
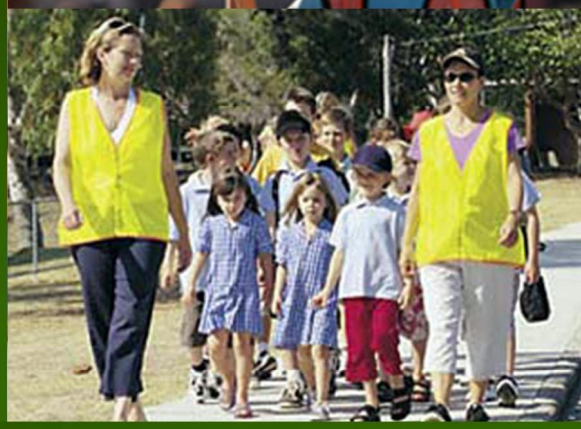

# A Safe Routes to School Survey in Hillsborough County

*Prepared for*
**Florida Department of Transportation, District 7**

*Prepared by*
**Center for Urban Transportation Research**


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Prepared for

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## EXECUTIVE SUMMARY

The Safe Routes to School (SRTS) program is aimed at encouraging elementary and middle school students to walk or bike to school through engineering and educational measures. Traffic congestion and delays continue to be a problem for cities large and small. Studies showed that as much as 25 percent of morning rush-hour traffic can be school-related as automobiles are the primary mode of travel to school by students. Additionally, children have become less active and more overweight. The percentage of children who are considered severely overweight has tripled in the last 30 years.

With the 2005 passage of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), the U.S. Congress designated $612 million toward developing the National SRTS Program. The program provides funds to states to substantially improve the ability of primary and middle school students to walk and bicycle to school safely.

As part of the Florida SRTS program, a pilot survey was conducted on student travel modes to school for 14 elementary schools and middle schools in Hillsborough County prior to implementation of SRTS engineering, education, and encouragement improvements to investigate characteristics of student travel behaviors. The influential factors that affect the number of students who walk or bike to schools were identified and ranked.

The standard survey forms and inputting tools designed by the National SRTS Council were used for both student and parent surveys. A total of 489 classrooms were surveyed, with 416 tally sheets returned by teachers and a student participation rate of 84 percent. A total of 12,318 parent surveys were distributed, and 3,213 were returned, a response rate of 26.1 percent. Since this was the first SRTS survey conducted using the standard survey forms in Florida as a part of the SRTS evaluation program, the detailed survey process and lessons learned were summarized for future reference in this report.

The chi-square test was used to identify the influential factors affecting the number of students who walk or bike to school, including demographic factors and subjective opinions from parents associated with their choice of travel mode to school. The chi-square test results revealed that all those factors are significantly associated with student travel modes to school.

Rankings of barriers that affect parent decisions to allow a student to walk or bike to school were achieved by analyzing the survey results. Distance was considered the most important barrier, affects 67 percent of parent decisions. Other important barriers include speed, traffic volume, violence or crime, safety of intersections and crossings, etc.

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# Chapter 1

# Introduction

## 1.1 Purpose of the Study

The objective of this study was to collect information to evaluate the Safe Routes to School (SRTS) program before and after a series of infrastructure improvements and educational programs were enacted. Two types of surveys were used for this project - one for students and one for parents. The student survey was conducted in the classroom by teachers, who asked students how they arrived at and departed from the school over a five-day day period (Monday through Friday). The parent survey was distributed by teachers to each student as a homework assignment.

The Center for Urban Transportation Research (CUTR) at the University of South Florida (USF) contracted with FDOT District 7 to conduct the SRTS survey in 14 schools in Hillsborough County in Phase I and to input and analyze the survey data in Phase II. This report summarizes the survey methods and lessons learned in Phase I, and data entry and analysis in Phase II.

## 1.2 School Location

The SRTS survey was conducted by CUTR in April 2007. Twenty-seven schools in Hillsborough County, Florida, that applied for SRTS infrastructure improvements were originally selected for the surveys. After initial contact with the principals, 17 schools agreed to participate in the survey. A total of 14 schools completed the surveys. Table 1 shows the participating school names and locations.

**Table 1 School Surveyed in Hillsborough County, Florida**

| School Name | ZIP Code | Address |
|---|---|---|
| Lutz Elementary | 33549 | 202 5th Ave SE Lutz |
| Boyette Springs Elementary | 33569 | 10141 Sedgebrook Dr, Riverview |
| Dowdell Middle | 33619 | 1208 Wishing Well Way, Tampa |
| Buckhorn Elementary | 33594 | 2420 Buckhorn School Ct, Valrico |
| McLane Middle | 33510 | 306 N Knights Ave, Brandon |
| Mulrennan Middle | 33594 | 4215 Durant Rd, Valrico |
| Burnette Middle | 33584 | 1010 N. Kingsway Rd, Seffner |
| Maniscalco Elementary | 33549 | 939 Debuel Rd, Lutz |
| Cypress Creek Elementary | 33570 | 4040 19th Ave. NE, Ruskin |
| Pride Elementary | 33647 | 10310 Lion's Den Dr, Tampa |
| Springhead Elementary | 33566 | 3208 S Nesmith Rd, Plant City |
| Valrico Elementary | 33594 | 609 South Miller Rd, Valrico |
| Thonotosassa Elementary | 33592 | 10050 Skewlee Rd, Thonotosassa |
| Learning Gate Community | 33549 | 16215 Hanna Rd, Lutz |

### 1.3 Distribution of Student Grade Levels

In the surveys, students from kindergarten through grade 8 were included. Table 2 shows the number of students participating by grade level.

**Table 2 Student Grade Levels**

| Grade | Number | Percent |
|---|---|---|
| Kindergarten | 628 | 7 |
| 1 | 1,143 | 13 |
| 2 | 790 | 9 |
| 3 | 1,675 | 19 |
| 4 | 1,224 | 14 |
| 5 | 382 | 4 |
| 6 | 922 | 11 |
| 7 | 943 | 11 |
| 8 | 1,056 | 12 |
| Total | 8,763 | 100 |

### 1.4 Survey Response Rates

A total of 489 classrooms in 14 schools were involved in the student survey, with 416 tally sheets returned, a response rate of 85 percent. Of the 9,821 students enrolled in the 14 schools, 8,204 students were included in the survey, a participation rate of 84percent, as indicated in Table 3.

**Table 3 Response Rates of Student Survey**

| | |
|---|---|
| Number of classrooms | 489 |
| Number of tally sheets returned | 416 |
| Response rate | 85% |
| Total students enrolled in school | 9,821 |
| Number of students counted* | 8,204 |
| Student articipation rate | 84% |

*mean of total number of students counted each day

Parent surveys were distributed to each student as a homework assignment to take to their parents. Parents were asked to answer questions related to their child(ren)'s travel mode to/from school on most days and those factors associated with their child(ren)'s travel behavior. The questions in the survey were multiple-choice questions. A total of 12,318 survey forms were distributed, and 3,213 were returned, a response rate of 26.1 percent, as shown in Table 4.

**Table 4 Response Rates of Parent Survey**

| Name of School | # of Forms Distributed | # of Forms Returned | Response Rate (%) |
|---|---|---|---|
| Lutz Elementary | 767 | 242 | 31.6 |
| Boyette Springs Elementary | 1,002 | 263 | 26.2 |
| Dowdell Middle | 813 | 196 | 24.1 |
| Buckhorn Elementary | 727 | 252 | 34.7 |
| McLane Middle | 1,465 | 297 | 20.3 |
| Mulrennan Middle | 1,329 | 234 | 17.6 |
| Burnette Middle | 1,027 | 212 | 20.6 |
| Maniscalco Elementary | 783 | 286 | 36.5 |
| Cypress Creek Elementary | 948 | 272 | 28.7 |
| Pride Elementary | 895 | 235 | 26.3 |
| Springhead Elementary | 835 | 254 | 30.4 |
| Valrico Elementary | 849 | 239 | 28.2 |
| Thonotosassa Elementary | 439 | 130 | 29.6 |
| Learning Gate Community | 439 | 101 | 23.0 |
| Total | 12,318 | 3,213 | 26.1 |

## Chapter 2

## Parent Survey Results

To evaluate student travel behavior in Hillsborough County before the implementation of the SRTS program, a parent survey about their child(ren)'s travel mode to school and related issues was carried out. While the student survey recorded the actual number of students for each travel mode in a week, the parent survey was designed to investigate the relationship between their child(ren)'s travel modes to/from school and the factors associated with it. This survey reflected the child(ren)'s travel behavior on most days and was not an actual record of their travel behavior in the same week.

### 2.1 Parents Surveyed

The parent survey form was designed by National Center for Safe Routes to School. Two types of questions were included in this survey: (1) demographic characteristics of the student, such as age, gender, number of children in the family, and distance from home to school, and (2) subjective feelings or opinions of the parents towards their child(ren)'s walking or biking to school.

Parents from 14 schools, including 4 middle schools and 10 elementary schools, participated in the survey. The grade level and gender of students whose parents were surveyed were listed in Table 5. A total of 3,209 parents were surveyed.

**Table 5 Student Gender and Grade Level from Parent Survey**

| School Name | Grade | | | | | | | | | Gender | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | K | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Male | Female |
| Lutz Elementary | 21 | 12 | 77 | 32 | 48 | 49 | | | | 115 | 126 |
| Boyette Spring Elementary | 43 | 44 | 20 | 25 | 69 | 58 | | | | 127 | 136 |
| Dowdell Middle | | | | | | | 83 | 87 | 16 | 110 | 86 |
| Buckhorn Elementary | 43 | 44 | 20 | 24 | 69 | 48 | | | | 123 | 129 |
| McLane Middle | | | | | | | 82 | 68 | 143 | 157 | 140 |
| Mulrennan Middle | | | | | | | 75 | 65 | 91 | 108 | 126 |
| Burnett Middle | | | | | | | 101 | 79 | 21 | 109 | 103 |
| Maniscalco Elementary | 48 | 50 | 25 | 30 | 69 | 59 | | | | 139 | 147 |
| Cypress Creek Elementary | 43 | 47 | 20 | 30 | 69 | 59 | | | | 130 | 142 |
| Pride Elementary | 33 | 38 | 19 | 24 | 69 | 48 | | | | 113 | 122 |
| Springhead Elementary | 38 | 46 | 23 | 27 | 69 | 46 | | | | 123 | 131 |
| Valrico Elementary | 37 | 44 | 23 | 27 | 54 | 46 | | | | 114 | 122 |
| Thonotosassa Elementary | 23 | 25 | 12 | 14 | 27 | 26 | | | | 63 | 67 |
| Learning Gate Community | 13 | 18 | 9 | 13 | 19 | 26 | | | | 47 | 54 |

## 2.2 Parents Survey Questionnaire

In the standard survey form designed by the National Center for Safe Routes to School, parents were asked the following questions:

1. How far does your child live from school?
2. On most days, how does your child arrive at school and leave for home after school?
3. How long does it normally take your child to get to/from school?
4. Has your child asked for permission to walk or bike to/from school?
5. At what grade will you allow your child to walk or bike without an adult to/from school?
6. Which issue affected your decision to allow, or not allow, your child to walk or bike to/from school?
7. Would you let your child walk or bike to/from school if these issues were changed or improved?
8. In your opinion, how much does your child(ren)'s school encourage or discourage walking and biking to/from school?
9. How enjoyable is walking or biking to/from school for your child?
10. How healthy is walking or biking to/from school for your child?

The above questions can be classified into several different categories: parent general attitudes towards walking or biking to/from school (questions 4, 5, 8, 9, 10); actual student travel behavior (1, 2, 3); and issues that influence parents when deciding to allow the child to walk or bike to school (6, 7).

When parents determine their child(ren)'s travel mode to/from school, some issues will become barriers that prevent them from allowing the child to walk or bike to school. It is advantageous to understand the issues that prevent parents from allowing their child to walk or bike to school so that proper countermeasures can be adopted in the SRTS infrastructure and education program. In this survey, the following issues were listed as potential barriers that might prevent parents from allowing their child to walk or bike to school:

- Distance from home to school
- Convenience of driving
- Time
- Child(ren)'s participation in before/ after- school activities
- Speed of traffic along route
- Amount of traffic along route
- Adults to walk or bike with
- Sidewalks or pathways
- Safety of intersections and crossings
- Crossing guards
- Violence or crime
- Weather or climate

## 2.3 Analysis of Parent Survey Results

The parent survey results from all 14 schools in Hillsborough County were combined so an overview on student travel behavior to/from school could be achieved. The average value of student travel modes to/from school calculated from the survey can be used to represent the overall level of student travel modes to/from school in Hillsborough County area and can be used as a standard when comparing values for other schools.

**Travel Mode to/from School**

Approximately 10.9 percent of the 3,209 parents surveyed reported that their child walks to school. Approximately 2.3 percent of parents reported that their child bikes to school. Most students are transported either by school bus or family vehicle. Approximately 37.7 percent of parents reported that their child goes to school by school bus, and 39.6 percent of students reported to traveling to school by family vehicle. Approximately 9.5 of students were reported to travel to school by carpool. No students went to school by transit or other travel mode such as skateboard, scooter, inline skates, etc.

Compared with the number of students who walk to school, there is a slight increase in number of students who walk home (approximately 12.1%). The same percentage of parents reported that their child rides a bike home. Approximately 10 percent more parents reported that their child takes the school bus home, and approximately 10 percent fewer parents reported that their child is transported in a family vehicle to home. Table 6 shows the results of the parent survey on their child(ren)'s travel mode to/from school on most days.

**Table 6 Student Travel Modes to/from School**

| Travel Mode | To School | From School |
|---|---|---|
| Walk | 351 | 388 |
| Bike | 73 | 73 |
| School Bus | 1,211 | 1,498 |
| Family Vehicle | 1,270 | 987 |
| Carpool | 304 | 220 |
| Transit | 0 | 20 |
| Other | 0 | 17 |
| Total | 3,209 | 3,203 |

Figure 1 illustrates the distribution of student travel modes to/from school according to results of the parent survey. It shows that there were some differences between student travel modes to and from school. Although no students traveled to school by transit or other travel modes, some students did select these travel modes to return home after school.

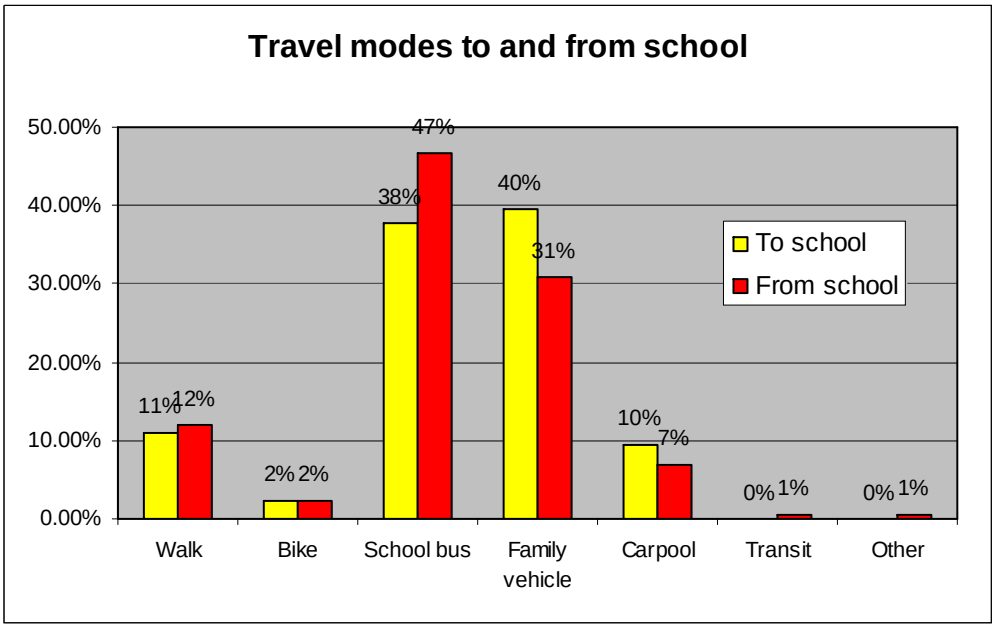


**Figure 1 Distribution of Student Travel Modes to/from School (All Surveyed Schools)**

## Distance to/from School

Table 7 shows the number of students according to distance from home to school. Among the 14 survey schools, approximately 57.8 percent of students lived less than 2 miles from their schools. Those students are more likely to walk or bike to school since they have no access to school buses.

**Table 7 Distance from Home to School**

| Distance from Home to School | Number | Percent |
|---|---|---|
| Less than ¼ mile | 334 | 10.7% |
| ¼ - ½ mile | 415 | 13.3% |
| ½ -1 mile | 207 | 6.6% |
| 1 - 2 miles | 850 | 27.2% |
| More than 2 miles | 1,261 | 40.4% |
| Don't know | 53 | 1.7% |
| Total | 3,120 | 100.0% |

Figure 2 illustrates the distribution of distance from home to school as reported by parents.

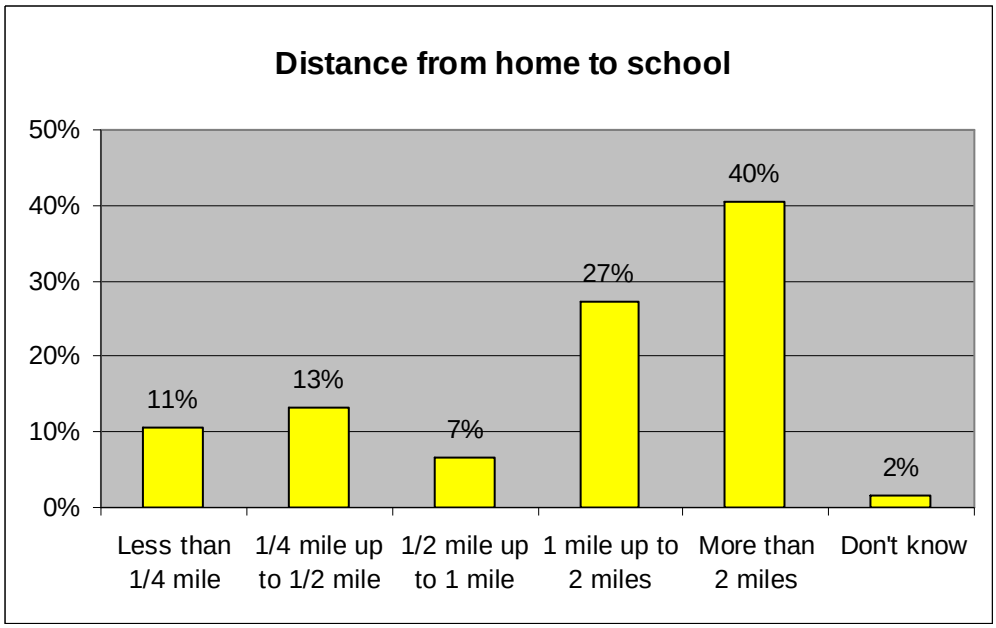


**Figure 2 Distribution of Distance from Home to School**

## Travel Time to/from School

Travel time to/from school is related to distance and travel mode. Table 8 shows the survey results on the students' normal travel time to/from school, as reported by their parents.

**Table 8 Normal Travel Time to/from School**

| Travel Time | To School | From School |
|---|---|---|
| Less than 5 minutes | 595 | 437 |
| 5-10 minutes | 907 | 632 |
| 11-20 minutes | 1,250 | 1,230 |
| More than 20 minutes | 199 | 579 |
| Don't know | 135 | 124 |
| Total | 3,086 | 3,002 |

Figure 3 shows the distribution of student travel time to/from school. Approximately 90 percent of student travel time to school was less than 20 minutes, and 77 percent of student travel time from school to home was less than 20 minutes.

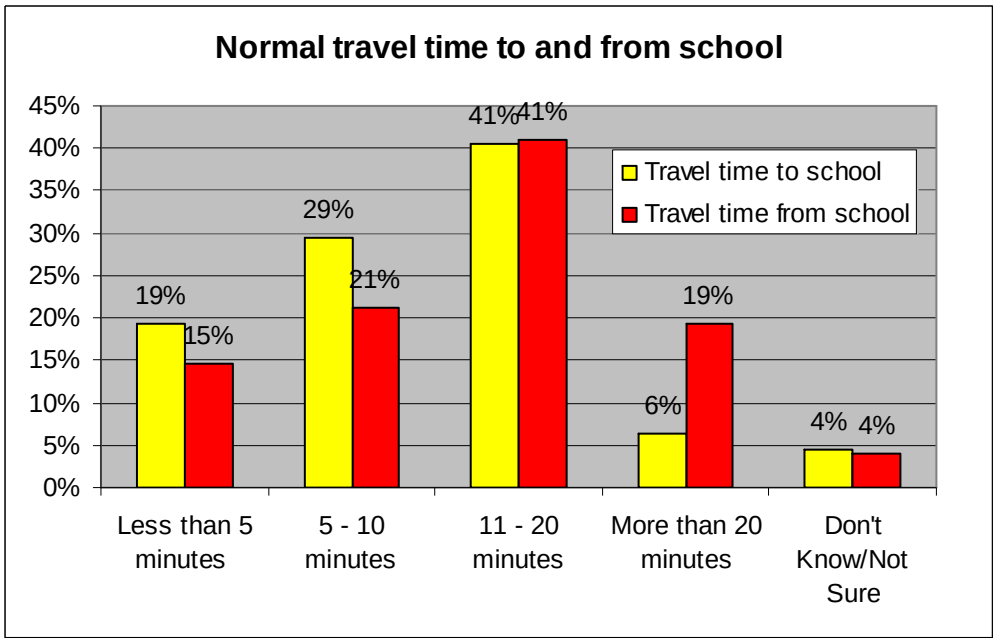


**Figure 3 Normal Travel Time to/from School**

## Student Attitudes

In the survey, parents were asked if their child(ren) had asked them for permission to walk or bike to/from school in the last year, which reflects the child's attitude towards walking and biking to/from school. For all parents surveyed in the 14 schools, 21 percent of parents said that their child had asked permission to walk or bike to/from school in the last year.

## Parent Attitudes

In the survey, parents were asked when they would allow their child(ren) to walk or bike alone to/from school. Table 9 shows the survey results.

**Table 9 Number of Parents Allowing Their Child to Walk or Bike Alone to/from School**

| Grade Allowed to Walk or Bike Alone | Number |
|---|---|
| Kindergarten | 0 |
| Grade 1 | 0 |
| Grade 2 | 42 |
| Grade 3 | 28 |
| Grade 4 | 63 |
| Grade 5 | 46 |
| Grade 6 | 444 |
| Grade 7 | 103 |
| Grade 8 | 111 |
| Never | 2,061 |
| Total | 2898 |

Figure 4 illustrates the distribution of grade levels in which students might be allowed to walk or bike alone to school. It can be observed that a majority of parents will not allow their child(ren) to walk or bike to school alone, especially under grade 6.

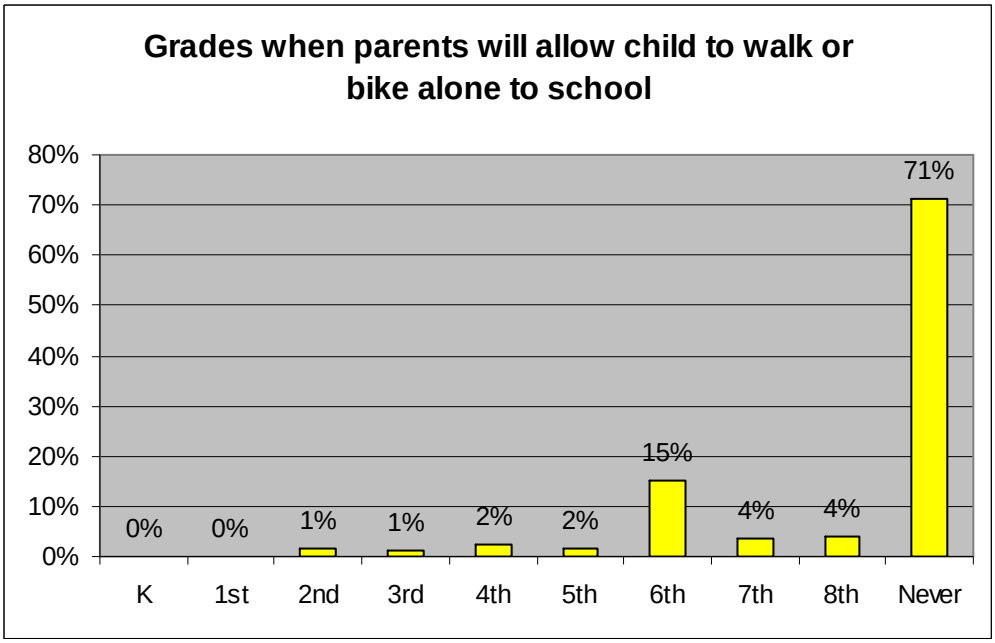


**Figure 4 Distribution of Grade Level for Allowing Child to Walk or Bike Alone to School**

## School Attitude

Parents were asked how much their child(ren)'s school encourages or discourages walking and biking to/from school. Table 10 shows the survey results.

**Table 10 School Attitude on Walking or Biking to/from School**

| School Attitudes | Number |
|---|---|
| Strongly encourage | 53 |
| Encourage | 165 |
| Neither | 2,501 |
| Discourage | 48 |
| Strongly discourage | 68 |
| Total | 2,835 |

Figure 5 illustrates the distribution of school attitude towards walking and biking to/from school. It shows that majority of parents felt that schools held a neutral attitude towards student walking or biking to/from school.

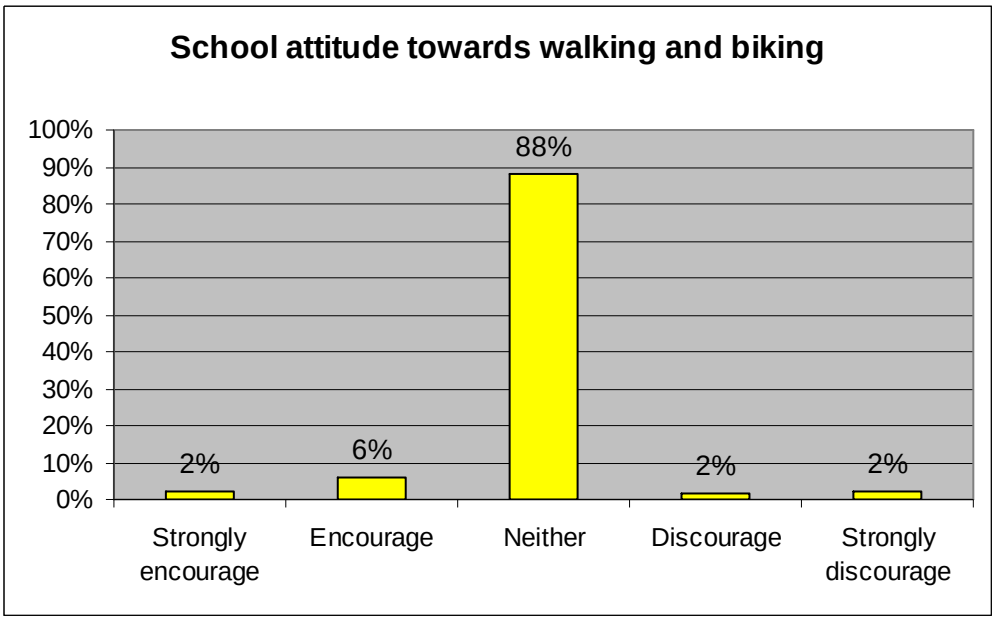


**Figure 5 Distribution of School Attitude towards Walking and Biking to/from School**

## Enjoyment

Parents were asked how enjoyable walking or biking to/from school is for their child(ren). Table 11 shows the survey results for this question.

**Table 11 Enjoyment of Walking or Biking to/from School**

| Enjoyment | Number |
|---|---|
| Very fun | 235 |
| Fun | 899 |
| Neutral | 1,461 |
| Boring | 125 |
| Very boring | 118 |
| Total | 2,838 |

Figure 6 illustrates the distribution of student enjoyment of walking or biking to/from school. Results indicated that only a small percentage of students dislike walking or biking to/from school.

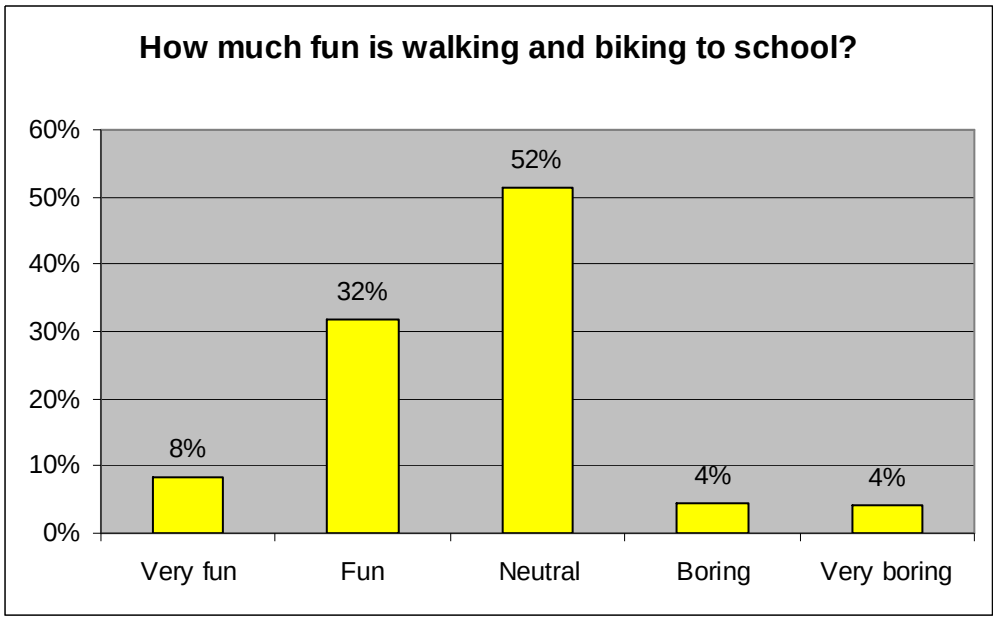


**Figure 6 Student Enjoyment of Walking or Biking to/from School**

## Health

The survey also asked parents how healthy they felt walking or biking to/from school is for their child(ren). Table 12 shows the survey results for this question.

**Table 12 Health of Walking or Biking to/from School**

| Response | Number |
|---|---|
| Very healthy | 1,113 |
| Healthy | 948 |
| Neutral | 680 |
| Unhealthy | 83 |
| Very unhealthy | 28 |
| Total | 2,852 |

Figure 7 illustrates the distribution on parents' feelings of health of the activity. The results indicated that only a few parents felt it unhealthy for their child(ren) to walk or bike to/from school.

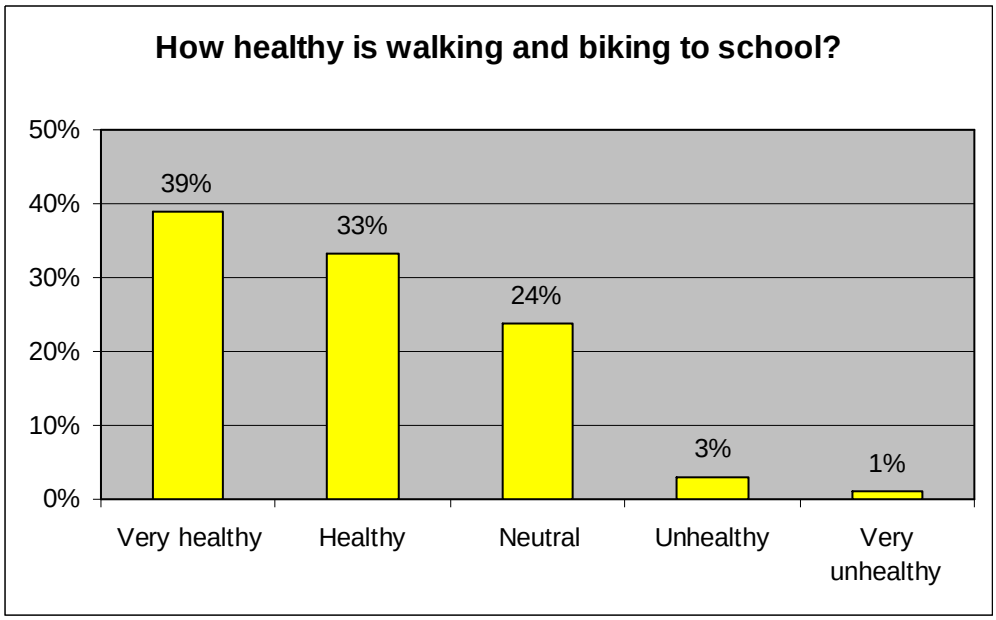


**Figure 7 Health of Walking or Biking to/from School**

## Ranking of Issues Affecting Student Travel Modes

Parents were asked to select from the lists those issues that would affect their decisions on their child(ren)'s travel mode to/from school. They were also asked to select from the lists those issues that might affect their decision to allow their child(ren) to walk or bike to school after improvements or changes are made. Table 13 shows the survey results.

**Table 13 Issues Affecting Student Travel Modes to/from School**

| Issue | Affects Travel Decision | Change Might Affect Decision |
|---|---|---|
| Distance | 2,153 | 819 |
| Driving convenience | 400 | 113 |
| Time | 971 | 305 |
| Extracurricular activities | 181 | 155 |
| Traffic speed | 1,725 | 707 |
| Traffic volume | 1,650 | 705 |
| Adults to walk with | 511 | 313 |
| Sidewalks & pathways | 920 | 402 |
| Intersection safety | 1,226 | 563 |
| Crossing guards | 485 | 386 |
| Violence or crime | 1,354 | 483 |
| Weather or climate | 1,129 | 389 |

Figure 8 illustrates the calculated results for all the issues. It indicates that distance from home to school is the most important issue that affects parents when they decide their child(ren)'s travel mode to/from school.

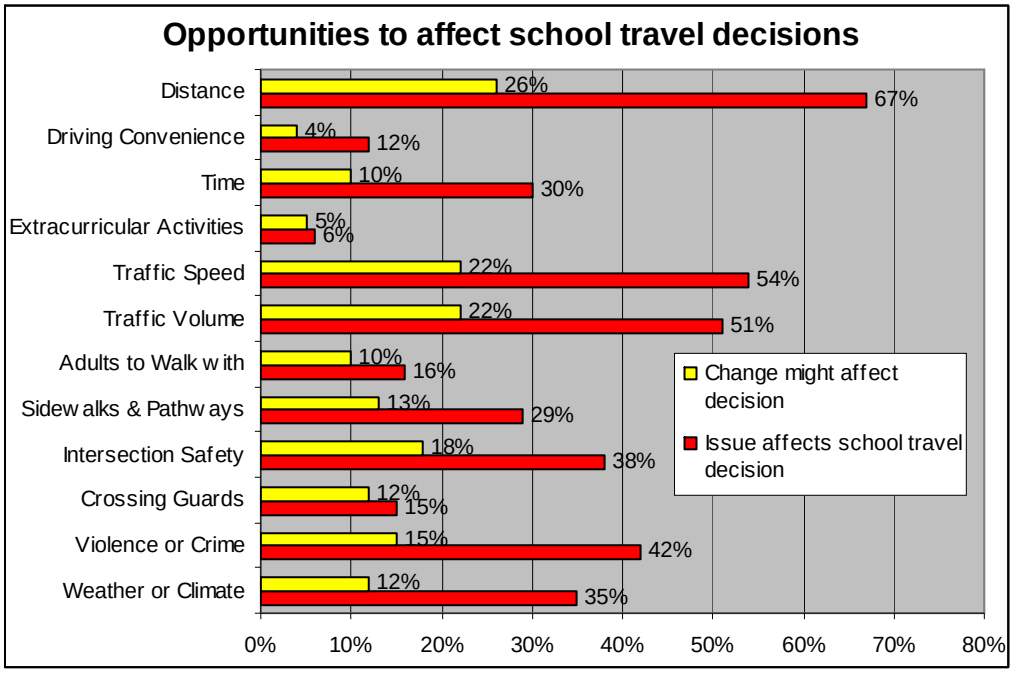


**Figure 8 Issues Affecting Student Travel Modes to/from School**

All the issues were ranked according to the percentage value. Based on the responses to the question asking which issues would prevent parents from letting their child walk or bike to school, the responses in descending order of importance were distance, traffic speed, traffic volume, violence or crime, intersection safety, weather or climate, time, sidewalks and pathways, adults to walk with, crossing guards, driving convenience and extracurricular activities. For the question asking which issues would convince them to allow their child to walk or bike to school after improvements or changes, the ranking were distance, traffic speed, traffic volume, intersection safety, violence or crime, sidewalks & pathways, weather or climate, crossing guards, adults to walk with, time, extracurricular activities and driving convenience.

### 2.4 Analysis of Parents Survey Results by Individual School

Some differences existed among the 14 schools in Hillsborough County, such as location, land use adjacent to school, etc. Correspondingly, some differences existed among them on student travel behavior to/from school. The student travel behaviors in the 14 schools were analyzed separately. The detailed analysis results are included in Appendix A.

# Chapter 3

## Analysis of Student Travel Modes

### 3.1 Tally Sheet

In the survey of student travel modes to/from school in the classroom, teachers were asked to record how students arrived at school and how they planned to return home after school on five consecutive days (from Monday to Friday). The survey results were recorded on tally sheets distributed to the teachers. They were asked to record the following information: school name, grade level of the class, weather for each day in the week, number of students enrolled in the class, and number of students who traveled to/from school by travel mode.

In total, 416 tally sheets were returned by the teachers, a response rate of 85%. Seven travel modes were recorded as student travel modes to/from school: walk, bike, school bus, family vehicle, carpool, transit and other travel modes such as skateboard, scooter, inline skates, etc. This chapter analyzes the survey results on student travel modes to/from school as recorded on the tally sheets.

### 3.2 Distribution of Student Travel Modes to and from School

Of the 78,975 trips reported, 40,775 were trips from home to school in the morning, and 38,200 were trips from school to home in the afternoon. Figure 9 is the combined distribution of student travel modes to/from school. The figure shows that most students went to/from school by school bus or family vehicle. Only a small percentage of students traveled to/from school by other travel modes such as walking, biking, carpool, transit, etc.

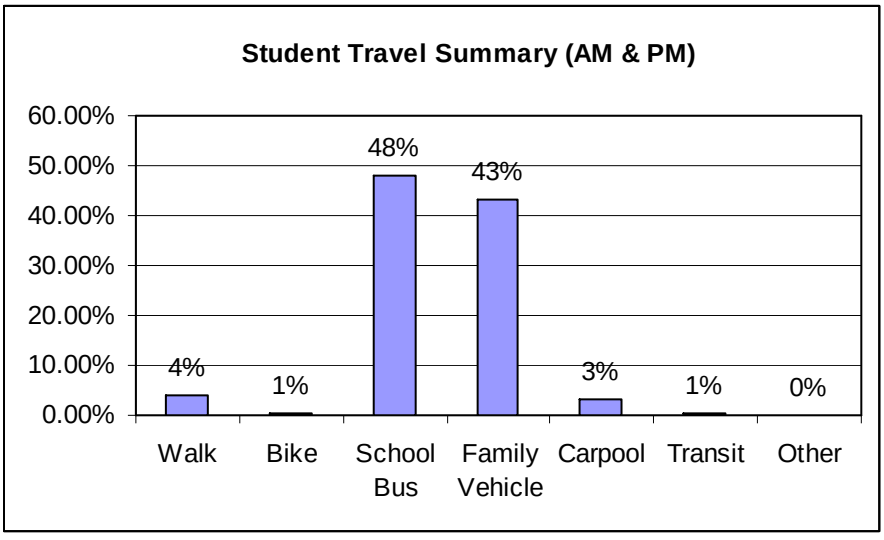


**Figure 9 Distribution of Student Travel Modes to and from School**

Figure 10 shows the difference between student travel modes to school in the mornings and their travel modes from school in the afternoons. The figure shows that there are some differences between the student travel modes to and from school.

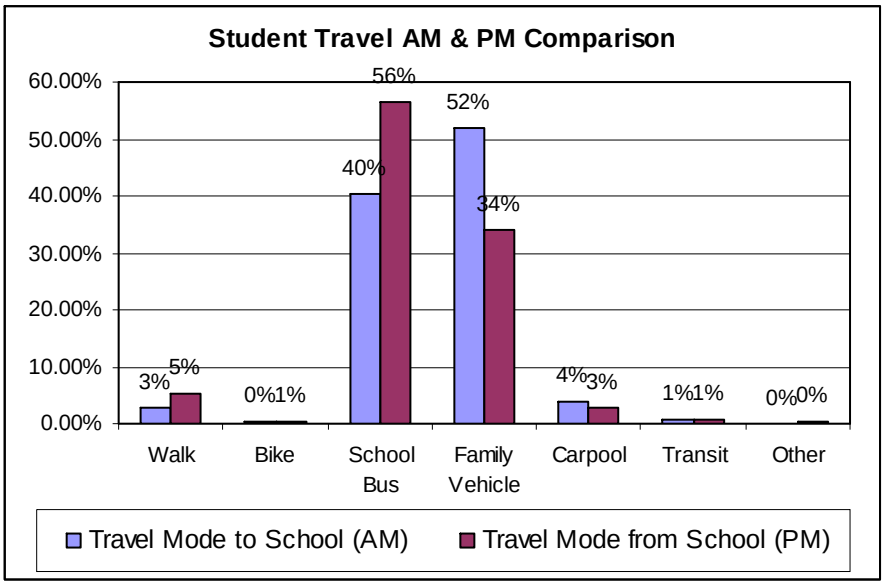


**Figure 10 Comparisons of Student Travel Modes to and from School**

### 3.3 Comparison of Student Travel Modes among Schools

There were some differences in student travel modes to/from school among the 14 schools surveyed. Factors influencing these differences could be type of school (elementary or middle), location, land use in the school area, etc.

Comparisons of student travel modes to/from school among these 14 schools were made. Table 14 shows the total number of students traveling to/from school in a week by each travel mode for the schools surveyed.

Figure 11 shows the distribution of student travel modes to/from school for the 14 schools. The figure illustrates that most students traveled to/from school by school bus or family vehicle, and relatively few traveled to/from school by other travel modes such as walking, biking, carpool and transit. There were some differences on the distribution of student travel modes to/from school among these schools.

In this study, special attention was paid to walking and biking. Figure 12 illustrates the percentage of students walking or biking to/from school, indicating that there were some differences by school.

Information on these schools related to location and land use in the school area is was not part of the current study, so further analysis on relationship between student travel modes to/from school and the characteristics of the school was not conducted.

**Table 14 Students by Travel Mode and School**

| Name of School | Travel Mode to/from School | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | Walk | Bike | School Bus | Family Vehicle | Car-pool | Transit | Other | |
| Lutz Elementary | 28 | 0 | 1,710 | 1,979 | 95 | 49 | 1 | 3,862 |
| Boyette Springs Elementary | 302 | 40 | 2,946 | 2,228 | 180 | 2 | 16 | 5,714 |
| Dowdell Middle | 193 | 24 | 2,389 | 2,310 | 199 | 42 | 15 | 5,172 |
| Buckhorn Elementary | 213 | 36 | 2,980 | 2,841 | 222 | 42 | 16 | 6,350 |
| McLane Middle | 411 | 44 | 4,360 | 3,745 | 294 | 42 | 16 | 8,912 |
| Mulrennan Middle | 129 | 16 | 2,005 | 2,048 | 137 | 40 | 1 | 4,376 |
| Burnette Middle | 325 | 48 | 3,813 | 3,487 | 262 | 42 | 16 | 7,993 |
| Maniscalco Elementary | 299 | 32 | 3,359 | 2,844 | 226 | 42 | 16 | 6,818 |
| Cypress Creek Elementary | 271 | 30 | 2,801 | 2,267 | 204 | 2 | 16 | 5,591 |
| Pride Elementary | 238 | 34 | 2,947 | 2,651 | 221 | 42 | 15 | 6,148 |
| Springhead Elementary | 137 | 24 | 1,978 | 2,164 | 123 | 40 | 1 | 4,467 |
| Valrico Elementary | 294 | 40 | 3,474 | 3,159 | 257 | 42 | 16 | 7,282 |
| Thonotosassa Elementary | 129 | 16 | 1,331 | 867 | 107 | 2 | 15 | 2,467 |
| Learning Gate Community | 174 | 16 | 1,953 | 1,584 | 95 | 0 | 1 | 3,823 |

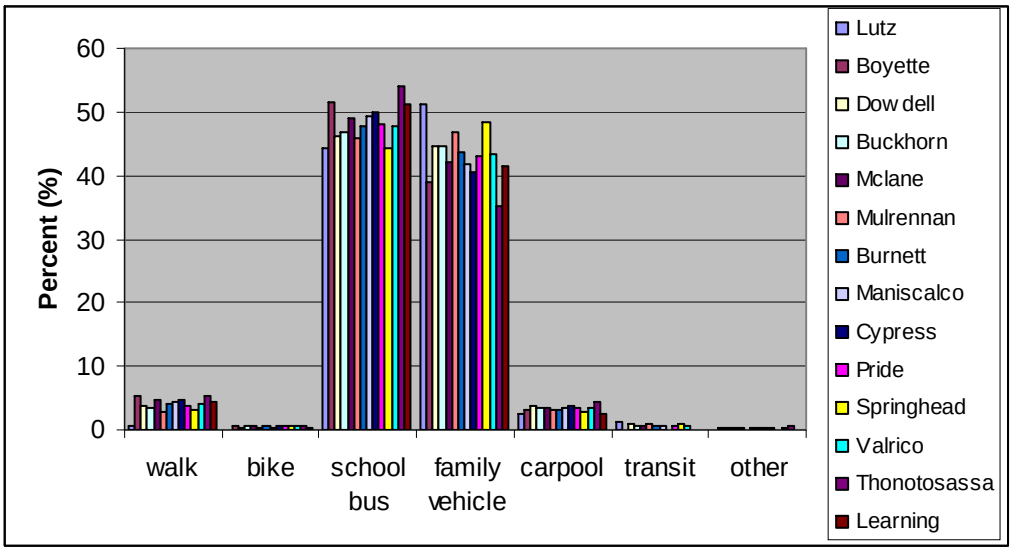


**Figure 11 Distribution of Student Travel Modes to/from School, by School**

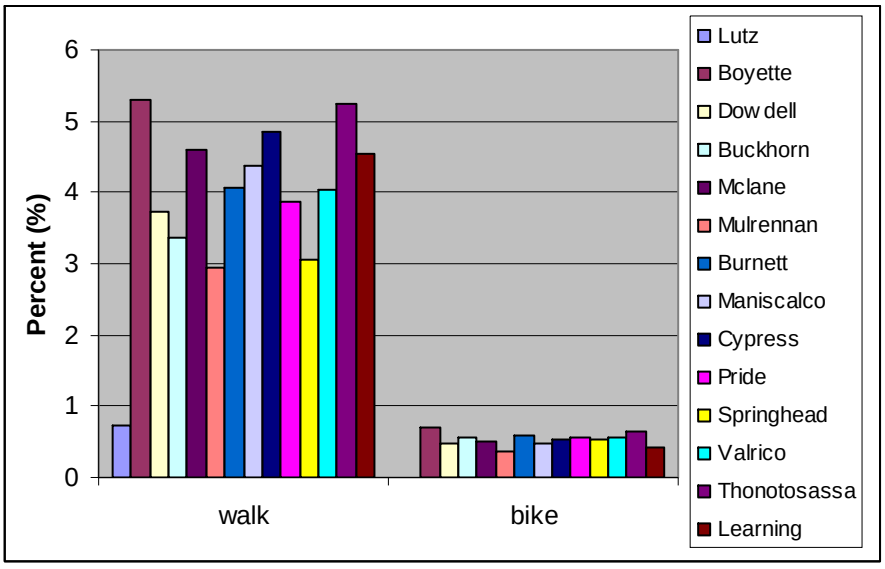


**Figure 12 Distribution of Students Walking or Biking to School, by School**

### 3.4 Influence of Weather on Student Travel Modes

Weather is an important factor in student travel modes to/from school. On rainy days, students would be more reluctant to walk or bike to/from school. Since the survey allows for the recording only "sunny" and "cloudy" conditions, the influence of weather on student travel modes to/from school cannot be reflected from the survey results recorded on the tally sheet.

### 3.5 Comparison of Student Travel Modes on Different Days of the Week

Student travel modes to/from school on different days of the week were compared. Table 15 shows the number of students who traveled to/from school by each travel mode for each weekday. The total numbers of trips recorded on different days ranged from 16,053 to 16,684. More trips were recorded in the mornings than in the afternoons.

For each travel mode, the distribution of student travel modes on different days of the week was analyzed. Figure 13 shows the percentage of students walking to/from school on different days of the week. The results show that fewer students walked to school in the mornings than in the afternoons. For different days of the week, there are only small differences in percentage of students walking to/from school.

Figure 14 shows the percentage of students biking to/from school on different days of the week. The results show that the number of students biking to school in the mornings and those biking from school in the afternoons are almost the same. There are some differences in the percentage of students biking to/from school on different weekdays, ranging from 0.2 percent to 1 percent.

**Table 15 Distribution of Student Travel Modes to/from School on Different Days**

| Day | Time | Walk | Bike | School Bus | Family Vehicle | Car-pool | Transit | Other | Total |
|---|---|---|---|---|---|---|---|---|---|
| Monday | AM | 322 | 30 | 3,085 | 4,238 | 277 | 50 | 10 | 8,012 |
| | PM | 503 | 30 | 4,203 | 2,555 | 224 | 41 | 21 | 7,577 |
| | Total | 825 | 60 | 7,288 | 6,793 | 501 | 91 | 31 | 16,053 |
| Tuesday | AM | 192 | 20 | 3,245 | 4,274 | 366 | 41 | 20 | 8,158 |
| | PM | 403 | 20 | 4,291 | 2,586 | 252 | 41 | 20 | 7,613 |
| | Total | 595 | 40 | 7,536 | 6,860 | 618 | 82 | 40 | 16,535 |
| Wednesday | AM | 202 | 30 | 3,367 | 4,182 | 316 | 41 | 10 | 8,148 |
| | PM | 362 | 30 | 4,346 | 2,668 | 223 | 41 | 10 | 7,680 |
| | Total | 564 | 60 | 7,713 | 6,850 | 539 | 82 | 20 | 16,591 |
| Thursday | AM | 202 | 80 | 3,436 | 4,340 | 254 | 41 | 10 | 8,363 |
| | PM | 352 | 80 | 4,384 | 2,641 | 192 | 41 | 20 | 7,710 |
| | Total | 554 | 160 | 7,820 | 6,981 | 446 | 82 | 30 | 16,684 |
| Friday | AM | 232 | 40 | 3,364 | 4,072 | 315 | 51 | 20 | 8,094 |
| | PM | 373 | 40 | 4,325 | 2,618 | 203 | 41 | 20 | 7,620 |
| | Total | 605 | 80 | 7,689 | 6,690 | 518 | 92 | 40 | 16,180 |

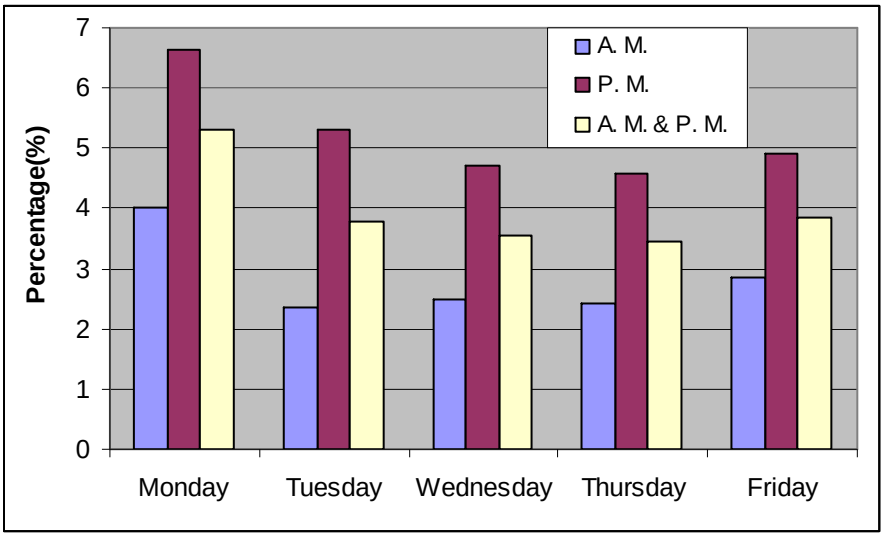


**Figure 13 Percentage of Students Walking to/from School on Different Days of the Week**

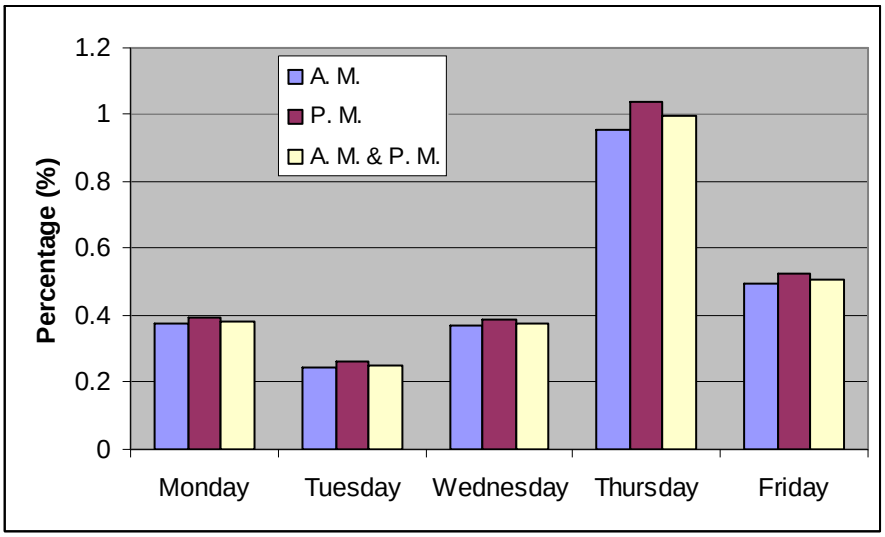


**Figure 14 Percentage of Students Biking to/from School on Different Days of the Week**

Figure 15 shows the percentage of students who travel to/from school by school bus on different days of the week. The results show that there are fewer students who travel to school by school bus in the mornings than those who take the school bus home in the afternoons. There are only small differences in the percentage of students who travel to/from school by school bus on different days of the week.

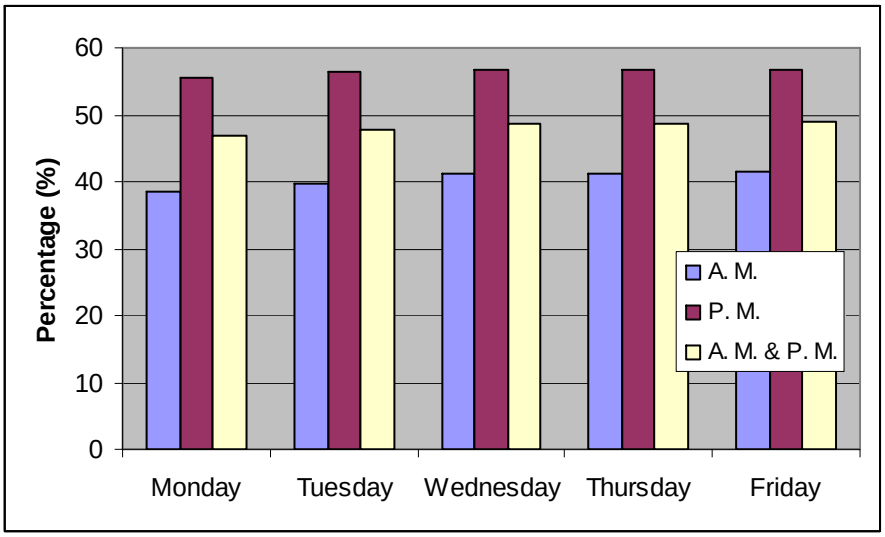


**Figure 15 Percentage of Students Traveling to/from School by School Bus on Different Days of the Week**

Figure 16 shows the percentage of students who travel to/from school by family vehicle on different days of the week. The results show that more students travel to school by family vehicle in the morning than in the afternoon. There are only small differences in the percentage of students who travel to/from school by family vehicle on different days of the week.

Figure 17 shows the percentage of students who travel to/from school by carpool on different days of the week. The results show that more students travel to school by carpool in the mornings than in the afternoons. There are only small differences in the percentage of students who travel to/from school by carpool on different days of the week.

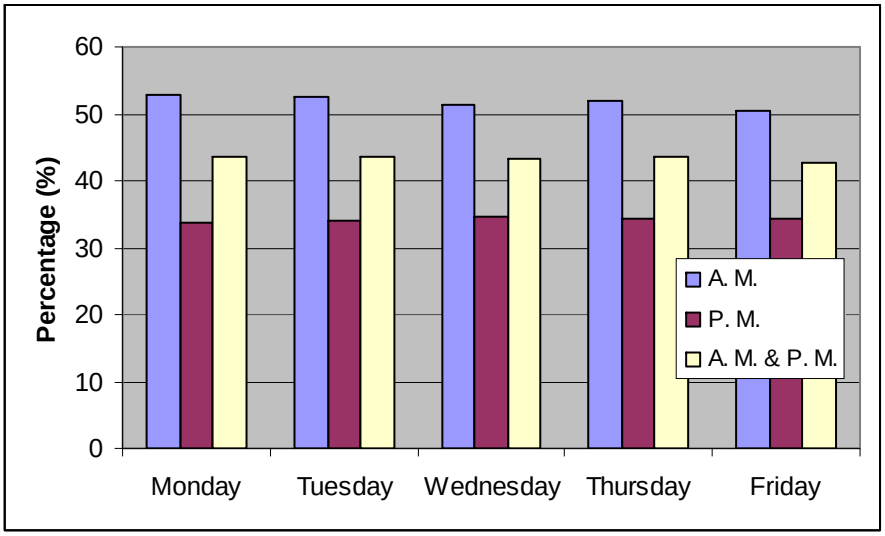


**Figure 16 Percentage of Students Traveling to/from School by Family Vehicle on Different Days of the Week**

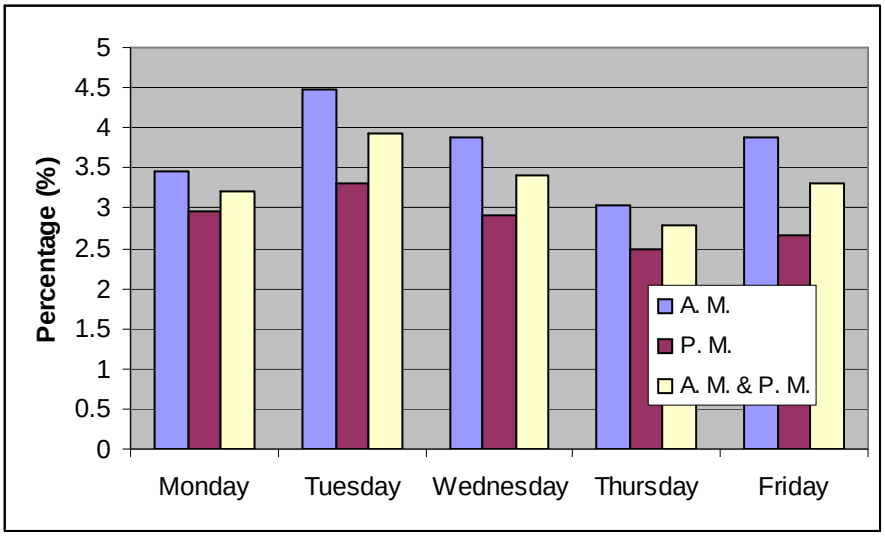


**Figure 17 Percentage of Students Traveling to/from School by Carpool on Different Days of the Week**

Figure 18 shows the percentage of students who travel to/from school by transit on different days of the week. On Mondays and Fridays, more students travel to school by transit in the morning in the afternoon, while on Tuesdays, Wednesdays and Thursdays, more students travel from school by transit in the afternoon than in the morning. There are only small differences in the percentage of students who travel to/from school by transit on different days of the week.

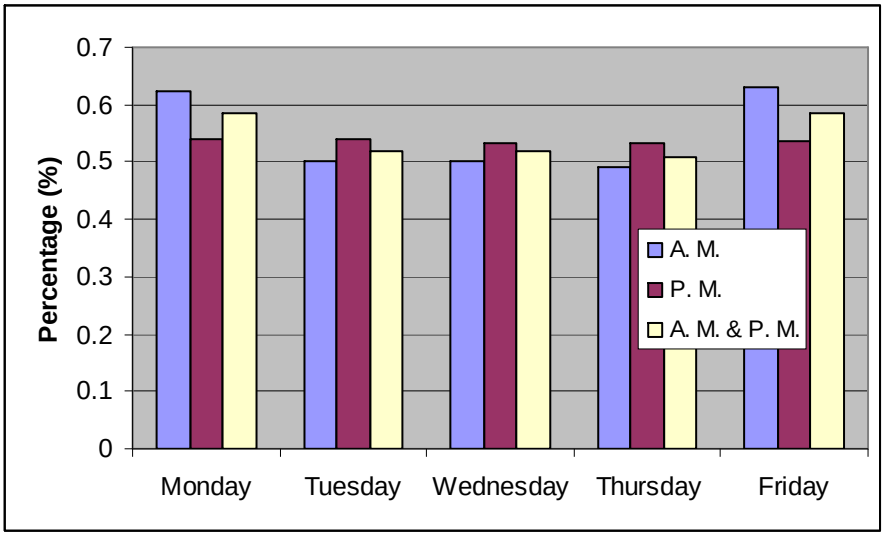


**Figure 18 Percentage of Students Traveling to/from School by Transit on Different Days of the Week**

Figure 19 shows the percentage of students who travel to/from school by other travel modes on different days of the week. The results show that there are only small differences in the percentage of students who travel to/from school by other travel modes on different days of the week.

### 3.6 Influence of Grade Level on Student Travel Modes

Student grade levels influence their travel modes to/from school. The older the student, the more likely he/she will walk or bike to school. Table 16 shows the number of students traveling to/from school with each travel mode in different grade levels.

Figure 20 shows the distribution of student travel modes to/from school for students at different grade levels, indicating that some differences exist among the different grade levels. The grade with the highest percentage of students traveling to/from school by school bus is grade 2, and the grade with the highest percentage of students traveling to/from school by family vehicle is kindergarten.

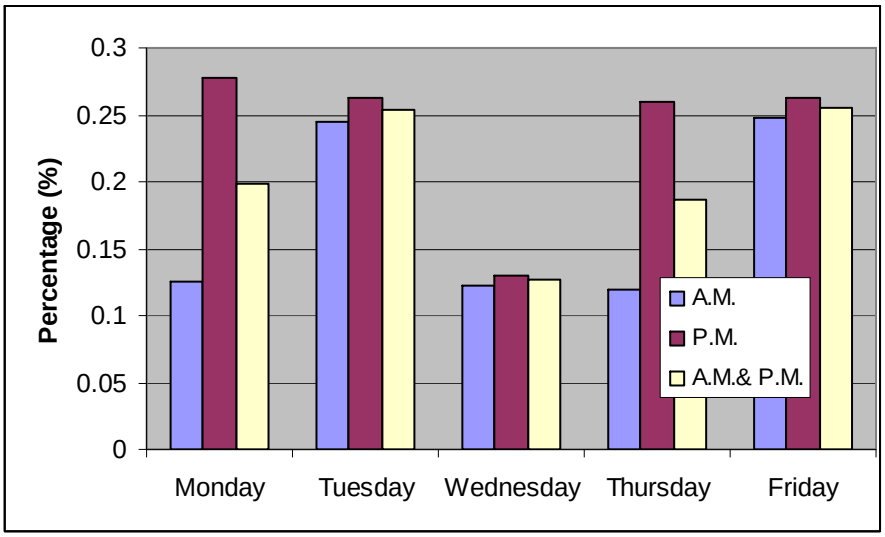


**Figure 19 Percentage of Students Traveling to/from School by other Travel Modes on Different Days of the Week**

Figure 20 indicates that the influence of grade level on student travel modes to/from school was not very significant. It shows that the grade level of a student or the age of a student is an influential factor on travel modes to/from school, but is not the decisive factor.

**Table 16 Student Travel Modes by Grade Level**

| Grade | Travel Mode | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | Walk | Bike | School Bus | Family Vehicle | Car-pool | Transit | Other | |
| Kindergarten | 166 | 40 | 2,448 | 2,597 | 110 | 0 | 0 | 5,361 |
| Grade 1 | 293 | 16 | 4,579 | 4,766 | 286 | 174 | 4 | 10,118 |
| Grade 2 | 301 | 112 | 3,692 | 2,794 | 231 | 49 | 17 | 7,196 |
| Grade 3 | 841 | 34 | 7,538 | 6,198 | 638 | 0 | 62 | 15,311 |
| Grade 4 | 364 | 60 | 5,538 | 4,567 | 367 | 40 | 29 | 10,965 |
| Grade 5 | 120 | 6 | 1,684 | 1,662 | 98 | 0 | 1 | 3,571 |
| Grade 6 | 316 | 48 | 3,982 | 3,702 | 302 | 80 | 25 | 8,455 |
| Grade 7 | 350 | 36 | 4,093 | 3,570 | 259 | 4 | 7 | 8,319 |
| Grade 8 | 392 | 48 | 4,492 | 4,318 | 331 | 82 | 16 | 9,679 |
| Total | 3143 | 400 | 38,046 | 34,174 | 2,622 | 429 | 161 | 78,975 |

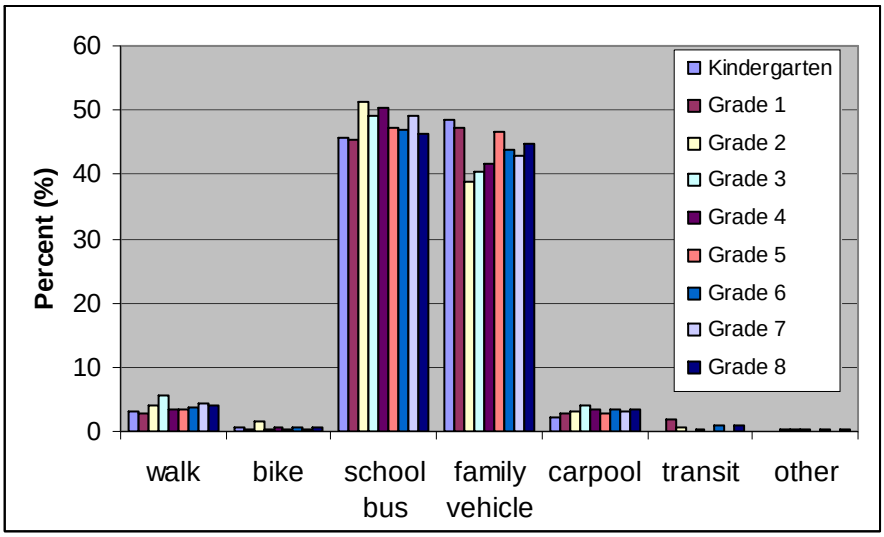


**Figure 20 Distribution of Student Travel Modes by Grade Level**

# Chapter 4

## Influential Factors Influencing Student Travel Modes to School

In Chapter 2, the results of parent survey on their child(ren)'s travel behavior were analyzed. The analysis provides some preliminary insights on student travel behavior; but further analysis is needed to explore the cause-effect relationship between the student travel mode to/from school and all factors associated with it. This chapter explores factors that influence parental decisions on their child(ren)'s travel mode to/from school.

Student travel modes to school is a complicated social-economic process that is determined by students and their parents or guardians. Many factors, such as the distance to/from the school and the student's willingness to walk or bike to school will influence student travel modes. In the survey form designed by the National Center for Safe Routes to School, many potential factors affecting student travel modes to/from school were included, such as student demographic characteristics and parent subjective opinions.

This chapter identifies influential factors on student travel modes to school. In the analysis, survey results from the 14 schools in Hillsborough County were combined, and a Pearson chi-square test was employed to determine significant relationships between these factors and student travel modes to school.

### 4.1 Pearson Chi-Square Test

The Pearson's chi-square test is used to assess whether paired observations on two variables expressed in a contingency table are independent. Chi-square is calculated by finding the difference between each observed and theoretical frequency for each possible outcome, squaring them, dividing each by the theoretical frequency, and taking the sum of the results. Equation (4-1) was used to do the Pearson's chi-square test.

$$\chi^2 = \sum_{i=1}^{n} \frac{(O_i - E_i)^2}{E_i} \qquad (4\text{-}1)$$

where $O_i$ is an observed frequency and $E_i$ is an expected frequency.

### 4.2 Influence of Student Demographic Characteristics

Student demographic characteristics such as grade level, gender, number of students in the family, and distance to/from the school were included in the survey. The results are shown in Table 17. Following is a discussion on the influence of these demographic characteristics on student travel modes.

#### Grade Level

The targeted survey population included students from kindergarten through grade 8. In general, a student's grade level is directly related to his/her age, and with increasing age, children will become more independent. Thus, student grade levels indicate their independence capability: the higher the grade, the more independent they will be. This

change in independence capability will affect student travel modes to school with a shift from automobile to walking or biking.

**Table 17 Student Travel Modes and Demographics**

| Demographics | Travel Mode | | | | | |
|---|---|---|---|---|---|---|
| | Walk | Bike | Carpool | Family Vehicle | School Bus | Total |
| **Grade** | | | | | | |
| Kindergarten | 28 (8.2%) | | 90 (26.2%) | 158 (46.1%) | 67 (19.5%) | 343 |
| Grade 1 | 56 (14.8%) | | | 180 (47.5%) | 143 (37.7%) | 379 |
| Grade 2 | 3 (1.1%) | | | 158 (59.0%) | 107 (39.9%) | 268 |
| Grade 3 | | | 79 (32.1%) | 82 (33.3%) | 85 (34.6%) | 246 |
| Grade 4 | 22 (3.9%) | 20 (3.6%) | | 344 (61.2%) | 176 (31.3%) | 562 |
| Grade 5 | 79 (17.0%) | | 2 (0.4%) | 130 (28.0%) | 254 (54.6%) | 465 |
| Grade 6 | 48 (13.0%) | 25 (6.8%) | 76 (20.6%) | 59 (16.0%) | 161 (43.6%) | 369 |
| Grade 7 | 105 (35.1%) | 28 (9.4%) | 40 (13.4%) | 37 (12.4%) | 89 (29.8%) | 299 |
| Grade 8 | 10 (3.7%) | | 17 (6.3%) | 125 (46.1%) | 119 (43.9%) | 271 |
| **Gender** | | | | | | |
| Male | 131 (8.3%) | 73 (4.6%) | 94 (5.9%) | 579 (36.6%) | 704 (44.5%) | 1,581 |
| Female | 220 (13.5%) | | 210 (12.9%) | 694 (42.6%) | 505 (31.2%) | 1,629 |
| **Number of Children in the Family** | | | | | | |
| 1 | 219 (13.7%) | 28 (1.8%) | 80 (5.0%) | 663 (41.5%) | 606 (38.0%) | 1,596 |
| 2 | 104 (9.0%) | 45 (3.9%) | 137 (11.9%) | 509 (44.2%) | 356 (30.9%) | 1,151 |
| 3 | 28 (11.5%) | | 77 (31.7%) | 26 (10.7%) | 112 (46.1%) | 243 |
| 4 | | | | 2 (4.9%) | 39 (95.1%) | 41 |
| 5 | | | | | 17 (100%) | 17 |
| **Distance** | | | | | | |
| Less than ¼ mile | 172 (51.5%) | 34 (10.2%) | | 85 (25.4%) | 43 (12.9%) | 334 |
| ¼ - ½ mile | 127 (30.6%) | | | 251 (60.5%) | 37 (8.9%) | 415 |
| ½ - 1 mile | 4 (1.9%) | 25 (12.1%) | | 154 (74.4%) | 24 (11.6%) | 207 |
| 1 - 2 miles | | 14 (1.6%) | 186 (21.8%) | 330 (38.7%) | 323 (37.9%) | 853 |
| More than 2 miles | 20 (1.6%) | | 108 (8.6%) | 415 (32.9%) | 718 (56.9%) | 1,261 |

To analyze the influence of grade level on student travel modes to school, especially to observe the shift in travel mode among different grade levels, student travel mode distributions for different grades were calculated separately, as shown in Table 17. Results show that, compared with students in lower grades, students in higher grades are more likely to walk or bike to school. The grade level with the maximum percentage of students walking or biking to school is grade 7. Family vehicle and carpool modes seem more preferable for lower grade students than for higher grade students, while school bus is more preferable for higher grade students than for lower grade students. There is a shift from carpool and family vehicle to walking, biking and school bus with increasing student grade levels.

Chi-square test shows that student grade level has significant association with travel mode to school for level of significance p=0.05($\chi^2$ =1178.17).

**Gender**

Student gender has an influence on behavioral patterns and, correspondingly, travel modes to/from school. For different genders, student travel mode distributions were calculated separately. The results in Table 17 shows that female students are relatively more likely to walk to school than male students (13.5% versus 8.3%), while almost all students biking to school are male (4.6% versus 0). Female students are more likely to carpool (12.9% versus 5.9%) than male students. The differences between male and female students on school bus and family vehicle are not significant.

Chi-square test shows that student gender is significantly associated with travel mode to school for level of significance p=0.05($\chi^2$ =182.29).

**Number of Children in the Family**

Different family sizes were observed in the survey with the number of children in the family ranging from 1 to 5. Considering the factors of limited space available in family vehicles and the convenience of mutual care for students in large families with several children, the number of children in a family will affect parent decisions on their child(ren)'s travel mode to/from school.

The results in Table 17 show that the fewer the number of children in the family, the more likely the children will walk or bike to school. No students from families with more than 3 children walk or bike to school. Thus, the number of children in the family can be treated as having a negative effect on walking or biking to school. For travel by family vehicle, the optimal family size is 1 to 2 children. For carpooling, the optimal family size is 3 children. For families with more than 3 children, travel via school bus is preferable. Student travel modes shift from family vehicle and walking to travel via school bus as the number of children in the family increases. It should be noted that the sample size for families with more than 3 children is relatively small.

The chi-square test shows that number of children in the family is significantly associated with student travel modes to school for level of significance p=0.05 ($\chi^2$ =417.82).

**Distance to/from School**

The distribution of student travel modes to school was calculated separately for different distances, as shown in Table 17. The results reveal that, for students who live a short distance from school, walking is the prevailing travel mode. It also shows that the optimal walking distance is limited. When the distance is more than ½ mile, fewer students walk to school. For travel via family vehicle, the optimal distance is ¼ - 1 mile, and the optimal distance for carpooling is 1 - 2 miles. The number of student traveling by school bus increases with increasing distance from home to school.

Table 17 shows that, for student travel modes to/from school, there is clearly a shift from walking and biking to family vehicle and carpool, and then to school bus with increasing distance.

The distance from home to school influences student travel modes to school. Longer distances mean more opportunities for students to be exposed to potential dangers such as traffic, violence and crime. To ensure their child(ren)'s safety, parents will choose proper travel modes to shorten the exposure to these potential dangers. Chi-square test shows that distance is significantly associated with student travel modes to school for level of significance p=0.05 ($\chi^2$ =1775.36).

The above analysis results indicated that student demographic characteristics such as grade level, gender, number of children in the family, and distance to/from school significantly influence travel modes to school for a 95% level of significance. Due to limits on the information collected in the survey, only 4 demographic characteristics were considered here.

### 4.3 Influence of Parents' Subjective Opinions

Even for students with the same demographic characteristics, differences still exist on their travel modes to/from school. Subjective opinions and feelings about walking or biking to schools play an important role in decision making, Understanding how student travel modes are affected by these subjective feelings and opinions can help in the design of an SRTS program to will attract more students to walk or bike to/from school. The survey results of how these factors influenced student travel modes to/from school are shown in Table 18.

**School Attitudes**

Results in table 18 reveal that 88.2% students felt that their school neither encouraged nor discouraged walking or biking to school, which indicates the lack of encouragement and educational programs at the surveyed schools. More efforts in these areas may help increase the number of students walking or biking to school.

Many students walking or biking to school felt that their schools held positive attitudes regarding this issue. Results in table 18 show that, in those 14% of students walking or biking to school, 3.5% felt the school held a positive attitude towards it, 11% felt the school neither encouraged nor discouraged it, and only 0.5% felt that the school held a negative attitude towards it.

Chi-square test shows that School Attitudes towards walking or biking is significantly associated with students' travel mode to school for level of significance p=0.05 ($\chi^2$ =834.30).

**Enjoyment**

Table 18 shows that approximately 40% of students believe that it is fun or very fun to walk or bike to/from school. Only 8.6% of the students consider it boring or very boring. Measures such as SRTS education program and engineering improvement can increase the number of students walking or biking to schools.

**Table 18 Student Travel Modes and Subjective Factors**

| Subjective Factors | Travel Mode | | | | | |
|---|---|---|---|---|---|---|
| | Walk | Bike | Carpool | Family Vehicle | School Bus | Total |
| **School Attitude** | | | | | | |
| Strongly Encourage | 28 (1.0%) | 25 (0.9%) | | | | 53 (1.9%) |
| Encourage | 30 (1.1%) | 14 (0.5%) | | 35 (1.2%) | 86 (3.0%) | 165 (5.8%) |
| Neither | 293 (10.3%) | 20 (0.7%) | 304 (10.7%) | 1,081 (38.1%) | 805 (28.3%) | 2,503 (88.2%) |
| Discourage | | 14 (0.5%) | | 13 (0.5%) | 21 (0.7%) | 48 (1.7%) |
| Strongly Discourage | | | | 21 (0.7%) | 47 (1.7%) | 68 (2.4%) |
| **Enjoyment** | | | | | | |
| Very Fun | | | 24 (0.8%) | 115 (4.0%) | 96 (3.4%) | 235 (8.3%) |
| Fun | 169 (6.0%) | 34 (1.2%) | 86 (3.0%) | 326 (11.5%) | 285 (10.0%) | 900 (31.7%) |
| Neutral | 160 (5.6%) | 14 (0.5%) | 179 (6.3%) | 621 (21.9%) | 488 (17.2%) | 1,462 (51.5%) |
| Boring | | 25 (0.9%) | 15 (0.5%) | 28 (1.0%) | 57 (2.0%) | 125 (4.4%) |
| Very Boring | 20 (0.7%) | | | 56 (2.0%) | 42 (1.5%) | 118 (4.2%) |
| **Health** | | | | | | |
| Very Healthy | 141 (4.9%) | | 135 (4.7%) | 393 (13.8%) | 441 (15.4%) | 1,110 (38.9%) |
| Healthy | 176 (6.2%) | 39 (1.4%) | 60 (2.1%) | 436 (15.3%) | 240 (8.4%) | 951 (33.3%) |
| Neutral | 12 (0.4%) | 34 (1.2%) | 99 (3.5%) | 254 (8.9%) | 284 (9.9%) | 683 (23.9%) |
| Unhealthy | | | 10 (0.4%) | 73 (2.6%) | | 83 (2.9%) |
| Very Unhealthy | 20 (0.7%) | | | 5 (0.2%) | 3 (0.1%) | 28 (1.0%) |
| **Permitted to Walk or Bike Alone** | | | | | | |
| Grade 2 | 3 (0.1%) | | | 39 (1.3%) | | 42 (1.4%) |
| Grade 3 | 28 (0.9%) | | | | | 28 (0.9%) |
| Grade 4 | 30 (1%) | 20 (0.6%) | | 23 (0.8%) | 18 (0.6%) | 91 (3.0%) |
| Grade 5 | | | 31(1%) | 26 (0.9%) | 37 (1.2%) | 94 (3.1%) |
| Grade 6 | 86 (2.8%) | 53 (1.7%) | 22 (0.7%) | 270 (8.8%) | 78 (2.5%) | 509 (16.6%) |
| Grade 7 | 32 (1.0%) | | | 101 (3.3%) | 2 (0.1%) | 135 (4.4%) |
| Grade 8 | 24 (0.8%) | | | 11 (0.4%) | 76 (2.5%) | 111 (3.6%) |
| Never | 52 (1.7%) | | 251 (8.2%) | 797 (25.9%) | 963 (31.3%) | 2,063 (67.1%) |
| **Student Attitudes** | | | | | | |
| Yes | 160 (5.1%) | 53 (1.7%) | 63 (2.0%) | 250 (8.0%) | 134 (4.3%) | 660 (21.1%) |
| No | 95 (3.1%) | 20 (0.6%) | 241 (7.7%) | 1,023 (32.9%) | 1,075 (34.5%) | 2,454 (78.8%) |

Chi-square test shows that parents' feelings about the enjoyment of walking or biking to/from school is significantly associated with student travel modes to/from school for level of significance p=0.05 ($\chi^2$ =304.29).

## Health

Most of the informants held positive attitudes towards the effect of walking or biking to school on health. Approximately 72.2 percent of students considered it healthy or very healthy and, among them, a large percentage walked or biked to school (12.5% of all students).

Chi-square test shows that parents' feelings about the health benefits of walking or biking to school is significantly associated with student travel modes to school for level of significance p=0.05 ($\chi^2$ =411.85).

**Grade Level for Allowing a Child to Walk or Bike to School Alone**

Results shown in Table 18 show that almost one third of the parents surveyed allow their child(ren) to walk or bike alone at different times. Chi-square test shows that the time that the parent allows a child to walk or bike alone is significantly associated with student travel modes to school for level of significance p=0.05 ($\chi^2$ =1361.17).

**Student Attitudes**

Student attitudes toward walking or biking to school can be classified into two categories: active or passive. Their attitudes can be reflected by whether they have asked permission to walk or bike to school from parents in the past. Those who have asked for permission can be regarded as being more willing to walk or bike to school than those who did not.. Survey results show that 21.1 percent of students have asked permission from parents to walk or bike to school, as shown in Table 18.

The chi-square test shows that whether students have ever asked permission to walk or bike to school is significantly associated with their travel mode to school for level of significance p=0.05 ($\chi^2$ =454.97).

The analysis above indicates that, with a 95% level of significance, this subjective opinion is significantly associated with student travel modes to/from school.

This chapter analyzed the influence of some factors on student travel modes to/from school. Two types of factors were considered: demographics and parent subjective opinions on walking or biking to/from school. The Pearson Chi-Square method was employed, and results show that these factors are significantly associated with student travel modes to/from school.

# Chapter 5

## Lessons Learned and Recommendations

In this study, the Hillsborough County Safe Routes to School (SRTS) survey was carried out in Florida for the first time and also was the first time the survey form and inputting tool designed by the National Center for SRTS were used. Many difficulties arose during the survey process; however, the researchers made every effort to ensure the successful completion of the survey. This chapter presents lessons learned from the survey process. Recommendations for improvement of the survey form and inputting tool are made for reference on future surveys.

### 5.1 Lessons Learned from the Survey

The following lessons were learned from conducting the survey:

- Select schools that applied for the SRTS engineering and education program.

In this survey, the 14 participating schools were selected from the list of 27 schools that applied for either the infrastructure improvement or education program.

- Get support from County School Board.

The first contact with principals was made by the Manager of Planning and Facilities Siting of the Hillsborough County School District via email to inform them about the SRTS program. A message about the SRTS survey was also passed to principals during a School Board meeting.

- Get approval to conduct the surveys from principals at each school.

A letter from the Florida Department of Transportation (FDOT) and an email from the study researchers were sent to principals outlining details of the survey. From this contact, only 4 of the 27 schools responded back by email. The second contact attempt was made by calling each of the 27 schools, with 13 successful contacts. There was a higher response rate because principals had been informed about the program and the survey at recent School District meetings. The County School Board and the state DOT should attend School District meetings to make principals aware of the program and the survey distribution process. Efficient communication with schools and parents is especially important to achieve a high response rate.

Despite the high response rate from schools, the return rates of completed survey forms from parents in the 14 schools were relatively low, ranging from 17 to 34 percent. The total return rate was only 26.1 percent. A higher return rate would ensure a larger sample size and save time for the researchers. For similar surveys in the future, the importance of the survey should be emphasized to principals, students, and their parents so that a higher return rate can be achieved.

## 5.2 Lessons Learned from the Survey Inputting Tool

This survey used the inputting tool designed by the National Center for SRTS to input and analyze the survey data. In using the inputting tool, some errors were discovered since this tool was recently developed and had not been widely used.

When analyzing the survey results, it was found on the "Variables Total" sheet in the file "Student Travel Tally" that the variable for the number of students walking to schools on Tuesday morning for each school (the variable WTA on row 36) was cited incorrectly. Thus, the results on student travel modes distribution was calculated incorrectly. The variable WTA should cite the value in column "AC" and for different schools on different rows. However, in the sheet the value on column "AB" on different rows was cited as the number of students walking to school for different schools. A value in the wrong location was cited as the number of students walking to school.

Since the value for number of students walking to school was incorrect, the total number of students surveyed on Tuesday morning for each school (the variable TOTTA) was miscalculated, as well as the percentage value for different travel. As a result, for the analysis of the tally sheet in this study, the researchers did not use the inputting tool to calculate the percentage value for different travel modes. Instead, the researchers calculated the value themselves. This error should be revised so that the researchers can use the results directly instead of calculating the results themselves.

## 5.3 Recommendations for Improvements to the Survey Form

Through the analysis of the survey results, some limitations of the survey form and the inputting tool were found. The following are researcher recommendations on revising the survey form and the inputting tool.

- The survey form failed to include some of the important factors associated with student travel modes to/from school. For example, the income level of the family and number of vehicles in the family can greatly influence student travel modes to/from school. To better understand the student travel modes to/from school, such questions should be included in the survey form.
- For the parent survey, the inputting tool can create an individual file only for each school; the survey results for all the schools in the area cannot be combined automatically. To perform a districtwide analysis on student travel modes to schools, the researchers had to input the survey results of every school in a new file and manually analyze the data. The developer should add this function to the inputting tool to facilitate the users to do such analysis. In the future, the developer should also consider the feasibility of creating a report automatically.
- Currently, the inputting tool can perform only some simple analyses of the survey results and only one factor can be considered in the analysis. Although these results can help determine the characteristics of student travel behaviors to some degree, further analyses are needed to see how those factors are interrelated and influence the student travel behaviors. For example, which factor will significantly influence the students' travel modes to school? In the future the developer can consider integrating the analysis process into the inputting tool.

# Chapter 6

# Conclusions

This project summarized the analysis results of the SRTS survey conducted in Hillsborough County to obtain an overview of student travel behaviors before the implementation of an SRTS program. A survey was conducted with students in the classroom and their parents about student travel behavior to and from school. A total of 14 schools, 10 elementary and 4 middle, participated in the survey. Based on the survey results, a detailed analysis of student travel modes to/from school and factors associated with their travel modes was conducted.

## 6.1 Student Travel Behavior from Parent Survey

Following are some interesting statistics based on the parent survey:

- Distance from home to school ranks as the most important factor that prevent students from walking or biking to/from school.
- A total of 13.2 percent of students walked or biked to school; 14.4 percent walked or biked from school.
- A total of 57.8 percent of parents reported that the distance from home to school was less than 2 miles.
- A total of 90 percent parents reported that their travel time to school was less than 20 minutes, and 77 percent reported that their travel time from school was less than 20 minutes.
- A total of 21 of parents reported that their child(ren) had asked permission to walk or bike to/from school in the past year.
- A total of 71.1 percent of parents reported they would never allow their child(ren) to walk or bike alone to/from school.
- Only 7.7 percent of parents believe that their child(ren)'s school encouraged or strongly encouraged walking or biking to/from school.
- Approximateily 40 percent of students thought it was fun or very fun to walk or bike to/from school.
- A total of 73.2 percent of parents considered it healthy or very healthy to walk or bike to/from school.

## 6.2 Student Travel Modes from Tally Sheet

Following are selected statistics from all 78,975 trips recorded on tally sheets:

- A total of 3.98 percent of students walked to/from school.
- Only 0.51 of students biked to/from school.
- A total of 48.17 percent of students traveled to/from school by school bus.
- A total of 43.27 percent of students traveled to/from school by family vehicle.

- Only 3.32 percent of students traveled to/from school by carpool.
- Only 0.54 percent of students traveled to/from school by transit.
- Only 0.20 percent of students traveled to/from school by other travel modes.

Student travel modes in different schools were compared. Only small differences existed in student travel modes to/from school among these schools.

Student travel modes on different days of the week (Monday through Friday) were compared. More students were observed to travel to school by walking and transit on Monday and Friday than on other weekdays.

### 6.3 Relationship between Student Travel Modes and Associated Factors

The relationships between the following factors and student travel modes to/from school were analyzed: student grade level, gender, number of children in the family, distance from home to school, school attitudes, enjoyment, health, grade allowing child to walk or bike to school alone, and student attitudes. Chi-square test was employed to investigate those factors that are significantly associated with student travel modes to/from school. The test results show that all these factors were significantly associated with student travel modes to/from school.

## Acknowledgements

This research was funded by the Florida Department of Transportation, District 7. The authors wish to thank CUTR Student Research Assistant Christopher Gonzalez for his assistance with data collection.

## Appendix A. Analysis of Parents Survey Results for Each School

The parent survey results for the 14 schools were analyzed separately. The following figures are the results of the analysis.

### A.1 Boyette Springs Elementary School

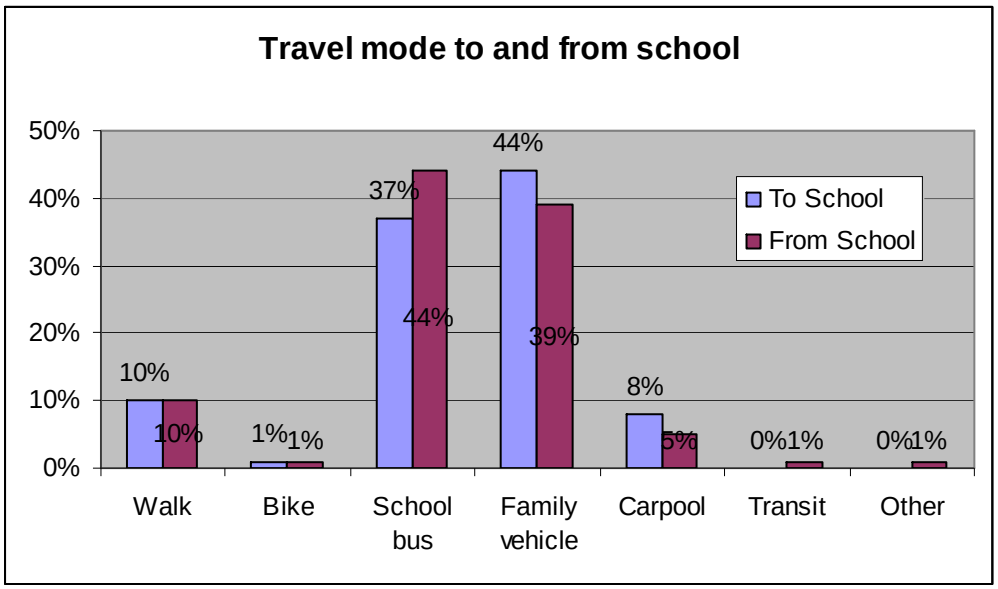


**Figure 21 Distribution of Student Travel Modes to/from School (Boyette)**

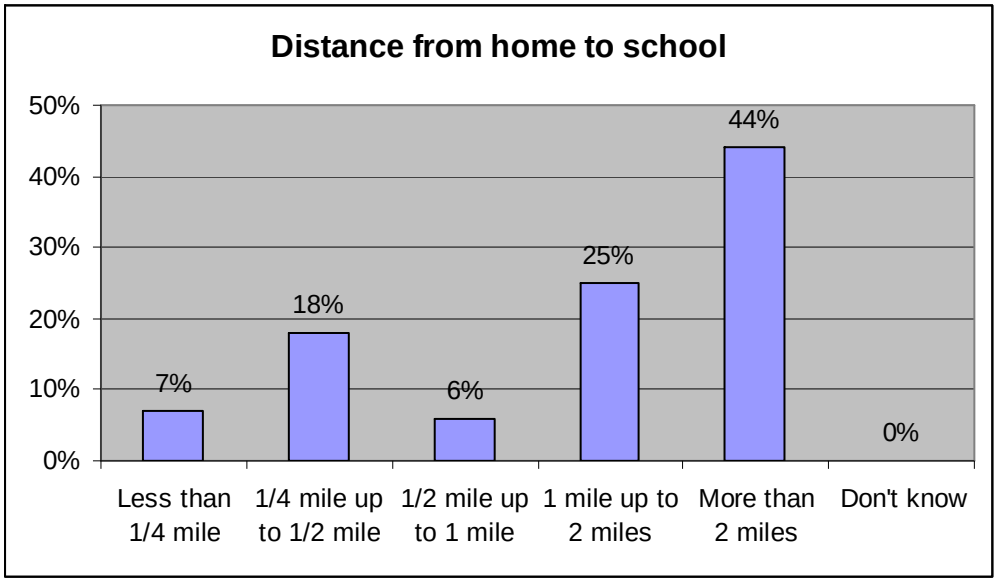


**Figure 22 Distribution of Distance from Home to School (Boyette)**

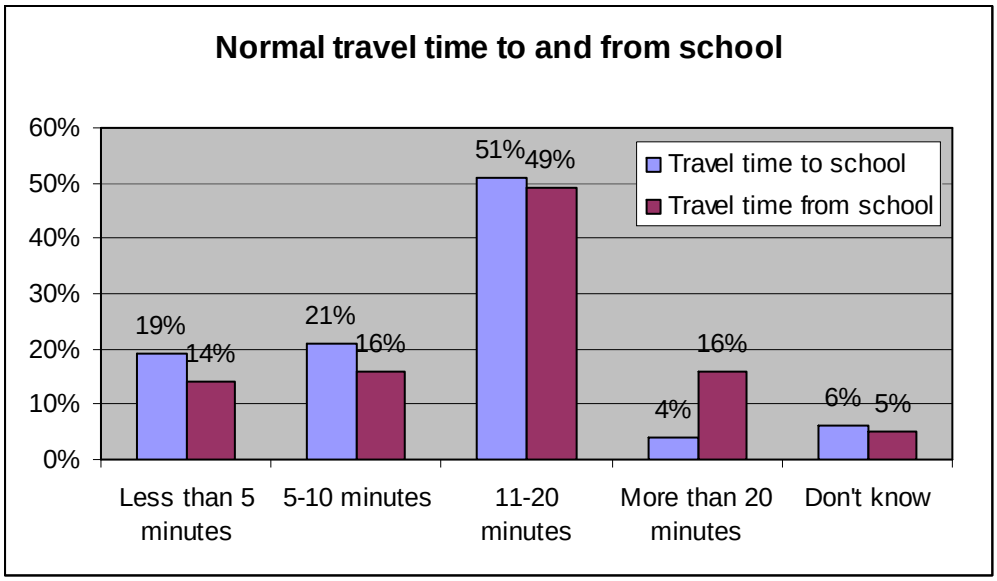


**Figure 23 Normal Travel Time to/from School (Boyette)**

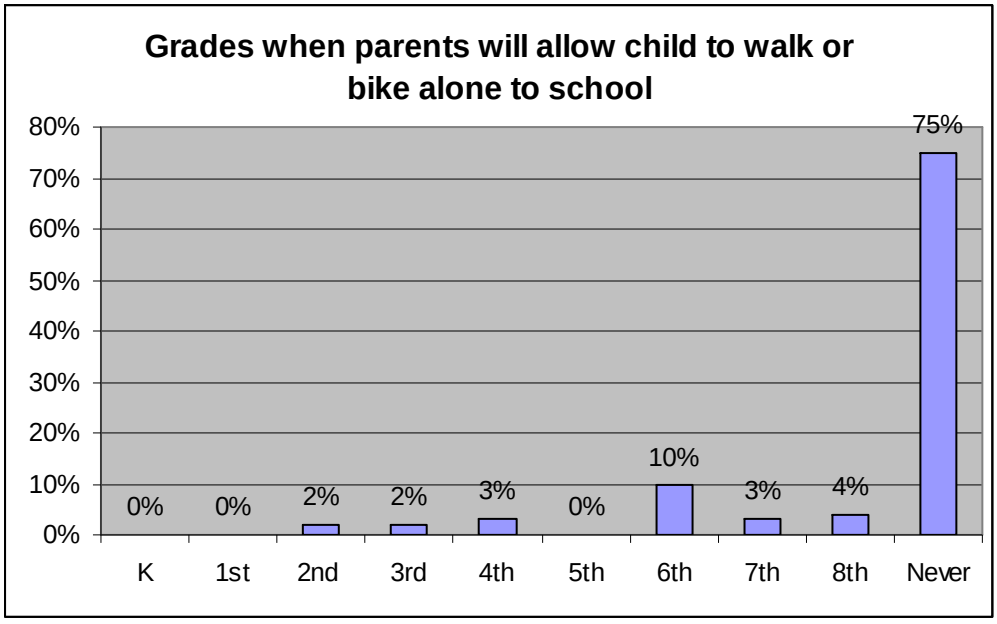


**Figure 24 Distribution of Grade Level for Allowing Child to Walk or Bike Alone to School (Boyette)**

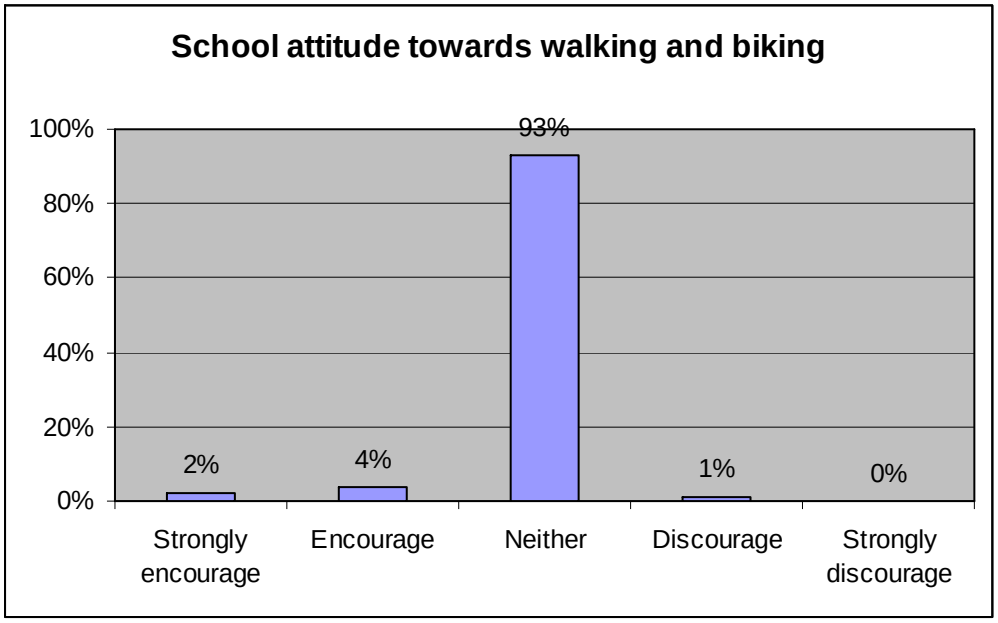


**Figure 25 Distribution of School Attitudes towards Walking and Biking to/from School (Boyette)**

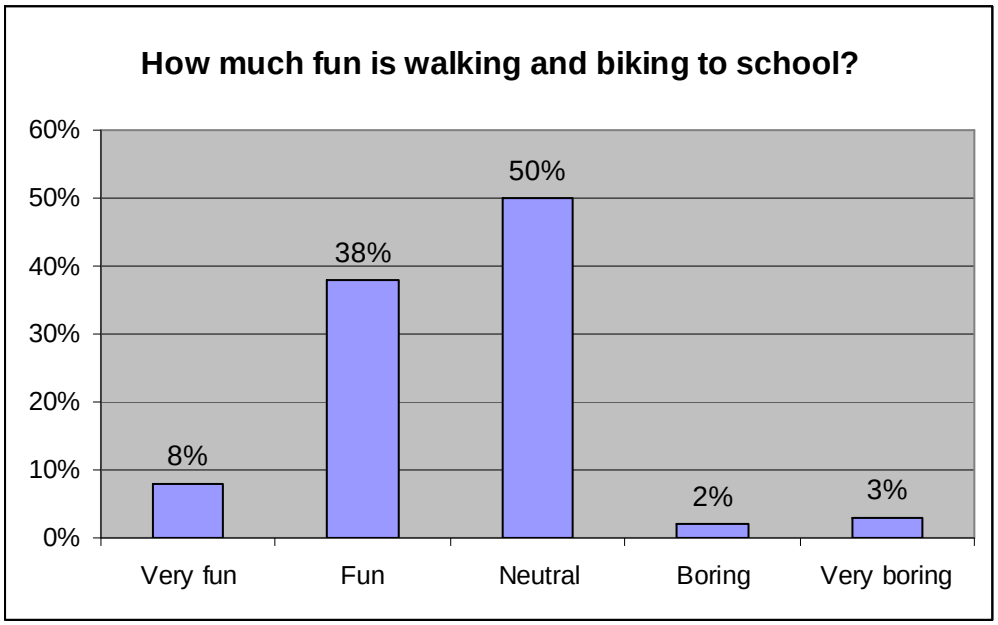


**Figure 26 Enjoyment of Walking or Biking to/from School (Boyette)**

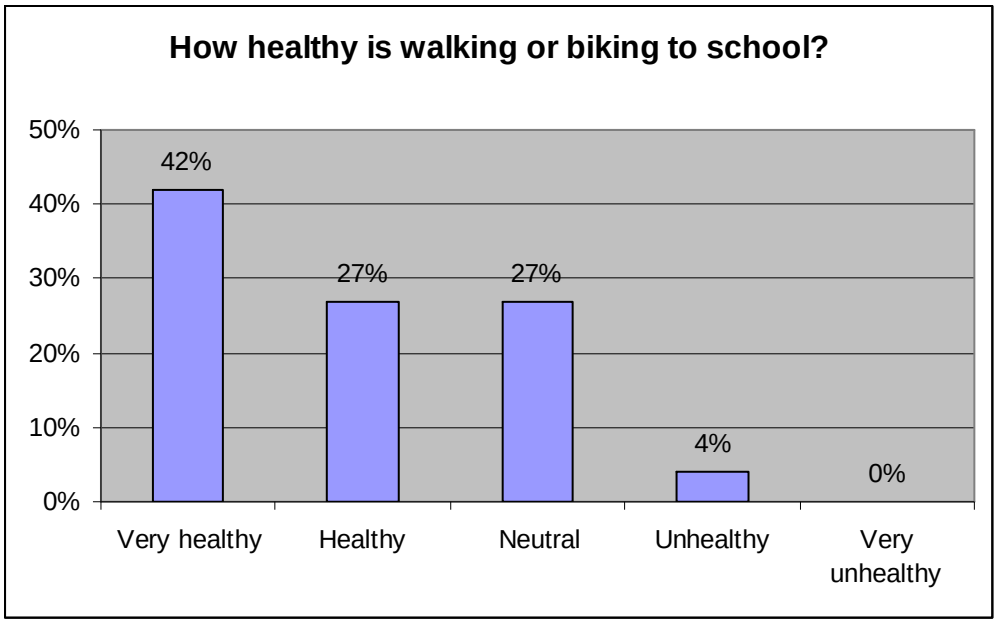


**Figure 27 Distribution of Health of Walking and Biking to/from School (Boyette)**

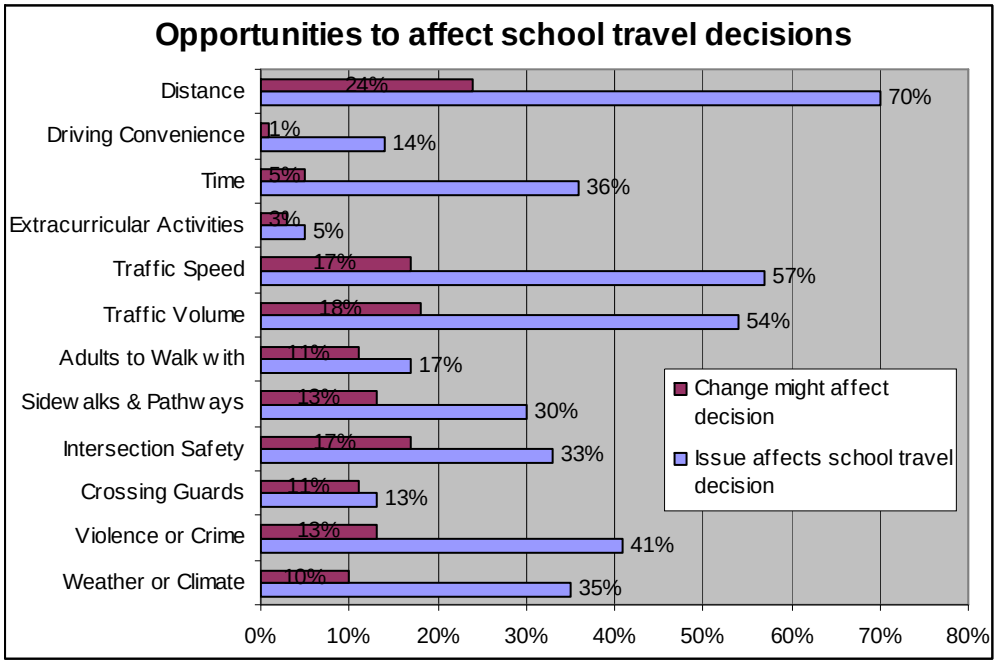


**Figure 28 Ranking of Factors Affecting Travel Mode (Boyette)**

## A.2 Buckhorn Elementary School

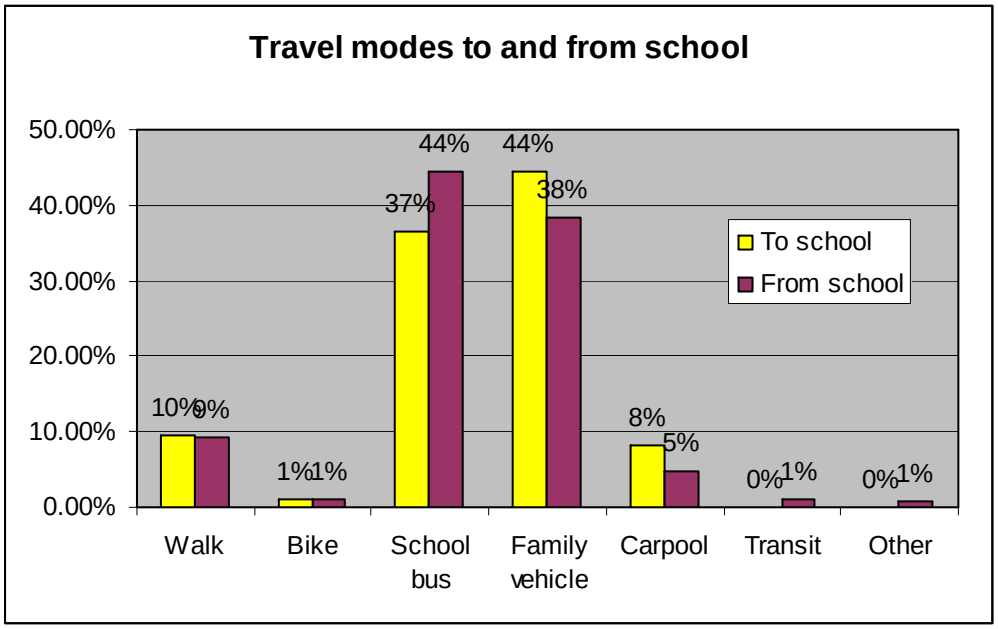


**Figure 29 Distribution of Student Travel Modes to/from School (Buckhorn)**

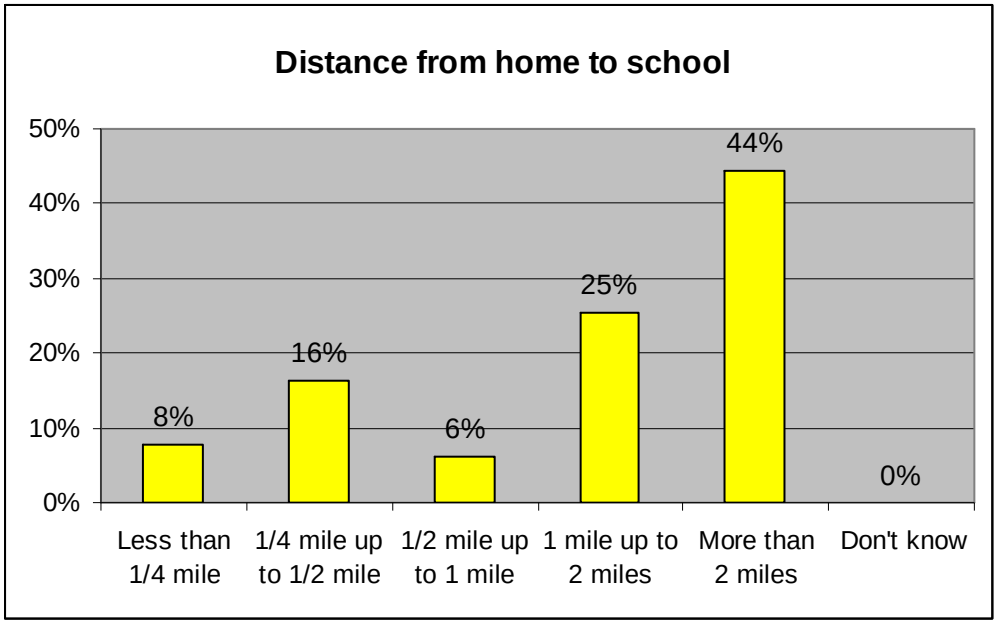


**Figure 30 Distribution of Distance from Home to School (Buckhorn)**

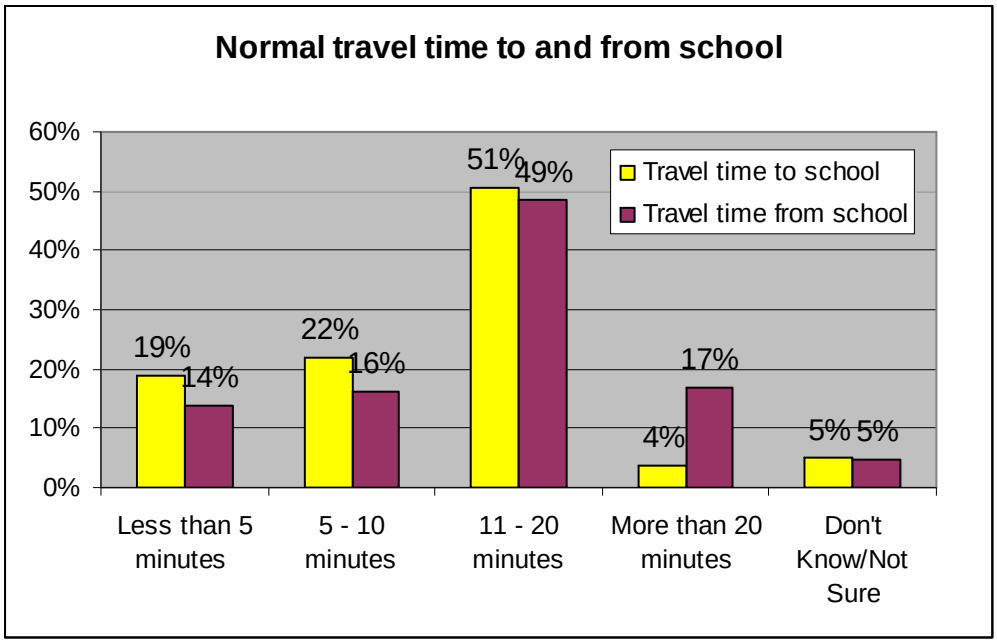


**Figure 31 Normal Travel Time to/ from School (Buckhorn)**

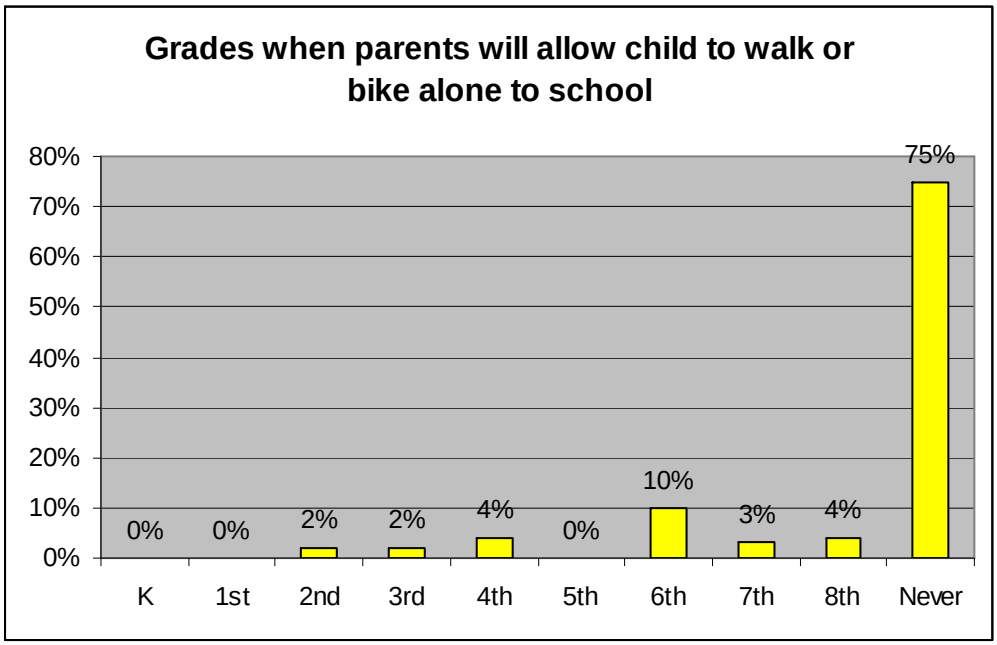


**Figure 32 Distribution of Grade Level for Allowing Child to Walk or Bike Alone to School (Buckhorn)**

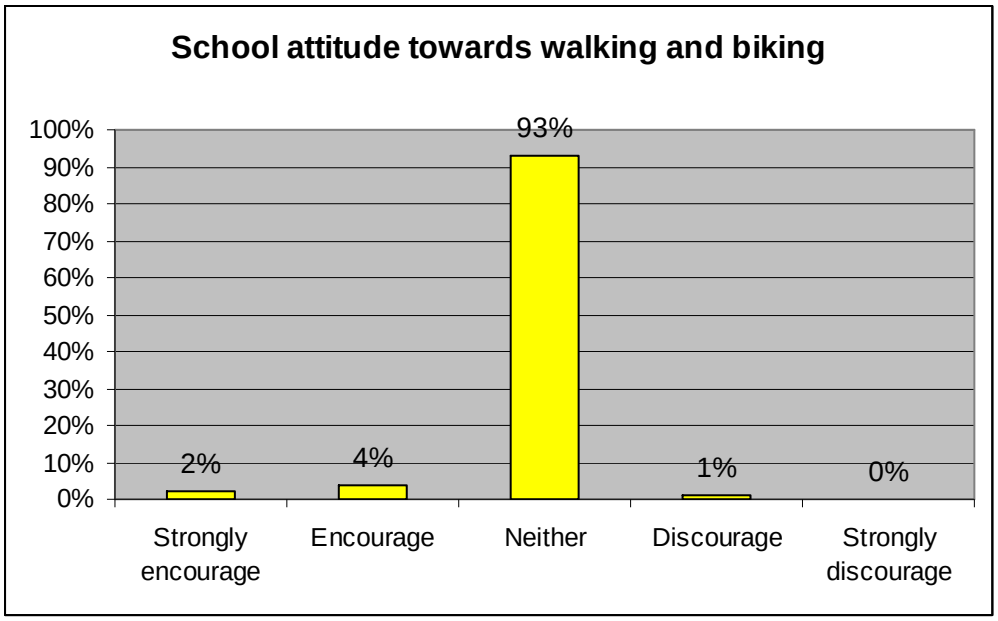


**Figure 33 Distribution of School Attitude on Walking and Biking to/from School (Buckhorn)**

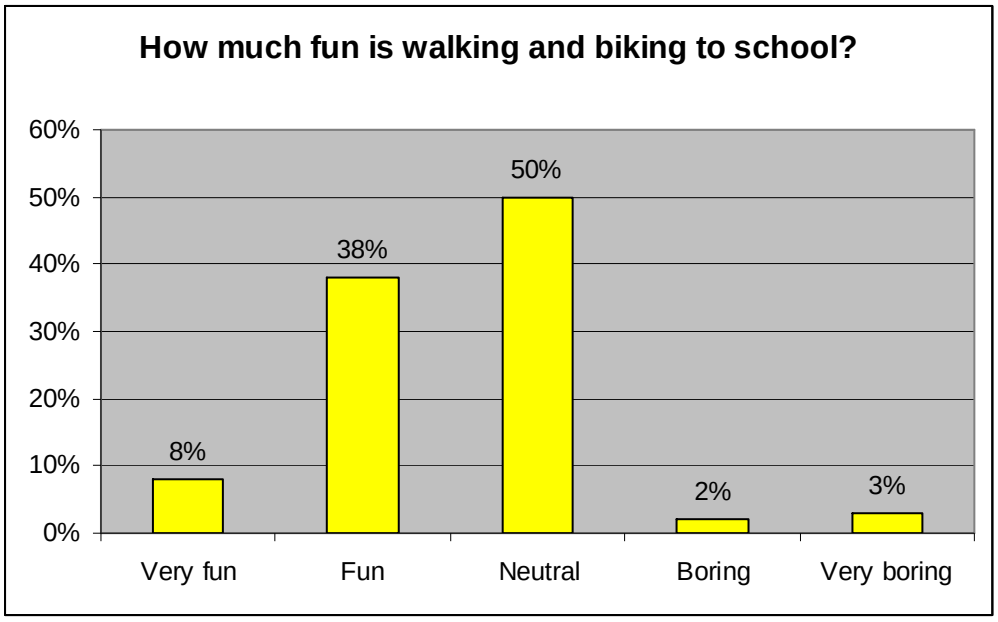


**Figure 34 Enjoyment of Walking or Biking to/from School (Buckhorn)**

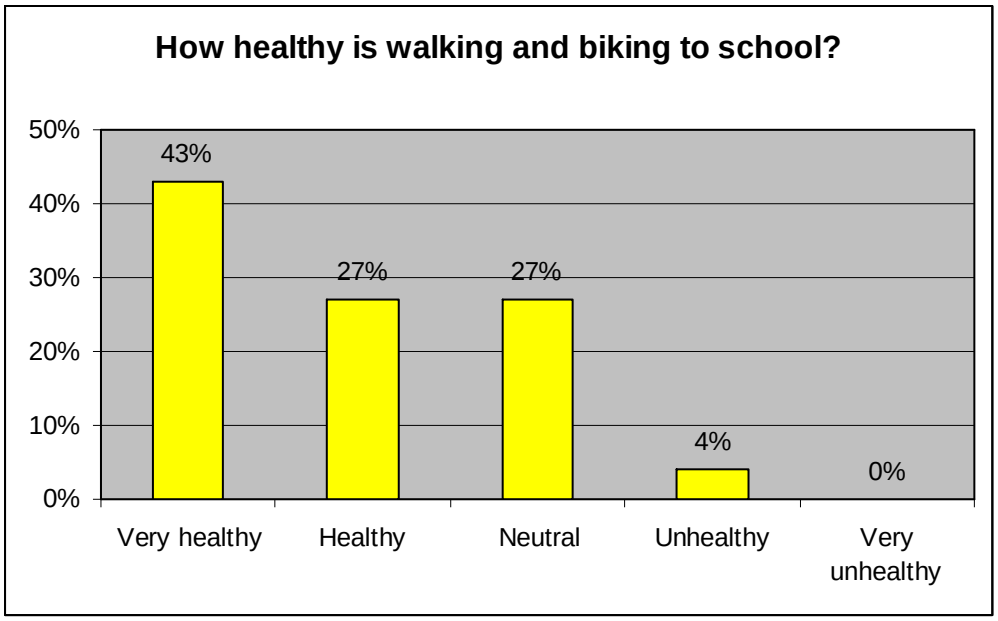


**Figure 35 Distribution on Health of Walking or Biking to/from School (Buckhorn)**

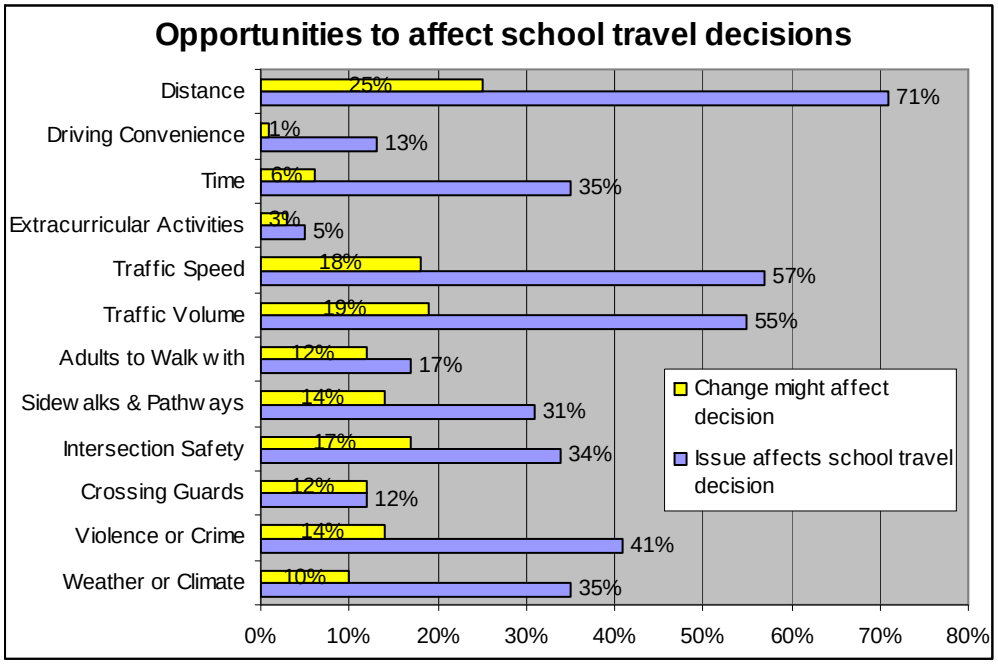


**Figure 36 Ranking of Factors Affecting Travel Mode (Buckhorn)**

## A.3 Burnett Middle School

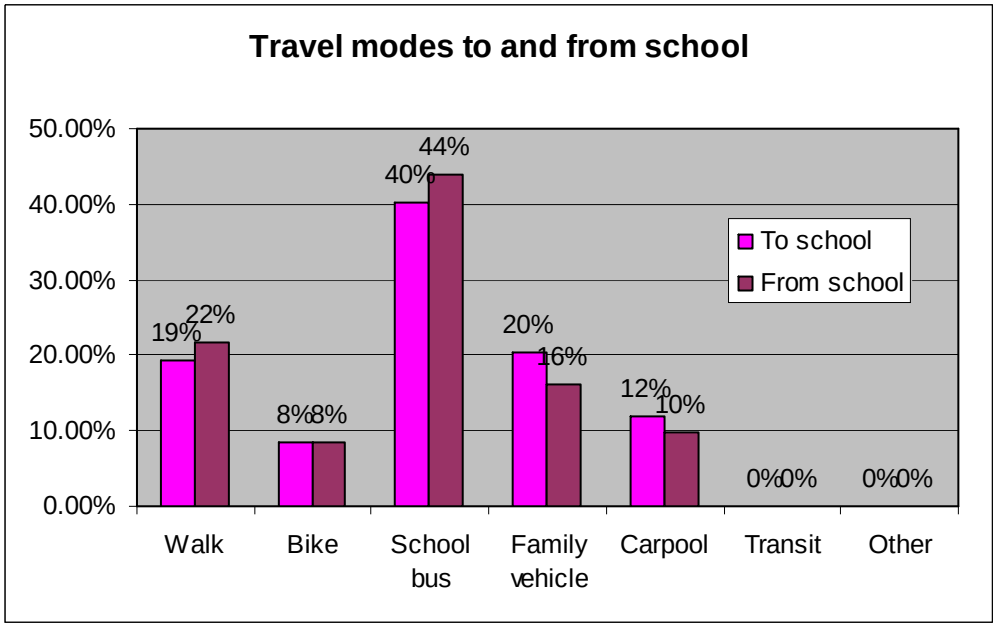


**Figure 37 Distribution of Student Travel Modes to/from School (Burnett)**

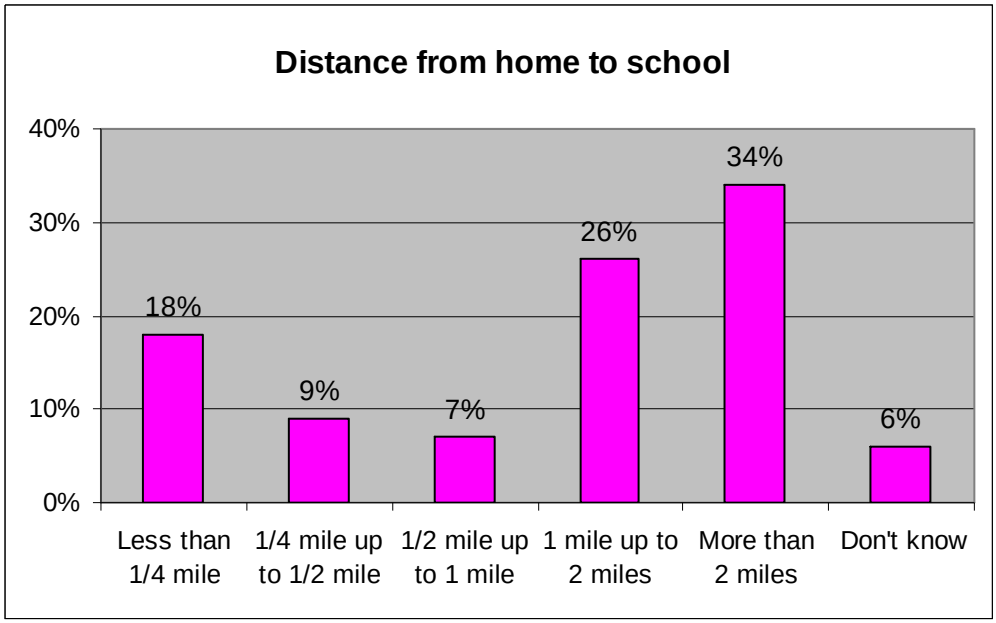


**Figure 38 Distribution of Distance from Home to School (Burnett)**

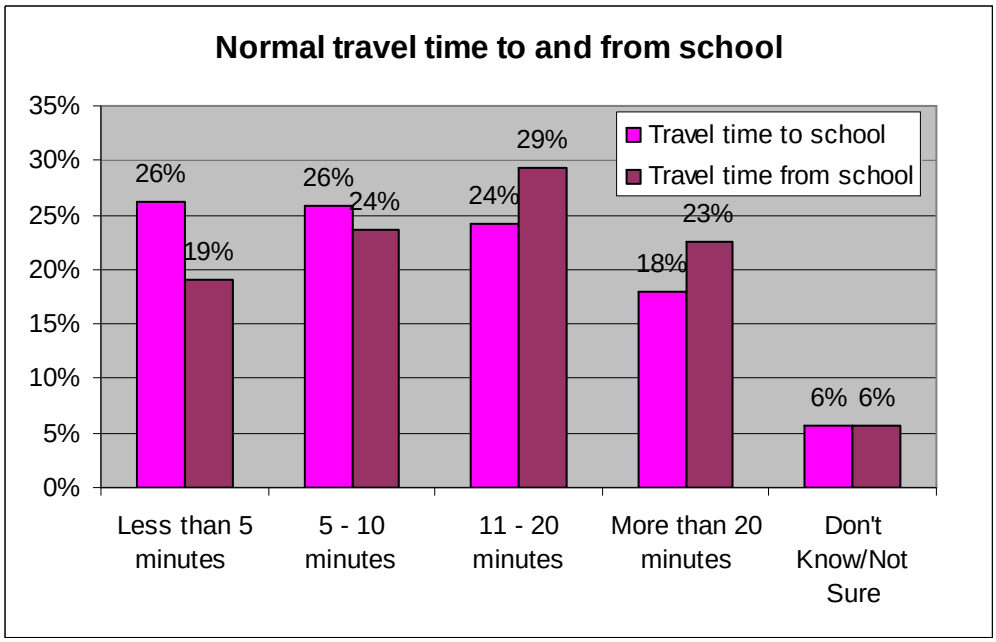


**Figure 39 Normal Travel Time to/from School (Burnett)**

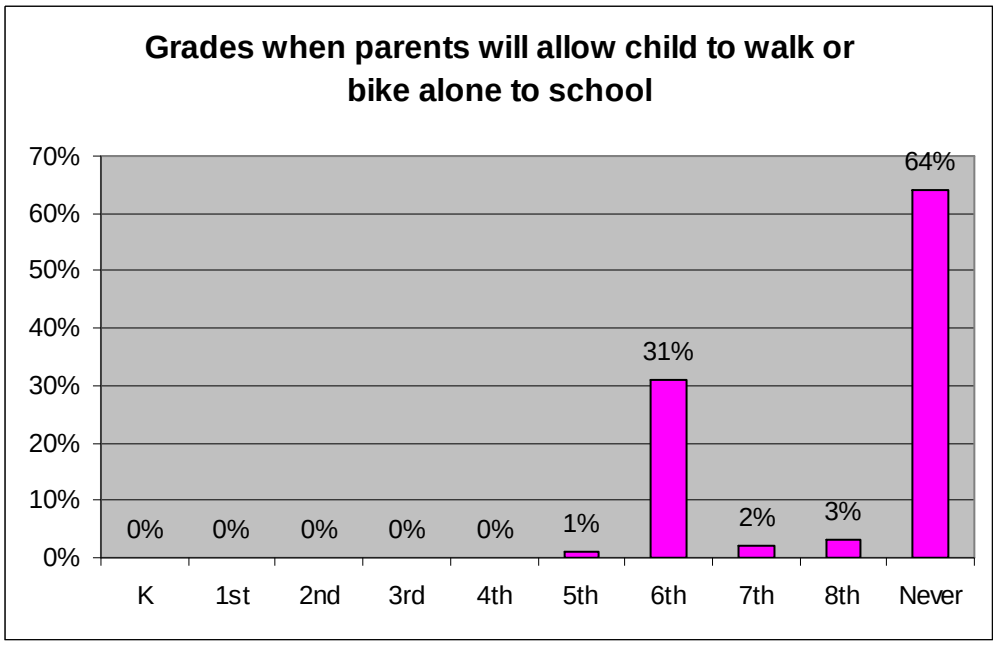


**Figure 40 Distribution of Grade Level for Allowing Child to Walk or Bike Alone to School (Burnett)**

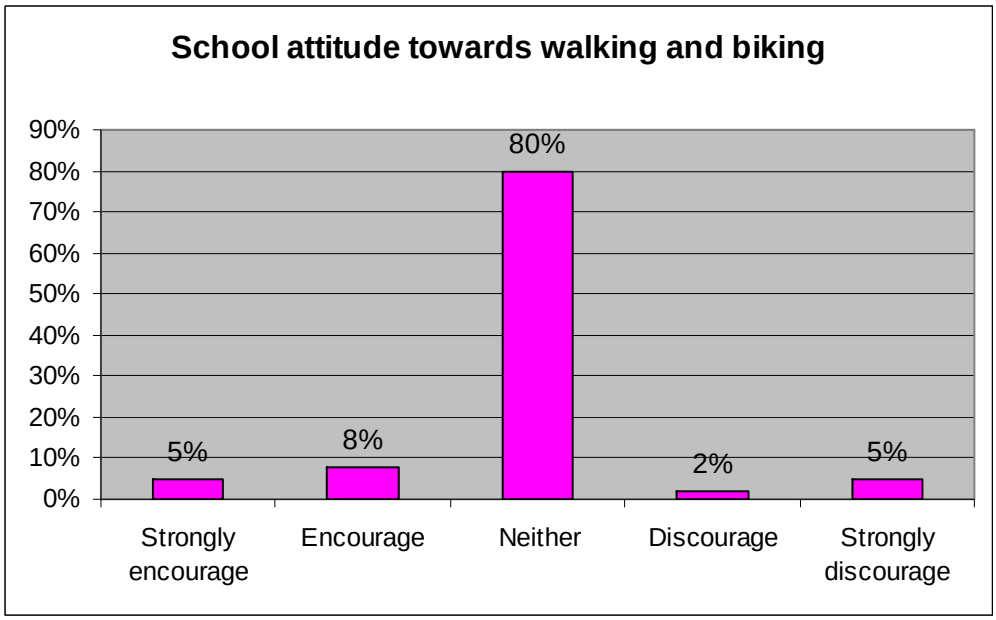


**Figure 41 Distribution of School Attitude on Walking or Biking to/from School (Burnett)**

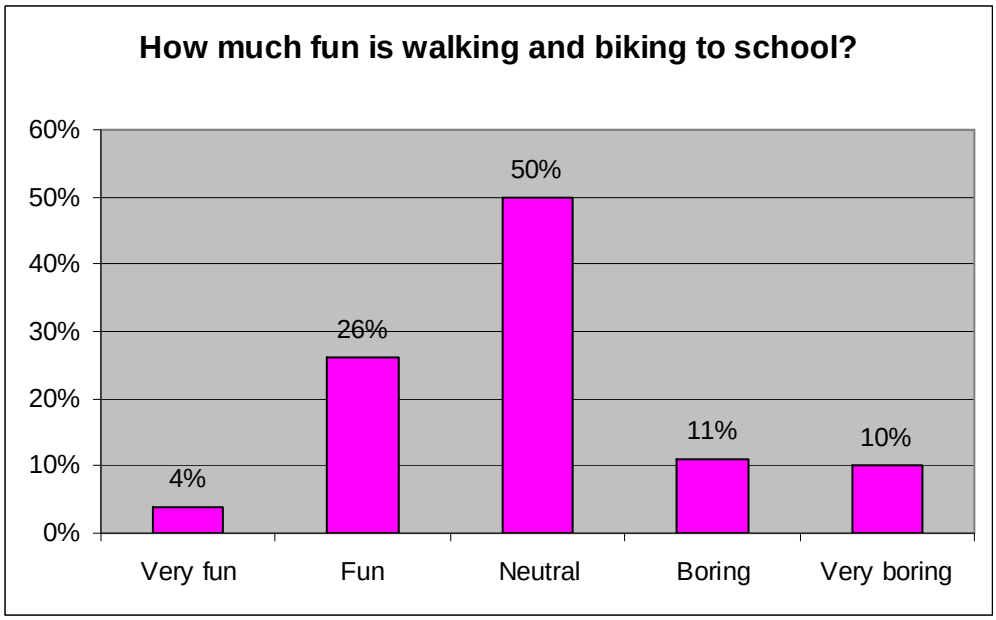


**Figure 42 Distribution of Enjoyment of Walking or Biking to/from School (Burnett)**

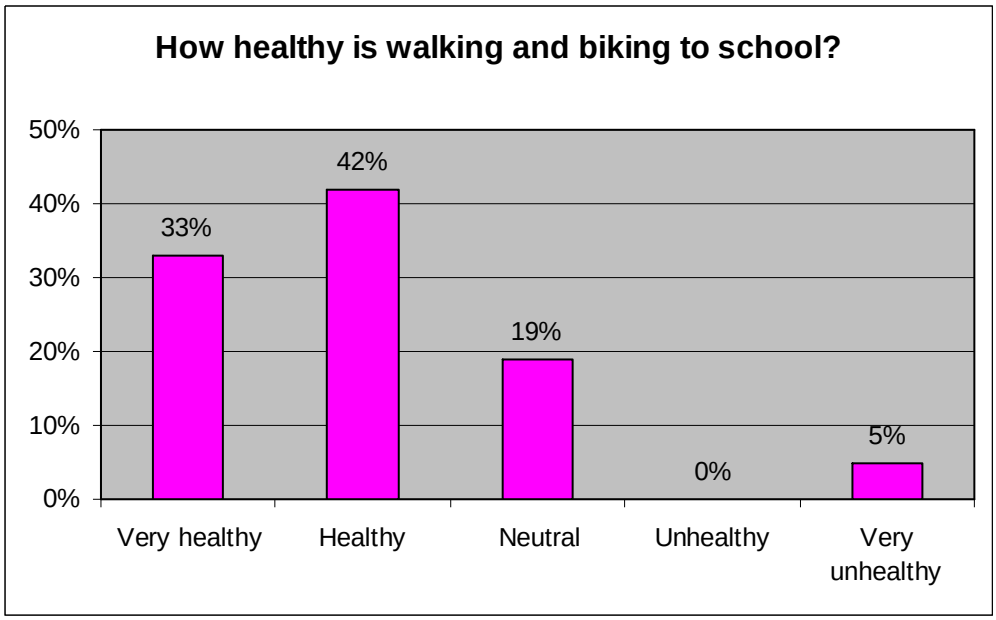


**Figure 43 Distribution of Health of Walking or Biking to/from School (Burnett)**

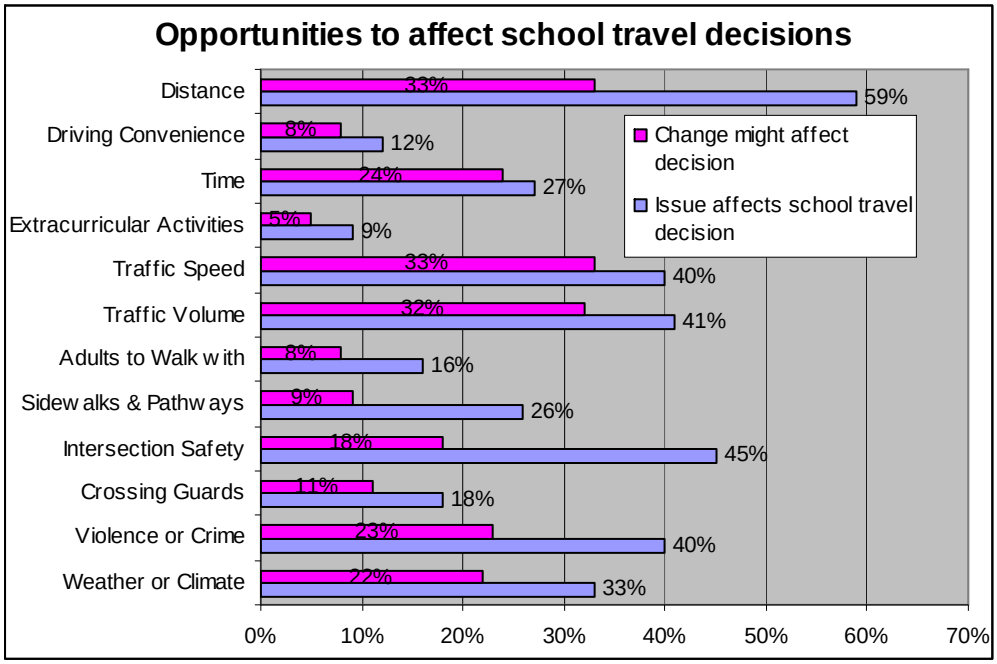


**Figure 44 Ranking of Factors Affecting Travel Mode (Burnett)**

## A.4 Cypress Creek Elementary School

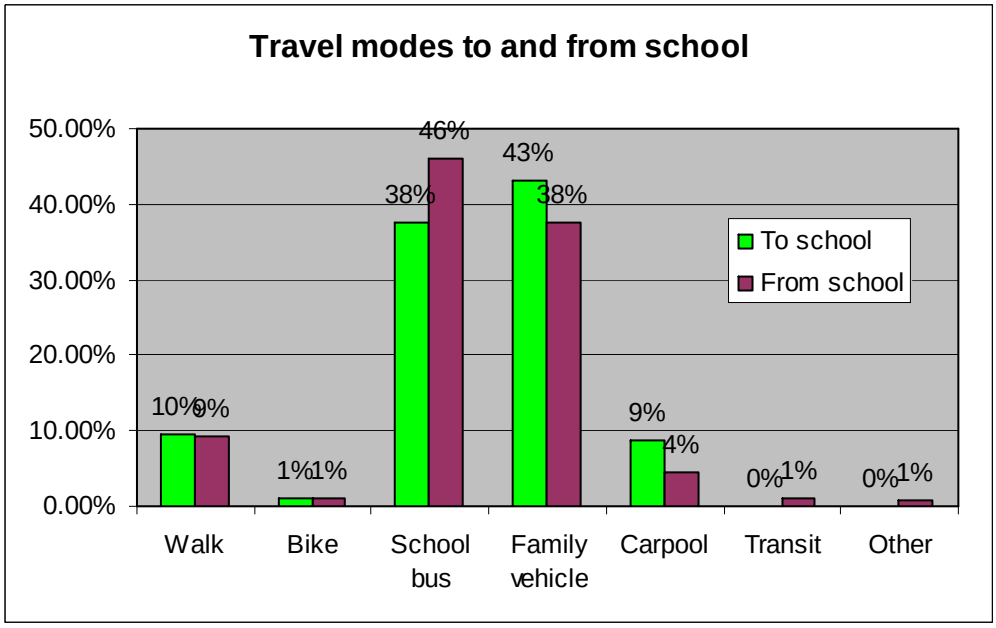


**Figure 45 Distribution of Student Travel Modes to/from School (Cypress Creek)**

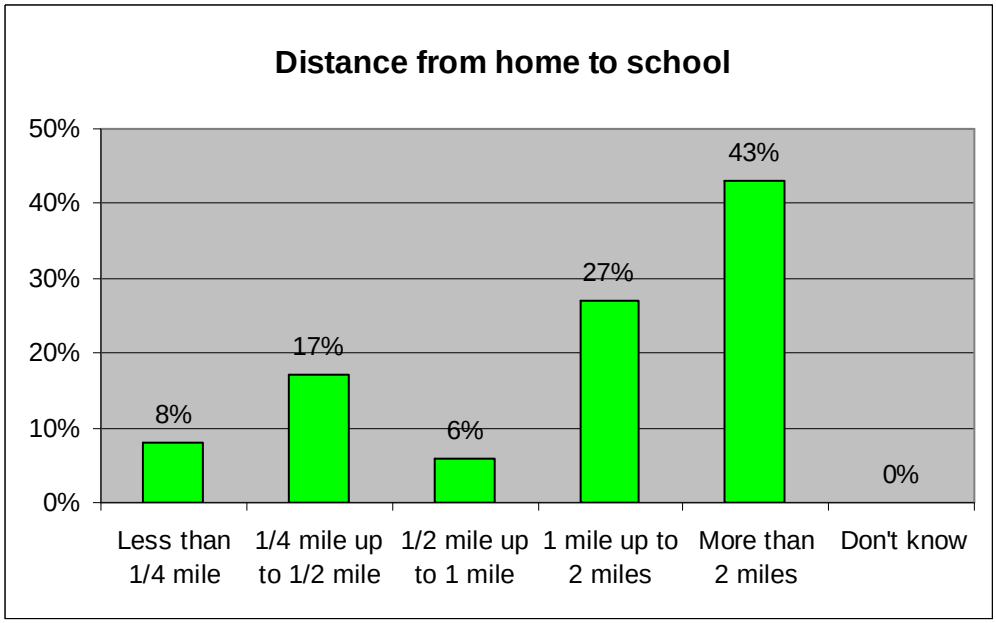


**Figure 46 Distribution of Distance from Home to School (Cypress Creek)**

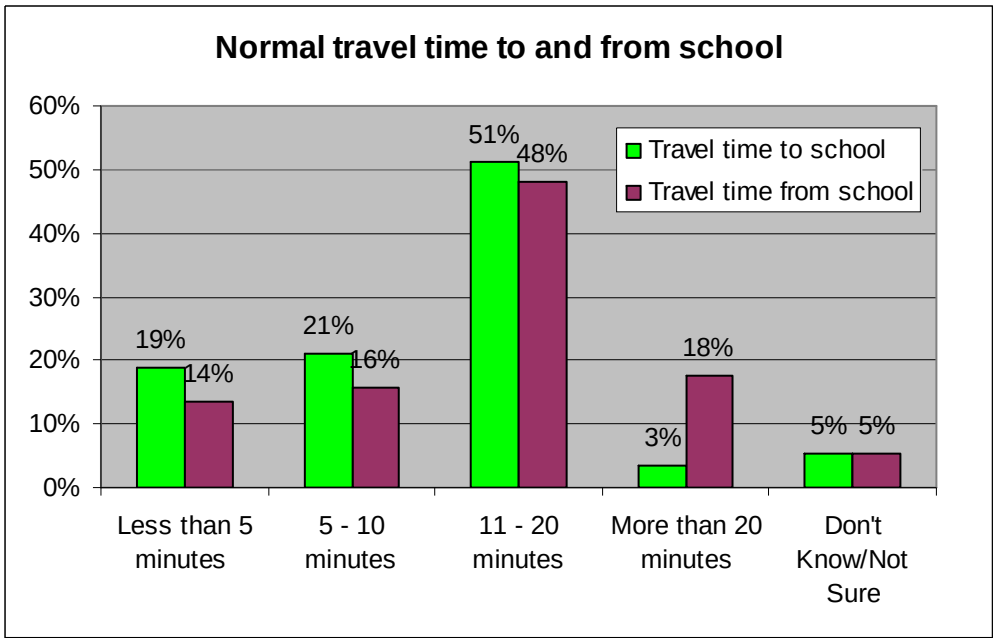


**Figure 47 Normal Travel Time to/from School (Cypress Creek)**

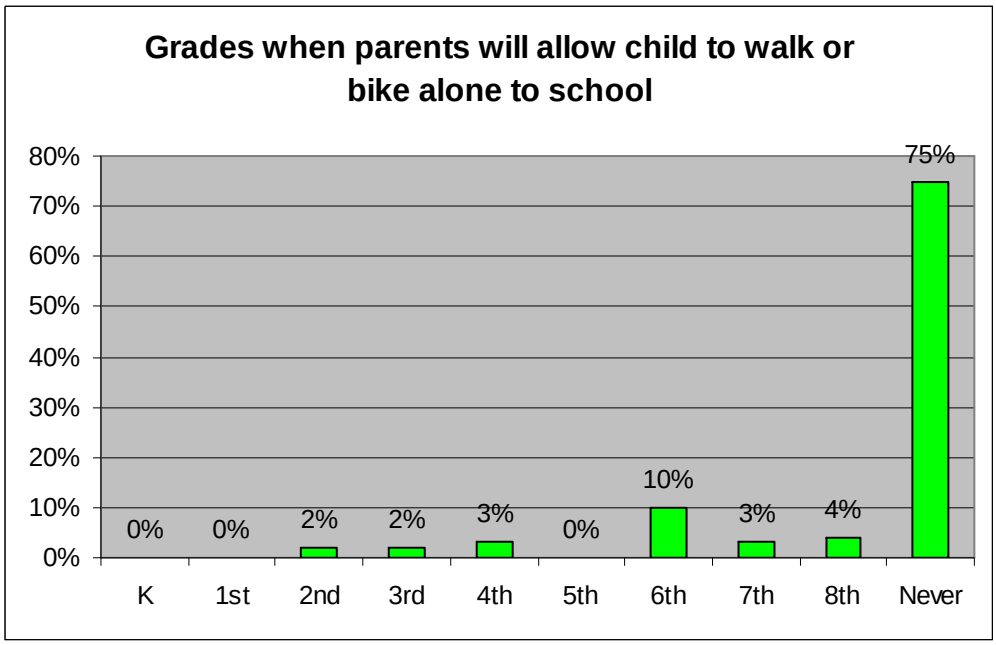


**Figure 48 Distribution of Grade Level for Allowing Child to Walk or Bike Alone to School (Cypress Creek)**

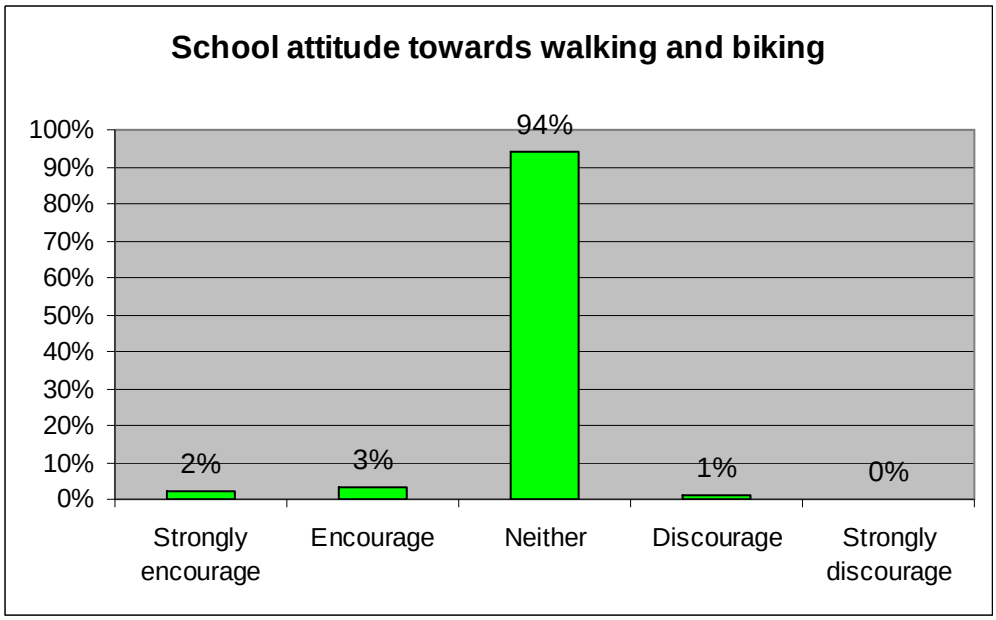


**Figure 49 Distribution of School Attitudes on Walking or Biking to/from School (Cypress Creek)**

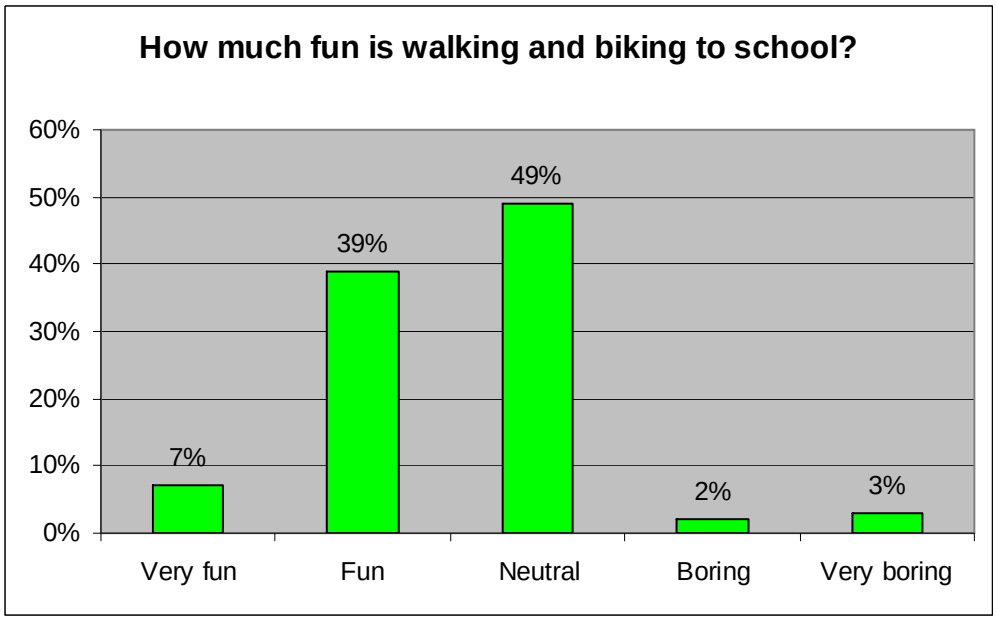


**Figure 50 Distribution of Enjoyment of Walking or Biking to/from School (Cypress Creek)**

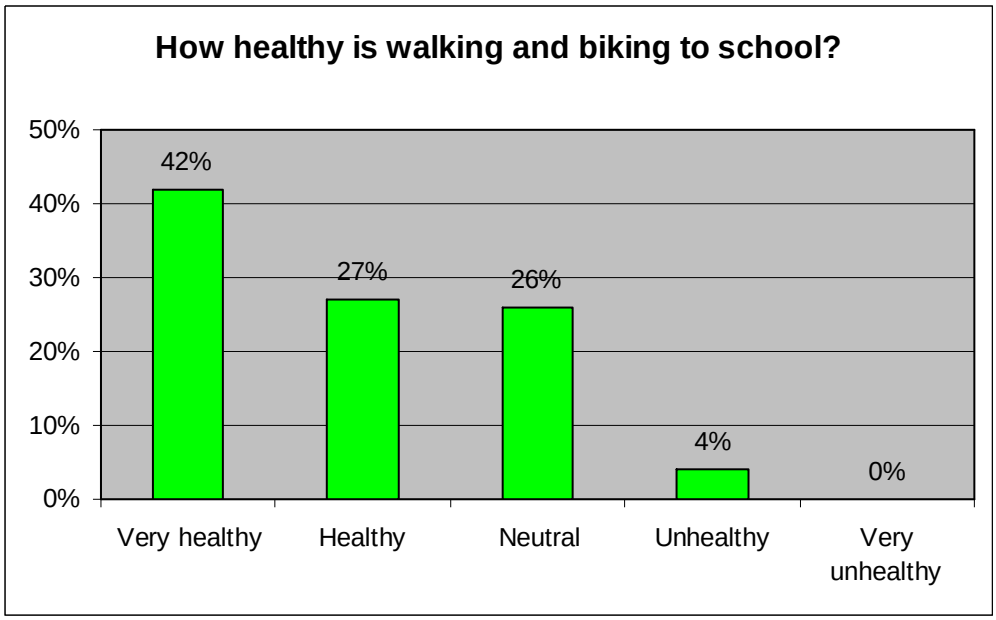


**Figure 51 Distribution of Health of Walking or Biking to/from School (Cypress Creek)**

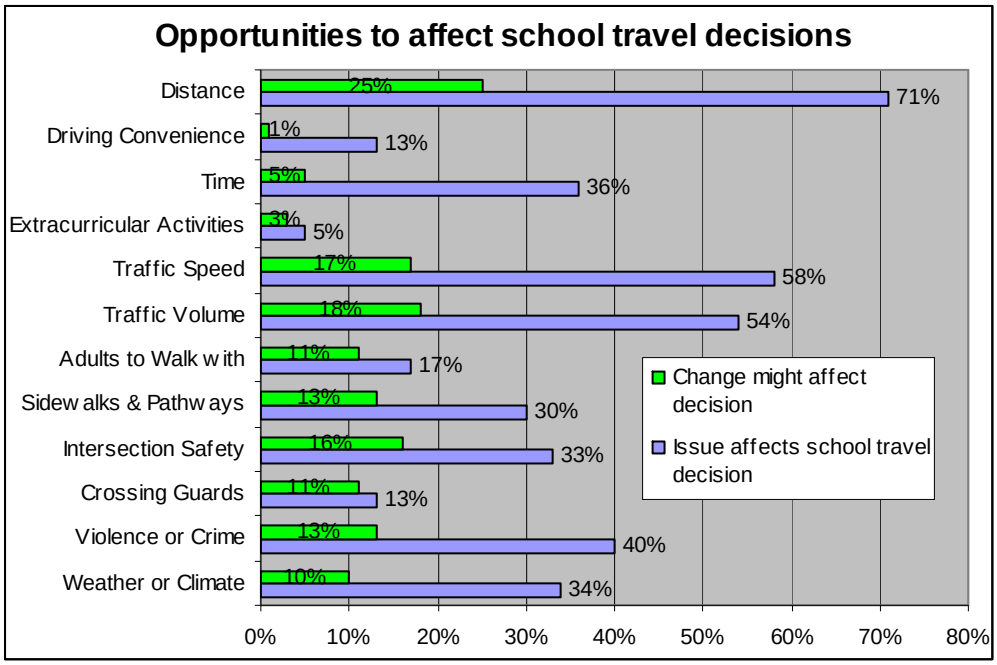


**Figure 52 Ranking of Factors Affecting Travel Mode (Cypress Creek)**

## A.5 Dowdell Middle School

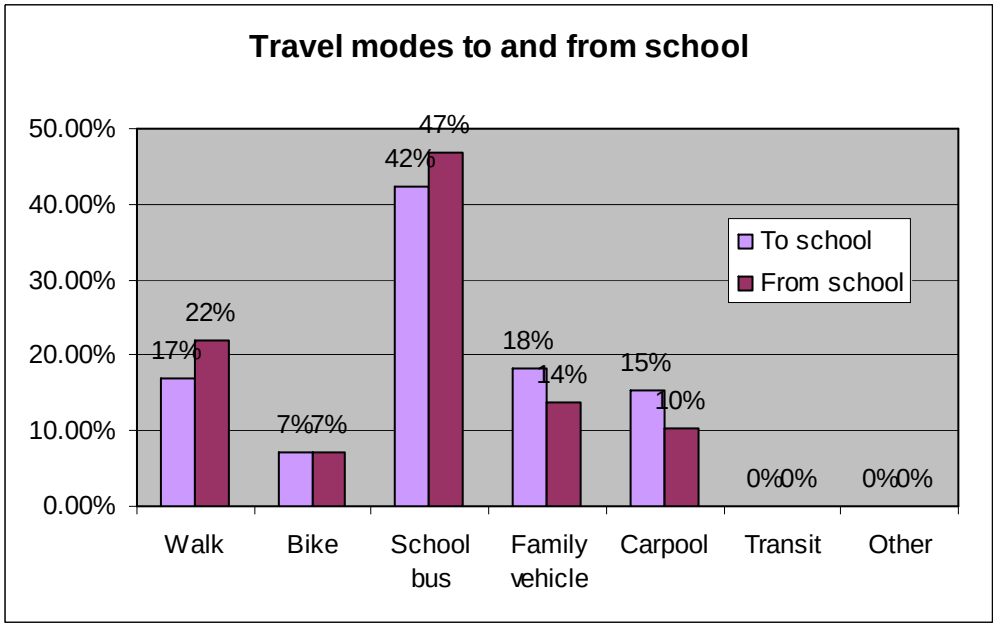


**Figure 53 Distribution of Student Travel Modes to/from School (Dowdell)**

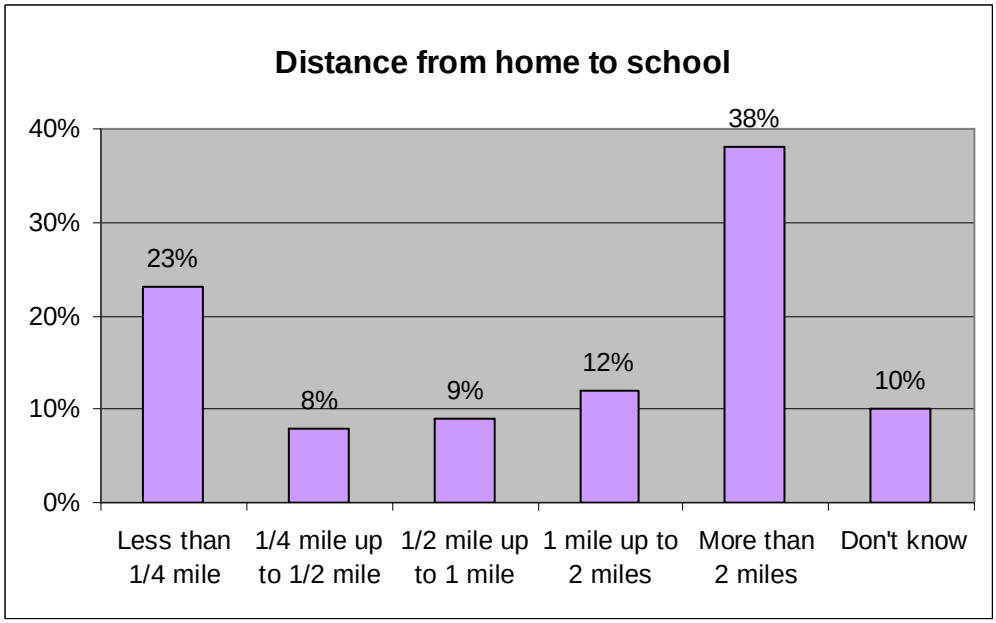


**Figure 54 Distribution of Distance from Home to School (Dowdell)**

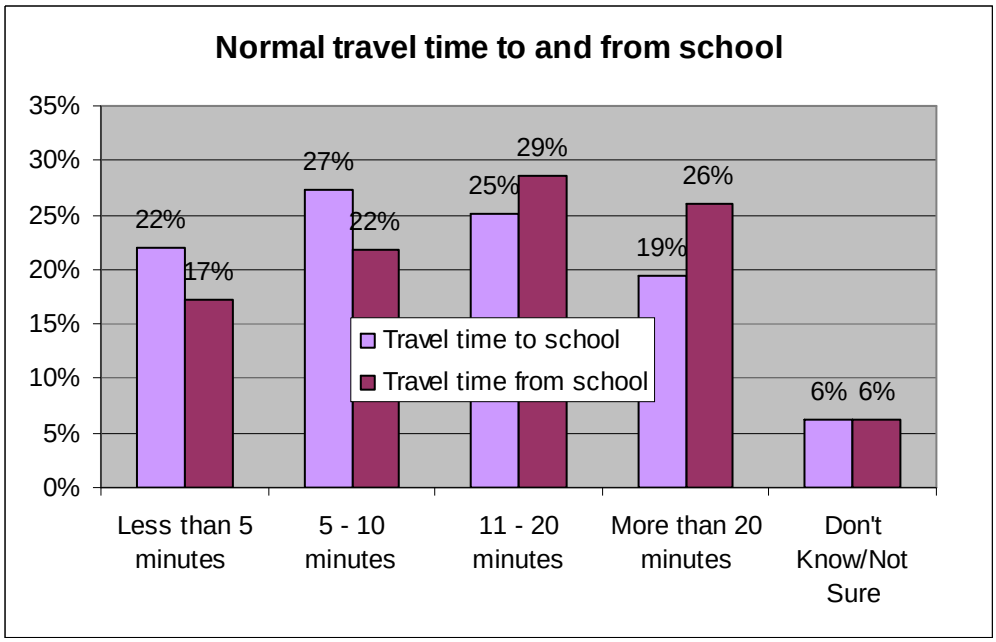


**Figure 55 Normal Travel Time to/from School (Dowdell)**

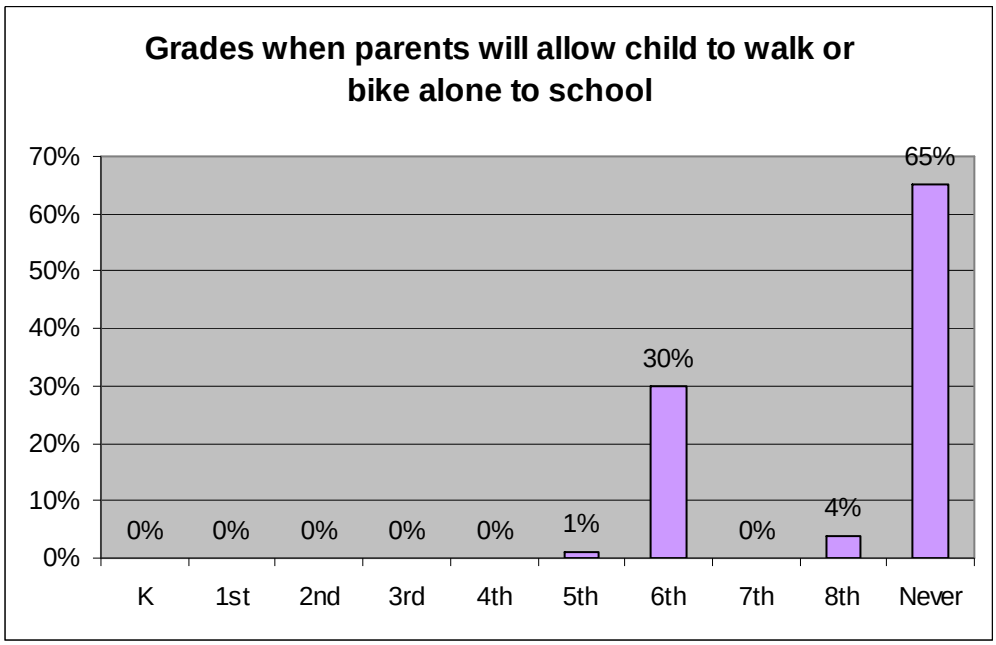


**Figure 56 Distribution of Grade Level for Allowing Child to Walk or Bike Alone to School (Dowdell)**

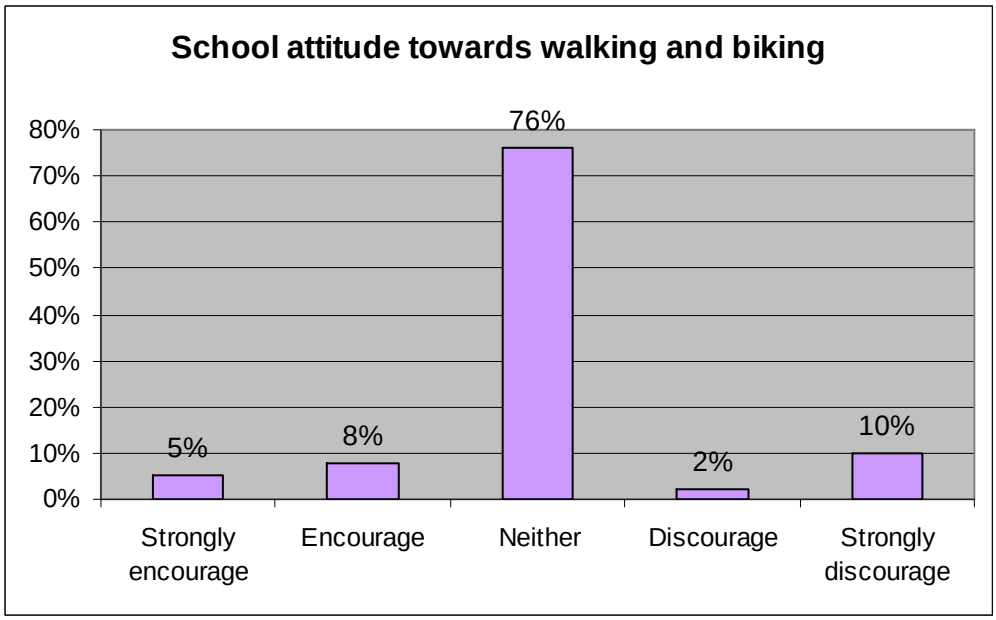


**Figure 57 Distribution of School Attitudes on Walking or Biking to/from School (Dowdell)**

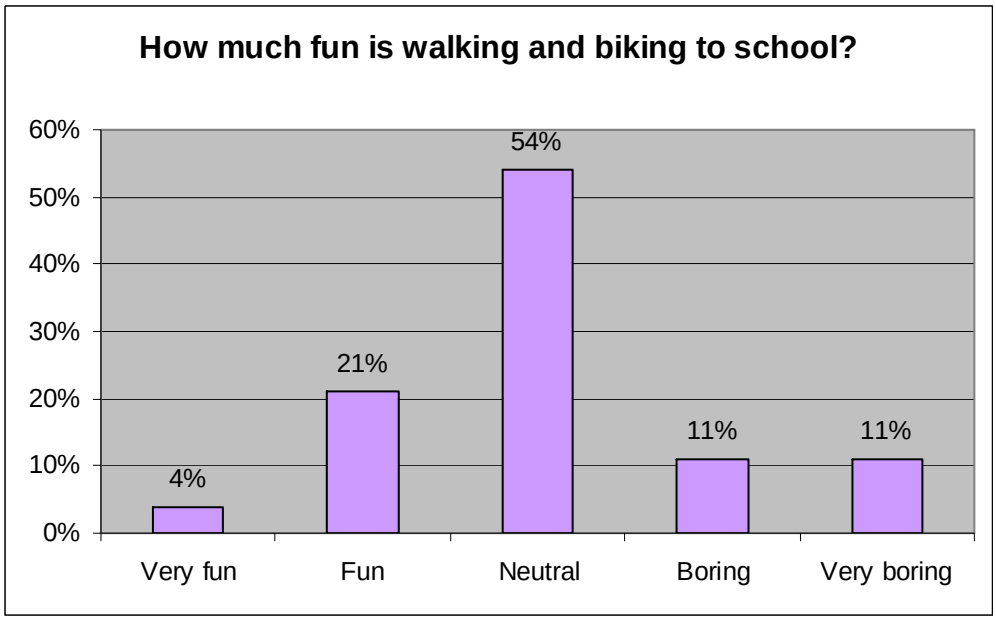


**Figure 58 Distribution of Enjoyment of Walking or Biking to/from School (Dowdell)**

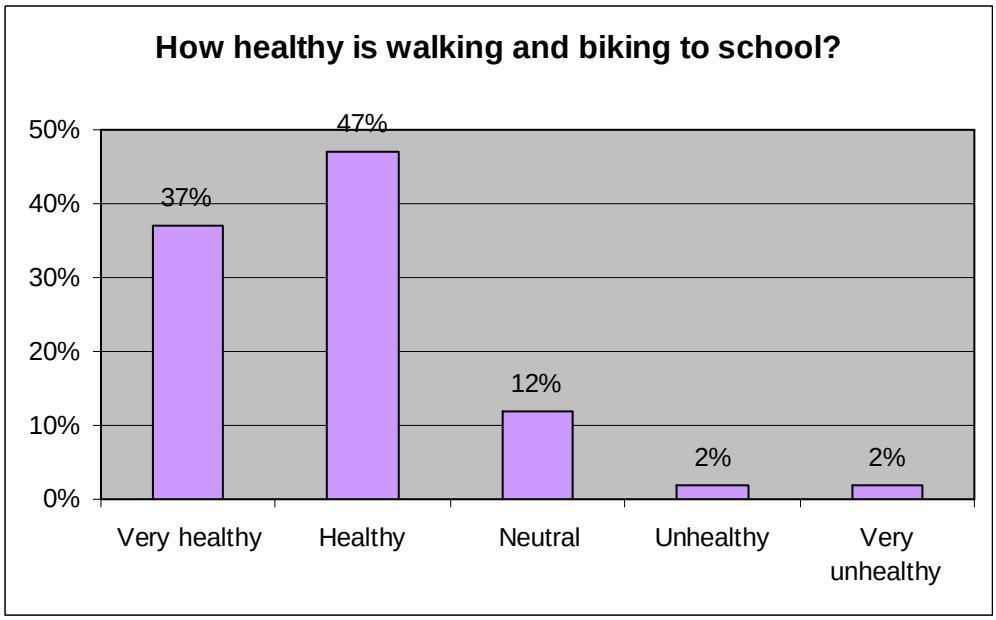


**Figure 59 Distribution of Health of Walking or Biking to/from School (Dowdell)**

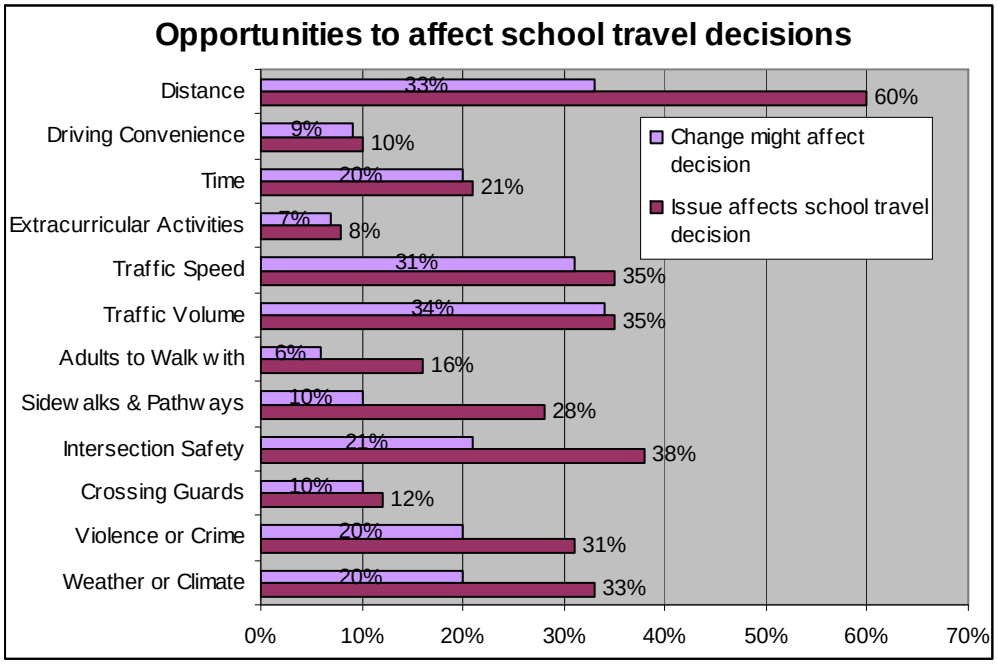


**Figure 60 Ranking of Factors Affecting Travel Mode (Dowdell)**

## A.6 Learning Gate Community School

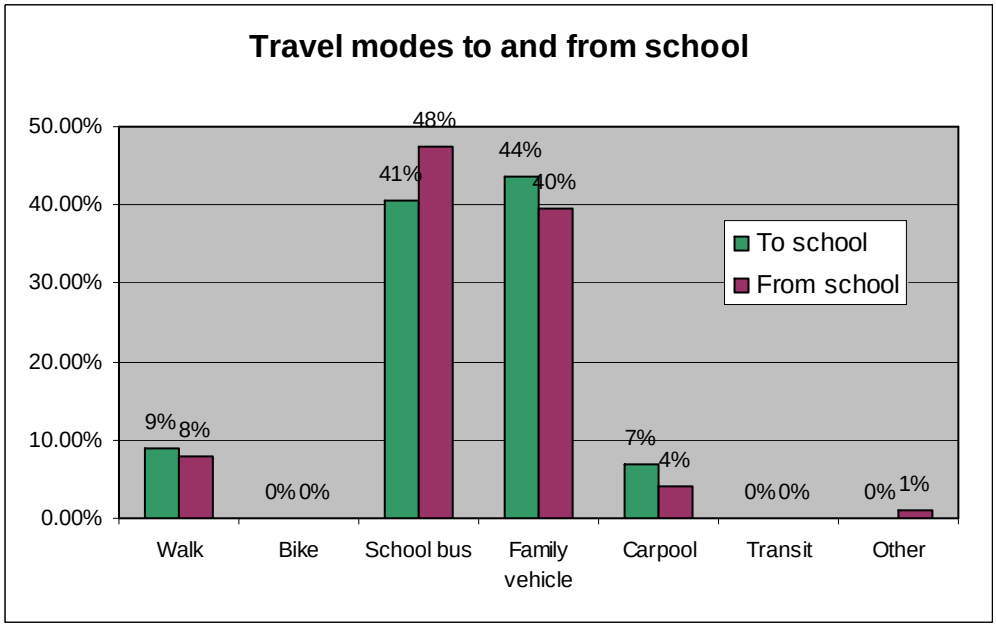


**Figure 61 Distribution of Student Travel Modes to/from School (Learning Gate)**

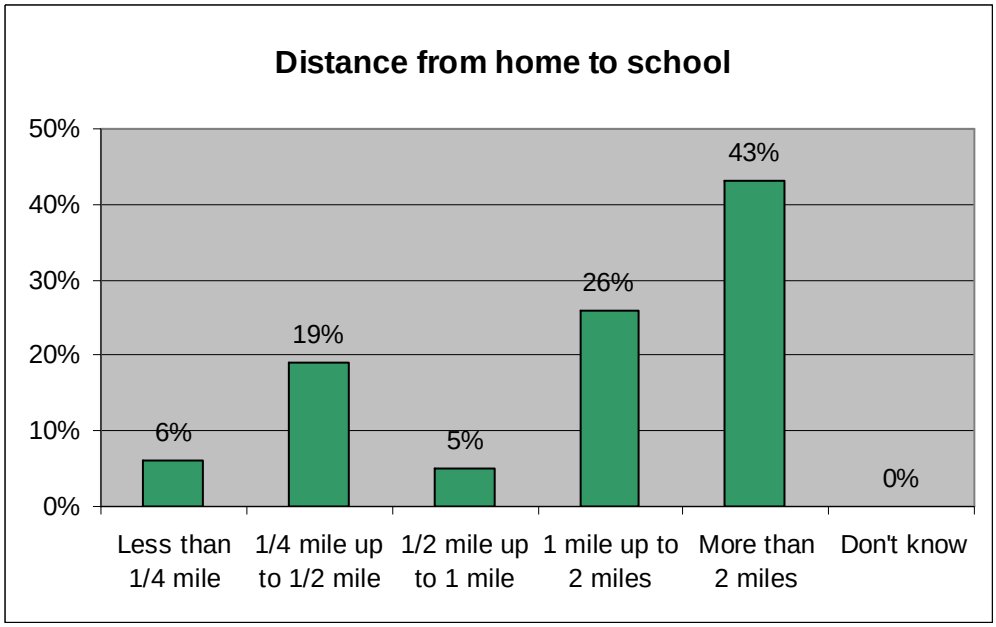


**Figure 62 Distribution of Distance from Home to School (Learning Gate)**

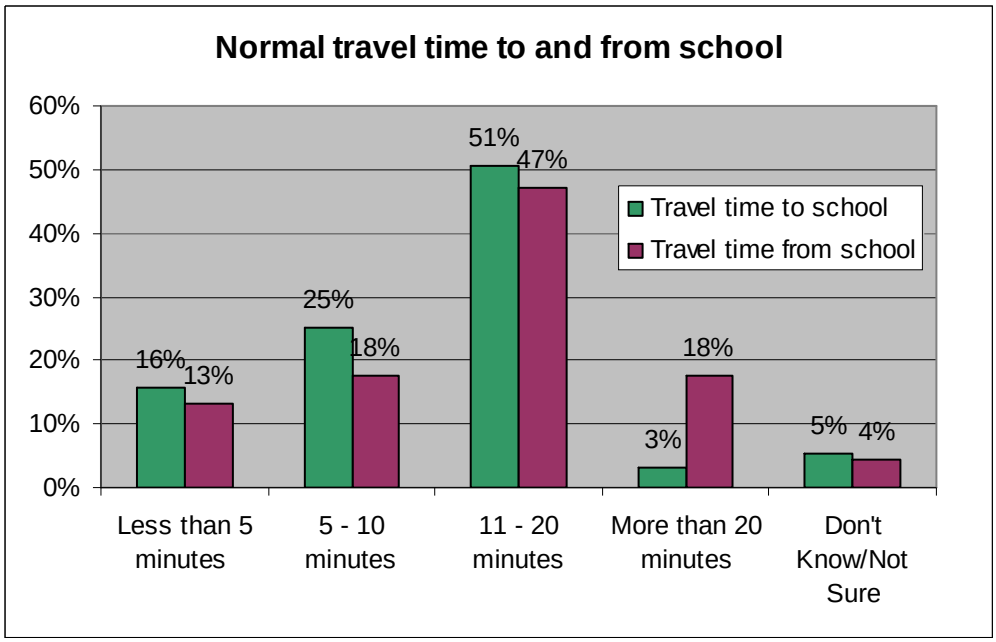


**Figure 63 Normal Travel Time to and from School (Learning Gate)**

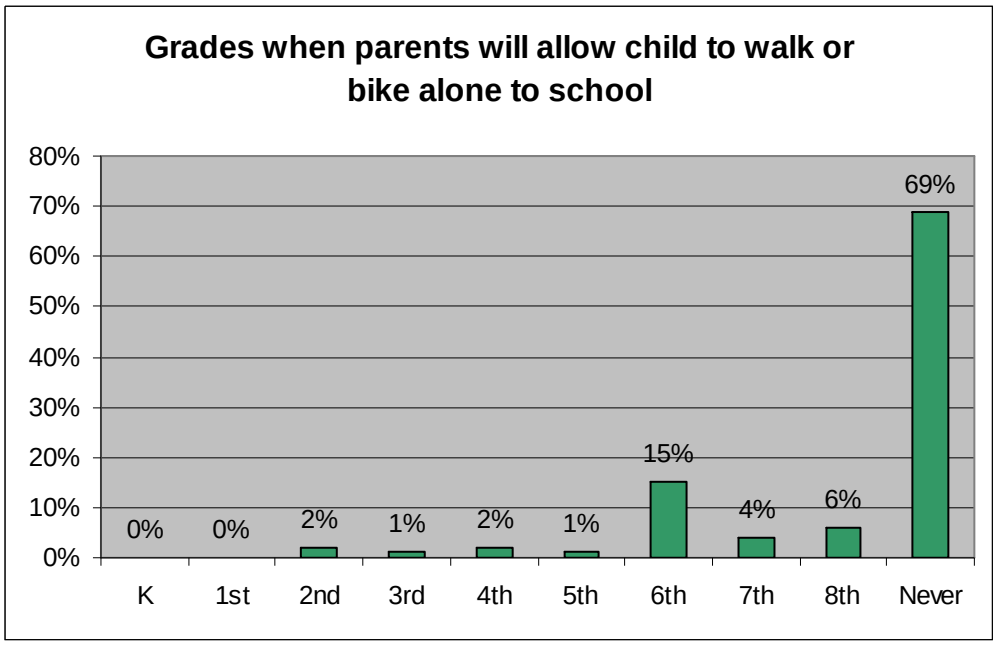


**Figure 64 Distribution of Grades Allowing Child to Walk or Bike Alone to School (Learning Gate)**

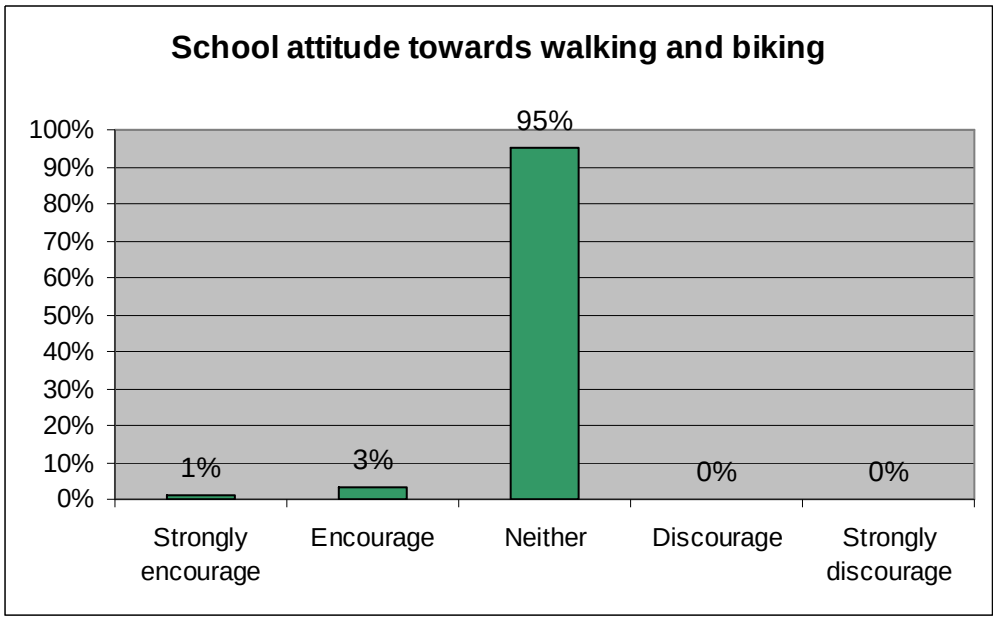


**Figure 65 Distribution of School Attitude on Walking or Biking to/from School (Learning Gate)**

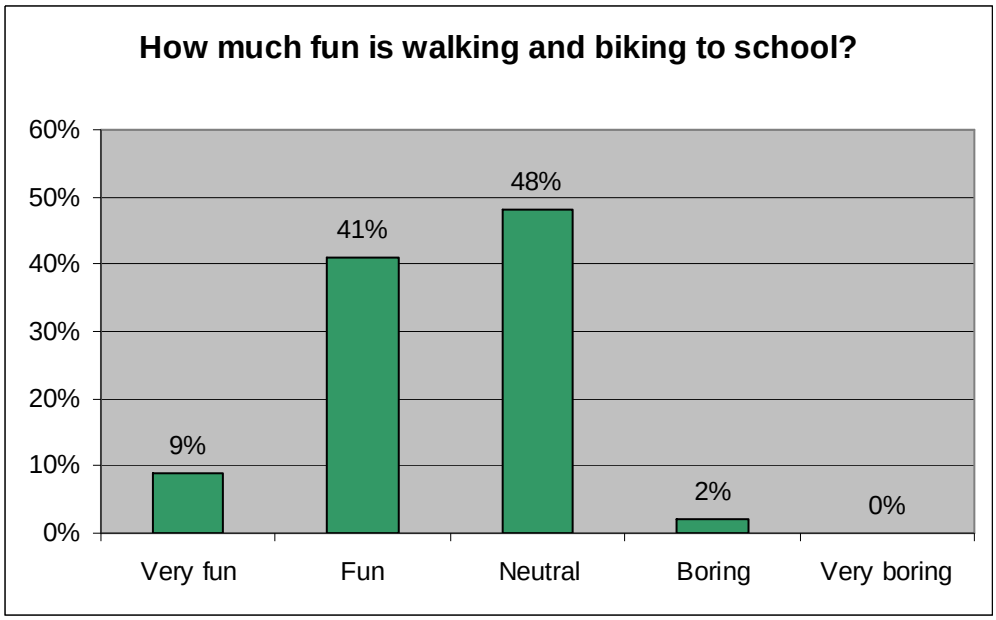


**Figure 66 Distribution of Enjoyment of Walking or Biking to/from School (Learning Gate)**

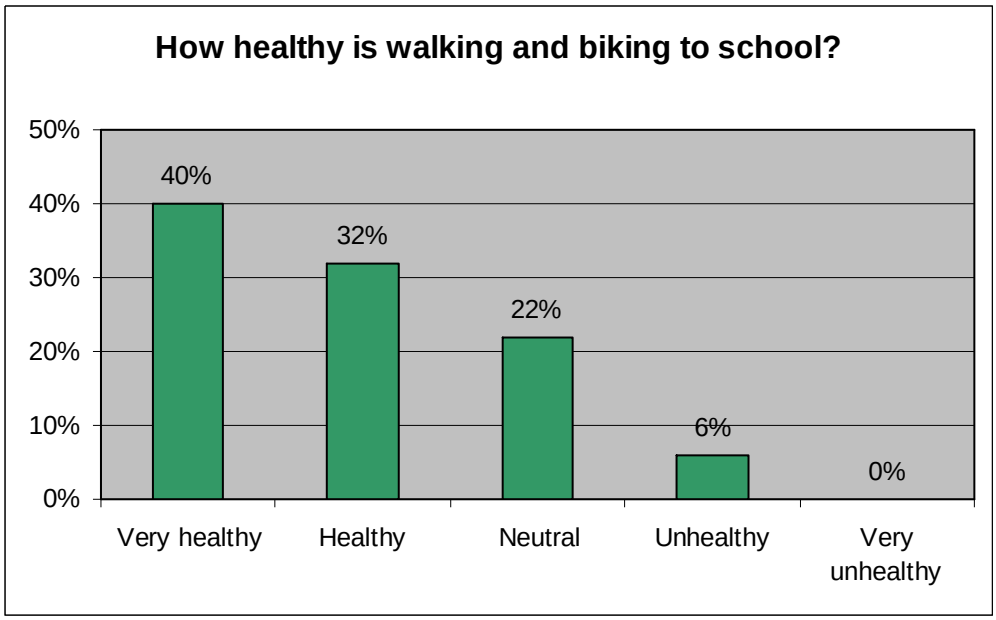


**Figure 67 Distribution of Health of Walking or Biking to/from School (Learning Gate)**

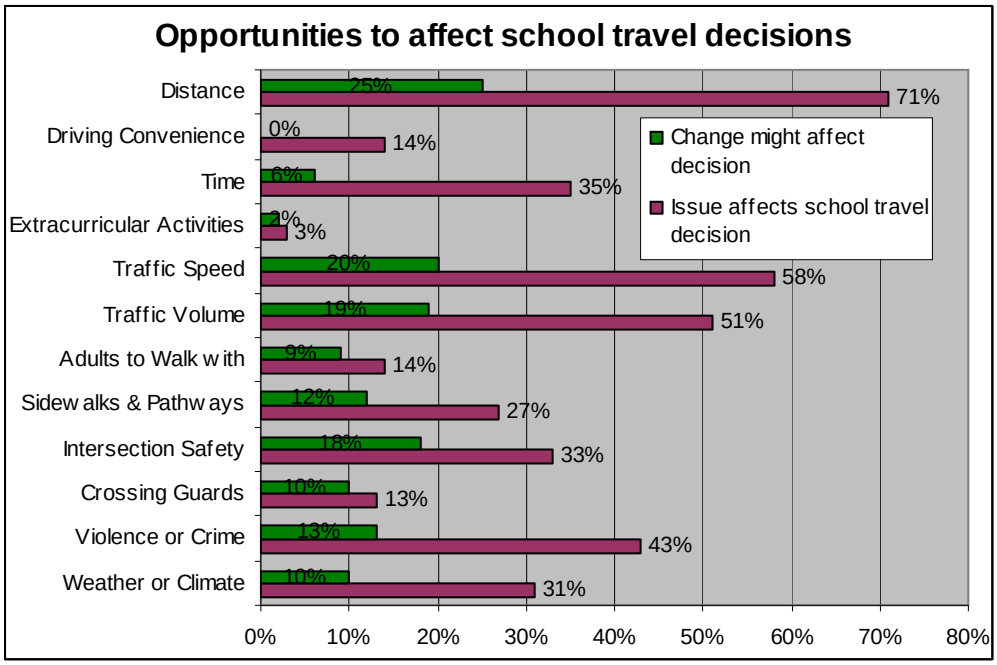


**Figure 68 Ranking of Factors Affecting Travel Mode (Learning Gate)**

## A.7 Lutz Elementary School

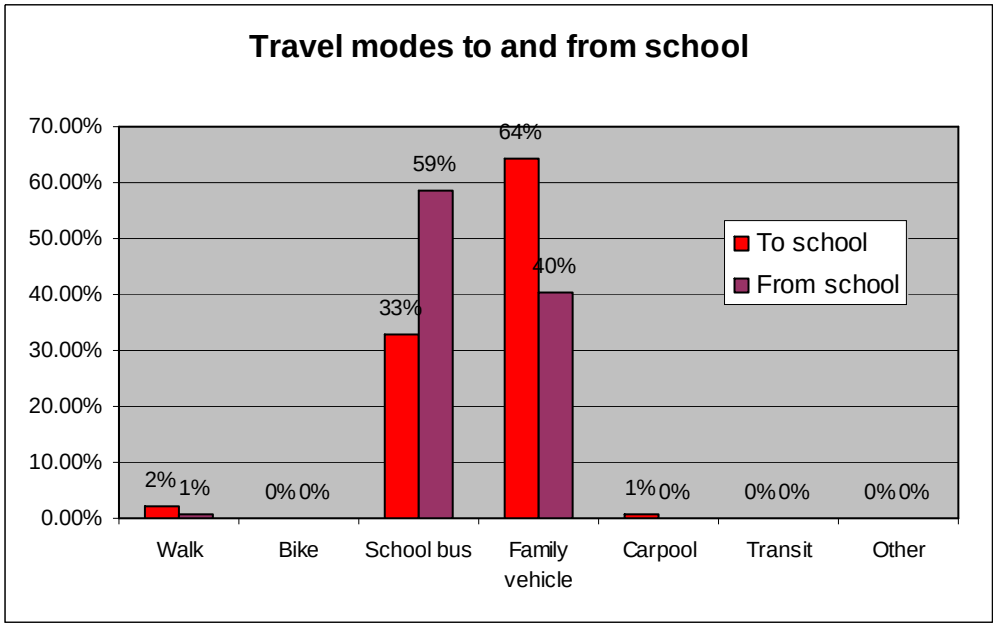


**Figure 69 Distribution of Student Travel Modes to/from School (Lutz)**

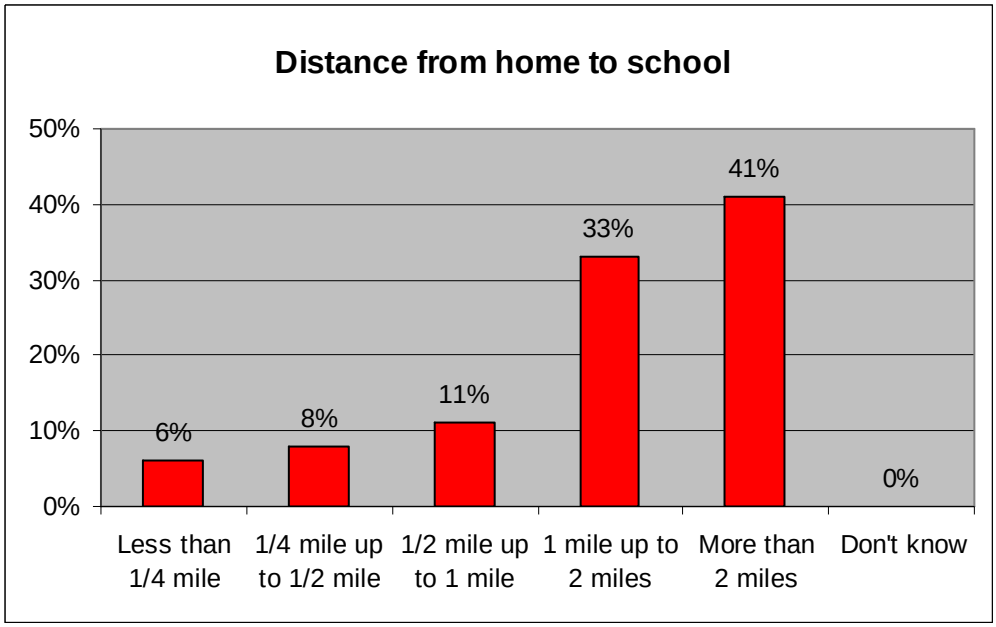


**Figure 70 Distribution of Distance from Home to School (Lutz)**

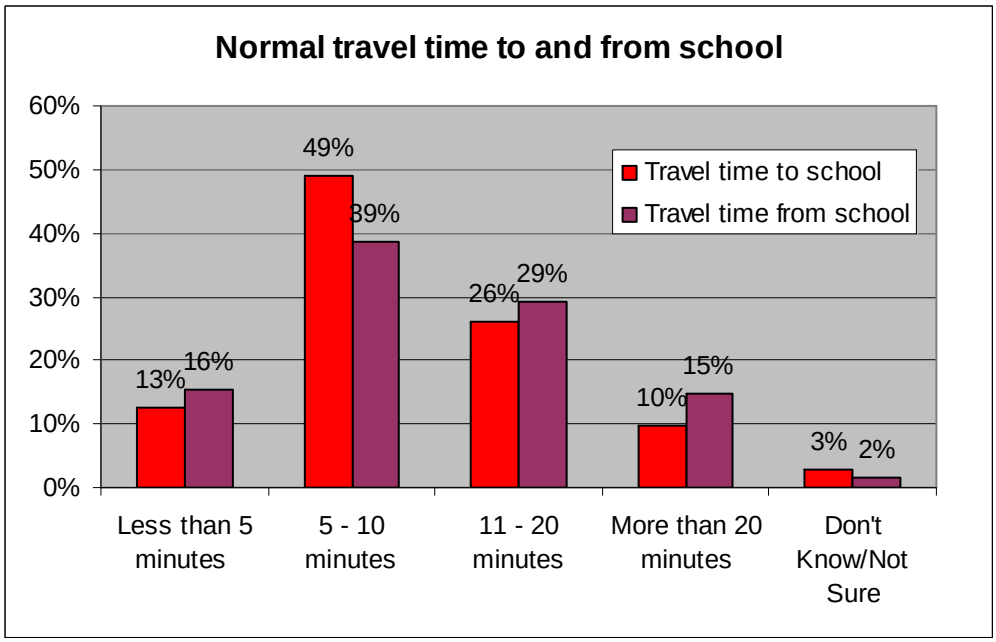


**Figure 71 Normal Travel Time to/from School (Lutz)**

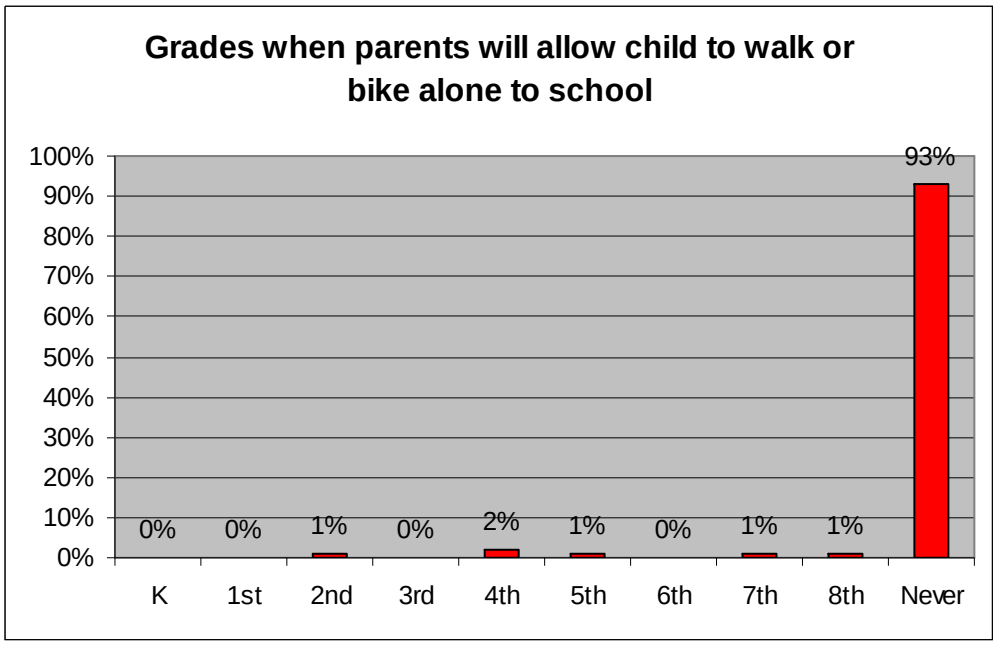


**Figure 72 Distribution on Grade Level for Allowing Child to Walk or Bike to School Alone (Lutz)**

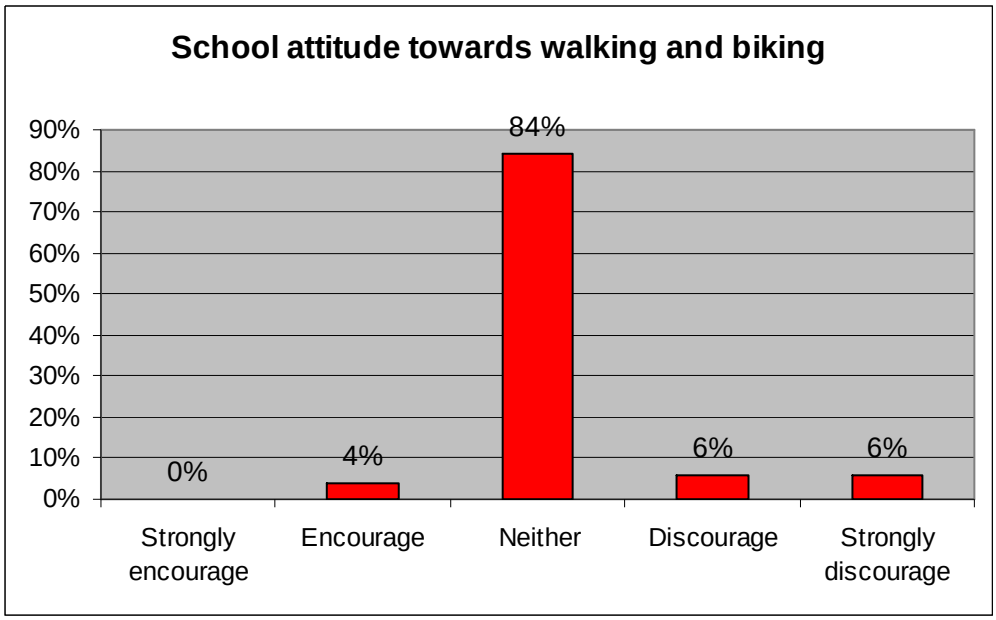


**Figure 73 Distribution of School Attitude on Walking or Biking to/from School (Lutz)**

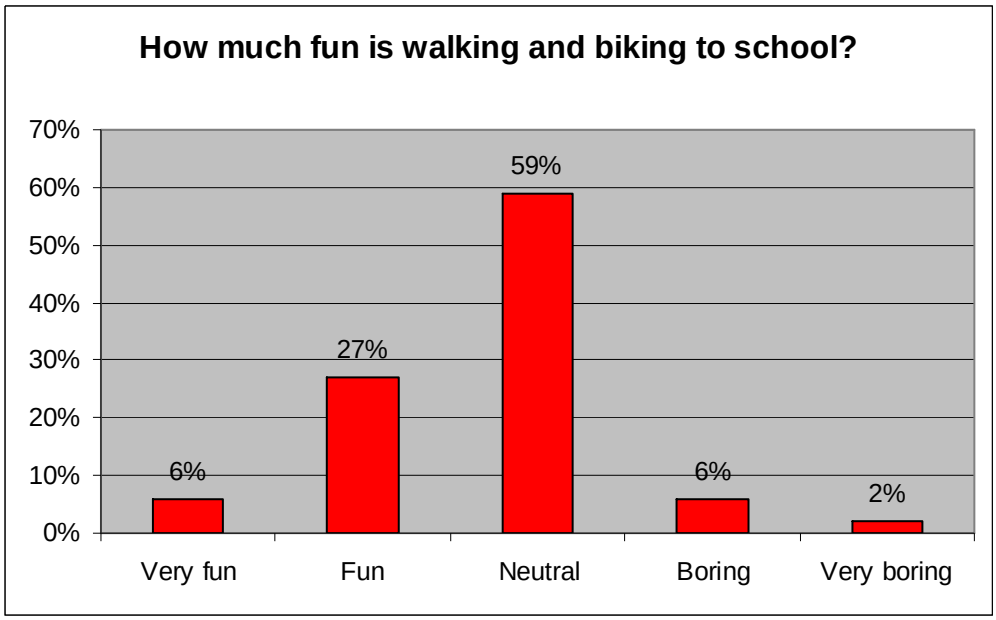


**Figure 74 Distribution of Enjoyment of Walking or Biking to/from School (Lutz)**

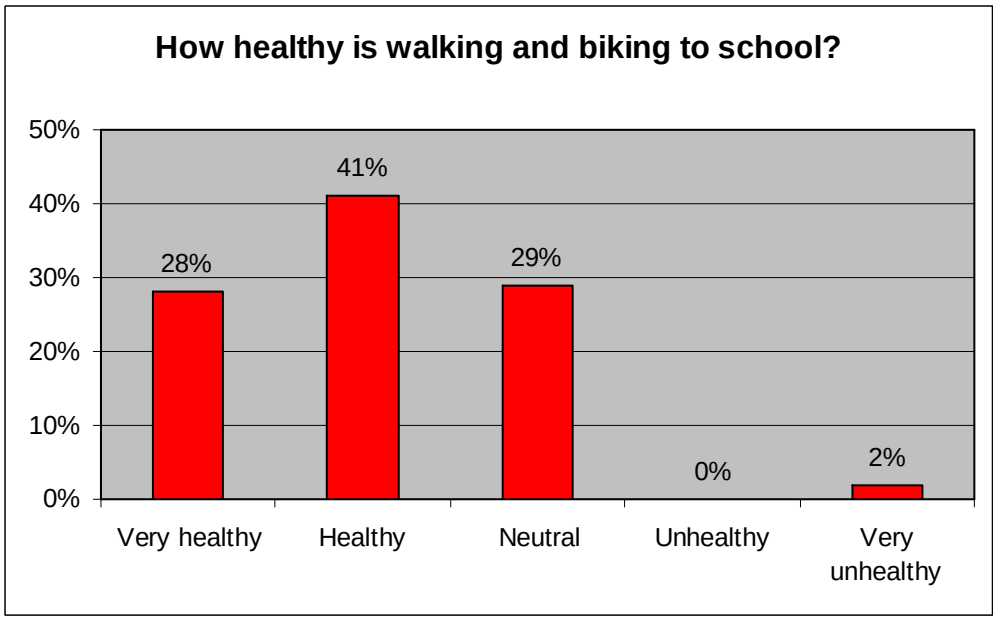


**Figure 75 Distribution of Health of Walking or Biking to/from School (Lutz)**

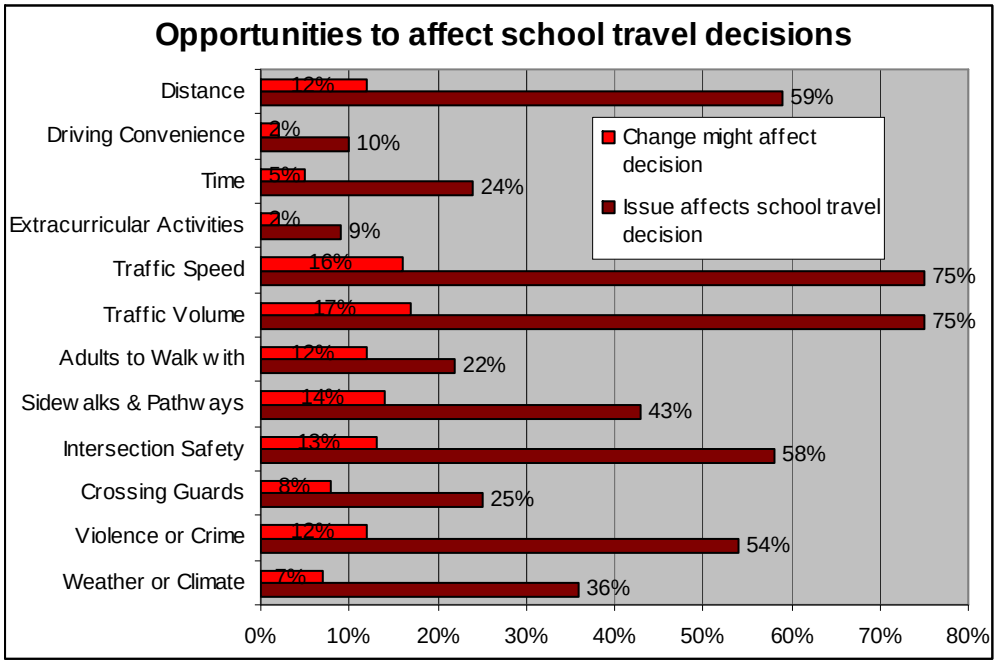


**Figure 76 Ranking of Factors Affecting Travel Mode (Lutz)**

## A.8 Maniscalco Elementary School

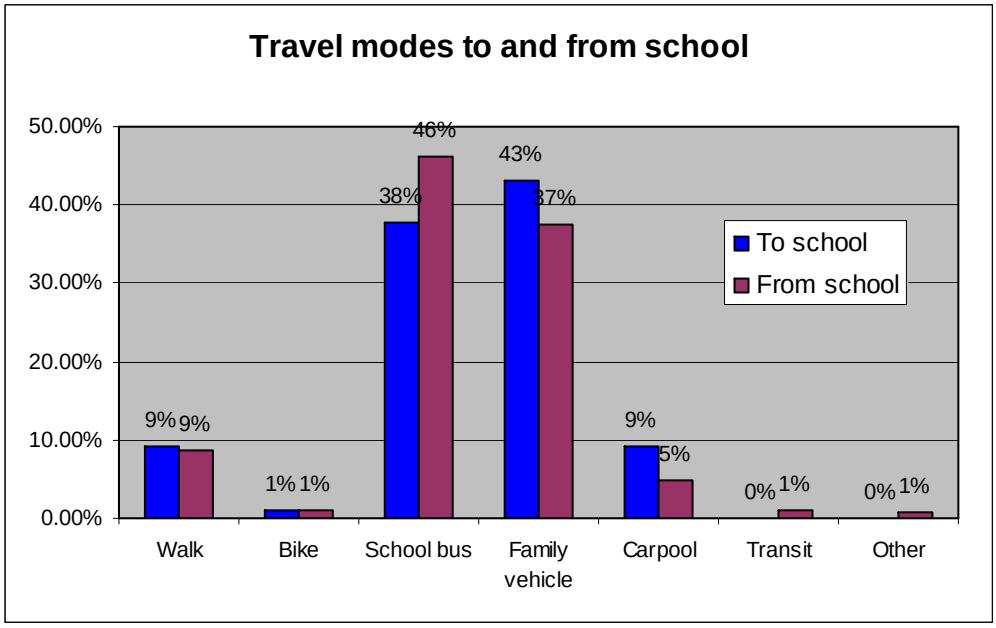


**Figure 77 Distribution of Student Travel Modes to/from School (Maniscalco)**

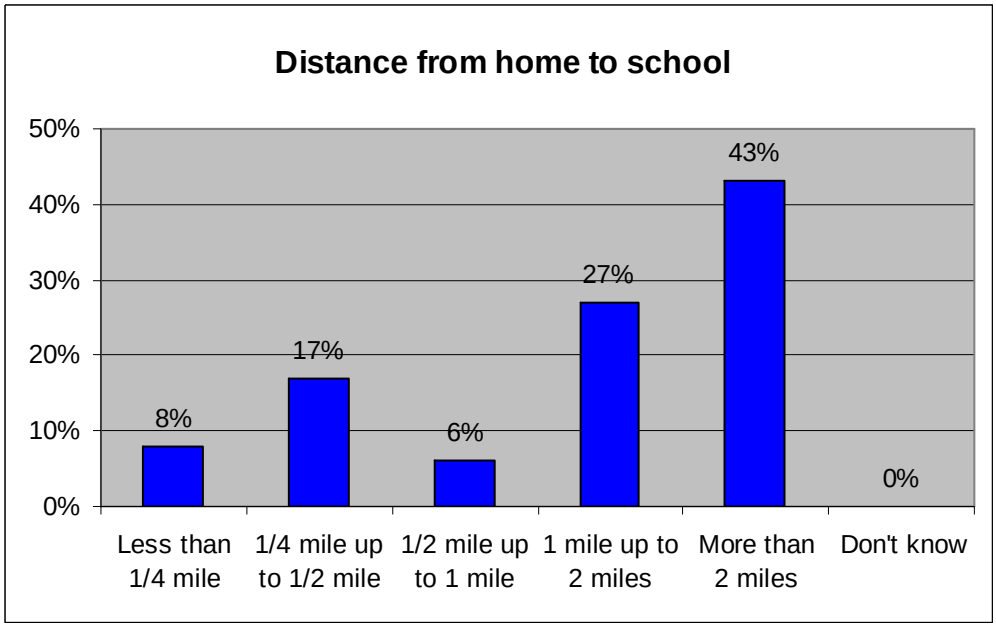


**Figure 78 Distribution of Distance from Home to School (Maniscalco)**

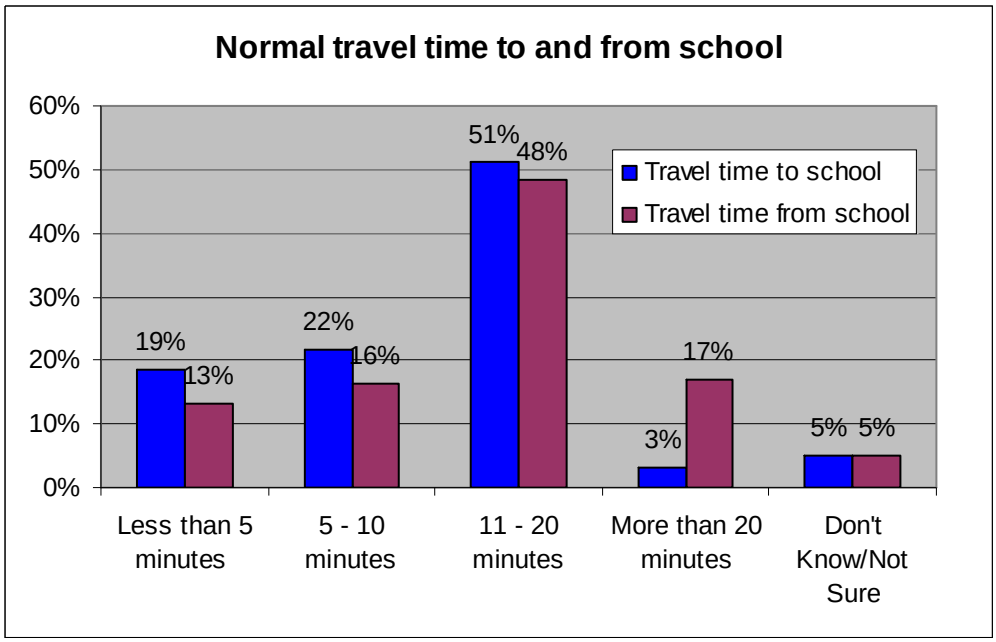


**Figure 79 Normal Travel Time to/from School (Maniscalco)**

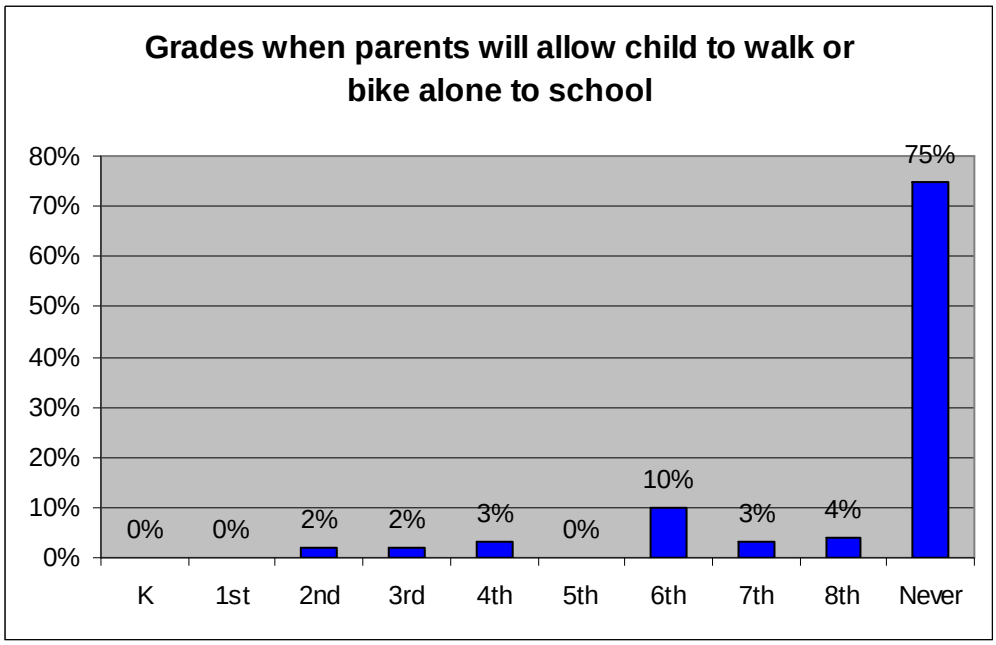


**Figure 80 Distribution of Grade Level for Allowing Child to Walk or Bike Alone to School (Maniscalco)**

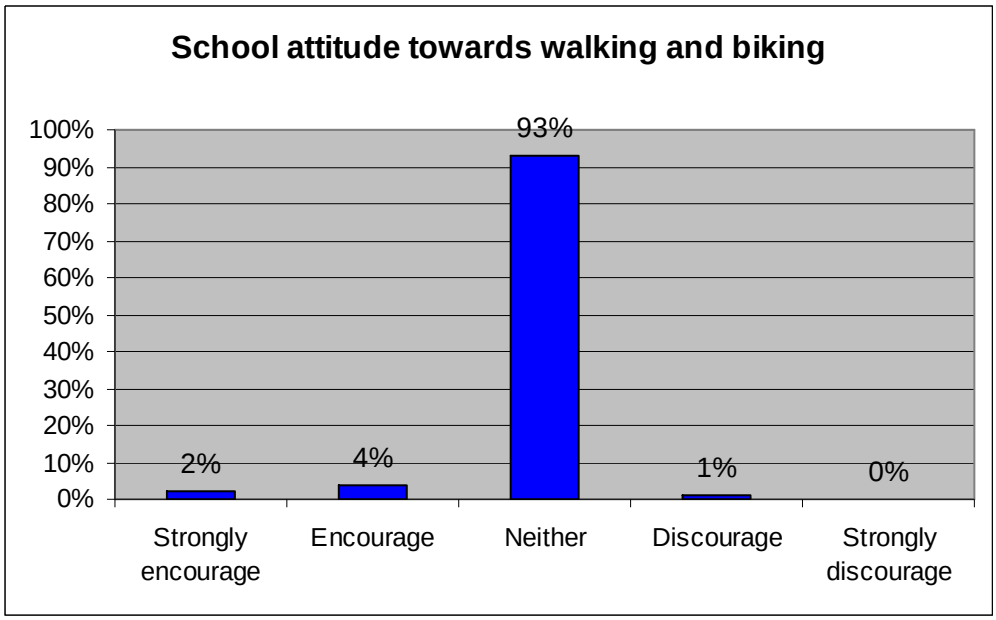


**Figure 81 Distribution of School Attitude on Walking or Biking to/from School (Maniscalco)**

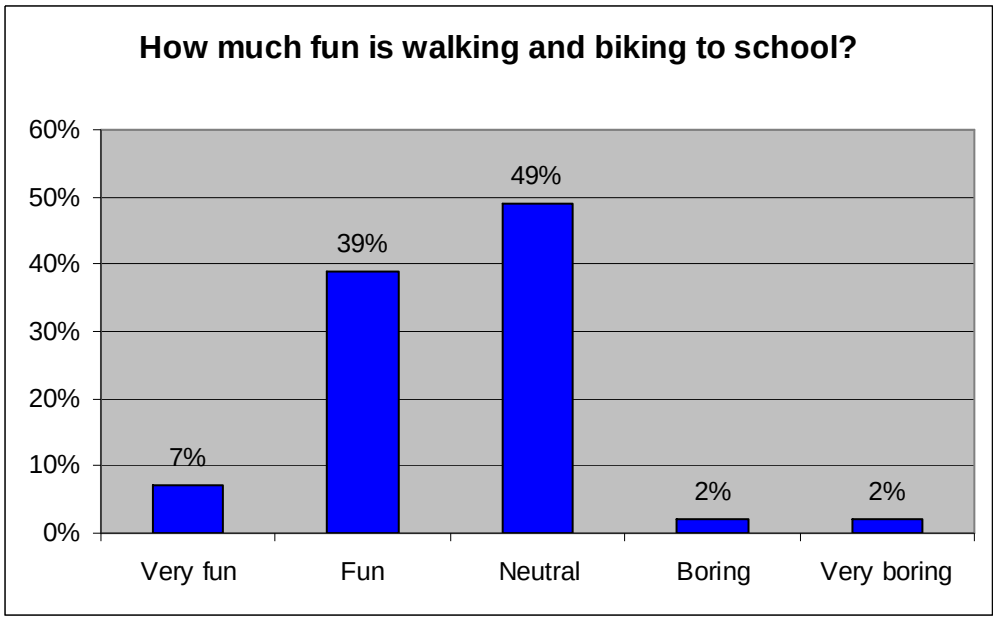


**Figure 82 Distribution of Enjoyment of Walking or Biking to/from School (Maniscalco)**

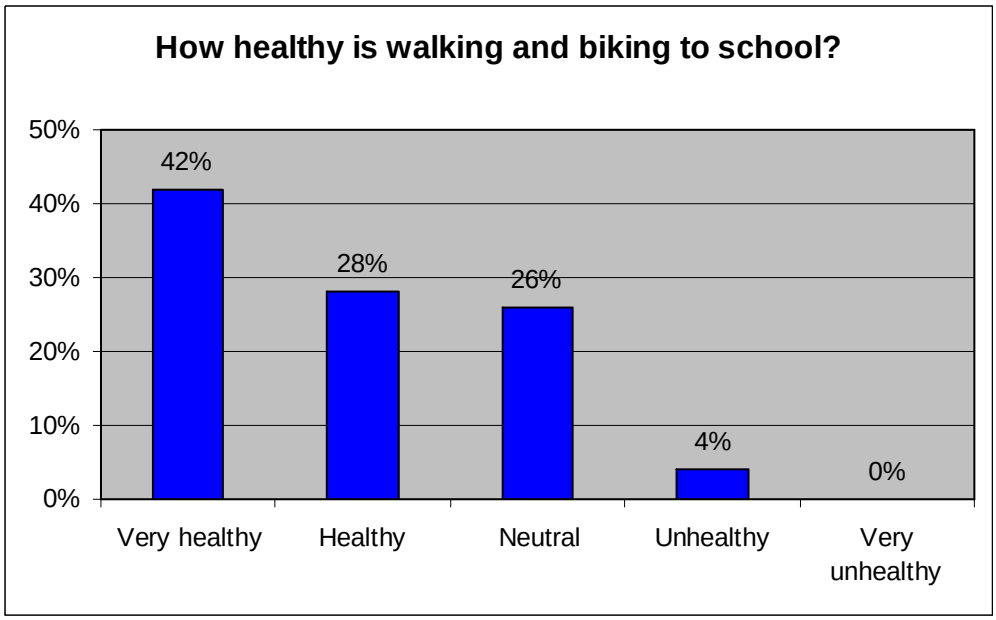


**Figure 83 Distribution of Health of Walking or Biking to/from School (Maniscalco)**

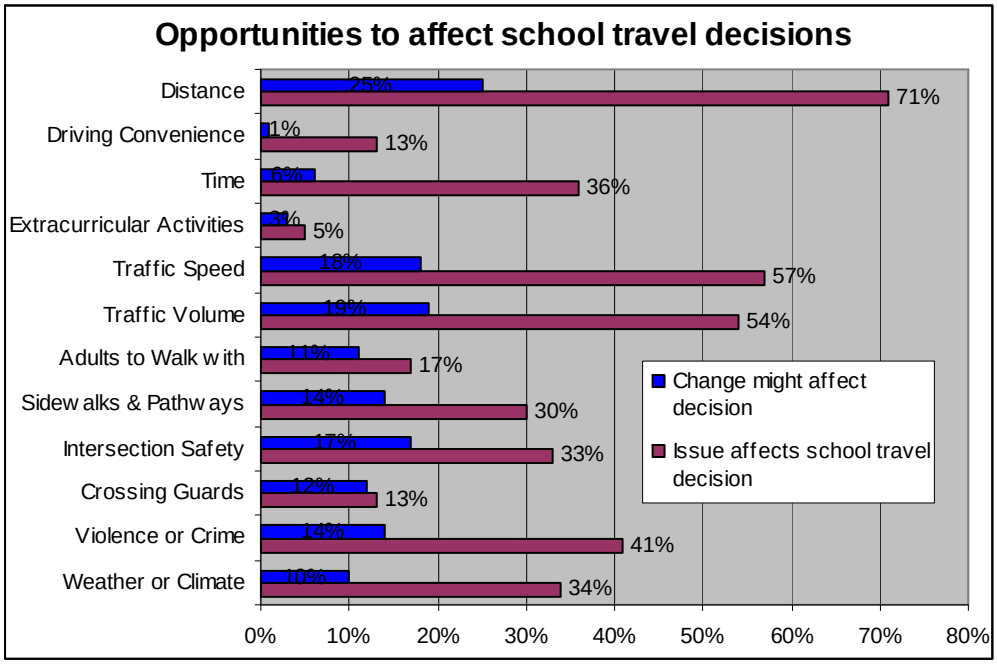


**Figure 84 Ranking on Factors Affecting Travel Mode (Maniscalco)**

## A.9 McLane Middle School

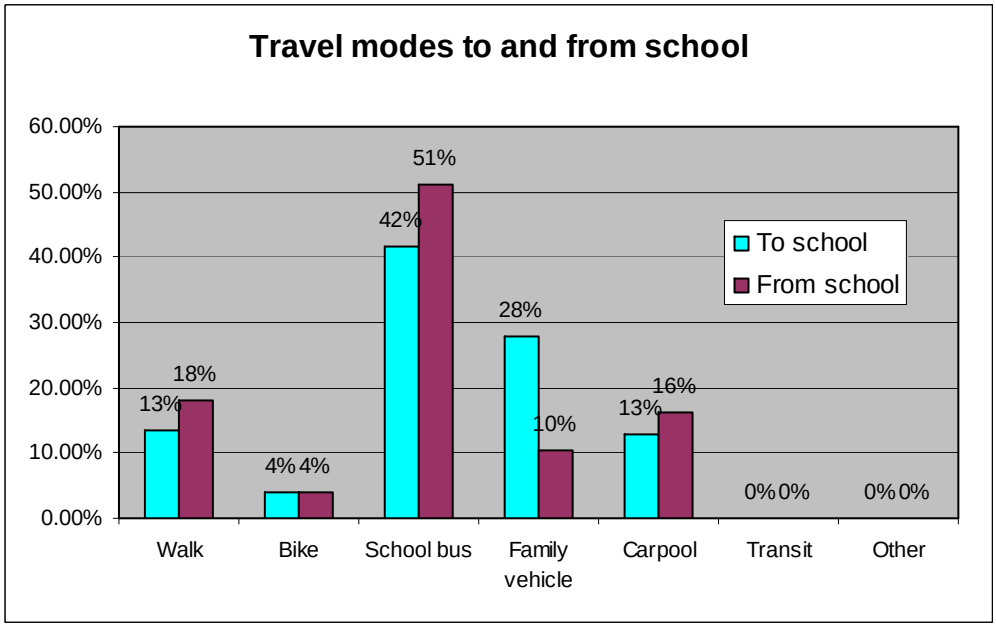


**Figure 85 Distribution of Student Travel Modes to/from School (McLane)**

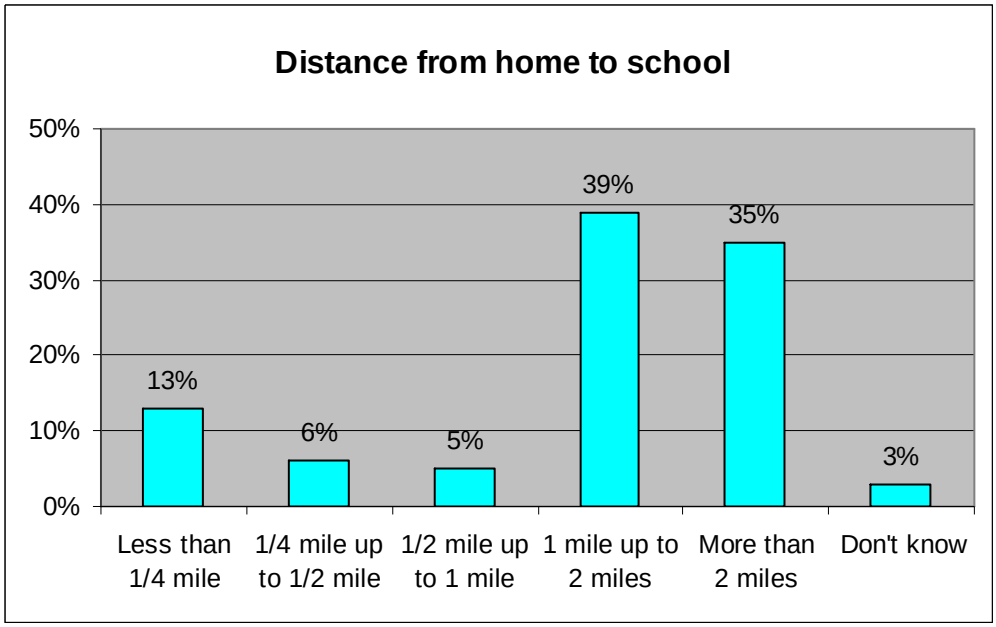


**Figure 86 Distribution of Distance from Home to School (McLane)**

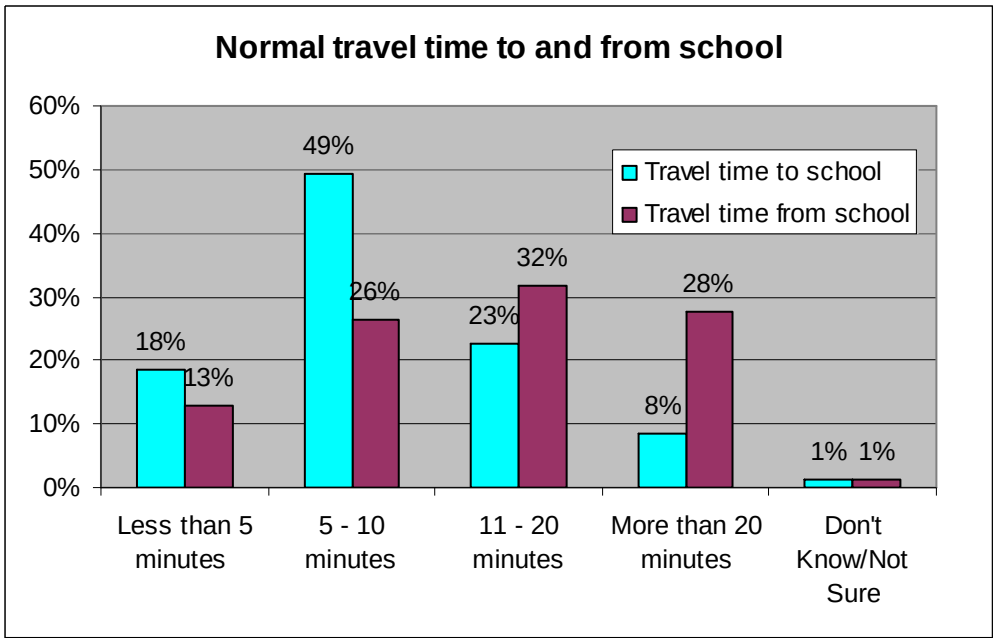


**Figure 87 Normal Travel Time to and from School (McLane)**

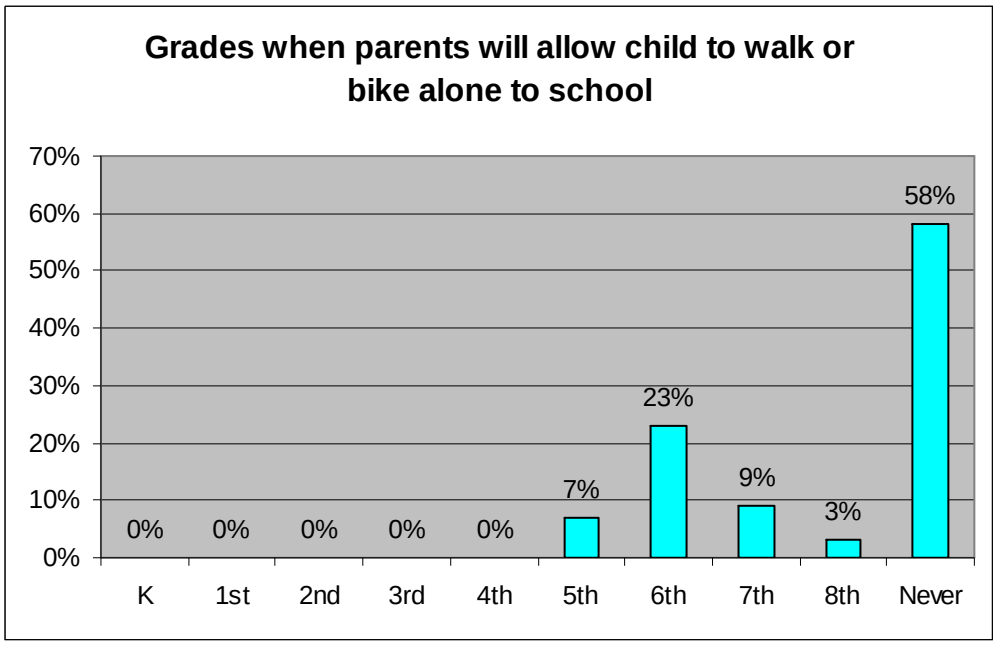


**Figure 88 Distribution of Grade Level for Allowing Child to Walk or Bike Alone to School (McLane)**

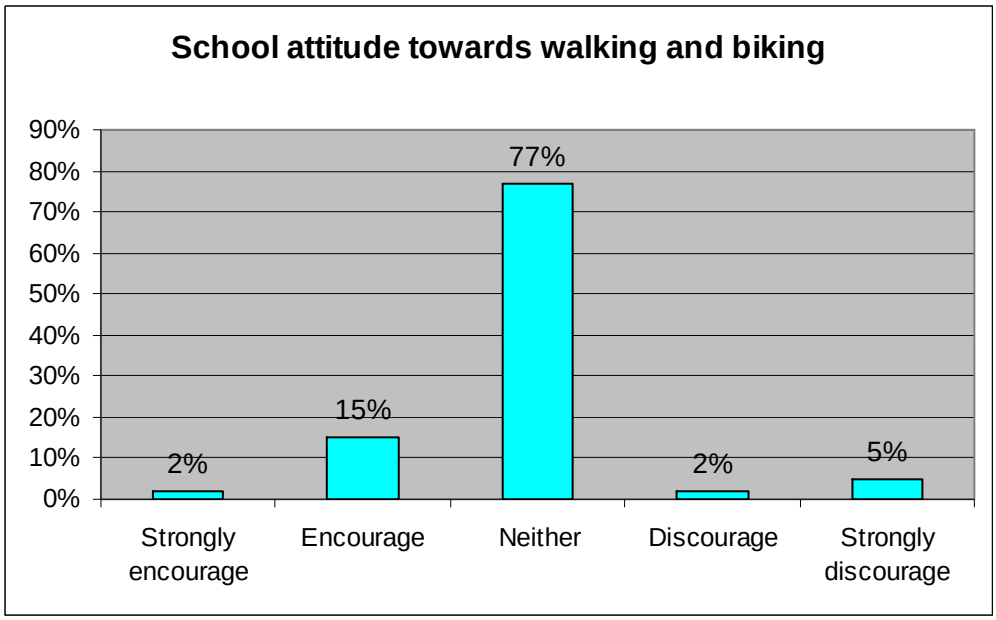


**Figure 89 Distribution of School Attitude on Walking or Biking to/from School (McLane)**

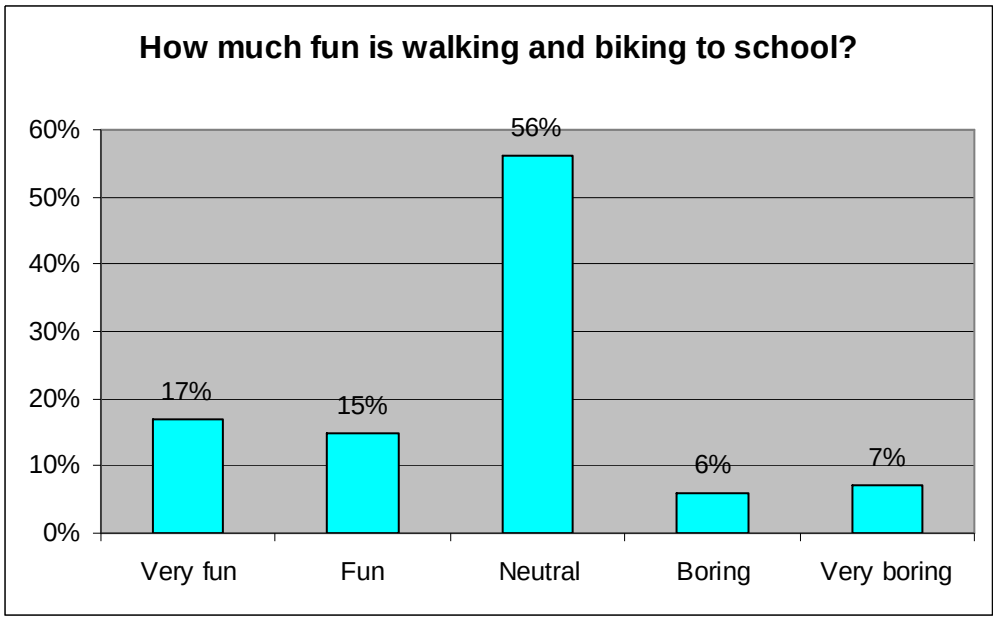


**Figure 90 Distribution of Enjoyment of Walking or Biking to/from School (McLane)**

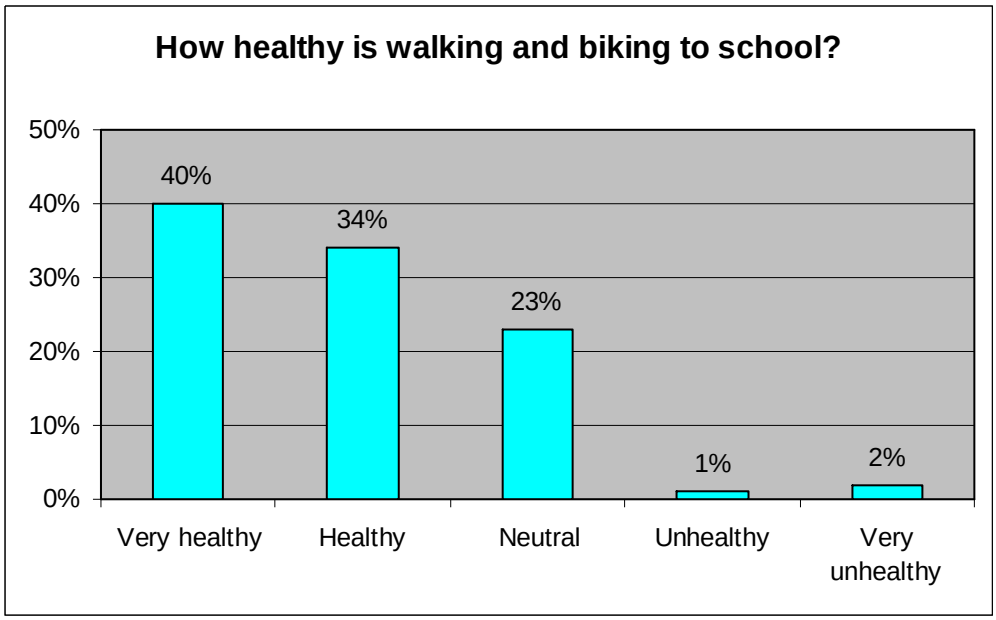


**Figure 91 Distribution of Health of Walking or Biking to/from School (McLane)**

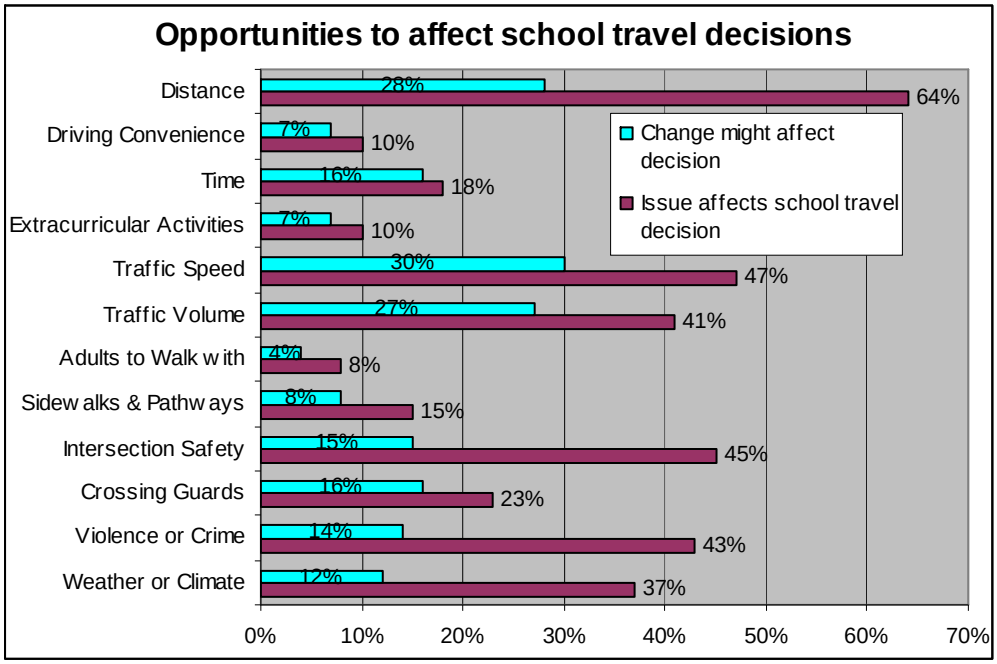


**Figure 92 Ranking of Factors Affecting Travel Mode (McLane)**

## A.10 Mulrennan Middle School

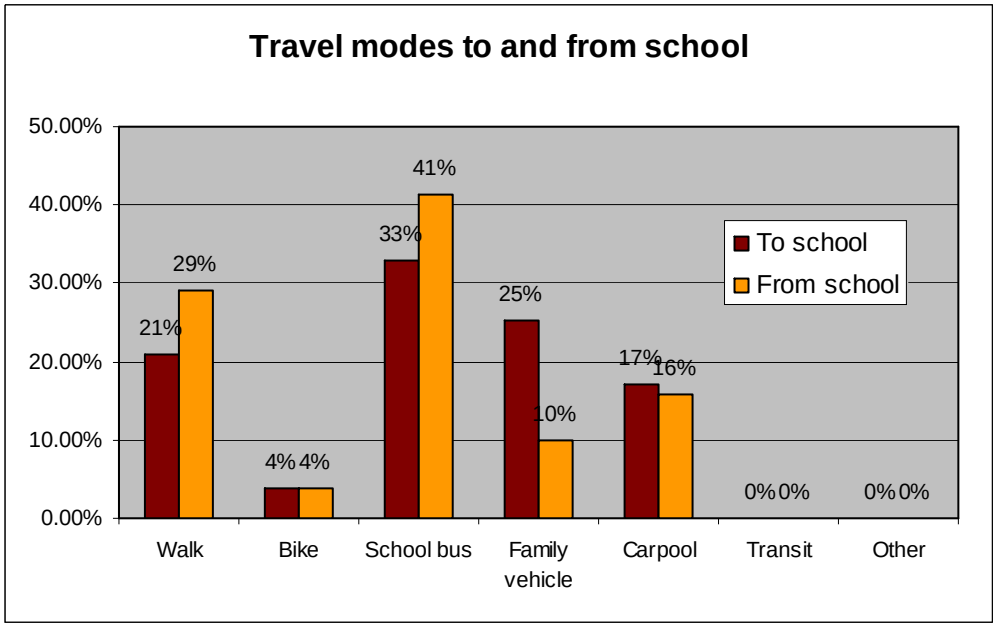


**Figure 93 Distribution of Student Travel Modes to/from School (Mulrennan)**

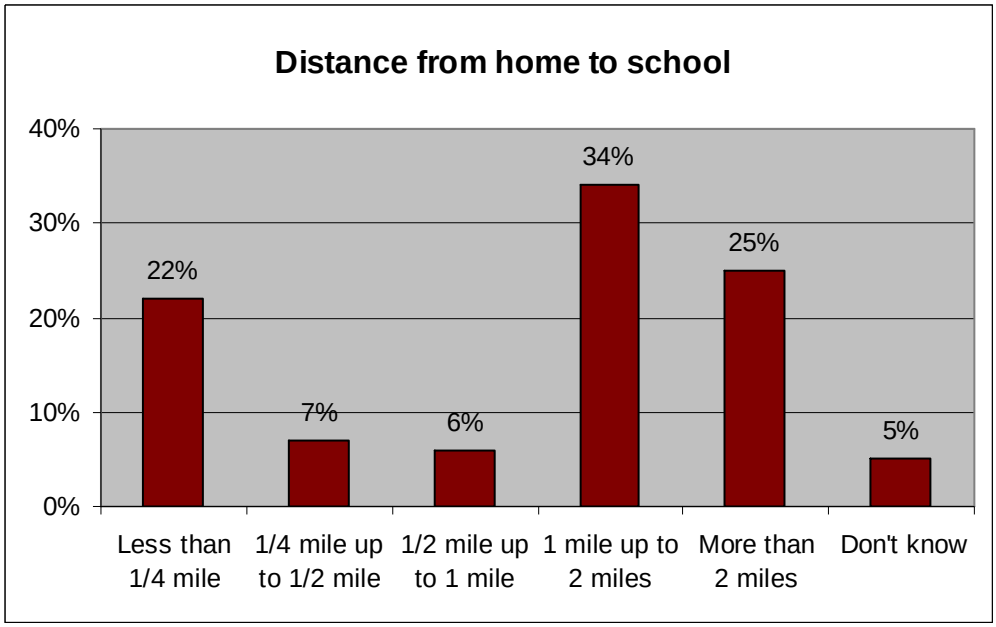


**Figure 94 Distribution of Distance from Home to School (Mulrennan)**

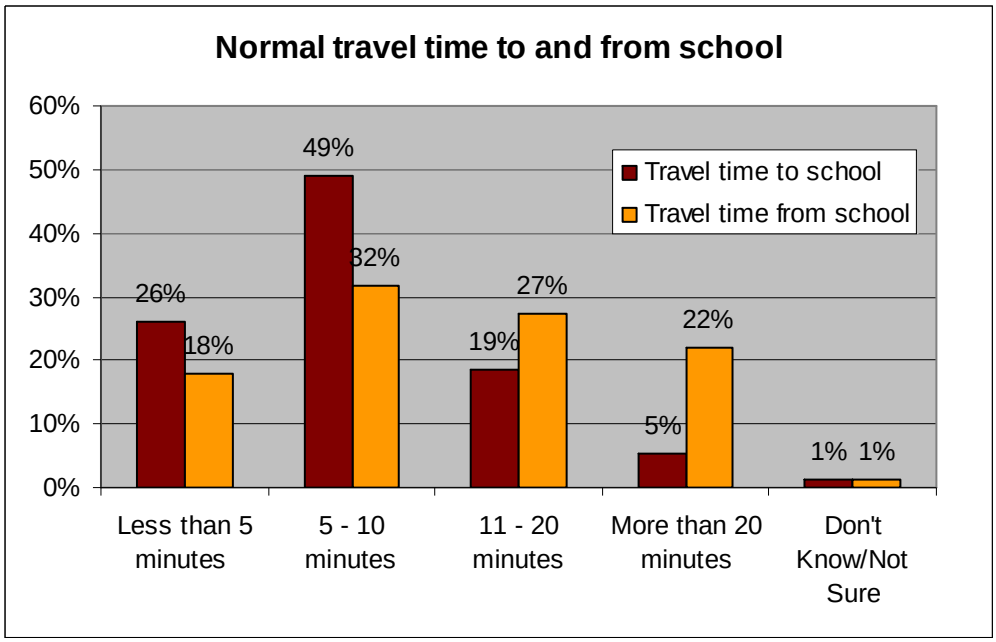


**Figure 95 Normal Travel Time to/from School (Mulrennan)**

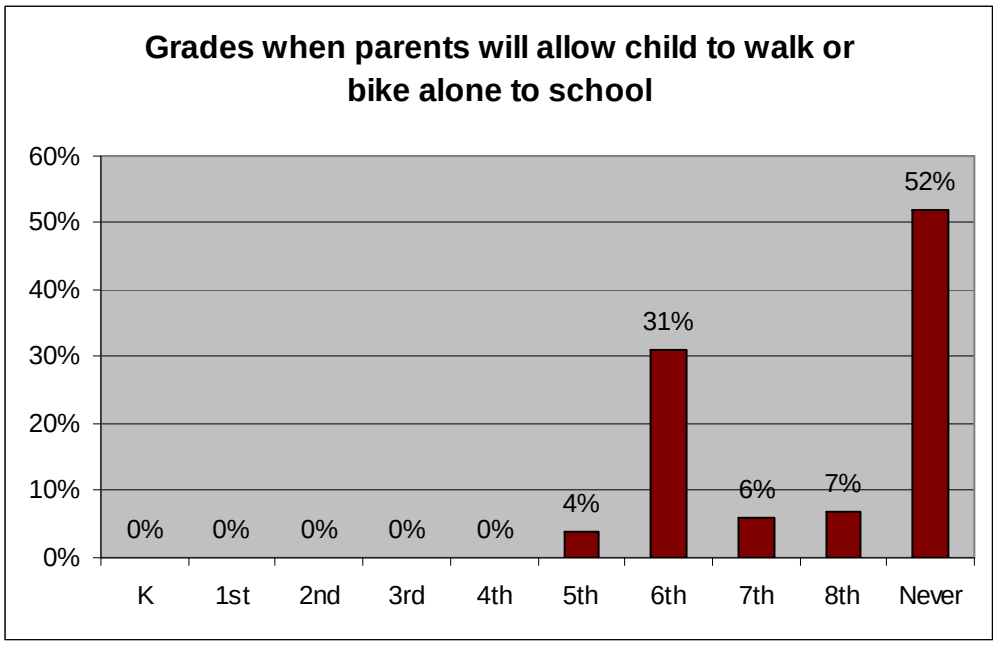


**Figure 96 Distribution of Grade Level for Allowing Child to Walk or Bike Alone to School (Mulrennan)**

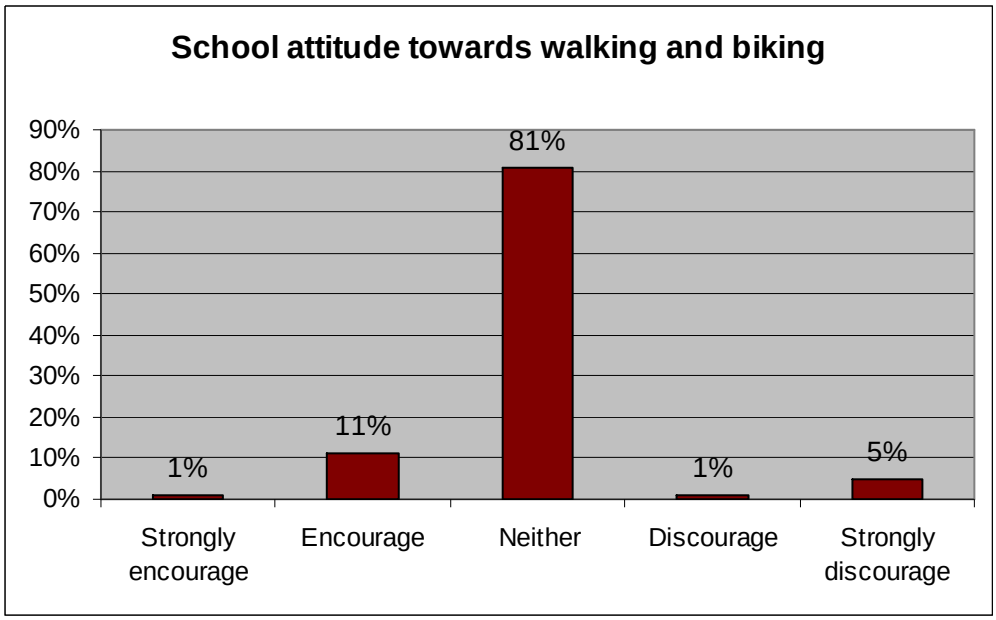


**Figure 97 Distribution of School Attitude on Walking or Biking to/from School (Mulrennan)**

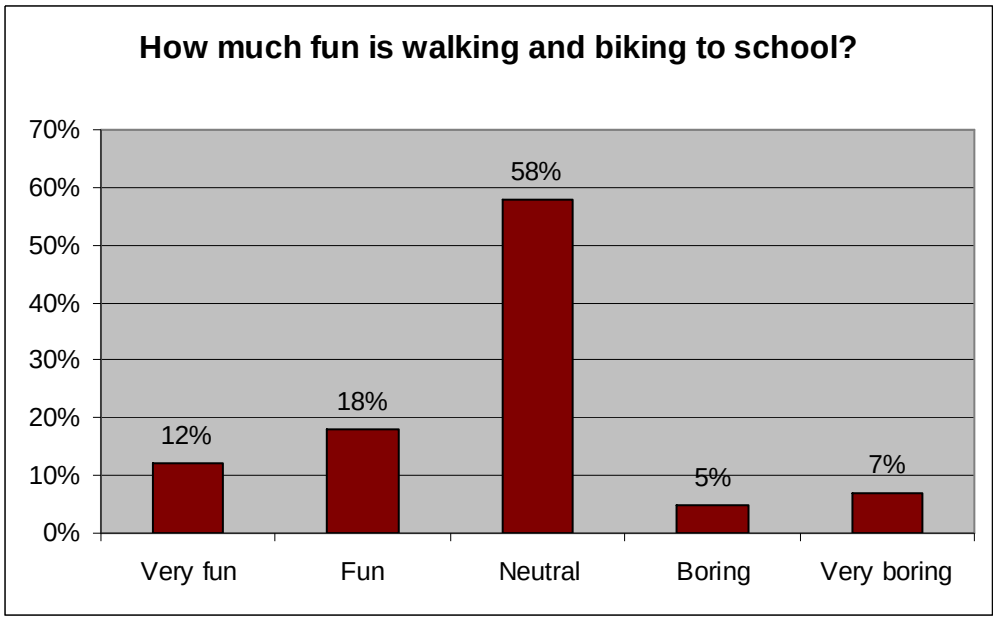


**Figure 98 Distribution of Enjoyment of Walking or Biking to/from School (Mulrennan)**

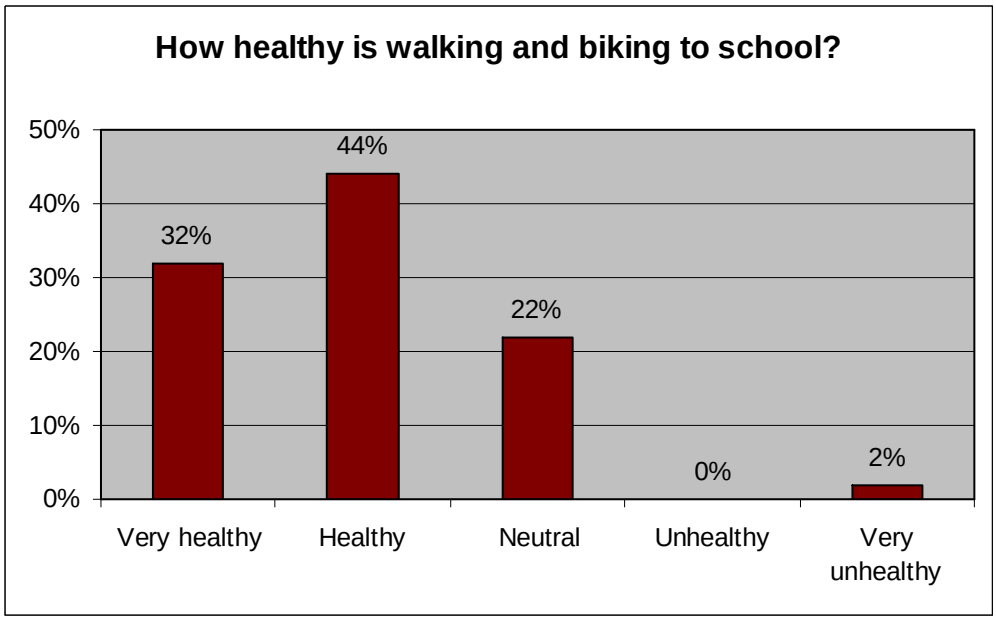


**Figure 99 Distribution on Health of Walking or Biking to/from School (Mulrennan)**

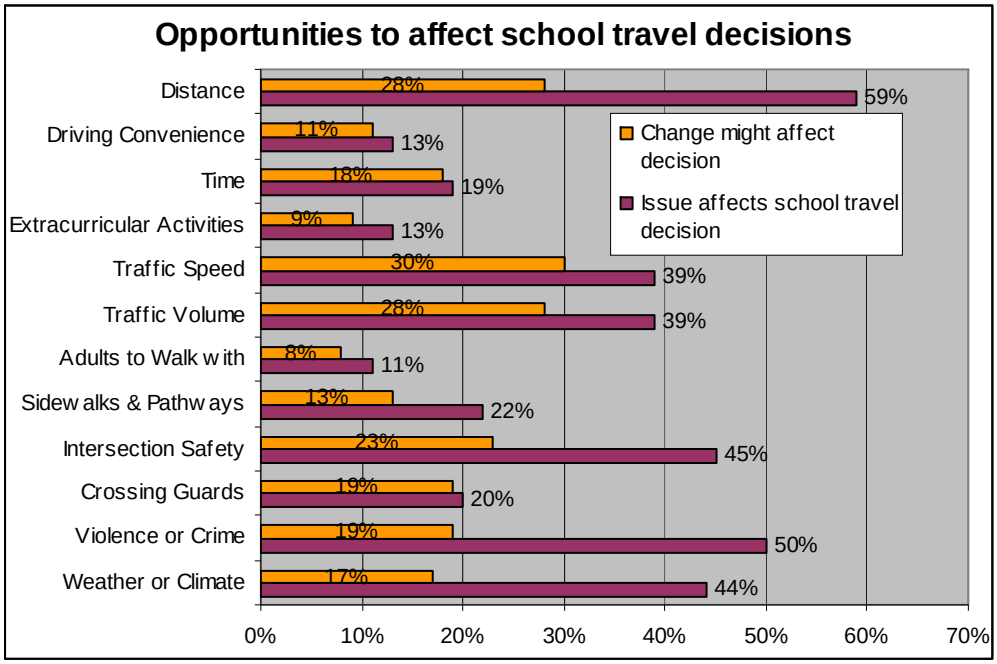


**Figure 100 Ranking of Factors Affecting Travel Mode (Mulrennan)**

## A.11 Pride Elementary School

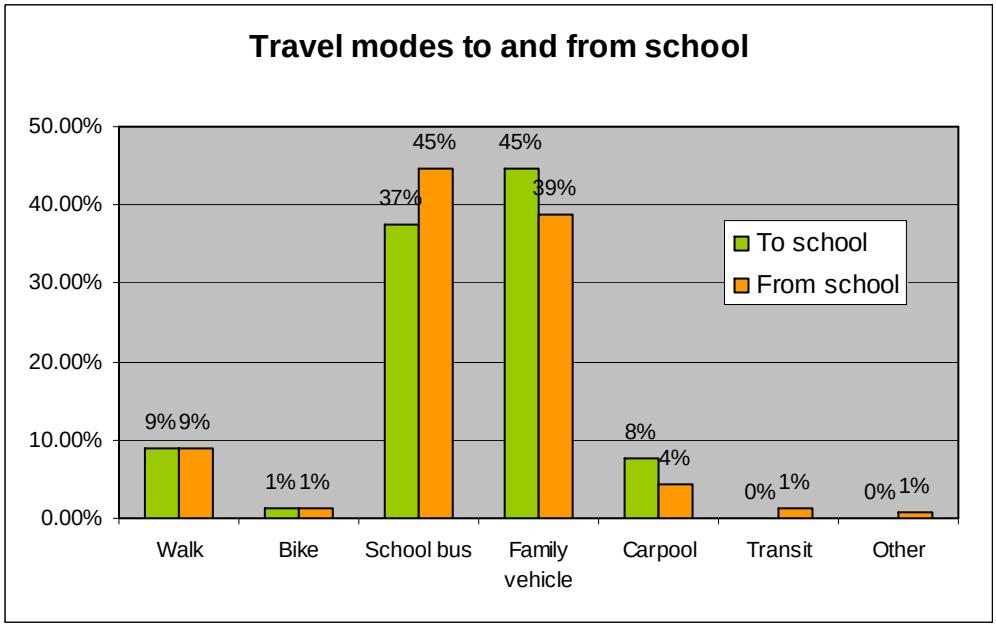


**Figure 101 Distribution of Student Travel Modes to/from School (Pride)**

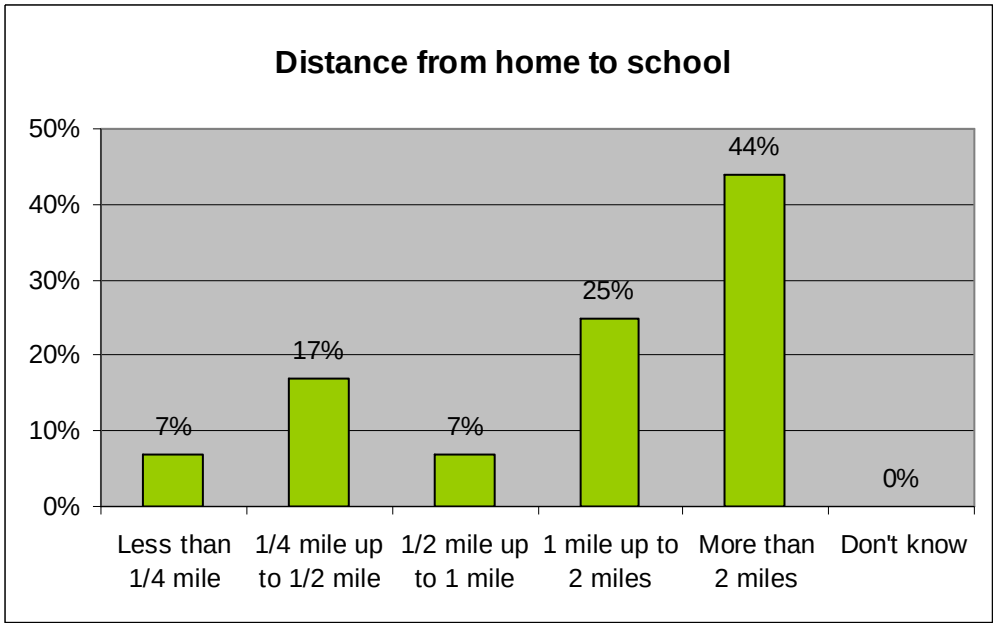


**Figure 102 Distribution of Distance from Home to School (Pride)**

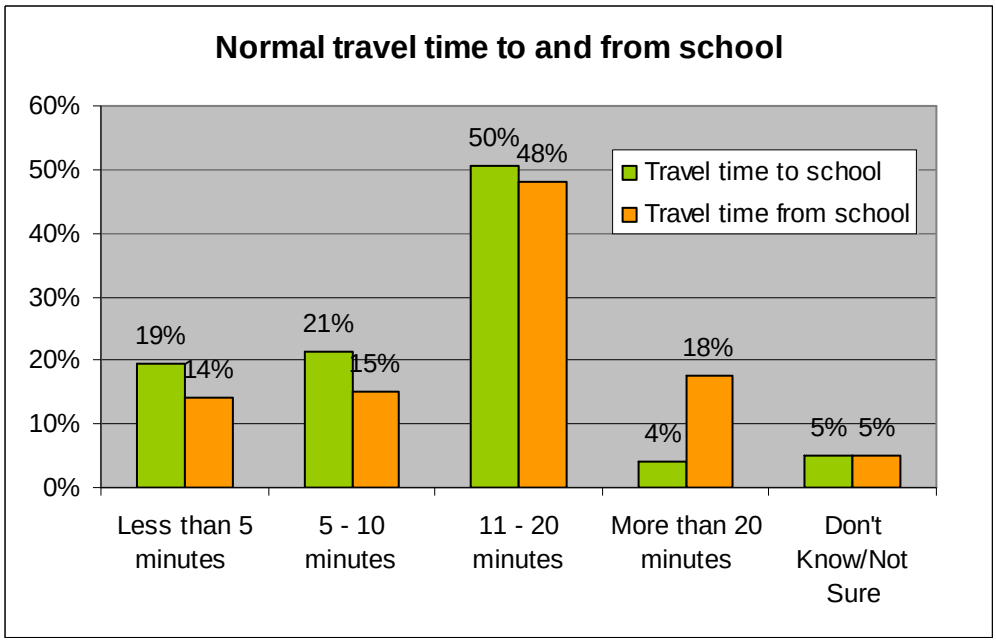


**Figure 103 Normal Travel Time to/from School (Pride)**

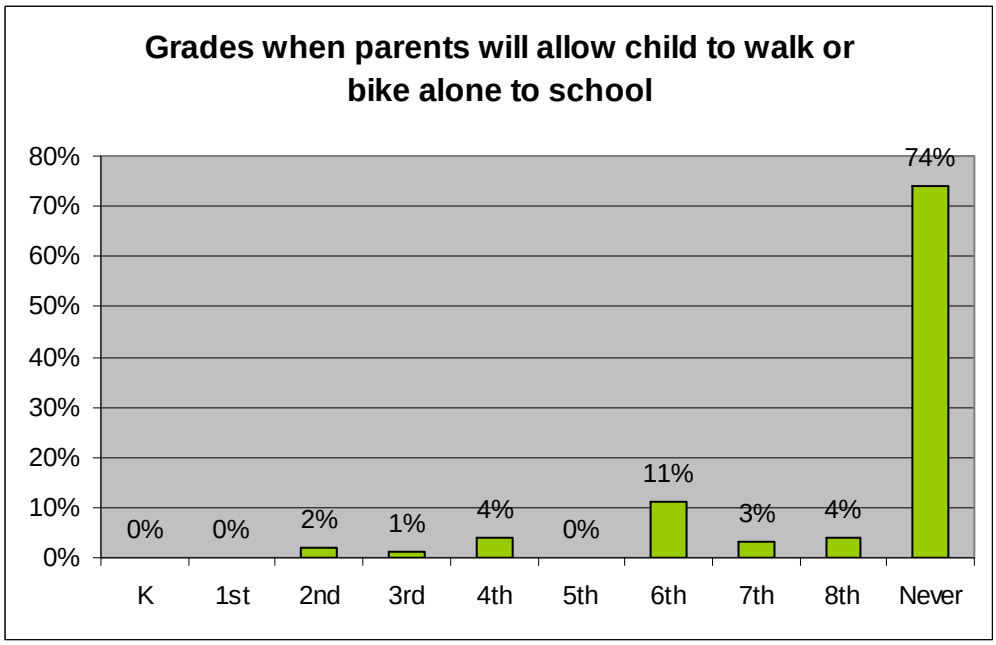


**Figure 104 Distribution of Grade Level for Allowing Child to Walk or Bike to School (Pride)**

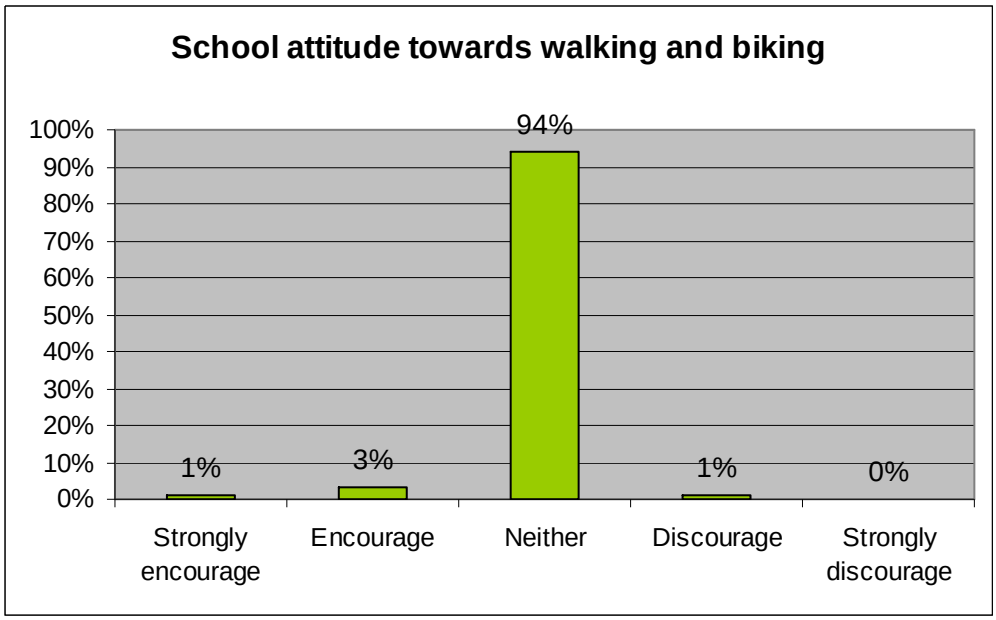


**Figure 105 Distribution of School Attitude on Walking and Biking to/from School (Pride)**

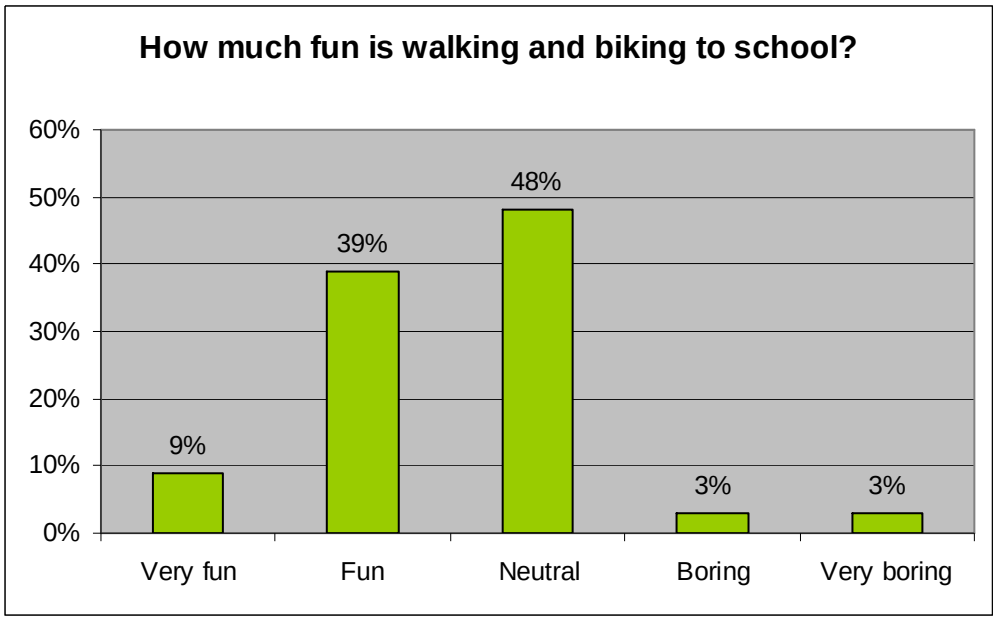


**Figure 106 Distribution of Enjoyment of Walking or Biking to/from School (Pride)**

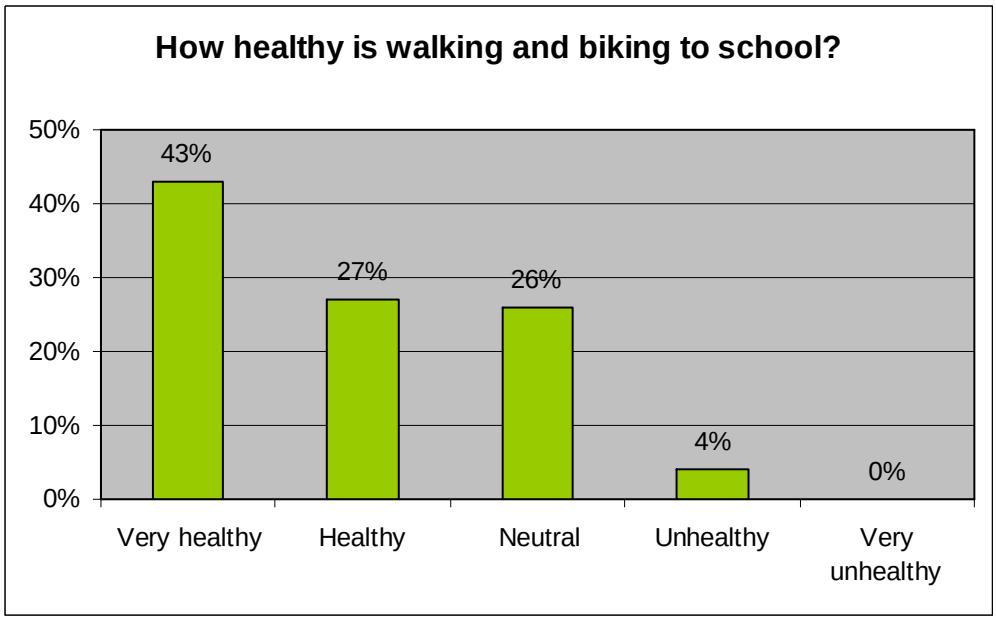


**Figure 107 Distribution of of Health of Walking and Biking to/from School (Pride)**

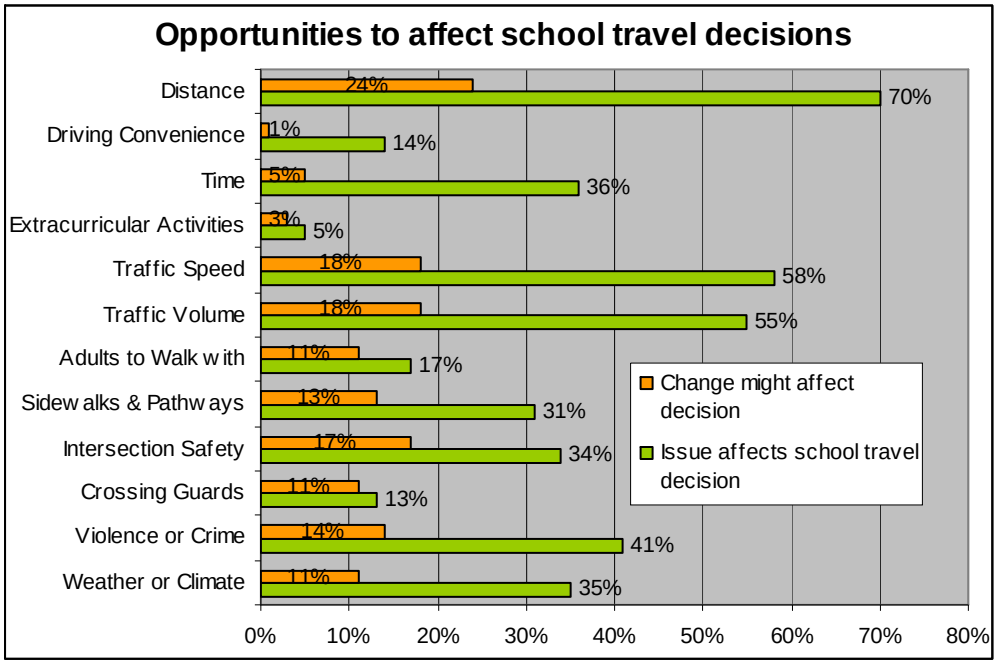


**Figure 108 Ranking of Factors Affecting Travel Mode (Pride)**

## A.12 Springhead Elementary School

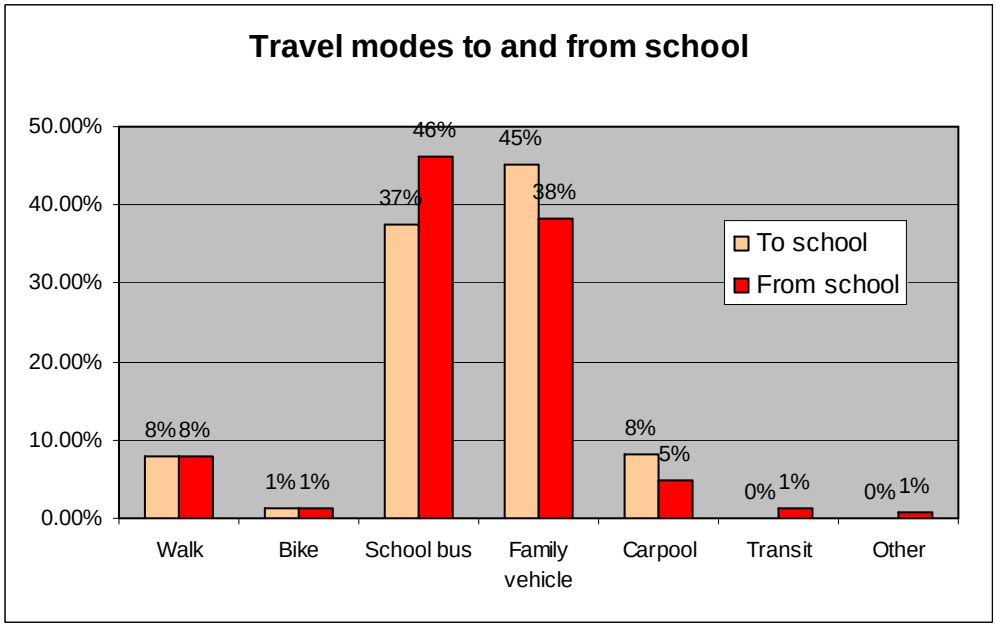


**Figure 109 Distribution of Student Travel Modes to/from School (Springhead)**

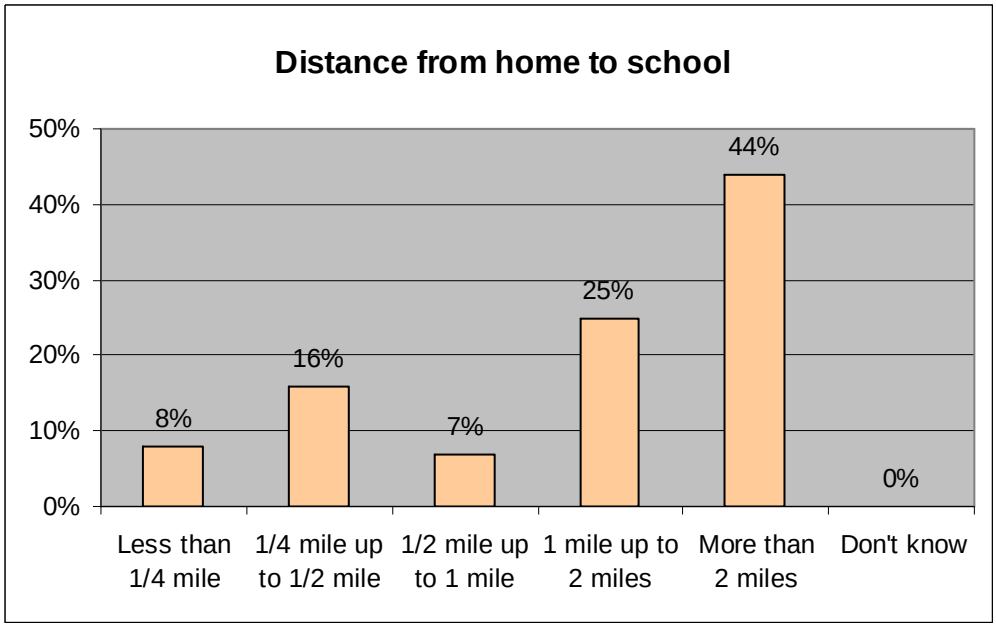


**Figure 110 Distribution of Distance from Home to School (Springhead)**

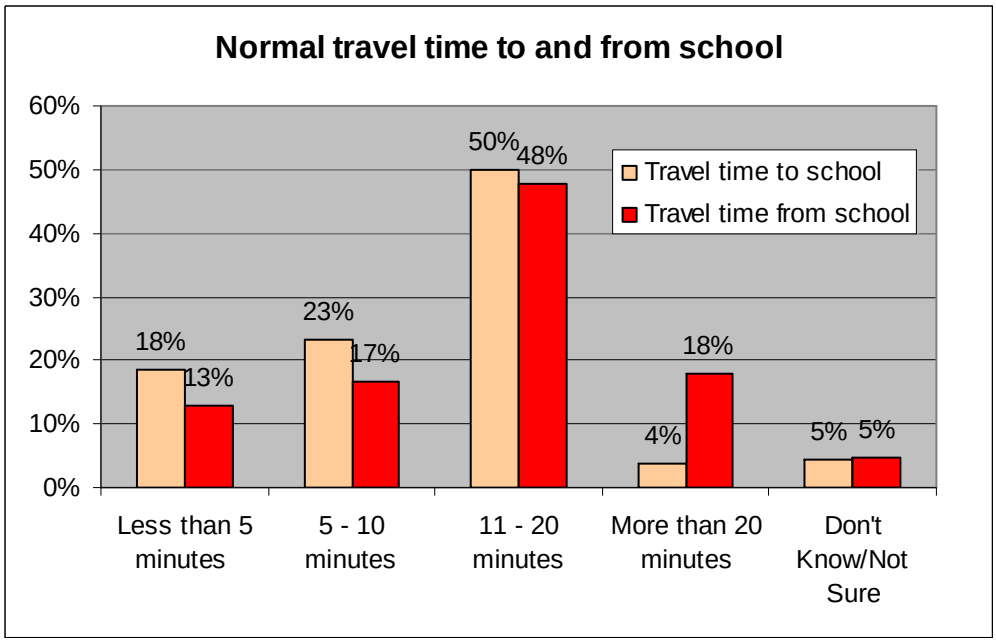


**Figure 111 Normal Travel Time to/from School (Springhead)**

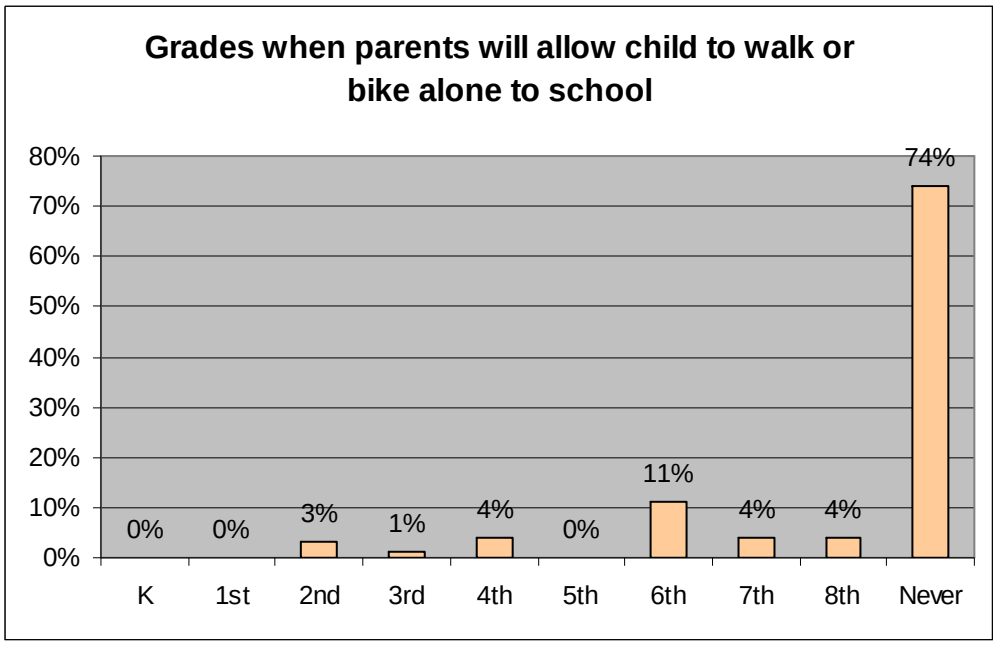


**Figure 112 Distribution on Grade Level for Allowing Child to Walk or Bike to School (Springhead)**

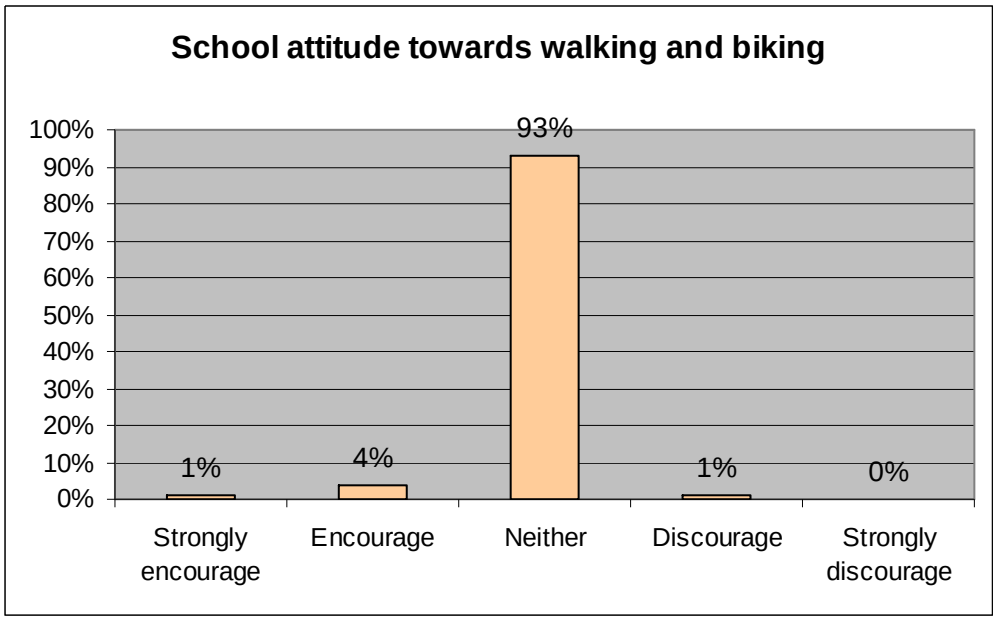


**Figure 113 Distribution of School Attitude on Walking or Biking to/from School (Springhead)**

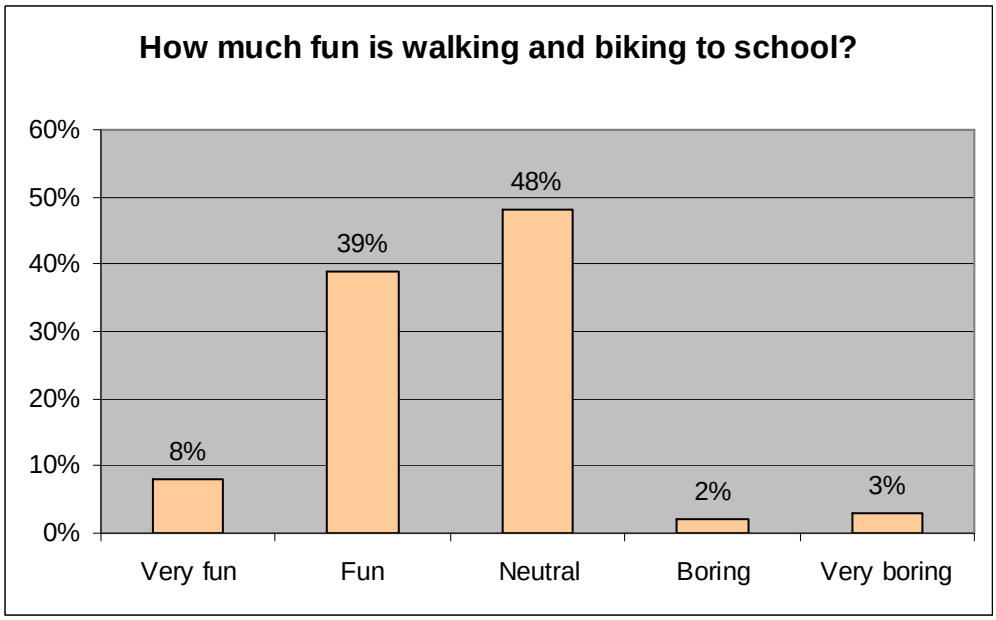


**Figure 114 Distribution of Enjoyment of Walking or Biking to/from School (Springhead)**

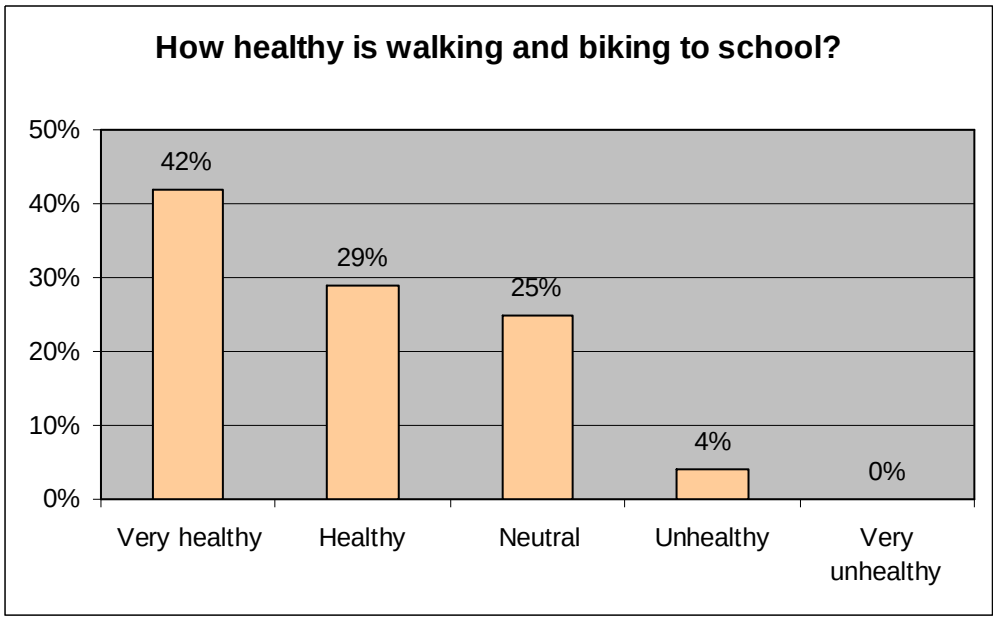


**Figure 115 Distribution of Health of Walking or Biking to/from School (Springhead)**

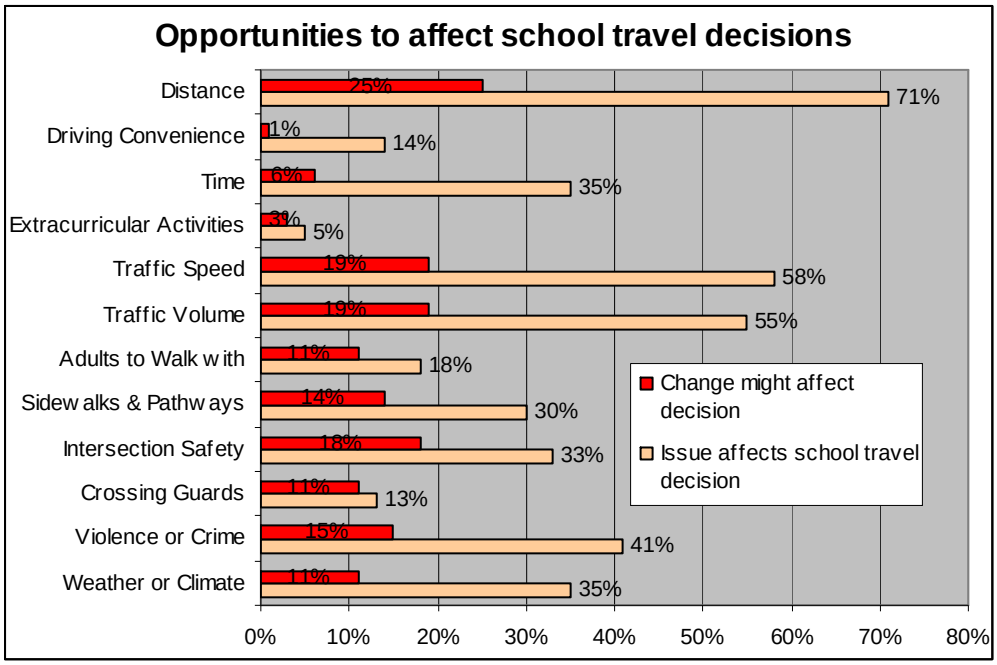


**Figure 116 Ranking on Factors Affecting Travel Mode (Springhead)**

## A.13 Thonotosassa Elementary School

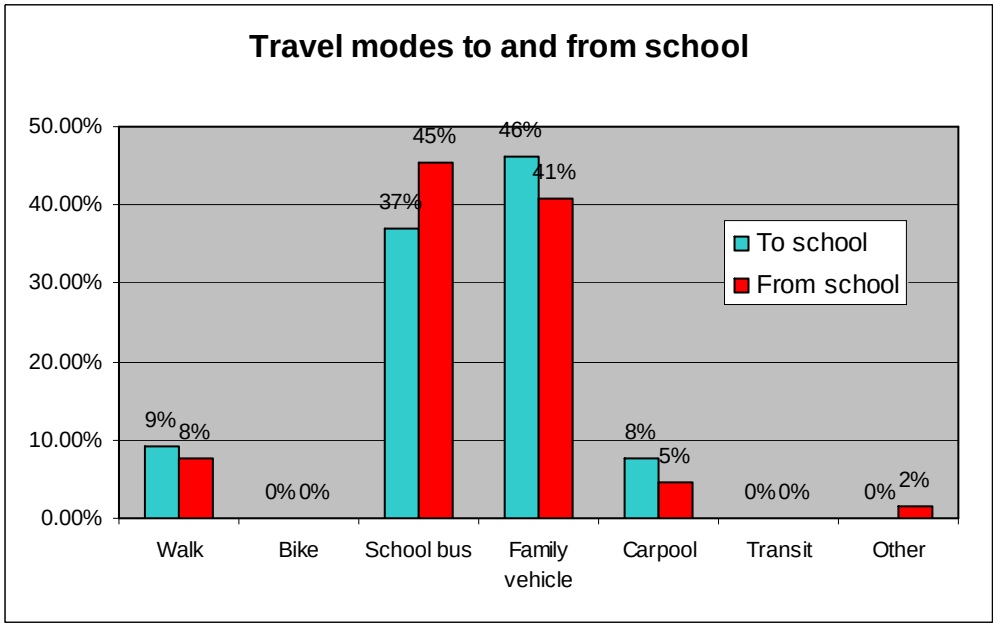


**Figure 117 Distribution of Student Travel Modes to/from School (Thonotosassa)**

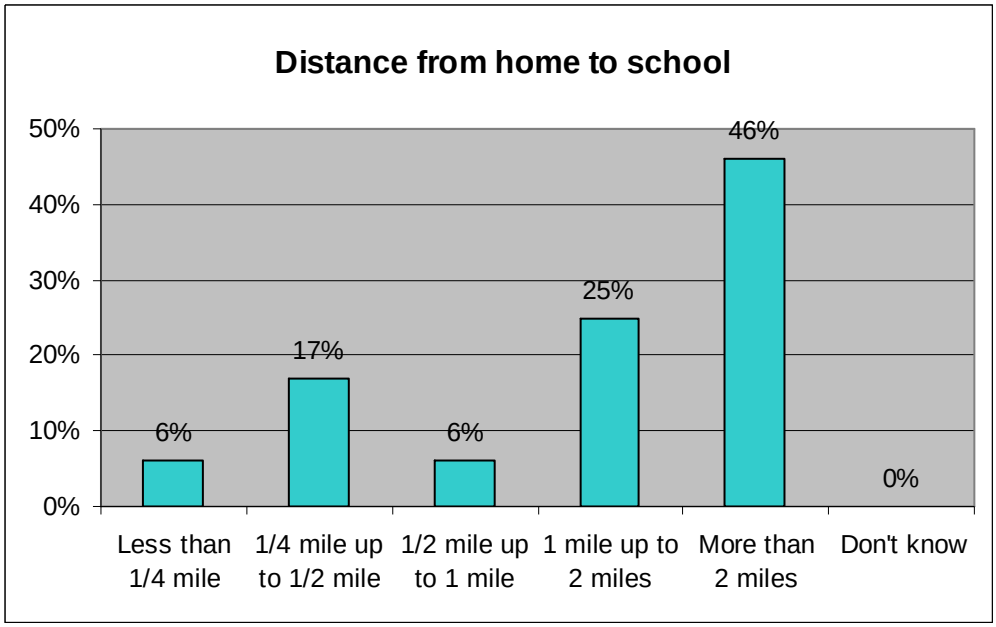


**Figure 118 Distribution of Distance from Home to School (Thonotosassa)**

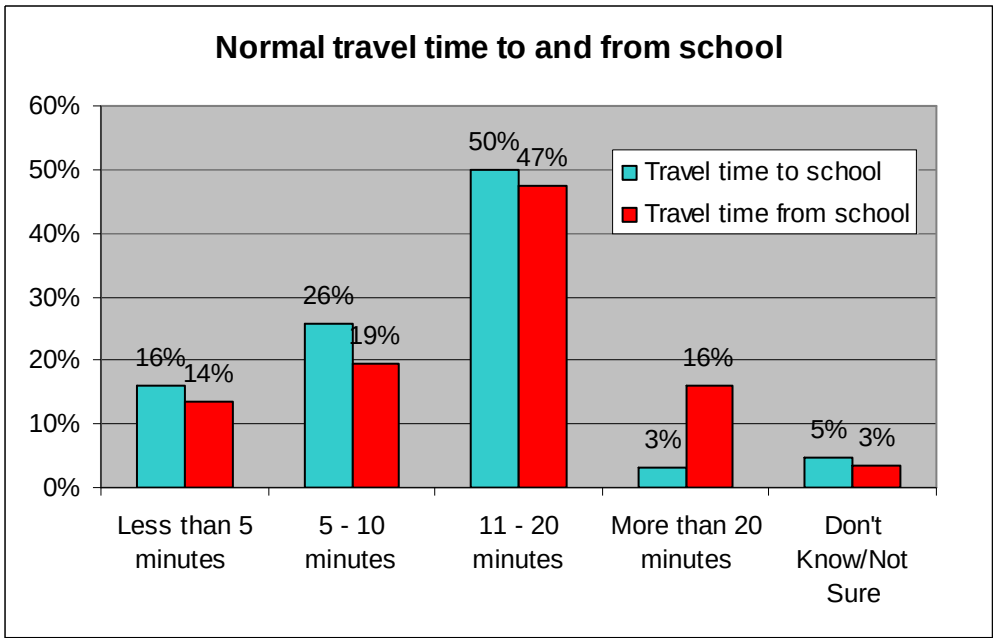


**Figure 119 Normal Travel Time to/from School (Thonotosassa)**

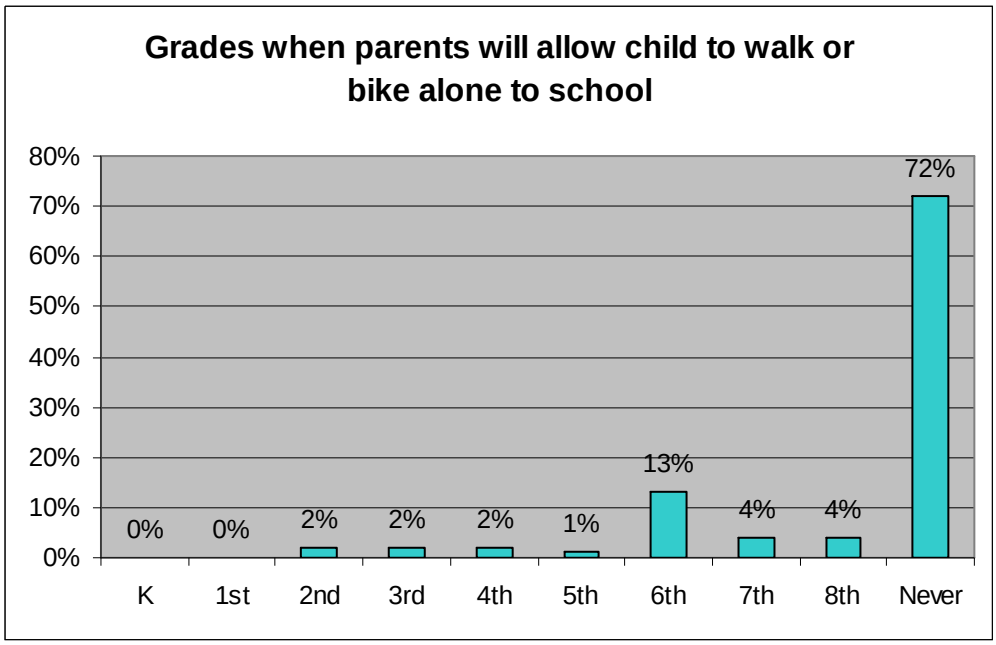


**Figure 120 Distribution of Grade Level for Allowing Child to Walk or Bike to School (Thonotosassa)**

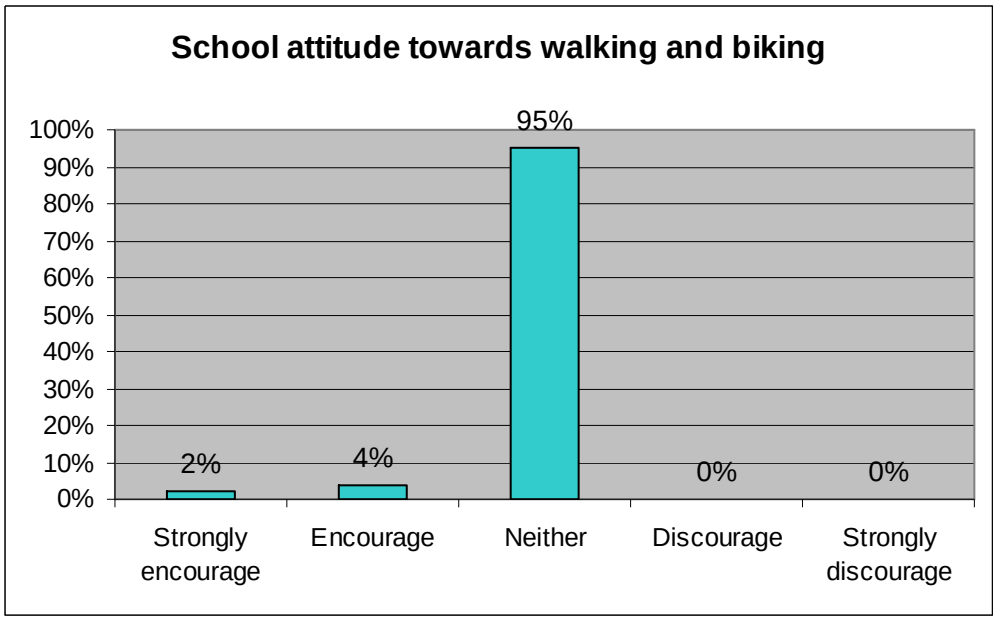


**Figure 121 Distribution of School Attitude on Walking or Biking to/from School (Thonotosassa)**

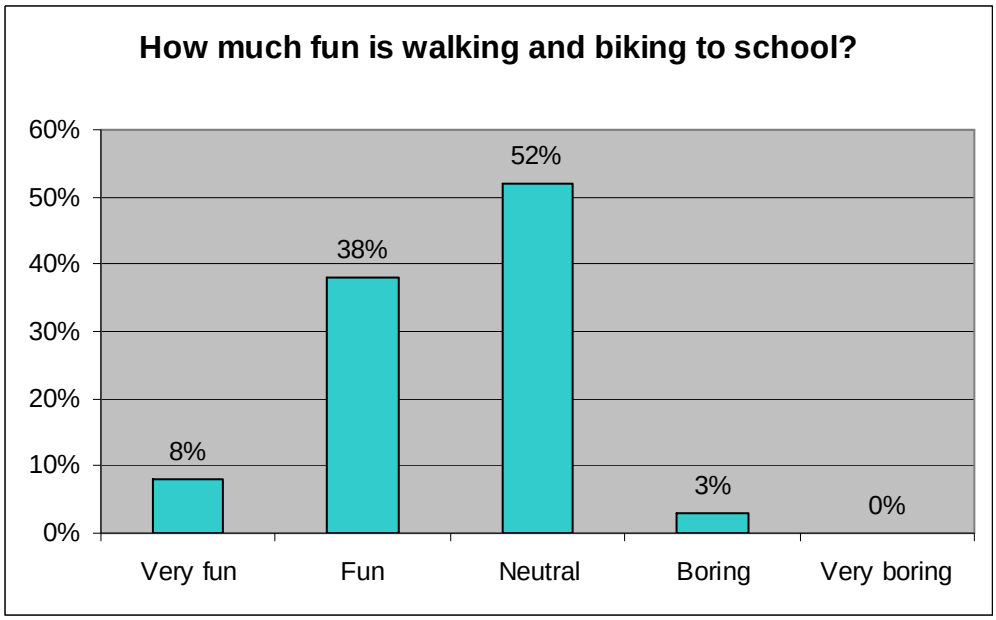


**Figure 122 Distribution of Enjoyment of Walking or Biking to/from School (Thonotosassa)**

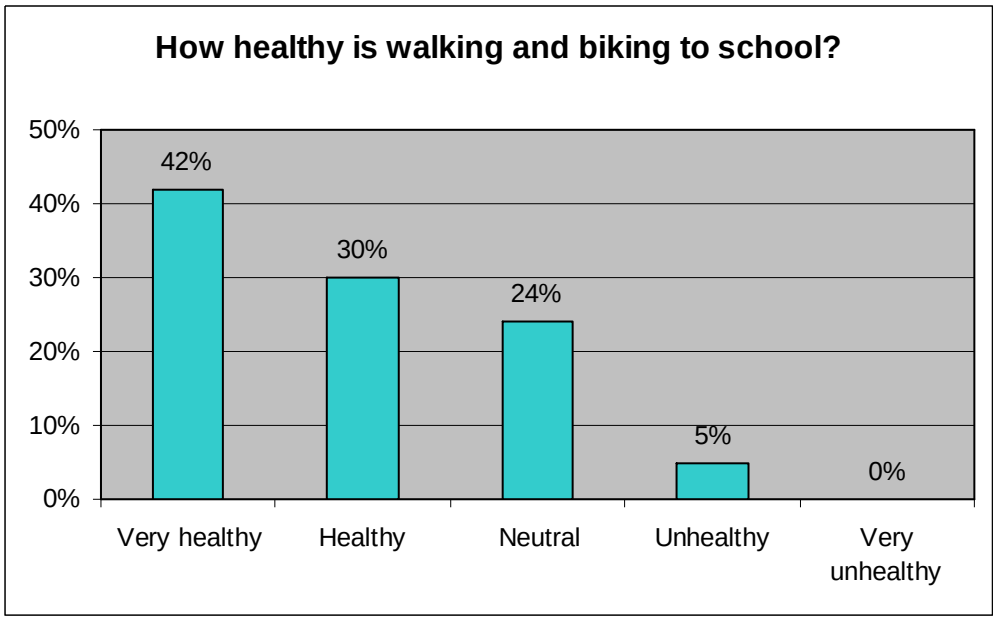


**Figure 123 Distribution of Health of Walking or Biking to/from School (Thonotosassa)**

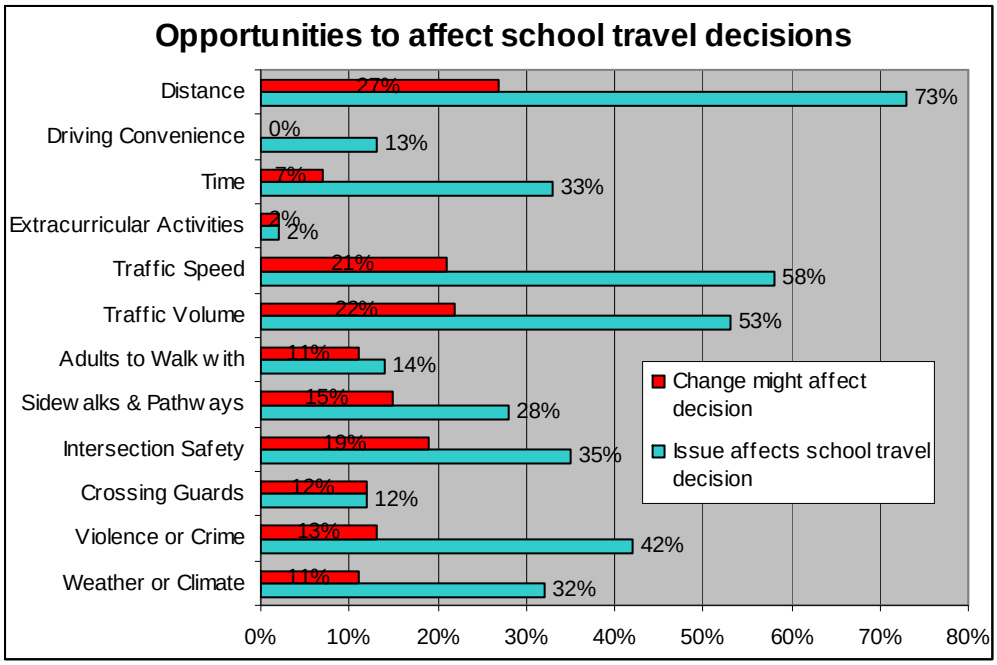


**Figure 124 Ranking of Factors Affecting Travel Mode (Thonotosassa)**

## A.14 Valrico Elementary School

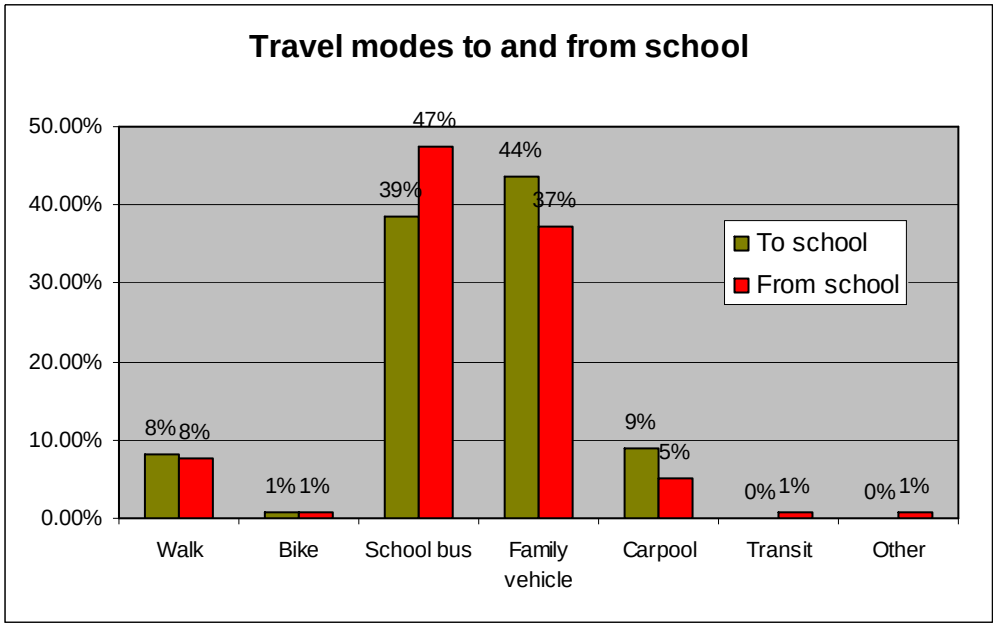


**Figure 125 Distribution of Student Travel Modes to/from School (Valrico)**

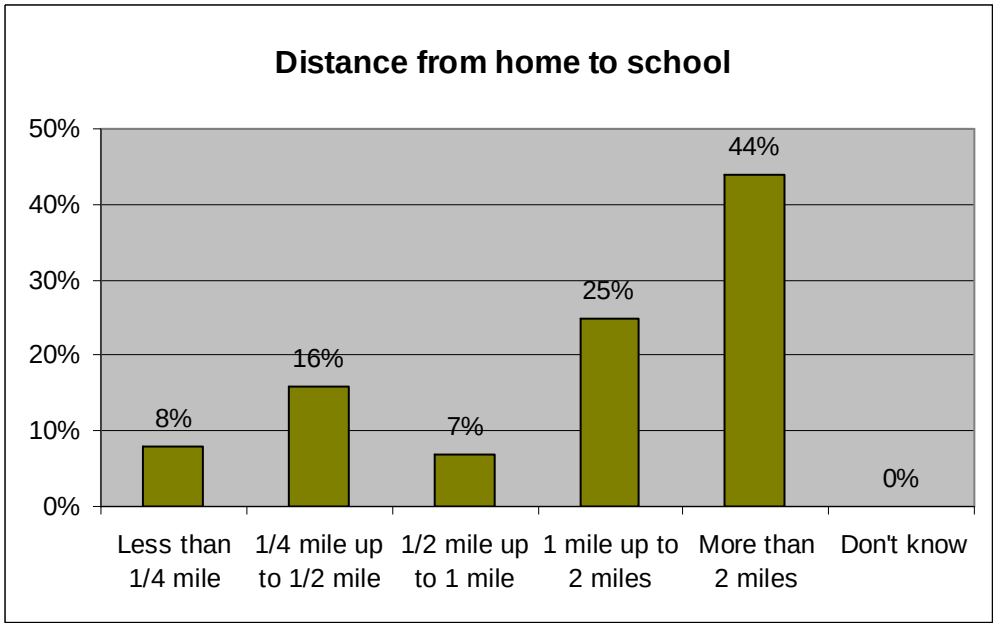


**Figure 126 Distribution of Distance from Home to School (Valrico)**

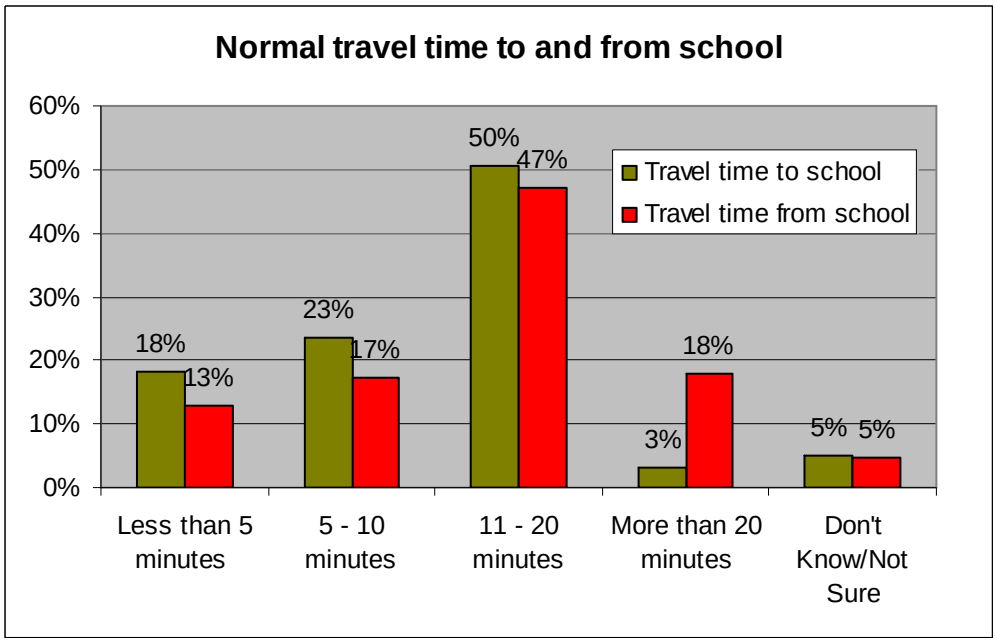


**Figure 127 Normal Travel Time to/from School (Valrico)**

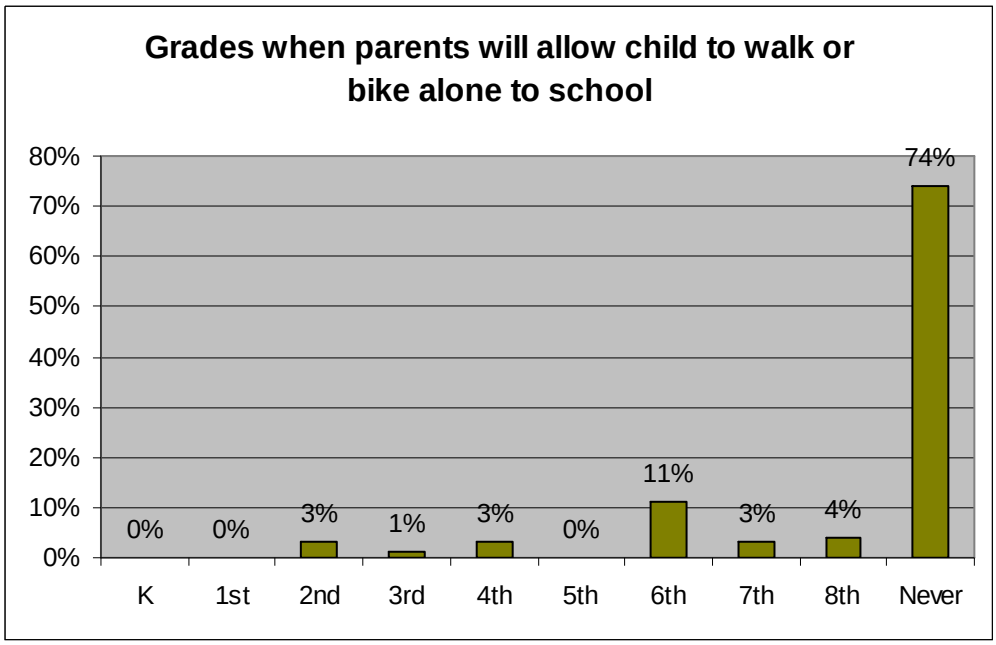


**Figure 128 Distribution of Grade Level for Allowing Child to Walk or Bike to School (Valrico)**

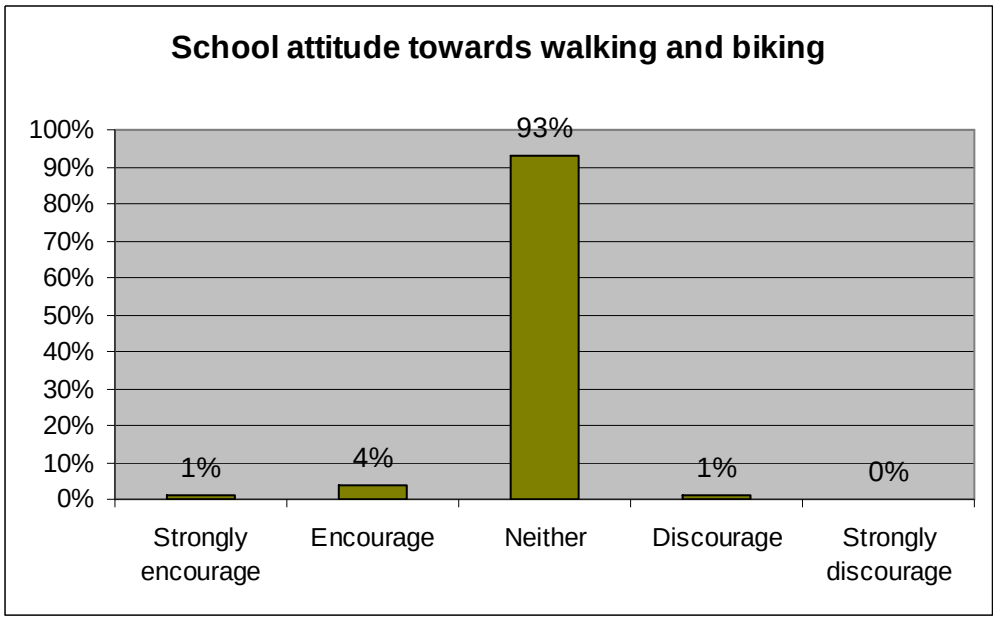


**Figure 129 Distribution of School Attitude on Walking or Biking to/from School (Valrico)**

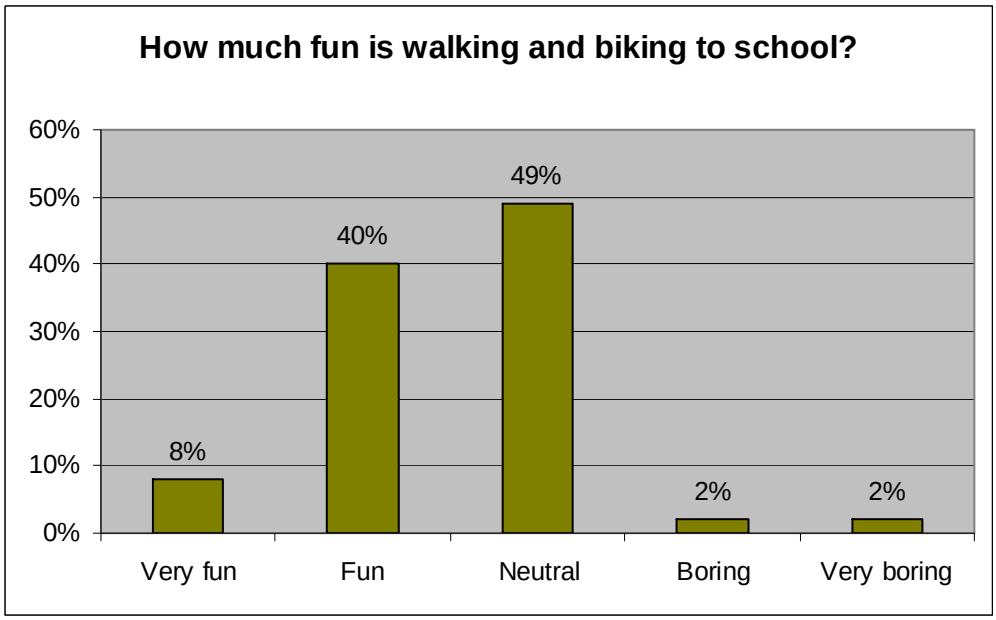


**Figure 130 Distribution of Enjoyment of Walking or Biking to/from School (Valrico)**

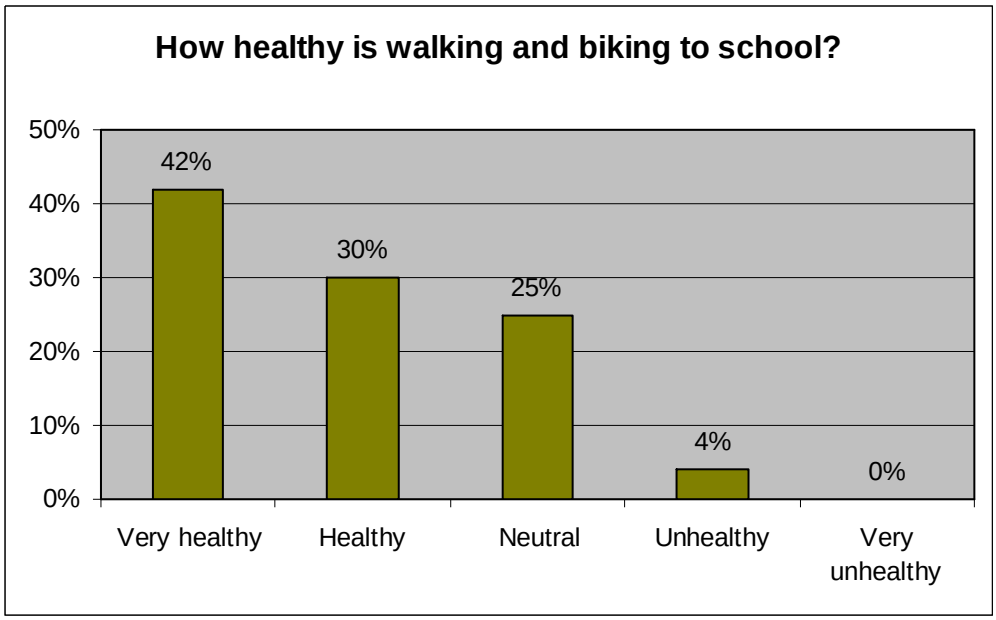


**Figure 131 Distribution on Health of Walking or Biking to/from School (Valrico)**

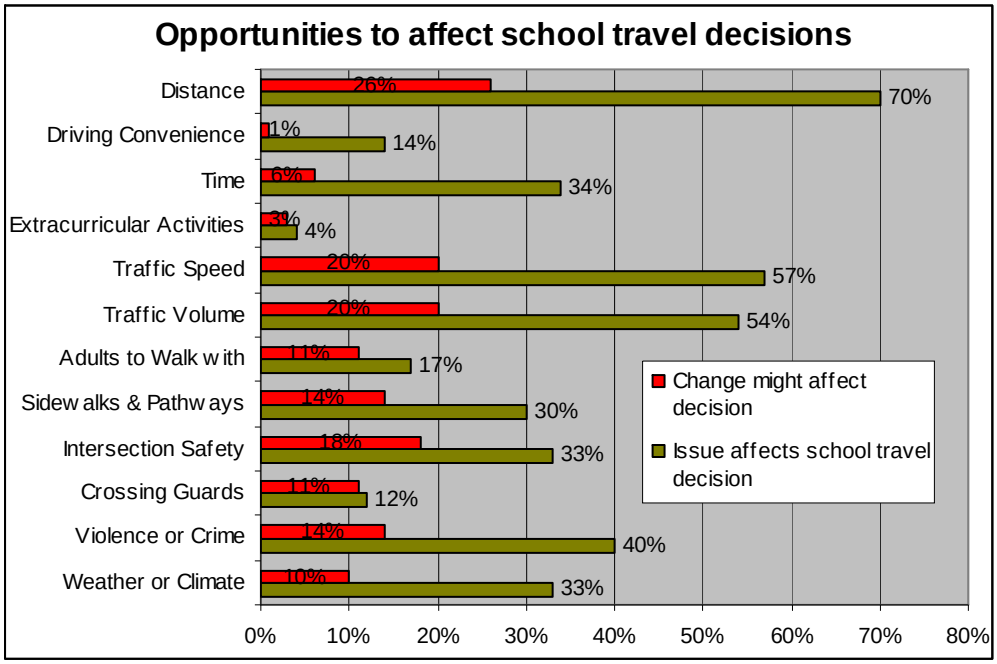


**Figure 132 Ranking of Factors Affecting Travel Mode (Valrico)**