Why Safe Routes to School Matters

Safety, Health & Transportation
The Good, the Bad, and the Ugly
Fewer kids are biking and walking. More parents are driving.

<table>
<thead>
<tr>
<th>Year</th>
<th>Walked or Biked</th>
<th>Driven</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td>48%</td>
<td>12%</td>
</tr>
<tr>
<td>2009</td>
<td>13%</td>
<td>44%</td>
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</tbody>
</table>

(U.S. DOT, 2009)
School travel by private vehicle accounts for 10-14% of morning rush hour traffic.

(McDonald, Brown, Marchetti Pedroso, 2011)
The consequences of this...
...instead of *this* can be alarming.
Promoting safe walking and bicycling is an ideal strategy to increase physical activity.
Safe Routes to School programs

- Make walking and bicycling safe ways to get to school
- Encourage more children to walk and bike to school
History of Safe Routes to School

- Many child pedestrian fatalities in Denmark during the 1970s
- Odense reduced the number of injured school children by 30% - 40%
- Spread to the UK and Canada in the 1990s; Bronx, NY in 1997
Benefits of SRTS programs

- Improve safety for pedestrians and bicyclists
- Reduce traffic congestion around schools
- Reduce auto emissions
- Improve children’s health
- Teach fundamental safety skills
- Strengthen family bonds
- Increase child’s sense of freedom and responsibility
- Provide more transportation options for everyone
- Cost savings for schools
  (reduce need for “hazard” busing)
Federal Safe Routes to School program

- Provided $1.147 billion to States 2005-2012
- Funded infrastructure and non-infrastructure activities
- Funded State SRTS Coordinators
- Funded National Clearinghouse (National Center for SRTS)

More Information: www.saferoutesinfo.org
MAP-21 (2012-2015) - FAST Act (current)

- Established Transportation Alternatives program (TAP), now called TA Set-Aside
- SRTS activities eligible to compete for funding
- State DOT’s and MPO’s administered funds

More Information:
www.saferoutesinfo.org
North Central Texas Council of Governments SRTS Funding

- TAP call in 2014 – one funding category for all bicycle and pedestrian projects: $4.9 million for SRTS
- TA-Set Aside call in 2017 – SRTS-specific funding category: $12.2 million for SRTS
- TA Set-Aside call in 2019 (one funding category) (pending RTC approval)

More Information: www.nctcog.org/SafeRoutesToSchool
The Ugly:

Today’s barriers to walking and bicycling
How did we get here?

- School siting issues
- Individual barriers to walking to school
- Community issues
1. School siting issues: A generation ago

- Small (average of 127 students)
- Located in community centers
- 48% of kids walked or biked to school

School siting issues: Today

- Current average enrollment - 520 students
- Mega-schools up to 2,800 students
- Schools located on 10 to 30 acres fringe land
- Lowest-cost construction
  (National Center for Education Statistics, 2013)
It’s not just distance

Students living within one mile or less who walk or bike to school:

1969 – 89%
2009 – 35%

(U.S. DOT, 2009)
2. Individual barriers to walking and bicycling to school

- Long distances 62%
- Traffic danger 30%
- Adverse weather 19%
- Fear of crime danger 12%

(CDC, 2005)
Traffic danger
Community conditions make it hard to walk or bike.
Adverse Weather

Is this barrier reflective of changed social norms?
Fear of crime danger

- Range of concerns is broad, often not unique to walking and bicycling to school
- Both reality and perceptions need to be addressed
- SRTS can be a part of a larger, community-wide response
3. Difficult community issues

- Traffic flow problems
- Abandoned buildings
- Illegal behaviors
The Bad:

Unintended consequences of less walking and bicycling

- to the environment
- to our health
1996 Summer Olympic Games banned single occupant cars in downtown Atlanta
Results of the ban

- Morning traffic – ↓ 23%
- Peak ozone – ↓ 28%
- Asthma-related events for kids – ↓ 42%

(Friedman, 2001)
Air quality

Measurably better around schools with more walkers and cyclists

Prevalence of Obesity and Diagnosed Diabetes Among US Adults - 1995

Age-Adjusted Prevalence of Obesity and Diagnosed Diabetes Among US Adults

1995

Obesity (BMI ≥ 30 kg/m²)

Diabetes

Prevalence of Obesity and Diagnosed Diabetes Among US Adults - 2000

Age-Adjusted Prevalence of Obesity and Diagnosed Diabetes Among US Adults

2000

Obesity (BMI≥30 kg/m²)

Diabetes

Prevalence of Obesity and Diagnosed Diabetes Among US Adults - 2005

Age-Adjusted Prevalence of Obesity and Diagnosed Diabetes Among US Adults

2005

Obesity (BMI≥30 kg/m²)

- Missing Data
- 14.0 – 17.9%
- 18.0 – 21.9%
- 22.0 – 25.9%
- ≥26.0%

Diabetes

- Missing data
- 4.5 – 5.9%
- 6.0 – 7.4%
- 7.5 – 8.9%
- ≥9.0%

Prevalence of Obesity and Diagnosed Diabetes Among US Adults - 2010

Age-Adjusted Prevalence of Obesity and Diagnosed Diabetes Among US Adults

2010

Obesity (BMI ≥ 30 kg/m²)

Missing Data
14.0%–17.9%
22.0%–25.9%

<14.0%
18.0%–21.9%

≥26.0%

Diabetes

Missing data
4.5%–5.9%
6.0%–7.4%

7.5%–8.9%

<4.5%

≥9.0%

Prevalence of Obesity and Diagnosed Diabetes Among US Adults - 2015

Age–adjusted Percentage of U.S. Adults Who Were Obese or Who Had Diagnosed Diabetes

2015

Obesity (BMI≥30 kg/m²) vs. Diabetes

Childhood Obesity Still Rising

National Obesity Rates for Adults (Age-Adjusted) and Children

- 13.9% (Children 1999-2000)
- 18.5% (Children 2015-2016)
- 30.5% (Adults 1999-2000)
- 39.6% (Adults 2015-2016)


- 1976–1980: 5.5%
- 1988–1994: 10.0%
- 1999–2000: 13.9%
- 2001–2002: 15.4%
- 2003–2004: 17.1%
- 2005–2006: 15.4%
- 2007–2008: 16.8%
- 2009–2010: 16.9%
- 2011–2012: 16.9%
- 2013–2014: 17.2%
- 2015–2016: 18.5%

Source: NHANES

Trust for America’s Health

TOOLE DESIGN
Short and long-term impacts of childhood obesity

- Heart disease and stroke
- Type 2 Diabetes
- Low self esteem
- Sleep apnea
- Several types of cancer
- Osteoarthritis

(CDC, 2014)
Physical activity

Most kids aren’t getting the physical activity they need.

(CDC, 2014; Trust for America’s Health and Robert Wood Johnson, 2011)
Physical activity recommendation for children and adolescents:

At least 60 minutes of physical activity daily.

(US Depts. of Health and Human Services, 2008)
Physical activity and academic performance

The Association Between School-Based Physical Activity, Including Physical Education, and Academic Performance
The Good:

Communities are taking action on behalf of their kids
Safe Routes to School programs are part of the solution...

... to improve unsafe walking and biking conditions

... to increase physical activity

... to improve poor air quality by reducing vehicle emissions
Research shows SRTS programs work

A study of 801 schools between in 2007-2013 found increases in walking and bicycling.

- 25% increase (5% per year) with education and encouragement programs
- 18% increase with infrastructure improvements

(McDonald, 2014)
Elements of Safe Routes to School programs

- Education
- Encouragement
- Enforcement
- Engineering
- Evaluation
Education

- Teaches safety skills
- Creates safety awareness
- Fosters life-long safety habits
- Includes parents, neighbors and other drivers
Encouragement

- Increases popularity of walking and biking
- Is an easy way to start SRTS programs
- Emphasizes fun of walking and biking

Source: Blue Zones Project
Enforcement

- Increases awareness of pedestrians and bicyclists
- Improves driver behavior
- Helps children follow traffic rules
- Decreases parent perceptions of danger
Engineering

- Creates safer, more accessible settings for walking and biking
- Can influence the way people behave
Evaluation

Is the program making a difference?

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**Parent Survey About Walking and Biking to School**

Dear Parent or Caregiver,

Your child’s school wants to learn your thoughts about children walking and biking to school. This survey will take about 5-10 minutes to complete. We ask that each family completes only one survey per school year. If more than one child from a school brings a survey home, please fill out the survey for the child with the most hours from today’s date.

After you have completed this survey, send it back to the school with your child or print it to the teacher. Your response will be kept confidential and no personal sales or other information will be associated with your results.

Thank you for participating in this survey!

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**Safe Routes to School Students Arrival and Departure Tally Sheet**

- **CARTER LETTERS ONLY OR BLUE OR BLACK INK ONLY**

- **School Name:**

1. **What is the grade of the child who brought home this survey?**
   - Grade PreK (K, 1st, 2nd)
2. **Is the child who brought home this survey male or female?**
   - Male
3. **How many children do you have in Kindergarten through 5th grade?**
4. **What is the street intersection nearest your home?** (Please name the streets or an interesting street marker)

- **Place a check in the box. If you make a mistake, fill the entire box, and then mark the correct box.**

5. **How far does your child live from school?**
   - Less than 1 mile
   - 1 mile to 3 miles
   - More than 3 miles

6. **On most days, how does your child arrive and leave for school?** (Select one or two columns, mark box with X)
   - Leaves school:
     - Walk
     - Bike
     - School bus
   - Arrives at school:
     - Walk
     - Bike
     - School bus

- **Other (skateboard, scooter, inline skates, etc.):**

- **Place a check in the box. If you make a mistake, fill the entire box, and then mark the correct box.**

7. **How long does it normally take your child to get to/from school?**
   - Less than 5 minutes
   - 5-10 minutes
   - More than 10 minutes

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**TOOLE DESIGN**
Every school faces a different challenge
Ideal – Create a SRTS Plan

- Proactive
- Design for what you want
- Secure community buy-in
Involve Key SRTS Stakeholders

Create a SRTS Team:

- Schools
- School Districts
- Local municipality (planners, engineers, elected officials)
- Law enforcement
- Parents
- Community organizations
Steps in developing a SRTS Plan

- Bring together the right people/assemble a team
- Gather information
- Identify issues (all E’s)
- Identify SRTS strategies (all E’s)
- Prioritize strategies
- Secure community buy-in
Today’s Workshop:

- Bring together the right people/assemble a team
- Gather information
- Identify issues (all E’s)
- Identify SRTS strategies (all E’s)
- Prioritize strategies
- Secure community buy-in
Gathering Information for a SRTS Plan
Gathering Information

- School information and student travel modes
- Existing conditions and behaviors
- Behaviors and perceptions
School Information

- Location and grades served
- Attendance boundaries & where students live
- Arrival/dismissal times
- Student travel modes
- Student walk/bike routes
- Parent perceptions
- Policies/programs
Existing Conditions
- Environment

- Traffic volume and speeds
- Pedestrian and bicyclist crash data
- Personal safety data and concerns
- Walking and bicycling environment
Existing Conditions - Behaviors

Observe school arrival and dismissal:

- Driver behaviors
- Pedestrian behaviors
- Bicyclist behaviors
Assessing the Ped/Bike Network

What infrastructure is important?
Engineering Treatments and Strategies
Creating safe routes with engineering

- Improve children’s safety
- Improve accessibility
- Encourage more bicycling and walking
Walkways and crossings: Prerequisites for walking
Connect to the school

- Consider barriers to walking and biking
- Think about the complete route from door-to-door
- What message are we sending?
Relationships are everything
Focus on the basics

- Signs
- Paint
- Ramps
Engineering topic outline

- Around the School
- Along the School Route
- Crossing the Street
- Slowing Down Traffic
School enrollment boundary
School walk zone
Existing conditions map
School zone
Signing and marking the school zone

- Manual on
- Uniform
- Traffic
- Control
- Devices
School area speed limit signing
Speed feedback signs
School crosswalk signs and warning signs
Fluorescent yellow-green post covers
Parking regulations

NO PARKING
7:00AM - 4:00PM
SCHOOL DAYS
Keep signs simple
School pavement markings
Sample school traffic control plan
Engineering topic outline

- Around the School

- Along the School Route
  - Sidewalks
  - On-street bicycling
  - Pathways
  - Connectivity

- Crossing the Street

- Slowing Down Traffic
What’s wrong with this picture?
What’s wrong with this picture?
Perception versus reality
Sidewalks are essential
Sidewalks on both sides are preferred
Limit driveway crossings
Connections to the school
Sidewalk design criteria

Connect all sidewalks in the school walking route

Accommodate pedestrian desire lines outside of splash zones

Splash zone
5’ to 6’
Provide sidewalk buffers
No sidewalk buffer
Good sidewalk buffer
Provide wide enough sidewalks

- Recommended minimum: 5’
- Preferred minimum: 6’
- At schools: 8’-10’
Repair sidewalks
Maintain landscaping to provide clear walkways and sight distances
Remove obstacles from sidewalks
Install street lighting
Meet Americans With Disabilities Act (ADA) requirements for universal design
Curb ramp design

- Two ramps per corner
- Eight ramps per intersection
Warning strip – 4’ x 2’
Don’t build driveways like intersections
Build driveways like driveways
Along the school route: Bikeways

- Local streets
- Bike lanes
- Shoulders
- Pathways
What’s wrong with this picture?
What’s wrong with this picture?
What’s wrong with this picture?
Local streets – where most kids ride
Bicycle lanes
Install bicycle racks
Yes – high school students will bike given the opportunity
Along the school route: Pathways
Success story: Mill Valley path
What’s wrong with this picture?
What’s wrong with this picture?
Connectivity creates a pedestrian-friendly street system

- Reduces walking distance
- Offers more route choices – disperses traffic
- Less traffic = more pedestrian friendly
Connectivity can reduce walking distances and crossings required.
Connecting cul-de-sacs

No connection between school and neighborhood
Formal and informal connections
Engineering topic outline

- Around the School
- Along the School Route
- **Crossing the Street**
  - Shortening crossing distances
  - Marking crosswalks
  - Creating visible crossings
  - Using stop signs and traffic signals
- Slowing Down Traffic
What’s wrong with this picture?
What’s wrong with this picture?
Principles for creating safe crossings

- Reduce crossing distance
- Use appropriate traffic control
  - Marked crosswalks
  - Warning signs or flashers
  - Stop signs and traffic signals
  - Crossing guards
- Slow vehicle speeds
Large turn radius
Curb radii: Keeping it tight

- $R_1 = \text{Actual Curb Radius}$
- $R_2 = \text{Effective Radius}$
Wide, multi-lane roads are barriers
Pedestrian and bicycle bridges

- Expensive
- Often not used
- Consider topography and circumstances
Tools to reduce crossing distance
Curb extensions at crossings

Reduce the crossing distance
Crossing islands
Marking crosswalks
Why install marked crosswalks?

- Indicate a preferred pedestrian crossing location
- Alert drivers to an often-used pedestrian crossing
- Indicate school walking routes
Where to install marked crosswalks

- Signalized intersections
- School routes
- Uncontrolled crossings (see MUTCD guidelines)
Install high-visibility markings

Ladder-style is easier to see.
What the pedestrian sees
What the driver sees  (same crosswalk)
High visibility markings
“Multiple threat” crashes

1st car stops to let pedestrian cross, blocking sight lines

2nd car doesn’t stop, hits pedestrian at high speed
Solution:  

1\textsuperscript{st} car stops further back, opening up sight lines

2\textsuperscript{nd} car can be seen by pedestrian
‘Yield here for pedestrian’ signs
In-street signage

Source: City of McKinney, 2019
Rectangular rapid flash beacon (RRFB)

- Pedestrian activated (push button or passive detection)
- Beacon is yellow and has a rapid flash
- Yield rates increased from approx. 20% to 80% (CMF = 0.53)
- Not yet in MUTCD – FHWA gave interim approval in 2008.
Rectangular rapid flash beacon
Pedestrian hybrid beacon

- Pedestrian activated
- Solid red phase brings all cars to a stop
- Can reduce pedestrian crashes by 55% (CMF = 0.45) (FHWA)
- In the MUTCD
- Should be strongly considered for all crossings where speed limits are ≥ 40 mph
What’s wrong with this picture?
What’s wrong with this picture?
Parking restrictions at corners

Better visibility for both drivers and pedestrians
Engineering topic outline

- Around the School
- Along the School Route
- Crossing the Street
- Slowing Down Traffic
Slowing down traffic
High speeds increase stopping distance

![Graph showing the relationship between travel speed and reaction or braking distance. The graph indicates that as speed increases from 10 mph to 40 mph, the stopping distance significantly increases.](image)
High speeds increase ped injuries

- PEDESTRIAN FATALITY & SERIOUS INJURY RISK

18% 50% 77%

- (20 MPH) (30 MPH) (40 MPH)

CONES OF VISION
Design can invite desired use
Modern roundabout

- Slows vehicles as they enter, travel through and exit.
- Reduces potential conflict points.
Narrow lanes reduce speeds

Use paint to reduce lane width
Speed humps slow traffic on local streets
Raised crosswalks
FHWA references

Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations
Final Report and Recommended Guidelines

An Analysis of Factors Contributing to “Walking Along Roadway” Crashes: Research Study and Guidelines for Sidewalks and Walkways

REPORT NO. FHWA-RD-01-101

U.S. Department of Transportation
Federal Highway Administration
Research and Development
Turner Fairbank Highway Research Center
6300 Georgetown Pike
McLean, VA 22101-2295

February 2002
FHWA references

Toolbox of Pedestrian Countermeasures and Their Potential Effectiveness

Introduction

This issue brief documents estimates of the crash reduction that might be expected if a specific countermeasure or group of countermeasures is implemented with respect to pedestrian crashes. The crash reduction estimates are presented as Crash Modification Factors (CMFs). Some of the crash reduction estimates are also presented in terms of left-turn crashes, certain crash severities, or total crashes.

Traffic engineers and other transportation professionals can use the information contained in this issue brief when asking the following types of questions: What change in the number of pedestrian crashes (and/or other crash types) can be expected with the implementation of the various countermeasures?

Crash Modification Factors (CMFs)

A CMF is the proportion of crashes that are expected to remain after the countermeasure is implemented. For example, an expected 20 percent reduction in crashes would correspond to a CMF of 0.80 (1.00 − 0.20 = 0.80). In some cases, the CMF is negative, i.e., the implementation of a countermeasure is expected to lead to a percentage increase in crashes.

One CMF estimate is provided for each countermeasure. Where multiple CMF estimates were available from the literature, selection criteria were used to choose which CMFs to include in the issue brief.

- First, CMFs from studies that took into account regression to the mean and changes in traffic volume were preferred over studies that did not.
- Second, CMFs from studies that provided additional information about the conditions under which the countermeasure was applied (e.g., road type, area type) were preferred over studies that did not.

Where these criteria could not be met, a CMF may still be provided. In these cases, it is recognized that the estimate of the CMF may not be as reliable, but is the best available at this time. The CMFs in this issue brief may be periodically updated as new information becomes available.
The Pedestrian Safety Guide and Countermeasure Selection System is intended to provide practitioners with the latest information available for improving the safety and mobility of those who walk. The online tools provide the user with a list of possible engineering, education, or enforcement treatments to improve pedestrian safety and/or mobility based on user input about a specific location. [read more]

**Resources:**

**Background** – understand what is needed to create a viable pedestrian system.

**Crash Statistics** – learn about the factors related to the pedestrian crash problem.

**Crash Analysis** – learn how crash typing can lead to the selection of the most appropriate countermeasures.

**Objectives** – learn how selected treatments may address many requested improvements to the pedestrian environment.

**Implementation** – read about the necessary components for implementing pedestrian treatments.

**More Info** – access additional information through a variety of resources.

**Downloads** – access print versions of the guide and other relevant materials.

**Available Tools:**

**Selection Tool** – find appropriate countermeasures on the basis of desired objectives and specific location information.

**Interactive Matrices** – view the countermeasures associated with crash types and performance objectives.

**Countermeasures** – read descriptions of the 49 engineering, education, and enforcement treatments.

**Case Studies** – review real-world examples of implemented treatments.

Project sponsored by:

U.S. Department of Transportation

Federal Highway Administration
Summary

1. Focus first on the basics
2. Identify and program longer-term improvement needs (e.g. sidewalks)
3. Match the treatment to the type of problem
4. Provide and maintain facilities along the school route
5. Provide safe street crossings
6. Slow down traffic speeds