Physical Activity: Interventions to Increase Active Travel to School

Summary Evidence Table – Systematic Economic Review

Study Information	Study and Population Characteristics	Program Name Intervention Components Comparison	Effectiveness Findings	Program Costs	Economic Benefit Components of Benefit	Economic Summary Measure
Author (Year): Moudon et al. (2012) **Design:** Observational **Economic Method:** Intervention Cost **Funding Source:** U.S Department of Transportation plus State/Local **Monetary Conversions:** Assumed index year 2008 in US dollars	**Location:** WA, WI, MS, FL, USA **Setting:** Mixed rural, urban, suburban schools and neighborhoods **Sample Size:** # Projects (Schools) % of Total Projects Evaluated 48 (53) 14% **Population Characteristics:** 98% elementary and middle schools School enrollment Median (IQI) 675 (319 to 962) **Time Horizon:** Projects from 2005 through April 2011	Safe Routes to School **Interventions:** Most common components Engineering (Infrastructure) – sidewalk, crosswalk, signage Enforcement - Patrols Education – educational activities Promotion – Walk/Ride days Other – Walking School Bus **Comparison:** None	**Change in walking or bicycling** Change in number of students walking or bicycling (n=45) Median 2.6% Mean 4.9%	Cost per school Median $148,770 Mean $171,863 **Components Included in Cost:** Likely included all components listed as intervention components **Components not Included in Cost:** None **Data Source:** Funded amount	No economic benefits estimated or reported	No summary economic measures reported

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Author (Year): Orenstein et al. (2007) **Design:** Observational and Model **Economic Method:** Cost-Benefit **Funding Source:** U.S Department of Transportation plus State/Local **Monetary Conversions:** Assumed index year 2006 in US dollars	**Location:** CA, USA **Setting:** Mixed rural, urban, suburban schools and neighborhoods **Sample Size:** # Projects (Schools) % of Total Projects Evaluated 125 (350) 22% **Population Characteristics:** 90% elementary and middle schools School enrollment 53% with =>1000 students **Time Horizon:** Projects from 2005 through April 2011 Analytic horizon modeled 1 and 2 years	Safe Routes to School **Interventions:** Most common components Engineering (Infrastructure) – sidewalk, traffic calming, crosswalk, signal Enforcement - No Education – No Promotion – No Other – No **Comparison:** Nearby communities with no SRTS	**Change in walking or bicycling** Very sparse data from included sample of schools. Best estimate is Boarnet (2003) which found 20% increase in number of ATS modes in 10 California schools. Two scenarios used for modeling benefits, 25% and 50% increase in number of children in ATS mode.	Total funding for 125 projects in 350 schools was $42.21 million. Cost per project (school) was $337,667 ($147,126). Total cost of program used in cost-benefit analysis was $28.9 million. **Components Included in Cost:** Likely included all components listed as intervention components **Components not Included in Cost:** None **Data Source:** Funded amount plus matching funds	Components of Benefit Private vehicle use – No Travel time – No Injuries or fatalities – Yes Busing – No Congestion – No Pollution or Greenhouse – No Health-related – No Modeled 1-year economic benefit of reduced pedestrian traffic injuries or fatalities in 125 SRTS locations compared to non-SRTS locations after increase in ATS due to intervention $21.4 million Benefits extended over 2 years with discount of 3% is $42.2 million	Cost-Benefit 1-year horizon with 25% increase in ATS 0.74:1.0 (=21.4/28.9) 2-year horizon with 25% increase in ATS 1.46:1.0 (=42.2/28.9)

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Author (Year): Muennig (2014) **Design:** Observational and Model **Economic Method:** Cost-Benefit **Funding Source:** U.S Department of Transportation plus State/Local **Monetary Conversions:** Index year 2013 in US dollars	**Location:** New York City, NY **Setting:** Schools and neighborhoods around schools **Sample Size:** # Projects (Schools) % of Total Projects Evaluated NR (124) NR # school age pedestrians modeled 45,525 # adult pedestrians modeled 181,148 **Population Characteristics:** Level of schools not reported **Time Horizon:** Project dates not reported Analytic horizon modeled 1 year and 30 years	Safe Routes to School Modeled for high risk intersections. **Interventions:** Most common components Engineering (Infrastructure) – sidewalk, roadway improvements, other Enforcement - No Education – Yes Promotion – No Other – No **Comparison:** No comparison group	**Change in walking or bicycling** Previous research showed 11% increase in walking or bicycling. **Change in injuries** Previous research showed 33% to 44% reduction in school-age injuries at high risk intersections.	Cost of SRTS in NYC was $10.298 million. Cost per school $83,048. **Components Included in Cost:** Likely included all components listed as intervention components **Components not Included in Cost:** None **Data Source:** Funded amount	Modeled with decision tree and cohort of pedestrians Components of Benefit Private vehicle use – No Travel time – No Injuries or fatalities – Yes Busing – Yes Congestion – No Pollution or Greenhouse – No Health-related – No $220.8 million is modeled 30-year economic benefit of reduced student age pedestrian injuries in high risk NYC intersections.	Cost-Benefit (school-age population only) 22.8:1.0 for 30-year horizon 1.74:1.0 for 2-year horizon at 3% discount (computed by reviewers)

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Author (Year): Fishman, Ker (2011) **Design:** Model **Economic Method:** Cost-Benefit **Funding Source:** Unfunded Proposal **Monetary Conversions:** Index year 2010 in Australian dollars	**Location:** Queensland, Australia **Setting:** Primary schools and neighborhoods **Sample Size:** # Projects (Schools) % of all Queensland Schools NR (470) 30% **Population Characteristics:** Enrollment per school 400 **Time Horizon:** Modeled 10 years	Active School Travel **Interventions:** Most common components Engineering (Infrastructure) – street improvements, bike cages in school Enforcement – Police presence Education – Safety and skills Promotion – Walk/ride day Other – Walking School Bus, maps, transition program to high school **Comparison:** None	**Change in walking or bicycling** Modeled 10% reduction in private vehicle use. 75% of these students were assumed to walk instead and 25% were assumed to bicycle to school.	Total cost was $10.6 million. Cost per school over 10 years (discounted 2.5%) was $16,238. **Components Included in Cost:** Included all components but street improvements that were listed as intervention components **Components not Included in Cost:** Cost of street improvement surrounding the schools (authors state this falls under Public Works responsibility) **Data Source:** Based on Active School Travel implemented in Brisbane	Components of Benefit Private vehicle use – Yes Travel time – Yes Injuries or fatalities – Yes Busing – No Congestion – Yes Pollution or Greenhouse – Yes Health-related – Yes Modeled 10-year economic benefit (discounted 2.5%) $37 million	Cost-Benefit 10-year horizon 3.5:1.0 25-year horizon 8.4:1.0

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Author (Year): University of Toronto (2016) **Design:** Observational and Model **Economic Method:** Cost-Benefit **Funding Source:** City of Toronto, other agencies, and not for profits **Monetary Conversions:** Assumed index year 2014 in Canadian dollars	**Location:** Toronto and area, Canada **Setting:** Elementary schools and neighborhoods **Sample Size:** # Projects (Schools) % of all schools NR (13) NR **Population Characteristics:** Enrollment per school 534 **Time Horizon:** 2 years Modeled over 1, 3, and 5 years	School Travel Planning **Interventions:** Most common components Planning – coordination of area agencies Engineering (Infrastructure) – bike racks in school, pavement painting, signage Enforcement – No Education – Bicycle training Promotion – Walk/ride days, incentives, promotion materials Other – No **Comparison:** None	**Change in walking or bicycling** Walking +1.0% Bicycle +1.5% Public Transit +3.5% Reduction in private car use −3.5%	Total cost over 1 year $76,950 ($5,919 per school) Total cost over 5 years $139,646 ($10,734 per school) **Components Included in Cost:** Included all component listed as intervention components **Components not Included in Cost:** None **Data Source:** Based on costs captured at each school	Components of Benefit Private vehicle use – Yes Travel time – Yes Injuries or fatalities – No Busing – No Congestion – Yes Pollution or Greenhouse – Yes Health-related – Yes Modeled 1-year economic benefit $186,369 ($14,336 per school) Modeled 5-year economic benefit $879,123 ($67,625 per school)	Cost-Benefit 3-year horizon 2.4:1.0 5-year horizon 6.3:1.0

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Author (Year): Yamaguchi (2007) **Design:** Observational and Willingness to Pay **Economic Method:** Cost-Benefit **Funding Source:** NR **Monetary Conversions:** Assumed index year 2004 in Japanese yen	**Location:** Suita City, Osaka, Japan **Setting:** Modeled for neighborhoods of all primary schools in Suita City. **Sample Size:** # Projects (Schools) % of all schools NR (NR) NR **Population Characteristics:** NR **Time Horizon:** NR	Interventions: Most common components Engineering (Infrastructure) – sidewalk improvement Enforcement – No Education – No Promotion – No Other – No **Comparison:** None	**Change in walking or bicycling** NR	Total cost 69 billion yen for entire City **Components Included in Cost:** Included all component listed as intervention components **Components not Included in Cost:** None **Data Source:** Suita City Hall. Based on projects planned for some districts.	Benefits based on willingness to pay survey of residents 135 billion yen The willingness to pay is for urban environment for barrier-free walking.	Cost-Benefit 2.0:1.0 (=135/69)

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Author (Year): Davis (2014) **Design:** Observational and Modeled **Economic Method:** Cost-Benefit **Funding Source:** UK Department of Transport **Monetary Conversions:** Assumed index year 2008 in UK pounds	**Location:** Select Towns and Cities, UK **Setting:** Schools and their neighborhoods **Sample Size:** Selected those projects from report that were related to schools. # Projects (Schools) % of all schools 9 (NR) NR **Population Characteristics:** NR **Time Horizon:** Walking/bicycling behavior observation over 1 year Benefits modeled over 10 years	Links to Schools Tackling the School Run **Interventions:** Most common components Planning – No Engineering (Infrastructure) – Modified or new roadways, bikeways, walkways, sidewalk, crossing, signals Enforcement – No Education – No Promotion – No Other – No **Comparison:** None	**Change in walking or bicycling** Median new users: Bicyclists 70; Pedestrians 268 Median change in trips for children: Bicycle +98% Walk +5%	Mean (median) project cost 145,789 (150,000) pounds per project **Components Included in Cost:** Included all component listed as intervention components **Components not Included in Cost:** None **Data Source:** Reported by each project and based on funding	Components of Benefit Private vehicle use – No Travel time – Yes Injuries or fatalities – Yes Busing – No Congestion – Yes Pollution or Greenhouse – Yes Health-related – Yes Modeled 10-year economic benefit Mean (Median) of 584,778 (479,009) pounds per project	Mean (Median) Cost-Benefit Ratio over 10-year horizon 5.0:1.0 (3.8:1.0)

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Author (Year): SUSTRANS (2014) **Design:** Observational and Modeled **Economic Method:** Cost-Benefit **Funding Source:** UK Department of Transport **Monetary Conversions:** Assumed index year 2012 in UK pound	**Location:** Multiple locations in U.K. **Setting:** Selected projects from report that were related to schools **Sample Size:** # Projects (Schools) % of all schools 3 (NR) NR **Population Characteristics:** NR **Time Horizon:** 1 year observations 2 years Modeled over 30 years	Linking Communities **Interventions:** Most common components Planning – No Engineering (Infrastructure) – New biking/walking path and bridges, modify/expand green corridor paths to enhance connectivity Enforcement – No Education – No Promotion – No Other – No **Comparison:** None	**Change in walking or bicycling** Increase from almost no child users to 2009 and 8318 for 2 projects	Mean of 470,029 pounds per project **Components Included in Cost:** Included all component listed as intervention components **Components not Included in Cost:** None **Data Source:** Based on each project report and funded amount.	Benefits modeled over 30 years Components of Benefit Private vehicle use – No Travel time – Yes Injuries or fatalities – Yes Busing – No Congestion – Yes Pollution or Greenhouse – Yes Health-related – Yes Modeled 1-year economic benefit Mean of 3,683,741 pounds per project	Mean Cost-Benefit 30-year horizon 10.0:1.0

SRTS, Safe Routes to School
CA, California; WA, Washington; WI Wisconsin; MS Mississippi; FL, Florida
NR, not reported