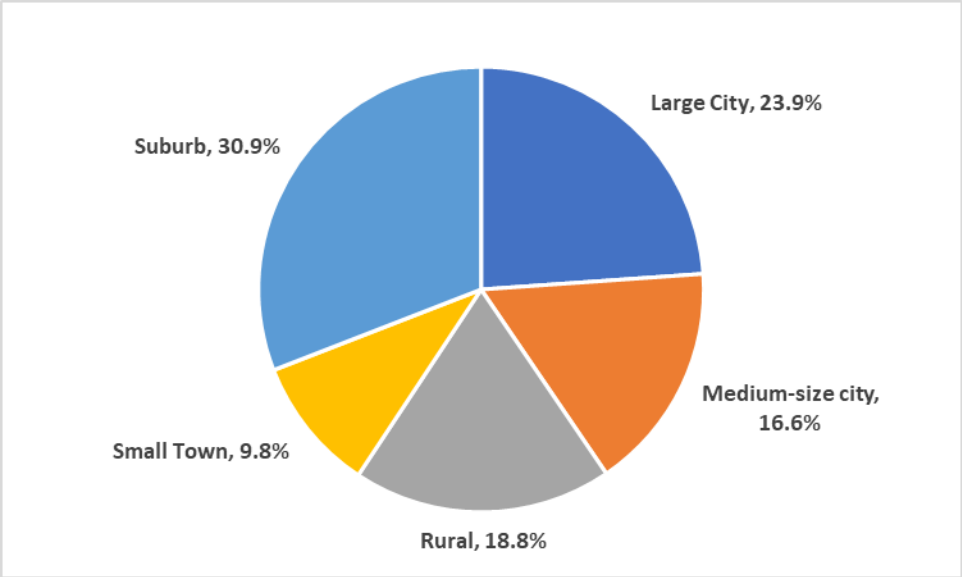


Figure 1. Location Type

The survey respondents were split relatively evenly between male and female, with females making up just over half of respondents (see Figure 2).

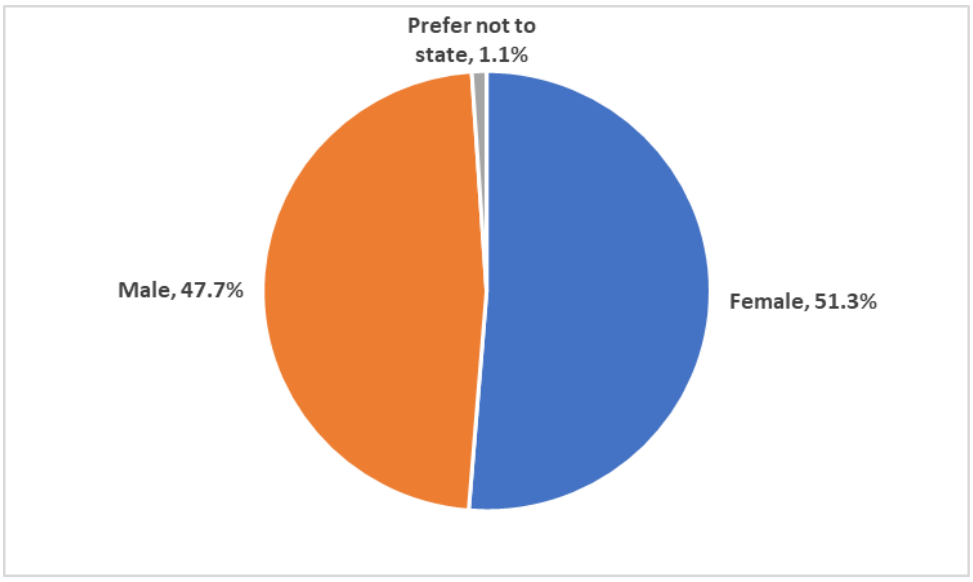


Figure 2. Gender

As Figure 3 shows, the age of respondents represented a variety of age groups with approximately half of respondents being 18-44 years of age and the other half being 45 years of age or older.

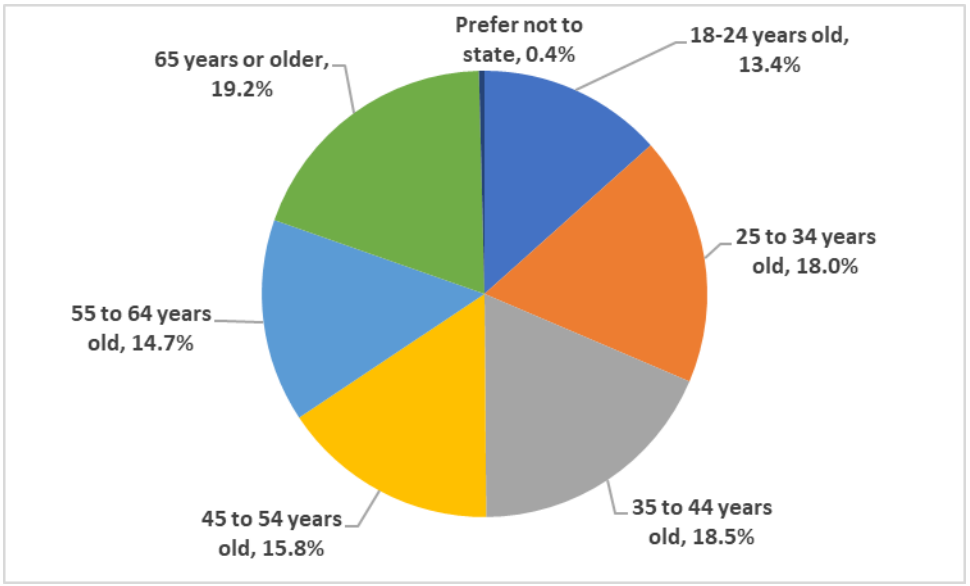


Figure 3. Age Category

The race and ethnicity of respondents shown in Figure 4 represents the diversity of Texas with a majority of respondents being White and Hispanic, with expected percentages of Black, Asian and other races. *Note:* The total adds to more than 100 percent, since this graph represents both race and ethnicity combined, which were asked as two separate questions. Therefore, those who selected Hispanic origin are also counted in the other Race categories, such as White, Black, etc.

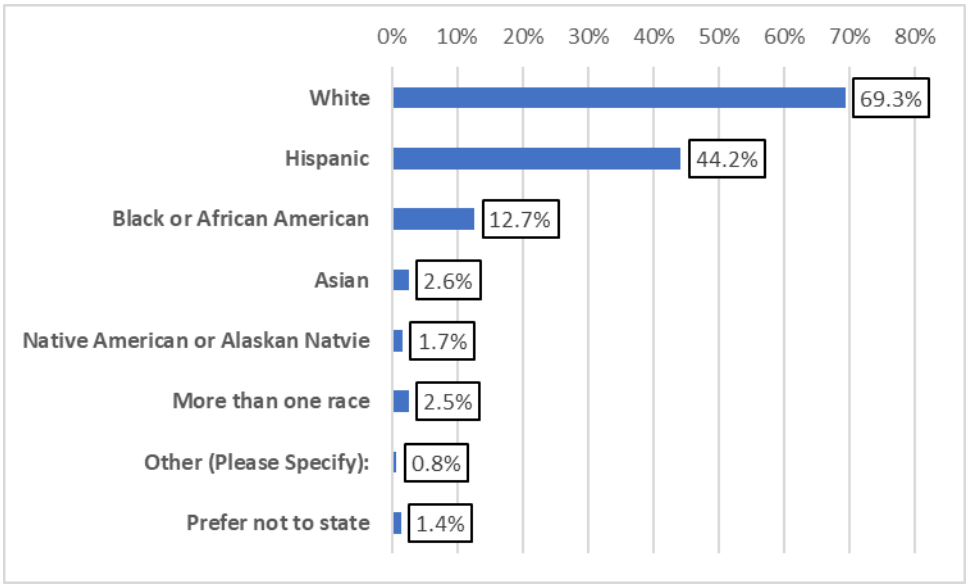


Figure 4. Race/Ethnicity

Educational attainment was also asked. As Figure 5 shows, **42.3 percent** of respondents have obtained a college degree (Associate's, bachelor's or postgraduate), and another **17.9 percent** attended some college. Overall, **94 percent** completed high school or equivalent (GED).

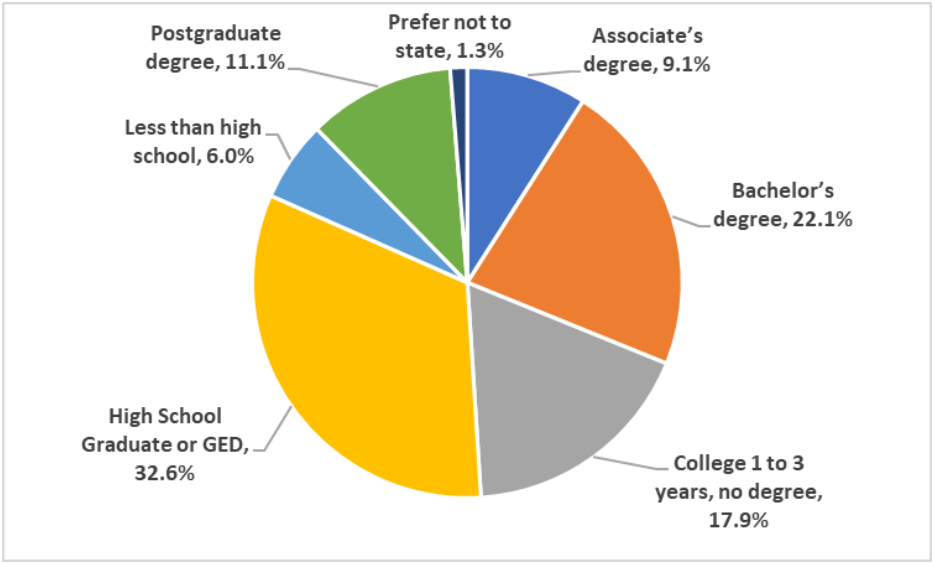


Figure 5. Education

Pedestrian Questions

Frequency and Purpose

First, respondents were asked about how frequently they walk on public roads or sidewalks. As Figure 6 shows, nearly a quarter (**24.4 percent**) of respondents reported walking daily, with **67.2 percent** reporting walking at least once per week. Just **13.1 percent** report never walking on

public roads or sidewalks. Respondents who said they never walked were not presented with the following two questions regarding the reasons for walking or their walking behavior.

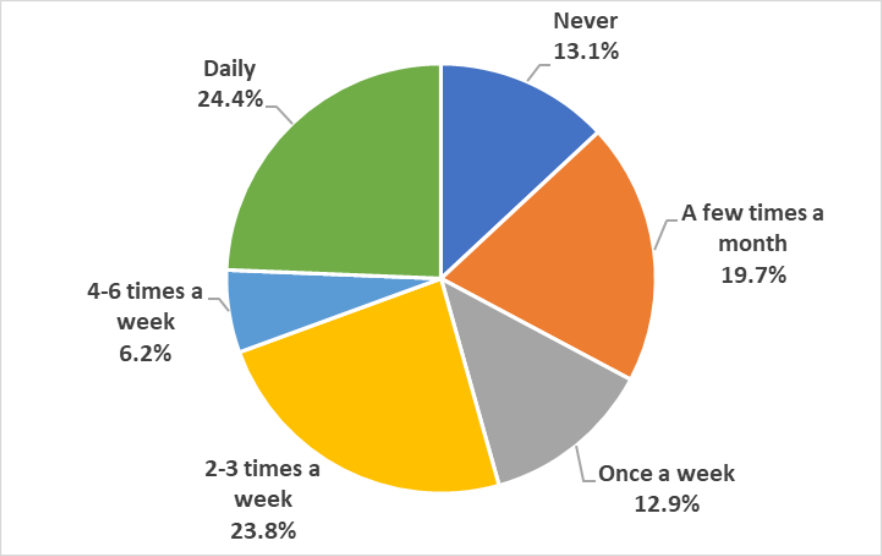


Figure 6. Walking Frequency

Respondents were also asked the reason(s) why they walk. Figure 7 shows the responses, with the vast majority of respondents (**69.5 percent**) reporting walking for exercise or other health benefits. This is followed by approximately one-third (**33.2 percent**) that report walking for leisure or fun, **23.9 percent** that do so for transportation purposes, and **14.3 percent** that walk for social reasons. About **4 percent** reported other reasons which mainly included walking a dog. The total exceeds 100 percent since respondents could choose all options that applied to them.

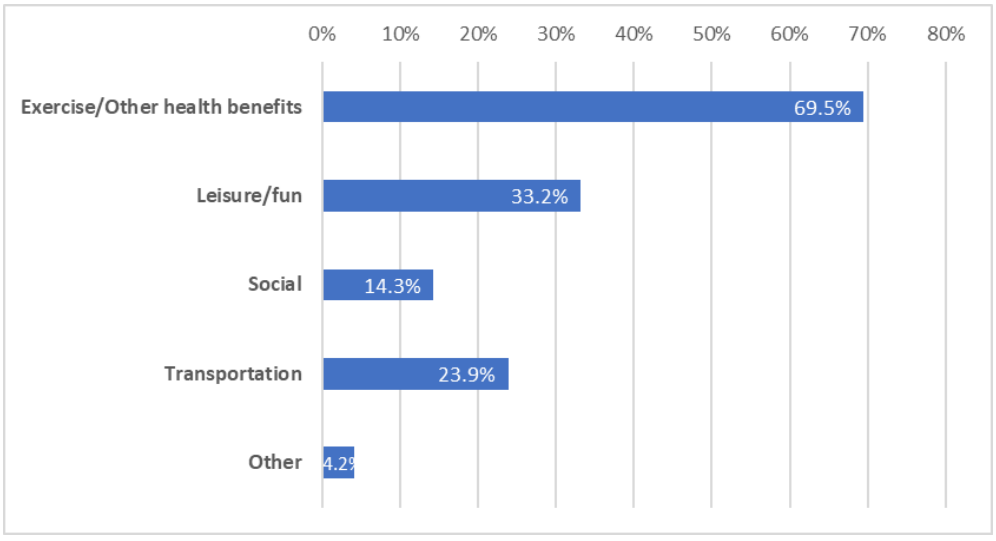


Figure 7. Walking Purpose

Pedestrian Behavior

Figure 8 shows reported pedestrian behavior, with **22.0 percent** of respondents reporting crossing the road at a location other than a crosswalk or intersection very often or always, with another **37.2 percent** reporting doing so sometimes. However, approximately **40 percent** reported doing so rarely or never. When pedestrians cross the road outside of a crosswalk or intersection, they are required to yield the right-of-way to vehicles.

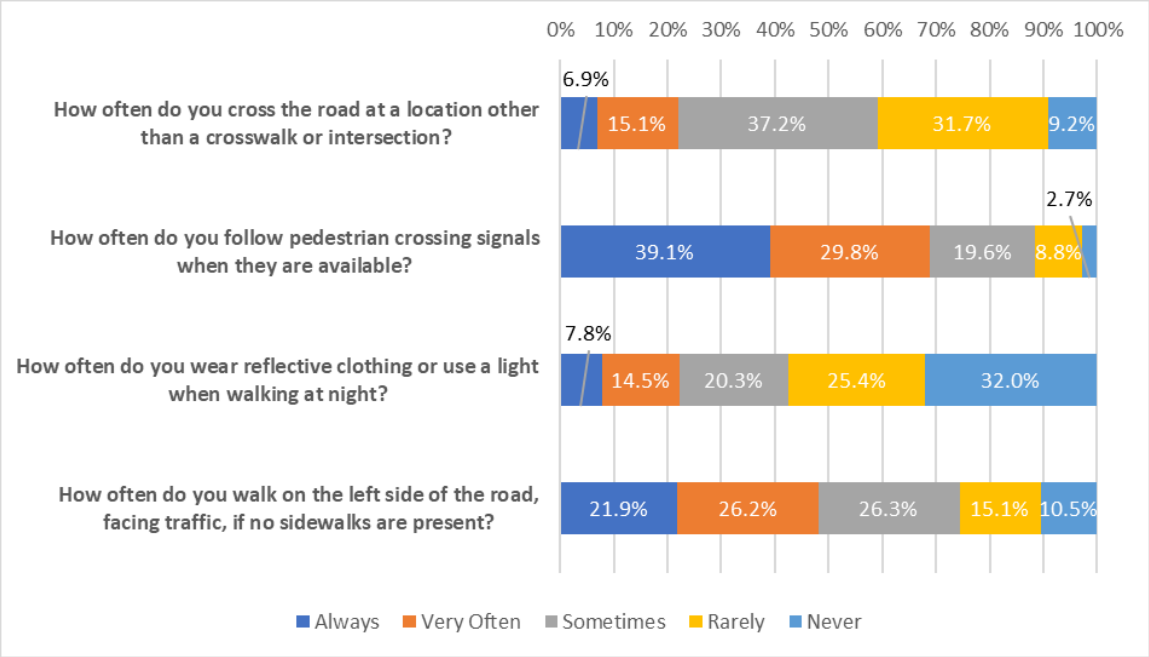


Figure 8. Walking Behavior

The majority of respondents (**68.9 percent**) reported following pedestrian signals very often or always, with only **11.5 percent** reporting doing so rarely or never. At locations with pedestrian signals in use, pedestrian right-of-way is dictated by that signal. Wearing reflective clothing or using a light at night was reported at least some of the time by **42.6 percent** of respondents. Wearing reflective clothing at night is not required, but can increase the visibility of pedestrians at night, therefore increasing their safety. Walking on the left side of the road when no sidewalks are available, which is the law in Texas, was reported by **48.1 percent** of respondents very often or always.

Pedestrian Safety Features

Respondents were asked about pedestrian safety features available on the roads near where they live, and Figure 9 shows the results. Responses show a lack of pedestrian crossing signals and marked crosswalks at intersections, with **20.1 percent** and **13.4 percent** respectively reporting these features at no locations near where they live. Street lighting/illumination was the most commonly reported safety feature observed by respondents.

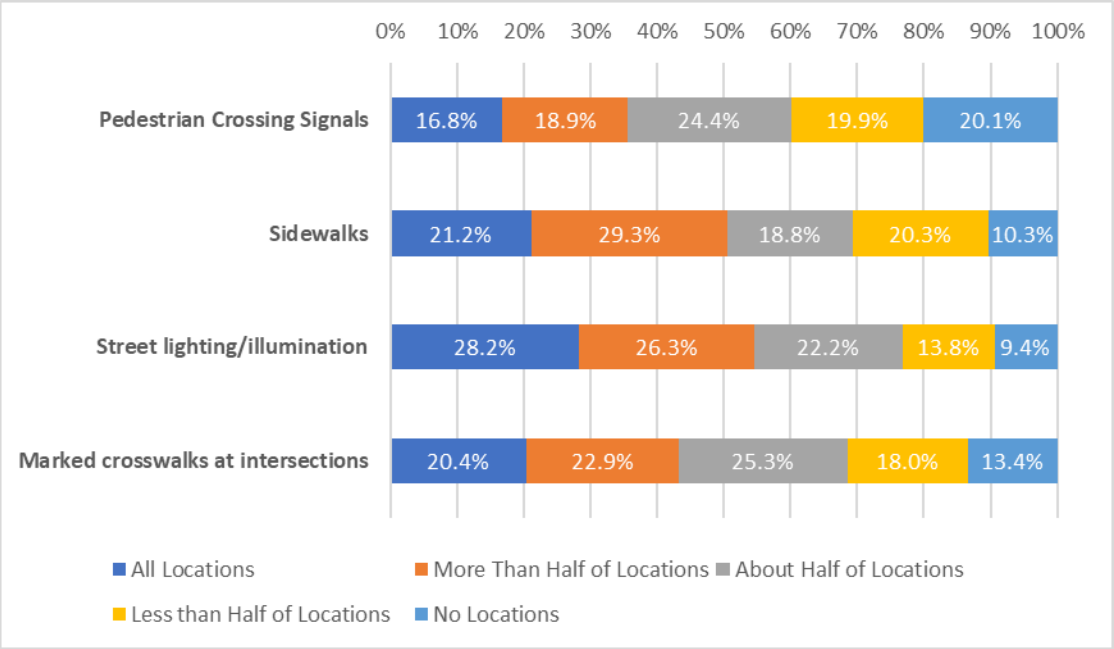


Figure 9. Pedestrian Safety Features

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 10 shows, the majority of respondents (**67.4 percent**) report safe ways to cross high-speed roads at some or all locations near where they live and **87.8 percent** say these crossings are convenient to use. However, **22.7 percent** of respondents reported no safe places to cross high-speed roads.

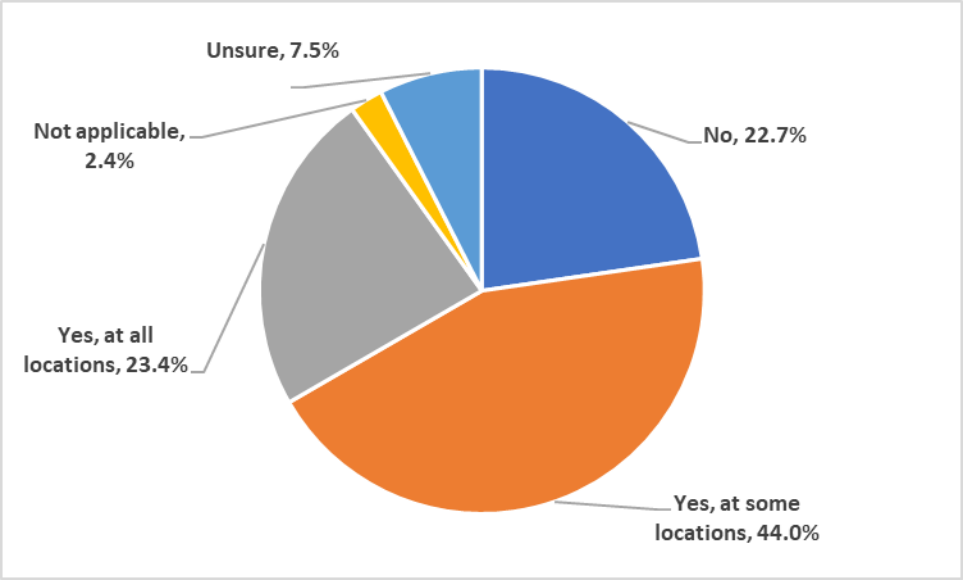


Figure 10. Safe Places to Cross High-Speed Roads as Pedestrian

Obstacles for Pedestrians

Respondents were asked about the obstacles that keep them from walking more often, and Table 1 shows the results. The biggest obstacle to walking more often reported by respondents was weather, which includes things like rain, snow, cold, and heat at **64.8 percent** of respondents. This was followed closely by the **62.0 percent** of respondents that reported driver behavior as an obstacle to walking more. Other obstacles reported by at least half of respondents were poor roadway/sidewalk conditions and a lack of sidewalks.

Table 1. Pedestrian Obstacles

Issue	% Cited as Obstacle
Time to get to destination	48.2%
Convenience	43.4%
Weather	64.8%
Lack of sidewalks	51.8%
Lack of crossing signals or signs	48.5%
Poor lighting	47.5%
Hard to navigate with a disability	31.9%
Poor roadway/sidewalk conditions	53.6%
Driver behavior	62.0%
Other sidewalk users	22.0%
Other	8.4%

Bicycle Questions

Frequency and Purpose

Figure 11 shows the reported frequency of biking among respondents. Approximately one in five (**20.4 percent**) of respondents reported biking at least once per week, with an additional **15.6 percent** reporting doing so a few times a month. Over half (**64.0 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.

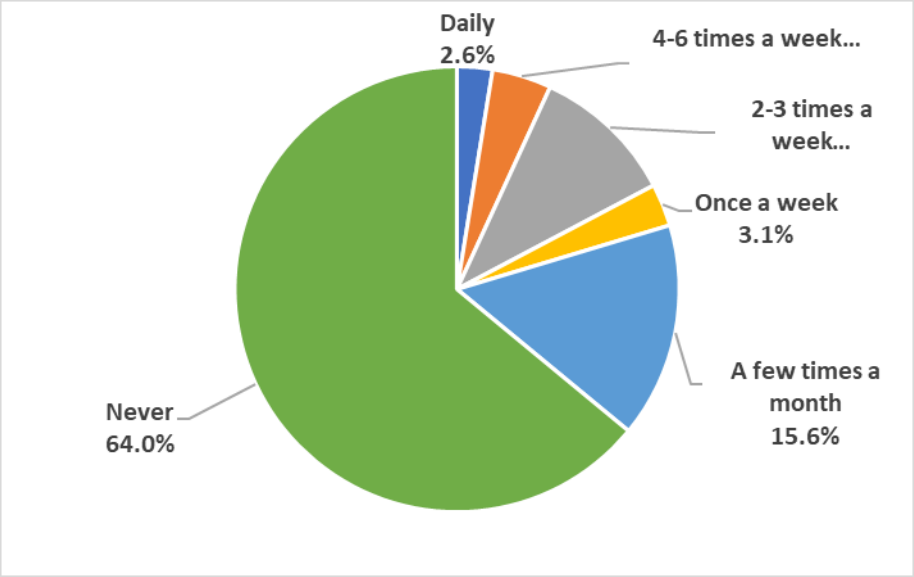


Figure 11. Biking Frequency

Figure 12 shows respondents reported biking mainly for exercise/other health benefits (**70.6 percent**) and leisure/fun (**50.2 percent**). Biking for transportation was reported by **23.8 percent** and biking for social reasons was reported by **11.6 percent** of respondents. The total exceeds 100 percent since respondents could choose all options that applied to them.

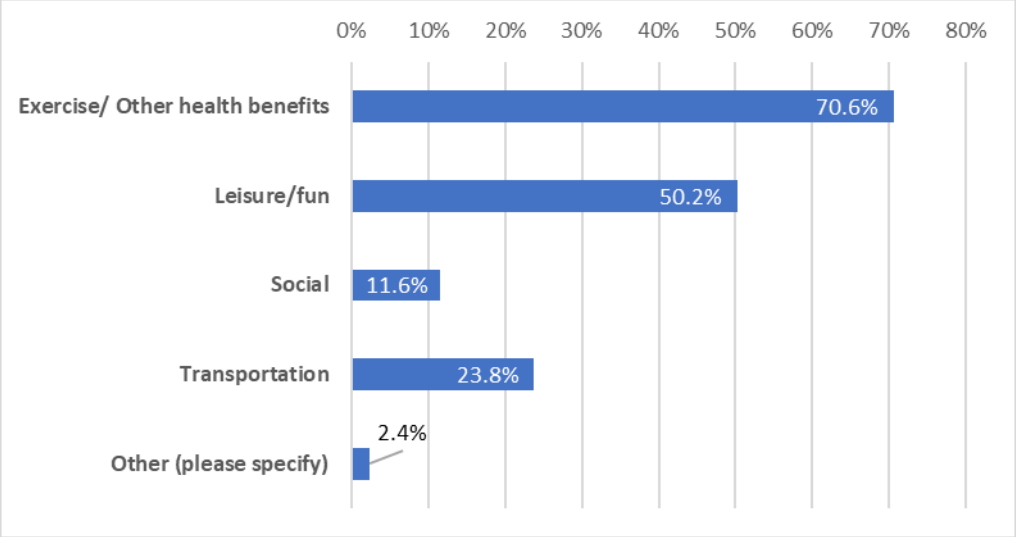


Figure 12. Biking Purpose

Bicyclist Behavior

Respondents were asked about their bicycling behavior over the last year (see Figure 13). Riding against traffic in the road very often or always was reported by **17.1 percent** of respondents, with **22.3 percent** reporting doing so sometimes and **26.5 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 a bike light at night was reported very often or always by

45.3 percent of respondents. Only **15.1 percent** 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 **37.5 percent** of respondents, with another **43.7 percent** reporting infrequent helmet use (rarely or never). Just under one-third (**37.5 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.

New this year was a question regarding biking on the sidewalk. Approximately, three-quarters (**74.8 percent**) of respondents reported riding their bicycle on the sidewalk at least some of the time, with **9.9 percent** saying they never ride on the sidewalk. While there is no state law prohibiting the use of bikes on the sidewalk, a local jurisdiction may have such prohibitions on some or all sidewalks.

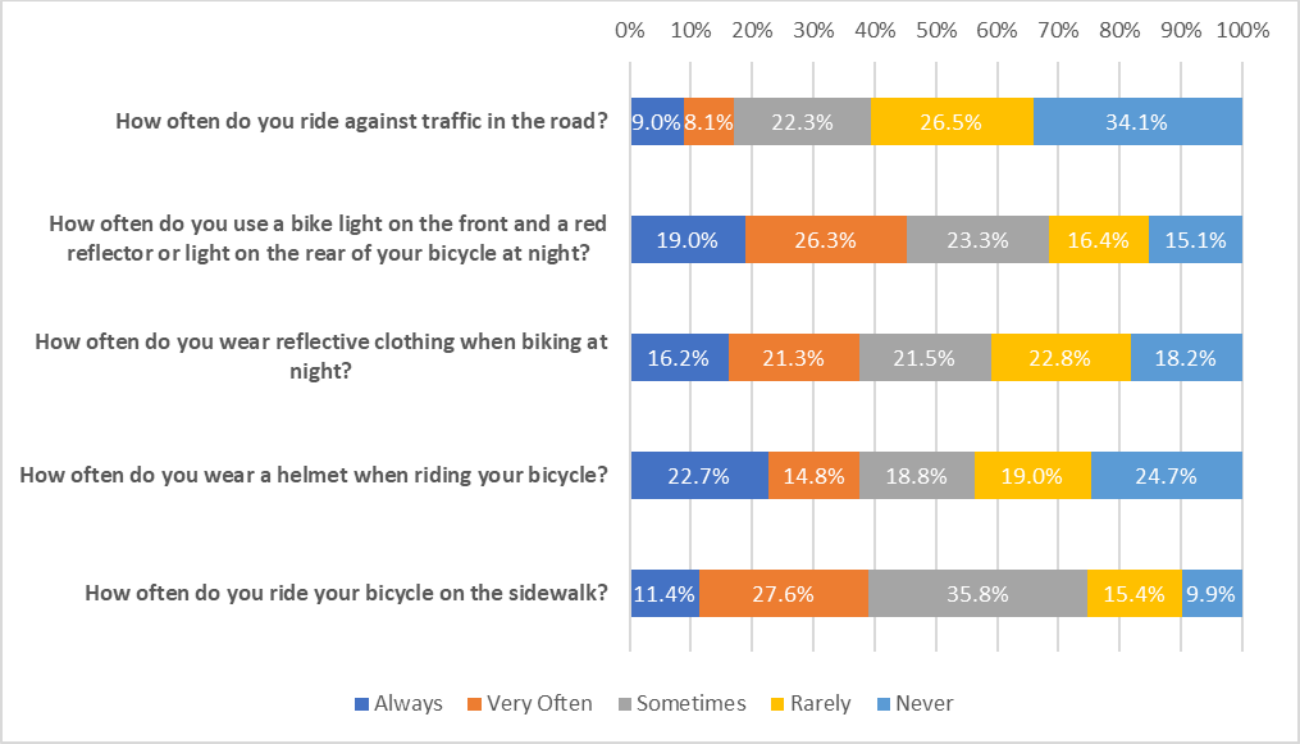


Figure 13. Biking Behavior

Bicycle Safety Features

Respondents were asked about bicycle safety features that were available in the area near where they live (see Figure 14). Separate spaces for cyclist use were reported as available in at least half of locations by **57.9 percent** of respondents with **13.7 percent** reporting no locations available near where they live with separate spaces for cyclists to use. Street lighting/illumination was reported at no locations by only **5.4 percent** of respondents.

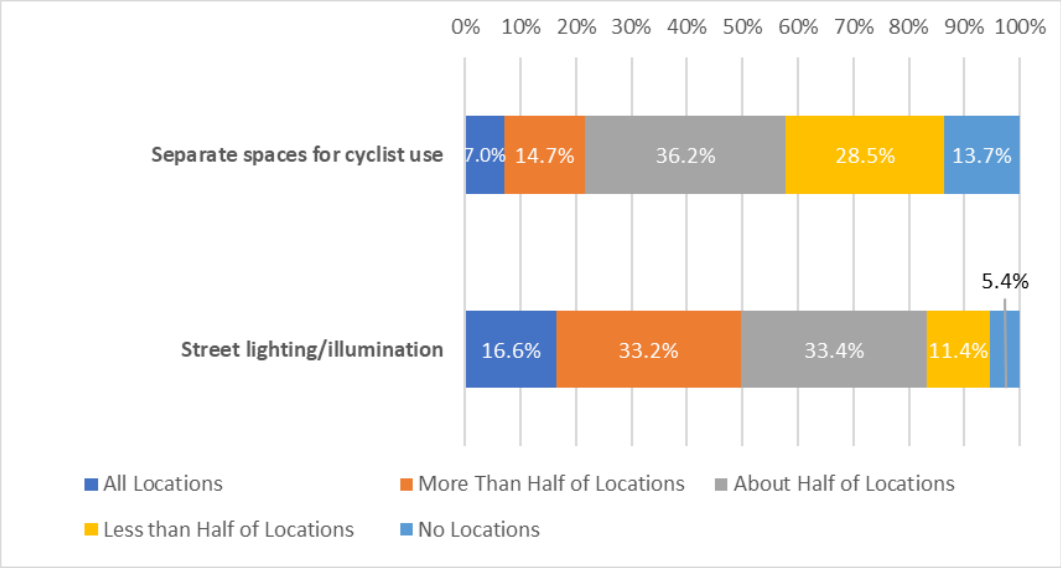


Figure 14. Bicycle Safety Features

As Figure 15**Error! Reference source not found.** shows, **68.9 percent** of respondents reported that there are safe places for bicyclists to cross higher speed roads at some locations near where they live and **20.6 percent** reporting that there were not. Overall, the crossings were seen as convenient, with Error! Reference source not found.**91.8 percent** reporting that these crossings were convenient to use.

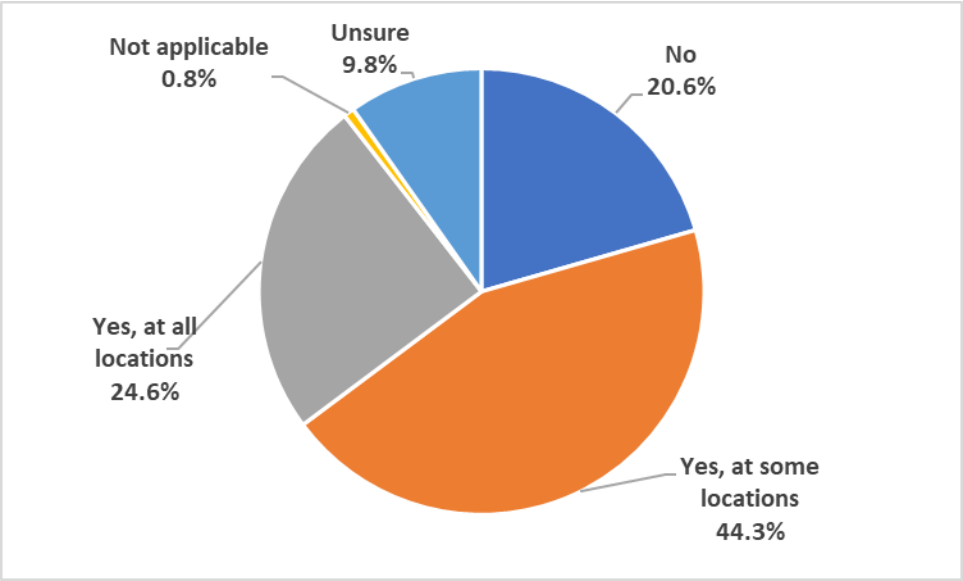


Figure 15. Safe Places to Cross High-Speed Roads as Bicyclist

Bicyclist Obstacles

Respondents were asked about obstacles to biking more often. As Table 2 shows, a lack of bike lanes/trails was the top obstacle to biking more often by respondents. This was closely followed

by weather and driver behavior. Other obstacles included poor roadway or sidewalk conditions and a lack of crossing signals or signs.

Table 2. Biking Obstacles

Issue	% Cited as Obstacle
Time to get to destination	40.8%
Convenience	42.5%
Weather	58.1%
Lack of bike lanes/trails	60.5%
Lack of crossing signals or signs	46.2%
Poor lighting	42.1%
Poor roadway/sidewalk conditions	51.4%
Driver behavior	57.2%
Other sidewalk users	26.9%
Other (please specify)	8.4%

Driver Questions

Driver Behavior

Respondents were asked four questions about their driving behavior around pedestrians and bicyclists, results are shown in Figure 16. The first two questions asked how often drivers yield to pedestrians. Yielding to pedestrians at an intersection with a stop sign or traffic signal was reported by **77.0 percent** of drivers very often or always, with **64.1 percent** of drivers reporting doing so all the time and another **12.9 percent** very often. Yielding to pedestrians at a crosswalk not at an intersection (or "mid-block") was reported less often with **72.2 percent** reporting do so very often or always. Only about half (**49.6 percent**) reported yielding at mid-block locations all the time.

Respondents were also asked about their yielding to bicyclists when required. This was reported by **81.1 percent** of respondents very often or always. Similarly, ensuring a safe passing distance between their car and a bicyclist was reported by **82.3 percent** of respondents very often or always.

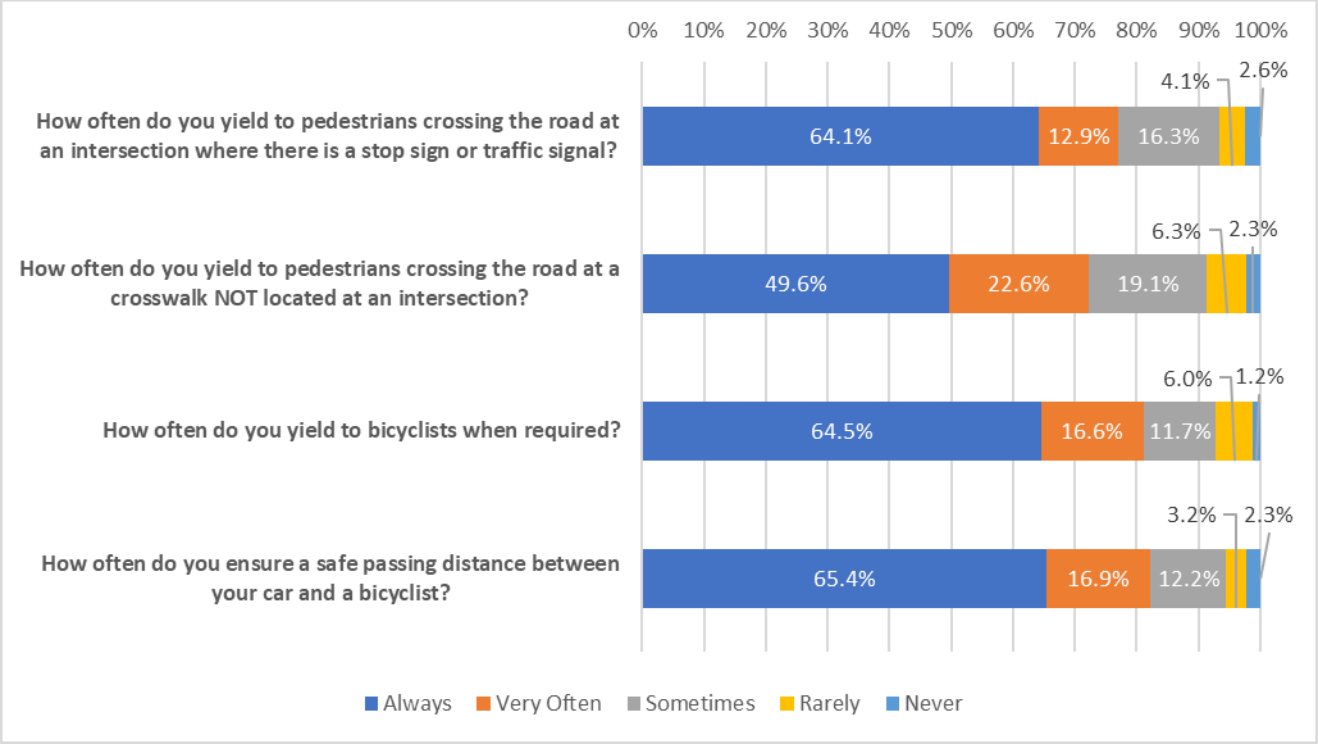


Figure 16. Driver Behavior

Enforcement

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 17 shows, just over one-quarter (**27.1 percent**) of respondents reported an awareness of any such efforts.

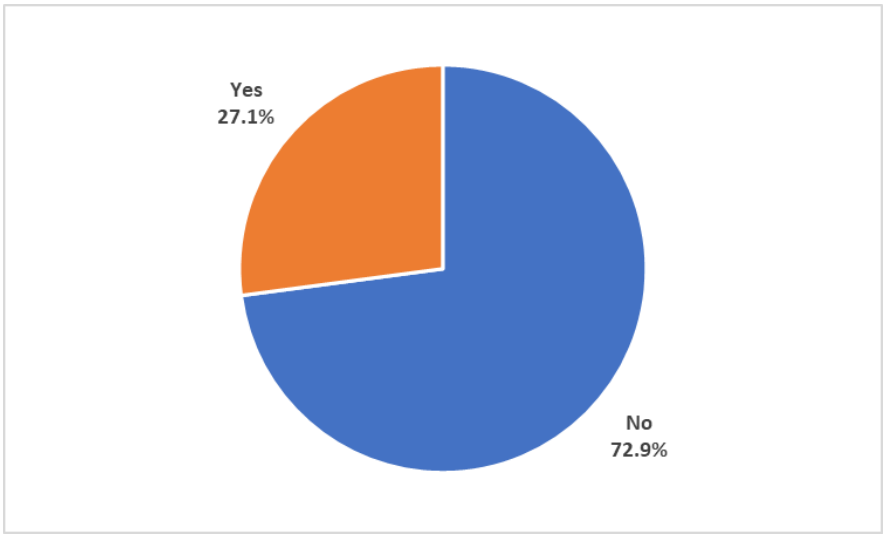


Figure 17. Traffic Enforcement Efforts

The respondents from this survey indicated numerous issues that officers, when present, might be looking for. These include tickets for, drunk walking, no helmet, jaywalking, driving in bicycle lanes, not giving pedestrians right-of-way, not stopping at a stop sign, and not complying with the rules of the road. Overall responses were mixed as far as the opinions about officer presence, as some individuals said that they have had, positive experiences while others described them as, "harassing, overly strict, and inconsistent". Officer presence was reported as improving and was reportedly seen slowing down traffic and ensuring safe crossings of the roads for pedestrians, bicyclists, and students. Some felt that infrastructure improvements would be more effective at reducing crashes and injuries than ticketing those who disobey the laws.

Laws & Messaging

As Figure 18 shows, more than half (**56.8 percent**) of respondents reported at least a moderate familiarity with pedestrian and bicycle safety laws and another **25.6 percent** reported being slightly familiar with these laws. No familiarity was reported by (**17.6 percent**) of respondents.

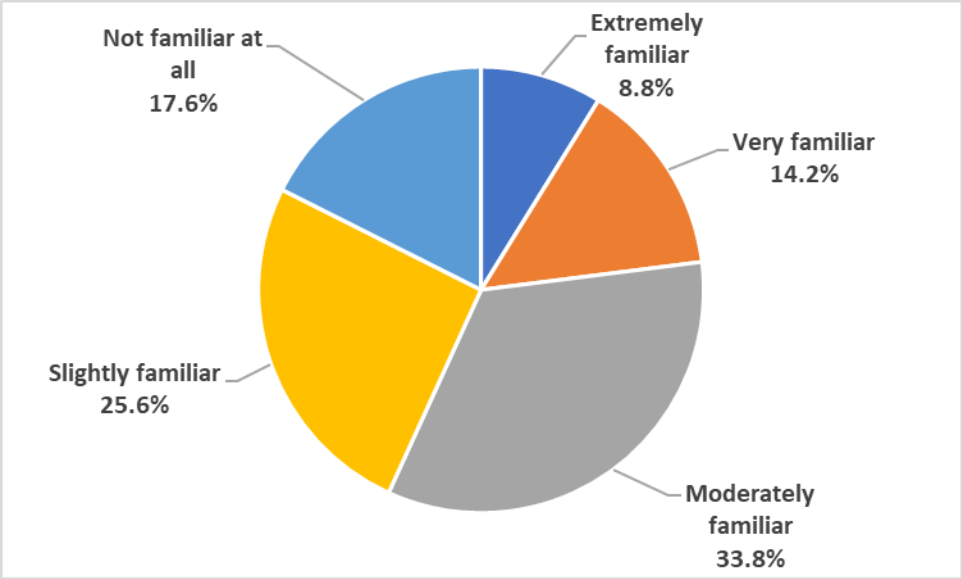


Figure 18. Familiarity with Laws

Roadway signs were the most commonly selected method of education by respondents (see Figure 19**Error! Reference source not found.**) for educating Texans on bike and pedestrian safety laws. Driver education curricula was also popular with just over half or respondents (**52.2 percent**) choosing this method. Education in elementary and middle schools and public service announcements were less popular. Dynamic messaging signs and media campaigns were the least chosen methods.

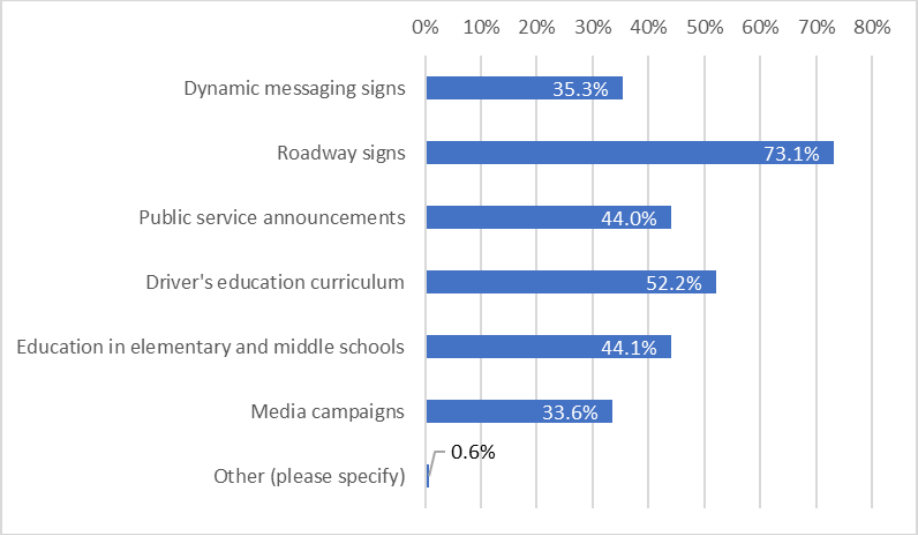


Figure 19. Messaging Preferences

Knowledge of Laws

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

Table 3 shows the results of the true/false questions, with the percent of respondents selecting each option shown and the correct answer highlighted in green. The average percent correct across all true/false questions was **69.5 percent**.

Table 3. Knowledge Question Responses

Question	TRUE	FALSE
A local authority may pass ordinances in addition to state statutes that address pedestrian and bicycle safety	87.5%	11.8%
Bicyclists do not have the same rights and responsibilities as a motor vehicle on Texas roadways	25.6%	74.4%
Bicyclists should ride as far to the left-hand side of the street as possible.	46.8%	53.2%
A bicyclist is required to use a light when riding at night	85.7%	14.3%
As a pedestrian, if a sidewalk is available and accessible, they must use it	83.2%	16.8%
As a pedestrian, if a sidewalk is NOT available and accessible, they should walk on the left-hand side of the street – facing traffic	75.6%	24.4%
The pedestrian always has the right-of-way	73.1%	26.9%

The two questions where the lowest percentage of respondents answered correctly were if bicyclists should ride as far to the left-hand side of the street as possible (**53.2 percent** correct) and if the pedestrian always has the right-of-way (**26.9 percent** correct).

New this year, respondents were asked if they were aware of the 2021 law requiring drivers to both stop and yield to pedestrians or other vulnerable road users using a crosswalk. As Figure 20 shows, **42.0 percent** of respondents were familiar with the law, with **39.9 percent** saying they were not familiar with the law and another **18.1 percent** who were not sure.

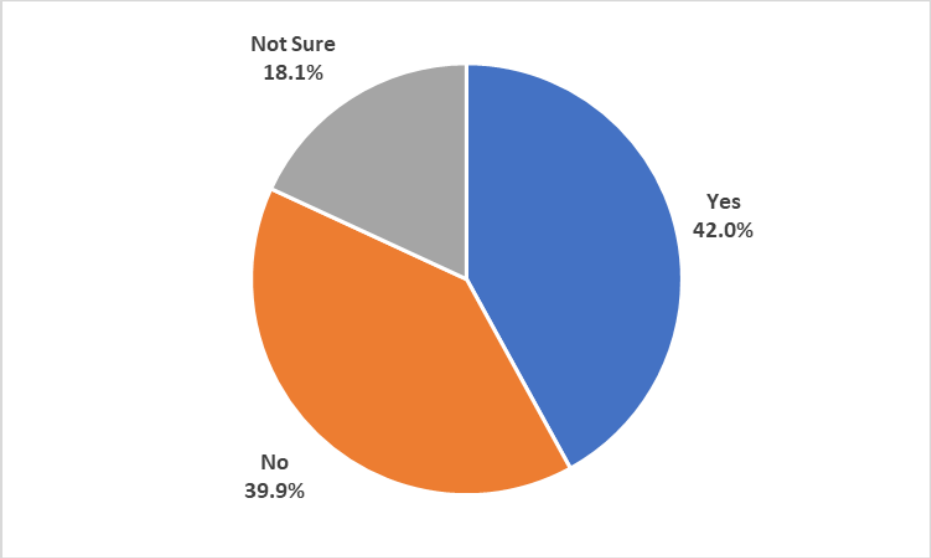


Figure 20. Familiarity with Stop and Yield Law

The final question on the assessment asked respondents to select the images that contained crosswalks. Figure 21**Error! Reference source not found.** shows the images that were displayed to respondents. Figure 22 shows the percentage of respondents that selected each image. The vast majority of respondents (**88.0 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 **59.1 percent** and **60.2 percent** of respondents, respectively. Only **3.2 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 **0.5 percent** of respondents in the survey correctly identified all images as containing a crosswalk. This also means that some respondents who correctly identified Image C (the unmarked crosswalk) as containing a crosswalk, did not mark any other image as containing a crosswalk.

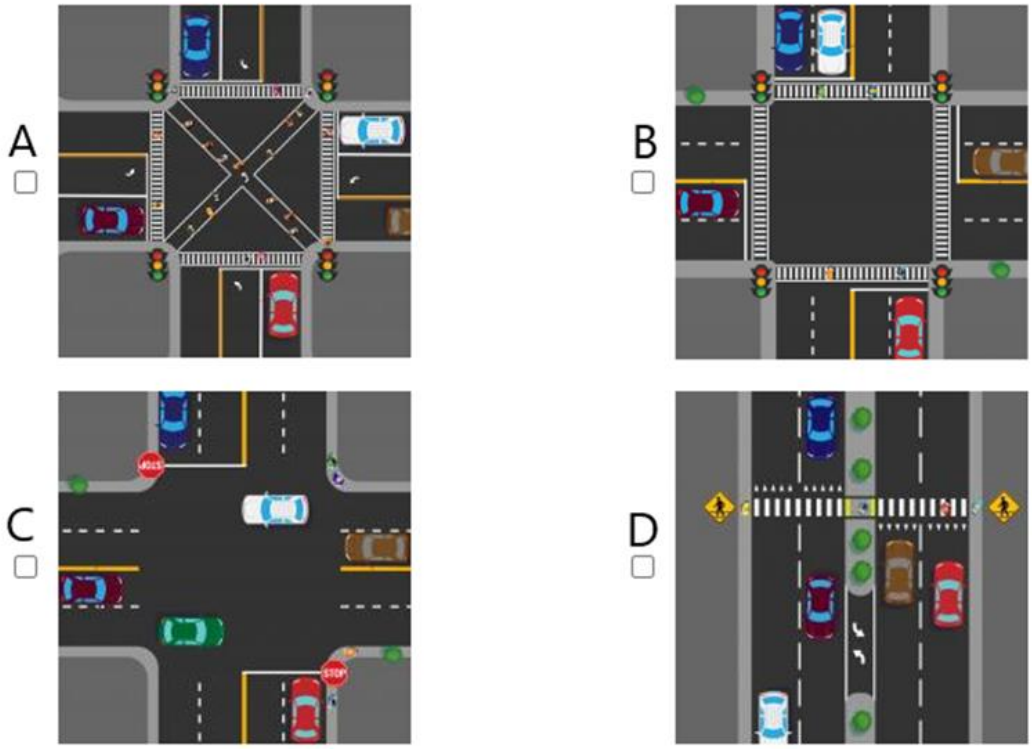


Figure 21. Crosswalk Images

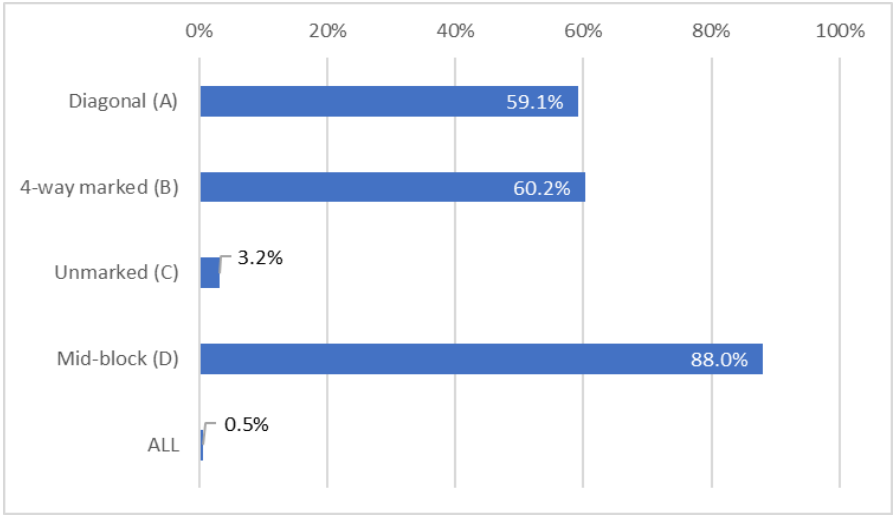


Figure 22. Identification of Crosswalks

Year-to-Year Comparisons

In this section comparisons to the same survey conducted in 2021 and 2022 are included to provide a picture of how pedestrian and bicycle safety is changing in Texas. A similar survey was also conducted in 2020, but due to the differences in data collection methods the findings are not comparable and therefore not included in the year-to-year analysis.

Pedestrian Questions

In the 2023 survey **13.1 percent** of respondents reported never walking, compared to **15.4 percent** in 2022 and **13.1 percent** in 2021 (see Figure 23). The reasons for walking were largely the same across the three years of the survey, with exercise/other health benefits being the main reason for walking.

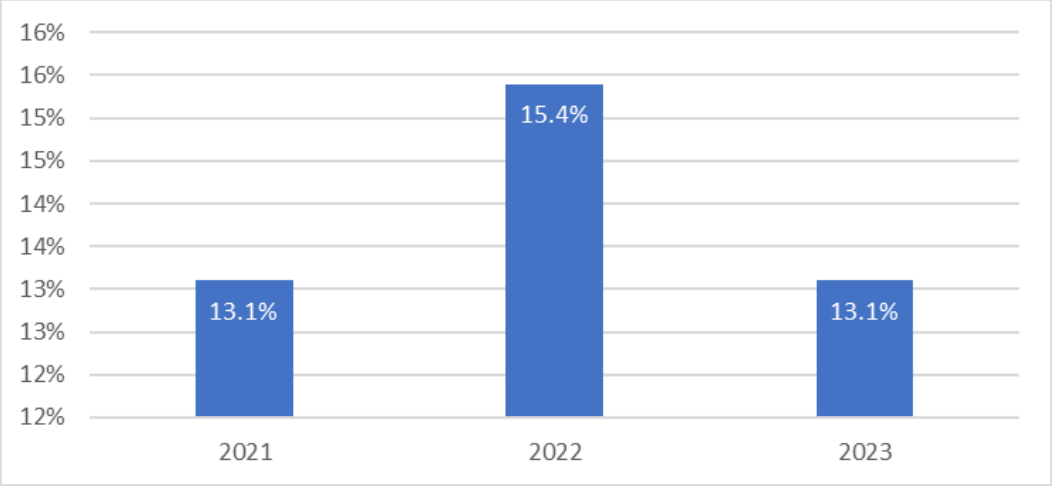


Figure 23. Respondents Reporting Never Walking, by Year

Reported pedestrian behavior showed some changes over the past three years. Figure 24 shows the percent of respondents in each year that reported engaging in the behavior very often or always. Crossing the road outside of an intersection or crosswalk was reported by a slightly higher percentage of respondents in 2023 but is still very close to 2021 levels. Following crossing signals very often or always did see an increase from 2022 to 2023, but still remains below 2021 levels. Wearing reflective clothing or using a light at night while walking did see a slight increase in 2023 compared to 2022 but is also still below 2021 levels. Walking on the left side of the road when no sidewalks are present has seen a steady increase from **41.7 percent** in 2021 to **48.1 percent** in 2023.

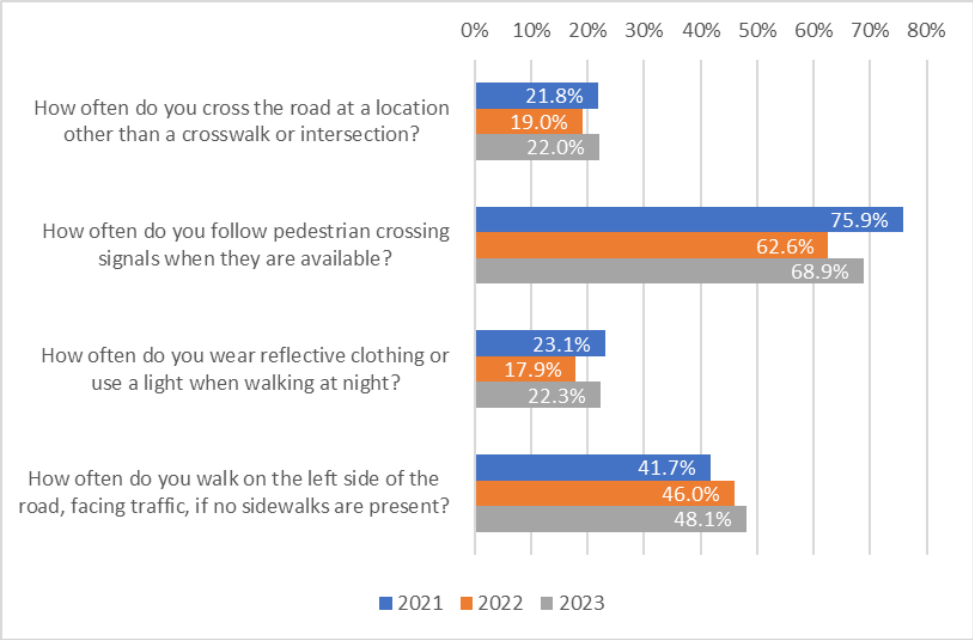


Figure 24. Pedestrian Behavior (Very Often or Always), by Year

Pedestrian safety features also showed some changes. Figure 25 shows the percent of respondents for each year that reported not seeing these safety features at any locations. Pedestrian crossing signals, street lighting/illumination and marked crosswalks all remaining very close to 2022 reported levels. However, the percentage of respondents that reported not seeing sidewalks at locations near where they live, did decline in 2023 to **10.3 percent** from **14.4 percent** in 2022.

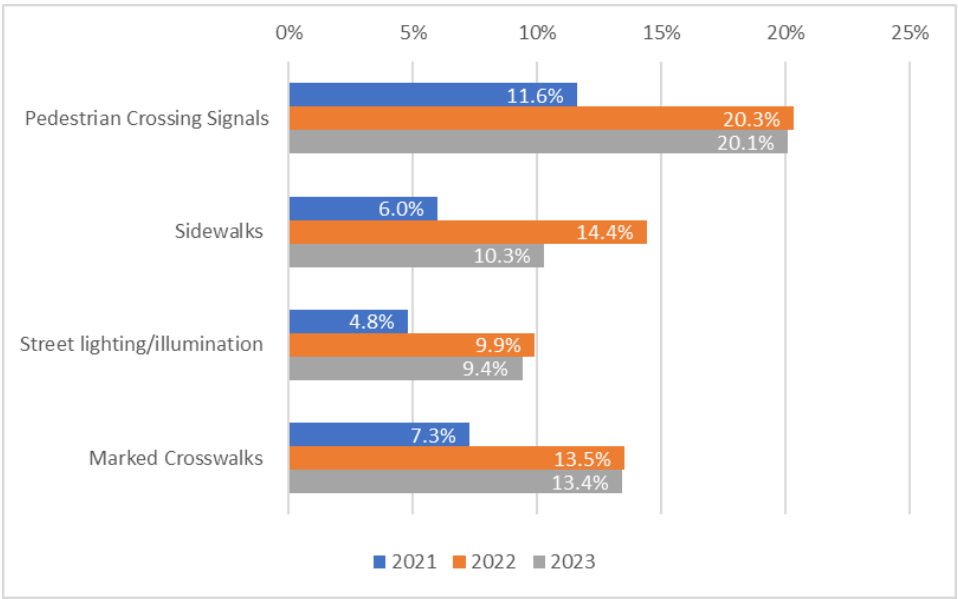


Figure 25. Pedestrian Safety Features at No Locations, by Year

Table 4 shows the percentage of respondents for each year that cited each issue as an obstacle to walking more often. The top obstacle reported by pedestrians across all years is weather, such as rain, snow, heat and cold. This is closely followed by pedestrian behavior, which has been increasing each year of the survey, rising from **49.4 percent** of respondents in 2021 to **62.0 percent** in 2023. Poor roadway and sidewalk conditions and lack of crossing signals/signs, as reported by respondents, have also both been increasing from 2021 to 2023.

Table 4. Pedestrian Obstacles, by Year

Issue	Percent Cited as Obstacle		
	2021	2022	2023
Time to get to destination	41.4%	49.6%	48.2%
Convenience	33.4%	37.7%	43.4%
Weather	60.0%	69.5%	64.8%
Lack of sidewalks	36.6%	52.3%	51.8%
Lack of crossing signals/signs	34.0%	45.8%	48.5%
Poor lighting	40.4%	54.4%	47.5%
Hard to navigate with a disability	23.9%	33.4%	31.9%
Poor roadway/sidewalk conditions	37.0%	49.5%	53.6%
Driver behavior	49.4%	55.7%	62.0%
Other sidewalk users	14.5%	24.0%	22.0%

Bicycle Questions

The percentage of respondents that reported never biking increased from **56.4 percent** in 2022 to **64.0 percent** in 2023, which brings it close to the 2021 level of **63.0 percent** (see Figure 26). The reasons for biking remain largely the same, with exercise or other health benefits being the top reason for biking.

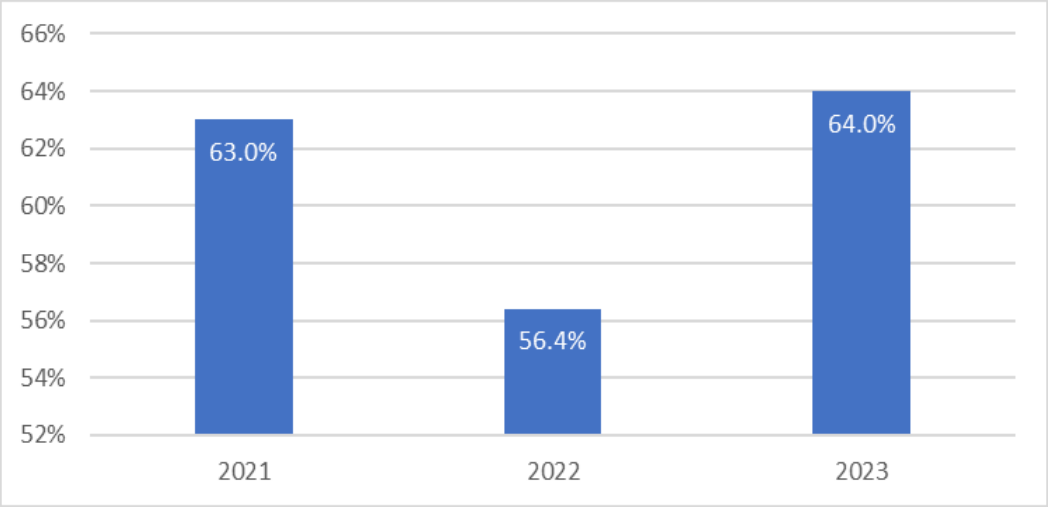


Figure 26. Respondents Reporting Never Biking, by Year

As Figure 27 shows, the percentage of respondents that reported riding against traffic in the road very often or always dipped to **17.1 percent** of respondents in 2023. Reported use of a bike light at night increased in 2023 compared to 2022. Reported use of reflective clothing when biking at night also increased by over **6 percentage points** from 2022 to 2023. However, reported helmet use very often or always, dipped to **37.5 percent** in 2023.

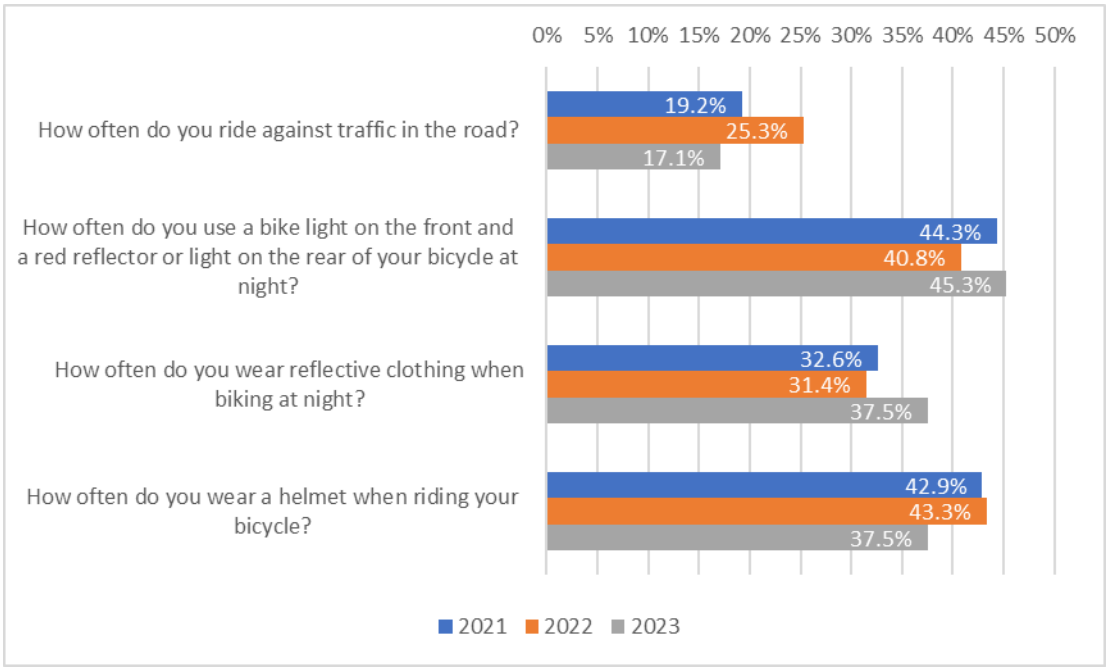


Figure 27. Bicyclist Behavior (Very Often or Always), by Year

Bicycle safety features reported by respondents also had some changes in 2023. As Figure 28 shows, the percentage of respondents that reported separate spaces for cyclist use at no locations was lower in 2023 than in 2022 or 2021 by over **6 percentage points**. However, the percentage of respondents that reported street lighting/illumination at no locations increased slightly in 2023 compared to previous years.

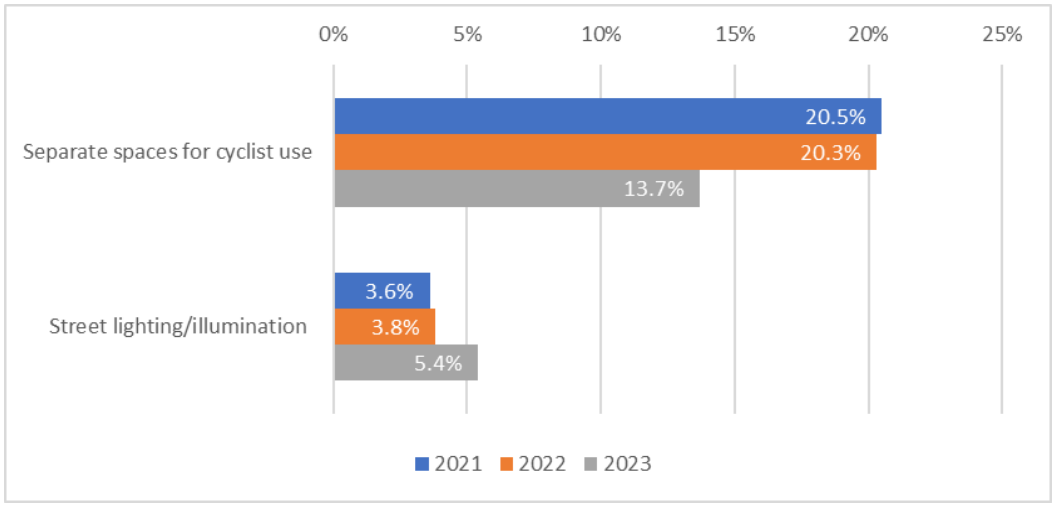


Figure 28. Bicycle Safety Features at No Locations, by Year

Table 5 shows the percentage of respondents that cited each issue as an obstacle to biking more often. The most cited obstacle in 2023 was a lack of bike lanes/trails, which is new for this year. It is noteworthy, however, that a lack of bike lanes/trails was actually reported as an obstacle by a higher percentage of respondents in 2022 compared to 2023. Weather was the most cited obstacle in previous years. Driver behavior also continues to be an obstacle across the three years of the survey.

Table 5. Bicyclist Obstacles, by Year

Issue	Percent Cited as Obstacle		
	2021	2022	2023
Time to get to destination	39.2%	46.9%	40.8%
Convenience	36.8%	45.4%	42.5%
Weather	62.2%	64.8%	58.1%
Lack of bike lanes/trails	57.5%	64.0%	60.5%
Lack of crossing signals or signs	35.4%	49.5%	46.2%
Poor lighting	36.8%	47.9%	42.1%
Poor roadway/sidewalk conditions	45.1%	52.1%	51.4%
Driver behavior	59.0%	56.5%	57.2%
Other sidewalk users	25.8%	30.7%	26.9%

Driver Questions

Figure 29 shows the driver behaviors around pedestrians and bicyclists reported by respondents very often or always. All driver behaviors showed their highest reported levels over the three survey waves. Reported driver yielding at intersections very often or always was **77.0 percent** and **72.2 percent** at crosswalks at non-intersections (or mid-block). Similarly, reported passing of bicyclists at a safe distance very often or always was **82.3 percent**.

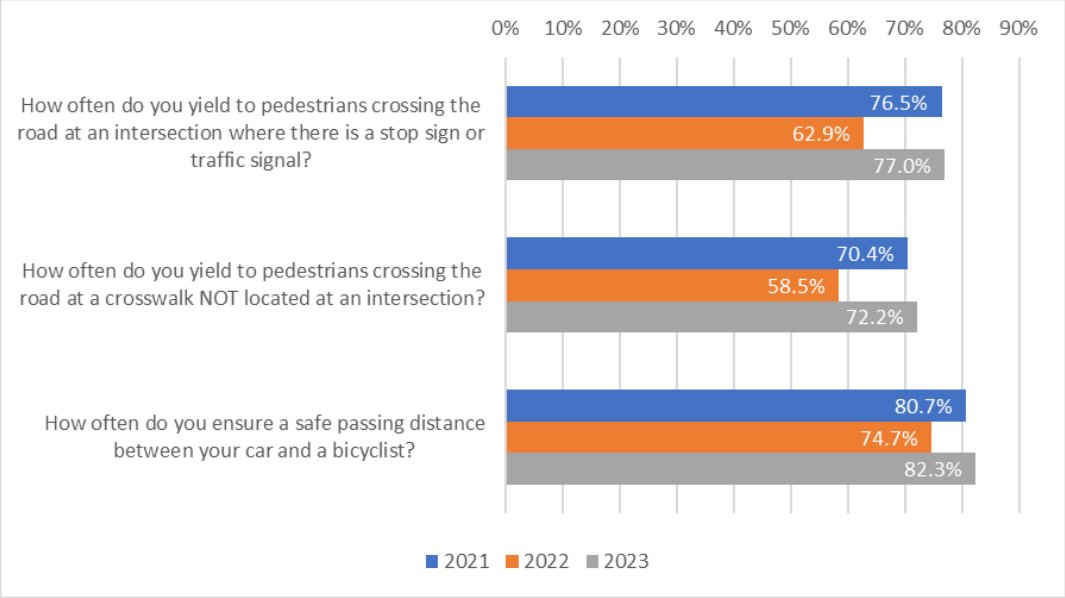


Figure 29. Driver Behavior, by Year

Enforcement

Figure 30 shows the percentage of respondents reporting seeing or hearing about enforcement efforts by law enforcement regarding pedestrian and bicycle safety. Overall, the percentage has remained around 25-30 percent over the past three years.

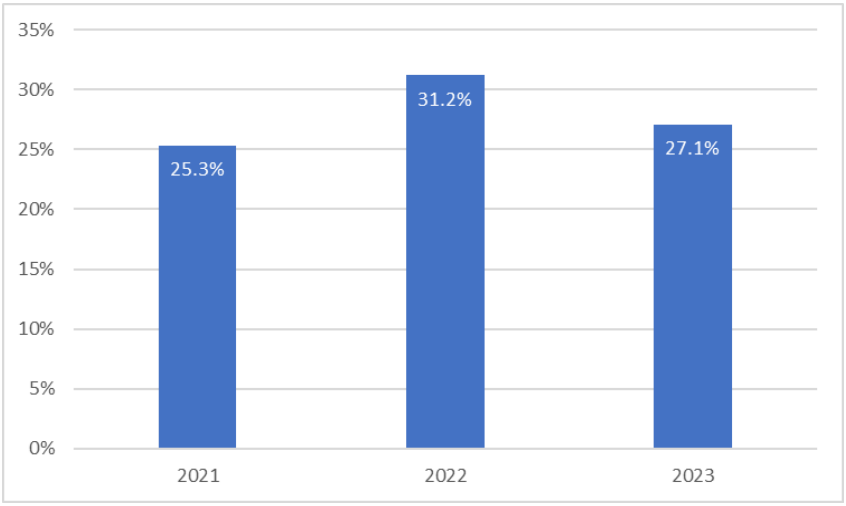


Figure 30. Respondents Reporting Enforcement, by Year

Familiarity with Laws

Figure 31 shows the self-reported familiarity with pedestrian and bicycle laws reported by respondents over the three years. Overall, the percentage of respondents that reported being at least moderately familiar with pedestrian and bicycle laws in 2023 was about the same as 2022; at **56.8 percent** and **56.5 percent**, respectively.

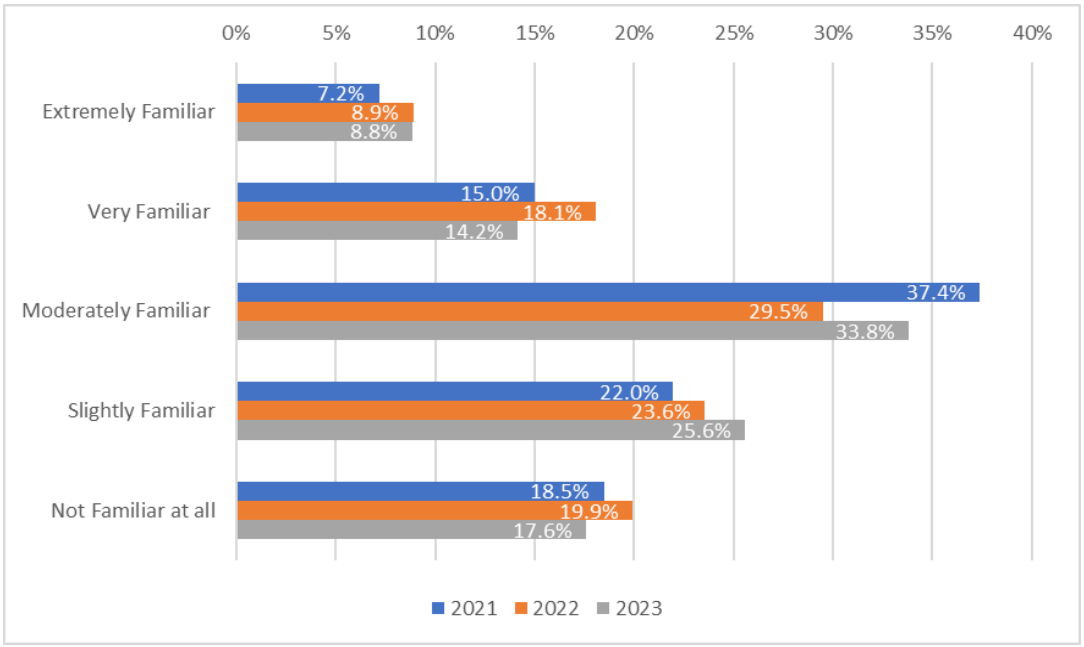


Figure 31. Familiarity with Laws, by Year

Methods for Education

Over the past three years, the preferred method of educating the public on pedestrian and bicycle laws have fluctuated (see Figure 32). Roadways signs remains the method selected by the highest percentage of respondents, but the 2023 percentage was lower than in 2021. Support for dynamic messaging signs fell in 2023 to **35.3 percent**. Public service announcements and driver's education curriculum have seen increasing support over the past three years. Support for education in Elementary and Middle Schools reached **44.1 percent** in 2023, but from previous years. Media campaigns have been decreasing in popularity over the past three years.

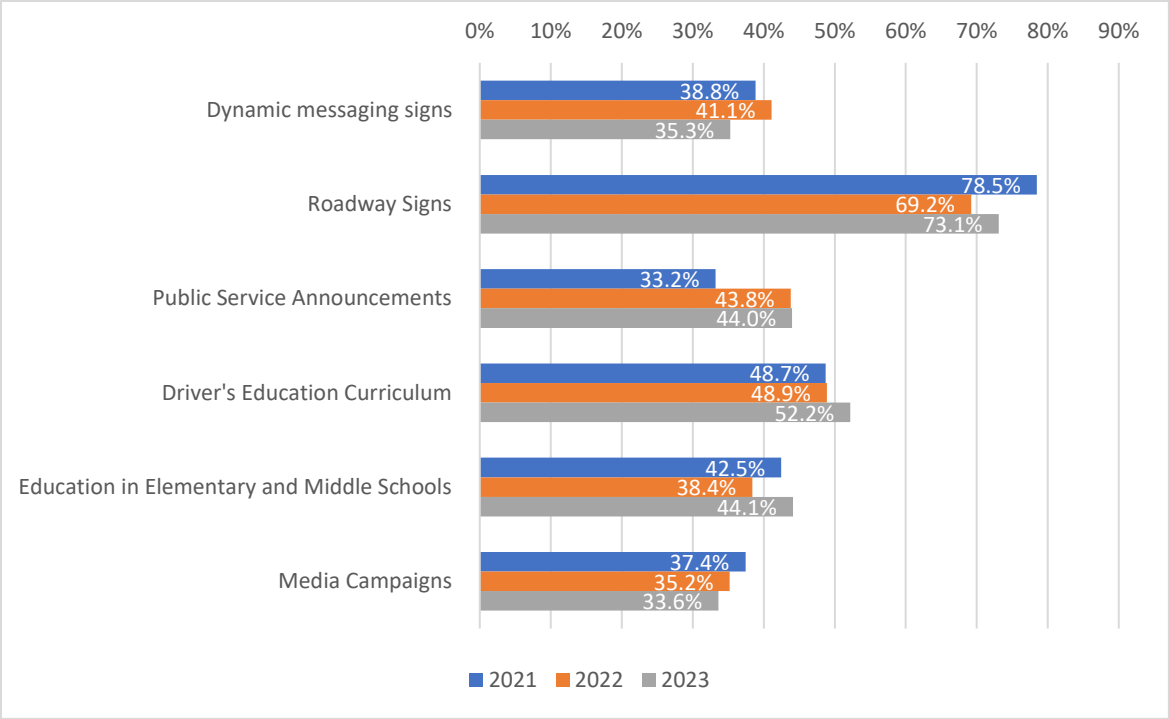


Figure 32. Educational Methods, by Year

Knowledge Questions

Figure 33 shows the percentage of respondents that correctly answered the True/False knowledge questions about pedestrian and bicycle safety laws. The responses have remained fairly consistent across the three years, with some minor changes. Most noteworthy is the continued increase in respondents that correctly answered false to the statement, "bicyclists do not have the same rights and responsibilities as a motor vehicle on Texas roadways" and correctly answered true to the statement, "as a pedestrian, if a sidewalk is NOT available and accessible, they should walk on the left-hand side of the street facing traffic." Similar to previous years, the average percent correct by respondents was **69.5 percent**.

Figure 34 shows the percentage of respondents that correctly identified different types of crosswalks by year. In 2023, **42.9 percent** of respondents correctly identified all the marked crosswalks, which is the highest percentage of the last three years. **Less than 5 percent** of respondents have correctly identified all pictures as containing crosswalks in all three years.

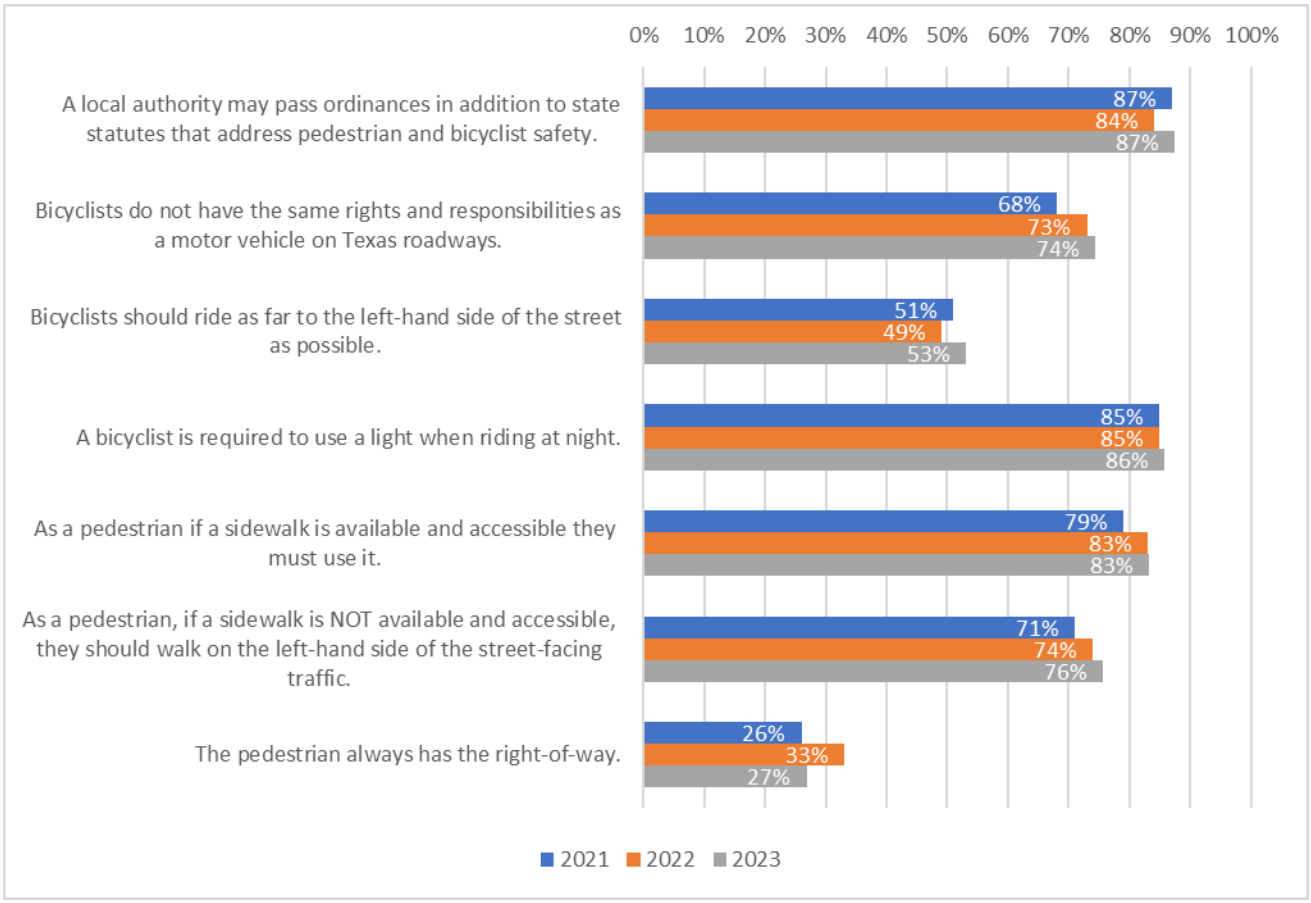


Figure 33. Knowledge of Laws, by Year

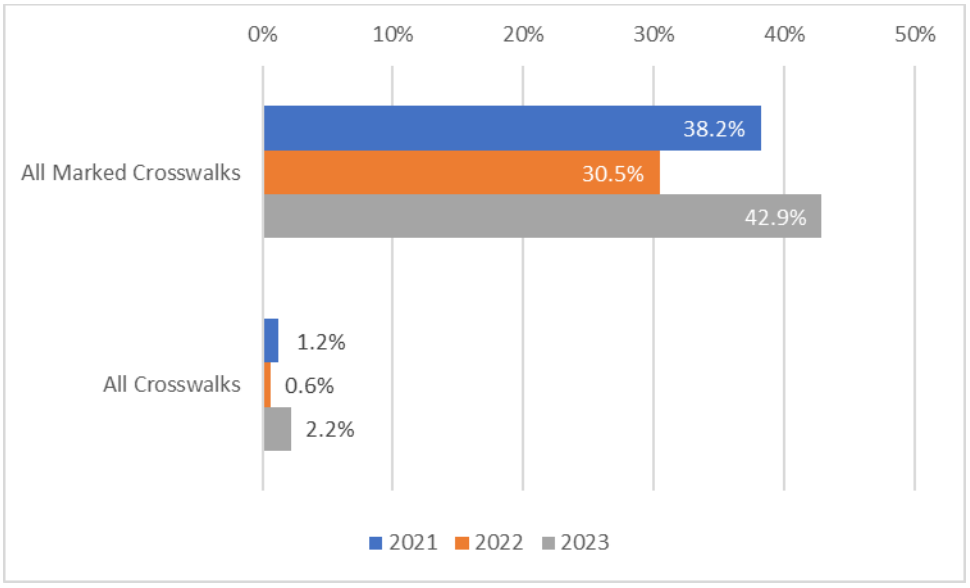


Figure 34. Crosswalk Identification, by Year

Appendix A

Pedestrian and Bicycle Safety- 2023 Survey

Pedestrian and bicyclist fatalities have increased sharply over the past decade. The Texas A&M Transportation Institute is conducting this survey to learn more about what road users know about pedestrian and bicycle safety laws in Texas. This survey is sponsored by the Texas Department of Transportation.

If you walk, bike, or drive on roads in Texas, we would like your input! The survey results will be used to design public outreach materials to educate road users about bicycle and pedestrian safety laws.

You must be at least 18 to participate. You can exit the survey at any point. The survey should take no more than 15 minutes to complete.

Your information will be kept confidential to the extent allowed by law, and all identifiable information will be kept on a password protected computer accessible only by the research team. This survey has been designed in Qualtrics, and you can click here to view the Qualtrics confidentiality policy.

If you have any questions about this survey, please contact Neal Johnson at neal-johnson@tti.tamu.edu. You may also contact the Human Research Protection Program at Texas A&M University at 1-855-795- 8636 or irb@tamu.edu.

By continuing with the survey you agree to participate. If you do not agree to participate, you may close your browser window.

Tell us about yourself

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 Select your race/ethnicity. Select all that apply.

- Asian (1)
- Hispanic or Latino or Spanish Origin of Any race (2)
- Black or African American (3)
- White (4)
- Native American or Alaskan Native (5)
- More than one race (6)
- Other (Please Specify): (7) _____
- Prefer not to state (8)

Q6 What is your highest level of education?

- Less than high school (1)
- High school graduate (or GED) (2)
- Some college (3)
- College degree (4)
- Advanced degree (5)
- Prefer not to state (6)

Q7 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)

Q8 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) _____

Q9 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)	•	•	•	•	•

Q10 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)	•	•	•	•	•

Q11 Are there safe ways to cross higher speed roads as a pedestrian where you live?

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

Q12 (If yes) Are the crossings convenient to use?

- Yes
- No

Q13 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)

Q14 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) _____

Q15 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)	•	•	•	•	•
How often do you ride your bicycle on the sidewalk?	•	•	•	•	•

Q16 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)	•	•	•	•	•

Q17 Are there safe ways to cross higher speed roads as a bicyclist where you live?

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

Q18 (If yes) Are the crossings convenient to use?

- Yes
- No

Q19 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)

Q20 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)

Q21 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) (6)
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 yield to bicyclists when required?	•	•	•	•	•	•
How often do you ensure a safe passing distance between your car and a bicyclist? (4)	•	•	•	•	•	•

Q22 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)

Q23 If yes, please describe your experiences with traffic enforcement efforts regarding walking and biking safety.

_____

_____

_____

_____

_____

Q24 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)

Q25 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 (5)
- Media campaigns (6)
- Other (please specify): (7) _____

This section focuses on your knowledge of pedestrian and bicycle safety laws.

Q26 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)	•	•

Q27 Are you aware of the new Texas law (effective September 2021) requiring drivers to both stop and yield to pedestrians or other vulnerable road users using a crosswalk?

Yes
No
Not Sure

Q28 Which of these pictures contains a crosswalk? Select all that apply

Image: Diagonal crossing (A)

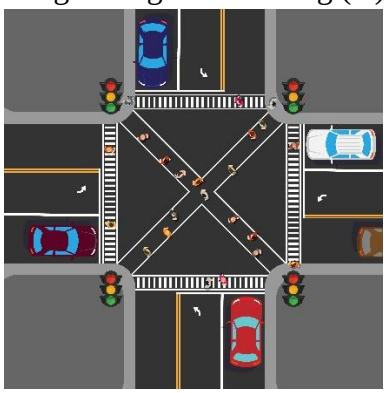


Image: Unmarked crosswalk (B)

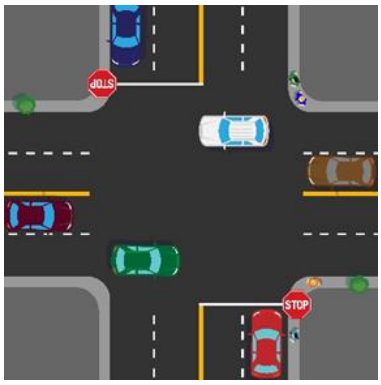


Image: Marked crosswalk (C)

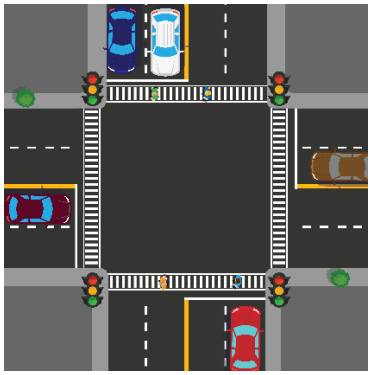
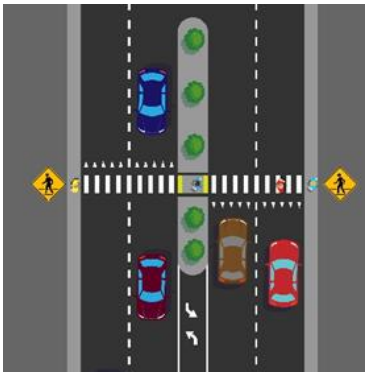


Image: Midblock crossing (D)



WEIGHTING METHODOLOGY
Texas A&M Pedestrian and Bicycle Safety Survey 2023

Sampling Design Overview:

This survey has secured a total of 414 adult respondents residing in Texas, using online panels for sample selection and survey administration. The following table shows the distribution of survey respondents by location type of their residences.

Table 1. Distribution of respondents by location type.

Area Type	Respondents	
Large City	121	29.2%
Medium City	61	14.7%
Rural	70	16.9%
Small Town	38	9.2%
Suburb	124	30.0%
Total	**414**	**100.0%**

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 the demographic variables for this survey included missing values, a *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 selection of eligible donors within homogeneous cells.

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 demographic 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] https://support.sas.com/resources/papers/proceedings16/SAS3520-2016.pdf
[2] Population benchmarks were secured from the latest March Supplement of the Current Population Survey (CPS 2022).

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

All of the above adjustments were carried out using the *WgtAdjust* procedure of SUDAAN[3] to balance the distributions of survey respondents against the various benchmarks simultaneously (tables 2 to 8). This procedure relies on a constrained logistic regression to predict the likelihood of response 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 (414) to produce the final analysis weights.

Table 2. Population and respondent distributions by age and gender

Age	Males				Females			
	Population		Respondents		Population		Respondents	
18-24	1,449,488	13.4%	22	12.6%	1,515,110	13.6%	31	13.0%
25-34	2,016,611	18.7%	43	24.6%	1,881,726	16.9%	46	19.2%
35-44	2,048,005	19.0%	43	24.6%	2,087,791	18.8%	41	17.2%
45-54	1,793,107	16.6%	23	13.1%	1,736,829	15.6%	43	18.0%
55-64	1,548,783	14.4%	20	11.4%	1,701,240	15.3%	39	16.3%
65+	1,929,793	17.9%	**24**	13.7%	2,199,356	19.8%	39	16.3%
Total	**10,785,787**	**100.0%**	**175**	**100.0%**	**11,122,052**	**100.0%**	**239**	**100.0%**

Table 3. Population and respondent distributions by gender and ethnicity

Ethnicity	Males				Females			
	Population		Respondents		Population		Respondents	
Hispanic	3,893,995	36.1%	69	39.4%	3,923,263	35.3%	82	34.3%
Others	6,891,792	63.9%	106	60.6%	7,198,789	64.7%	157	65.7%
Total	**10,785,787**	**100.0%**	**175**	**100.0%**	**11,122,052**	**100.0%**	**239**	**100.0%**

Table 4. Population and respondent distributions by gender and race

Race	Males				Females			
	Population		Respondents		Population		Respondents	
White	8,519,911	79.0%	123	70.3%	8,606,332	77.4%	188	78.7%
Black	1,329,384	12.3%	32	18.3%	1,506,905	13.5%	36	15.1%

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

Others	936,492	8.7%	20	11.4%	1,008,815	9.1%	15	6.3%
Total	**10,785,787**	**100.0%**	**175**	**100.0%**	**11,122,052**	**100.0%**	**239**	**100.0%**

Table 5. Population and respondent distributions by Gender and Education

Education	**Males**				**Females**			
	Population		**Respondents**		**Population**		**Respondents**	
No College	4,538,508	42.1%	54	30.9%	4,271,301	38.4%	67	28.0%
Some College	1,971,850	18.3%	33	18.9%	1,857,424	16.7%	56	23.4%
Associate	857,445	7.9%	17	9.7%	1,139,100	10.2%	38	15.9%
Bachelor's	2,202,002	20.4%	41	23.4%	2,590,669	23.3%	49	20.5%
Master's +	1,215,982	11.3%	30	17.1%	1,263,558	11.4%	29	12.1%
Total	**10,785,787**	**100.0%**	**175**	**100.0%**	**11,122,052**	**100.0%**	**239**	**100.0%**

Table 6. Population and respondent distributions by average daily TV watching

Daily TV	**Adults**			
	Population		**Respondents**	
Less Than 3 Hours	9,871,672	45.1%	111	26.8%
3 or More Hours	12,036,167	54.9%	303	73.2%
Total	**21,907,839**	**100.0%**	**414**	**100.0%**

Table 7. Population and respondent distributions by average weekly internet use

Weekly Internet	**Adults**			
	Population		**Respondents**	
Less Than 10 Hours	11,828,042	54.0%	171	41.3%
10 or More Hours	10,079,797	46.0%	243	58.7%
Total	**21,907,839**	**100.0%**	**414**	**100.0%**

Table 8. Population and respondent distributions by early adoption

Early Adoption	**Adults**			
	Population		**Respondents**	
Sometimes or Never	19,002,860	86.7%	244	58.9%
Sometimes or Always	2,904,979	13.3%	170	41.1%
Total	**21,907,839**	**100.0%**	**414**	**100.0%**

Variance Estimation for Weighted Data:

Survey estimates can be interpreted properly only in light of their associated sampling errors. Since weighting 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 analysis weight of the i^{th} respondent, the inflation due to weighting, which is commonly referred to as *Design Effect*, can be approximated by:

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

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:

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

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

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

Of note, the overall design effect for this survey is estimated to be 1.73.