

5-2014

## Safe Routes for Portland: A comparative analysis of The Walking School Bus model for Maine Schools.

Rebecca Spitko

*University of Southern Maine, Muskie School of Public Service*

Follow this and additional works at: [https://digitalcommons.usm.maine.edu/muskie\\_capstones](https://digitalcommons.usm.maine.edu/muskie_capstones)



Part of the [Education Policy Commons](#), and the [Health Policy Commons](#)

---

### Recommended Citation

Spitko, Rebecca, "Safe Routes for Portland: A comparative analysis of The Walking School Bus model for Maine Schools." (2014). *Muskie School Capstones and Dissertations*. 92.

[https://digitalcommons.usm.maine.edu/muskie\\_capstones/92](https://digitalcommons.usm.maine.edu/muskie_capstones/92)

This Capstone is brought to you for free and open access by the Student Scholarship at USM Digital Commons. It has been accepted for inclusion in Muskie School Capstones and Dissertations by an authorized administrator of USM Digital Commons. For more information, please contact [jessica.c.hovey@maine.edu](mailto:jessica.c.hovey@maine.edu).

2014

# Safe Routes for Portland

A comparative analysis of The Walking  
School Bus model for Maine Schools.

Capstone requirement of the Community  
Planning & Development program

Rebecca Spitko  
Community Planning & Development  
Professor Yuseung Kim – advisor  
May 2014



## Table of Contents

|   |           |
|---|-----------|
| <b>Problem Statement</b> .....                              | <b>2</b>  |
| <b>Definition of Terms</b> .....                            | <b>3</b>  |
| <b>Literature Review</b> .....                              | <b>4</b>  |
| <b>Student Health</b> .....                                 | <b>4</b>  |
| <b>Classroom Behavior</b> .....                             | <b>5</b>  |
| <b>Traffic Congestion</b> .....                             | <b>7</b>  |
| <b>Air Quality</b> .....                                    | <b>7</b>  |
| <b>Transportation Budget</b> .....                          | <b>8</b>  |
| <b>Walking School Bus Model</b> .....                       | <b>9</b>  |
| <b>Findings</b> .....                                       | <b>10</b> |
| <b>Research Question</b> .....                              | <b>13</b> |
| <b>Methodology</b> .....                                    | <b>13</b> |
| <b>Research Methodology</b> .....                           | <b>13</b> |
| <b>Sample Selection</b> .....                               | <b>14</b> |
| <b>Validity</b> .....                                       | <b>14</b> |
| <b>Discussion</b> .....                                     | <b>15</b> |
| <b>Portland</b> .....                                       | <b>15</b> |
| Demographics .....  | 15        |
| Walking School Bus .....                                    | 16        |
| <b>Identified Barriers</b> .....                            | <b>17</b> |
| Student Safety .....  | 17        |
| Volunteer Support .....                                     | 17        |
| Program Leadership .....                                    | 18        |
| <b>Active WSB Programs</b> .....                            | <b>18</b> |
| Keister Elementary School, Harrisonburg, VA .....           | 19        |
| Lonsdale Elementary, Lonsdale, Tennessee .....              | 22        |
| Van Derveer Elementary School, Somerville, NJ .....         | 24        |
| Whittemore Elementary School, Waltham, Massachusetts: ..... | 26        |
| Lyseth Elementary School, Portland, ME .....                | 28        |
| <b>Assessment</b> .....                                     | <b>31</b> |
| <b>Strengths</b> .....                                      | <b>31</b> |
| Encouragement/Incentive Programs .....                      | 31        |
| Consistency .....   | 32        |
| Safety Training .....                                       | 33        |
| Media Involvement .....                                     | 33        |
| <b>Recommended Strategies</b> .....                         | <b>33</b> |
| Engage the Students .....                                   | 34        |
| Engage the Parents/Guardians .....                          | 36        |
| Engage the school .....                                     | 38        |
| <b>Conclusion</b> .....                                     | <b>40</b> |
| <b>Appendix</b> .....                                       | <b>42</b> |
| <b>References</b> .....                                     | <b>44</b> |

## **Problem Statement**

Over the last 4 decades obesity rates among children ages 6-11 in the United States have nearly quadrupled. Currently, one in three children in America are overweight or obese .(Deckelbaum and Williams, 2001) Comorbidities associated with overweight children include an increase in respiratory related illnesses, a decrease in attention span and an increase in behavioral struggles (Deckelbaum and Williams, 2001) (Agranat-Meged MD et al, 2005).

The cause of this alarming rise is attributed to a shift in the American lifestyle and dietary behaviors, including a dramatically increased dependence on vehicular transportation by both adults and children. The percentage of children aged 5-14 years old who primarily commute to and/or from school by means of walking or bicycling has decreased from 48% to 13% from 1969 to 2009. This decrease can partially be attributed to urban sprawl and regional school consolidations that have made vehicular school commuting a necessity for many students. However, further comparison of those same years, specifically focused on children grades K-8 who reside within a one mile radius of their school, reveal the percentage of children actively commuting to and/or from school drastically declined from 89% to only 35% (National Center for Safe Routes to School, 2011). Recently, there has been an increased focus on utilizing transit to and from school as a means to increase the amount of daily physical exercise children receive.

This purpose of this paper is to identify the effects an increase in active transportation to and from school would have on both commuters and communities, and to examine how to create a successful environment for active transportation models in Maine.

## **Definition of Terms**

**Active Transportation** – used to describe non-fuel dependent transportation of any kind, including walking, running, bicycling, skateboarding, etc.

**Active Commuting** – the use of active transportation specifically to and/or from school

**High-Risk Children** – children ages 5-17 who are clinically overweight or obese

**Physical Activity** – participating in an activity of moderate to vigorous intensity and lasting a minimum of 5-10 minutes.

**Walkable Distance** – considered to be a distance of one mile or less

**Vehicular Transportation** – used to describe any fuel dependent transportation such as single occupancy vehicle, school provided buses or other public transportation.

**Vehicular Commuting** – the use of vehicular transportation specifically to and/or from school

## Literature Review

The purpose of this paper was initially to examine the health effects an increase in active transportation to and from school would create, specifically in elementary school children. However, it became increasingly apparent the effects of an increase in active transportation would reach far beyond the public health crisis. The following literature review has been broken up to address the five main areas that could be influenced by an increase in active transportation, focused to remain specific to students and communities attending and surrounding elementary schools. These five areas of study are: Student Health, Classroom Behavior, Traffic Congestion, Air Quality and School Transportation Budgets. Literature was then gathered on the results of The Walking School Bus, a policy intervention to address the decrease in active student commuting, on pilot communities.

Literature related to each individual topic was available; however, literature connecting individual problem areas with one another was not present.

### Student Health

Physical activity and health are interconnected. It is recommended that children ages 5-17 years old should have at least 60 minutes of physical activity per day. However, health benefits can be seen through an average of as little as 30 minutes per day and can be substantial at that level in high-risk children. (Janssen, I., Leblanc, A., 2010) In-school physical education classes are often viewed as the primary source of day time physical activity among elementary age children. However, the amount of actual time spent in moderate to vigorous physical activity

amounts to <20% of class time. (Tudor-Locke, C., Ainsworth, B., Popkin, B., 2001)

Recess is also considered to be a source for physical activity among children, however only 71.4% of elementary schools provide regularly scheduled recess for all K-5 grades, and physical activity is not mandated. (Burgeson et al., 2001)

Currently, approximately only one in three children are physically active on a daily basis and spend over seven hours a day in front of a screen. (Rideout, 2010)

Some health characteristics of children who meet the recommended amounts of physical activity include lower blood cholesterol, lower blood pressure, lower levels of obesity, higher bone density, lower rates of depression and a reduced number of injuries as compared with children who do not meet the recommended amounts of physical activity. (Janssen, I., Leblanc, A., 2010) (Slemenda, C., et al, 1991) Additionally, regular physical activity enhances overall health, as seen by a reduced rate of illness, and aides in the prevention of chronic diseases in high-risk children. (Sothorn, M., et al, 1999).

An active commute to school is an available and convenient potential for the recommended 20-40 minute continuous moderate to intense activity necessary to achieve health benefits. Additionally, children who utilize an active commute are significantly more active during non school hours than those who have a vehicular commute. (Cooper, A., Page, A., Foster, L., Qahwaji, D., 2003)

### **Classroom Behavior**

Previous studies suggested a correlation between body mass index (BMI) and cognitive function/academic performance among school aged children. However, these results were proven not to be statistically significant once adjusted

for parental/familial characteristics and influences. A positive relationship was shown between physical activity and cognitive function/academic performance among children. (Li, Y., et al., 2008) A 2012 study concluded children who were given daily 20 minutes of in-class physical activity showed a 6% improvement on a standardized test of academic achievement as compared to a 1% decrease by a control group. (Donnelly, J., 2011) More specifically, higher intensity aerobic activity shows an incrementally greater influence on academic performance as compared with moderate to lower intensity activities. (Castelli, D., et al., 2007)

Research connecting physical activity and behaviors is limited, but does suggest same day physical activity improves task specific attention and reduces classroom redirection when compared with students who did not have any physical activity that day. (Mahar, M. et al., 2006) Additionally, research shows same day physical activity can be beneficial in managing behavioral symptoms among students with ADD/ADHD. (Gapin, J., et al., 2011)

Though the research is limited, this suggests an increase in the number of students actively commuting could improve classroom focus and decrease classroom disruption and discipline. However, research appeared to be specific to mid-day moderate to high intensity physical activity. No research could be found specifically comparing the cognitive functioning, academic performance or classroom behaviors among children who actively commute to/from school with children who do not.

## Traffic Congestion

As the use of single-occupancy trips rises, traffic congestion continues to be a problem for all urban areas. From 1982 to 1999, the average percentage of daily traffic spent in congestions doubled and the average length of congested periods increased from about 2-3 hours to 5-6 hours, respectively. (Downs, A., 2004) The trip to school can account for up to 25% of the traffic volume on roads during the morning peak travel time. (NHTSA, 2011)

## Air Quality

Vehicle emissions are a significant contributor to air pollution. Emissions include diesel particulate matter (DPM), which include carcinogens such as carbon monoxide, benzene and butadiene. (Feychting, M. et al., 1998) Exposure to vehicle emissions is of particular concern for younger children, who are more susceptible to air toxins due to their high inhalation rates, narrow lung airways and immature immune systems. (Sabin, L. et al., 2005) Additionally, exposure to high concentrations of air pollutants can alter the process of lung development and have a lasting effect on respiratory health. (Trasande, L., Thurston, G., 2005)

Vehicle self-pollution occurs when a vehicle's emissions migrate inside the vehicle's passenger compartment, thus exposing passengers to higher concentrations of DPM than what is found in the ambient air surrounding the vehicle. Studies show DPM concentrations are higher in vehicles that are idling, making frequent stops or are in close proximity to other vehicles. (Kaur, S., 2007) A study specific to school buses found newer school buses showed significantly lower

concentrations of in-cabin pollutants due to an increase in emission and air quality regulations,. Concentrations also varied depending on the positioning of windows. (Marshall, J., Behrentz, E., 2005) This suggests student riders on urban school buses, specifically those located in low income neighborhoods that are unable to upgrade their vehicle fleet, or colder climates that require all windows to be closed for the majority of the year, are particularly vulnerable to in-cabin pollutants.

Although no literature could be found that specifically compared exposure rates among students using active transportation from students riding a school bus, exposure studies did reveal that adult pedestrians and cyclists in an urban environment experienced lower concentrations of DPM in comparison with those inside vehicles. Exposure rates lowered even more when pedestrians or cyclists were removed from the majority of vehicles, such as using a separate bicycle or walking path. (Kaur, S., 2007)

### **Transportation Budget**

High and, less frequently, middle schools that are clustered around reliable public transportation systems tend to have a reduced transportation cost. This result is due to collaboration between the public schools and transportation systems where students are given free or reduced cost public transit passes to use in lieu of school provided transportation. Participating schools are then able to reduce or even eliminate the need for school buses, reducing total transportation costs. (Nechyba, T., Walsh, R., 2004)

Over 21.8 million dollars were spent on student transportation during the 2009-2010 school year, averaging \$871 per student transported. (Snyder, T., Dillow,

S., 2013) Information detailing the total percentage of busing considered to be courtesy or hazard busing, busing made available to children who reside within a walkable distance from the school, was unavailable.

### **Walking School Bus Model**

A Walking School Bus (WSB) is a group of students walking to and from school with adult volunteers on a regular, designated route with assigned pick-up and drop-off locations. (saferoutesinfo.org) The WSB model originated in Australia in 1992 and has since migrated to the United Kingdom, New Zealand and North America. The program has gained a significant amount of popularity in the U.S. after being featured by first lady, Michelle Obama, as part of the federal 5210 Let's Go Campaign. (letsgo.org 2011) Policy makers have also begun to show increased support for the WSB program as an effective, low cost intervention to increase active transportation among elementary schools. WSB pilot programs are often sponsored or partially funded through the federal Safe Routes to School initiative (SRTS) and the Center for Disease Control.

As a young policy alternative, there was limited research available as to the full, long-term impact of the program. Studies following the implementation process and short-term impact were available. Studies on the program reveal participating schools report staffing, community outreach/volunteer recruitment and initial participation to be the primary challenges. However student participation generally quickly increased, and remained steady for the duration of the program. (Kong, A., et al, 2009) During test studies, the WSB model has shown to be successful in increasing the total percentage of children who commute actively to school.

(Mendoza, J., et al., 2009) Additionally, in schools that adopted the WSB program part time (1-3 days/ week) participating students were more likely to actively commute to school on program off-days. (Heelan, K., et al 2009)

## Findings

Studies consistently show physical activity have a myriad of benefits among young children. Literature strongly supports that students who are physically active have improved cognitive functioning and academic performance as well as a stronger immune systems and a lower risk for chronic health issues. To a lesser extent, studies also support physically active students have the ability to remain focused on classroom tasks and were observed as having an easier time responding to in-class redirection. The results of studies on the behavioral effects of physical activity were not as statistically significant, as compared to studies on health effects, due to a greater difficulty controlling for outside influences that could have accounted for behavioral difficulties among sample populations. However, I was unable to find a study that suggested physical activity had either no, or an adverse, effect on in-class behaviors.

I was unable to find literature that compared in-cabin emissions between a school bus vs. passenger vehicle, or specifically comparing exposure cases among commuting elementary school children. However, literature did supports that, in general, pedestrians and cyclists are exposed to lower concentrations of toxic vehicle emissions and show a reduced risk to the adverse health effects that accompany exposure.

While the effects an active transportation model might have among children could be deduced, literature on the effects on the surrounding community was sparse and, at times, inconclusive. Literature was extremely limited as to the overall effects of school transportation on traffic congestion, likely due to its specificity to each individual geographic area. I was unable to find studies comparing peak traffic congestion among communities who have adopted public school active transportation models with those who have not. Similarly, I was not able to find a school budgets breakdown to highlight amounts allocated toward regular, courtesy or hazard transportation. This may be due to the young nature of the active transportation model. A research study specific to this topic would be beneficial as the popularity of active transportation models continue to grow.

All studies of the specific WSB program found the program to be successful and enjoyable among participants, however there were similarly noted implementation and longevity concerns among the pilot programs studied. Despite the demonstrated need for and proven success of a program, it continues to be viewed as an extra-curricular activity as opposed to a serious alternative to the traditional vehicular transportation model. None of the schools studied felt the program was reliable enough to be a primary form of transportation.

The literature found appeared to be heavily compartmentalized. I was able to find an abundant amount of information on the physiological effects of physical activity, but I was not able to find a comparative study on possible (if any) benefits that could be gained from a change specifically in school commute. The research examining the WSB program primarily examined the failure/success of the program

as determined by the number of students walking to school. The studies were lacking the benefits (if any) experienced by those students participating in pilot programs.

Despite the missing elements, research appears to suggest the WSB program is an enjoyable experience and is successful in engaging students to actively commute to school on a more regular experience, thereby increasing the amount of daily physical activity students receive and reducing the total number of on-road vehicles.

## Research Question

- 1.) In what ways is active commuting encouraged among Portland students?
- 2.) What barriers impede Portland schools from adopting an active transportation model?
- 3.) How can the experiences of other Walking School Bus programs be applied to the Portland community?

## Methodology

The purpose of this section is to (1) explain the research methodology; (2) explain how the sample selection was chosen; and (3) identify validity concerns.

### Research Methodology

The purpose of this study is two-fold. Firstly, I plan to examine the current state of Portland school transit, including what specific active transportation programs are currently in place. For this, I will meet with individuals involved in local active school transportation programs, community members with children attending Portland public schools and faculty/staff at participating schools.

Secondly, I will examine several Walking School Bus models to identify strategies that can be applied locally with the intention of assisting Portland in implementing an official school-sponsored WSB model. When available, I plan to interview a representative of studied programs.

## Sample Selection

Reviewed schools were chosen first based on the success of their program; and secondly based on comparability and compatibility to the Portland community.

Programs are deemed successful if they meet the following criteria:

- 1.) Programs that have run consecutively for at least 2 years.
- 2.) Programs that operate consistently for the length of the academic year.
- 3.) Programs that have proven results in increasing the number of students actively commuting to and/or from school.

## Validity

This study is designed to develop a list of recommendations to Portland based off of the successes and struggles other communities experienced while implementing similar active commuting models. To control for validity and reliability I attempted to select communities that had some similar characteristics to Portland.

Due to the qualitative nature of this research, I was unable to control for the situational intricacies of each studied program and community (culture, need, previous parent engagement, etc.), therefore some differences exist between sample communities and Portland that could impact the success of the recommendations, if implemented.

## Discussion

In light of the wellness findings of active transportation among young children and the success of schools who have adopted supporting programs, urban districts continue to promote traditional busing as the primary method of transportation for students. The purpose of this section is first to examine Portland's readiness for alternative student transportation and the barriers faced while implementing an active transportation model at select Portland elementary schools. Following will be an overview of operating walking programs at several elementary schools. This section will conclude with an on-site analysis of the volunteer experience working with one of Portland's spring walking routes.

## Portland

To learn the status of Portland's active commuting programs I met with Betsy Critchfield, program director of Portland's WSB, and Sarah Cushman, Southern Maine region Safe Routes to School (SRTS) planner. I also attended school board meetings, researched community demographics and school budget information to determine neighborhood walkability and community culture.

## Demographics

Portland has a total of 10 (2 island and 8 mainland) public elementary schools and covers 21.3 square land miles. The majority of the Portland community is considered to be compact and moderately walkable with neighborhoods on the peninsula considered most walkable and the outer Riverton and Stroudwater neighborhoods least walkable. Of the 8 mainland elementary schools, 5 schools

report over 90% of their student population reside within a walkable distance from the school. Schools Reiche, East End Community and Longfellow report over 98% of their student population reside within a walkable distance. The Portland school district has a budget of \$446,036 for student transportation services, for the 2013-2014 school year, and has 24 buses operating daily. Portland schools do not track the mode of transportation taken by students when arriving or leaving schools. However, it is estimated by school officials that, with the exception of peninsula elementary schools, the majority of students receive daily transportation by bus or car, regardless of residential proximity to the school.

### **Walking School Bus**

During the spring season of 2012, Maine received 2 year grant through Safe Routes to School, a collaboration between the Maine Department of Transportation and the Bicycle Coalition of Maine, to launch a Walking School Bus program. Portland was chosen to pilot the program based on community walkability, student enrollment and school interest. The WSB program piloted during the spring season of the 2012-2013 school year with 2-3 daily routes at East End Community and Reiche elementary schools. After a successful first year the Walking School Bus planned to resume the routes at Reiche and EECS, and introduce routes at Lyseth and Riverton elementary schools. However, due to difficulties finding volunteer walkers, the routes at Lyseth were postponed until the spring and routes for Reiche, and Riverton were unable to run. Portland is the first community in Maine to have a coordinated and continuously operating WSB program.

The end of the current school year marks the end of the initial funding for the program. Currently hosted by SRTS the WSB is seeking assistance and support from the Portland School District for the continuation of the program.

### **Identified Barriers**

Barriers experienced during implementation of The Walking School Bus program in Portland were identified through conversations with WSB coordinators, school faculty/staff and community members attending or surrounding participating schools.

### **Student Safety**

Student safety was the most common concern when discussing active commuting to and from school. The main concern was harm from vehicular traffic; however the lack of adequate side walks (cracking, uneven or in close proximity to a busy street without a road shoulder or grassy buffer) were also noted by caregivers, especially those with children attending Lyseth Elementary School. Most caregivers reported they would feel comfortable allowing their children to walk with adult volunteers who had received safety training classes, but some caregivers at Lyseth noted they were still more comfortable with their children riding a school bus due to the traffic along Allen Avenue.

### **Volunteer Recruitment**

For the 2013-2014 academic school year, Lyseth, Reiche and Riverton elementary schools were slated to have routes beginning in the fall. However, due to lack of volunteers Reich and Riverton were unable to run the program and Lyseth's

routes did not begin until the spring. Lack of volunteers also reduced the number of routes expected to run at East End Community Schools. The largest challenge is locating willing volunteers. Once volunteers are identified, retention is less of a concern, but still noted.

The time of day and perceived commitment are believed to be factors in the difficulty of obtaining volunteers. The time of day can be challenging either due to a conflict with employment or due to the early morning nature of the program. To a lesser degree, the potential of being outside during inclement weather was thought to also be a possible factor in volunteer commitment.

### **Program Leadership**

In its current state, Betsy Critchfield oversees all WSB routes. This includes, but is not limited to administrative support, community outreach, volunteer identification and training, route creation, student engagement and incentives, and school communications. This places this position at a high risk for employee burn out and makes it difficult for this individual to form relationships with each individual community. As the program continues to expand to include either more schools or more routes per school, this single leader model will not continue to be sustainable.

### **Active WSB Programs**

The purpose of this section is to detail five different Walking School Bus programs. Four of these were identified as comparison programs based on previously mentioned criteria. Each program was brought to their respective schools to address community specific concerns that will be detailed in their

respective analyses. The fifth program described is a pilot program at Lyseth Elementary School. Each section will briefly describe community and school demographics, the motivating factor(s) that lead to the inception of a WSB program and the implementation process. Lessons learned and application to Portland schools will follow.

### **Keister Elementary School, Harrisonburg, VA**

The Walking School Bus was brought to Keister Elementary School in an attempt to create a more active student body. This section details their history as obtained through newspaper articles, school reports and an interview with Anne Lintner, principal of Keister Elementary.

Harrisonburg, Virginia is a mid-size rural city approximately two and a half hours west southwest of Washington D.C. Harrisonburg has a population of just under 49,000 people and has 17.3 square miles of land. The Harrisonburg City Public Schools serve a total of approximately 4,400 students with 5 public elementary schools, Keister, Smithland, Spotswood, Spring and Waterman.

Keister is located on the western side of Harrisonburg and is similar in size and demographic to the Portland Elementary School system. During the 2012-2013 academic year, Keister had a student size of 489 with students speaking over 40 languages. Keister Elementary School currently boasts a successful active student program. Twice a week the school hosts a morning walking program where students and teachers meet and walk around a track for 20 minutes prior to the start of the school day. The school also runs multiple WSB routes, including unofficial routes Mondays – Thursdays, and official routes on Fridays. Participation

in the Friday route became so successful the school was able to eliminate one morning bus route.

Anne Lintner, principal at Keister Elementary, has been advocating for active student programs since she accepted her position with Keister. Her goal was to utilize school programs to shift the culture of Harrisonburg and have a more active community. Keister's active student program began with supporting semi-annual Walk to School Days. During these days students who actively commuted were given stickers to announce their participation to the study body. Sticker-bearing students were then invited to be part of an end-of-day social where their picture was taken and displayed in the office until the following Walk to School Day. Lintner believes the end-of-day social and displayed picture instilled pride and "bragging rights" in participating students, which resulted in anticipation and excitement for the next Walk-to-School day.

After the success of the semi-annual Walk to School Days, Keister began monthly Walk to School Days, eliminating the end of school social and displayed photograph. Although, the excitement around the day began to diffuse, staff noticed the day to day number of walking students appeared to be increasing. This caused concern over the rise in student pedestrian traffic around the same time as bus and other vehicular student drop-off. Lintner decided to create a walking program where students would arrive earlier than the majority of vehicles and walk around the track for 20 minutes before the start of the school day. Students responded enthusiastically to the morning walking program, however due to a challenge in

staff participation for supervision, this program down-sized to a Friday only walking program.

Around the same time, Harrisonburg City Schools received a 500k Safe Routes to School grant to be used to improve school infrastructure such as sidewalks, cross walks, bike lanes and signage around the school. Upon completion of the project Lintner decided to ride the momentum resulting from the neighborhood improvements and create a Walking School Bus. Because of the larger proportion of students who were already walking to school on Fridays to participate in the walking program, Friday was chosen to host the school's new Walking School Bus.

In addition, Keister utilized an at-home liaison, Sonny Rodriguez, to prepare the community for the shift. This volunteer position met individually with each family member along the walking route to explain the program and route days. Although this process was incredibly time intensive, Lintner cites Sonny's outreach as an integral element in the rapid success of their WSB program.

Lintner assumed her position as principal during the 2004-2005 school year and immediately began working toward creating a more active student population. The addition of a coordinated WSB was a culmination of the previous years of work in incorporating walking into the culture of Keister. Students currently have unofficial WSB routes Monday – Thursday and coordinated routes on Friday that have replaced traditional busing. The school still hosts walking mornings on Tuesdays and Thursdays, and Lintner believes one of those days could be the next WSB day. Lintner reports, "The culture of Keister is that we walk. We no longer

celebrate “Walk to School Days” or even incentivize the WSB with stickers or prizes.” Students had been prepped for the idea that walking was a regular part of their day, so walking to school became a natural shift from their daily routine. Lintner is hopeful for the future of active commuting at Keister, and hopes to add additional walking routes in the coming years.

### **Lonsdale Elementary, Lonsdale, Tennessee**

Lonsdale Elementary School also runs a walking school bus as a means to increase the amount of physical activity among students. As opposed to the internal motivations of faculty and staff at Keister Elementary, the walking program was brought to Lonsdale Elementary through the Knox County Health Department as a response to what was perceived as a health crisis among elementary students in Knoxville. Information on Lonsdale’s Walking School Bus was gained through census data, health department releases and communications with Susan Bryant, Project GRAD campus manager, and Liliana Burbano, representative of Knox County’s Safe Routes to School program.

Lonsdale is a neighborhood in Knoxville, Tennessee located northwest of the city’s downtown neighborhood. The Lonsdale neighborhood has a population of approximately 10,000 people and is 2.84 square miles. Knox County School District operates all the public schools in Knox County, including 50 public elementary schools. Lonsdale Elementary School has an enrollment of just under 300 students and is the sole elementary school serving the Lonsdale neighborhood.

In Lonsdale, more than half of elementary age children are overweight or obese and the neighborhood is considered at high risk for childhood diabetes and

high blood pressure. The Knox County Health Department (KCHD) piloted a WSB project at Lonsdale specifically for 4<sup>th</sup> and 5<sup>th</sup> grade students during the spring of the 2011-2012 academic year. The goal of the program was to promote a more active lifestyle in an attempt to lower the percentage of overweight and obese children. The program began with two routes operating daily and was warmly received within the community; however the program reported struggles with participant retention after initial recruitment.

Through community surveys sponsored by KCHD parents noted a reluctance to participate in the WSB due to neighborhood safety concerns and the loss of parent-child quality time. As a response, the health department organized community inspections where students and parents walked the neighborhood identifying danger zones, such as missing crosswalks or broken sidewalks). Elementary students and parents then brought their findings and concerns to the mayor. Liliana Burbano believes the activity not only helped to get children involved in the well being of the community, it also put pressure on the mayor to address safety concerns around the school and instilled pride in the students when repairs were made. In order to continue to keep the children engaged in the program, SRTS and KCHD engaged children prior to the 2012-2013 academic year by involving them in the process of mapping WSB routes. Children reported a greater excitement to participate in the WSB because they felt they helped to make the program possible.

The program saw an increase in participation for the 2012-2013 academic year and increased to have routes 5 days a week and include students in grades K-

3<sup>rd</sup> for the 2013-2014. As an unintended benefit, the school also saw a decrease in the total number of tardy student. The WSB in Lonsdale continues to be funded through Healthy Kids, a Healthy Community grant, and operated by the Knox County SRTS program. Due to the success at Lonsdale the KCHD is currently looking into to identify another Knoxville elementary school for a second WSB program.

#### **Van Derveer Elementary School, Somerville, NJ**

Somerville is a 2.33 square mile borough located in Somerset County, New Jersey. As of the 2010 census, Somerville has a population of 12,098. Van Derveer Elementary is the only public elementary school in the Somerville Public School District. Van Derveer Elementary had a 2009-2010 enrollment of 846 students.

Van Derveer Elementary School experienced sudden budget cuts while preparing for the 2004-2005 academic year that caused an immediate elimination of the school's courtesy busing program. Susan Haynes, principal of Van Derveer, had concerns about the sudden increase of the number students walking to school and contacted RideWise Transportation Management Association for suggestions of how to plan for the change in student habits. RideWise suggested the WSB model to Van Derveer school and parent officials, who agreed to pilot the program that academic year.

Van Derveer had the unique situation of having only 4 weeks to plan, organize and implement a WSB program, a process that generally takes 2-6 months. Once all parties agreed on the WSB model, RideWise immediately began with a map to plot student addresses for all students who were no longer receiving school sponsored busing services. Walking routes were then designed around clusters of students.

This process enabled the school to spread out clusters of students and evenly distribute participants among multiple walking routes. Route schedules were then created and included pick-up/drop-off times and locations. In order to expedite the volunteer outreach process, outreach was limited to town meetings or other events that were highly attended by engaged community members, as opposed to door to door or the “cold call” outreach approach of fliers.

Once routes had been determined and volunteers had been organized, the next step was to publicize the program to ensure everyone within the community would be aware of its presence. Flyers were distributed along walking routes in the weeks leading to implementation. The local media was contacted to cover a story on the new program. Lists of walking routes were published in the local newspaper. Lastly, route announcements, including recommended student routes and walking bus stops, were mailed to parents along with bus assignments. Haynes reported the attempt was to not present the program as extracurricular, but instead the sponsored alternative to what was previously a bus route. This, along with a committed and engaged collection of volunteers ensured a successful start to the program.

Haynes reported adjusting the walking routes to fit to student clusters has increased the success of the program because students are more likely to continue to walk a route if their peers are involved. This method has proved successful in spreading out the number of children on any given route, while still ensuring each route would have moderate participation. Van Derveer continues to adjust routes yearly to fit the geographical shifts of its students.

Haynes also believes lack of planning inadvertently aided to their success. Because the program was organized and implemented quickly, Van Derveer actively sought and utilized a large amount of feedback from the community. The school used intensive program tracking and evaluating strategies from program volunteers and in-class teacher/student feedback, regular surveys from participating students and parents/guardians and welcomed recommendations for program adjustments or theme days from all community members. Haynes believes the feedback requests and follow through not only helped to prevent the program from going stale after the initial buzz of the beginning of the school year, it also instilled a loyalty among community members. The Somerville community no longer felt they were participating in a community walking program, but rather they helped to create and were a part of one.

#### **Whittemore Elementary School, Waltham, Massachusetts:**

Waltham is a mid-sized city located in Middlesex County, Massachusetts approximately 11 miles northwest of downtown Boston. The city has a population of 60,636 and is 12.7 square miles in size. Waltham Public School District operates all 6 elementary schools in Waltham. Whittemore Elementary began utilizing the WSB model during the spring of the 2005-2006 academic school year. Whittemore's program operates walking routes once a week, Walking Wednesdays, and is intended as an extra-curricular activity primarily to assist in relationship building among students.

Walking Wednesdays begins at Whittemore a few weeks after the school year and runs weekly from September – November and March - June. The program drops

to once a month for the winter months of December – February, due to low student participation. The program was originated organized through Healthy Waltham with the support of MassRides, but was quickly taken over by Whittemore’s parent-teacher organization. Currently, Whittemore’s WSB is entirely parent organized, funded and staffed. There are no plans to transition the program over to become officially school sponsored.

Walking Wednesdays works primarily through unofficial routes where parents and children walk together to school, usually on similar paths with the same group of people, but it does not follow the organized drop off/pick up model that traditionally follows the Walking School Bus. Students who do not live close to the school are able to participate by being dropped off a few blocks from the school, and walking the remainder of the commute.

Whittemore’s Walking Wednesdays program is highly incentivized among students. Each participating student receives a raffle ticket upon arrival to school. One ticket is then chosen and announced during the school’s morning announcements and the winning student is able to pick from a prize selection that is provided through parent donations. This method allows the school to easily keep track of the total number active commuters, which is also announced and tracked from week to week. The goal of each week is to increase the number of walkers from previous weeks.

Additionally, Whittemore has several incentives to individualize Walking Wednesdays from each other. For example, students can recommend themed weeks where participating students are invited to dress up. During the winter

months parents donate hot chocolate for participating students upon their arrival at school. At the end of each school year Whittemore hosts a Grand Finale Walking Day which includes a morning assembly to celebrate all students who have participated throughout the year.

Whittemore sees a high participation rate in their Walking Wednesdays program. Although the incentives help to encourage student participation, Principal Nadine Stein believes encouragement from student peers is the primary motivator for participation. Stein notes, “Students begin walking with each other and enjoy the time spent with their peers where they are not in a classroom or staring at a screen”. Because of this, Whittemore believes Walking Wednesdays has increased the number of active commuting students during non-program days as well.

#### **Lyseth Elementary School, Portland, ME**

Lyseth Elementary School, located in the North Deering neighborhood of Portland, is the most recent school in Portland to begin a WSB program. Two routes, each running once a week on Fridays, became operational in April and are planned to continue for the remainder of the school year. This section details my personal experience and observations as an adult volunteer on the school’s inaugural route. The purpose of this section is to identify the strengths of Portland’s implementation process, as well as to identify areas to improve based on the lessons learned from the comparative study.

Lyseth Elementary is a k-5<sup>th</sup> grade elementary school and serves approximately 530 students. Lyseth was chosen to host the walking program after expressing interest to WSB coordinators during the initial district-wide program bid

during the spring of 2012. Plans for a WSB route were originally set to commence at the beginning of the 2013-2014 school year, however routes did not actually begin until the spring season. Volunteer outreach around the school primarily included neighborhood fliers and outreach to the school's parent-teacher organization prior to the start of the academic school year. Student outreach primarily included communications with the school's principal and staff as well as in class fliers and take-home handouts given to students.

Although student interest was present, the lack of volunteers was the primary factor in the delay program launching. This resulted in a decrease in student awareness, as nearly half a year passed from initial outreach to route commencement. By the day of the first walk on April 4<sup>th</sup>, the route I volunteered with had one official participant, the son of the second adult volunteer. During the first walk we were able to recruit 4 additional students from their bus stops. Recruited students stated they were aware of the WSB program, but were either unaware that it had begun, or that they were on a walking route. These students continued to regularly participate with the program until the writing of this paper. They reported they enjoyed and looked forward to participating; however they would ride the school bus if their bus arrived prior to the walking route.

Permission slips for the walking program were distributed and collected through the volunteers. Volunteers were given permission slips by WSB coordinators to pass along to the children and asked to collect them the following week. This proved to be a challenge for volunteers. This process meant children were walking their first week without signed parental permission (volunteers

attempted to obtain verbal permission prior to allowing the children to join) and often forgot to return slips the following week (resulting in multiple weeks of walking without signed permission). Once forms were collected volunteers on both Lyseth routes expressed confusion as to who was responsible for managing permission forms once collected. As a result, completed forms were spread between volunteers, the school office and WSB coordinators.

Another challenge occurred upon arriving at school. At Lyseth, students are not able to enter the school until 8:35am. Depending on walking speed and start time, walking routes had the potential to arrive at the school prior to that time. It was unclear whether it was the responsibility of volunteers to supervise the children until they were able to enter the school, or if the students could be released to the school, who had an attending teacher observing early arriving students, upon arrival. This has the potential to be a chaotic situation, as there are many children surrounding the school in the morning, and could be a liability concern should there be a situation where a student is lost or injured. Additionally, because a policy around morning drop off was not determined, it became open to volunteer interpretation and was therefore not consistent among the two walking routes and could cause additional confusion among student participants.

The walking program utilized a frequent walker card as an incentive program with participating children. While very successful in incentivizing students, there was some confusion between volunteers as to whether the walker card was a program specific to children participating in the WSB model, or any child who actively commuted to school on Fridays. This led to conflicting information passed

on to students, and was upsetting to students who did not live along a walking route and therefore were unable to participate.

There is significant potential for a successful Walking School Bus program at Lyseth. Participating students reported they were happy with the program, enjoyed walking to school and would like to walk more often. Several students who were unable to participate due to not living in the proximity of either of the routes expressed interest in having a walking route added to their neighborhood. However, improvements must be made on connecting the program, or at minimum the volunteers, with school staff. Also, increasing communication between program coordinators and walking volunteers, as well as general improvements to program organization are needed in order to reduce volunteer/participant confusion and encourage program longevity.

## **Assessment**

This section details strengths of Portland's WSB program as it currently stands, as well as recommended strategies for program continuation and improvement.

### **Strengths**

#### **Encouragement/Incentive Programs**

Each student who actively commutes during a WSB day is eligible to receive a Student Walker Card intended to be clipped to the student's backpack. Upon clarification, students do not need to walk specifically with an organized WSB, as the

Portland program is intended to encourage an overall increase active commuting among all students. At the completion of each walk students are given anywhere from one to three stickers for the card. The number of stickers given is determined by the conditions of the morning (cold, rainy, etc.) and is determined at the discretion of the route's adult volunteer(s). The sticker works as an incentive for several reasons. First, it is a daily incentive. Second, the process of "filling" one's walker card incentivizes continued walking as students become engaged and excited to complete this task. Lastly, the visibility of the walker card on students' backpacks helps to engage non-participating students in a conversation surrounding active commuting. Previously, students became eligible for an additional prize once their walker card was filled; however it became apparent the stickers alone equally engaged students and therefore the additional prizes were eliminated to reduce expenditures. This is an inexpensive and engaging incentive program that has proved to be successful among students at participating schools.

### **Consistency**

Once implemented, the Portland programs run regularly and consistently, regardless of weather. The Portland WSB program has never had to cancel a route due to a sudden loss of volunteer. Coordinator Betsy Critchfield serves as emergency back-up in case of illness or no-show. Generally speaking, students are aware of the scheduled walking days (either daily or weekly, depending on the school) and the program is reliable.

## **Safety Training**

Each volunteer is screened through an in person interview and a background check is completed before being accepted as a WSB volunteer. Volunteers must then complete a safety training course prior to their first walk with students. Volunteers are assigned a single, regular route, allowing children the ability to become familiar and build a relationship with their adult volunteer walkers. Additionally, each volunteer is given a reflective, fluorescent safety vest and a solid flag to broadcast their presence amidst morning traffic.

## **Media Involvement**

Portland's WSB program has a history of being covered by local television news and newspapers prior to the start of each academic year. Portland's program should continue this, and possibly seek the potential for a follow up story, potentially to highlight participation during the winter months or the end of the school year.

## **Recommended Strategies**

This section includes tips and strategies observed through the conversations and readings of successful Walking School Bus models and were chosen either due to their unique elements, or because they were a common theme among multiple models. Strategies are divided into the three categories as aligned with the purpose of the action. Categories include, (1) Engage the Students; (2) Engage the Parents; and (3) Engage the Schools.

## Engage the Students

### *Classroom Visits*

Community and student outreach is one of the largest challenges to the success of a WSB. Students, once engaged, will become enthusiastic participants in the WSB program. Portland currently has some in-class outreach; however, there is a heavy reliance on take-home fliers and electronic communication from the school to engage student participants. Unfortunately, the rate at which these methods are successful is low due to lost take-home fliers/permission slips or unread electronic messages. Individual classroom visits are a vital method of quickly connecting with students to make them aware of route days and times as well as answer questions about the program. Follow up visits are also encouraged to collect permission forms and allow for lost information.

The challenge of this method is the time it takes to meet with individual classes, particularly during the start of the school year when other implementation duties are high. Therefore, this method would be best utilized through programs that have a high rate of parent, volunteer or school faculty/staff participation. As the beginning of the school year is generally the most hectic for administrative duties, it may be challenging to find time to meet with individual classrooms if in school volunteers are not present. To combat that, this strategy could also be used as a method to revamp the program during lower participation months, as coordinators may have more time to meet with students later in the school year.

## *Event Days*

Event days occur when any aspect of a daily walk differs from the typical walk day. Examples of event days are student theme days, such as “color wars”, participation events such as “walk with a friend day”, or days commemorating achievements, such as “winter weather days” or “happy 50<sup>th</sup> or 100<sup>th</sup> walking day”. The purpose of event days is twofold. First, similar to the walker cards, it creates a visual presence of the Walking School Bus program in the school through the use of costumes, student certificates or prizes. Students are likely to question the purpose of the costumes or certificates, broadening verbal outreach between students. Secondly, this can be a tool to maintain program interest or expand recruitment by keeping the program from going stale among students. Event days can be easily organized or in depth, depending on themes, and can either occur on a single route at the discretion of the adult volunteers, or include all participating students on walking routes.

A struggle with utilizing event days to build program loyalty and student outreach is that the success of the day directly correlates with the level of student participation. Ensuring participants are aware of planned events can be challenging, particularly in the schools that do not have daily routes. Therefore, theme days would likely be most successful either at a school that is actively engaged with a WSB program (and would give previous day reminders to students) or schools that have daily routes (walking volunteers could remind students). Another consideration is that events that include costumes need to meet school guidelines, including the school dress code. Because of these challenges, this strategy is best

used as a rare event, such as to mark a special day, or to increase participation during attendance slumps.

### *Guest Walkers*

The purpose of using guest walkers is also to encourage verbal outreach both within the school as well as the community at large. Guest walkers may be school teachers, principal or superintendent, to focus outreach on the school level, or city mayor, sporting mascots or radio personalities, to focus outreach on the community level. It is important to ensure media attention when attempting community level outreach.

Larger scale guest walkers may be more difficult to obtain due to cost, scheduling difficulties or unpredictable weather. However, utilizing teachers or a principal is a successful tool among the individual student population and also works to build a relationship between the school and the program.

### *Engage the Parents/Guardians*

#### *Door-to-Door Outreach*

Portland's WSB program is very creative with their volunteer outreach. Strategies include fliers around the community and reaching out to local businesses, volunteer organizations and surrounding college campuses. This type of recruitment is unique to Portland, and in some aspects, it is a tremendous strength. However, by relying on the WSB to bring volunteers to the school, the program is further dividing itself from being part of the school and student curriculum. It is

necessary for parents/guardians to become a larger part of the Portland program in order for it to thrive.

Similar in both motivation and time investment to the in-class student visit strategies, door-to-door outreach can have a tremendous effect on parent/guardian engagement. Many communities, including schools, have a small handful of volunteers that tend to participate in multiple functions. This can be detrimental to the sustainability of any one given program, as a small pool of volunteers does not strengthen a community and leaves a gap when the engaged individual moves on. The purpose of this is to engage “on the fence” volunteers.

An alternative to this is walking a bus route to meet with care givers who are waiting for the bus with their children; however, door -to-door is likely to reach a greater number of individuals. This strategy could also help to remove the responsibility of permission slips from the student or walker volunteer and, to some extent, could increase neighborhood interactions.

### *Involvement in Program Planning*

Engaging parents/guardians in the planning of walking routes or the implementation process allows parents to become more familiar with the program and can assist in easing some safety concerns. Caregivers who are familiar with the program are also more likely to encourage participation among their children and be more responsive in returning materials sent home with the student.

Lonsdale was able to accomplish this while engaging students in the public process and improving infrastructure around the school. While successful in Lonsdale, a strategy of that much intensity is not feasible for every school, especially

schools who are struggling with program leadership. A simpler, less time-consuming way to involvement parents/guardians is to elicit them in program feedback. Parents who see their suggested changes implemented are more likely to feel connected to the program as a community institution.

A challenge of this is parents/guardians must be moderately engaged before they will be aware of the opportunity to participate in the planning and promotion process. During a program's inaugural year, this strategy would be more successful when combined with the previously mentioned door-to-door strategy. Once a program is established, this strategy could be promoted during the final months of the school year to be active during the summer months.

### **Engage the school**

Successful programs are those that have been incorporated as part of the culture of the school. Portland's current program runs as a separate entity from schools. The WSB has a program director who is working to bring the program to several schools as opposed to each school working individually to build a walking program from within. Although each participating school supports the WSB program, they are not actively involved in program organization, implementation or monitoring. This hinders student participation and growth because the program dissipates as soon as the students arrive at school. A successful program is one that filters through the student's day.

Arguably, engaging the school is the most crucial strategy to ensuring the success of a WSB program. Generally speaking, programs that are brought to schools are not as successful, or not as quickly successful, as programs that come from the

school itself. School buy-in is one explanation for this. A school is going to be more invested in the success of a program that they have assisted in creating.

Additionally, students who have the impression that the walking program is part of the school are more likely to carry the program into the classrooms. Being a part of a before school program carries a different meaning to a student than how they commuted to school that day.

Several of the recommended strategies to engage students or parents/guardians have secondary effects of reaching out to the schools. Certificates that are handed out in class or semi-annual celebrations of walkers will help to integrate the program and the school, however, a liaison at each participating school is the most effective way for the WSB have an in school presence. This will also give each school their own individual point person that will be able to understand the unique intricacies of each individual school. This individual will have the time to manage individual classroom visits for students, and parent/guardian specific outreach for adults.

Portland's current strategy of one director overseeing multiple schools is challenging and will be difficult to sustain. Not only is there a high risk for burnout, the current model does not allow for the school specific needs. It also leaves little time to implement program add-ons (such as those recommended in this paper) and a higher level of responsibility on volunteers. Although manageable for the time being, individual school liaisons will be necessary in order for the Portland program to continue sustainably.

## Conclusion

The Walking School bus is an effective model to increase active commuting to school among elementary school students. Students who actively commute to/from school have are more active and spend more time outside than students who use vehicular transportation. Students who are physically active exhibit several health, psychosocial and behavioral benefits that can be measured both at home and in the classroom. Additionally, neighborhoods that are considered walkable report a stronger sense of community which leads to an increased sense of safety and a higher reported rate of happiness among community members.

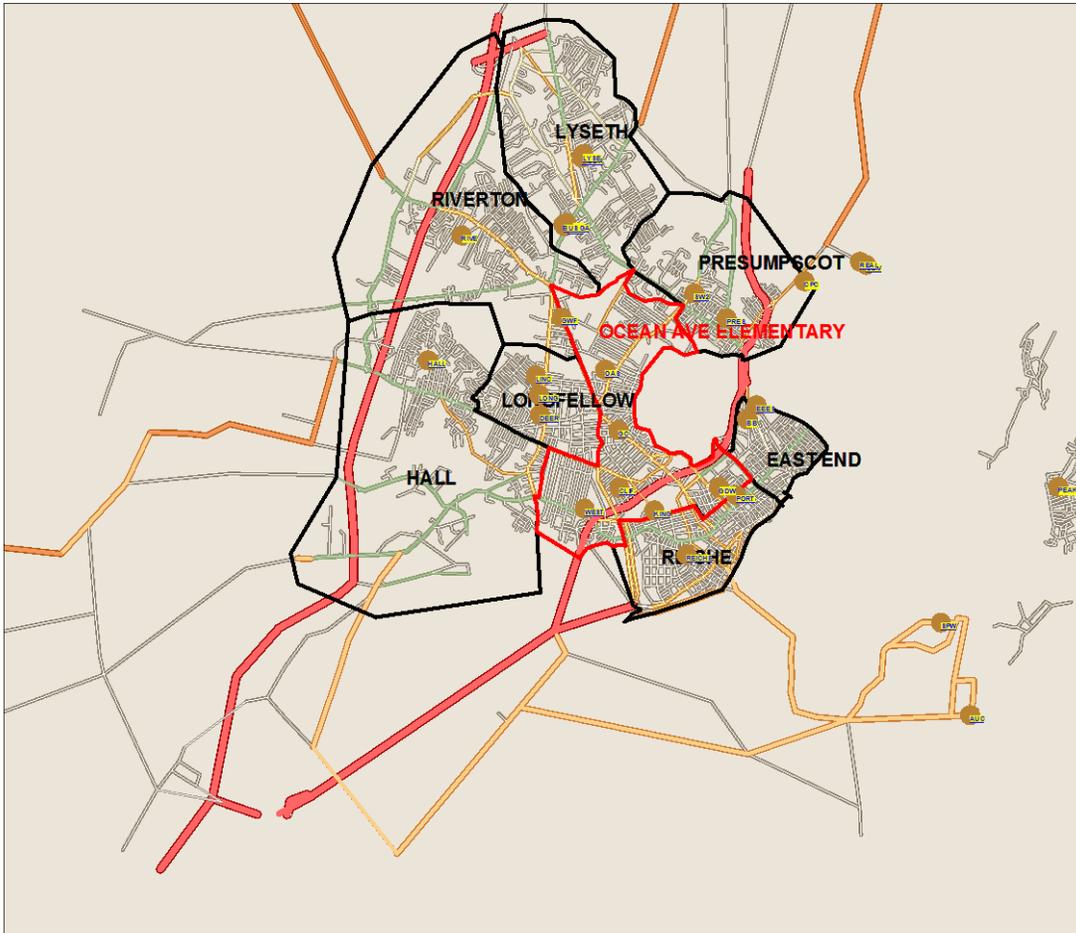
Several communities have been successful in implementing Walking School Bus models in their communities. After two years of operation, Portland has proved itself ready to join these communities. The program has thrived in spite of limited resources and administrative overhead. Above all, student excitement and engagement has allowed Portland's Walking School Bus program to become a national leader of winter active school commuting with their year round, all weather operation.

The future of active commuting in Portland is promising, although there are several areas of improvement that could ensure success. Continued focus on engaging the students and parents are crucial for program growth. Certainly without volunteers and participants the program will slowly diminish, or will waiver between successful and desolate from year to year. However, the greatest lesson that can be applied to the Portland program to ensure future operations is to identify, or if possible fund, an in school liaison for each participating school to

manage school specific needs, concerns, disciplinary measures and incentives as well as to build a personal relationship with participating students. By focusing on engaging the host school, specifically through the use of an in house liaison, measures to engage students and parents will naturally follow.

## Appendix

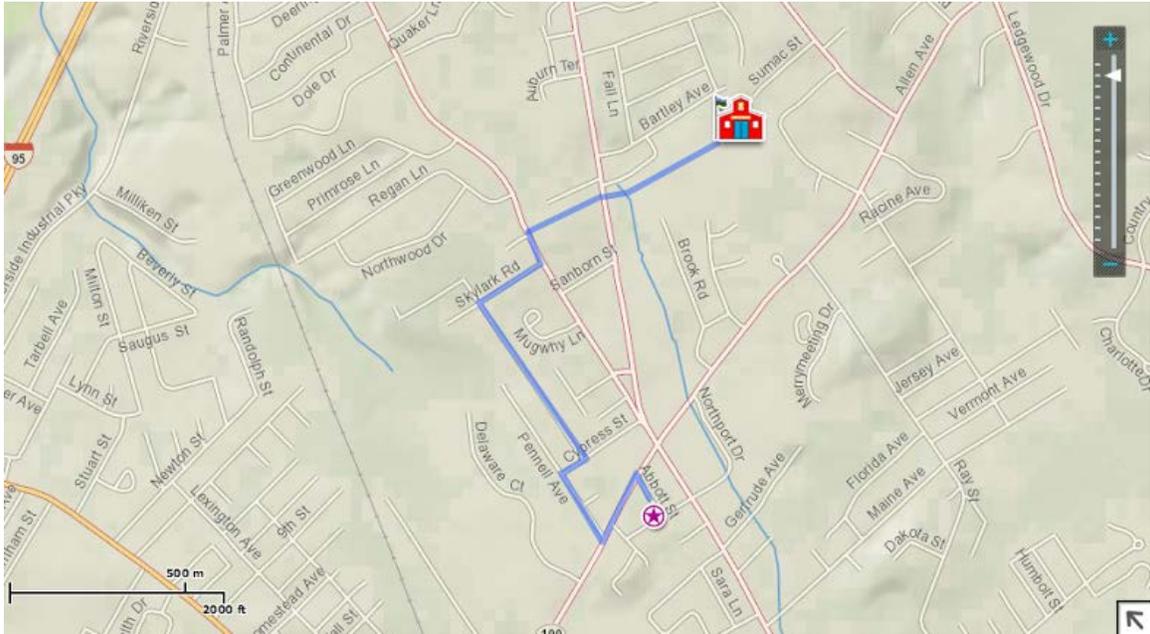
Portland Public Schools  
District Map



### Portland Elementary Schools:

- East End Community School
- Hall Elementary School
- Longfellow Elementary School
- Lyseth Elementary School
- Ocean Avenue School
- Presumpscot Elementary School
- Reiche Elementary School
- Riverton Elementary School
- Cliff Island School (not pictured)
- Peaks Island Elementary School (not pictured)

Walking School Bus route for Lyseth Elementary School:



## References

- Agranat-Meged A., Ceitcher, C., Leibenson, L., Stein, M., Galili-Weisstub, E., (May 2005). Childhood obesity and attention deficit/hyperactivity disorder: A newly described comorbidity in obese children. *International Journal of Eating Disorders*. Vol 37. Issue 4. Pgs 357-359.
- Burgeson, C. R., Wechsler, H., Brener, N. D., Young, J. C., & Spain, C. G. (2001). Physical education and activity: Results from the School Health Policies and Programs Study, 2000. *Journal of School Health*, 71, 279–293.
- Castelli, D. M., Hillman, C. H., Buck, S. M., & Erwin, H. E. (2007). Physical fitness and academic achievement in third-and fifth-grade students. *Journal of Sport & Exercise Psychology*, 29(2).
- Cooper, A. R., Page, A. S., Foster, L. J., & Qahwaji, D. (2003). Commuting to school: Are children who walk more physically active?. *American journal of preventive medicine*, 25(4), 273-276.
- Deckelbaum, R., Williams, C. (November 2001). Childhood Obesity: The Health Issue. *Obesity Research*. Vol 9. Issue S11. Pgs 239s-243s.
- Donnelly, J., (June 2011). Classroom-based physical activity, cognition and academic achievement. *Preventive Medicine*. 52(1), S36-S42.
- Downs, Anthony. (2004). *Still stuck in traffic: coping with peak-hour traffic congestion*. Brookings Institution Press.
- Feychting, M., Svensson, D., & Ahlbom, A. (1998). Exposure to motor vehicle exhaust and childhood cancer. *Scandinavian journal of work, environment & health*, 24(1), 8-11.
- Gapin, J. I., Labban, J. D., & Etnier, J. L. (2011). The effects of physical activity on attention deficit hyperactivity disorder symptoms: the evidence. *Preventive medicine*, 52, S70-S74.
- Janssen, I., & LeBlanc, A. G. (2010). Review Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity*, 7(40), 1-16.
- Heelan, K. A., Abbey, B. M., Donnelly, J. E., Mayo, M. S., & Welk, G. J. (2009). Evaluation of a walking school bus for promoting physical activity in youth. *Journal of physical activity & health*, 6(5).

- Kaur, S., Nieuwenhuijsen, M. J., & Colville, R. N. (2007). Fine particulate matter and carbon monoxide exposure concentrations in urban street transport microenvironments. *Atmospheric Environment*, *41*(23), 4781-4810.
- Kong, A. S., Sussman, A. L., Negrete, S., Patterson, N., Mittleman, R., & Hough, R. (2009). Implementation of a Walking School Bus: Lessons Learned\*. *Journal of school health*, *79*(7), 319-325.
- Li, Y., Dai, Q., Jackson, J. C., & Zhang, J. (2008). Overweight is associated with decreased cognitive functioning among school-age children and adolescents. *Obesity*, *16*(8), 1809-1815.
- Mahar, M. T., Murphy, S. K., Rowe, D. A., Golden, J., Shields, A. T., & Raedeke, T. D. (2006). Effects of a classroom-based program on physical activity and on-task behavior. *Medicine and science in sports and exercise*, *38*(12), 2086.
- Marshall, J. D., & Behrentz, E. (2005). Vehicle self-pollution intake fraction: children's exposure to school bus emissions. *Environmental science & technology*, *39*(8), 2559-2563.
- Mendoza, J. A., Levinger, D. D., & Johnston, B. D. (2009). Pilot evaluation of a walking school bus program in a low-income, urban community. *BMC public health*, *9*(1), 122.
- National Highway Traffic Safety Administration, Traffic Safety Facts Research Note, March 2011. Motor Vehicle Traffic Crashes as a Leading Cause of Death in the United States, 2007. Retrieved from: <http://www.nrd.nhtsa.dot.gov/Pubs/811443.pdf>
- Nechyba, T. J., & Walsh, R. P. (2004). Urban sprawl. *Journal of economic perspectives*, *17*7-200.
- Rideout, Victoria J., Foehr, Ulla G., and Roberts, Donald F. *Generation M2: Media in the Lives of 8- to 18-Year-Olds*. Rep. Menlo Park: Henry J. Kaiser Family Foundation, 2010.
- Sabin, Lisa et. al. (2005). Characterizing the Range of Children's Air Pollutant Exposure during School Bus Commutes. *Journal of Exposure Analysis and Environmental Epidemiology*. Vol 15, pgs 277-287
- Slemenda, C. W., Miller, J. Z., Hui, S. L., Reister, T. K., & Johnston, C. C. (1991). Role of physical activity in the development of skeletal mass in children. *Journal of bone and mineral research*, *6*(11), 1227-1233.
- Snyder, Tyler., Dillow, Sally., (2013) Digest of Education Statistics 2012. U.S. Department of Education Center for Education Statistics. Table 206

Sothorn, M. S., Loftin, M., Suskind, R. M., Udall, J. N., & Blecker, U. (1999). The health benefits of physical activity in children and adolescents: implications for chronic disease prevention. *European journal of pediatrics*, 158(4), 271-274.

Trasande, L., & Thurston, G. D. (2005). The role of air pollution in asthma and other pediatric morbidities. *Journal of allergy and clinical immunology*, 115(4), 689-699.

Tudor-Locke, C., Ainsworth, B. E., & Popkin, B. M. (2001). Active commuting to school. *Sports Medicine*, 31(5), 309-313.