



RESEARCH REVIEW

Impact of Safe Routes to School programs on walking and biking

ABSTRACT

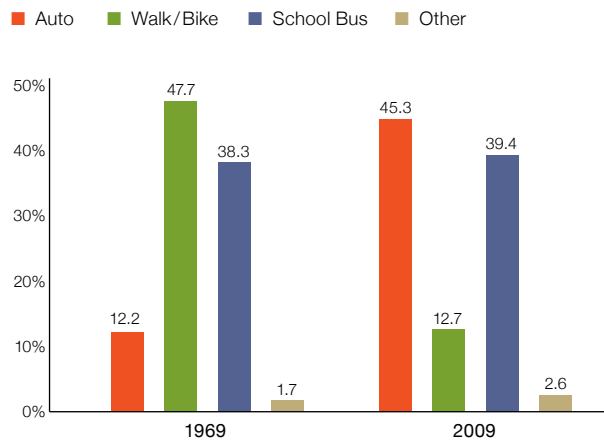
Most school children in the U.S. get to school by bus or car, with only a small percentage walking or biking. In 2005, Congress created the Safe Routes to School (SRTS) program to improve safety and increase the number of children walking and biking to and from school through educational efforts, encouragement programs, and road improvements at or near schools. Research studies indicate that SRTS has increased rates of walking and biking and improved safety. Studies also show the program is an economically sound investment that can decrease health costs and school transport costs.

This research review highlights findings from studies conducted in several states and cities that have examined walking or biking rates, safety, and economic issues associated with SRTS.

INTRODUCTION

Increasing walking, biking, and other modes of active school travel holds promise for reducing childhood obesity and improving the health of children and adolescents. Today, 13 percent of children walk or bike to school, which is a sharp decline from 1969, when 48 percent did so.¹ Low rates persist even where distance is not a barrier: Among children who lived within a quarter-mile of school, only 56 percent usually walked or biked.¹ A number of factors may contribute to low rates of walking and biking to school, including lack of sidewalks, high volumes and speeds of vehicular traffic, unsafe road crossings, concerns about children traveling on their own, long distances between home and school, and high rates of auto ownership.^{2, 3}

FIGURE 1 Comparison of School Travel Modes, K–8th Grade, 1969–2009¹



A 2005 federal transportation law, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), authorized SRTS as a new program that would provide full federal funding for projects that:

- “enabled and encouraged children, including those with disabilities, to walk and bicycle to school;
- made walking and biking to school safer and more appealing; and
- facilitated the planning, development, and implementation of projects that would improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity of schools.”⁴

Between 2005 and 2012, Congress appropriated \$1.2 billion for SRTS to provide education, encouragement, and enforcement programs, as well as engineering improvements, at schools nationwide. By the end of 2012, nearly 14,000 elementary and middle schools received SRTS funding.⁵ Several studies found that schools with SRTS programs are generally similar to average schools and neighborhoods in the United States, or that they serve higher proportions of low-income and minority students who are more likely to walk to school.^{5, 6, 7}

TABLE 1 “Five E’s” of Safe Routes to School Programs⁸

Evaluation	Monitoring and documenting outcomes, attitudes and trends through the collection of data before and after the intervention(s)
Engineering	Creating operational and physical improvements to the infrastructure surrounding schools that reduce speeds and potential conflicts with motor vehicle traffic, and establish safer and fully accessible crossings, walkways, trails and bikeways
Education	Teaching children about the broad range of transportation choices, instructing them in important lifelong bicycling and walking safety skills and launching driver safety campaigns in the vicinity of schools
Encouragement	Using events and activities to promote walking and bicycling and to generate enthusiasm for the program with students, parents, staff and surrounding community
Enforcement	Partnering with local law enforcement to ensure that traffic laws are obeyed in the vicinity of schools (this includes enforcement of speeds, yielding to pedestrians in crosswalks and proper walking and bicycling behaviors) and initiating community enforcement such as crossing guard programs and student safety patrols

METHODOLOGY

This research review is based on the published evidence on four aspects of the SRTS program: impact of SRTS on children’s health, impact of SRTS on walking and biking rates, improved safety following implementation of SRTS, and the economics of implementing SRTS programs. To assess the current knowledge in each of these areas, we reviewed the academic literature with an emphasis on recent review articles and studies with stronger research design that allow causal inference, such as randomized controlled trials or quasi-experiments.

KEY RESEARCH RESULTS

- **Actively commuting to and from school could improve mental and physical health.**
- **SRTS has increased the number of students who walk or bike to and from school.**
- **Unsafe routes make it harder for students to walk or bike to and from school. SRTS has made it safer for students to walk or bike to or from school.**
- **SRTS can lower health care and transportation costs for school districts and families.**

Studies Supporting Key Research Results

Actively commuting to and from school could improve mental and physical health.

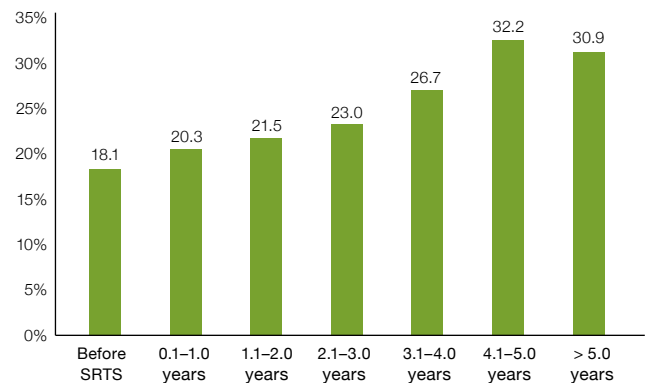
- Walking or biking to school provides an average of 16 of the recommended 60 minutes of daily physical activity for children and adolescents.⁹
- A 2014 analysis reviewed 68 articles on walking, biking, and other modes of active school transport and their impact on health, and found that:
 - Active travel was associated with increased physical activity, with no evidence that children compensate by doing less activity at other times of the day;
 - There was evidence of improved cardiovascular fitness among students who bike to school, however, no such relationship was consistently observed for walkers; and
 - Studies of body composition and physical activity had varying results: more than half of studies found no relationship, and nearly 40 percent found that walkers and bikers had improved body composition (i.e., a lower percentage of fat and/or higher percentage of muscle). However, the definition of walkers and bikers in these studies often included children that actively traveled as little as one day per week.¹⁰
- A study of 3,847 students in grades 7 to 9 in Denmark, which has a strong and well-developed biking culture, found that biking to school was associated with lower body mass index (BMI) and lower odds of being overweight or obese compared to driving or using transit. The study also found that walking to school was associated with lower odds of being overweight.¹¹
- In a randomized study, participants in a Walking School Bus program (wherein a group of students walk to and from school on a pre-defined route, usually with adult supervision) in low-income Houston elementary schools showed large increases in active commuting and daily physical activity.¹²
- In general, physically active children also tend to perform better academically,¹³ and evidence suggests that physical activity among children is related to better mental health.¹⁴

A study of 1,700 students from five cities in Spain found that adolescent girls who walked or biked to school were more likely to do better on a standardized test measuring their verbal, numeric and overall cognitive skills.¹⁵

SRTS has increased the number of students who walk or bike to and from school.

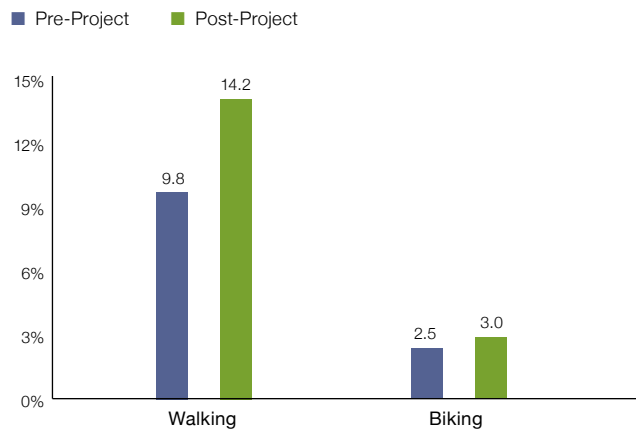
- A study of 801 schools in the District of Columbia, Florida, Oregon, and Texas found that SRTS increased the proportion of students walking and biking to school, and that these effects built over time. The effect was significant even after adjusting for factors such as school location and demographics, and the study included comparisons to schools that did not participate in the program.¹⁶

FIGURE 2 Average Rates of Walking and Bicycling to School by Length of Participation in Safe Routes to School Program¹⁶



- The same study found that engineering improvements (such as improving intersections and adding sidewalks) were associated with walking or biking rates going up by 3.3 percentage points per year, amounting to a relative change of 18 percent over five years. Education and encouragement programs were also associated with walking and biking going up by 1 percentage point per year, a relative increase of 25 percent over five years. The impacts were independent, suggesting that a school that combines engineering improvements with education and encouragement could potentially see increases in walking or biking of up to 43 percent over 5 years.¹⁶
- Another study on the impact of SRTS in Florida, Mississippi, Washington, and Wisconsin showed that the walking rate increased from 9.8 percent to 14.2 percent after implementation of SRTS at the 55 schools studied. The biking rate increased from 2.5 percent to 3 percent at the 50 schools with available data.¹⁷

FIGURE 3 **Percentage of Students Walking and Biking to School, Before and After SRTS Projects in Five States**¹⁷



- A longitudinal study of SRTS in Eugene, Ore., from 2007 to 2011 showed net increases of 5 to 20 percentage points in walking and biking at schools with SRTS programs compared to schools without such programs.¹⁸

Unsafe routes make it harder for students to walk or bike to and from school. SRTS has made it safer for students to walk or bike to or from school.

- Parents and caregivers identify safety issues such as traffic speed, traffic volume, and lack of sidewalks as barriers to active travel to school.^{19, 20, 21}
- A New York City study analyzed child pedestrian injuries during school travel hours from 2001 to 2010 and found a 44 percent reduction in injury rates in areas that received SRTS interventions, compared with no change in similar areas that did not have SRTS interventions.²²
- In Toronto, researchers found that increased rates of walking and biking did not increase child pedestrian injury rates.²³

SRTS can lower health care and transportation costs for school districts and families.

- American school districts currently spend \$100 million to \$500 million annually to bus children for just one or two miles due to hazardous conditions. Improving walking conditions near schools could reduce this cost substantially, by decreasing the need for school bus service for students who live close enough to walk or bike to and from school.²⁴
- In New York City, the total cost of implementing SRTS was just over \$10 million, but it produced estimated cost reductions of \$221 million by reducing costs associated with injury, lifelong disability, and death.²⁵

CONCLUSIONS AND POLICY IMPLICATIONS

There is consistent evidence that implementation of SRTS programs is associated with more children walking and biking safely to and from school in a cost-effective manner. Moreover, each additional year of SRTS participation leads to more students walking and biking. While evaluations of SRTS are limited and based on selected states and cities, the evidence from multiple large studies supports continued implementation of such programs.

Attention to creating safe conditions for walking and biking to school was increased by the federal SRTS program. However, federal funding has not provided stable support for the program. In addition to federal funding, there is a need for local communities to integrate their own SRTS programs into ongoing planning processes and prioritize infrastructure investments that make it easier and safer for children to walk or bike to and from school. Communities can take action through subdivision regulations that require sidewalks, education facility plans that ensure access to school by foot and bicycle, school wellness policies that include Safe Routes to School, and capital improvement plans that prioritize engineering improvements near schools. Action and investments in low-income communities are also strategies to reduce disparities and benefit adult and youth residents.

FUTURE RESEARCH NEEDS

Future research should consider assessing the state of knowledge on SRTS effectiveness through periodic review articles every three to five years. Another next step should be conducting a randomized trial of SRTS and exploring whether more comprehensive programs (e.g., sidewalks, crossing guards, and education) are more effective than single-component programs (e.g., sidewalks only). Studies identifying SRTS strategies that are effective in specific target populations and locations; studies that show broad-based reductions in injuries associated with implementation of SRTS; and rigorous cost-effectiveness analyses would also be helpful for policymakers and advocates. Beyond questions of immediate program effects, there is a need to investigate how early exposure to regular walking and biking affects individuals over several years. While there have been assertions of benefits over time, there has been little empirical investigation.

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REFERENCES

- 1 McDonald NC, Brown AL, Marchetti LM, Pedroso MS. U.S. school travel, 2009: an assessment of trends. *Am J Prev Med.* 2011; 41:146–151.
- 2 McDonald NC, Aalborg AE. Why parents drive children to school: implications for Safe Routes to School programs. *J Am Plann Assoc.* 2009;75(3):331-342.
- 3 Chillón P, Hales D, Vaughn A, Gizlice Z, Ni A, Ward DS. A cross-sectional study of demographic, environmental and parental barriers to active school travel among children in the United States. *Int J Behav Nutr Phys Act.* 2014;11:61.
- 4 Fact sheets on highway provisions: safe routes to school program. Federal Highway Administration Web site. <http://www.fhwa.dot.gov/safetealu/factsheets/saferoutes.htm>. Accessed September 18, 2014.
- 5 McDonald NC, Barth PH, Steiner RL. Assessing the distribution of safe routes to school program funds, 2005–2012. *Am J Prev Med.* 2013;45(4):401-406.
- 6 Safe Routes to School Technical Assistance Resource Center. California Safe Routes to School program low-income schools and communities study. California Department of Public Health. 2010. <http://www.dot.ca.gov/hq/LocalPrograms/saferoutes/documents/TARCLow-incomeStudyfinal.pdf>. Accessed November 3, 2014.
- 7 McDonald, N. Critical factors for active transportation to school among low-income and minority students. Evidence from the 2001 National Household Travel Survey. *Am J Prev Med.* 2008;34(4):341–344.
- 8 The “Five E’s” of Safe Routes to School. Safe Routes to School National Partnership website. <http://saferoutespartnership.org/local/getting-started-locally/5es>. Accessed March 4, 2015.
- 9 Bassett DR, Fitzhugh EC, Heath GW, et al. Estimated energy expenditures for school-based policies and active living. *Am J Prev Med.* 2013;44(2):108–113.
- 10 Larouche R, Saunders TJ, Faulkner G, Colley R, Tremblay M. Associations between active school transport and physical activity, body composition, and cardiovascular fitness: a systematic review of 68 studies. *J Phys Act Health.* 2014;11(1):206-227.
- 11 Ostergaard L, Grontved A, Borrestad LAB, Froberg K, Gravesen M, Andersen LB. Cycling to school is associated with lower BMI and lower odds of being overweight or obese in a large population-based study of Danish adolescents. *J Phys Act Health.* 2012;9(5):617-625.
- 12 Mendoza JA, Watson K, Baranowski T, Nicklas TA, Uscanga DK, Hanfling MJ. The walking school bus and children’s physical activity: a pilot cluster randomized controlled trial. *Pediatrics.* 2011; 128(3):e537-e544. doi:10.1542/peds.2010-3486.
- 13 Singh A, Uijtdewilligen L, Twisk JW, van Mechelen W, Chinapaw MJ. Physical activity and performance at school: a systematic review of the literature including a methodological quality assessment. *Arch Pediatr Adolesc Med.* 2012;166(1):49–55.
- 14 Biddle SJ, Asare M. Physical activity and mental health in children and adolescents: a review of reviews. *Br J Sports Med.* 2011;45(11):886–895.
- 15 Martínez-Gómez D, Ruiz JR, Gómez-Martínez S, et al. Active commuting to school and cognitive performance in adolescents: the AVENA study. *Arch Pediatr Adolesc Med.* 2011;165(4):300-305. doi:10.1001/archpediatrics.2010.244.
- 16 McDonald NC, Steiner RL, Lee C, Rhoulac Smith T, Zhu X, Yang Y. Impact of the safe routes to school program on walking and bicycling. *J Am Plann Assoc.* 2014. doi:10.1080/01944363.2014.956654.
- 17 Stewart O, Moudon AV, Claybrooke C. Multistate evaluation of safe routes to school programs. *Am J Health Promot.* 2014;28(3 Suppl): S89-S96.
- 18 McDonald NC, Yang Y, Abbott SM, Bullock AN. Impact of the safe routes to school program on walking and biking: Eugene, Oregon study. *Transport Policy.* 2013;29:243-248. doi:10.1016/j.tranpol.2013.06.007.
- 19 Chauhan C, Yeh J, Fox P. The safe routes to school program in California: an update. *Am J Public Health.* 2012;102(6):e8–e11. doi:10.2105/AJPH.2012.300703.
- 20 Ahlport KN, Linnan L, Vaughn A, Evenson KR, Ward DS. Barriers to and facilitators of walking and bicycling to school: formative results from the non-motorized travel study. *Health Educ Behav.* 2008;35(2):221–244.
- 21 Timperio A, Ball K, Salmon J, et al. Personal, family, social, and environmental correlates of active commuting to school. *Am J Prev Med.* 2006;30(1):45–51.
- 22 DiMaggio C, Li G. Effectiveness of a safe routes to school program in preventing school-aged pedestrian injury. *Pediatrics.* 2013;131(2): 290–296. doi:10.1542/peds.2012-2182.
- 23 Rothman L, Macarthur C, To T, Buliung R, Howard A. Motor vehicle-pedestrian collisions and walking to school: the role of the built environment. *Pediatrics.* 2014;133(5):776–784. doi:10.1542/peds.2013-2317.
- 24 McDonald NC, Steiner RL, Palmer WM, Bullock, AN, Sisiopiku, VP, Lytle BF. Costs of school transportation: quantifying the fiscal impacts of encouraging walking and bicycling for school travel. *Transportation.* 2014; doi:10.1007/s11116-014-9569-7.
- 25 Muennig PA, Epstein M, Li G, DiMaggio C. The cost-effectiveness of New York City’s Safe Routes to School Program. *Am J Public Health.* 2014;104(7):1294-1299.