TRANSPORTATION METHODS
AND THEIR EFFECTS ON ACADEMIC OUTCOMES

by

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As members of the Master's Committee, we certify that we have read the thesis prepared by Jenna Hollander, titled Transportation Methods and their Effects on Academic Outcomes and recommend that it be accepted as fulfilling the thesis requirement for the Master's Degree.

Date: 11/28/18

Final approval and acceptance of this thesis is contingent upon the candidate's submission of the final copies of the thesis to the Graduate College.

I hereby certify that I have read this thesis prepared under my direction and recommend that it be accepted as fulfilling the Master's requirement.

Date: 11/28/18
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Abstract

Actively commuting to and from school has declined in recent decades, while childhood obesity rates have substantially increased. This research takes a closer look at elementary school-aged children’s transportation methods to find whether or not these methods may be associated with academic outcomes. Parents (N = 208) completed the Safe Routes to School survey, where they reported their child’s transportation methods to and from elementary school, and answered two additional questions that were added to the survey to account for previous academic outcomes and physical activity. The measurement for academic outcome was grades and was based on the child’s most recent report card. No relationship was found between children’s transportation methods and academic outcomes (p > .05). Parent’s beliefs regarding how healthy active transportation is was statistically significant (p < .05) depending on the language in which they completed the survey. A relationship was found between children asking to actively commute and their parent’s perception of how healthy active transportation is (p < .05). Further research may be directed towards finding the directionality of these relationships. This information will help guide policymakers’ decisions regarding who their target population should be and how they should be promoting certain healthy habits.

Keywords: Transportation methods, academic outcomes, health
**Introduction**

Active transportation is no longer a standard practice. Less than fifty years ago, nearly half of all children in the United States walked or biked to school. In 2011, the number of children who walked or biked to school dropped to 13% (Brown, Jones, Marchetti, Pullen, Scully, & Zeeger, 2011). During this same time period the rates of childhood obesity rapidly increased. Just 5% of children were obese fifty years ago, whereas today nearly 20% of children are obese (Johnson, 2012). Many would argue that childhood obesity rates in the Western world have reached epidemic proportions (Hill & Peters, 1998; Johnson, 2012). Though there are likely a variety of factors that play into these alarming rates, general consensus would agree that this epidemic is largely due to our environment. The environment in which we live has been referred to as an ‘obesogenic’ environment, meaning it promotes unhealthy behaviors and discourages healthy ones such as regular physical activity (Hill & Peters, 1998; Powell, Spears, & Rebori, 2010). One contributor to this obesogenic environment is car use (Hinde & Dixon, 2005). Since the use of vehicles to get to and from school has drastically increased in recent decades and daily physical activity among youth has declined, perhaps the children that are actively commuting to and/or from school are experiencing positive benefits.

Children that actively transport to and from school have been shown to have lower body mass indexes (BMI) than non-active transporters (Rosenberg, Sallis, Conway, Cain, & McKenzie, 2006). Having a normal BMI has been associated with numerous positive outcomes at any age, including increased self-worth (Franklin, Denyer, Steinbeck, Caterson, & Hill, 2006). The reason this matters for this particular study is that overweight school-aged children have shown decreased cognitive functioning and lower academic outcomes in school (Yanfeng, Dai, Jackson, & Zhang, 2008). Children with greater activity levels are better able to fend off excess
weight gain, in addition to having greater academic achievement (Castelli, Hillman, Buck, & Erwin, 2007; Coe, Pivarnik, Womack, Reeves, & Malina, 2006). If the solution to increasing children’s self-worth, academic outcomes, and likelihood of maintaining a healthy BMI were as easy as walking or biking to school, then many parents might reconsider their children’s current transportation methods.

**Previous Research and New Directions**

The fields of education and public health have researched many relevant ideas pertaining to the current study. For instance, one focus in public health is active transportation; previous research in this field has found correlations between active transportation, physical activity, and weight status (Rosenberg, 2006). Other studies related to active transportation have focused on interventions to promote active transportation and trends in transportation methods (McDonald, 2007). Literature focusing on improving student outcomes in the field of education is also nothing new. For example, there is previous literature assessing how parental involvement may affect student outcomes (Domina, 2005). Improving academic outcomes for ESL students is another topic that has been researched extensively and is related to the field of education (Baik & Greig, 2009). Based on the substantial amount of research that has looked at transportation methods, one may infer that assessing transportation methods further is important (Mackett, 2003; Tan, Wang, Lu, & Bian, 2007). Similarly, the significance of academic outcomes and determining which other variables may impact them also seems worthwhile (Martinez-Gomez, Ruiz, Martinez-Gomez, Chillon, Rey-Lopez, Diaz, Castillo, Veiga, & Marcos, 2011).

As has been shown, academic fields may seamlessly merge and work together when analyzing the real world. This research is no different as it draws upon both the fields of education and public health. Some of the previous literature that has integrated the two fields
looks at academic outcomes in relation to food insecurity and stress management interventions (Jyoti, Frongillo, & Jones, 2005; Keogh, Bond, & Flaxman, 2006). The study most similar to this research was done in Spain and examined active commuting to school and cognitive performance in adolescents (Martinez-Gomez et al., 2011). The current study builds upon the related literature, as it analyzes elementary aged children in the Southwestern United States. Similar to the Spain study, active transportation to school and the potential role it has on academic outcomes was assessed; however, in addition to this, any active transportation (to school, from school, or to and from school) was also examined.

**Current Study**

The purpose of the proposed study is to look at the relationship between students’ transportation methods and their achievement in school. This research looked at academic outcomes in elementary school students, examining specific transportation methods to see how they differ among students and how they may play into student outcomes. Specifically, the following research questions were examined:

- Do children that actively transport to or from school have better academic outcomes than non-active transporters?
- Are any differences seen in transportation methods and perceptions of transportation methods among English and Spanish speakers?
- What is the maximum amount of time students will spend actively commuting to and from school?

**Methodology**

Transportation will be defined as either active or non-active. Active transporters commute to and/or from school by walking or biking. Active transporters require total physical
activity to or from school and will not include students that walk to their bus stop or walk to their transit/public bus stops. Non-active transporters include students that commute by school bus, family vehicle, transit, or carpooling. Non-active transporters that commuted by family vehicle include families that only have their children in the vehicle. Those that carpool have children outside of their family that they drive to or from school.

**School**

Mission Manor Elementary, a SunnySide Unified School District (SUSD) school, was chosen for this research largely due to the principal’s interest in this study. Prior to the study, the principal expressed a need for more information about transportation method choices and wanted to know why so many parents chose to drive their children to school. The principal and staff from the school of study have been supportive of student research, health initiatives, and local non-profit organizations in the past. Interest in this study may have sprouted from the congestion and backed-up traffic in the school area during normal drop-off and pick-up hours. There is little information available on why students are choosing not to walk or bike to school.

Mission Manor Elementary has 674 students in grades K-6. The school has a unique genetic makeup, with 96% of students being Hispanic. The minority enrollment at the school of study is 96% of the student body, which is more than the state average of 61%. Mission Manor’s overall test scores for math and reading were in the bottom 50% of all schools in Arizona for the 2015-2016 school year (Public School Review, 2016).

**Participants**

Inclusion criteria for this study were that participants are considered a legal guardian of the student, are eighteen years of age or older, have (at least) one child attending the elementary school studied, and speak English or Spanish.
Surveys were completed for all grades from K-6. The final total of surveys completed was 208 ($N=208$). Surveys were completed in English ($n=138$, 66.3%) and Spanish ($n=70$, 33.7%). More detailed demographic information was not asked of participants to help with anonymity.

**Materials**

After receiving approval from the school to conduct this research, the next step was finalizing the survey. Informed consent was provided on top of the surveys so that the subjects could read that they were consenting to participate in this research by answering any questions (see Appendix A). The consent form also advised parents not to write names on the packet to maintain anonymity. There was no question or area on the packet that asked for the parent or child's name. A nationally-accredited, evidence-based survey created by Safe Routes to School was used as the foundation for the survey implemented (McDonald, Dwelley, Combs, Evenson, & Winters, 2011; see Appendix B). A few questions that were not relevant to this research were omitted and two additional questions were added to the final survey (see Appendix C). For example, one question that was omitted asked parents to report the highest grade or year of school that they have completed. Though this question may have provided interesting information, it seemed more important to be sensitive to the study population. Another omitted question asked for the name of the school their child attends. Since we were only examining one school, this question was not necessary. The first additional question added to the survey was to capture overall physical activity levels of children. The physical activity question asked parents how many days per week their child is physically active for at least 60 minutes per day (see Appendix C). The purpose of this question was to obtain more information regarding physical activity to act as a control variable when assessing the overarching hypothesis. The next
additional question was to acquire information regarding students’ academic outcomes. Parents were asked to report what grades (mostly 4’s, 3’s, 2’s, 1’s, or other) their child generally receives. Parents were instructed to base this answer on their child’s last report card.

Procedure

Once the measurement tools—the survey, two additional questions, and consent form—were finalized and combined into one packet, the survey packets were dropped off to the principal and then distributed to all teachers. Teachers sent survey packets home with students for their parents to complete. Potential participants were given one week to complete and return the survey. After the due date for the surveys passed, all were collected by each individual teacher and delivered to administrative staff. The administrative staff held onto the surveys until all teachers delivered them.

After the surveys were picked up, they were immediately input into Google Surveys. All questions were coded to allow for statistical analyses to be run on the data. For example, if a question allowed for respondents to check off multiple boxes, each box was then assigned a number and all numbers were input into an Excel sheet. After coding of all questions was complete, in-depth statistical analyses were then performed on the data using the statistical package R. Missing data was not included in the analysis. Casewise deletion was used to handle missing data in all regression analyses.

Coding of variables

Table 1 provides information about how the survey questions were coded in each statistical analysis. Any students that walk or bike on the way to school were included in the variable “active transporters on the way to school.” To assess whether or not any active transportation (to school, from school, or to and from school) was positively associated with
academic outcomes, students that walk or bike on the way to school, on the way home from school, or both were considered active and categorized as such in the “transport to or from school” variable. For the variable pertaining to children’s interest in active transportation, if the child asked to actively commute in the past year, then they were considered to be interested in active transport. If the child did not ask to actively commute in the past year, then they were considered not interested in active transport. Potential answers for children’s academic outcomes included: mostly 4’s for excellent performance, mostly 3’s for satisfactory performance, mostly 2’s for a neutral score, mostly 1’s for unsatisfactory performance, or other. For example, some parents that selected “other” reported their students being in the special education program; these responses, any missing data, or those that selected more than one response for this question were not included in this analysis.
### Table 1

*Initial coding of variables*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coded as</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey language</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>0</td>
</tr>
<tr>
<td>Spanish</td>
<td>1</td>
</tr>
<tr>
<td>Transport to school</td>
<td></td>
</tr>
<tr>
<td>Non-active</td>
<td>0</td>
</tr>
<tr>
<td>Active</td>
<td>1</td>
</tr>
<tr>
<td>Transport to or from school</td>
<td></td>
</tr>
<tr>
<td>Non-active</td>
<td>0</td>
</tr>
<tr>
<td>Active</td>
<td>1</td>
</tr>
<tr>
<td>Commute time</td>
<td></td>
</tr>
<tr>
<td>&lt; 5 min.</td>
<td>1</td>
</tr>
<tr>
<td>5-10 min.</td>
<td>2</td>
</tr>
<tr>
<td>11-20 min.</td>
<td>3</td>
</tr>
<tr>
<td>20 min.</td>
<td>4</td>
</tr>
<tr>
<td>Child’s interest in AT</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>Parent beliefs on AT</td>
<td></td>
</tr>
<tr>
<td>Very unhealthy</td>
<td>0</td>
</tr>
<tr>
<td>Unhealthy</td>
<td>1</td>
</tr>
<tr>
<td>Neutral</td>
<td>2</td>
</tr>
<tr>
<td>Healthy</td>
<td>3</td>
</tr>
<tr>
<td>Very Healthy</td>
<td>4</td>
</tr>
<tr>
<td>Grades</td>
<td></td>
</tr>
<tr>
<td>Mostly 1’s</td>
<td>1</td>
</tr>
<tr>
<td>Mostly 2’s</td>
<td>2</td>
</tr>
<tr>
<td>Mostly 3’s</td>
<td>3</td>
</tr>
<tr>
<td>Mostly 4’s (Excellent)</td>
<td>4</td>
</tr>
<tr>
<td>Physical Activity (60+ min)</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>0</td>
</tr>
<tr>
<td>1 day</td>
<td>1</td>
</tr>
<tr>
<td>2 to 3 days</td>
<td>2</td>
</tr>
<tr>
<td>4 to 5 days</td>
<td>3</td>
</tr>
<tr>
<td>6+ days</td>
<td>4</td>
</tr>
</tbody>
</table>

*Note.* AT = active transport.
Study Design and Data Analysis

Since subjects used in this experiment were not manipulated and were instead naturally categorized based on their current transportation choices, a non-experimental research design was used. Descriptive statistics were generated for all variables in the regression models and research questions. Correlations were run for all variables in the regression models. In all analyses, a statistical significance was set at \( p < .05 \). Multicollinearity was checked in research questions one and two for all variables of interest.

Research question 1. To answer the first proposed research question, we must determine whether children that actively transport to school have better academic outcomes. A multiple linear regression was used to assess whether or not there is any relationship between these two variables (transportation and grades). The dependent variable was academic outcome. Active transportation was the independent variable. Children were considered active transporters if they walk or bike on the way to school. The reasoning for this was to see if maximum benefits would be found on the way to school and the thought behind this was that getting physical activity prior to school might improve students’ focus and concentration when they sit down for class. The control variables used in the analysis were overall physical activity levels, travel time to and from school, language, how healthy the parent perceives active transportation, and the child’s interest in active transportation.

A similar test was done to find out if any active transportation (to school, from school, or to and from school) has beneficial impacts on academic outcomes. To analyze this, the testing for academic outcomes and transportation methods was assessed using a multiple linear regression. The only difference between this test and the first multiple linear regression is that
all active transporters were assessed, as opposed to just the active transporters on the way to school.

**Research question 2.** As for differences between English and Spanish speakers, since the dependent variable—language—is binary, a logistic regression was used for this research question. The independent variables included parent’s perception of how healthy active transportation is, whether or not the child actively transports to or from school, the child’s academic outcomes, travel time to and from school, general physical activity levels, and the child’s interest in active transportation. The variable for language was categorized depending on what language respondents completed the survey. Those who completed the survey in English were categorized as English speakers, and those that completed the Spanish surveys were categorized as Spanish speakers.

**Research question 3.** The final proposed research question is to find what amount of time students will spend actively commuting to and from school is. To answer this, the question asking for travel time to school will be examined. Based on the number of responses selected for each answer in this question, frequencies and percentages will be used to detect patterns in travel times to school. In order for elementary students at Mission Manor elementary to qualify for bussing services, they have to live further than one mile from the school. This will be considered when assessing patterns in responses for this question.

**Results**

**Descriptive Information**

Table 2 reports the descriptive statistics for the survey variables. When parents were questioned why they decided to regularly drive their children to and/or from school, the most common response was “stranger danger” concerns with 46.7% \( (n=91) \) expressing this as a
concern, followed by 40.5% \((n = 79)\) saying their child was too young, and 34.9% \((n = 68)\) reporting that it is most convenient for them to drop their child off on the way to work.

As shown in Table 2, when parents were questioned if their child asked for permission to walk or bike to or from school in the last year, 54.5% \((n = 110)\) said yes. Overall, the majority of parents considered active transportation as healthy for their child. 53.5% \((n = 106)\) reported active transportation as “very healthy” and 28.3% \((n = 56)\) said it was “healthy” (see Table 2).

One of the questions asked parents if they would like their child to participate in regular walking and biking programs offered by the school. The possible answers included bike repair, a walking school bus, safety education for walkers, monthly or weekly active travel challenges, afterschool walking and biking clubs, or weekend bike rides. The most frequent option chosen was safety education for walkers \((n = 64, 43\%)\).

The last question asked in the survey had to do with the children’s academic performance (i.e. grades). The question asked parents what grades the child mostly received. Their response was to be based on their child’s last report card. The majority of responses was mostly 4’s and mostly 3’s with a combined total of 79.9% \((n = 151)\) (see Table 2).

Of these respondents, 53.4% \((n = 110)\) of parents had one child that attended Mission Manor elementary school, 34.5% \((n = 71)\) had two children, 10.7% \((n = 22)\) had three children, and 1.4% \((n = 3)\) had four or more children (see Table 2). Respondents were instructed to only complete one survey no matter how many children they had attending the elementary school of study. Nearly half of the respondents had more than one child attending the school \((n = 96, 46.7\%)\).

The data from completed surveys indicated that 74.5% \((n = 155)\) of students commute to school by family vehicle, 17.3% \((n = 36)\) of children arrive by walking, 4.3% \((n = 9)\) take the
school bus, 1.4% \( (n=3) \) carpool, 1% \( (n=2) \) take public transit, 1% \( (n=2) \) actively commute by biking, and 0.5% reported “other” \( (n=1) \), which includes alternative active transportation methods such as skateboarding, riding a scooter, or anything else that did not fit into the other categories. For the commute home from school, 61.2% \( (n=126) \) of children were picked up and driven home by family vehicle and 28.6% \( (n=59) \) of students walked home from school, while other transportation methods stayed roughly the same as on the way to school. Of the surveys completed, 66.3% \( (n=138) \) were completed in English and 33.7% \( (n=70) \) of surveys were completed in Spanish.
Table 2

*Descriptive statistics of the study population*

<table>
<thead>
<tr>
<th>Variables</th>
<th>$n$</th>
<th>%</th>
<th>$M$ (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total children</td>
<td>206</td>
<td></td>
<td>1.57 (.72)</td>
</tr>
<tr>
<td>1 child</td>
<td>110</td>
<td>53%</td>
<td></td>
</tr>
<tr>
<td>2 children</td>
<td>71</td>
<td>34%</td>
<td></td>
</tr>
<tr>
<td>3 children</td>
<td>22</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>4+ children</td>
<td>3</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Survey Language</td>
<td>208</td>
<td></td>
<td>.34 (.47)</td>
</tr>
<tr>
<td>English</td>
<td>138</td>
<td>66%</td>
<td></td>
</tr>
<tr>
<td>Spanish</td>
<td>70</td>
<td>34%</td>
<td></td>
</tr>
<tr>
<td>AT to school</td>
<td>38</td>
<td>18%</td>
<td>.18 (.39)</td>
</tr>
<tr>
<td>AT from school</td>
<td>61</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>AT to/from school</td>
<td>99</td>
<td>48%</td>
<td>.33 (.47)</td>
</tr>
<tr>
<td>Commute time</td>
<td>207</td>
<td></td>
<td>2.17 (.99)</td>
</tr>
<tr>
<td>&lt; 5 min.</td>
<td>55</td>
<td>27%</td>
<td></td>
</tr>
<tr>
<td>5-10 min.</td>
<td>89</td>
<td>43%</td>
<td></td>
</tr>
<tr>
<td>11-20 min.</td>
<td>38</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>20+ min.</td>
<td>22</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td>Child’s interest in AT</td>
<td>202</td>
<td></td>
<td>.55 (.50)</td>
</tr>
<tr>
<td>Yes</td>
<td>110</td>
<td>55%</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>92</td>
<td>45%</td>
<td></td>
</tr>
<tr>
<td>Parent beliefs on AT</td>
<td>198</td>
<td></td>
<td>3.38 (.78)</td>
</tr>
</tbody>
</table>
## Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>%</th>
<th>M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unhealthy/very</td>
<td>6</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td>30</td>
<td>15%</td>
<td></td>
</tr>
<tr>
<td>Healthy/very</td>
<td>162</td>
<td>82%</td>
<td></td>
</tr>
<tr>
<td>Physical Activity</td>
<td>197</td>
<td></td>
<td>2.7 (.96)</td>
</tr>
<tr>
<td>0 days</td>
<td>7</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>1 day</td>
<td>8</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>2-3 days</td>
<td>64</td>
<td>32%</td>
<td></td>
</tr>
<tr>
<td>4-5 days</td>
<td>77</td>
<td>39%</td>
<td></td>
</tr>
<tr>
<td>6 or more days</td>
<td>41</td>
<td>21%</td>
<td></td>
</tr>
<tr>
<td>Grades</td>
<td>189</td>
<td></td>
<td>3.03 (.68)</td>
</tr>
<tr>
<td>4’s Excellent</td>
<td>42</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>3’s Satisfactory</td>
<td>109</td>
<td>58%</td>
<td></td>
</tr>
<tr>
<td>2’s Neutral</td>
<td>30</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>1’s Unsatisfactory</td>
<td>3</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>2%</td>
<td></td>
</tr>
</tbody>
</table>

*Note. N’s range from 189 to 208 due to occasional missing data. AT = active transport.*

Table 3 reports the correlation coefficients for all variables used in the regression analyses. The majority of the correlations between variables was low, 0.1 to 0.3. The language parent’s completed the survey in and their perception of how healthy active transportation is, was close to being moderately associated with each other, $r = 0.25$. Not surprisingly, active transport to school was highly correlated with active transport to/from school, $r = 0.68$. 
Table 3

Correlation matrix for variables of interest

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Survey language</td>
<td>-</td>
<td>0.08</td>
<td>0.02</td>
<td>-0.01</td>
<td>0.25*</td>
<td>-0.18</td>
<td>0.06</td>
<td>-0.04</td>
</tr>
<tr>
<td>2. AT to school</td>
<td>-</td>
<td>0.68*</td>
<td>0.12</td>
<td>0.14</td>
<td>0.08</td>
<td>0.06</td>
<td>-0.10</td>
<td></td>
</tr>
<tr>
<td>3. AT to/from school</td>
<td>-</td>
<td>0.19</td>
<td>0.16</td>
<td>-0.03</td>
<td>-0.01</td>
<td>-0.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Child’s interest AT</td>
<td>-</td>
<td>0.17</td>
<td>-0.01</td>
<td>-0.14</td>
<td>0.04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Parent beliefs on AT</td>
<td>-</td>
<td>0.04</td>
<td>0.11</td>
<td>0.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Physical Activity</td>
<td>-</td>
<td>0.08</td>
<td>0.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Commute time</td>
<td>-</td>
<td>0.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Grades</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. The numbers along the left column correspond to the numbers along the top row (i.e., #1 represents survey language, #2 represents active transport to school, etc.). Correlation categories—low: \( r = 0.1 – 0.3 \), moderate: \( r = 0.3 – 0.5 \), and high: \( r = 0.5 - 1.0 \).

**Research question 1.** Table 4 reports the results of the linear regression examining active transport to school and grades. There was no significant relationship \( (p > .05) \) between actively transporting to school and having better academic outcomes. Whether children actively commuted or non-actively commuted to school, their academic outcomes were essentially the same. Multicollinearity was not an issue for this research question all scores came back in normal ranges \( (VIF < 2) \).
Table 4

*Relationship between active transportation to school and academic outcome using a multiple linear regression*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>B</th>
<th>SE</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>2.69</td>
<td>0.31</td>
<td>8.57</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>AT to school</td>
<td>-0.19</td>
<td>0.13</td>
<td>-1.44</td>
<td>0.15</td>
</tr>
<tr>
<td>Physical activity</td>
<td>0.09</td>
<td>0.06</td>
<td>1.46</td>
<td>0.15</td>
</tr>
<tr>
<td>Commute time</td>
<td>0.01</td>
<td>0.06</td>
<td>0.23</td>
<td>0.82</td>
</tr>
<tr>
<td>Survey language</td>
<td>-0.08</td>
<td>0.12</td>
<td>-0.69</td>
<td>0.49</td>
</tr>
<tr>
<td>Parent beliefs on AT</td>
<td>0.01</td>
<td>0.08</td>
<td>0.17</td>
<td>0.87</td>
</tr>
<tr>
<td>Child’s interest in AT</td>
<td>0.05</td>
<td>0.11</td>
<td>0.42</td>
<td>0.68</td>
</tr>
</tbody>
</table>

*Note.*  AT = active transport. **p < .001.

Since no significant relationship was found between active transport to school and academic outcomes, a second test was done to assess whether or not active transportation in any direction (to school, from school, or both) was positively associated with academic outcomes (see Table 5). Students that were categorized as active transporters to school, from school, or both were categorized as active transporters in this multiple linear regression. These results also came back statistically insignificant (*p > .05*). In this study, there was no relationship between one’s transportation method and their academic outcome. Multicollinearity was not an issue for this research question all scores came back in normal ranges (VIF < 2).
Table 5

*Relationship between any active transportation to or from school and academic outcome using a multiple linear regression*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>$B$</th>
<th>SE</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>2.79</td>
<td>0.29</td>
<td>9.63</td>
<td>&lt;.001**</td>
</tr>
<tr>
<td>AT to/from school</td>
<td>-0.20</td>
<td>0.11</td>
<td>-1.77</td>
<td>0.07</td>
</tr>
<tr>
<td>Physical activity</td>
<td>0.08</td>
<td>0.06</td>
<td>1.35</td>
<td>0.20</td>
</tr>
<tr>
<td>Commute time</td>
<td>&lt;-.001</td>
<td>0.06</td>
<td>0.003</td>
<td>0.10</td>
</tr>
<tr>
<td>Survey language</td>
<td>-0.09</td>
<td>0.11</td>
<td>-0.77</td>
<td>0.44</td>
</tr>
<tr>
<td>Parent beliefs on AT</td>
<td>0.02</td>
<td>0.08</td>
<td>0.28</td>
<td>0.78</td>
</tr>
<tr>
<td>Child’s interest in AT</td>
<td>0.08</td>
<td>0.11</td>
<td>0.70</td>
<td>0.48</td>
</tr>
</tbody>
</table>

*Note.* AT = active transport. **$p < .001.$

**Research question 2.** Table 6 reports the results for the logistic regression examining the language participants completed the surveys in and whether or not that impacts the parents’ perceptions of the healthiness of active transport or if the child is actually an active transporter. Missing data ranged from 0% to 8%. The variable for how healthy the parent perceived active transportation was statistically significant (OR=2.49, 95% CI [0.39, 1.49]). Parents that completed the survey in Spanish were almost two and a half times more likely to believe active transport was healthy compared to parent’s completing the survey in English. The rest of the variables were statistically insignificant for language ($p > .05$). This means that there were no other noticeable differences in responses between those that completed the survey in English versus those that completed the survey in Spanish, including whether or not the children were
active transporters. Multicollinearity was not an issue as all scores back in normal ranges (VIF < 2).

Table 6

Results for differences between English and Spanish speakers

<table>
<thead>
<tr>
<th>Predictor</th>
<th>B</th>
<th>SE</th>
<th>p</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>2.14</td>
<td>1.24</td>
<td>0.08</td>
<td>0.11</td>
<td>-4.64, 0.24</td>
</tr>
<tr>
<td>AT to/from school</td>
<td>-0.17</td>
<td>0.36</td>
<td>0.65</td>
<td>0.85</td>
<td>-0.89, 0.54</td>
</tr>
<tr>
<td>Grades</td>
<td>-0.18</td>
<td>0.25</td>
<td>0.45</td>
<td>0.83</td>
<td>-0.67, 0.29</td>
</tr>
<tr>
<td>Commute time</td>
<td>0.01</td>
<td>0.18</td>
<td>0.94</td>
<td>1.01</td>
<td>-0.34, 0.36</td>
</tr>
<tr>
<td>Physical activity</td>
<td>-0.36</td>
<td>0.19</td>
<td>0.06</td>
<td>0.70</td>
<td>-0.74, 0.1</td>
</tr>
<tr>
<td>Parent beliefs on AT</td>
<td>0.91</td>
<td>0.28</td>
<td>&lt;.01*</td>
<td>2.49</td>
<td>0.39, 1.49</td>
</tr>
<tr>
<td>Child’s interest in AT</td>
<td>-0.31</td>
<td>0.35</td>
<td>0.38</td>
<td>0.73</td>
<td>-1.01, 0.38</td>
</tr>
</tbody>
</table>

Note. AT = active transport. * p < .05

Research question 3. To test the maximum amount of time children may willingly spend actively commuting, the most common responses for commute time were calculated for the active transporters (see Table 7). Thirty-eight students (n=38) actively commuted on the way to school. Of these active transporters, the most common response was five to ten minutes (n=14, 37%) and eleven to twenty minutes (n=14, 37%). Less than five minutes was the third most common response (n=8, 21%). The number of participants selecting more than twenty minutes for their active commute time was substantially less than the other responses (n = 2, 5%). Students are actively transporting for up to twenty minutes. If they have to commute for more than twenty minutes, then they are less likely to actively commute.
Table 7

*Time active commuters spend on the way to school*

<table>
<thead>
<tr>
<th>Commute time</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 5 minutes</td>
<td>8</td>
<td>21%</td>
</tr>
<tr>
<td>5-10 minutes</td>
<td>14</td>
<td>37%</td>
</tr>
<tr>
<td>11-20 minutes</td>
<td>14</td>
<td>37%</td>
</tr>
<tr>
<td>&gt; 20 minutes</td>
<td>2</td>
<td>5%</td>
</tr>
</tbody>
</table>

*Note.* Numbers and percentages based only on those that actively transport on the way to school.

**Other findings.** Further post-hoc testing found that if children asked to actively commute in the past year, then the parent was more likely to perceive active transportation as healthy or very healthy. The dependent variable, which was whether or not the child asked to actively commute in the past year, was a binary variable as responses were either yes or no. A logistic regression was used for this particular test. The independent variable associated with how healthy parents perceive active transportation came back statistically significant (OR=1.61, 95% CI [1.06, 2.47]); therefore, respondents that had children asking to actively commute to or from school in the past year were more likely to perceive active transportation as healthy or very healthy (see Table 8). If children asked to actively commute in the past year, then parents were more likely to perceive active transportation as healthy. Another significant finding was that the students that asked to actively transport in the past year were almost two and half times (OR=2.45, 95% CI [1.29, 4.79]) more likely to actually actively transport to/from school.
Table 8

Outcomes for logistic regression examining relationship between how healthy parents perceive active transportation and children’s interest in active transportation

<table>
<thead>
<tr>
<th>Predictor</th>
<th>SE</th>
<th>z</th>
<th>p</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.85</td>
<td>-2.13</td>
<td>0.03*</td>
<td>0.16</td>
<td>0.03, 0.85</td>
</tr>
<tr>
<td>Parent beliefs on AT</td>
<td>0.21</td>
<td>2.22</td>
<td>0.02*</td>
<td>1.61</td>
<td>1.06, 2.47</td>
</tr>
<tr>
<td>AT to/from school</td>
<td>0.33</td>
<td>2.69</td>
<td>0.007**</td>
<td>2.45</td>
<td>1.29, 4.79</td>
</tr>
<tr>
<td>Physical activity</td>
<td>0.03</td>
<td>0.21</td>
<td>0.83</td>
<td>1.03</td>
<td>0.75, 1.42</td>
</tr>
</tbody>
</table>

*Note. AT = Active transport. Dependent variable = Child’s interest in AT.*

* p < .05, ** p < .01.

To verify this finding, another logistic regression was run to find out more information about the directionality of the relationship between parent beliefs about active transportation and the child’s desire to actively commute (see Table 9). For this regression, the parent’s belief that active transportation is healthy was the dependent variable. Though there were five potential responses to this question originally (see Table 1), this variable was turned into a binary variable. Either they thought active transportation was healthy, or they thought active transportation was unhealthy. All respondents that considered active transportation healthy or very healthy were included in the healthy group. Those that marked neutral, unhealthy, or very unhealthy for this question were put into the unhealthy group. The variable accounting for the children’s interest in active transportation came back statistically significant (OR=2.44, 95% CI [1.03, 6.15]) again. Parents that perceive active transportation as healthy are more likely to have children that ask to actively commute to school.
Table 9

Outcomes for logistic regression on relationship between children’s interest in active transport and parent’s beliefs that active transport is healthy

<table>
<thead>
<tr>
<th>Predictor</th>
<th>SE</th>
<th>z</th>
<th>p</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.67</td>
<td>1.84</td>
<td>0.07</td>
<td>3.40</td>
<td>0.98, 13.6</td>
</tr>
<tr>
<td>Child’s interest in AT</td>
<td>0.45</td>
<td>1.98</td>
<td>0.04*</td>
<td>2.44</td>
<td>1.03, 6.15</td>
</tr>
<tr>
<td>AT to/from school</td>
<td>0.51</td>
<td>0.88</td>
<td>0.38</td>
<td>1.57</td>
<td>0.60, 4.58</td>
</tr>
<tr>
<td>Physical activity</td>
<td>0.22</td>
<td>0.07</td>
<td>0.95</td>
<td>1.01</td>
<td>0.65, 1.56</td>
</tr>
</tbody>
</table>

*Note. AT = Active transport. Dependent variable = How healthy parents perceive AT.

*p < .05.

Discussion

The school studied was interested in obtaining information from this survey to see why so many parents were driving their children to school and to see if there was any interest in health programming and/or initiatives for students that encourage active transportation. Since there was no information about this topic available for our study population, completing this research filled a need for one of Tucson’s underserved communities. Based on survey results, it seems as though there is a strong interest for safety education for walkers (n=64, 43%), weekend bike rides (n=47, 31.5%), and an afterschool walking or biking club (n=46, 30.9%). The strong interest in after school walking or biking programs may provide some evidence that parents would allow their child to actively commute should the sidewalks and roads become more pedestrian friendly. The results of this research allowed the school to have further information regarding student and parent behaviors, interests, and perceptions. This information will help to
initiate increased efficiency and effectiveness of school programming so that they can best adapt
their approach to have the most beneficial outcome on families in the SUSD.

New and useful information was brought to our attention and may be useful for professionals in a variety of fields including (but not limited to) education, child development, public health, and fields focusing on policy. Since a relationship was found between parent and child views regarding healthy habits, it shows that changing the mind of either the parent or child may affect the way the other perceives these habits. Knowing that there is a reciprocal relationship between parent and child (health) perceptions is important for any group that is working to change these perceptions and behaviors. These findings may also encourage future research as further examining the relationship between parent and child perceptions could increase efficiency of many school programs and initiatives. Knowing in which direction this relationship exists (i.e. if the parent’s views shape the child’s or the child’s views shape the parent’s) could be powerful information for said organizations.

Additionally, this research found differences in health perceptions depending on one’s primary language. Parents that completed the survey in English were more likely to perceive active transportation as healthy. Exploring cultural differences between English and Spanish speakers regarding what constitutes as healthy could help reduce barriers for various programs. Knowing how to approach and market these initiatives to different populations could be extraordinarily helpful for creating positive behavior change.

The current study provides new information in a new area. This study worked with a low-income community at a school that was primarily Hispanic, providing new and noteworthy information for the Southwestern United States. Additionally, information from this research will help to meet the needs of the community. This survey was able to collect information regarding
parent’s perspectives on the safeness of active transportation within their community and other related information that the school wanted to know. Based on the findings, partnering organizations and initiatives may work at the policy level to encourage the implementation of crosswalks, sidewalks, stoplights, and more (all of which were expressed as needs by parents in the survey results). The school wanted to know more about why parents choose the transportation methods they do, and with this study, this community need was met.

Provision of safe walking paths is a common factor that influences whether or not parents will allow their child to actively commute to or from school (Yueng, Wearing, & Hills, 2008). Due to a shared concern in Tucson that roads were made primarily for driving and are not safe enough for active commuters, organizations within the Tucson community were created to work on combatting this issue; however, it is clear that much work still needs to be done (Living Streets Alliance, 2017). The results of this research indicate a need for safer roads, sidewalks, and bike paths within the city. Due to this, the results are relevant to all. Schools, activists, non-profits, city stakeholders, and others may work to help promote and increase safe active-transportation methods in their community. Within the population studied the number one reason parents did not allow their child to actively commute was due to safety concerns (n = 91, 46.7%). All guardians that currently live in and have children within the SunnySide Unified School District may also have a particular interest in the results of this research. Working to improve the infrastructure of Tucson should become more of a focus since an increase in active transportation is desired. Organizations in Tucson that focus on public health, policy, or barriers to active transportation, among others, may work to increase accessibility and take further action to implement the creation of safer roads and paths for children. For example, working to get a stoplight put into a high-risk area for students may be the first step this school and partnering
organizations can push for. If this safety measure is put in, then parents may feel increased reassurance of safety and, in turn, allow interested children to actively transport to and from school.

**Limitations**

One limitation to this study is generalizability. This work may be generalized to other schools within SUSD with similar demographics. As was shown in the second research question, there may be cultural differences that impact perceptions of active transportation. Generalizing results outside of this district and demographic makeup may not be plausible due to different practices in other communities, regions, and cultures.

Safety issues were a common concern for parents in this area and stranger danger concerns was the number one reason \((n=91, 46.7\%)\) parents chose to drive their children. Fewer parents may have felt that walking or biking to school was safe, or healthy, due to a “newsworthy incident” that happened less than a year before survey completion. Though the overwhelming safety concerns are important for the school to know and to help guide future decisions regarding policy and programming, some of the research questions may have had different results if safety were less of an overwhelming concern for parents. The study population seemed to have a strong concern for safety issues; the prominent safety concerns in this study may be considered one barrier to the overall generalizability of results.

When assessing the overarching hypothesis, responder bias likely interfered with the results of this study. Since 80\% of the parents reporting their child receives mostly 4’s (excellent performance) or mostly 3’s (satisfactory performance), our results are inconclusive. The actual proportions of grades could not be attained from the school, but 80% of parents reporting high grades may not be representative of the actual breakdown of grades received. Some other
limitations when assessing a relationship between transportation and grades include many of the parents having more than one child attending the school studied; however, when selecting an answer for the question regarding academic outcomes, parents could only select one answer. Parents that had multiple children attending the school (n= 96, 46.6%) may have chosen to report the child that received higher grades. Also, parents were expected to report their child’s grades based on their last report card, which was given out four months before this study took place. If parents did not remember their child’s grades from months ago, they may have chosen to report higher, rather than lower, grades; or, they may have chosen not to report their child’s grades at all. Though most parents did report their child’s grades (n=189), nearly 10% (n=19, 9.1%) of the overall study population chose not to report their child’s grades at all, which means that this missing data may have impacted the results. Parents self-reporting their children’s grades did allow for increased anonymity of subjects, but due to the high probability of there being responder bias or social desirability of reporting good grades for their children, the self-reporting of grades was a limitation to this study.

Implications and Future Research

Though we did not see direct impacts of transportation methods on grades, it is possible that teachers may be able to see noticeable differences between students. Future research may look at different possible impacts of active transportation, observing whether or not active transporters display more positive classroom behaviors. For instance, do active transporters show more engagement, concentration, and focus in class? How frequently students raise their hand in class may be a variable of interest. Negative classroom behaviors, such as disruptiveness in class, may also provide insight. Just because there were not any differences found among
transportation method and grades in school does not mean that there isn’t some sort of positive behavior change in the classroom that is elicited by active transportation.

Survey results showed a small percentage of parents reporting their child receiving grades lower than A’s or B’s (n = 33, 17.6%). Though it is possible that the parents choosing to complete the survey have children that generally receive higher than average grades, it also seems likely that a parent would choose to not report a low grade and instead opt for a higher grade. Instead of using parents to self-report variables of interest, future studies may choose to incorporate teacher reporting, school records, or classroom observation into the study.

Based on the study findings, there may be cultural differences that impact perceptions of active transportation. Different backgrounds view health and child development differently, as was shown based on information collected. Even though demographic information such as primary language spoken was collected based on which survey (English or Spanish) the participants completed, the survey did not ask any questions specifically asking for demographic information. Due to the limited demographic information acquired in the survey, this study is unable to make many assumptions related to different demographics. For example, data on the gender of students was not attained and could have led to a deeper understanding of our study population, as was the case in the Spain study that found significant impacts on academic outcomes for girls but not boys (Martinez-Gomez et al., 2011). It is advised that future related studies obtain more demographic information and explore cultural differences further; doing so may lead to insightful findings for health and child development initiatives.

Distance or total time that it takes to actively commute is a factor when students choose their transportation methods, and after a certain point distance may become a barrier to actively transporting to school (Nelson, Foley, O’Gorman, Moyna, & Woods, 2008). When analyzing
what the most common amount of time students will spend actively commuting to and from school is, we found that numbers substantially drop after twenty minutes (see Table 7). This may be due to the fact that children are not eligible for bussing services unless they are located further than one mile from the school; thus, if they are living more than 20 minutes away from the school they may be choosing the take the bus instead of actively commuting. Additionally, more than twenty minutes may be an unrealistic amount of time for young students to spend actively commuting. Though students seem are actively commuting up to twenty minutes in the morning, it is possible that spending twenty minutes actively commuting to school would exert too much of the students’ energy first thing in the morning.

When assessing travel time to and from school, even though students may be using different modes of transportation to and from school, there was only one opportunity for respondents to report travel time. When commuting home from school, the transportation methods reported were significantly more active than they were on the way to school. This is likely due to parents finding it convenient to drop their children off at school on the way to work. Children may get out of school before parents are done with their workday; thus, more children are required to actively commute home instead of being picked up by family vehicle. Since differences in transportation methods to and from school were found in this study, revising the survey in future studies so that parents can report different travel times to and from school is encouraged. Having more information about the commute time on the way home from school could have led to more precise findings when trying to answer research question 3.

In the post-hoc analysis we found that there is a significant relationship between parent perceptions and children’s interest in something such as active transportation (p < .05); however, we do not necessarily know in which direction this relationship exists. One regression was run
using children interest in active transportation as the dependent variable, which was based on whether or not the child asked to actively commute in the past year, and the parents’ perception of how healthy active transportation is as the independent variable. The results indicated that there was a significant relationship between these variables. Another regression was run using parents’ perceptions as the dependent variable and the children’s interest in active transportation as the independent variable. This test also came back statistically significant. Is it the children that are changing the parents’ perceptions, or is it the “healthy” parents that are encouraging healthier habits within the children? After reviewing the literature, it seems likely that it is the parents’ perceptions that impact their children’s views and interests (Fogelham, Nuutinen, Pasanen, & Myöhänen, 1999). Though we can make assumptions based on previous literature, this study does not conclude that this is the case in the current study. Further exploration examining the reciprocal relationship between parent and child perceptions may lead to interesting findings in future research. For example, should public health programming target children, parents, or both? Knowing who to market programs to can help increase efficiency and is important information for many fields of study.

Conclusions

Nearly half of the parents that could have participated in this study did. Of the approximately 650 students that attended the school of interest, 208 students were accounted for ($N = 208$); however, roughly half of the parents that participated in this study had more than one child attending the school ($n = 96, 46.7\%$). Due to this, this study reached the 208 students accounted for, but it also accounts for at least 96 more students. This means that almost half of all potential parents that could have been reached were. The high response rate may be due to the fact that an incentive item, a very nice water bottle, was given as an incentive to those that
completed the families that completed the surveys. Due to the high response rate, we can say with greater certainty that the information found in this study explains our study population well.

There were many interesting findings that came about from this research. The school administration wanted to know why parents choose certain behaviors (i.e. transportation methods) and now they can understand with greater clarity. The population studied showed a desire for the creation of a safer environment before allowing their children to actively commute. Many parents do not feel as though it is safe for their child to actively commute; however, should circumstances improve, parents indicated that they would then allow their child to actively commute. The administration may have seen active transportation as healthy and driving students to school as unhealthy, but now they have an increased understanding of why parents are choosing their current non-active transportation methods and why parents may not view active transportation as healthy. Having this information available will help guide the school when choosing their future action steps, and because of the information found, they will have to consider that appropriate future steps may look different for English and Spanish speakers.
References


Appendix A

Informed Consent letter

Parent Survey About Walking and Biking to School

You are being invited to participate in a study called “Transportation Methods and Their Effects on Student Outcomes.” This study is to learn more about how transportation methods may affect children’s school performance. To participate, fill out the following survey that asks about your child’s transportation methods, why you and your child have chosen these methods of transportation, and previous academic outcomes your child has received. Feel free to ask questions before making your decision whether or not to participate. Please consider the following information before choosing to participate:

- Taking part in this survey should take less than 10 minutes to complete.
- You must be at least 18 years old and have a child attending Mission Manor Elementary School to participate in this study.
- You should not write your name on the survey.
- Taking part in this project is up to you.
- There are no known risks or benefits to doing this survey.
- The information that you provide in the study will be handled confidentially.

Contact information: For questions, concerns, or complaints about the study you may contact Jenna Hollander at 610-536-7302 or jennahl@alum.arizona.edu, or Dr. Adriana Cimetta at cimetta@email.arizona.edu. For questions about your rights as a participant or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact the Human Subjects Protection Program at 520-626-6721 or online at http://hsp.arizona.edu/compliance/human-subjects-protection-program.
Appendix B

Original Version of the Safe Routes to School Survey
8. Has your child asked you for permission to walk or bike to/from school in the last year? □ Yes □ No

9. At what grade would you allow your child to walk or bike to/from school without an adult? (Select a grade between PK, K, 1, 2, 3...) □ grade (or) □ I would not feel comfortable at any grade

10. What of the following issues affected your decision to allow, or not allow, your child to walk or bike to/from school? (Select ALL that apply)
   □ Distance
   □ Convenience of driving
   □ Time
   □ Child’s before or 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

   □ My child already walks or bikes to/from school □ Yes □ No □ Not Sure
   □ Yes □ No □ Not Sure
   □ Yes □ No □ Not Sure
   □ Yes □ No □ Not Sure
   □ Yes □ No □ Not Sure
   □ Yes □ No □ Not Sure
   □ Yes □ No □ Not Sure
   □ Yes □ No □ Not Sure
   □ Yes □ No □ Not Sure
   □ Yes □ No □ Not Sure

11. Would you probably let your child walk or bike to/from school if this problem were changed or improved? (Select one choice per line, mark box with X)

   □ My child already walks or bikes to/from school

12. In your opinion, how much does your child’s school encourage or discourage walking and biking to/from school?
   □ Strongly Encourages □ Encourages □ Neither □ Discourages □ Strongly Discourages

13. How much fun is walking or biking to/from school for your child?
   □ Very Fun □ Fun □ Neutral □ Boring □ Very Boring

14. How healthy is walking or biking to/from school for your child?
   □ Very Healthy □ Healthy □ Neutral □ Unhealthy □ Very Unhealthy

15. What is the highest grade or year of school you completed?
   □ Grades 1 through 8 (Elementary) □ College 1 to 3 years (Some college or technical school)
   □ Grades 9 through 11 (Some high school) □ College 4 years or more (College graduate)
   □ Grade 12 or GED (High school graduate) □ Prefer not to answer

16. Please provide any additional comments below.
Appendix C

Revised Version of the Safe Routes to School Survey Used for this Study

Parent Survey About Walking and Biking to School

1. How many of your children attend Mission Manor Elementary? __________
   Grade(s) of each child (K-6): __________

2. How far does your child live from school?
   - Less than ¼ mile
   - ¼ mile to ½ mile
   - ½ mile to 1 mile
   - 1 mile to 2 miles
   - More than 2 miles
   - Don’t know

3. On most days, how does your child arrive and leave for school?
   **Arrive at school**
   - Walk
   - Bike
   - School Bus
   - Family Vehicle
   - Carpool
   - Transit
   - Other

   **Leave from school**
   - Walk
   - Bike
   - School Bus
   - Family Vehicle
   - Carpool
   - Transit
   - Other

4. How long does it normally take your child to get to/from school? (travel time to school)
   - Less than 5 minutes
   - 5-10 minutes
   - 11-20 minutes
   - More than 20 minutes
   - Don’t know/Not sure

5. If you regularly drive your child(ren) to/from school, please check all the reasons for that choice:
   - N/A – My child walks, bikes, or buses
   - Speed of traffic along walking/biking route
   - Drop off on way to work
   - Lack of sidewalks/pathways
   - Running late / avoid tardiness
   - Condition of sidewalks/pathways
   - Bad weather (rainy/too hot)
   - Dangerous crossings
   - Lack of adults to walk or bike with
   - Lack of crossing guards
   - Distance is too far
   - Stranger danger concerns
   - Child(ren) too young
   - Crime or violence
   - Too much traffic along walking/biking route
   - Other __________________________

6. Has your child asked for permission to walk or bike to/from school in the last school year? Yes  No

7. How healthy is walking or biking to/from school for your child(ren)? (select one)
   - Very healthy
   - Healthy
   - Neutral
   - Unhealthy
   - Very unhealthy

8. Do you have specific concerns along your walking/biking route to school? (i.e. poor sidewalks; lack of connections, intersection issues, dogs, other hazards). Please describe and give location.
9. Would you probably let your child walk or bike to/from school if this problem(s) were improved?
   N/A- My child already walks, bikes, or takes the bus  Yes  No

10. Would you like your child to participate in regular walking/biking programs offered by the school? If so, which of the following activities interest you the most:
    Bike repair  Afterschool walking/biking club
    Walking School Bus*  Weekend bike rides
    Pedestrian safety education  Other: __________________________
    Monthly/weekly active travel challenge(s)

* A Walking School Bus and Bicycle Train function like a regular bus, with a defined route and specific schedule. Children and an adult leader walk or bike to school together one or more days per week.

11. During the PAST 7 DAYS, how many days was your child physically active for a total of at least 60 minutes per day? (Add up all time spent in any kind of physical activity that may have increased heart rate and breathing for some of the time.)
    0 days  1 day  2-3 days  4-5 days  6 or more days

12. Based on the last report card, my child received:
    Mostly 4's (or E's)  Mostly 3's (or S's)  Mostly 2's (or N's)  Mostly 1's (or U's)
    Other: __________________________

13. Please provide any additional comments below.
_____________________________________________
_____________________________________________