Moving Forward:
Safe Routes to School Progress in Five States

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MOVING FORWARD:
SAFE ROUTES TO SCHOOL PROGRESS IN FIVE STATES

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16. ABSTRACT

This study assessed the Safe Routes to School (SRTS) program in five states: Florida, Mississippi, Texas, Washington, and Wisconsin. A database of all SRTS projects announced for funding and all schools affected by these projects was developed. The database was analyzed to (1) quantify the SRTS programs' impact in the five states and compare them to SRTS programs nationally, (2) assess the SRTS programs' effectiveness in increasing rates of walking and bicycling to school, and (3) identify characteristics of SRTS projects associated with greater increases in walking and bicycling to school.

In the five states, 569 SRTS projects were announced for funding through April 2011. These projects reached more than 1,410 schools and 781,180 children—roughly 10 percent of the PK-8 grade public school population in the five states. Engineering components were featured in most projects, and sidewalks were the most common engineering activity.

Among completed SRTS projects with before and after travel data, rates of walking increased by 45 percent (from 9.8 percent to 14.2 percent), bicycling increased by 24 percent (from 2.5 percent to 3.0 percent), and all active travel to school (ATS) increased by 37 percent (from 12.9 percent to 17.6 percent). Increases in rates measured at the project level were statistically significant. Before and after travel data were only available for projects with an engineering component. Among these projects, those that affected fewer schools and students, as well as those with encouragement and education components tended to perform better. These relationships, however, were not statistically significant. The only statistically significant relationship found was a negative correlation between baseline rates of bicycling to school and increases in rates of bicycling to school, suggesting that SRTS projects may be more effective at encouraging bicycling to school where few children already do so.

The results of this study offer preliminary evidence that the SRTS program is achieving one of its primary goals of increasing rates of walking and bicycling to school and that SRTS funds are delivering a return on investment. It identified some trends of more successful projects, which warrant further investigation. As more projects end, the research framework established in this study can be used to further explore these findings and refine programs that help children safely walk or bicycle to school.

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DISCLAIMER

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Washington State Department of Transportation or Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

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EXECUTIVE SUMMARY

Substantial progress has been made in implementing the federal Safe Routes to School (SRTS) program since its inception in 2005. This report takes a detailed look at SRTS projects announced in five of the six states that contributed to the Statewide Mobility Assessment study: Florida, Mississippi, Texas, Washington, and Wisconsin (Alaska also contributed to the study but was unable to provide project data). The purpose of this analysis of SRTS projects in the five states is to (1) quantify the SRTS programs' impact in the five states and compare them to SRTS programs nationally, (2) assess the SRTS programs' effectiveness in increasing rates of walking and bicycling to school, and (3) identify characteristics of SRTS projects associated with greater increases in walking and bicycling to school.

Part I of this report quantified the impact of the SRTS program. In the five states, 569 SRTS projects were announced for funding. These projects reached more than 1,410 schools and 781,180 children—roughly 10 percent and 11 percent of the PK-8 grade public schools and school population, respectively, in the five states. An engineering component was present in 72 percent of projects, while 28 percent were exclusively non-infrastructure. Sidewalk activities were the most common activity, featured in 69 percent of projects.

Part II of this report assessed the change in rates of walking, bicycling, and all forms of active travel to school (ATS) for a limited number of complete SRTS projects. Increasing the number of children walking or bicycling to school is just one of the goals of the SRTS program. The results were encouraging. After implementation of an SRTS program, walking increased by 45 percent (from 9.8 percent to 14.2 percent), bicycling increased by 24 percent (from 2.5 percent to 3.0 percent), and all ATS increased by 37 percent (from 12.9 percent to 17.6 percent). Increases in rates measured at the project level were statistically significant for walking, biking, and all forms of ATS.

Part II also investigated the relationship between changes in rates of ATS and school, school neighborhood, and project characteristics. Changes in rates of ATS were not significantly related to any school or school neighborhood characteristics, such as enrollment, the number of school-aged children near school, or the percentage of students on the free/reduced lunch program. Changes in rates of ATS were also not significantly related to any project characteristic, although smaller projects with encouragement and education components tended to perform better. Lower baseline rates of bicycling to school were significantly associated with greater increases in rates of bicycling to school, suggesting that SRTS projects may be more effective at encouraging bicycling to school where few children already do so.

This is the final in a series of three reports published as part of the Statewide Mobility Assessment study. The first, "Safe Routes to School (SRTS) Statewide Mobility Assessment Study—Phase I Report" (www.wsdot.wa.gov/research/reports/fullreports/743.1.pdf), used a literature review to investigate baseline rates of ATS and the barriers to its use. Baseline rates of ATS at SRTS schools in the study states are also explored in Appendix A of this report. The second report, "So Many Choices, So Many Ways to Choose: How Five State Departments of Transportation Select Safe Routes to School Programs for Funding" (www.wsdot.wa.gov/research/reports/fullreports/743.2.pdf), offered insights into how the five state departments of transportation define an effective SRTS project and prioritize awards for the many SRTS project proposals they receive.

This third and final report of the Statewide Mobility Assessment study offers preliminary signs that the SRTS program is achieving one of its primary goals, increasing rates of walking and bicycling to school, and that SRTS funds are delivering a return on investment. As the SRTS program continues and more projects end completion, the research framework established in this study can be used to further explore these findings and refine SRTS programs so they may be even more effective at supporting children in safely walking or bicycling to school.

INTRODUCTION

Safe Route to School (SRTS) programs are designed to enable more children to safely walk, bicycle, or use other modes of active travel to school (ATS). ATS can result in benefits at many levels, including personal, household, and societal. Children that use ATS receive more physical activity and may have a greater sense of independence (Fulton et al. 2005; Heelan et al. 2005; Saksvig et al. 2007; Sirard et al. 2005). They may reduce travel expenses for their household or school district and may contribute to reduced congestion, improved air quality, and, eventually, lower health care costs (Environmental Protection Agency 2003).

SRTS projects hold promise for realizing the benefits of ATS because walking and bicycling are underutilized modes of travel. Only 13 percent of children aged five to 14 years walked or bicycled to school in the U.S. in 2009 (Safe Routes to School National Partnership 2010). Even of the 31 percent of children aged five to 14 years who lived within a mile of school—a distance considered easily walkable—only 38 percent usually walked or bicycled to school while 41 percent usually arrived at school in an automobile (Safe Routes to School National Partnership 2010). Rates of ATS do vary from location to location, and tend to be lower where numerous barriers exist. Barriers include distances to school being perceived as too far to walk, safety concerns of traffic and crime, sufficient resources to drive children to school, and parental attitudes and schedule constraints that make the auto the preferred mode of travel to school (Moudon, Stewart, and Lin 2010). SRTS projects that effectively address these barriers could see increases in rates of ATS.

The federal SRTS program was established in the U.S. with the passage of the 2005 federal transportation legislation Safe, Accountable, Flexible, and Efficient Transportation Equity Act–a Legacy for Users (SAFETEA–LU). The program is administered by the Federal Highway Administration (FHWA), which allocates funds to states in amounts proportional to the number of primary and middle school students in the state. Federal SRTS funds are administered through state department of transportation (DOT) SRTS programs and are used to fund local SRTS projects selected through a competitive grant process.[1] These local SRTS projects directly support walking and bicycling to school through activities that can be classified into the "five E's": engineering, encouragement, enforcement, education, and evaluation (Hubsmith 2006). Local SRTS projects are given much leeway in content, which is generally tailored to meet local needs. However, at least 70 percent and no more than 90 percent of FHWA funds allocated to state SRTS programs must be awarded to engineering activities within 2 miles of a school that teaches at least one grade from kindergarten through eight. The remaining 30 percent to 10 percent must be allocated to non-infrastructure activities.

Substantial progress has been made in implementing the federal SRTS program. As of December 31, 2010, states nationwide have announced more than $583 million in funds, which have been distributed to 7,357 local SRTS projects. Despite the broad reach of the funding announced, the SRTS program only

[1] In this report, an SRTS "project" is defined as one or more coordinated SRTS activities awarded funding through a state DOT SRTS program. In the past, this study has used the term "program" instead of "project." This has been changed to correspond with terminology used by the National Center for Safe Routes to School and to clearly differentiate between the federal- and state-level SRTS programs and local projects.

receives roughly 0.5 percent of the total apportioned federal-aid highway program funds (U.S. Department of Transportation 2011). Furthermore, state SRTS programs have only been able to award 38 percent of the funding requested, and the number of SRTS applications funded represents only 44 percent of those received (National Center for Safe Routes to School 2011). These figures indicate that the program is widely popular and an unmet demand for SRTS projects exists. In the face of such high demand, SRTS coordinators at all levels require information to ensure that SRTS funds are directed to quality local projects in needy locations—i.e., that program funds are being used in the most effective and efficient manner.

Recent efforts have been made at the national level to develop a broad understanding of the process and outcomes of the SRTS program (National Center for Safe Routes to School 2011). The Transportation Pooled Fund Statewide Mobility Assessment study has complemented these broad national efforts with focused reviews of the SRTS programs in the participating study states of Alaska, Florida, Mississippi, Texas, Washington, and Wisconsin. The study's objective is to support state-level management of the Federal SRTS program.

This report is the third and final report published by the Statewide Mobility Assessment study. The first, "Safe Routes to School (SRTS) Statewide Mobility Assessment Study—Phase I Report" (www.wsdot.wa.gov/research/reports/fullreports/743.1.pdf), used a literature review to investigate baseline rates of ATS and the barriers to its use. Baseline rates of ATS at SRTS schools in the study states are also explored in Appendix A of this report. The second report, "So Many Choices, So Many Ways to Choose: How Five State Departments of Transportation Select Safe Routes to School Programs for Funding" (www.wsdot.wa.gov/research/reports/fullreports/743.2.pdf), offered insights into how the five state DOTs define an effective SRTS project and prioritize awards for the many SRTS project proposals they receive.

This final Statewide Mobility Assessment study report presents an analysis of a detailed database of SRTS projects announced for funding in five of the participating states: Florida, Mississippi, Texas, Washington, and Wisconsin. It is divided into two parts. Part I quantifies the impact of the SRTS programs in each of the five states and compares them to SRTS programs nationally. Part II assesses the effects of SRTS projects on rates of ATS for a limited number of complete SRTS projects. It attempts to identify characteristics of more effective SRTS projects by comparing changes in rates of ATS to school, school neighborhood, and project characteristics. The results of these analyses are intended to support recommendations for future allocation of SRTS funds so that awards go to the most effective projects. The report also establishes methods and tools for continuing to evaluate the effectiveness of SRTS investments.

SRTS PROJECT DATABASE DEVELOPMENT

SRTS coordinators from the Florida, Mississippi, Texas, Washington, and Wisconsin state DOTs provided information on all SRTS projects that had been announced for funding between 2005 and April 15, 2011. The state of Alaska was also a participant in this study but was unable to provide SRTS project data. FHWA funding for the SRTS program is first apportioned to state DOTs. State DOTs then request SRTS project proposals from state and local agencies or organizations. Next, all SRTS project applications undergo a competitive review process. State DOTs then announce funding awards for successful SRTS project applications. Finally, a project agreement is signed and SRTS funds are obligated to a SRTS project. At this point the federal government has committed to reimburse the state for project expenditures and the project can begin (National Center for Safe Routes to School 2011). There is often a time lag between when SRTS projects are announced for funding and when funds are obligated.

SRTS coordinators in the five states provided data on all projects announced for funding by the state DOT SRTS program. In most study states, including Florida and Mississippi, the state SRTS program is supported exclusively through FHWA funds. In Washington, however, FHWA SRTS funds are supplemented by state SRTS funds. Therefore, SRTS projects in the database included those funded through both FHWA and state funds. Data were not collected for any SRTS projects funded through other state DOT programs, such as the American Recovery and Reinvestment Act-funded programs. Data were also not collected for any non-state DOT funded SRTS programs, such as those funded by city DOTs or local volunteers. Additionally, data were only collected for SRTS activities funded by the state DOT. If a state DOT-funded SRTS project implemented additional SRTS activities above and beyond those funded by the state DOT, they would not be recorded in the data.

The SRTS project information provided by state coordinators was developed into a database that featured characteristics of the SRTS projects and the schools affected. These coordinator-provided data were further developed to include additional school and school neighborhood data from the National Center for Education Statistics (NCES) and the 2000 US Census (Lin 2011). NCES data were collected for the 2007-08 school year, a midpoint in the timeframe when these SRTS projects were announced. The information contained in this database reflects a balance between the data that were identified as desirable to understand the SRTS projects and school-based communities and those data that were feasible to collect. Variables that were of interest and largely available across the five states are described in Table 1.

Table 1: Variables contained in the Statewide Mobility Assessment SRTS project database and analyzed in this report.

Domain	Variable	Values	Description
Project	Project type	Combined, infrastructure, non-infrastructure, planning	Describes variety of activities included in project. Infrastructure projects only feature an engineering component. Non-infrastructure projects do not feature an engineering component, but do feature one or more education, encouragement, or enforcement activities. Combined projects feature both an engineering component and at least one non-engineering component. Planning projects facilitate the process of developing a SRTS plan, but not implementation. All projects were considered to include an evaluation component. Data provided by state SRTS coordinators.
	E's	Binary (Y/N for each of the five E's)	Indicates whether the project included activities that could be classified under four of the five E's: Engineering, Education, Encouragement, and Enforcement. All projects were considered to include an evaluation component. Data provided by state SRTS coordinators.
	Activities	Binary (Y/N for each activity)	Indicates whether the project included specific activities, such as sidewalk construction, walking school bus, crossing guard, signage, and more. Data provided by state SRTS coordinators.
	Grant award	$	Amount of money awarded to the project. Data provided by state SRTS coordinators.
	Schools affected	Numeric	Number of schools that were affected by the project. Data provided by state SRTS coordinators.
School	Enrollment	Numeric	Number of students attending the school. Provided by the state SRTS coordinators or obtained from the NCES for the 2007-08 school year.
	Level	Primary, Middle, High, Other	Identifies grade ranges taught. Provided by coordinators or obtained from the NCES.
	% free and reduced lunch	Percent	Percentage of enrolled students eligible for the free or reduced price lunch program. Obtained from the NCES.
School neighborhood	K-12 students	Numeric	Number of children aged five to 18 that live within one mile of the school. Data developed using GIS analysis applied to NCES school locations and 2000 census data.
	% low income	Percent	Percentage of households within one mile of school that have a household income of less than $30,000 per year. Data developed using GIS analysis applied to NCES school locations and 2000 census data.
	% non-English speaking	Percent	Percentage of households within one mile of school that speak a language other than English at home. Data developed using GIS analysis applied to NCES school locations and 2000 census data.

Rates of walking and bicycling to school were the outcome variable of interest because they reflected one of the primary goals of the SRTS program: increasing the number of students using ATS. Rates of walking, bicycling and total ATS were available for at least some SRTS schools and projects in four of the five states: Florida, Mississippi, Washington, and Wisconsin. All five states required SRTS grant applicants to provide counts of students using ATS. However, some projects were awarded before this policy was implemented and many projects have yet to be completed. This limited the amount of travel mode data available.

Travel mode data that were reported came in various formats. Travel mode data were reported at the project and/or school level for walking, biking, and/or all forms of ATS as either absolute numbers of children using a mode, percentages of students using a mode, or absolute numbers of trips to or from school using a mode. The following steps were taken to standardize the travel mode data:

- For travel data reported at the project level:
  - If the project only affected one school, the data were also applied to the single school.
  - If the project affected multiple schools, the data could not be disaggregated to the school level.
- For travel data reported at the school level:
  - If all schools affected by a project had data, they were aggregated to the project level.
  - If not all schools affected by a project had data, the data could not be aggregated to the project level.
- Variations on travel modes reported:
  - If data on both walking and biking were reported, these were combined for a rate of all ATS [other forms of active travel to school, such as scooters or skateboards, tend to be very rare (National Center for Safe Routes to School 2010)].
  - If only data on all ATS were reported, it could not be disaggregated for separate rates of walking and biking.
  - If only data on walking or biking were reported, no rate of all ATS could be calculated.
- Variations on travel mode use figures reported:
  - If travel mode use was reported as an absolute number of students using a mode, the rate of mode use was calculated as a portion of total enrollment.
  - If travel mode use was reported as a percent, absolute number of students using the mode was calculated by multiplying by the total enrollment.
  - If travel mode use was reported as an absolute number of trips using a mode, the rate of mode use was calculated as a portion of total trips.

SRTS PROJECT DATABASE ANALYSIS

Descriptive statistics were calculated for SRTS project and school characteristics of interest, which included project type, the number of E's, specific project activities, funding awarded per project and school, the number of schools and students affected, and the grade levels of SRTS schools. These characteristics were compared with national data when possible. The results of these analyses are presented in Part I.

Part II presents an assessment of changes in rates of walking, bicycling, and all ATS after SRTS project completion. First, projects and schools with both pre- and post-project travel data were compared to those without such data. For those projects and schools with data, rates of change in active travel modes were presented and paired samples t-tests were used to determine if changes in rates of ATS were statistically significant. Bivariate analysis was then used to examine the relationship between the project, school, and school neighborhood characteristics listed in Table 1 and the change in rates of walking, bicycling, and all ATS. In this analysis, pre-project rates of ATS were also included to test the hypothesis that SRTS projects are more effective at schools where few children already walk or bike to school and there might be a large latent demand for ATS.

Pre-project, or baseline, rates of walking, bicycling and all ATS are presented in Appendix A. Rates of these modes at the state and multi-state level were calculated as the total number of students using a travel mode divided by the total enrollment for those schools or projects with travel mode data. Means tests and binary logistics regression were then used to analyze the relationship between the school and school neighborhood characteristics listed in Table 1 and pre-project rates of ATS [the outcome variable, school-level rate of ATS, was positively skewed—most schools had low rates of ATS, while a few schools had very high rates of ATS—and was therefore converted to a binary variable indicating whether the rate of ATS was greater than or equal to the national rate of 13 percent (Safe Routes to School National Partnership 2010)]. For all statistical analyses, SPSS 12.0 was used.

PART I—SRTS PROGRAMS IN THE STUDY STATES

This first part of the report quantifies the impact of the SRTS program in each of the five states, and compares them to SRTS programs nationally. It is divided into two sections. The first describes SRTS project characteristics, such as types of projects and specific project activities. The second section describes characteristics of schools that participated in an SRTS project, such as enrollment and school level.

1.1. SRTS Project Characteristics

This section quantifies characteristics of the SRTS projects announced for funding in Florida, Mississippi, Texas, Washington, and Wisconsin. It then compares, if possible, these characteristics to SRTS programs nationally. The project characteristics analyzed include project type, the number of E's in a project, specific project activities, and the amount of funding announced per project.

1.1.1. Project Types

A total of 569 SRTS projects were announced for funding in all five states: 188 in Florida, 27 in Mississippi, 200 in Texas, 69 in Washington, and 85 in Wisconsin. These include projects at various stages in the completion process, at least 59 of which have been closed at the time of this publication. Of the total projects, Texas and Florida each accounted for about a third. Washington and Wisconsin projects represented 12 percent and 15 percent, respectively, while Mississippi represented 5 percent of the projects. These proportions were roughly in line with each of these state's SRTS funding apportionment, which is based on each state's share of the national total of school-aged children in grades kindergarten through eight (National Center for Safe Routes to School 2011).

In all five states, about half of the 569 projects announced for funding were infrastructure, a quarter of the projects were non-infrastructure and another 21 percent were combined projects. This project distribution does not identify how much money was awarded to the various project types. But it does seem reasonable that three quarters of SRTS projects across the five states featured an engineering component given the federal SRTS program requirement that 70-90 percent of state funds must be spent on infrastructure activities, and the remaining 10-30 percent be spent on non-infrastructure activities. Wisconsin was the only state to offer planning grants, which made up 18 percent of the projects it announced for funding (Table 2). For classification purposes, planning grants are considered non-infrastructure projects. However, planning grants often are the first step toward the implementation of infrastructure activities (National Center for Safe Routes to School 2011).

Table 2: Number of SRTS projects announced for funding by project type.

State	Infrastructure	Non-infrastructure	Combined	Planning	Total projects
Fla	144 (77%)	44 (23%)	0	0	188 (100%)
Miss	0	9 (33%)	18 (67%)	0	27 (100%)
Texas	119 (60%)	81 (41%)	0	0	200 (100%)
Wash	2 (3%)	0	67 (97%)	0	69 (100%)
Wis	28 (33%)	7 (8%)	35 (41%)	15 (18%)	85 (100%)
All five	293 (51%)	141 (25%)	120 (21%)	15 (3%)	569 (100%)

State-by-state figures of project types reflected the SRTS grants offered in each state (Moudon, Stewart, and Lin 2011). The larger states—Florida and Texas—offered only grants for Infrastructure and non-infrastructure projects. In these states, a single school may be affected by both types of projects, resulting in what could be considered a combined project, even though they would not be reported as such. This was the case for 20 schools in Florida and 45 schools in Texas. In Mississippi all projects had a non-infrastructure component—it offered grants for combined projects and non-infrastructure projects. In Washington State all projects were required to have an infrastructure and non-infrastructure component—the two Washington projects classified as infrastructure likely had a non-infrastructure component that was not directly funded by the state DOT, and therefore did not appear in this database. Wisconsin offered grants for all types of SRTS projects, as well as SRTS project planning. Because Wisconsin offered separate grants for infrastructure and non-infrastructure projects, it was possible for a single school to be affected by one of each type of projects. This was the case for seven schools.

The portion of project types funded in the five states mirrored national trends (National Center for Safe Routes to School 2011). The five states funded a higher portion of infrastructure projects and a lower portion of planning projects (Table 3).

Table 3: Comparison of national and five-state numbers of SRTS projects by project type.

Area	Infrastructure	Non-infrastructure	Combined	Planning	All types
Five states	293 (51%)	141 (25%)	120 (21%)	15 (3%)	569 (100%)
Nationwide	3,164 (43%)	1,986 (27%)	1,471 (20%)	736 (10%)	7,357 (100%)

1.1.2. Number of E's in Projects

SRTS projects feature intervention activities that can be classified under four "E's": engineering, education, encouragement, and enforcement. The fifth SRTS E, evaluation, was considered to be separate from any SRTS intervention and therefore was not included in the analysis. We reviewed the number of different types of intervention activities that were announced for funding by the state DOT for each project in the five states. This count may not capture all the project activities, since SRTS projects may feature additional activities—especially low-cost non-infrastructure activities—not directly funded through the state DOT. The majority of projects—57 percent—featured activities that were classified under just one E (Table 4). These were mostly comprised of projects in Florida and Texas with only engineering activities. The second most common number of E's in a project was three. In Texas, all non-infrastructure projects featured the three E's that were not engineering (i.e., education, encouragement, and enforcement) and Texas projects accounted for a substantial number of projects with three E's. Many projects in states that offered combined projects (Miss., Wash., and Wis.) also had projects with three E's. Projects with all four E's were less common. Only states with combined grants had any projects that featured all four E's. Wisconsin had 17 projects with no E's. Fifteen of these were planning grants, where applicants were funded to develop a SRTS plan; the remaining two were projects that funded a SRTS coordinator position. Florida also reported one project to fund a SRTS coordinator, and therefore reported no E's. These 18 projects do not directly result in any interventions, but do set the foundation for the delivery of SRTS projects.

Table 4: Number of SRTS projects by number of E's.

State	No E's	One E	Two E's	Three E's	Four E's	Total projects
Fla	1 (1%)	163 (87%)	24 (13%)	0	0	188 (100%)
Miss	0	3 (11%)	5 (19%)	12 (44%)	7 (26%)	27 (100%)
Texas	0	129 (65%)	0	71 (36%)	0	200 (100%)
Wash	0	2 (3%)	3 (4%)	21 (30%)	43 (62%)	69 (100%)
Wis	17 (20%)	28 (33%)	20 (24%)	9 (11%)	11 (13%)	85 (100%)
All five	18 (3%)	325 (57%)	52 (9%)	113 (20%)	61 (11%)	569 (100%)

1.1.3. Project Activities

Specific SRTS activity data were available for 439 out of 569 of the announced SRTS projects. These included a limited number of projects in Florida (135 out of 188) and Texas (139 out of 200); all projects in Washington; all but one pending project in Mississippi; and all non-planning projects in Wisconsin. Each SRTS project could feature one or more specific activity. Of the 439 projects with specific activity data, sidewalk improvements were by far the most frequent activity. They accounted for 35 percent of the total infrastructure activities in the five states and were present in 69 percent (302 out of 439) of all projects. The next most common activities were crosswalk improvements and signage (signage includes speed feedback signs, school zone flashers, and pavement markings) (Table 5).

Table 5: Frequency of specific infrastructure activities featured in SRTS projects.

Infrastructure Activity	Florida	Mississippi	Texas	Washington	Wisconsin	All five states
Sidewalk	99 (87%)	18 (23%)	98 (28%)	50 (31%)	36 (21%)	301 (35%)
Crosswalk		17 (22%)	58 (17%)	37 (23%)	32 (19%)	144 (17%)
Signage	3 (3%)	5 (6%)	64 (18%)	31 (19%)	17 (10%)	120 (14%)
ADA improvement		18 (23%)	63 (18%)	9 (6%)	12 (7%)	102 (12%)
Bicycle rack	3 (3%)	5 (6%)	26 (8%)	8 (5%)	16 (9%)	58 (7%)
Traffic calming/control		11 (14%)	6 (2%)	8 (5%)	31 (18%)	56 (6%)
Shared use path	1 (1%)	2 (3%)	16 (5%)	12 (8%)	24 (14%)	55 (6%)
Bicycle lane	7 (6%)	1 (1%)	4 (1%)	4 (3%)	4 (2%)	20 (2%)
Pedestrian overpass, bridge	1 (1%)	1 (1%)	11 (3%)			13 (1%)
Total Activities	114 (100%)	78 (100%)	346 (100%)	159 (100%)	172 (100%)	869 (100%)

Infrastructure activities composed 72 percent (871 out of 1,210) of the reported SRTS activities, while non-infrastructure activities composed 28 percent (341 out of 1,210). The most frequently reported non-infrastructure activity was a media campaign or promotion of walking or bicycling to school, which accounted for 22 percent of the reported non-infrastructure activities and was present in 17 percent of the SRTS projects. It was followed closely in frequency by increased emphasis patrols and walk or ride to school days (Table 6).

Table 6: Frequency of specific non-infrastructure activities featured in SRTS projects.

Non-infrastructure Activity	Florida	Mississippi	Texas	Washington	Wisconsin	All five states
Media campaign/promotion	7 (23%)	19 (22%)	19 (83%)	19 (17%)	12 (14%)	76 (22%)
Increased emphasis patrol		4 (5%)		46 (41%)	11 (13%)	61 (18%)
Walk/ride to school day		24 (28%)		11 (10%)	22 (25%)	57 (17%)
Walking school bus		8 (9%)		11 (10%)	11 (13%)	30 (9%)
Mileage club/pedometer	1 (3%)	5 (6%)		6 (5%)	16 (18%)	28 (8%)
misc. education activities	18 (58%)	2 (2%)	1 (4%)	1 (1%)	4 (5%)	26 (8%)
Bicycle Rodeo		9 (10%)		12 (11%)	4 (5%)	25 (7%)
Crossing guard		10 (11%)		7 (6%)	1 (1%)	18 (5%)
SRTS project coordinator	1 (3%)	2 (2%)	2 (9%)		2 (2%)	7 (2%)
Bicycle Train		2 (2%)			4 (5%)	6 (2%)
Safety study	2 (6%)	2 (2%)	1 (4%)			5 (1%)
Bicycle equipment	2 (6%)					2 (1%)
Total Activities	31 (100%)	87 (100%)	23 (100%)	113 (100%)	87 (100%)	341 (100%)

The most common SRTS activities represent a mix of the activities that were most frequently requested by local SRTS program applicants and those activities that were most frequently favored by SRTS coordinators. Often these were the same activities, and SRTS coordinators often advised program applicants on the most appropriate interventions for their conditions. A comparison of the activities included in funded and unfunded SRTS program applications would shed more light on the differences between what has been requested and what has been funded. This analysis, however, is beyond the scope of the current study.

The National Center for Safe Routes to School calculated the frequency of SRTS activities for a nationally representative sample of 415 SRTS school-based projects (National Center for Safe Routes to School 2011). Direct comparison of the activities in the five states to these national figures is difficult due to differences in how activities were classified, yet some general trends can be observed. Sidewalk improvements were the most common activity in the national sample and in the five states, but nationally they were featured in a much smaller proportion of projects (19 percent vs. 69 percent). Traffic calming[2] and pedestrian/bicycle access[3] were the next most common activities nationally (14 percent each). These types of activities were similar to the next most common activities in the five states, crosswalk and signage, which were present in 33 percent and 27 percent, respectively, of the projects in the five states. But again these activities were present in a larger portion of projects in the five states, even though they included a much more limited range of activities. Education[4] was the most common non-infrastructure activity nationally (13 percent). In the five states, media

[2] Traffic calming activities included bulb outs, speed humps, median refuges, school zone signs, automated speed enforcement (cameras), raised crossings, flashing beacons, speed feedback signs, pedestrian-activated signals and countdowns

[3] Pedestrian/bicycle access included bicycle racks, bicycle lanes, trails, pedestrian bridges, pedestrian tunnels, and crosswalks.

[4] Education included Pedestrian/bicycle education, safety education, education for others, workshops, outreach projects, awareness campaigns, PSAs, billboards, signs, trainings (including SRTS National Course), and marketing.

campaign/promotion, which is just one type of education activity included in the national definition, was the most common activity in the five states—17 percent of projects featured it.

1.1.4. Funding Announced per Project

Since the state SRTS programs began through April 15, 2011, a total of nearly $157 million ($156,903,190) in grant money was announced to be awarded to SRTS projects across all five states. The average grant awarded to a SRTS project in the five states was slightly more than $275,000—roughly the cost of constructing sidewalks along one side of a half mile of street, according to a Washington State DOT cost estimator. The average amount of grant money awarded to a project, however, varied considerably by the type of project and by state (Table 7). Projects that featured an engineering component (combined and infrastructure projects) were awarded a higher average amount of funding than those that did not (non-infrastructure and planning projects). This is reasonable, as infrastructure activities generally have higher costs than activities that do not include material, labor, engineering, and other construction costs. Interestingly, this trend was absent in Wisconsin, where non-infrastructure projects were awarded substantially more money than infrastructure or combined projects. Wisconsin non-infrastructure projects, however, affected a large number of schools and this state had the lowest average non-infrastructure award per-school (see Table 11).

Table 7: Average grant money awarded per SRTS project.

State	Infrastructure	Non-infrastructure	Combined	Planning	All types
Fla	$379,876	$251,917	n/a	n/a	$349,929
Miss	n/a	$89,576	$334,108	n/a	$252,598
Texas	$382,243	$104,172	n/a	n/a	$269,625
Wash	$161,939	n/a	$268,703	n/a	$265,609
Wis	$158,335	$284,945	$151,035	$22,024	$141,701
All five	$358,179	$158,320	$244,194	$22,024	$275,753

Nationally, as of December 31, 2011, $583,896,594 in SRTS funds was announced to be awarded to 7,357 SRTS projects for an average of $79,366 per project (National Center for Safe Routes to School 2011). SRTS projects in the five states had an average award per project that was 3.5 times greater than the national average. This trend held for all project types (Table 8).

Table 8: Comparison of national and five-state averages for grant money awarded per project.

State	Infrastructure	Non-Infrastructure	Combined	Planning	All types
Five states	$358,179	$158,320	$244,194	$22,024	$275,753
Nationwide	$121,818	$26,455	$95,239	$7,937	$79,366

1.2. SRTS School Characteristics

This section quantifies characteristics of the schools that participated in SRTS projects announced for funding in Florida, Mississippi, Texas, Washington, and Wisconsin. When possible, it then compares these characteristics to schools that participated in SRTS projects nationally. The school characteristics analyzed include school enrollment, school level, and the funding announced per school.

1.2.1. Number of Schools and Students Affected

In the five states, more than 750,000 students were enrolled in the 1,410 schools known to be affected by an announced SRTS project (Table 9). The total k-8 public school student population in the five states was 7.0 million and there were 13,852 public schools with at least one grade from pre-kindergarten to eight. It can be estimated that SRTS projects affected roughly 11.1 percent of the pk-8 public school student population and 10.2 percent of the pk-8 public schools in the five states. In comparison, the entire federal SRTS program has affected an estimated 4.8 million students across the nation enrolled in 10,400 schools (National Center for Safe Routes to School 2011). This represents an estimated 13.9 percent of the 34.4 million public school students and 14.3 percent of the 72,870 PK-8 public schools nationwide (U.S. Department of Education 2011). These percentages are not precise measures of the SRTS program reach. Some SRTS projects target private schools and or high schools. These percentages do, however, allow for comparison of the reach of the SRTS programs in the five states. They suggest that SRTS projects in the five states generally have a more focused reach than projects nationwide.

Table 9: Estimated number of SRTS school student enrollment.

State	Awarded SRTS projects	SRTS projects with schools identified	Identified SRTS schools (% of total public schools)	Identified SRTS school enrollment (% of total public school enrollment)
Fla	188	157	354 (10.9%)	268,027 (14.5%)
Miss	27	24	70 (9.5%)	33,306 (9.5%)
Texas	200	196	359 (5.5%)	226,008 (6.4%)
Wash	69	69	122 (7.0%)	56,285 (8.0%)
Wis	85	82	505 (30.8%)	197,554 (33.3%)
All five	569	528	1,410 (10.2%)	781,180 (11.1%)

1.2.2. School Levels

Of the 1,410 schools known to be directly affected by a SRTS project, three quarters were elementary schools and almost one quarter was middle schools. Only 1 percent was high schools. The remaining 3 percent were classified as “other” schools by the NCES and mostly included schools serving grades kindergarten through eight. Many of these “other” schools were private schools located in Wisconsin (Table 10). The low number of high schools affected is because federally funded SRTS projects must be focused at or near schools serving one or more grades from kindergarten through eight. High schools may be affected by SRTS projects funded with state, not federal, funds. A high school may also be affected by a SRTS infrastructure project directed at a school serving one or more grades from kindergarten through eight that is located on the same campus or nearby.

Table 10: Number of SRTS schools of each level.

State	Elementary schools	Middle schools	High schools	Other schools	Total schools
Fla	288 (81%)	59 (17%)	2 (1%)	5 (1%)	354 (100%)
Miss	51 (73%)	18 (26%)	0	1 (1%)	70 (100%)
Texas	273 (76%)	82 (23%)	0	4 (1%)	359 (100%)
Wash	75 (61%)	33 (27%)	11 (9%)	3 (2%)	122 (100%)
Wis	363 (72%)	100 (20%)	3 (1%)	39 (8%)	505 (100%)
All five	1,050 (74%)	292 (21%)	16 (1%)	52 (4%)	1,410 (100%)

1.2.3. Funding Announced per School

SRTS funding awarded per school was calculated only for projects where the exact number of schools affected was known. This included 528 projects affecting a total of 1,410 schools. The remaining 41 projects were focused across entire cities, districts, counties, or states and were not included in this analysis. Across all five states and four project types, the average funding awarded to each school was a little more than $100,000 (Table 11). This is about twice the national average of about $56,000 [calculated using total funds announced and schools affected as reported by the NCSRTS (National Center for Safe Routes to School 2011)]. In the five states, non-infrastructure projects were awarded considerably less funds per school than projects with an infrastructure component; likely reflecting the relatively high cost of construction. Also, only up to 30 percent of federal SRTS funds allocated to a state can be awarded for non-infrastructure activities. States may attempt to reach as many schools as possible with these limited non-infrastructure funds, resulting in low average non-infrastructure awards per school.

Table 11: Average funding awarded per school.

State	Infrastructure	Non-infrastructure	Combined	Planning	All types
Fla	$226,779	$11,943	n/a	n/a	$155,774
Miss	n/a	$6,397	$162,539	n/a	$88,929
Texas	$182,679	$60,926	n/a	n/a	$145,373
Wash	$53,980	n/a	$155,199	n/a	$150,221
Wis	$68,206	$5,973	$44,568	$10,324	$22,895
All Five	$186,698	$18,149	$109,223	$10,324	$101,735

1.3. Discussion of Part I

This part of the study quantified the SRTS program in the five states that contributed data to the Statewide Mobility Assessment study. Since the federal SRTS program began in 2005, the five states have announced funding of almost $157 million to 569 SRTS projects that have affected more than 1,410 schools and 781,180 students. This represents roughly 10.2 percent of the PK-8 grade public schools and 11.1 percent of the PK-8 grade public school population in the five states. These portions are slightly smaller than the national program reach of 14.3 percent of PK-8 grade public schools and 13.9 percent of the PK-8 grade public school population nationwide. SRTS projects in the five states thus appear to be more focused and resource intensive. Indeed, SRTS projects in the five states had an average award per project that was 3.5 times greater than the national average ($275,753 compared to $79,366). Projects announced for funding in the five states affected a greater average number of schools and students per school than that in the national sample. The five states also funded a larger proportion of relatively high-cost infrastructure and combined infrastructure/non-infrastructure projects (72 percent for the five states compared to 63 percent nationally). The portion of non-infrastructure projects was similar (25 percent for the five states and 27 percent nationally), while a greater portion of low-cost planning projects were funded nationally (3 percent for the five states and 10 percent nationally). Finally, while sidewalk construction was the most common engineering or infrastructure activity in the five states and nationally, the portion of projects that featured a sidewalk improvement was 69 percent in the five states and 19 percent nationally.

The results of Part I illustrate the differences that exist among state SRTS projects and schools across the nation, as well as among those within the five states. In addition to presenting an assessment of SRTS projects' effectiveness at increasing rates of ATS, Part II compares these differences in SRTS projects and schools to changes in rates of ATS to determine if there are certain characteristics associated with more effective SRTS projects.

PART II—CHANGES IN RATES OF ATS

This second part of the report assesses the effect of SRTS projects on rates of ATS. As described in the SRTS Project Database Development section (page 3), travel data were standardized from various reporting formats. This section looks only at projects and schools with both pre- and post-project active travel mode data. Both pre- and post-project ATS data were available for a limited number of projects and schools in four states (Florida, Mississippi, Washington, and Wisconsin) (Table 12).

Table 12: SRTS projects and schools with complete pre- and post-project data.

Mode	State	Projects w/data	Schools w/data
Walk	Fla	11	17
	Miss	2	6
	Wash	17	15
	Wis	3	17
	All Four	33	45
Bicycle	Fla	8	14
	Miss	2	6
	Wash	16	15
	Wis	3	7
	All Four	29	42
All ATS	Fla	8	14
	Miss	2	6
	Wash	32	23
	Wis	3	7
	All Four	45	50
Any mode (walk or bike or all ATS)	Fla	11	17
	Miss	2	6
	Wash	32	23
	Wis	3	7
	All Four	48	53

The first section compares the projects and schools with any mode change data to those without such data. The second section presents overall rates of change in walking, bicycling, and all ATS for a combination of all projects and schools with such data in the four states. Changes in the three active travel modes at the project and school levels are then tested for statistical significance. The final section in this part presents the relationship between changes in rates of the three active travel modes and school, school neighborhood, and project characteristics. A complete list of all 48 projects with both pre- and post-project active travel mode data can be found in Appendix B—SRTS Projects with Both Pre- and Post-Project ATS Data.

2.1. Comparison of Projects and Schools with and without Pre- and Post-Project Data

This section compares SRTS projects and schools with both pre- and post-project active travel data to those without such data. It is intended to provide a context for the changes in rates of ATS and correlates of those changes in rates of ATS that are presented later in this part of the report.

2.1.1. SRTS Projects with and without Pre- and Post-Project Data

In the four states with active travel mode data, 48 SRTS projects had recorded data at both a pre- and post-project time; 306 projects had not. The characteristics of these two types of projects were compared to provide a sense of how projects with pre- and post-project data differed from those without (Table 13).

Table 13: Comparison of projects with both pre- and post-project data to those without.

		Projects w/pre and post data				Projects w/o pre and post data			
Project Characteristic		**n**	**(%)**	**mean**	**(SD)**	**n**	**(%)**	**mean**	**(SD)**
Funding per project ($)		48	(100%)	192,787	(116,982)	306	(100%)	305,210	(322,653)
Funding per school ($)*		48	(100%)	157,081	(121,849)	269	(88%)	197,327	(207,510)
Funding per student ($)**		48	(100%)	478	(845)	270	(88%)	366	(418)
Schools per project*		48	(100%)	1.5	(0.8)	269	(88%)	3.5	(11.0)
Students per project**		48	(100%)	777	(613)	270	(88%)	1,949	(5,594)
Pre-project rate of ATS (%)		47	(98%)	12.4	(11.2)	145	(47%)	16.3	(12.7)
Project reach	- One school	30	(63%)			140	(46%)		
	- Multiple identified schools	18	(38%)			129	(42%)		
	- Multiple unidentified schools	0	(0%)			37	(12%)		
Project type	- Combined	36	(75%)			84	(27%)		
	- Infrastructure	12	(25%)			162	(53%)		
	- Non-infrastructure	0	(0%)			60	(20%)		
Number of E's	- Zero	0	(0%)			3	(1%)		
	- One	12	(25%)			183	(60%)		
	- Two	3	(6%)			49	(16%)		
	- Three	17	(35%)			25	(8%)		
	- Four	16	(33%)			45	(15%)		
E's	- Engineering	48	(100%)			246	(80%)		
	- Enforcement	24	(50%)			55	(18%)		
	- Encouragement	26	(54%)			112	(37%)		
	- Education	35	(73%)			124	(41%)		
Infrastructure activities***	- Sidewalk	33	(75%)			170	(66%)		
	- Crosswalk	20	(45%)			66	(26%)		
	- Signage	11	(25%)			45	(18%)		
	- ADA improvement	7	(16%)			32	(13%)		
	- Bicycle rack	5	(11%)			27	(11%)		
	- Traffic calming/control	5	(11%)			45	(18%)		
	- shared use path	8	(18%)			31	(12%)		
	- Bicycle lane	0	(0%)			16	(6%)		
	- pedestrian overpass, bridge	0	(0%)			2	(1%)		
Non-infrastructure activities***	- Media campaign/promotion	10	(23%)			47	(18%)		
	- Increased emphasis patrol	18	(41%)			43	(17%)		
	- Walk/ride to school day	8	(18%)			49	(19%)		
	- Walking school bus	8	(18%)			22	(9%)		
	- Mileage club/pedometer	4	(9%)			24	(9%)		
	- misc. education activities	1	(2%)			24	(9%)		
	- Bicycle Rodeo	5	(11%)			20	(8%)		
	- Crossing guard	2	(5%)			16	(6%)		
	- SRTS project coordinator	1	(2%)			4	(2%)		
	- Bicycle Train	1	(2%)			5	(2%)		
	- Safety study	0	(0%)			4	(2%)		
	- Bicycle equipment	0	(0%)			2	(1%)		

* Only includes projects where participating schools were identified
** Only includes projects with enrollment data
***Percentages calculated from projects where specific activities were identified, n=44 w/pre and post data, n=256 w/o pre and post data

Projects with pre- and post-project data had a lower average award per project and per school. They also affected fewer schools and students per project. This translated into a higher average award per student. It could be that collecting travel data is simply more manageable when fewer schools and students take part in the project. In addition to being focused at fewer schools and on fewer students, SRTS projects with data were also more comprehensive. They had a higher percent of combined, a lower percent of infrastructure, and no non-infrastructure projects. There was a lower percent of projects with data with only one or two E's, and a higher percent projects with data with three and four E's. Projects with data also had a higher percentage of most specific E's. Overall, these projects with data offer a solid representation of the wide range of SRTS interventions used to support more children walking and bicycling to school. However, they may underrepresent SRTS projects that use only a small number of interventions or those that affect broader areas. Notably, no non-infrastructure projects have both pre- and post-project data; all schools with data featured an engineering component. Finally, projects with data tended to have lower pre-project rates of ATS then those without data. It could be that projects that measured change of rates in ATS are those that focused on increasing ATS, rather than increasing safety for a large amount of children that already walked or biked to school.

2.1.2. SRTS Schools with and without Pre- and Post-Project Data

In the four states with active travel mode data, 53 schools that participated in a SRTS project had recorded data at both a pre- and post-project time; 966 SRTS schools had not. The characteristics of these two types of SRTS schools were compared to provide a sense of how schools with pre- and post-project data differed from schools without (Table 14).

Table 14: Comparison of SRTS schools with both pre- and post-project data to those without.

			Schools w/pre and post data				Schools w/o pre and post data			
Domain	**School Characteristic**		**n**	**(%)**	**mean**	**(SD)**	**n**	**(%)**	**mean**	**(SD)**
School	School level	- Primary	42	(79%)			714	(74%)		
		- Middle	10	(19%)			193	(20%)		
		- High	0	(0%)			15	(2%)		
		- Other	1	(2%)			44	(5%)		
	Enrollment		53	(100%)	543	(265)	966	(100%)	532	(307)
	Students on free /reduced lunch (%)		53	(100%)	57.3	(18.77)	938	(97%)	54.06	(26.94)
	Pre-project rate of ATS (%)		52	(98%)	12.5	(11.08)	389	(40%)	19.7	(16.89)
School N'hood	School age children		53	(100%)	1,452	(1,118)	940	(97%)	2,262	(2,719)
	Low-income households (%)		53	(100%)	42.3	(11.93)	940	(97%)	40.5	(14.95)
	Non-English speaking households (%)		53	(100%)	15.1	(9.34)	940	(97%)	15.1	(15.18)

SRTS Schools with and without both pre- and post-project data are roughly comparable for school level (almost three-quarters were elementary, almost one-quarter were middle schools), mean enrollment, and various measures of socio-economic status (mean percent of students on the free/reduced lunch program, mean percent of low-income households in the neighborhood, and mean percent of non-English speaking households in the neighborhood). SRTS schools with both pre- and post-project data were different from those without in that there were fewer school-age children within a mile of school and pre-project rates of ATS were lower (two characteristics which are correlated, see Appendix A—Baseline Rates of ATS at SRTS Schools).

2.2. Changes in Rates of ATS

This section presents changes in active travel modes to school after SRTS project completion. It first presents overall rates of change in active travel modes using a combination of project- and school-level data. It then assesses changes in rates of active travel using only project- and school-level data.

2.2.1. Overall Changes in Rates of ATS

In order to present the most comprehensive picture of changes in rates of active travel modes, they were calculated using an aggregation of both project- and school-level data. For each pre- and post-project period, the total number of students using an active travel mode and the total enrollment was calculated at the project level. Then, for those schools not already included in the project-level data, school-level counts of students using an active travel mode and enrollment were added to the project-level totals. This process ensured that double counting did not occur for places where project- and school-level data were both available. Percentages were calculated for each pre- and post-project period from these combined project- and school-level totals as the number of students using an active travel mode divided by the total number of students. Changes in rates were calculated as the pre-project percentage of students using a travel mode subtracted from the post-project percentage of students using a travel mode (Table 15).

Table 15: Change in rates of active travel to school (ATS) for schools and projects with both pre- and post-project travel data.

Mode	State	Projects represented	Schools represented	Pre-project rate	Post-project rate	Change in rate	% change in rate
Walk	Fla	15	17	11.4%	16.0%	4.6%	41%
	Miss	2	6	2.1%	9.0%	6.9%	326%
	Wash	20	28	11.3%	15.2%	3.9%	34%
	Wis	3	4	6.2%	7.5%	1.3%	20%
	All Four	40	55	9.8%	14.2%	4.4%	45%
Bicycle	Fla	12	14	4.5%	4.3%	-0.2%	-5%
	Miss	2	6	0.2%	0.2%	0.0%	13%
	Wash	19	26	1.6%	2.9%	1.2%	76%
	Wis	3	4	0.3%	2.8%	2.5%	752%
	All Four	36	50	2.5%	3.0%	0.6%	24%
All ATS	Fla	12	14	17.8%	22.6%	4.8%	27%
	Miss	2	6	2.3%	9.2%	6.9%	298%
	Wash	35	56	13.0%	17.4%	4.4%	34%
	Wis	3	4	6.6%	10.3%	3.7%	57%
	All Four	52	80	12.9%	17.6%	4.7%	37%

Rates of ATS increased for all modes in all states, with the exception of a 0.2 percent drop in bicycling in Florida. Across all projects and schools with pre- and post-project travel data in the four states, walking increased by 45 percent (from 9.8 percent to 14.2 percent), bicycling increased by 24 percent (from 2.5 percent to 3.0 percent), and all ATS increased by 37 percent (from 12.9 percent to 17.6 percent). The increase in ATS at the 52 different projects and 80 schools represented by these ATS data translated into an estimated 1,897 additional students walking or bicycling to school.

2.2.1. Project-Level Changes in Rates of ATS

Project-level changes in rates of all active travel modes were assessed using paired samples t-tests. Only projects with project-level pre- and post-project data were included in the analysis. Significant differences in pre- and post-project rates were found for all ATS (p=.000), walking (p=.000), and for bicycling (p=.011). The average project-level change was 2.8 percent for walking, 0.9 percent for bicycling, and 4.9 percent for all ATS (Table 16).

Table 16: Distribution of project-level change in rates of active travel to school (ATS).

Mode	n	Mean	SD	Min	1st quartile	Median	3rd Quartile	Max
Walk	33	2.8%	3.6%	-3.1%	0.6%	2.2%	4.5%	14.3%
Bicycle	29	0.9%	1.7%	-1.4%	0.0%	0.3%	1.3%	7.1%
All ATS	45	4.9%	7.5%	-2.6%	1.1%	2.6%	6.1%	46.9%

2.2.2. School-Level Changes in Rates of ATS

School-level pre- and post-project rates of ATS were compared using paired samples t-tests. Only schools with school-level pre- and post-project data were included in the analysis. There was a significant difference in pre- and post-project rates of walking (p=.000) and all ATS (p=.000), but not bicycling (p=.085). Average school-level changes in rates of walking and all ATS were 4.5 and 7.0 percentage points, respectively (Table 17).

Table 17: Distribution of school-level change in rates of active travel to school (ATS).

Mode	n	Mean	SD	Min	1st quartile	Median	3rd Quartile	Max
Walk	45	4.5%	7.0%	-3.1%	0.3%	2.3%	6.0%	38.2%
Bicycle	42	1.2%	4.3%	-9.7%	-0.3%	0.4%	2.4%	17.6%
All ATS	50	7.0%	9.6%	-2.7%	1.3%	4.1%	10.7%	47.0%

2.3. Characteristics Associated with Changes in Rates of ATS

To identify characteristics of more effective SRTS projects, the relationship between project, school, and school neighborhood characteristics were analyzed. The results are presented in this section.

2.3.1. Project Characteristics Associated with Changes in Rates of ATS

Possible correlations between SRTS project characteristics and changes in project-level rates of walking, biking, and all ATS were investigated. Interval-ratio variables were tested using bivariate analysis while nominal variables were tested using one-way ANOVA or Kruskal Wallis tests. These analyses included 48 projects, 45 of which had pre- and post-project ATS data, 33 of which had pre-and post-project walk data, and 29 of which had pre- and post-project bicycle data (Table 18, results shown only for all ATS).

Table 18: Relationship between SRTS project characteristics and change in rate of ATS.

Independent Variable		n	Average change in rate of ATS	P value	Pearson Correlation
$ per project		45	n/a	.079	-0.265
$ per school		45	n/a	.269	-0.168
$ per student		45	n/a	.722	-0.055
Schools per project		45	n/a	.418	-0.124
Students per project		45	n/a	.233	-0.181
Pre-project rate of ATS		45	n/a	.825	0.034
Project type	- Combined	36	5.6%	.194	
	- Infrastructure	9	2.0%		
Number of E's	- One	9	2.0%	.339	
	- Two	3	6.0%		
	- Three	17	7.2%		
	- Four	16	3.8%		
Engineering component	- No	0	n/a	n/a	
	- Yes	45	4.9%		
Enforcement component	- No	21	6.6%	.168	
	- Yes	24	3.4%		
Encouragement component	- No	19	2.9%	.131	
	- Yes	26	6.3%		
Education component	- No	10	1.9%	.160	
	- Yes	35	5.7%		
Sidewalk activity	- No	11	3.8%	.620	
	- yes	32	5.1%		

* significant at 5%; ** significant at 1%; *** significant at 0.1%

No significant relationships were found for the walk only mode, the bike only mode, or all ATS modes. The amount of money awarded to a SRTS program had a weak negative relationship with changes in ATS. The number of schools and students participating in a SRTS project also had a weak negative relationship. These relationships were not statistically significant, but the trends suggest that SRTS programs perform better when focused at fewer schools and/or students, and investing more money in a project may not necessarily result in better results. All 48 SRTS projects with pre- and post-project data featured an engineering component and were either combined or Infrastructure project types. Therefore it was not possible to assess the effectiveness of infrastructure projects. On average, changes in rates of ATS were greater for combined projects, especially those with an encouragement or education component. While these differences were not statistically significant, they do support the logic that creating supportive environments—both built and social—for active travel will lead to greater use. SRTS projects with enforcement activities, which likely have a more direct impact on safety than actual use of ATS, had smaller increases in rates of ATS than those without. Projects with a sidewalk activity had a marginally greater increase in ATS than those without.

2.3.2. School Characteristics Correlated with Changes in Rates of ATS

Bivariate analysis was used to investigate possible correlations between school and school neighborhood characteristics and changes in school-level rates of walking, biking, and all ATS. These analyses included 53 schools, 50 of which had pre- and post-project ATS data, 45 of which had pre-and post-project walk data, and 42 of which had pre- and post-project bicycle data (Table 19, results shown for all ATS).

Table 19: Relationship between school characteristics and change in rate of ATS.

Domain	Ind. variable	n	P value	Pearson Correlation
School	Level - Elementary	39	.522	n/a (ANOVA test used)
	- Middle	10		
	Enrollment	50	.134	-0.215
	% free/red. lunch	50	.737	-0.049
	Pre-project rate of ATS	50	.090	0.242
Neighborhood	K-12 children	50	.811	0.035
	% Low income	50	.271	-0.159
	% Non-English speaking	50	.995	-0.001

* significant at 5%; ** significant at 1%; *** significant at 0.1%

No significant relationships were found for walk and all ATS modes. For bicycling, a significant negative relationship was found between pre-project rates of bicycling to school and changes in rates of bicycling to school (P=.009, Pearson correlation = -0.401). This suggests that SRTS projects have a better opportunity to introduce bicycling as a viable mode of travel to school where few children already bicycle to school. No significant difference in changes in rates of bicycling to school was found between elementary and middle schools. This result did not support the hypothesis that middle schools were more likely to see increases in rates of bicycling to school because the bicycle is a more effective form of active transportation for older children who may live further from school. Instead, it appears that bicycling to school has the potential to be successfully encouraged at elementary schools and middle schools alike. The lack of other significant relationships between changes in rates of walking, bicycling, and all ATS suggests that school and school neighborhood population characteristics have little to do with the effectiveness of SRTS projects.

2.4. Discussion of Part II

This part of the report assessed just one of the intended outcomes of the SRTS program: changes in active travel modes to school. Preliminary analysis of pre- and post-project travel data in Florida, Mississippi, Wisconsin, and Washington suggests that rates of walking, bicycling, and all ATS increase after implementation of a SRTS project. Across all projects and schools with pre- and post-project travel data in the four states, walking increased by 45 percent (from 9.8 percent to 14.2 percent), bicycling increased by 24 percent (from 2.5 percent to 3.0 percent), and all ATS increased by 37 percent (from 12.9 percent to 17.6 percent). Changes in rates of ATS were not significantly correlated with any project, school, or school neighborhood characteristics.

This lack of significant findings does not necessarily mean that certain SRTS characteristics do not result in better outcomes. The sample of projects with pre- and post-data analyzed in this study was small and not generalizable to all SRTS projects or schools. SRTS projects in the analysis tended to be more comprehensive and focused on fewer schools and students in areas with fewer school-aged children. So while the projects analyzed represented a wide range of SRTS interventions, they may have underrepresented projects with a limited number of interventions or a broader reach. Notably, the lack of non-infrastructure SRTS projects with pre- and post-project data precluded any comparison of the effectiveness of infrastructure versus non-infrastructure projects. In a comparison of combined versus infrastructure only projects, however, rates of ATS increased more after combined projects compared to infrastructure only projects; and encouragement and education activities appeared to be more effective than enforcement activities at increasing rates of ATS. These trends were not statistically significant, but were reasonable and could become more or less pronounced as more projects with varying activities come to completion and can be included in the analysis.

Evidence was found that schools with lower baseline rates of bicycling were more likely to have greater increases in rates of bicycling. It appears that SRTS projects may be able to introduce bicycling as a viable mode choice where few children already bicycle. This finding suggests that careful planning is necessary for SRTS projects to identify existing conditions related to the use of active travel to school, base goals on those existing conditions, then focus limited resources on the SRTS activities that would best achieve those goals.

LIMITATIONS

This study found encouraging immediate increases in ATS after completion of SRTS projects. However, because rates of ATS over a similar time period were not available for control schools, any changes in ATS could simply be part of a larger trend and not be a direct result of the SRTS interventions. Also, these results cannot be extrapolated to all SRTS projects. Pre- and post-project travel data were only available for a small sample of schools (n=53) and projects (n=48). They represented a broad range of SRTS interventions, but tended to be more comprehensive and focused on fewer schools and children. As more projects come to completion, more before-and-after cases may be available for analysis. These types of data will be vital to identifying effective characteristics that can be incorporated into future SRTS projects in order to ensure their success. Efforts to collect these data from SRTS schools, as well as control schools, would be well worth the resources. SRTS programs are advised to make this investment.

The results of this study were also limited by inconsistent data collection methods. Rates of ATS were either provided by SRTS schools or projects or collected by SRTS coordinators. The ATS data were collected using various methods, such as in-class hand counts or observations outside a school during commute times. These various methods may not be directly comparable and not all ATS data collection methods have been validated. Furthermore, this analysis assumes that all students at a school were affected by a SRTS project. Assuming that the infrastructure improvements were site specific and not necessarily encompassing all of the infrastructure needs of the school, only those students living in the direction of the infrastructure improvement would benefit from the improvements. In addition, some non-infrastructure activities, such as classroom education, may be targeted to specific grade levels and not all students in the schools. The specific population that is intended to benefit from a SRTS project should be reported.

Temporal mismatch was also present in data used for the analysis. SRTS projects were implemented and completed at various times, but NCES school data were collected for the 2007-08 school year and school neighborhood data were derived from the 2000 census. This may not present a great limitation, however, since school characteristics and urban form change slowly over time.

Finally, this study assessed the effectiveness of SRTS projects using only one metric: the rate of ATS. Many SRTS projects are implemented at schools where many students already walk or bicycle to school with the goal of increasing safety for these students. Specific goals should be recorded when SRTS projects are awarded funding so that project performance can be evaluated accordingly. SRTS projects may also have unintended impacts, such as contributing to the safety of non-student pedestrians or encouraging active travel to other destinations among students. Furthermore, the pedestrian infrastructure built through SRTS projects will likely have a long-lifespan and be used by generations of students. The full extent of these and other potential SRTS project outcomes was not assessed in this study. A comprehensive benefit-cost analysis would be required to quantify the full impact of the SRTS program.

All of these limitations could be overcome with more rigorous data collection efforts. SRTS coordinators are encouraged to collect detailed SRTS project descriptions and unbiased school-level travel data from SRTS project applicants both before and after project completion. Travel data should be collected at least at the school level and should at least differentiate between walking and bicycling. The NCSRTS provides data collection instruments that exceed these criteria (National Center for Safe Routes to School 2010). Travel data should also be collected from control schools over similar periods. These data paired with the analytic framework presented here would contribute to a more complete understanding of the effectiveness of SRTS projects.

CONCLUSION

In the six years from 2005 to 2011 substantial progress has been made in implementing the federal SRTS program. To track this progress, the Statewide Mobility Assessment study developed a database of SRTS projects and schools in five of the six participating states. Almost $157 million in funding has been announced for 569 SRTS projects that have affected more than 1,410 schools and 781,180 students. Roughly 10 percent of the PK-8 grade public school population in the five states has been impacted by an SRTS project.

To evaluate the effectiveness of the SRTS program in supporting more children safely walking and biking to school, changes in rates of active travel among completed SRTS projects with before and after travel data were calculated. Rates of ATS increased by 37 percent after completion of a SRTS project. This is encouraging preliminary evidence that the program is effective at achieving its goal of supporting more children to safely walk or bicycle to school.

Because there has been a large demand for SRTS project funding, state SRTS coordinators require methods to ensure they prioritize project applications with the greatest potential for success. More comprehensive SRTS projects with a smaller reach tended to have greater increases in ATS, although the relationships were not statistically significant. For bicycling specifically, lower baseline rates of bicycling to school were significantly related to greater increases in rates of bicycling to school after implementation of a SRTS project. These relationships provide some insight into the types of SRTS projects that perform well. They, however, are based on a small sample of projects. They warrant further investigation as more projects come to completion. Additional school-level pre- and post-project ATS data will be required for a more robust evaluation from which firm SRTS intervention recommendations can be drawn.

This report offers a detailed assessment of the SRTS program in five states across the nation. It is a valuable resource to understand the extent to which the SRTS program affects school-based communities and supports walking and bicycling to school. SRTS coordinators, SRTS project applicants, and other SRTS stakeholders may wish to use the initial trends identified in this study to cultivate SRTS projects that may be more effective at increasing rates of active travel. The results of this study can also be used as a point of departure for further research into the characteristics of effective SRTS projects. The database and research framework developed in this study will serve both SRTS coordinators and researchers as they continue to track the progress of the SRTS program, evaluate its effectiveness, and refine the understanding of how to successfully support safe walking and bicycling to school.

REFERENCES

Environmental Protection Agency. 2003. Travel and Environmental Implications of School Siting, edited by U.S. Environmental Protection Agency. Washington, DC.

Fulton, J.E., J.L. Shisler, M.M. Yore, and C.J. Caspersen. 2005. Active transportation to school: findings from a national survey. *Res Q Exerc Sport* 76 (3):352-357.

Heelan, K.A., J.E. Donnelly, D.J. Jacobsen, M.S. Mayo, R. Wasburn, and L. Greene. 2005. Active commuting to and from school and BMI in elementary school children -- Preliminary data. *Child Care Health Dev* 31 (3):341-349.

Hubsmith, Deborah A. 2006. Safe Routes to School in the United States. *Children, Youth and Environments* 16 (1):168-190.

Lin, Lin. 2011. A Census of Schools and School Neighborhoods in Five States. Seattle, Washington: University of Washington.

Moudon, Anne Vernez, Orion Stewart, and Lin Lin. 2010. Safe Routes to School (SRTS) Statewide Mobility Assessment Study - Phase I Report. Seattle: Washington State Transportation Center.

———. 2011. So Many Choices, So Many Ways to Choose: How Five State Departments of Transportation Select Safe Routes to School for Funding. Seattle: Washington State Transportation Center.

National Center for Safe Routes to School. 2010. Safe Routes to School Travel Data: A Look at Baseline Results from Parent Surveys and Student Travel Tallies.

———. 2011. Federal Safe Routes to School Program Evaluation Plan.

———. 2011. Federal Safe Routes to School Program Progress Report.

Safe Routes to School National Partnership. 2011. *U.S. Travel Data Show Decline in Walking and Bicycling to School has Stabilized* [Press Release]. National Center for Safe Routes to School and Safe Routes to School National Partnership 2010 [cited September 5 2011]. Available from http://www.saferoutespartnership.org/27892/450701.

Saksvig, B.I., D.J. Catellier, K. Pfeiffer, K.H. Schmitz, T.L. Conway, S. Going, and et al. 2007. Travel by walking before and after school and physical activity among adolescent girls. *Arch. Pediatric Adol. Med.* 161 (2):153-158.

Sirard, J.R., W.F. Jr. Riner, K.L. McIver, and R.R. Pate. 2005. Physical activity and active commuting to elementary school. *Med. Sci. Sports Exercise* 37 (12):2062-2069.

U.S. Department of Education. 2011. Digest of Education Statistics, 2010: National Center for Education Statistics.

U.S. Department of Transportation, Federal Highway Administration. 2012. *Recommended Guidelines/Priorities for Sidewalks and Walkways* [cited June 14 2012]. Available from http://www.walkinginfo.org/pedsafe/moreinfo_sidewalks.cfm.

———. 2012. *Revised Apportionment of Funds for Fiscal Year (2011) Pursuant to the Surface Transportation Extension Act of 2010, As Amended* 2011 [cited June 18 2012]. Available from http://www.fhwa.dot.gov/legsregs/directives/notices/n4510745.htm.

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APPENDIX A—BASELINE RATES OF ATS AT SRTS SCHOOLS

This appendix presents pre-project, or baseline, rates of walking, bicycling, and all types of ATS at SRTS schools. Baseline data were available for certain projects and schools in four states: Mississippi, Washington, Wisconsin, and Florida. Table A-1 lists the number of individual projects and schools with complete pre-project data. As noted in the SRTS Project Database Development section (page 3), travel data were standardized from various reporting formats. As a result of this process, some projects may have travel data while the schools involved in the project do not. Conversely, some schools may have travel data while the SRTS project they were involved in does not.

Table A-1: SRTS projects and schools with complete pre-project data.

Mode	State	Projects w/data	Schools w/data
Walk	Fla	51	124
	Miss	24	67
	Wash	38	33
	Wis	77	257
	All Four	190	481
Bicycle	Fla	49	105
	Miss	24	67
	Wash	37	33
	Wis	77	257
	All Four	187	462
All ATS	Fla	49	105
	Miss	24	67
	Wash	56	43
	Wis	78	258
	All Four	207	473
Any mode (walk or bike or all ATS)	Fla	51	124
	Miss	24	67
	Wash	56	43
	Wis	78	258
	All Four	209	492

The first section of this appendix compares the 492 SRTS schools with baseline active travel data to the 559 SRTS schools in the four states without. The second section presents overall baseline rates of walking, bicycling, and all ATS in the four states. The final section in Appendix A presents the relationship between baseline rates of ATS greater than the national average and school and school neighborhood characteristics. It is intended to supplement the findings of the first Statewide Mobility Assessment study report, “Safe Routes to School (SRTS) Statewide Mobility Assessment Study—Phase I report” (www.wsdot.wa.gov/research/reports/fullreports/743.1.pdf). In that first report, a literature review identified baseline rates of ATS and the barriers to its use. This section compares baseline rates of ATS to some of those barriers using SRTS schools in the study states.

A.1. Comparison of Schools with and without Baseline ATS Data

School-level pre-project rates of at least one mode of active travel were available for 492 (47 percent) of the 1,051 total identified SRTS schools in the four states with travel data. This included 124 schools in Florida, 67 in Mississippi, 43 in Washington, and 258 in Wisconsin. Schools with pre-project travel data in were compared to schools without. Means testing revealed that SRTS schools that reported pre-project rates of ATS had a significantly lower enrollment (p=.023), lower percentage of students on the free/reduced-price lunch program (p=.000), fewer children aged 5 to 18 in the neighborhood (p=.000) and lower percentage of low-income (p=.005) and non-English speaking households (p=.014) in the neighborhood (Table A-2). School and school neighborhood characteristics found to be significant in means testing were included in a binary logistic regression model. This model showed that only the school's enrollment and the number of children in the neighborhood were significantly related to pre-project data availability (Table A-3). Schools with fewer students enrolled and fewer children in the neighborhood were more likely to have school-level data. These findings don't necessarily mean that schools with these characteristics are more likely to collect data, since rates of walking and bicycling were sometimes reported at the project, not school level. The results of this analysis are only to provide context for analysis of schools with pre-project ATS data presented in the next section, since the sample of schools is neither a complete nor random sample of SRTS schools.

Table A-2: Characteristics of SRTS schools with and without pre-project ATS data.

		Schools w/ATS data			Schools w/o ATS data				
Domain	**Independent variable**	**n**	**mean**	**(SD)**	**n**	**mean**	**(SD)**	**P value**	**Test of significance**
School	Level - Elementary	375	-	-	402	-	-	.367	Pearson chi-square
	- Middle	94			116				
	Enrollment	492	506	(298)	559	548	(307)	.023*	One-way ANOVA
	% free/red. lunch	469	50.0	(25.6)	549	56.7	(27.1)	.000***	One-way ANOVA
Neighborhood	K-12 students	470	1,635	(1,772)	550	2,633	(3,137)	.000***	Kruskal Wallis
	% Low income	470	39.2	(15.3)	550	41.4	(14.5)	.005**	Kruskal Wallis
	% Non-English speaking	470	14.4	(16.0)	550	16.7	(13.7)	.014*	One-way ANOVA

* significant at 5%; ** significant at 1%; *** significant at 0.1%

Table A-3: Relationship between presence of pre-project ATS data and school characteristics.

Domain	**Independent variable**	**P value**	**Odds ratio**	**(95% CI)**
School	Level	-	-	-
	Enrollment (100)	.025*	.949	(.906 - .994)
	% free/red. lunch	.153	.995	(.988 - 1.002)
Neighborhood	K-12 students (100)	.000***	.984	(.978 - .991)
	% Low income	.555	1.004	(.992 - 1.016)
	% Non-English speaking	.418	1.004	(.994 - 1.015)
Model summary	n = 1,016 schools			
	- 2 log likelihood = 1,357.00			
	Cox & snell r square = .043			
	Nagelkerke r square = .058			

* significant at 5%; ** significant at 1%; *** significant at 0.1%

A.2. Baseline Rates of ATS

This section presents baseline (pre-project) rates of active travel modes to school. It first presents overall rates of active travel modes using a combination of project- and school-level data. It then presents the distribution of rates of active travel using only project- and school-level data.

A.2.1 Overall Baseline Rates of ATS

Pre-project rates of all forms of ATS and walking and bicycling to school were available from some SRTS projects and/or schools prior to a SRTS project implementation. In order to present the most comprehensive picture of baseline rates of active travel to school, they were calculated using an aggregation of both project- and school-level data. First, the total number of students using an active travel mode and the total enrollment was calculated at the project level. Then, for those schools not already included in the project-level data, school-level counts of students using a mode and enrollment were added to the project-level totals. This processes ensured that double counting did not occur for places where project- and school-level data were both available. Rates of mode use were calculated as percentages from these combined project- and school-level totals as the number of students using an active travel mode divided by the total number of students. The total number of projects, schools and students represented using this process is presented in Table for each state and for each travel mode. In the four states combined, the pre-project rate of all modes of ATS was 20.1 percent, with considerably more children walking to school than bicycling to school (Table A-4). Rates calculated at the state level varied. SRTS projects and/or schools with data in Wisconsin had the highest rates of active travel to school, followed by Florida, Washington and Mississippi. These rates calculated at the state level may suggest state-wide trends, but they are a convenience sample of SRTS projects and/or schools with data and are not representative of any of the states.

Table A-4: Pre-project rates of active travel to school (ATS).

Mode	State	Projects represented	Schools represented	Enrollment	Rate of mode use	Students using mode
Walk	Fla	72	124	96,113	14.6%	14,015
	Miss	24	70	33,306	7.1%	2,350
	Wash	41	70	33,553	14.2%	4,751
	Wis	80	427*	190,702	21.6%	41,109
	All four states	217	691	353,674	17.6%	62,225
Bicycle	Fla	70	119	91,840	2.4%	2,230
	Miss	24	70	33,306	0.4%	118
	Wash	40	68	33,323	1.9%	646
	Wis	81	427*	190,702	3.3%	6,278
	All four states	215	684	349,171	2.7%	9,272
All ATS	Fla	70	119	91,840	16.9%	15,561
	Miss	24	70	33,306	7.4%	2,468
	Wash	59	102	48,216	15.4%	7,403
	Wis	82	428*	191,592	25.0%	47,912
	All four states	235	719	364,954	20.1%	73,344

* This actual number of schools is greater because one Wis. project did not have a count of the schools affected.

A.2.2 Project-Level Distribution of Rates of ATS

At the project-level, pre-project rates of all types of ATS ranged from 0 to 67 percent of the student population. The average rate of ATS was 14.7 percent while the median value was 12.0 percent, indicating a positive skew (Table A-5). This means most projects had lower rates of ATS, while a few had very high rates of ATS.

Table A-5: Distribution of project-level rates of active travel to school (ATS).

State	n	Mean	SD	Min	1st Quartile	Median	3rd Quartile	Max
Fla	49	14.3%	9.0%	0.7%	6.8%	13.0%	18.9%	40.6%
Miss	24	10.6%	12.1%	0.0%	2.2%	4.9%	17.0%	47.0%
Wash	56	14.8%	11.8%	0.0%	5.5%	12.9%	23.7%	53.9%
Wis	78	16.2%	14.2%	0.0%	6.0%	13.5%	50.7%	67.0%
All four	207	14.7%	12.3%	0.0%	5.3%	12.0%	20.3%	67.0%

A.2.3 School-Level Distribution of Rates of ATS

School-level baseline rates of ATS followed a similar distribution as project-level baseline rates of ATS, but were slightly higher. Rates ranged from 0 to 81 percent of the student population. The average school-level rate was 18.1 percent and the median was 14.0 percent, again indicating a positive skew were most schools had lower rates of ATS while a few schools had very large rates of ATS (Table A-6).

Table A-6: Distribution of school-level rates of active travel to school (ATS).

State	n	Mean	SD	Min	1st Quartile	Median	3rd Quartile	Max
Fla	105	16.8%	11.7%	0.7%	7.4%	15.0%	23.4%	62.8%
Miss	67	10.2%	12.5%	0.0%	1.7%	5.2%	18.7%	66.7%
Wash	43	13.0%	11.6%	0.0%	4.8%	9.7%	18.8%	53.9%
Wis	258	21.6%	18.6%	0.0%	7.0%	17.1%	30.0%	81.0%
All four	473	18.1%	16.5%	0.0%	6.2%	14.0%	25.1%	81.0%

Bicycling was hypothesized as a mode of active travel that would be favored among middle school students compared to elementary school students. This was because, compared to walking, bicycling skills are learned at a later age and bicycling can more effectively cover greater distances. Middle schools serve older children and due to consolidation are more likely to be located further from the students they serve. Average baseline rates of bicycling were greater at middle schools, but the difference was not statistically significant (p=0.242) (Table A-7).

Table A-7: Mean rates of bicycling by school level.

School level	n	Mean	(95% C.I.)
Elementary	349	3.6%	(2.9% - 4.2%)
Middle	91	4.4%	(3.2% - 5.5%)

A.3. Correlates of Higher Baseline Rates of ATS

Schools that reported pre-project rates of walking and bicycling to school were analyzed for existing conditions that were correlated with walking and bicycling to school. Due to a skewed distribution of rates of ATS, the data were transformed into a binary variable indicating whether the rate of total ATS was equal to or greater than the national rate of 13 percent (Safe Routes to School National Partnership, 2010). Of the 492 schools with pre-project rates of ATS, 236 (48 percent) had rates less than the 13 percent while 256 (52 percent) had rates equal to or greater than 13 percent.

Means testing was used to analyze the relationship between schools with rates of ATS that were greater and lesser than the national average and school and school neighborhood characteristics (Table A-8). Significant relationships were found between the school-level enrollment (p=.034) and the number of school-aged children in the neighborhood (p=.000). An unadjusted binary logistic regression model of these two variables found them both to be statistically significant (p=.000). The model indicated that for every 100 additional students enrolled at a school, the odds of having rates of ATS greater than the national average decreased by 14.3 percent; while for every 100 additional children aged 5 to 18 in the school neighborhood, the odds of having rates of ATS greater than the national average increased by 7.0 percent (Table A-9). These findings make sense, as schools with a larger student body are likely to have larger attendance areas and draw more students who live at distances too far too easily walk or bicycle. Conversely, schools with more school-aged children within a mile are likely to have more students enrolled who live close enough to school to easily commute on foot or bicycle.

Table A-8: Characteristics of SRTS schools with a rate of ATS equal to or greater than the national rate of 13 percent.

		>= national rate of ATS			< national rate of ATS				
Domain	**Independent variable**	**n**	**mean**	**(SD)**	**n**	**mean**	**(SD)**	**P value**	**Test of significance**
School	Level - Elementary	202	-	-	173	-	-	.907	Chi-square
	- Middle	50			44				
	Enrollment	256	478	(269)	236	535	(325)	.034*	Kruskal Wallis
	% free/red. lunch	250	51.9	(26.7)	219	47.9	(24.1)	.092	One-way ANOVA
Neighborhood	K-12 students	249	2,177	(2,072)	221	1,025	(1,070)	.000***	Kruskal Wallis
	% Low income	249	40.4	(16.1)	221	37.9	(14.2)	.070	One-way ANOVA
	% Non-English Speaking	249	14.8	(14.9)	221	13.9	(17.1)	.564	One-way ANOVA

* significant at 5%; ** significant at 1%; *** significant at 0.1%

Table A-9: Relationship between school characteristics and rates of ATS equal to or greater than the national rate of 13 percent.

Domain	Ind. variable	P value	Odds ratio	(95% CI)
School	Level	-	-	-
	Enrollment (100)	.000***	.857	(.794 - .925)
	% free lunch	-	-	-
Neighborhood	K-12 students (100)	.000***	1.070	(1.049 - 1.091)
	% Low income	-	-	-
	% Non-English speaking	-	-	-
Model summary	N = 470 schools			
	- 2 log likelihood = 568.475			
	Cox & snell r square = .159			
	Nagelkerke r square = .212			

* significant at 5%; ** significant at 1%; *** significant at 0.1%

A.4. Discussion of Appendix A

Across all SRTS projects with baseline travel data in in Florida, Mississippi, Wisconsin, and Washington, 17.6 percent walked, 2.7 percent bicycled, and 20.1 percent of students used some form of ATS. These baseline rates were higher than the national rates of 12 percent walking and 1 percent bicycling. Baseline rates of ATS among these schools were positively related to the number of school-aged children living within a mile of school and negatively related to the number of students enrolled at a school. This comes as no surprise, as the initial literature review completed for this study identified numerous studies have found that a child's distance to school is the strongest correlate of ATS (Bringolf-Isler et al. 2008; Ewing, Schroeer, and Greene 2004; Martin and Carlson 2005; McDonald 2008; McMillan 2007; Nelson et al. 2008; Schlossberg et al. 2006; Timperio et al. 2006; Yarlagadda and Srinivasan 2008). It is reasonable to expect that small schools in more densely populated areas will see more children walking and bicycling to school. Without complete ATS data at all schools, SRTS coordinators could use enrollment and children within a mile of school as proxies for students potentially walking and bicycling to school in order to prioritize funding for SRTS projects that will improve pedestrian and bicycle safety near these schools, and thereby keep the largest number of students who already use ATS safer. Socio-demographic characteristics of the school or school neighborhood were not significantly related to baseline rates of ATS. This is also not surprising as prior research has inconsistently found household income, age, and race to be correlated with ATS [For a summary of common correlates of ATS, see (Davison, Werder, and Lawson 2008; Sirard and Slater 2008; Stewart 2011)].

Attempts to identify school and school-neighborhood characteristics associated with rates of ATS were limited by a lack of data. Only a portion of schools in four of the five states had ATS mode share data. The inclusion of ATS data for the remaining state could have captured a better cross-section of school conditions across different U.S. climatic, demographic, and urban form conditions. Additionally, SRTS schools with pre-project ATS data differed from SRTS schools without data in that there were fewer students enrolled and fewer school-aged children estimated to reside within a mile. It is unknown if the characteristics associated with pre-project rates of ATS presented in this study would persist in an analysis of a representative sample.

References

Bringolf-Isler, Bettina, Leticia Grize, Urs Mäder, Nicole Ruch, Felix H. Sennhauser, and Charlotte Braun-Fahrländer. 2008. Personal and environmental factors associated with active commuting to school in Switzerland. *Preventive Medicine* 46 (1):67-73.

Davison, Kirsten K., Jessica L. Werder, and Catherine T. Lawson. 2008. Children's active commuting to school: current knowledge and future directions. *Preventing Chronic Disease* 5 (3).

Ewing, R., W. Schroeer, and W. Greene. 2004. School location and student travel: analysis of factors affecting mode choice. *Transportation Research Record: Journal of the Transportation Research Board* 1985:55-63.

Martin, S., and S. Carlson. 2005. Barriers to children walking to or from school -- United States, 2004. *Morbidity & Mortality Weekly Report* 54 (38):949-952.

McDonald, Noreen C. 2008. Children's mode choice for the school trip: the role of distance and school location in walking to school. *Transportation* (35):23-35.

McMillan, Tracy E. 2007. The relative influence of urban form on a child's travel mode to school. *Transportation Research Part A: Policy and Practice* 41 (1):69-79.

Nelson, Norah M., Eimear Foley, Donal J. O'Gorman, Niall M. Moyna, and Catherine B. Woods. 2008. Active commuting to school: how far is too far. *The International Journal of Behavioral Nutrition and Physical Activity* 5 (1).

Schlossberg, M., J. Greene, P. Paulsen, B. Johnson, and B. Parker. 2006. School trips: effects of urban form and distance on travel mode. *J. Am. Plan. Assoc.* 72 (3):337-346.

Sirard, John R., and Megan E. Slater. 2008. Walking and Bicycling to School: A Review. *American Journal of Lifestyle Medicine* 2 (5):372-396.

Stewart, Orion. 2011. Findings from Research on Active Transportation to School and Implications for Safe Routes to School Programs. *Journal of Planning Literature* 26:127-150.

Timperio, A., K. Ball, J. Salmon, R. Roberts, B. Giles-Corti, D. Simmons, L. Baur, and D. Crawford. 2006. Personal, family, social, and environmental correlates of active commuting to school. *American Journal of Preventive Medicine* 30 (1):45-51.

Yarlagadda, Amith K., and Sivaramakrishnan Srinivasan. 2008. Modeling children's school travel mode and parental escort decisions. *Transportation* 35 (2):201-218.

APPENDIX B—SRTS PROJECTS WITH BOTH PRE- AND POST-PROJECT ATS DATA

				Enrollment	Project		Four E's			Side-	Change	Change	Change
Project Title	State	Award ($)	Schools	(pre project)	Type	Eng	Enf	Enc	Edu	walk	% Walk	% Bike	% ATS
Sidewalks – Crescent School	Wash	116,500	1	183	combined	Y	N	Y	Y	Y	.	.	46.99
"We Walk For Fun" Program	Wash	155,000	1	210	combined	Y	Y	Y	Y	Y	14.28	0	14.28
Feet First Ferndale	Wash	151,000	1	423	combined	Y	N	Y	Y	Y	.	.	14.18
The John Muir 'Green Feet' Project	Wash	129,000	1	312	combined	Y	Y	Y	Y	N	6.08	7.05	13.14
950 Feet 0f Sidewalk On Poplar Street	Wash	73,150	1	97	combined	Y	N	Y	Y	Y	.	.	10.3
City Of Horn Lake	Miss	79,250	2	1,618	combined	Y	N	Y	Y	Y	9.76	-0.3	9.45
Endicott School District 322	Wash	23,100	2	212	combined	Y	N	N	Y	Y	.	.	8.49
Gulf Highland Elementary School Gulf Highland Dr	Fla	298,000	1	628	infra.	Y	N	N	N	.	3.82	3.98	7.8
SRTSs; Mattawa	Wash	150,000	3	1406	combined	Y	Y	N	Y	N	.	.	7.53
MP Locke & Marlow Elementary Schools – Madison St @ Trouble Creek Rd	Fla	20,273	3	2,387	infra.	Y	N	N	N	.	5.82	0.92	6.66
Safe Passage	Wash	140,000	1	368	combined	Y	Y	Y	Y	Y	6.25	0	6.25
SRTS; Asotin	Wash	204,000	2	578	combined	Y	N	Y	Y	Y	7.26	-1.38	5.88
DC Everest School Improvements	Wis	234,400	1	886	combined	Y	N	Y	Y	Y	2.18	3.61	5.8
Discovery Middle School Project	Wash	108,900	1	722	combined	Y	Y	Y	Y	N	4.29	1.24	5.54
New Concrete Sidewalk and ADA Ped. Ramps	Wash	117,536	1	312	combined	Y	N	N	Y	Y	.	.	5.44
City Of Oxford	Miss	275,791	4	2,183	combined	Y	N	Y	Y	Y	4.72	0.31	4.99
Saltar's Point Elementary School SRTS Project	Wash	367,948	1	289	combined	Y	Y	N	Y	Y	2.42	2.07	4.49
Walking School Bus Project	Wash	125,000	1	341	combined	Y	Y	Y	Y	N	.	.	4.1
SRTS; Longview Elementary; Moses Lake	Wash	132,365	1	561	combined	Y	N	N	Y	Y	3.2	0.89	4.09
Rib Mountain Pedestrian Improvements	Wis	132,000	1	284	infra.	Y	N	N	N	Y	1.59	2.28	3.87
Sherwood Forest Elementary School Project	Wash	124,950	1	359	combined	Y	Y	Y	Y	Y	.	.	3.62
Progress Path	Wash	294,000	3	962	combined	Y	Y	Y	Y	N	.	.	2.7
Safer Walking & Bicycling Routes for our Students	Wash	236,500	2	932	combined	Y	Y	Y	Y	Y	0.85	1.82	2.57
Lochburn Middle School 86th Street SW Sidewalks	Wash	177,000	1	644	combined	Y	N	Y	Y	Y	2.79	-0.31	2.48
Hathaway Crosswalk Lighting	Wash	150,000	1	465	combined	Y	Y	N	Y	N	2.15	0.21	2.36
Park Lodge Elementary – SRTS Project	Wash	321,000	1	384	combined	Y	Y	Y	Y	Y	2.34	0	2.34
Taholah School Walk Route Project	Wash	297,344	2	219	combined	Y	Y	Y	Y	Y	.	.	2.28
Bainbridge Island Path	Wash	149,968	4	3,121	combined	Y	Y	N	Y	N	.	.	2.24
Corvette Avenue from Thunderbird Rd to New Life Way	Fla	176,918	1	677	infra.	Y	N	N	N	Y	1.18	0.88	2.06
47th Avenue Sidewalk Improvements	Wash	607,150	2	1,437	combined	Y	Y	Y	Y	Y	.	.	1.89
Marshfield SRTS Projects	Wis	68,073	2	967	combined	Y	N	Y	Y	N	0.41	1.44	1.86
Mountain View Elem. School SRTS Program	Wash	152,200	1	287	combined	Y	Y	N	Y	Y	1.39	0.34	1.74
Olympic Middle School Safe Walking Route Improvements	Wash	185,000	1	720	combined	Y	Y	Y	N	N	.	.	1.66
Carlsonia and Dean Streets Pedestrian Improvement Project	Wash	252,600	3	887	combined	Y	Y	Y	Y	Y	1.12	0	1.12

Project Title	State	Award ($)	Schools	Enrollment (pre project)	Project Type	Four E's Eng	Enf	Enc	Edu	Side-walk	Change % Walk	Change % Bike	Change % ATS
Safe Routes To Daybreak	Wash	184,000	2	1,154	combined	Y	Y	Y	Y	Y	2.68	0.17	1.03
Thunderbird Road from Comet Terrace to Red Pine Drive	Fla	207,590	1	677	infra.	Y	N	N	N	Y	1.47	-0.44	1.03
NE 104th Street Sidewalk Project	Wash	148,000	2	1,496	combined	Y	Y	N	Y	Y	.	.	0.8
Edison Elementary – Pioneer Middle School – SRTS Project	Wash	333,917	2	886	combined	Y	Y	Y	Y	Y	0.9	-0.45	0.45
Stevenson Elementary School	Wash	132,000	2	1,226	combined	Y	Y	N	Y	N	.	.	0.4
SE Hames / SE Babb SE Agnew Rd	Fla	445,345	1	688	infra.	Y	N	N	N	Y	0	0.14	0.14
Keller Community SRTS	Wash	241,250	1	41	combined	Y	Y	Y	Y	N	0	0	0
Odessa School Sidewalk Project	Wash	127,108	2	230	combined	Y	Y	Y	Y	Y	0	0	0
Titcomb Street from Golf Links Avenue To Woodward Avenue	Fla	72,738	1	720	infra.	Y	N	N	N	Y	-1.11	0.83	-0.27
Lake Center Dr / N of Lake Cntr Dr to W of eudora Rd / Triangle Elementary	Fla	133,178	1	673	infra.	Y	N	N	N	Y	-1.78	0.74	-1.04
Ridgewood St at Alpine St	Fla	484,494	1	794	infra.	Y	N	N	N	Y	-1.63	-1	-2.64
Old Spanish Trail From Lockey Ave to 3rd Ave	Fla	273,483	1	960	infra.	Y	N	N	N	.	8.33	.	.
Sara Avenue from 9th Street West to 12th Street West	Fla	59,397	1	1,134	infra.	Y	N	N	N	Y	1.85	.	.
Sheehy Elementary @ E Lambright / N 32nd / 38th / 39th and Fern Sts	Fla	185,337	1	543	infra.	Y	N	N	N	.	-3.13	.	.