THE INFLUENCE OF URBAN FORMS ON PARENTS' ASSESSMENT OF NEIGHBORHOOD SUITABILITY FOR ACTIVE COMMUTING TO SCHOOL: A CASE STUDY IN EUGENE, OR.

by

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Yizhao Yang, Chair of the Committee

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Abstract

Rates of active school commuting (ASC) among elementary school age children have declined precipitously over the last three decades. Programs like Safe Routes to School seek to reverse this trend through a variety of interventions, including modifications of existing streetscapes. These costly improvements must be prioritized for maximum effect. However, while parents largely determine their children's modes of school commuting, the relationship between physical barriers to ASC and parents' attitudes toward ASC remains unclear. This study examines the school commuting behavior of students in a mid-sized Oregon City. It seeks to understand the influence that urban forms exert on children's rates of walking or biking to school, on parents' decisions to allow their children to do so, and on the assessments of neighborhood suitability for ASC that inform those parental decisions. Results show that parents' neighborhood assessment is a strong predictor of active school commuting. Moreover, parents' decisions about school commuting modes may be more influenced by environmental characteristics than by family socioeconomic characteristics. Recommendations include future research designs that examine the relationship between specific urban forms and parents' perception of neighborhood safety, with a particular focus on street density and block length.

ACKNOWLEDGMENTS

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Dedicated to Judy, Jack and Frank for the infinite patience they have shown over the last two years while I have indulged my intellectual curiosity, and to my dad, Dr. Max Abbott, who has always given me the inspiration and encouragement to do the things I wasn't sure that I could.

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Chapter 1. Introduction

Recent planning literature is replete with research following two closely related, yet distinct, lines of inquiry. The first is the relationship between urban form and travel demand, particularly a reduction of demand for travel by personal automobiles. The second is the decreasing rate of children's active commuting to school, its relationship to environmental factors *and* the relationship of those environmental factors to parents' attitudes toward active school commuting (ASC). Rates of ASC among children in the US have significantly diminished over the last three decades. A longitudinal study of data collected by the US Department of Transportation shows that the percentage of schoolchildren walking or biking to school had declined from nearly 41% in 1969 to less than 13% in 2001. Over the same period, trips to school by private vehicle rose from 17% to 55% (N. C. McDonald, 2007). It is an expressed policy of many local governments to encourage the use of transportation modes other than private automobiles[1]. Logically, increased levels of ASC will reduce vehicle trips, supporting such policy goals.

While acknowledging the lack of evidence to, as yet, confirm the hypothesis, some researchers suggest that active school commuting may be an important source of physical activity that contributes to a lowering of children's health risks (Tudor-Locke, Ainsworth, & Popkin, 2001). There *is* evidence that walking or biking to school encourages higher overall activity levels among children. Research in Denmark, for instance, has shown that ASC - particularly walking - is associated with higher overall levels of physical activity among primary grade school children compared with those who are driven to school in cars (Cooper, Andersen, Wedderkopp, Page, & Froberg, 2005). Measures taken to increase rates of ASC, therefore, may support policy objectives in the spheres of both public health and transportation.

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[1]Transportation and land use planning for the City or Eugene, OR, the setting for this case study, is guided by County and State policies encouraging reduction of reliance on automobiles; *Central Lane MPO Regional Transportation Plan* http://docs.lcog.org/mpo/PDF/rtp/2031/2031RTP_Chapters1-4_Nov-07Adoption_Corrected.pdf, accessed 11/10/2011; *Oregon Administrative Rules, DLCD, Transportation Planning,* Division 12, http://arcweb.sos.state.or.us/pages/rules/oars_600/oar_660/660_012.html, accessed 11/10/2011.

Unsurprisingly then, research in recent decades has sought to identify factors, both social and environmental, that can be shown to exert a positive influence on active transport (AT) among adults, and active school commuting (ASC) among schoolchildren. School authorities and local governments have sought to encourage active commuting through a variety of interventions; including modifications of existing streetscapes. This study seeks to build on considerable existing research into urban forms and to examine their influence on both students' rates of ASC and parents' attitudes toward the suitability of their immediate neighborhoods for their children's participation in ASC. Clarifying the relationship between urban forms, travel behavior, and attitudes toward both could aid the formulation of street infrastructure improvement priorities.

Chapter 2. Literature Review

Urban forms and active travel

The planning literature has a rich traditional vocabulary for describing urban forms. 'Pedestrian friendly' urban design has been associated with fewer vehicle trips and higher rates of transport by modes other than auto. (Cervero & Kockelman, 1997; Cervero, Sarmiento, Jacoby, Gomez, & Neiman, 2009) An association has also been shown between urban forms and physical activity levels, providing a rationale for infrastructure investments as a public health benefit (Frank, Schmid, Sallis, Chapman, & Saelens, 2005). Linkages between *specific* urban forms and travel behaviors, however, are complex and difficult to deconstruct. This is due, in part to the difficulty in controlling for the large number and wide variety of independent variables (Crane, 2000). Individual urban form measures, such as residential density alone, have proven insufficient to account for AT among adults. (Forsyth, Oakes, Schmitz, & Hearst, 2007) Some studies confirm a strong relationship between environmental conditions, both objective and perceived, and levels of AT (Guo & Bhat, 2007; Hoehner, Ramirez, Elliott, Handy, & Brownson, 2005). Moreover, "various aspects of the built environment probably work together in impacting decisions to walk", among adults (M. Alfonzo, Boarnet, Day, McMillan, & Anderson, 2008; M. A. Alfonzo, 2005). Recent research highlights the highly subjective nature of perceptions about the safety of the physical environment, the attendant difficulties of measuring effective physical interventions, and the difficulty of deriving a common vocabulary across planning and health disciplines to describe environmental attributes that promote physical activity (Forsyth, Michael Oakes, Lee, &

Schmitz, 2009; Krizek, Handy, & Forsyth, 2009; Sallis, 2009). Handy, et al., note that to better understand adults' motivations to use active transport (AT), "measures of the built environment must be refined" and that "detailed data on the built environment must be spatially matched to detailed data on travel behavior"(Handy, Boarnet, Ewing, & Killingsworth, 2002). Recent studies have begun to build a new vocabulary of street connectivity with which to associate active transportation behaviors (Berrigan, 2010; Dill, 2004). A study of AT behavior in Australia noted that adults tend to overestimate the distance to nearby neighborhood destinations while underestimating the distance to destinations farther from home (McCormack, Cerin, Leslie, Du Toit, & Owen, 2008). It concluded that future studies should incorporate actual and perceived distance measures as each may play a role in determining physical activity levels.

Active School Commuting

Following the demonstrated success in California in the late 1990s of interventions on school travel behavior (Staunton, Hubsmith, & Kallins, 2003) a Safe Routes to School (SRTS) program was widely adopted by school districts in Oregon, and in states across the US. Significant attention, and research, has been directed to finding which environmental characteristics are most conducive to students' active commuting. Many studies have looked for predictors of ASC among a variety of environmental, social, and demographic variables (Hume, 2009; A. Timperio, Ball, K., Salmon, J., Roberts, R., Giles-Corti, B., Simmons, D., Baur, L., Crawford, D., 2006; A. Timperio, Crawford, Telford, & Salmon, 2004). Other research has focused exclusively on environmental measures. One study analyzed 26 objectively measured urban forms, grouped as neighborhood characteristics, route characteristics, or school characteristics (Jenna R. Panter, Andrew P. Jones, Esther M. F. Van Sluijs, & Simon J. Griffin, 2010). Among environmental variables, however, only distance has consistently been shown to exert a strong influence on active school commuting.

Research has consistently shown a negative association between distances from home to school and the rates of ASC. A review of data from the US Department of Transportation's 2001 National Household Travel Survey found that, while density of street networks has a weak positive association with walking to school, the strongest effect on mode choice for school commuting was exerted by distance (N. McDonald, 2008). The study noted that 48% of students

living within one mile of school walked, compared with only 3% of those living more than one mile.[2] These findings were reinforced by a study of 10 to 14 year old school children living in the San Francisco area which found that roughly 75% of students living less than 0.5 miles from school used active commuting, whereas this number decreased to 18% for those living between 1.0 and 1.5 miles from school (N. C. McDonald & Aalborg, 2009). A study of Oregon Middle School children found that while intersection density, and other urban, forms were associated with levels of walking to school, distance was the strongest predictor of both walking and biking, and the only strong predictor of biking (Schlossberg, Greene, Phillips, Johnson, & Parker, 2006). A subsequent study of Canadian school children found that intersection density was *not* a strong predictor of ASC, though land use mix and tree cover may be (Larsen et al., 2009).[3]

Influences of parental decision making

Research has recently begun to examine the relationship between these forms and parents' perceptions about the suitability of their neighborhoods for ASC. An Australian study examined parents' decisions regarding their child's use of ASC. Parents reported the child's age, the safety of walking paths, availability of adult supervision, and commuting distance, in order of importance, as factors influencing their decision. Only distance, however, was found to be significantly associated with increased odds of actual active commuting (Yeung, Wearing, & Hills, 2008). A recent UK based study found that distance from home to school was the most reliable predictor of ASC when that distance is relatively large (J R Panter, A P Jones, E M F van Sluijs, & S J Griffin, 2010). For smaller distances, however, parental attitudes toward the neighborhood suitability for ASC were a stronger predictor of travel behavior. The study concluded that any effectiveness evaluation of physical interventions should consider their role in modifying parental attitudes. Recent research has emphasized the importance of attitudinal

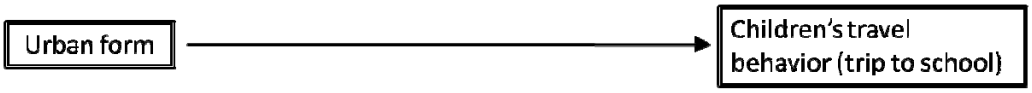
[2] In light of the finding that only 20% of students however lived within one mile of school, these facts led the author to conclude that the most effective policy measure to increase levels of ASC would be a return to neighborhood schools, near students' residences.

[3] A notable limitation of this study was the fact that, due to privacy concerns, postal codes were used as proxies for student addresses. Home to school distances and routes were consequently more approximate than those in other studies.

variables in any understanding of how parents make decisions regarding their child's use of ASC (Kerr et al., 2006; Yang, under review).

McMillan illustrated that the SRTS program design suggests a simple relationship between urban form and students 'commuting behavior, as shown below in Figure 1. (McMillan, 2005).

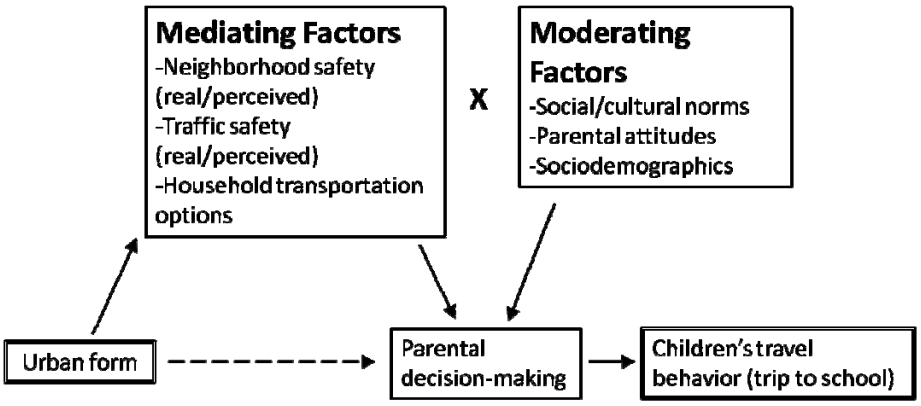
Figure 1: McMillan 2005 (a)



McMillan, 2005 Figure 1 *Relationship suggested by SRTS program*

Asserting that existing research had largely ignored the central role of parental decision making to the commuting behavior of children, McMillan offered a more complex conceptual framework, shown below in Figure 2 (McMillan, 2005). In this model parental decisions, which determine children's ASC, are indirectly influenced by urban form and subject to the mediating influences of perceptions about the suitability of their neighborhood for ASC, and the moderating factors of social pressures and economic constraints.

Figure 2: McMillan 2005 (b)



McMillan, 2005 Figure 2 *Conceptual framework of Elemen. child's travel behavior*

Street network connectivity measures

As noted above, there is considerable space in the planning literature devoted to the influence of environmental conditions, particularly street network connectivity, on levels of active

transportation. Recent research has postulated key urban form metrics. Cervero and Kockelman famously used travel diary records from the San Francisco Bay area to establish the '3Ds' influencing travel demand; density, diversity, and design (Cervero & Kockelman, 1997). Dill tabulated urban forms in the research literature into fourteen objective connectivity measures (Dill, 2004). Of these measures she found four, *Street Network Density, Connected Node Ratio, Intersection Density, and Link-Node Ratio* most useful for measuring connectivity in Portland, OR. A recent study of 32 Florida elementary schools identified barriers and facilitators to student ASC. It used *Straight-Line Distance* and *Network Distance* (roadway and pedestrian) to define ½ mile pedestrian sheds. These sheds were then evaluated using *Pedestrian Route Directness (PRD)* as one index of their effectiveness in capturing potential student pedestrians (Bejleri, Steiner, Fischman, & Schmucker, 2010).

The present study follows the leads established by researchers cited above in seeking to clarify the association between ASC and urban form variables, summarized in Figure 3: Comparison of Environmental Variables.

Figure 3: Comparison Environmental Variables

Variables	Definition
Dill, 2004	
Street network density	Street length / sq mile in 1/4 mile buffer area (lin. miles)
Connected Node Ratio	Sum of nodes /sum of nodes plus Cul-de-Sacs in buffer(number)
Intersection density	Nodes / sq mile in 1/4 mile buffer area (number)
Link to Node Ratio	Sum of links /sum of nodes in buffer(number)
Schlossberg et al., 2006	
Distance	Home to school distance on street network
Dead end density	Number of dead end intersections in buffer area
Intersection density	Number of 3 and 4 way intersections in buffer area
Route directness	Ratio of straight line to network distance
Major road crossing (barrier)	Dichotomous variable, intersects route
Railroad crossing (barrier)	Dichotomous variable, intersects route
Bejleri et al., 2010	
Network Distance	Both roadway and pedestrian
Straight-Line Distance	Euclidean distance to school
Pedestrian Route directness (PRD)	Ratio of network distance to straight-line distance
This Study	
Network Distance (shortest route)	Distance along identified shortest network route (lin. miles)
Total crossings	Major road and railroad crossings along route (number)
Major Street Ratio (traffic analog)	Ratio of Major Street lengths to total Route length
Pedestrian Route directness	Ratio of network distance to euclidean distance (number)
Block Length	Average length of links along network route (lin. miles)
Intersection Density	Nodes / sq mile in 1/4 mile buffer area (number)
Street Density	Street length / sq mile in 1/4 mile buffer area (lin. miles)
Connected Node Ratio	Sum of nodes /sum of nodes plus Cul-de-Sacs in buffer(number)
Link to Node Ratio	Sum of links /sum of nodes in buffer(number)

This case study - 4 elementary schools

For this study, these variables were applied to a travel survey conducted, during the spring of 2010, among parents of 4 elementary schools in the 4J school district in Eugene, Oregon. These data provide a set of information about the perceptions of 4J school district parents with regard to the suitability of their neighborhoods for their child's ASC, and about students actual travel behavior. This study uses those data to compare parent's perceptions of the 'walk-ability' or 'bike-ability' of their neighborhood, and the actual frequency of walking and biking by students, with objective urban form metrics in the current planning literature.

This study seeks to answer three primary research questions:

1. Do parents' assessments of neighborhood suitability for ASC correspond well with GIS based objective urban form measures?

2. Which of these measures can best explain parent's assessment of neighborhood suitability for ASC? Are some environmental characteristics more salient to some parents than to others?

3. Of the two information sets - 1) parents' subjective assessments of neighborhood suitability for ASC and 2) GIS based objective urban form measures - which can best explain actual rates of ASC?

By clarifying the relationship between actual physical barriers to ASC and parents' perceptions of barriers, this study may help local agencies apportion reinvestment funds toward physical improvements, or other interventions, that will have the greatest impact on ASC.

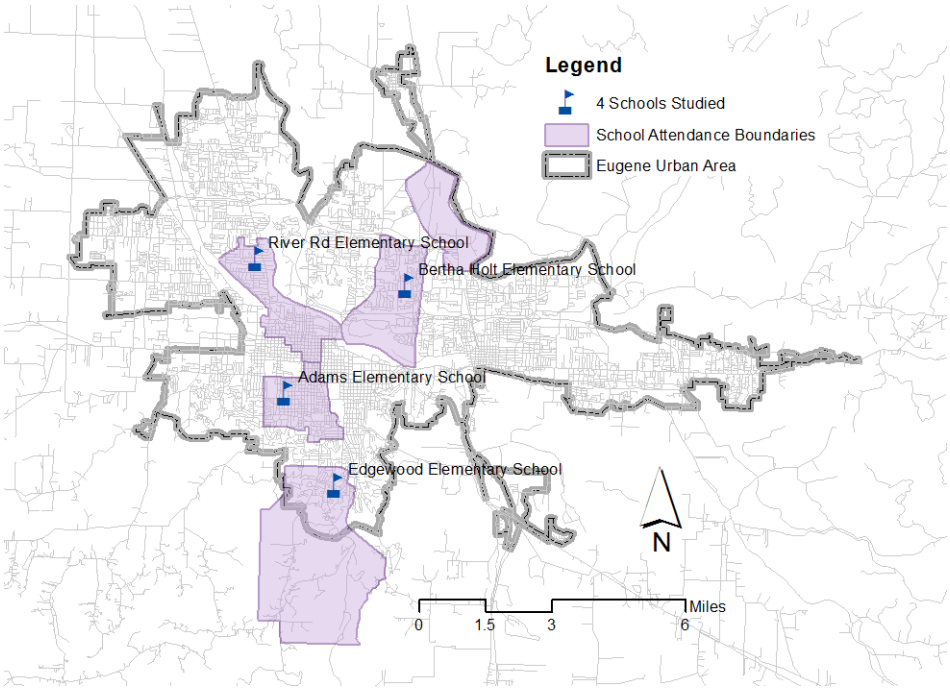
Chapter 3. Methodology

Introduction

The 4J School District serves residents of Eugene, Oregon, and immediately surrounding areas, covering 155 square miles in the southern Willamette Valley. The City of Eugene is a mid-size city with population of approximately 157,845[4]. 4J originated as the Eugene School District in 1854 and subsequently expanded to include Coburg and other nearby, smaller communities. The district's overall student attendance in 2010 was roughly 16,500. There were 22 elementary school programs in the district at the time this survey was conducted. This study focuses on the parents of young children who attend four of those elementary schools (K to Grade 5); River Road, Bertha Holt, Adams, and Edgewood.

[4] Portland State University, Population Research Center 2010 population estimate certified as of Dec. 31, 2010. http://pdx.edu/prc/annual-oregon-population-report

Figure 4: Case Study Area



SRTS / 4J Program Background

There were 26 public elementary schools in the District when the SRTS program began in 2007. The elementary school enrollment for that school year was approximately 6,000 students. Four of these schools have since closed or consolidated.

The US Congress passed the legislation that established Safe Routes to School as a national program in 2005. The program became fully operational in the 4J School District in the fall of 2007. The program funds and administers a variety of interventions aimed at increasing student rates of ASC. It also captures those rates of ASC through periodic classroom tallies and parent surveys. As a general rule these surveys and tallies are intended to be taken at three intervals. The first is a baseline count of ASC rates, to be taken before the program's start. The second is a midcourse count, to be taken some time during the course of the intervention program. The third is a post-course count, to be taken when all program interventions are completed. In practice, however, many programs are ongoing, with no specified end date.

Interventions are broadly classified into four categories, also known as the 4E's; engineering, education, encouragement, and enforcement. Engineering interventions are usually infrastructure improvements such as sidewalk construction, crosswalks, and traffic signal improvements. Education programs aim to improve students' active commuting skills and awareness; and to increase the safety of walking and biking activities. Similarly, encouragement interventions seek to raise the awareness of active commuting benefits among both students and their parents. 'Walk and bike to school day' is one example of a program designed to increase enthusiasm for active commuting. The fourth 'E', enforcement, includes such interventions measures as the funding of street crossing guards, the placement of speed feedback trailers near schools, and increased police presence to enforce speed limits in school zones.

In the 4J school district, with only a few exceptions, interventions to date have been those in the categories of education and encouragement. Infrastructure related improvements, which often take longer to realize, have only recently been widely implemented.

4J School Choice Program

School choice refers broadly to a variety of policies related to school enrollment and funding. Here I refer specifically to a 4J school district policy, begun in the early 70's, which allows parents to enroll their children in schools other than their assigned schools(Lawson, 1985). Under the school choice program a student may attend any school not assigned for the student's neighborhood, provided that space is available.[5] Of the approximately 6000 students enrolled in the 4J elementary schools in 2007-2008 school year, about 15% enrolled in neighborhood schools not assigned to their geographic residence (Yang, under review). Students that attend non-assigned schools, through the choice program, are required to provide their own transportation. Only students who attend their neighborhood school, and who live more than a mile from their schools, are eligible for bus service.[6]

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[5] Transfer requests are selected by lottery. Considerations such as parents' workplace locations, childcare arrangements, and other factors are used to weight the priority of lottery selections.

[6] This transportation policy is not inflexible; parents are responsible for transportation to school unless space is available on a district bus. Exceptions can also be made to the one mile rule if it is deemed unsafe to walk, or if the

Survey Design and Sample

To address the research questions a secondary analysis was conducted of data from a cross-sectional survey sample of 278 parents of elementary school children in the 4J school district. The surveys were collected by mail in May of 2010 as part of a separate research project, funded by the Robert Wood Johnson Foundation, aimed at understanding the effects of SRTS interventions on ASC behavior over time. Survey respondents were self-selected from a population of 1,134 surveys mailed to parents of all students at the four elementary schools, at addresses provided by the 4J school district.[7] This list of 1,134 parent addresses was the sampling frame. The four schools included in this survey were chosen because none had yet been significantly involved in the SRTS program, enabling them to act as a control group in a broader study of SRTS interventions across the school district. They are also well suited to the purposes of the present study because each of the neighborhoods surrounding the four schools has demographic and physical characteristics that are distinctive from each of the other three, thus enabling some comparison of the differences and their possible effects on attitudes toward ASC and on travel behavior.

Survey Instrument and Procedures

The survey instrument and procedures for gathering and analyzing data were approved in advance by the Office for Protection of Human Subjects at the University of Oregon, and by an administrator of the 4J School District[8]. The four page survey included sixty items, designed to collect self reported modes of school commuting and parents' attitudes toward ASC. A cover

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child has special needs. Special needs students may ride the bus to their school of choice, along with a sibling, subject to space availability.

[7] The survey instrument asked respondents to identify the nearest major intersection. This allowed me to identify eight cases in which respondents had changed addresses. For these cases residences were digitally re-located to the nearest intersection identified in the survey.

[8] The initial survey draft was eight pages in length, and included several questions regarding socio-economic status. The survey size was significantly reduced at the request of the 4J administrator who specifically asked that questions related to income, ethnicity, or parents' educational attainment level be eliminated.

letter explaining the purposes of the study, and ensuring confidentiality, was included with mailed survey. Advance notifications and follow up measures, broadly following recommendations from "Dillman's Total Survey Design" were used to improve response rates versus similar mailed surveys (Dillman, 1978). Notification postcards were sent in advance of the survey. Reminder postcards were sent afterward. Twenty gift certificates of $25 value were offered, via raffle, to encourage returns.

The four page survey was designed to capture responses into six broad categories.

Basic Information

Respondents were asked to identify the school that their child attends and the nearest cross street to their residence.

Travel mode

Respondents were asked, on a 1 to 5 scale (0 = never, 5 = every day) to estimate the frequency of their child's travel, *to* school from home, in a typical week during the previous seven months, using the following modes:

- Walked with adult(s)
- Walked without adult(s)
- Biked with adult(s)
- Biked without adult(s)
- Rode school bus
- Rode in a car (family vehicle or carpool)
- Other (specify)

They were then asked the same questions regarding the child's travel *from* school to home. Facsimiles of the survey instrument, the cover letter and postcards are included in Appendix A.

Opinions about school travel

Respondents were asked to estimate the distance from their residence to school and to estimate the approximate travel time if walking, biking, and driving. They were asked whether they considered this to be a walkable distance, and if they considered it a bikeable distance. They were asked to rate, on a scale of 1 to 5 (1 = not important, 5 = extremely important) the

importance the reasons that might factor in to their decision use a car or school bus rather than walking or biking to school. The list of reasons was:

- Distance from residence to school too far
- Child is too young – not ready to walk or bike
- No one is available to accompany my child to walk or bike to school
- Fear of child getting hurt or abducted
- Concern with traffic (e.g., lots of traffic on roads and/or roads crossing)
- Faster speed (less time) allowed by car travel
- Combining school trip with other trips (e.g., trip to workplace, shopping)
- Other reasons (please specify)

They were similarly asked, if applicable, to rate on the same 1 to 5 scale the importance of reasons that might factor in to their decision to let their child walk or bike to school. The list of reasons was:

- Combining school trips with other trips (e.g., walk or bike to workplace)
- Increase child's physical activity
- Quality time spent with child together walking or biking to school
- No car available
- Save money
- Faster than driving a car
- No school bus available
- Other (please specify)

Student questions

Respondents were asked a series of questions regarding the child and the household characteristics. These asked:

- The age, grade, and gender of the child
- Number of cars in the household
- Whether a school bus was available for transport to school
- If the child had asked for permission to walk or bike to / from school in the last year
- At what grade would you allow your child to walk or bike to /from school without an adult – or if they would not feel comfortable at any grade
- The respondent's opinion concerning how much the child's school encourages or discourages walking and biking to / from school, on a 1 to 5 scale.

Attitudinal questions

Respondents were asked to express their level of agreement on a 1 to 5 scale (1= strongly disagree, 5= strongly agree) to the following statements:

- For trips around town, driving is a more comfortable way of travel than walking or biking.
- Walking or biking, whenever possible, is a way to demonstrate one's commitment to protecting the environment.
- I generally prefer driving whenever I need to go places in this area.
- Walking or biking to school is a good way to increase children's physical activity.
- I have to drive around to do things – even if I would rather not.
- Walking or biking to school is a good way to help children know their neighborhood.
- Children who are always transported by adults to do things may develop a habit of relying on automobiles in their later life.
- I feel like I drive my car as much as other people do.
- In the place where we live I could let my child walk or bike to school if I wanted to.
- I believe that the layout of my neighborhood makes it a good place for my child to walk.

Comments

Finally, respondents were given space in which to add any comments. Those comments were transcribed and are included in Appendix A. A facsimile of the full survey instrument, and the associated notification postcards, is included in Appendix B.

GIS procedures

All GIS procedures were carried out using ArcMap 10.0 and extensions, as noted below. The latest available Lane Council of Government (LCOG) GIS data for street centerlines (2010 data), rights of way, tax lots, and other existing physical conditions, covering the Eugene / Springfield metropolitan area , were used to create the mapping database. GIS data depicting school locations and school attendance boundaries were also used. All LCOG and 4J GIS data were obtained from the University of Oregon Map Library.

The LCOG street centerline shape file was enhanced to reflect the possible paths that *could* be used for ASC, as follows:

The original street file included freeways, which are obviously not acceptable as walking or biking routes. Freeways were eliminated from the database by deselecting all street segments

classified as *Urban Interstate*, *Rural Interstate*, or *Other Urban Freeways and Expressways* (FED_CLASS).[9]

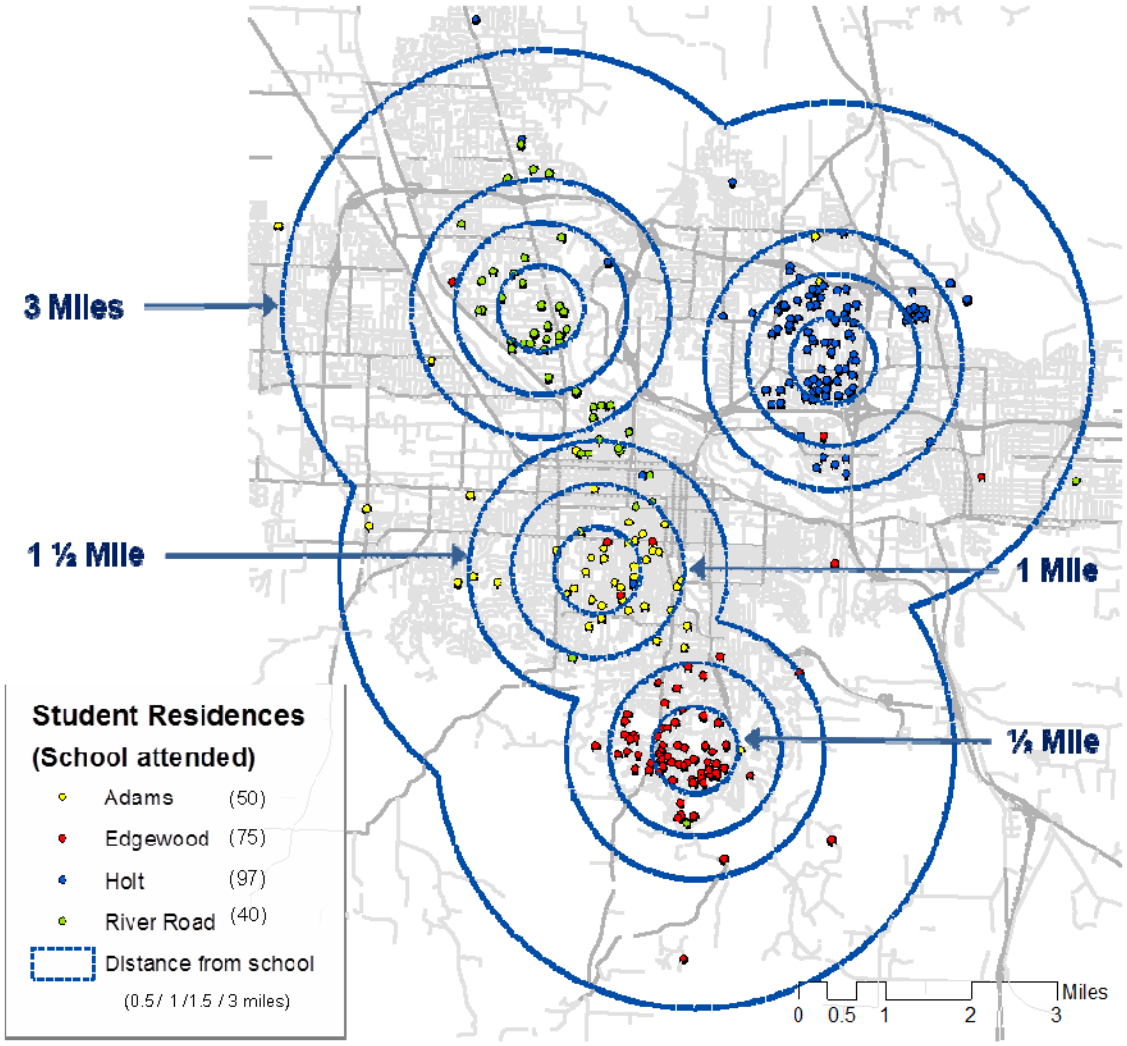
Existing paths, dedicated for bike and pedestrian use, represent viable routes for ASC. These paths were added to the street database, creating a new street centerline file of potential routes to school; one that includes both streets and recognized paths[10], but does not include freeways.

Respondent addresses were then address matched (geo-coded) to the expanded street centerline file. Each point location was field verified to be accurate to within a few hundred feet of the assigned address for all cases. In a few cases point locations were digitally corrected to match field observations.

[9] Defined at US DOT website http://www.fhwa.dot.gov/planning/fcsec2_1.htm#top

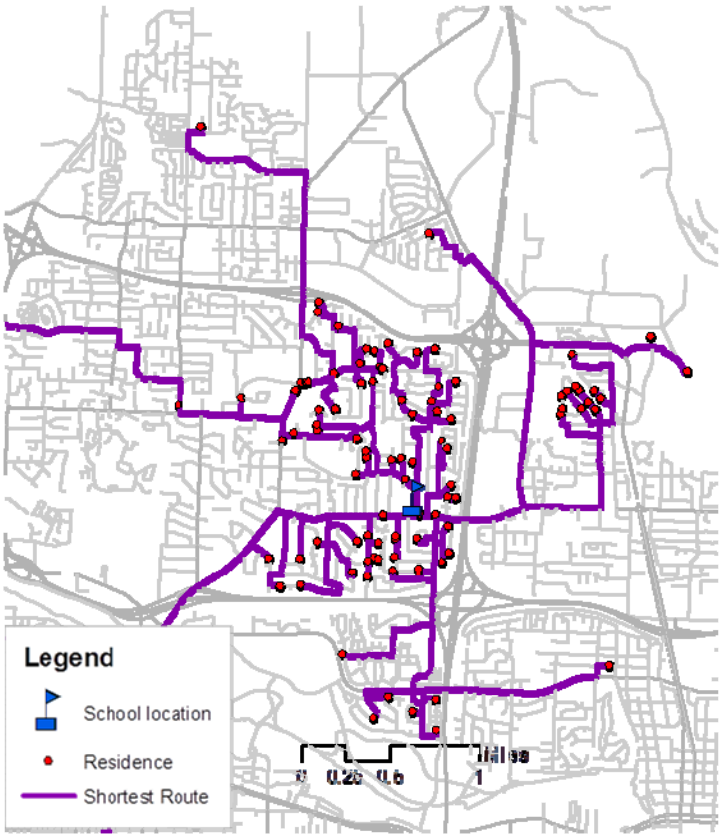
[10] City of Eugene, OR Bike Map *http://www.eugene-or.gov/portal/server.pt/gateway/PTARGS_0_2_356489_0_0_18/Eugene2010.pdf* Last updated October 2009, accessed March 15, 2011.

Figure 5: Respondent Residences and School Distance Buffers



The shortest route was calculated, along this street and path network, between the residence of each respondent and the school they attend, using the *Closest Facility* function of the ArcMap *Network Analyst* extension, as illustrated in Figure 6. As a comparison, the Euclidean (straight line) distance between those two points was calculated, for each case, using the ArcMap *Analysis*/*Proximity*/*Near* tool.

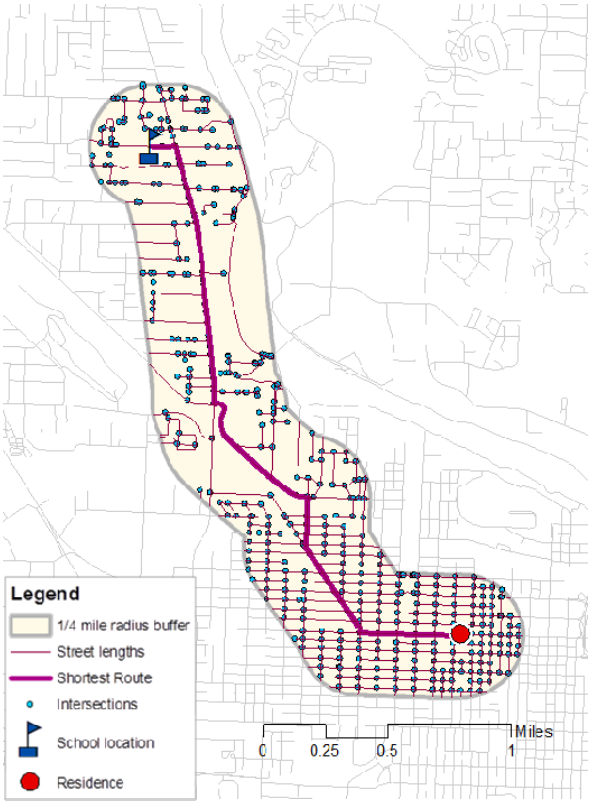
Figure 6: Network Distances (Shortest Routes)



Urban form measures were calculated for a polygon surrounding this most direct route from the home of each respondent to their school. These polygons were created using the Buffer tool to include ¼ mile distance surrounding each route, following the methodologies outlined in prior research (Dill, 2004; Schlossberg, et al., 2006). These individual case polygons, shown in Figure 7, are the units of analysis for this study. [11]

[11] For subsequent data analyses the addresses were identified only by an assigned number to protect the anonymity of respondents.

Figure 7: Case Polygons



Statistical Analysis

All statistical calculations were computed using PASW Statistics 18 software, release 8.0.0.

Measures

The dependent variables were the frequencies of ASC (biking or walking) by respondents' children, and the respondents' perceptions of the suitability of their neighborhood for ASC. The independent variables were nine measures of urban form as shown in Table 1 below.

Table 1: Urban Form Measures

Measure	Description	Reference
1. Network Distance	Shortest route from home to school	(Schlossberg, et al., 2006)
2. Total Crossings	Number of Major Street Crossings along route	(Schlossberg, et al., 2006)
3. Pedestrian route directness (PRD)	The ratio of network distance to straight line distance from home to school	(Dill, 2004; Jenna R. Panter, et al., 2010; Schlossberg, et al., 2006)
4. Block length	Average length of streets, between cross streets, along the network route.	(Dill, 2004)
5. Ratio of Major Street segments	The ratio of major street segment lengths to total street segment lengths along the shortest.[12]	(McGinn, Evenson, Herring, Huston, & Rodriguez, 2007)[13]
6. Intersection density	The number of street intersections per square mile.	(Dill, 2004; Jenna R. Panter, et al., 2010; Schlossberg, et al., 2006)
7. Street density	Linear miles of street length per square mile.	(Dill, 2004; Jenna R. Panter, et al., 2010)
8. Connected node ratio	The number of street intersections divided by the number of intersections plus cul-de-sacs	(Dill, 2004; Jenna R. Panter, et al., 2010)
9. Link to node ratio	The number of links divided by the number of nodes within the study area	(Dill, 2004)

The frequency of ASC was derived directly from survey responses to questions asking how many days per week student's typically walked or biked to and from school, on a scale from 'never' (0) to 'every day' (5). Responses were coded into one of three categories - once per week, at least three times per week, or every day – for the commute to school from home and to home from school.

Respondents' assessments of neighborhood ASC suitability were calculated as an average of their answers, on a five point Likert scale, to five separate questions:

[12] This measure was created as a proxy for traffic volumes and traffic speed, data for which were not available to the researcher.

[13] McGinn, et al. used ArcGIS Spatial Analyst extension to establish means and ranges for Traffic Volume and Speed.

How important each reason was when making your decision to use the car or school bus rather than walking or biking:

1. Distance from residence to school too far.
2. Fear of child getting hurt or abducted.
3. Concern with traffic (e.g., lots of traffic on road and/or roads crossing).

On a scale of 1 to 5, express your level of agreement (or disagreement) with the following statements:

4. In the place where I live I could let my child walk or bike to school if I wanted to.
5. I believe the layout of my neighborhood makes it a good place for my child to walk.

The values of answers to questions 1, 2, and 3 were inverted to indicate a positive response, consistent with questions 4 and 5.[14] The response variables yielded a reliability coefficient (Cronbach's Alpha) of 0.782, indicating a good fit for a composite measure.

Analytic Approach

Descriptive statistics of the survey sample were prepared, describing:

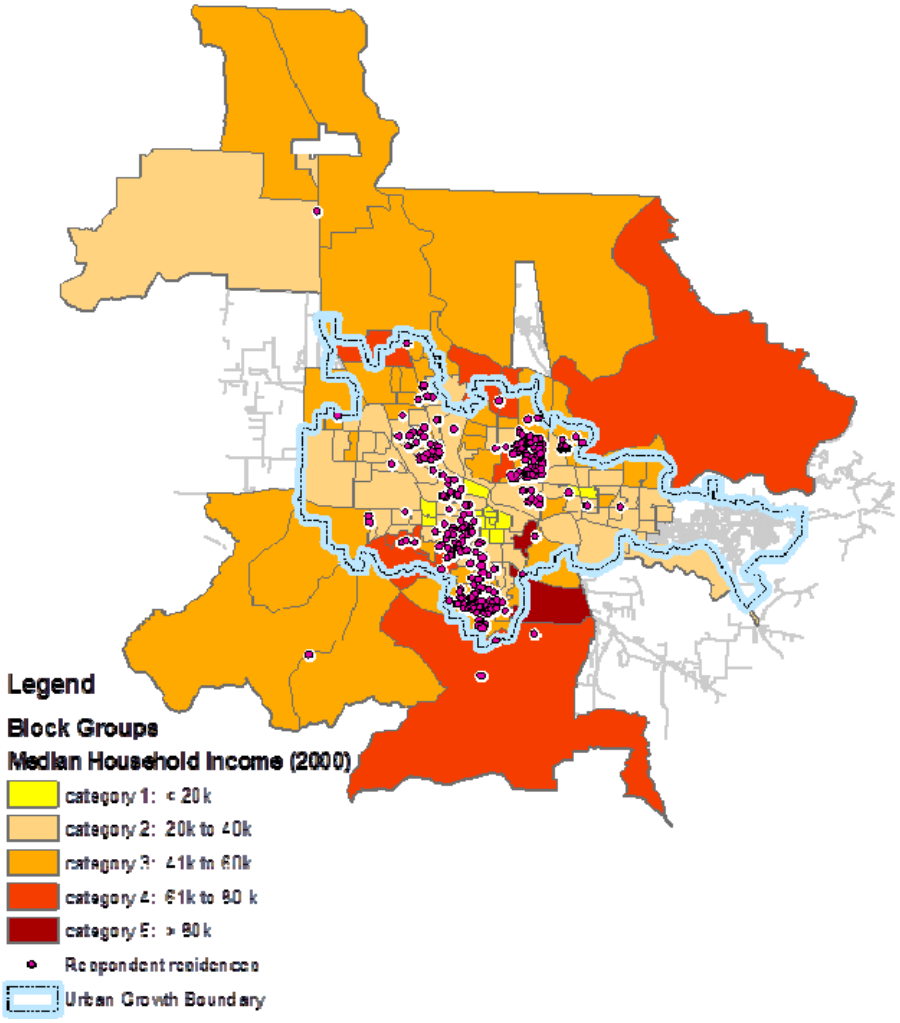
The number of respondents for each school
The students' age
The students' school grade
The students' gender
Reported rates of student ASC

The independent variables, describing urban form, were plotted on the same home-to-school polygons for each case. To address question 1, correlations were conducted to assess the relationship between the calculated urban form measures and parents ASC suitability composite scores. A multivariate linear regression was used to examine which of urban form GIS scores best predict the composite parent suitability assessment score, addressing question 2. Finally, to address question 3, a series of logistic regressions were conducted to determine, of the nine GIS scores and the composite parent suitability assessment score, which best predicts actual travel behavior. For this final set of regression models age, gender, and a proxy for economic status were used as control variables. Questions about household income, and other demographic

[14] The response variables yielded a reliability coefficient (Cronbach's Alpha) of 0.782, indicating a good fit for a composite measure.

information, were removed from the survey instrument in response to privacy concerns expressed by school district administration. The economic status proxy variable was established by mapping the location of each respondent residence within in its respective US census block group boundary. Median household incomes were then mapped for the population of each block group, from US census data, as illustrated in Figure 8.[15]

Figure 8: Median Household Income (Control Variable)

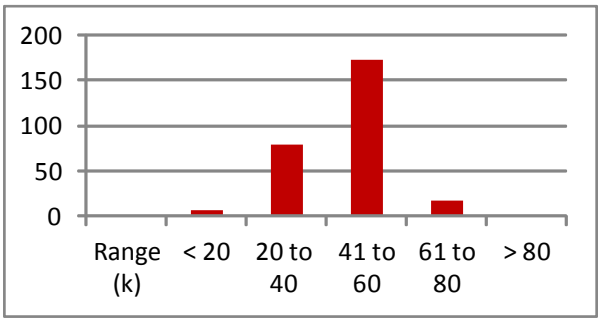


[15] 2000 US decennial census data (SF3). Though 2000 data are more than a decade old, they were deemed the best available at the closest scale. Moreover, they indicate a relative range for neighborhoods. Though the ranges have undoubtedly changed significantly in the last decade, the relative income ranges for neighborhoods, in the study area, probably has not.

Income ranges were divided into quintiles roughly matching the distribution income ranges in the Eugene-Springfield MSA, as illustrated in Figure 9.[16] The appropriate income category was assigned as a control variable to each respondent based on residence location.

Figure 9: Study Area Median Household Income Distribution (2000)

Category	Range (k)	Distrib
1	< 20	7
2	20 to 40	80
3	41 to 60	172
4	61 to 80	18
5	> 80	1
	n =	278



Chapter 4. Results

Survey Response Rate

Of 1134 instruments mailed 281 were returned. Of these three were deemed invalid because of inconsistent or incoherent responses, leaving 278 valid returns, for a 24.5% valid response rate.

Descriptive Statistics

Respondents' children ranged from Kindergarteners to 5th graders, the majority being 5th graders (61, 21.9%). A slight majority of the students were male (143, 51.6%). Most parents reside in a Block Group that had a median household income falling in the range of $41k to $60k (172, 61.9%). Frequencies and percentages for the demographics are presented in Table 1.

[16] 2000 US decennial census data (SF3).

Table 2: Frequencies and Percentages for Demographics

Demographic	n	%
Grade		
Kindergarten	49	17.7
1st	36	13.0
2nd	41	14.8
3rd	48	17.3
4th	42	15.1
5th	61	21.9
Gender		
Female	134	48.4
Male	143	51.6
Household income		
< $20k	7	2.5
$20k to $40k	80	28.8
$41k to $60k	172	61.9
$61k to $80k	18	6.5
> $80k	1	0.4

The students' ages ranged from 5 years old to 11 years old. The average age of a student was 8.36 years old (*SD* = 1.79).

The majority of respondents answered that their children did not walk or bike to or from school even 1 day per week (185/66.5% and 174/ 62.6% respectively). However, 93 students walked or biked to school at least one day per week (33.5%), 53 students walked or biked to school at least three days per week (19.1%), and 29 students walked or biked every day to school (10.4%). Also, 104 students walked or biked from school at least one day per week (37.4%), 59 students walked or biked from school at least 3 days per week (21.2%), and 31 students walked or biked from school every day (11.2%). More students walked or biked home than those that walked or biked to school. Frequencies and percentages for walking or biking to and from school are presented in Table 3.

Table 3: Frequencies and Percentages for Students Walking or Biking To and From School

Walked or biked	n	%
To school at least one day		
No	185	66.5
Yes	93	33.5
To school at least three days		
No	225	80.9
Yes	53	19.1
To school everyday		
No	249	89.6
Yes	29	10.4
From school at least one day		
No	174	62.6
Yes	104	37.4
From school at least three days		
No	219	78.8
Yes	59	21.2
From school everyday		
No	247	88.8
Yes	31	11.2

Descriptive statistics were conducted on the nine GIS scores. Network distance ranged from 0 to 12 (M = 1.47, SD = 1.57). Total crossings ranged from 0 to 19 (M = 1.76, SD = 3.16). Pedestrian route directness ranged from 0.95 to 4.58 (M = 1.47, SD = 0.39). Block length ranged from 0.01 to 0.21 (M = 0.08, SD = 0.03). Ratio of major street segments length along shortest route to total route length ranged from 0 to 1 (M = 0.22, SD = 0.26). Intersection density ranged from 38 to 900 (M = 232.13, SD = 73.08). Street density ranged from 8.5 to 39.4 (M = 22.99, SD = 5.28). Connected node ratio ranged from 0.17 to 0.97 (M = 0.81, SD = 0.08). Link to node ratio ranged from 0.61 to 7.19 (M = 1.54, SD = 0.69).

A composite score for parents' assessment of the suitability of their neighborhood for ASC was created by taking the average of responses to the five selected questions concerning urban form. These composite scores ranged from 1 to 5 (M = 2.69, SD = 1.12). Means and standard deviations are presented in Table 4.

Table 4: Means and Std. Deviations for Nine GIS Scores and Parent ASC Suitability Score.

Score	M	SD
Network Distance	1.47	1.57
Total crossings	1.76	3.16
Pedestrian route directness	1.47	0.39
Block length	0.08	0.03
Ratio of Major Street segments along shortest route	0.22	0.26
Intersection density	232.13	73.08
Street density	22.99	5.28
Connected node ratio	0.81	0.08
Link to node ratio	1.54	0.69
Parent ASC suitability assessment	2.69	1.12

Research Question 1

Do parents' assessments of neighborhood suitability for ASC correspond well with GIS based objective urban form measures?

To assess research question 1, ten Pearson product moment correlations were to be conducted to assess the relationship between the nine GIS scores, along with the composite score, and the parent ASC score. The assumption of normality was assessed with Kolmogorov Smirnov (KS) tests. All of the tests were significant, violating the assumption for normality. Therefore, ten Spearman rho correlations were conducted as the assumption of normality does not apply to the Spearman rho test.

The results showed that *network distance* was negatively significantly correlated with parent ASC scores, r_s = -.64, p < .001, suggesting that when network distance increases, parent assessment of ASC suitability decreases. Similarly, *total crossings,* r_s = -.40, p < .001 and *ratio*

of major street segments along shortest route, $r_s = -.36$, $p < .001$, were both negatively significantly correlated with parent ASC scores, suggesting that when the number of major streets to be crossed or traversed increases, parent assessment of ASC suitability decreases. The results showed that *street density*, $r_s = .34$, $p < .001$, l*ink to node ratio*, $r_s = .29$, $p < .001$, *block length*, $r_s = .19$, $p = .002$, and *connected node ratio*, $r_s = .13$, $p = .025$, were positively significantly correlated with parent ASC scores, suggesting that when the values of these variables increase, assessment of ASC suitability increases. Results of the Spearman correlations are presented in Table 5.

Table 5: Results of Spearman Correlations with GIS and Parent ASC Suitability Assessment Scores

GIS score	Parent ASC Suitability Assessment
Network Distance	-.64**
Total Crossings	-.40**
Pedestrian route directness	.03
Block Length (avg. along network route)	.19**
Ratio of Major Street segments along shortest route	-.36**
Intersection density	.02
Street Density	.34**
Connected Node Ratio	.13*
Link to Node Ratio	.29**
GIS Composite	-.00

Note. * $p < 0.05$. ** $p < 0.01$.

Research Question 2

Which of the measures can best explain parents' assessment of neighborhood suitability for ASC? Are some environmental characteristics more salient to some parents than to others?

To assess research question 2, a multiple linear regression was conducted to assess if the nine GIS scores predict parents' ASC suitability score. The assumption of normality was assessed by

viewing a P-P scatterplot. The scatterplot showed little deviation from normality verifying the assumption. Homoscedasticity was assessed by viewing a residuals scatterplot. The scatterplot showed no visible pattern, verifying the assumption. The assumption of absence of multicollinearity was assessed by viewing the variance inflation factors (VIF). No VIF was over 10, verifying the assumption.

The result of the multiple regression was significant, F (9, 267) = 15.97, suggesting the nine GIS scores did account for (R^2) 35% of the variance in parent ASC score. Network distance was a significant predictor, B = -0.40, p < .001, suggesting that for every one point increase in network distance, parent ASC decreases by 0.40 points. Block length was also a significant predictor, B = 8.59, p = .002, suggesting that for every one point increase in block length, parent ASC also increased by 8.59 points. Street density was the last significant predictor, B = 0.05, p = .015, suggesting that for every one point increase in street density, parent ASC increased by 0.05 points. Results of the multiple regression are presented in Table 6.

Table 6: Multiple Regression with Nine GIS Scores Predicting Parent ASC Suitability Assessment Scores

Source	B	SE	β	t	p
Network distance	-0.40	0.06	-0.55	-6.30	.000
Total crossings	0.06	0.03	0.17	1.92	.056
Pedestrian route directness	0.06	0.14	0.02	0.42	.673
Block Length	8.59	2.80	0.19	3.07	.002
Ratio of major street lengths to total route length	-0.26	0.27	-0.06	-0.95	.343
Intersection density	0.00	0.00	-0.03	-3.7	.710
Street density	0.05	0.02	0.22	2.45	.015
Connected node ratio	1.43	1.12	0.11	1.28	.202
Link to node ratio	0.19	0.14	0.11	1.37	.171

The positive *Block Length* association with parent *Network Distance* was an expected result. The positive association of ASC suitability scores with *Block Length*, however, was a surprising finding. Eight Spearman rho product moment correlations were conducted to assess the

relationship between the nine GIS scores and the *Network Distance* score to clarify the extent to which other measures may simply be representing distance. *Total Crossings* showed a significant positive correlation, while *Block Length*, *Ratio of Major Streets*, *Street Density*, and *LNR* all showed weak negative correlations to *Network Distance*.

Table 7: Results of Spearman Correlations with GIS Scores and Network Distance Score

GIS score	Network Distance
Total Crossings	0.59**
Pedestrian route directness	-0.02
Block Length (avg. along network route)	-0.34**
Ratio of Major Street segments along shortest route	-0.46**
Intersection density	.020
Street Density	-0.24**
Connected Node Ratio	-0.08
Link to Node Ratio	-.016**

Note. * $p < 0.05$. ** $p < 0.01$.

Research Question 3

Of the two information sets – 1) parents' subjective assessments of neighborhood suitability for ASC and 2) GIS based objective urban form measures – which can best explain actual rates of ASC?

To examine research question 3, six hierarchical logistic regressions were conducted to assess if the nine GIS scores and parent attitude composite score predicts walking or biking to and from school after controlling for age, grade, gender, and household income. Prior to analysis, the assumption of absence of outliers was assessed by checking the normalized values for the nine GIS scores. Outliers are defined as having standardized values of more than 3.29 (Tabachnick & Fidell, 2007). Eight network distance scores were removed, seven total crossing scores were removed, five pedestrian route directness cores were removed, four block length scores were removed, two intersection density scores were removed, four connected node ratio scores were removed, six link to node ratio scores were removed, and one parent attitude composite was

removed, all for having normalized scores above 3.29 or below -3.29. In each of the logistic regressions, covariates were entered first to check for significance.

Walk or bike to school at least one day per week

The results of the logistic regression for if they walk or bike to school at least one day per week was not significant for the covariates, χ^2 (4) = 4.50, p = .343. However, the full model was significant, χ^2 (14) = 141.92, p < .001, suggesting that the covariates and the nine GIS scores successfully accounted for (Nagelkerke R^2) 56.1% of the variance in walking or biking to school at least one day per week. The model had three significant predictors for walking or biking to school at least one day per week. Network distance was a significant predictor, B = -2.51, p < .001, OR = 0.08, suggesting that for every one point of network distance, the student was 12.5 times more likely to *not* walk or bike to school at least one day per week. Total crossings was also a significant predictor, B = 0.37, p = .025, OR = 1.45, suggesting that for every one point increase in total crossings, the student was 1.45 times more likely to walk or bike to school at least one day per week. Lastly, Parent ASC Suitability Assessment was a significant predictor, B = 0.82, p < .001, OR = 2.27, suggesting that for every point increase in Parent ASC Suitability Assessment, the student was 2.27 times more likely to walk or bike to school at least one day per week. Results of the logistic regression are presented in Table 8.

Table 8: Logistic Regression with Nine GIS Scores, Parent Attitudes Composite and Covariates Predicting Walking or Biking to School At Least One Day per Week

Source	B	SE	Wald (1)	p	OR
Age	0.15	0.40	0.14	.706	1.16
Grade	-0.08	0.40	0.04	.850	0.93
Gender	0.36	0.36	0.98	.323	1.43
Household income	0.28	0.28	0.96	.326	1.32
Network distance	-2.51	0.55	20.91	.000	0.08
Total crossings	0.37	0.17	5.00	.025	1.45
Pedestrian route directness	0.58	0.41	2.03	.154	1.78
Block Length	13.85	11.17	1.54	.215	1034141.77
Ratio of major street lengths to total route length	0.77	0.98	0.62	.429	2.17
Intersection density	0.01	0.00	2.72	.099	1.01
Street density	-0.08	0.06	1.92	.166	0.92
Connected node ratio	8.89	4.68	3.61	.057	7270.02
Link to node ratio	0.41	0.43	0.93	.334	1.51
Parents' ASC Suitability Assessment	0.82	0.20	16.27	.001	2.27

Walk or bike to school at least three days per week

The results of the logistic regression for if they walk or bike to school at least three days per week was not significant for the covariates, χ^2 (4) = 5.22, p = .265. However, the full model was significant, χ^2 (14) = 121.95, p < .00, suggesting that the covariates and the nine GIS scores successfully accounted for (Nagelkerke R^2) 57.5% of the variance in walking or biking to school at least three days per week. The model had two significant predictors for walking or biking to school at least three days per week. Network distance was a significant predictor, B = -3.55, p < .001, OR = 0.03, suggesting that for every one point of network distance, the student was 33.33 times more likely to *not* walk or bike to school at least three days per week. Parent attitude composite was a significant predictor, B = 1.04, p < .001, OR = 2.83, suggesting that for every one point increase in parent attitude composite, the student was 2.83 times more likely to walk or

bike to school at least three days per week. Results of the logistic regression are presented in Table 9.

Table 9: Logistic Regression with Nine GIS Scores and Covariates Predicting Walking or Biking to School At Least Three Days per Week

Source	B	SE	Wald (1)	p	OR
Age	0.01	0.50	0.00	.984	1.01
Grade	0.12	0.50	0.06	.811	1.13
Gender	0.58	0.44	1.75	.186	1.78
Household income	0.00	0.33	0.00	.997	1.00
Network distance	-3.55	0.94	14.16	.000	0.03
Total crossings	-0.58	0.44	1.76	.185	0.56
Pedestrian route directness	0.80	0.43	3.51	.061	2.23
Block Length	-1.00	11.78	0.01	.932	0.37
Ratio of major street lengths to total route length	1.50	1.42	1.11	.292	4.49
Intersection density	0.00	0.00	0.04	.850	1.00
Street density	-0.07	0.07	1.04	.307	0.93
Connected node ratio	7.41	5.39	1.89	.169	1648.95
Link to node ratio	0.29	0.46	0.40	.527	1.34
Parents' ASC Suitability Assessment	1.04	0.25	17.11	.001	2.83

Walk or bike to school every day of the week

The results of the logistic regression for if they walk or bike to school every day of the week was not significant for the covariates, χ^2 (4) = 3.42, p = .490. However, the full model was significant, χ^2 (14) = 67.75, p < .001, suggesting that the covariates and the nine GIS scores successfully accounted for (Nagelkerke R^2) 44.6% of the variance in walking or biking to school every day of the week. The model had three significant predictors for walking or biking to school at least one day per week. Network distance was a significant predictor, B = -2.60, p = .015, OR = 0.07, suggesting that for every one point of network distance, the student was 14.29

times more likely to *not* walk or bike to school every day of the week. Connected node ratio was a significant predictor, $B = 18.93$, $p = .032$, OR = 167100000, suggesting that for every one point increase in connected node ratio, the student was 167100000 times more likely to walk or bike to school every day of the week. Parent attitude composite was a significant predictor, $B = 0.77$, $p = .008$, OR = 2.17, suggesting that for every point increase in connected node ratio, the student was 2.17 times more likely to walk or bike to school every day of the week. Results of the logistic regression are presented in Table 10.

Table 10: Logistic Regression with Nine GIS Scores and Covariates Predicting Walking or Biking to School Every Day of the Week

Source	B	SE	Wald (1)	p	OR
Age	0.18	0.58	0.10	.758	1.19
Grade	-0.17	0.59	0.09	.768	0.84
Gender	0.93	0.51	3.35	.067	2.54
Household income	0.12	0.42	0.08	.775	1.13
Network distance	-2.60	1.07	5.88	.015	0.07
Total crossings	-0.50	0.53	0.90	.342	0.61
Pedestrian route directness	0.46	0.44	1.07	.300	1.58
Block Length	7.87	12.74	0.38	.537	2618.25
Ratio of major street lengths to total route length	-0.76	1.82	0.18	.676	0.47
Intersection density	-0.01	0.01	0.68	.409	0.99
Street density	-0.02	0.12	0.02	.888	0.98
Connected node ratio	18.93	8.85	4.58	.032	167100000.00
Link to node ratio	-3.75	3.08	1.48	.223	0.02
Parents' ASC Suitability Assessment	0.77	0.29	7.01	.008	2.17

Walk or bike from school at least one day per week

The results of the logistic regression for if they walk or bike from school at least one day per week was not significant for the covariates, χ^2 (4) = 5.39, $p = .249$. However, the full model was

significant, χ^2 (14) = 147.70, $p < .001$, suggesting that the covariates and the nine GIS scores successfully accounted for (Nagelkerke R^2) 56.6% of the variance in walking or biking from school at least one day per week. The model had three significant predictors for walking or biking from school at least one day per week. Network distance was a significant predictor, B = -2.06, $p < .001$, OR = 0.13, suggesting that for every one point of network distance, the student was 7.69 times more likely to *not* walk or bike from school at least one day per week. Total crossings was a significant predictor, $B = 0.37$, $p = .007$, OR = 1.45, suggesting that for every one point increase in total crossings, the student was 1.45 times more likely to walk or bike from school at least one day per week. Lastly, parents ASC was a significant predictor, $B = 1.03$, $p < .001$, OR = 2.79, suggesting that for every one point increase in link to node ratio, the student was over 2.79 times more likely to walk or bike from school at least one day per week. Results of the logistic regression are presented in Table 11.

Table 11: Logistic Regression with Nine GIS Scores and Covariates Predicting Walking or Biking from School At Least One Day per Week

Source	B	SE	Wald (1)	p	OR
Age	0.16	0.39	0.16	.691	1.17
Grade	-0.10	0.39	0.06	.802	0.91
Gender	-0.04	0.35	0.01	.911	0.96
Household income	0.00	0.28	0.00	.998	1.00
Network distance	-2.06	0.48	18.77	.001	0.13
Total crossings	0.37	0.14	7.31	.007	1.45
Pedestrian route directness	0.29	0.40	0.52	.470	1.33
Block Length	15.03	11.14	1.82	.177	3380779.81
Ratio of major street lengths to total route length	1.33	0.92	2.09	.148	3.78
Intersection density	0.00	0.00	0.37	.543	1.00
Street density	0.03	0.06	0.26	.609	1.03
Connected node ratio	5.05	4.45	1.28	.257	155.34
Link to node ratio	-0.21	0.41	0.25	.616	0.81
Parents' ASC Suitability Assessment	1.03	0.21	24.09	.001	2.79

Walk or bike from school at least three days per week

The results of the logistic regression for if they walk or bike from school at least three days per week was not significant for the covariates, χ^2 (4) = 5.41, p = .248. However, the full model was significant, χ^2 (14) = 110.54, p < .001, suggesting that the covariates and the nine GIS scores successfully accounted for (Nagelkerke R^2) 51.3% of the variance in walking or biking from school at least three days per week. The model had two significant predictors for walking or biking from school at least three days per week. Network distance was a significant predictor, B = -2.55, p = .001, OR = 0.08, suggesting that for every one point of network distance, the student was 12.50 times more likely to *not* walk or bike from school at least three days per week. Parent ASC was a significant predictor, B = 0.87, p < .001, OR = 2.40, suggesting that for every one point increase of parent ASC, the student was 2.40 times more likely to walk or bike from school three days per week. Results of the logistic regression are presented in Table 12.

Table 12: Logistic Regression with Nine GIS Scores and Covariates Predicting Walking or Biking from School At Least Three Days per Week

Source	B	SE	Wald (1)	p	OR
Age	-0.50	0.44	1.25	.263	0.61
Grade	0.64	0.45	2.04	.153	1.89
Gender	0.40	0.40	1.02	.312	1.49
Household income	-0.24	0.31	0.59	.442	0.79
Network distance	-2.55	0.75	11.71	.001	0.08
Total crossings	-0.49	0.37	1.78	.182	0.61
Pedestrian route directness	0.75	0.41	3.34	.067	2.12
Block Length	-6.37	10.64	0.36	.549	0.00
Ratio of major street lengths to total route length	1.23	1.25	0.97	.324	3.43
Intersection density	0.00	0.00	0.33	.565	1.00
Street density	0.03	0.06	0.22	.636	1.03
Connected node ratio	1.79	4.58	0.15	.696	5.97
Link to node ratio	0.05	0.42	0.01	.911	1.05
Parents' ASC Suitability Assessment	0.87	0.22	15.18	.001	2.40

Walk or bike from school every day of the week

The results of the logistic regression for if they walk or bike from school every day of the week was not significant for the covariates, χ^2 (4) = 3.47, p = .482. However, the full model was significant, χ^2 (14) = 61.89, p < .001, suggesting that the covariates and the nine GIS scores successfully accounted for (Nagelkerke R^2) 39.9% of the variance in walking or biking from school every day of the week. The model had two significant predictors for walking or biking from school at least one day per week. Network distance was a significant predictor, B = -2.28, p = .013, OR = 0.10, suggesting that for every one point of network distance, the student was 10 times more likely to *not* walk or bike from school every day of the week. Parent attitude composite was also a significant predictor, B = 0.83, p = .002, OR = 2.29, suggesting that for every one point increase in parent attitude composite, the student was 2.29 times more likely to walk or bike from school every day. Results of the logistic regression are presented in Table 13.

Table 13: Logistic Regression with Nine GIS Scores and Covariates Predicting Walking or Biking from School Every Day of the Week

Source	B	SE	Wald (1)	p	OR
Age	-0.16	0.53	0.10	.758	0.85
Grade	0.26	0.54	0.23	.628	1.30
Gender	0.62	0.47	1.73	.189	1.85
Household income	-0.08	0.39	0.04	.838	0.92
Network distance	-2.28	0.92	6.12	.013	0.10
Total crossings	-0.38	0.47	0.67	.412	0.68
Pedestrian route directness	0.30	0.43	0.50	.481	1.36
Block Length	-3.73	12.00	0.10	.756	0.02
Ratio of major street lengths to total route length	-1.64	1.72	0.90	.342	0.19
Intersection density	0.00	0.01	0.40	.528	1.00
Street density	-0.14	0.08	2.56	.110	0.87
Connected node ratio	7.99	6.52	1.50	.220	2956.26
Link to node ratio	-0.16	0.77	0.05	.832	0.85
Parents' ASC Suitability Assessment	0.83	0.27	9.19	.002	2.29

In summary, all six full models of the logistic regressions were significant. The nine GIS scores as a whole and the parent attitude composite, controlling for the covariates, predicted if the student walked or biked to or from school. Network distance was a significant predictor in all six logistic regressions. At its highest odds ratio, the student was 33.33 times more likely to *not* walk or bike to school at least three days per week for every one point in network distance. Parent attitude composite was also a significant predictor in all of the logistic regressions. At its highest odds ratio, the student was 2.83 times more likely to walk or bike from school at least three days.

Chapter 5. Findings and Analysis

Introduction

The goals of the analysis were threefold:

1. To identify possible correlations between urban forms and parents assessments of the suitability of their neighborhood for active school commuting.
2. To identify specific urban form measures that may be particularly salient in the formation of parents' suitability assessments.
3. To determine whether students' actual rates of ASC are best predicted by urban forms or by parents' assessment of the neighborhood suitability for ASC.

Question One

Analysis of the first research question found significant correlations between parents *ASC Suitability Assessment* and seven of the nine GIS based objective urban form measures. *Network Distance*, *Total Crossings*, and *Ratio of Major Streets* showed a negative correlation. *Street Density*, *Link to Node Ratio*, *Block Length*, and *Connected Node Ratio*, all showed a positive correlation.

Question Two

The second research question asked which urban form measures best explains parent *ASC Suitability Assessment* scores*.* A multiple linear regression found that the nine urban form measures accounted for 35% of the variance in *ASC Suitability Assessment.* Three measures were significant, *Network Distance*, *Block Length*, and *Street Density*. The least explanatory of these, *Street Density,* expresses the ratio of total street length to the total land area within the ¼ mile polygon surrounding the shortest route. Parent *ASC Suitability Assessment* increased .05 points for each point increase in *Street Density*. Parent *ASC Suitability Assessment* increased 1.63 points for each 1,000 foot increase of *Block Length*, and decreased 0.4 points for each mile of increase in *Network Distance*. When normalized by the mean value of the variables (0.08 miles for *Block Length* and 1.47 miles for *Network Distance*) those results become 0.64 points of increase and 0.58 points of decrease, respectively. The results suggest that street density plays a small role in forming parents' view of the suitability of their neighborhoods for walking or biking; whereas Network Distance and Block Length would seem to play relatively large, nearly equal, and opposite roles in forming that view, when expressed in increments of their mean values.

As noted above, *Block Length* shows a weak but significant correlation with *Network Distance* ($r_s = -0.34$, $p < .001$). Further GIS analysis of the data was undertaken to better understand what may underlie this relationship. First, a quintile division was calculated for the range of average

block length distances among all home to school route polygons, using a natural breaks method (Jenks). Polygons with an average block length in the two highest divisions (equal to or greater than 0.1mile) were dissolved as a boundary around the respective schools. Next, the polygons surrounding the shortest route to school, for all respondents who reported walking or biking to or from school at least 3 days per week, were dissolved as a boundary around the respective schools. These were mapped together with school locations, streets, and major streets. Figure 10 shows a relatively close alignment between these boundaries for River Road, Edgewood, and Holt schools. None of the Adams School routes showed average block lengths of 0.1 mile or greater. This finding suggests that there is an accidental, or unexplained, inverse relationship between Network Distance and Block Length along the travel route in the immediate areas surrounding (1.5 mile radius) three of the four schools. This finding was further confirmed by conducting Spearman rho product moment correlations between Block Length and Network Distance, differentiated by school. Table 14 illustrates that a significant correlation exists for River Road, Edgewood and Holt Schools, but not for Adams School. Figure 11 illustrates the areas around River Road, Edgewood and Holt Schools in closer detail. Adams School, in contrast to the other three, is sited in an older section of town that is characterized by shorter block lengths, higher residential densities, and a higher mix of commercial land uses. The River Road neighborhood includes many long block residential streets, on an east-west axis, near the school location. The Holt neighborhood is similar, but the axis is north-south. Edgewood has fewer long blocks, and they are not on any axis. Edgewood School is adjacent to middle school. Together the two schools occupy a relatively large land area which increases the block lengths surrounding the school. This, together with the hilly terrain in the area, likely explains the long block lengths near Edgewood. All of this suggests that longer block lengths are an artifact of the original subdivision design near these three schools. Block Length is likely a collinear variable with Network Distance rather than an explanatory variable for Parent ASC Suitability Assessment.

Figure 10: Boundaries of Routes with long Block Lengths

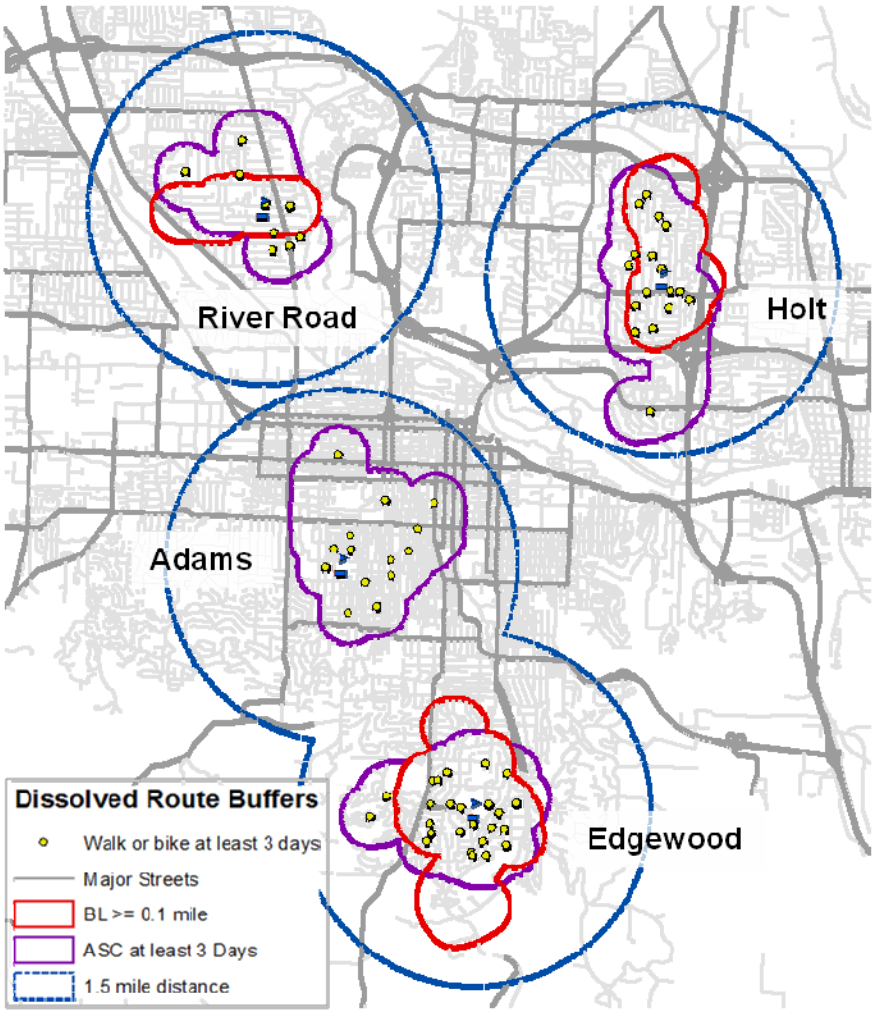
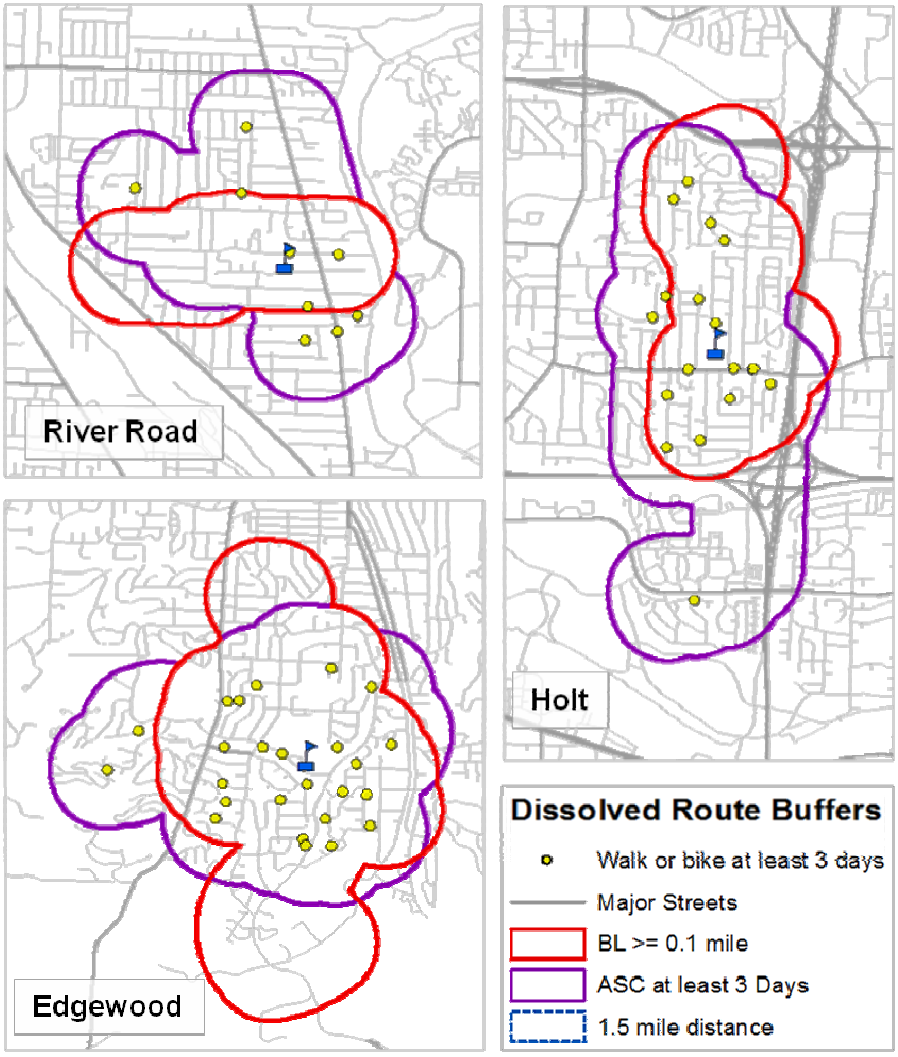


Table 14: Results of Spearman Correlations with Block Length and Network Distance

Mean Block Length by School	Network Distance
Adams	-0.02
Edgewood	-0.23*
Holt	-0.46**
River Road	-0.40**

Note. * $p < 0.05$. ** $p < 0.01$.

Figure 11: Routes with long Block Lengths – Detail



Question Three

Finally, the third research question sought to discover if any of the nine urban form measures, or the composite measure of parents' suitability assessment, was a significant predictor of actual rates of ASC; and if so which was the best predictor. The *Total Crossings* measure was significant for those students who walk or bike only one day per week. Those students are 1.45 times more likely to walk or bike, both to and from school, for each major street or rail crossing along the route. This finding is counter-intuitive and would appear to be inconsistent with a negative correlation between *Total Crossings* and parent *ASC Suitability Assessment*, identified

above. Further analysis might demonstrate that a higher number of street crossings is a proxy for higher *Street Density* and shorter *Block Lengths*, both of which showed a positive correlation to *ASC Suitability Assessment.* At present, however, this apparent contradiction is unexplained.

In *each* of the six logistic regression models, *Network Distance* and *ASC Suitability Assessment* were significant predictors. For every ASC frequency level the odds ratio that students would walk or bike was reduced 7 to 14 times, both to and from school, for each mile of *Network Distance* along the shortest route. None of the other urban form measures were significant predictors of ASC in more than one of the models.

For every ASC frequency level the odds ratio that students would walk or bike increased roughly 2 to 3, both to and from school, for each point of increase in parent *ASC Suitability Assessment.* Parents' view of neighborhood ASC suitability, then - as measured by their composite answers to questions about distance, safety, and environmental conditions - is a much better predictor of ASC rates than any of the urban form measures except distance.

Further Analysis

Each analysis performed to answer a research question left some questions unanswered. Some variables showed unexpected or apparently contradictory results compared with others. As described above, the unexpected results for *Block Length* are likely due to a collinear relationship with *Network Distance*. It also seems clear that some explanatory variables may have predictive values for parents' assessments that differ by school. To test this, four Spearman rho product moment correlations were conducted to clarify differences by school.

Table 15: School Breakdown of parent ASC Suitability Assessment Score to 4 key Forms

ASC Suitability Assessment / by School	Network Distance	Block Length	Street Density	Total Crossings
Adams	-0.78**	-0.04	0.56**	-0.58**
Edgewood	-0.58**	0.06	0.20	-0.21
Holt	-0.62**	0.33**	0.51**	-0.35**
River Road	-0.60**	0.28	-0.20	-0.53**

Note. * $p < 0.05$. ** $p < 0.01$.

As shown in Table 15, Network Distance is significantly negatively correlated with parents ASC suitability assessment for each of the four schools. The other variables are not as consistent in either significance or direction. Total Crossings shows a significant negative correlation to suitability assessment at all schools except Edgewood. Street Density shows a significant positive correlation to suitability assessment only for Adams and Holt Schools, and Block Length has a weak significant positive correlation only for Holt School. These results may suggest that these urban form variables are highly contextual and have different associative meanings to parents residing in one neighborhood than in another.

Analysis of Survey Respondent Comments

Written comments, provided by survey respondents, were analyzed for any additional clarity they might provide regarding the influence of urban forms on the formation of parents' assessment of neighborhood suitability for ASC. Comments were divided into positive and negative expressions regarding the neighborhood suitability for ASC. Positive expressions, statements affirming the reasons that parents *had* chosen ASC, or under what conditions they *would* choose ASC, were categorized as 'non-issues'. Negative expressions, statements describing barriers to ASC choice, were categorized as 'barriers'. The overwhelming majority of parents' comments portrayed urban forms as barriers (88% vs. 12% non-issues) with regard to ASC suitability. These extracted comments were further categorized by topic. The categories most frequently mentioned were *Distance* and *Traffic* (25% each) followed closely by *Crossings* and *Sidewalks* (17% each). The full results of this analysis are detailed in Appendix A: Survey Participant Comments.

The analysis of respondent comments reinforces the earlier findings that travel distance, traffic conditions, and street crossings play an important role in the formation of parents' assessment of neighborhood suitability for ASC. The presence or absence of sidewalks is also clearly an important factor, though not included in this study.

Limitations

Data were not available regarding the gender and age of non-respondents to the survey. There is, therefore, some possibility of age and gender bias among the respondent sample. Moreover, demographic information about the survey respondents was highly limited. Questions regarding ethnicity, income levels and educational attainment were withdrawn in response to privacy concerns raised by the school district administration. As a result the only available demographic control variable was income level, drawn from 2000 census data. Those data reflect income ranges at the census block group level and are therefore more generalized than might be wished. Compounding the issue is the fact that those data are now 10 years old. Future studies should seek to obtain complete demographic information for all respondents to avoid the risk of bias, and adequate comparative data for the population to ensure relevance.

For this study, street classifications were used as a proxy for traffic volumes, data for which were not available. The inclusion of actual traffic volumes, measured at times when school commuting is most common, may have improved the accuracy the relationship between traffic related GIS scores and parent suitability assessments.

Chapter 6. Conclusions and Recommendations

Discussion

This research appears to confirm previous studies that found distance from home to school to be the strongest predictor of ASC, and may also confirm a weak positive association between *Street Density* and walking to school (N. McDonald, 2008; Jenna R. Panter, et al., 2010; Schlossberg, et al., 2006; Yeung, et al., 2008). It also supports models in which travel behavior results from parental decision making, which itself is influenced by urban forms (McMillan, 2005). The

findings support other researchers' conclusions that parents' perceptions of the environment are pivotal in their decision to allow children to walk or bike to school, underscoring the emphasis given to intervention programs focused on education and encouragement, as well as physical interventions (Kerr, et al., 2006; Yang, under review). The findings of this research, in fact, suggest that urban forms may be much more influential on parents' decisions regarding ASC than other factors such as socio-economic or demographic factors.

The findings suggest that some of the other urban form variables may have limited explanatory power for parents' ASC suitability assessment; *Street Density*, and *Total Crossings* in particular. The strength of these, however, varies from one school to another. It is impractical to model these variables at the scale of individual schools because of the small sample sizes involved. Never the less, these results may suggest that urban form variables are highly contextual and have different associative meanings to parents residing in one neighborhood than in another.

Implications for Researchers

A recent study noted that travel behavior research often uses statistical techniques that require large data sets and focuses on a few key environmental interventions that can influence travel behavior through large scale interventions, but that these techniques are less effective for identifying interventions that address the diversity of factors that influence parental perceptions regarding active commuting specific to individual school neighborhoods (Zuniga, 2011). The present study findings underscore that conclusion. As noted above, the meanings that urban forms convey to parents, regarding suitability of the neighborhood for ASC, are likely to change depending on the context in which those forms exist. Long block lengths that in one neighborhood connote direct routes to school along low traffic residential streets may, in another, connote poor connectivity and unnecessarily long travel times. To the extent possible the scope of interventions intended to benefit specific school populations should be informed by research that captures environmental concerns most salient to that population of parents. Zuniga's use of Q-technique may be a useful starting point for such research among small groups (Zuniga, 2011).

In this study urban form measures were compared with parents' assessments of their neighborhood's suitability for ASC. The urban forms measured were those contained within a

polygon defined by a 1/4 mile distance on either side of the assigned shortest route. While this is a convenient method for a researcher to capture urban forms relevant to each specific child's route, this polygon does not necessarily reflect the impression that parent may have about the character of the neighborhood. One might speculate, for example, that a parent's perceptions of risk due to heavy traffic might be more influenced by conditions nearest the residence than by conditions along the remainder of the route. For parents whose children do not use ASC, neighborhood perceptions may be more influenced by the routes they commonly drive to and from the residence, then by likely ASC routes to school. Future studies should seek to understand how parents form a spatial definition of their neighborhood, and to what extent their suitability assessment matches an actual likely route to school.

This study uses GIS software to assign a student's likely route to school based on shortest distance. While this methodology is extremely useful for simplifying what would otherwise be a complex and time-consuming task for the researcher, it is not at all clear that either parents or students would use only this criterion in picking a route to school. A visual examination of the map makes it clear that, in some cases, a slightly longer route could be chosen; one that traverses streets with less auto traffic, or more bike/pedestrian friendly infrastructure. Bejleri, et al. noted the risks of overlooking informal paths when using street centerline data to estimate pedestrian routes of travel (Bejleri, et al., 2010). The methodology of future GIS based ASC studies would be greatly strengthened by seeking to establish what routes are actually chosen, and the criteria that parents use to make those choices. This could be accomplished via interviews with the parents of children who regularly use ASC.

Implications for policy makers

Other research has noted that Safe Routes to School programs have historically favored physical improvements around the school over education programs at a ratio of roughly 70% to 30% (Yang, under review). The findings of the present study suggest that parents' decision to let their child walk or bike to school is highly influenced by their perception of neighborhood safety. To the extent that infrastructure improvements improve safety they must clearly be a first priority. To influence parents' perceptions, such infrastructure investments must logically be paired with

programs to inform parents about them. Moreover, physical interventions intended to increase rates of ASC should address the specific concerns of the parents in the neighborhood. This study suggests that, for existing neighborhoods, placement of sidewalks and measures to improve the safety of street crossings are likely to be useful focal areas for local study.

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Appendix A: Survey Participant Comments

Survey participants' written comments were analyzed and references to urban forms or environmental conditions were extracted and categorized by topic. Comments were further categorized as positive or negative expressions of neighborhood suitability for ASC. Statements affirming reasons why parents choose ASC for their children, or under what conditions they would choose ASC, were categorized as positive. Statements describing barriers to ASC choice were categorized as negative. Of 64 comments, 8 were positive and 56 were negative toward ASC suitability. The categories most frequently mentioned were Distance and Traffic, followed closely by Crossings and Sidewalks, as detailed in Table A1: Participant Comment Summary.

Table A1: Participant Comment Summary

	Distance	Crossings	Traffic	Sidewalks	Topography	Parking
Non-Issues	5	0	2	1	0	0
Barriers	11	11	14	10	9	1
Total	16	11	16	11	9	1
%	**25%**	**17%**	**25%**	**17%**	**14%**	**2%**

The 64 extracted comments are shown in Table A2: Extracted Comments Related to Environmental Conditions / Urban Form. A full reproduction of all comments follows in Table A3: Complete Reproduction of Survey Participant Comments

Table A2: Extracted Comments Related to Environmental Conditions / Urban Form

	Non-Issues (I do because or I would if...)
Distance	I hope that we will continue to have a neighborhood school within **walking distance.**
	an easy **walking distance**
	transferring to a school **within 1 mile** of our home... hope to bike/walk
	moving to a house **closer to our schools** so walking to school is easier
	We ... bought our house for its proximity to good **schools w/in walking distance**
Sidewalks	If **sidewalks** ... were available I would allow my kids to walk or bike
Traffic	best ways to encourage walking...more stoplights, lowered speed limit.

	...if there were bike / ped only roads ... **motor vehicles** were secondary
	Barriers (I do not because…)
Crossings	**crossing** busy streets
	children **crossing** a very busy street with no red/green light signal
	not comfortable biking up 29th Ave. ... and **crossing** (busy street)
	child has to **cross** 2 very busy streets
	a major **intersection** my daughter has **to cross**
	a dangerous road for bikers and pedestrians when **crossing**. Cars drive too fast
	not a good **crosswalk** ….unless you go to ...another busy street that is not a direct route
	not a good place to cross! **No crosswalks!**
	Intersections ... not marked with **stop signs** in either direction.
	I have yet to see anyone **slow down near the intersection** at the school
	dangerous intersections
Distance	it is a **long way**
	we live **too far** away
	If we lived closer to school
	Distance is really **too far**
	(School) is a **distance away**
	The distance is also **too far**
	too far, too dangerous,
	it is simply **too far**
	the **distance** is too much
	we live **too far** from school
	We live **pretty far away** from school
Parking	no great places to **park bike**
Sidewalks	lack of consistent sidewalks
	a windy, dangerous road with no **sidewalk** or even shoulders;

	would really like a **sidewalk** or bike lane... no safe place to walk and no alternative route
	lack of sidewalks
	heavily driven by cars & **no sidewalks** - too dangerous
	no **sidewalks** in our neighborhood...though there's not that much traffic on our street
	no **sidewalks** in our neighborhood
	Many streets in our neighborhood have **no sidewalks**
	(Street) is very dangerous. There are **no sidewalks**
	2/3 of the walking distance has **no sidewalks**
Topography	too steep
	We live on a **hill**
	hills and traffic ... make biking difficult (but not impossible)
	Our street is very **steep and curv**y so it's difficult to bike safely
	live at the top of a **very big hill**
	live up 2 **big hills**
	not very walk friendly because of traffic ... and because of **steep hills**
	live up on a steep and curvy area
	I live at the top of ... **a big hill.**
Traffic	cars often travel **40 in a 25** mile zone.
	hills and **traffic** ... make biking difficult (but not impossible)
	...**cars speed** around the curves which makes this road way too dangerous to walk on.
	Cars speed around turns
	not very walk friendly because of **traffic** ... and because of steep hills
	speeding ... parents in vehicles
	heavily driven by cars & no sidewalks - too dangerous
	Lots of potholes & way **too much traffic** cutting through
	there is a lot of **traffic**

	(**Busy street**) as the main road to school makes it too unsafe to ride to school.
	speeding **cars**
	lack of concern for walkers' and bikers' safety **by drivers**
	Traffic goes way too fast now
	Average speed during the day is 50

Table A3: Complete Reproduction of Survey Participant Comments

The area I live in has a lot of drunk homeless people who harass the kids.
We live by a bike path with a lot of homeless drunks. Also my daughter can not get a school bus home just because it is not in her district. I find it very unfair. I have 4 children and I don't think it is fair that I have to pick different schools just to get transportation.
I will likely walk / bike more when my younger daughter is also at Adams in 2 yrs. This is very important to us and I hope that we will continue to have a neighborhood school within walking distance.
I don't think walking / biking is a strong possibility during child's elementary years due to parent's schedules -> and we would not let her walk / bike alone. The young children in our area all seem to take the bus, which they enjoy.
It's very important that children develop awareness and confidence by walking to school. I am concerned about lack of parent volunteers / block home type programs in Eugene. Neighborhoods are smaller and better for families. Children feel more comfortable in a smaller environment and learn better. Emotional / bullying / social problems are better managed in small schools. By being able to walk to and from school kids get exercise and develop independence. In neighborhood schools, if they do not make it to school, it's noticed quicker because it's smaller.
The school is just over College Hill from our house. It's too steep for my kids to safely bike without an adult. They would need to go north of18th to bike and that is a lot of crossing busy streets. I don't really feel comfortable with that. This summer we will ride our bikes together over College Hill so that they are prepared to do that on their own for one more year. If it still proves too hard for them, I feel OK with them taking the bus one more year. After that we are an easy walking distance from Roosevelt and South HS.
I am disabled and have to drive. My son has autism and my daughter ADHD. People moving in and out of my neighborhood makes it unlikely to let my kids go anywhere. Neither owns a bike.

We intended to be more environmentally conscientious than we achieved this year due to behavioral challenges in the mornings with our child.
We live on a hill, my child has cerebral palsy, we have eight other children attending two other schools than Adams. I drive the bus in to ATA. At noon I drive the van to get our head start and kinder child. On Wednesday I drive the bus in the PM pick ATA kids up early. It is not possible to consider walking or biking to school for any of our nine children! Wish we could, I would love a morning walk :)
My daughter is transported to a life skills classroom in the 4J district from Junction City so much of this survey doesn't apply to us.
I worry about the children crossing a very busy street with no red/green light signal. The cars often travel 40 in a 25 mile zone.
My son is a 4th grader. This is the first year my son has walked or biked to school. Until this year I was not comfortable with him doing this alone and I did not have anyone to accompany him. I had to pay for before-school care in my home up to now, because my work begins before his school begins. I work near his school so we bike there together early each day. He rides from there to school after an hour.
Our bike / ped trips would increase dramatically if (1) there were bike / ped only roads / road networks in town, (2) bikes/peds were treated as the primary priority, and motor vehicles were secondary- i.e. cars need to wait / yield to bikes / peds rather than the other way around (forget the law - we are talking about reality as our transportation grid is laid out). Schools need to make bike / walk up the catered to access means, and cars secondary - our school is automobile centric - envision ped / bike plazas / only roads around the school.
Question #14, 3rd grade, I would let them walk with another child. I would not let my daughter walk alone until the 6th grade. My son probably 4th but I prefer they walk with another student.
I would love to walk to school with my child but it is a long way (2 miles) and I am not comfortable biking up 29th Ave. with him and crossing Willamette. When he gets older I am afraid I will still be concerned about the traffic, but might consider letting him ride accompanied.
Our son does walk / bike to elementary school 3 blocks away almost every day.
My son is only 6 years old and people travel very quickly down these narrow streets (further narrowed by cars parked on both sides). I drop him off on my way to work in Veneta. If I worked closer I would consider us riding together, but with a 2 year old we have a lot of gear that travels w / us which makes a car a more feasible solution.

I tried allowing my daughter to walk with her younger cousin. I found myself worried immensely about strangers. Driving her to school is for my own peace of mind. Next year when she is in middle school she will be walking to and from school. This is based on her having a cell phone for emergencies.
Child receives transport through IEP. The school he attends is not our neighborhood school.
Adams is not our neighborhood school, so bussing is not available. My child has to cross 2 very busy streets to get to school (13th & 11th). If not for this, he would likely be told he must walk or bike more often - but he is not a big fan of either, despite his athleticism.
One parent is PPPM alumna & the other is at COE! Good work. My daughter is a person of color (at risk) and looks older than she actually is. Also easily distracted by dogs, cats, birds, etc. I do not know if she would go from pt. A -> p. B reliably and haven't tested it till her 11th birthday (last week).
I feel like today's society has made parents fearful of allowing children to walk / bike to school without an adult. The few times I have allowed it, I have called the school to make sure they arrived OK. I would only feel comfortable doing this if I walked / biked with them. Unfortunately I drop my kids off on my way to work. Safety is the number 1 issue.
The lack of consistent sidewalks in the friendly neighborhood can be a problem.
The hills and traffic between our house and Adams makes biking difficult (but not impossible). The school bus is much more convenient (and safe) for us right now. Soon we will move to the "flats" and I will walk and or bike more often - to school / sports events & practices / etc. Public transportation is also a readily available alternative for my older children right now.
Factors that make it difficult for my child to walk/bile include 10 age 20 distance 3) 2 working parents that need to be at work by 7:45, and do not get off work until 5:00 (which means after school care as well as an early bus ride for my daughter at 7:19 am) However we closer to both middle school and high school and my daughter will walk / ride bike every day starting in 6th grade, just like her 2 older siblings.
School start time is #1 problem w/ biking. I bike commute too work 75%, but school starts too late for us to bike there & make work start time. Also - school provides supervision to those that bus prior to class start, but not bikers, walkers.
I used to use my bike more frequently but find myself not allowing enough time between things, or dressing appropriately for the weather, and hop in the car. I need/want to slow down for me and be a role model for my son.

Because Willamette is a major intersection my daughter has to cross, I would not feel comfortable, nor would my husband, in allowing her to walk to school in the morning or home from school. Also, we car pool every day, drop both girls at school and me off at work daily - so the car is used for carpool purposes.
Our street is very steep and curvy so it's difficult to bike safely with a young child. Scheduling physical activity is priority in our family. We don't bike in town or on surrounding highways because we feel this is an unsafe practice on roadways. Transporting bikes to the bike path is the safest alternative.
We live at the top of a very big hill. When my son is old enough he will be able to walk or ride to school, but the way home will be very difficult. Also, both parents work outside the home & we won't always be available for him to come directly home, (he goes to the YMCA sometimes - on these days he could ride or walk to school when he is old enough).
The difficulty our family faces is that we are a two income family - the parent that drops the child off then has to take the younger sibling to day care and then go to work. Walking as much as we would like to every day just isn't possible for us at this point in time. However, as our kindergartner gets older we will begin having her walk to school.
Our son is a transfer student to Edgewood. As such it is unlikely that he would be able to walk or bike to school unless we move closer to his elementary school. Although our household views walking and biking as positive modes of transportation both for our environment & community, our son's schooling is a priority and our neighborhood school did not meet our standard.
We are a family that exercises frequently and encourages our children to. We would encourage the 7th grader to walk to the city bus stop but Fox Hollow is a windy, dangerous road with no sidewalk or even shoulders; cars speed around the curves which makes this road way too dangerous to walk on.
Edgewood does not encourage people to leave their cars at home and let children walk to school. Things that discourage this are: 1) allowing people to park anywhere 2) auctioning off special reserved parking spaces to raise money 3) discouraging children from arriving more than 5 minutes before classes start. The mad rush of hundreds of cars arriving in a 10 minute window makes traffic very dangerous. There are few crossing guards so it is not terribly safe. Also cultural forces today encourage children to believe that they are not safe outside, so they are afraid to walk or bike to school.
Questions 14 and 16 I lacked clarity for me concerning grades range and walking alone. I would never let my child walk alone to elementary school.

If this was our neighborhood school the children would ride the bus in the mornings except 1 day a week when w/ their mother. They would be picked up by dad, step mom, or mom after school (4:30 ish) and driven home. We want our children to be safe. They are too young to walk by themselves and we live too far away to make that viable. Plus dad and stepmom work and go from taking the kids to school to work. In Eugene so many people have their kids in non-neighborhood schools that walking & biking just doesn't work.
We have steep hills which make biking pretty unattractive
I am not sure at what age my children will walk / bike alone - depends on their maturity level, but will prefer them to walk / bike once able.
We live up 2 big hills. This does make cycling more difficult when time is limited. We do often run errands on bikes the weekends & in the summer. Cycling requires more time planning, but we do it when we can.
The only reason I transport my son to school is due to having to be at work as soon as I can once I drop him off. He is not at the age yet where I would want him to walk or ride alone to school. I would love to walk him to school or ride but my work schedule does not allow me the time in the morning to do so. Otherwise I would, in a heartbeat.
When I grew up in Japan everybody walked to school. We learned many naturally this way. Daily exercise, eating healthy, safety issue, know neighbor, friendship... many things. I love to walk with my children so much now.
The deciding factor in getting to school is usually time. We always run out of it! Busy schedules, wanting / needing more sleep, too much going on, etc... Our child's journey home was usually a bit looser and tended to include some walking, stopping at the playground, & going to friends houses, but still usually by car. We luckily live in a very mellow & safe neighborhood. Walking or or biking to school is certainly called for. Age? Each kid / parent is different. Our child started walking alone in the 4th grade.
We like to walk together to / from school and to / from store etc., whenever possible but I feel that we have this luxury because I am available w/a flexible schedule. Many working parents simply don't have the time needed to walk each day.
Fox Hollow is a dangerous road for bikers and pedestrians when crossing. Cars drive too fast. There's a 35 mph sign then 25 mph school zone within 50 yards of each other. Cars speed around turns making it hazardous even to cars. It is therefore unsafe to bike to school.

I walk my son (8) and my daughter (12) to school every day. My daughter walks home alone and I walk to school to pick up my son. I had knee surgery in March and my daughter then walked my son to school. I had to drive to pick him up! We moved to the south hills to be closer to the schools and to be able to walk/cycle to school. This is an important part of our physical fitness routine!
We would really like a sidewalk or bike lane on Fox Hollow Rd near Owl Rd. There is no safe place to walk and no alternative route to school.
Our family lives in an area where bike riding & walking on Dillard is dangerous. If we lived closer to school we would walk. This survey, especially the B D F on this (last) page made me think that I could park at a distance from the school so that my children could walk so that they have the experience of walking in the school's neighborhood. In our neighborhood, Hidden Meadows, we do walk the dogs and know our area. Thank you for including us in your survey.
Our neighborhood is not very walk friendly because of traffic on Willamette and because of steep hills. My 6th grader in Spencer Butte walks every day.
We will be transferring to a school within 1 mile of our home beginning in the Fall 2010. We hope to carpool more and possibly bike/walk when possible. 4J bus service is also available and I am open to allowing my kindergartner and then second grader to allow to ride the bus.
It depends on the state law. I would let my child walk alone if the state law allows.
We have been walking or biking the kids to and from school since kindergarten (in the bike trailer!) We are strong supporters of neighborhood schools over school choice largely for this reason. Having walked the same route together for the last 3 years we felt comfortable letting the kids walk alone starting this year, mainly because we've gotten to know our neighbors along the way, and partly because even the car commuters along the way are used to seeing us and look out for the kids. Rain or sun or snow, we walk every day. The kids have ponchos in their backpacks just in case.
We bike and walk regularly throughout town. I hope this survey does some good as far as promoting car-less households.
Question 16 made this survey seem less like a "study to explore factors that affect decisions about how students travel from home to school" and more like propaganda. And I am a bicyclist who rides to work most days! Frankly, I'm surprised it was funded.
Biggest obstacle to allowing my children to walk to walk alone to school are speeding (through neighborhoods) parents in vehicles, driving their kids to school, making street crossings very hazardous.

(Especially those headed to French Immersion School / Fox Hollow).
I generally walk w/kids to school; however my schedule changed & my husband now takes the kids to school. He prefers to drive, thus the kids are now driven to & from school.
These questions are somewhat vague and too general. Lots of reasons and scenarios come into play when choosing transportation modes. I'm not sure how much is really established from this survey w/the exception of the obvious. Perhaps you just want to know about the basics. Thanks.
I would love to start an incentive program to walk/ride to school at Edgewood, as is done in other parts of Eugene. (It's too bad that one isn't already in place!) Usually we do walk / ride 5x week, but occasionally drive due to pouring rain. The weather tends to dictate a 'drive day' rather than anything else.
We are in the process of moving to a house closer to our schools so walking to school is easier.
We live up on a steep and curvy area. I encourage my children to walk to and from school, however when it is raining or cold I feel compelled to take them to school. I have also been reluctant to allow them to walk to school for safety reasons, predators, and lack of sidewalks on Willamette street. Both of my daughters will be in Middle school next year, 6-8th grades. I feel more secure in their walking to school together rather than by themselves. During the 2010 - 11 school year both of my children will walk to and from school.
Though in a typical week during the school year, my children travel to and from school by car, we do walk / bike to / from school one or two days a week when the weather permits. I may be comfortable with my children walking or biking to school after the 3rd grade, but only if they are with a friend. My 1st grader only bikes to school when accompanied by me (walking).
I live at the top of Fox Hollow which is a big hill. I bike and hike, but it isn't to school. Very unsafe with the speeds people drive on Fox Hollow and absolutely no shoulder.
If sidewalks and travelling companions were available I would allow my kids to walk or bike to school. We walk & bike there on the weekends to play. I don't have an extra hour in the morning to walk over & back to school... or in the afternoon.
Child lives primarily with her mom at 18th & Friendly. One day per week she stays at her father's house in the district. Mother is unwilling at this point for the child to get herself to school - even in middle school.

We enjoy our time together. As we age time is less available. To and from school is - great and valuable time spent as a family.
I would encourage my kids to bike to school when old enough to do so - probably 3rd or 4th grade, depending on our after school care situation. I believe full time working parents have a challenge in this area because kids may not be going directly home after school. The weather is also a huge factor as I would not make my kids bike in the rain / really cold times! We do enjoy biking for the pleasure of it going to friends / parks in the neighborhood.
Listen my kids get plenty of exercise. Tae Kwan Do, huge yard - swing, camp, fish, hike, and have animals to run and play with. My children go to 2 separate schools at opposite ends of town 10 miles apart. _ I live off River Rd. - Abductions, speeders, preditors (sic) like child molesters have struck 200 yards from my house. They will never walk to there (sic) schools and they won't go to North Eugene H.S. either. It has poor teachers with bad attitudes, bullys (sic), and incompetent administration, and there (sic) view on special needs kids sucks hard core!
There is not a good crosswalk on Willakenzie, unless you go to Coburg Rd - another busy street that is not a direct route. Distance is really too far anyway...
My child prefers riding her bike to school over riding the bus, weather permitting. I think she enjoys the independence and the activity.
Our son is too young to walk or bike to school on his own. We also have a preschooler who goes to school further away so we often combine trips for those. When both kids are at Holt I'm sure we'll be walking & biking to school a lot more. I don't really enjoy walking / biking with my kids because they complain and are slow pokes. But I try to do it regularly so they get used to it. I think it will be easier as they get older and can understand that they are helping their bodies and the environment.
Not sure if our answers should be part of your survey - we live in the 4J portion of Springfield - so Holt is a distance away and our son needs to use a wheelchair to go any long distances. He is unable to bike until we are able to obtain a specially fitted trike.
I do feel that allowing my child to ride their bike to school is not a good idea. My children are in lots of sports so physical activity is not a concern. My biggest concern is is their safety. Crossing Best Lane - Willagillespie is not a good place to cross! No crosswalks! Also when they get to school there are no teachers or staff out in front of the school. That is a concern to me. I work full time and cannot be there to bike with my children. Also being a mother of 3 girls I fear abduction. I do feel a little better letting

them bike at 6th grade - middle school. Thanks.
For most of September my son and I rode our bikes to school. We stopped because I started going to 2 different colleges in October. Attempting to ride with him to school, then to Lane, then to the U of O, then to childcare and then back home is nearly impossible. But when I don't have school I will either walk or ride bikes with my son to his school and back home. I marked 'never' for riding bikes or walking because during a typical week - childcare or I, depending the day and my school schedule, will drop him off and pick him up. My grandparents, childcare, cannot walk or bike because one has post polio syndrome, another has joint problems and has to use a walker, and the other two are also not physically able to walk or ride their bikes with my son to and from school. 1 set of grandparents also lives too far away, about 25 minutes by c
Usually we drive when we're late (very frequent!) or when it's raining -Sept. Oct, and June we walk or bike almost every day - but in the rainy season we drive.
These questions leave out important facts about the decisions we make and why we make them. Question 1 can be either strongly agree or strongly disagree by how I interpret the words "if I wanted to", I want my child to walk every day, yet I can't allow them to because I fear abduction. Several people would probably say I could let them walk if I wanted to, but I say I want to let them walk /bike but can't because of safety issues. I answered strongly disagree only because safety not because of my desire for health. I prefer to walk or bike but can't when running errands because you can't pack large amounts of items or people on your bike / too uncomfortable to walk while packing heavy loads
We live behind Sacred Heart @ Riverbend; not in a typical neighborhood, route options to school include either down MLK Jr Pkwy - Harlow Rd. or Beltline - Gateway - Harlow Rd. Both are unsafe for young bikers or walkers. The distance is also too far. I am terminally ill with cancer and unable to drive student so we rely heavily on the bus.
Special needs child attends school out of area
While our elementary school has the infrastructure for biking and walking (bike racks, crossing guards) they do nothing to encourage biking + walking. They don't even require drivers to turn off their vehicles at pick up time. Walkers and bikers must stand breathing exhaust while they wait for their children. I'd love to see them participate in a walk / bike to school day or month, but I don't see that happening unless a few families do it.

Given what can & does happen to children I just cannot let my children have independence in this area. I need to see them or take them into the building each day, no matter the cost to me or the environment.
Safety first!
My child has to walk along Arcadia St. which is heavily driven by cars & no sidewalks - too dangerous for a young child.
Arcadia street is a terrible street to walk or bike on. Lots of potholes & way too much traffic cutting through from Willakenzie neighborhood. We have one registered sex offender living on Arcadia between our home and the school. He's close to the 400 meter rule or in it I think.
I am a divorced mom with two children. It is impossible to drop and pick up my son every day to school. That is the biggest reason he rides the bus.
I have a daughter in the 3rd grade. I don't feel comfortable letting her and my 5th grade son walk together without an adult and 9 times out of 10 they fight so bad that I don't enjoy being with them at the same time.
My son plays outside every night except when it isn't possible. With his friends he plays catch, nerf, gymware and other games. When it's getting dark early he plays inside. He usually uses his 1 hour of X-box, after that we play board games and such.
For my son to walk or ride a bike he would have to go on the bridge on Harlow Rd. over I-5 Hwy and I feel that there is a lot of traffic and he is too young to walk / ride alone. I'm already working at that time when he goes to school and my wife has to stay home with our 18 month old baby.
My son will begin walking to school next year (6th grade) because I need to be at work before he needs to be at school. Now, however, the timing is perfect for me to drop him off at school on my way home to work.
The goal of this survey is unclear. There is clearly an agenda regarding safety (physical) and city layout / design. What is not being asked is how school boundaries, choice of school and available school bussing transports my children. I would vehemently oppose any project that further resulted in the reduction of school bus availability. LTD is a poor option for my highschooler as it takes almost 2 for him to get to / from school. Also - your survey does not address the weather conditions grade / middle school children face in Oregon. This is a major influence to walk / bike decisions. I am not fearful of abduction in my neighborhood or the route to school. However, - my grade school children are not mature enough to walk / bike 5 miles to / from school.

My children enjoy walking and biking to school. We take them less and less by car both AM and PM. It is not feasible to walk or ride a bike for errands etc. My time is too important and I have too many things to do to walk or bike! We walk or bike for family activity. We also no not believe (as the temp graphs agree with us) that "global warming" is human caused. Therefore we walk and bike as a way for exercise and family time only.
Wonderful Susan bus driver.
Having to use Harlow Rd as the main road to school makes it too unsafe to ride to school.
Intersections with Arcadia are a concern in our neighborhood as most are not marked with stop signs in either direction. Near misses are common among speeding cars.
For 16 I ('In the place where I live I could let my child walk or bike to school if I wanted to') .. but not alone!
In the fall & spring we walk to and from school daily. In the winter it is not so appealing to walk to the schoool in the cold and dark. I truly find that I get great information from my daughter walking home. I just listen and get a feel for her day. It is a great time of day for me. I'm not sure what the right age is for walking alone. It would be nice if there were more children walking on my street. Usually we are the only people walking for most of the route to school. I would definitely let them walk if there were a higher concentration of kids but now I walk with them since we are the only ones.
I do not own a car. We depend on the city bus for everything.
We live too close to school for the bus & I leave for work too early to drop the kids off. They need to be responsible and get themselves to school and home on time.
My husband works in downtown Eugene. He takes LTD to work every day & he takes our 1 yr old on the bus w / him & drops him at daycare downtown. I am self-employed & have the more flexible work schedule so I tend to drive more for the family - appointments, lessons, shopping etc. We specifically bought our house for its proximity to good schools w / in walking distance. It's irksome to see all the vehicles blocking our neighborhood before and after school. I LOVE walking our daughter to & from school most days & I plan to keep doing it until she feels comfortable walking herself. I'll miss those great times hearing about her day as we walk.
The weather has a lot to do with walking or riding a bike to school. It has been bad this year.

Our community and police department, judicial system seems not to take public safety seriously enough. Child predators are released from jail quickly and I had two people I knew abducted and murdered by age 18 (in California) and I was abducted @ age 13 and was stalked by another abductor who turned out to have murdered children in Northern California after school. My best friend was raped @age 14 and he contracted AIDS and died. We are extremely committed to the environment and we don't drive, consume meat, or dairy, recycle, etc, but the number of scumbags running around on the streets who rape and murder children makes me uncomfortable about having my child walk unattended for protracted durations. A scumbag who tried to kidnap a two-year-old in Lane County was released within days recently. My child is also autistic. Thanks for caring about ecology.
I like knowing my child arrived at school and is safe. Will he remember to lock his bike so it wouldn't get stolen? Walking / riding bikes is ok for older children who don't live too far from school. Maybe if a group of younger children all rode their bikes or walked together I wouldn't worry as much. I don't think most people have the time to walk / bike their children to and from school every day.
I see what this survey is for. Our environment is important but our childrens' safety is number one! If our children start walking / biking will you be providing a safe & watched route? Do you guys even look at our city & how many fucked up sex offenders that live here? Make an effort to stop these sick bastards from getting a slap on the wrist for raping a child & being a molester. I will NEVER allow my girls to walk to school. There are way too many perverts that mingle w /in society. My kids won't be another statistic. You survey is really bullshit when you look @ the greater picture of our children. Help stop violence against children & make their lives safer & maybe over-protective bitches like me will let their kids walk or bike. Have a nice day a*****s -
Don't want my daughter walking alone, too far, too dangerous, just never know. I work or I would walk or bike her. Thank you.
There are no sidewalks in our neighborhood & that makes it difficult to walk around, though there's not that much traffic on our street. Also we have 3 small children so logistically its easier to drive most places at this point.
I am not sure I answered # 7 correctly. We walk or bike as much as possible. If it is heavy rain, or we are running late, I or my husband will drive. Since my child is with me, and when she was younger we used a bike trailer or jogging stroller, I was never real concerned about abduction or her age or getting hurt.
Not familiar enough with the area to walk alone and it's not a good neighborhood.

As the mother of my child I work full time and have to rely on others to take my child to school and barely have enough time to make it to his school to pick him up. If this life was the way I would like it to be I would still be a stay at home Mom, walking or biking to school every day.
Busy streets, disrespectful (of pedestrians and bikes) drivers, and lack of police enforcements for people who don't allow pedestrians to cross in the crosswalk. I've even had a LTD bus not let me and my young children cross when we were in an island in the middle of a crosswalk. I complained to LTD and was told their driver was within the law because we were standing in a "safety island" and therefore they were not required to stop for us. This lack of concern for walkers' and bikers' safety by drivers in our community makes me never want my children to share the road or sidewalk with cars. I know many adult friends, following bike laws, who have been hit by cars in our neighborhood.
Next year my child will be changing to her neighborhood school (Edgewood). She will be walking to the bus stop and riding the school bus. We live off Fox Hollow Rd., too far south for bike lanes. If the City added bike lanes on Fox Hollow, all the way to our intersection, I would allow my child to walk or bike. Traffic goes way too fast now.
I just recently moved to Springfield and I want to keep my son at his current school. I use to live closer, but still drove my son as I didn't want to use the bus system as it was easier to drop him off before I went to work.
On the days I can I would like to walk with my child but it is simply too far. I have only done it once. I have two school aged children attending different schools - neither of which is close. The bus is not always an option with all the route cancellations.
I, the father, walk or ride my bike whenever it is feasible to do so. I also use LTD buses. I drive as little as possible, usually only to work and back, and when we buy groceries. Walking is one of the healthiest exercises there is and we do a lot of it, my daughter included, but no to go from school. She is too young and the school is too far. It might prove to be beneficial,; financially, ecologically, and educationally to have more schools that are smaller so that all children could walk or bike to school. We tend to forget that some of this nation's great men and women attended one room school houses. My own mother taught in one. The neighborhoods could take responsibility for the upkeep and safety. It is time we 'green' our schools
As my child gets older, we will definitely make an effort to bike to and from school more often.

There are no great places to park bike. There are no sidewalks in our neighborhood so I would be nervous having my child walk or bike independently.
I would be happy to let my daughter bike / walk to school if she did not have to walk down River Rd. Average speed during the day is 50 by most people I have noticed that a lot of these drivers are parents of students at River Rd elementary also. There is also the matter of the speed limit being 20 when children are present but I have yet to see anyone slow down near the intersection at the school & there is no enforcement of the speed limit during school hours. I think Eugene could solve the budget problems for the next 20 years with tickets given out in that 1 block radius during one school year.
I have a special needs child - he has autism. We love to bike but he needs to be accompanied and he loves to ride the bus.
My grandchild is learning to ride his bike. When he does we will ride our bikes. We have walked him to school but most of the time we drive - its the time.
River Road Elementary is not our neighborhood school.
I am a single mother who depends on my vehicle to get my daughter to the bus stop & then me to my work in Springfield. Riding bikes and walking is just not a feasible mode of transportation for us during the work week.
My neighborhood is not that good and I don't have a car so we walk almost well every day, just not to school but a lot of other places.
Many streets in our neighborhood have no sidewalks and the distance is too much for him to bike by himself in elementary school.
Hilliard is very dangerous. There are no sidewalks. People walking, bikers & bikes w/ carts,& people w/ dogs use the bike lane. It is a 2 lane narrow rd. Vehicles like assistance vans, UPS & mail trucks just pull to the side to pick up riders & deliver mail - cars have to navigate around crossing over dbl yellow line & pedestrians that are also trying to pass - it is very nerve racking.
Being very busy we try to do multi ways of travel other than car. My son said he has to walk or bike in the month of May "exercise - no car month". My son likes it when they have a visual of all students way of transportation - Thank you.
2/3 of the walking distance has no sidewalks on relatively busy neighborhood streets. The school bus stop is the equivalent of 2-3 blocks from home and has no sidewalks. Most usually there are only two children at the stop, including mine, and frequently she is the only one or has to wait by herself until the

other child comes. On the return trip from school the bus stops right in front of our house.
I feel that we live too far from school to bike due to time constraints. School and kidsport activities are the only trips we use our car for. Otherwise we bike everywhere. If I were able to change my work schedule we would choose to bike to school.
We live pretty far away from school; a few miles which include dangerous intersections.
Related to 16J (last question), unfortunately our "neighborhood school" is not in our neighborhood. The former Whitaker school would have been our school had it not been closed, in which case we would certainly be walking or biking most of the time. Also, as our daughter rides the bus almost exclusively many of the questions don't seem particularly relevant.
The problem in a rainy climate is that it's hard to keep the kids safe & reasonably dry. Having children pre-K age means a lot of preparation to be outdoors in inclement weather. On my own, in not too-inclement weather, I prefer my bicycle. But I do succumb to the desire to be warm and dry as I travel around town.
The best ways to encourage walking in the River Road area would be directly related to River Road itself - more stoplights, lowered speed limit.

Appendix B: Survey Instrument and Associated Mailings

Cover letter

Dear Parent/Guardian of 4J Elementary Student,

Getting children to and from school is a challenge that affects every parent.

We are writing to ask your help with a study, conducted by The University of Oregon, about travel to school by elementary school students in Eugene. This study is funded by a grant from the Robert Wood Johnson Foundation and is endorsed by the 4J school district. It explores factors that affect decisions about how students travel from home to school. This is a follow-up to an earlier phase of the study, conducted in 2008. Since that time the school district has implemented programs to encourage walking and biking to school. This second phase of the study will help us understand how effective these programs have been. Your child's school has been selected to participate in this follow up survey.

This is where we need your help! A survey is enclosed that asks specific questions about school travel. Participation in the survey is entirely voluntary. However, you will help us very much by taking the time to share your experiences and opinions about school travel. We expect the survey to take about 10 to 15 minutes to complete. To express our appreciation for your participation we are offering some gifts as incentives. **By answering this survey you could win a $25 gift certificate to a Borders bookstore.** Here's how it works. There is an incentive form included with this mailing. Simply fill it out with your name address and return it, along with the completed survey, in the enclosed addressed envelope. The odds of winning a $25 gift card are approximately 1 in 17. The actual odds will depend on the number of surveys returned. **Please return the completed survey to us before June 2, 2010.**

Survey responses are confidential. Please do not write your name or any other personal information on the survey form itself to help us maintain your confidentiality. Forms that contain personal information will be stored and maintained separately. Completion and submission of the survey will serve as your consent to participate in the study. If you have any questions about your rights as a research subject, please contact the Office for the Protection of Human Subjects at the University of Oregon (541) 346-2510. This Office oversees the review of the research to protect your rights and is not involved with this study.

Thank you in advance for your time and consideration. Please feel free to contact us at (541) 346-0855 if you have any questions or concerns.

Sincerely,

Yizhao Yang
Assistant Professor
Department of Planning, Public Policy and Management

Steve Abbott
Graduate Research Fellow
Department of Planning, Public Policy and Management

Survey Instrument

School Travel Survey

If you have more than ONE child attending an elementary school in the 4J School District, please answer this survey based on the oldest child in elementary school.

School Travel and Neighborhood Environment

1. School Name: _____

2. Thinking about this school year (September 2009 - May 2010), during a typical five-day school week, how did your child usually travel to elementary school? (Please check all that apply) *NOTE*: Throughout this survey the word "bike" is used to refer to any non-motorized transportation with wheels (bike, skateboard, rollerblades, unicycle, etc)

To School	Never	Once a week	2 times a week	3 times a week	4 times a week	Every day
	↓	↓	↓	↓	↓	↓
Walked with adult(s)	☐	☐	☐	☐	☐	☐
Walked without adult(s)	☐	☐	☐	☐	☐	☐
Biked with adult(s)	☐	☐	☐	☐	☐	☐
Biked without adult(s)	☐	☐	☐	☐	☐	☐
Rode school bus	☐	☐	☐	☐	☐	☐
Rode in a car (family vehicle or carpool)	☐	☐	☐	☐	☐	☐
Other, please specify:	☐	☐	☐	☐	☐	☐

3. Thinking about this school year (September 2009 - March 2010), how did your child usually travel from elementary school in an average five-day school week? (Please check all that apply)

From School	Never	Once a week	2 times a week	3 times a week	4 times a week	Every day
	↓	↓	↓	↓	↓	↓
Walked with adult(s)	☐	☐	☐	☐	☐	☐
Walked without adult(s)	☐	☐	☐	☐	☐	☐
Biked with adult(s)	☐	☐	☐	☐	☐	☐
Biked without adult(s)	☐	☐	☐	☐	☐	☐
Rode school bus	☐	☐	☐	☐	☐	☐
Rode in a car (family vehicle or carpool)	☐	☐	☐	☐	☐	☐
Other, please specify:	☐	☐	☐	☐	☐	☐

1

Your Opinions about School Travel

4. How far do you live from the school your child currently attends?

Distance (miles): approximately _____
Travel times (minutes): driving a car _____, walking _____, or biking _____

5. Do you consider this a walkable or bikeable distance for your child at this time?

A walkable distance to the school: ☐ YES ☐ NO A bikeable distance to the school: ☐ YES ☐ NO

6. What is the street intersection nearest your home? (Provide the names of two intersecting streets)

_____ **and** _____

7. Below is a list of reasons that might factor into your school travel choices. Please circle how important each reason was when making your decision to use the car or school bus rather than walking or biking.

	Not Important	Somewhat Important	Important	Very Important	Extremely Important	N/A
A. Distance from residence to school too far	1	2	3	4	5	☐
B. Child is too young – not ready to walk or bike to school	1	2	3	4	5	☐
C. No one is available to accompany my child to walk or bike to school	1	2	3	4	5	☐
D. Fear of child getting hurt or abducted	1	2	3	4	5	☐
E. Concern with traffic (e.g., lots of traffic on roads and/or roads crossing)	1	2	3	4	5	☐
F. Faster speed (less time) allowed by car travel	1	2	3	4	5	☐
G. Combining school trip with other trips (e.g., trip to workplace, shopping)	1	2	3	4	5	☐
Other reasons (please specify) H. _____	1	2	3	4	5	☐
I. _____	1	2	3	4	5	☐

8. Below is a list of reasons that might factor into your school travel choices. Please circle how important each reason is when making your decision to let your child walk or ride a bike to/from school instead of driving or using the school bus. Skip this question if your child never walks or bikes to school.

	Not Important	Somewhat Important	Important	Very Important	Extremely Important	N/A
A. Combining school trip with other trips (e.g., walk or bike to workplace)	1	2	3	4	5	☐
B. Increase child's physical activity	1	2	3	4	5	☐
C. Quality time spent with child together walking or biking to school	1	2	3	4	5	☐
D. No car available	1	2	3	4	5	☐
E. Save money	1	2	3	4	5	☐
F. Faster than driving a car	1	2	3	4	5	☐
G. No school bus available	1	2	3	4	5	☐
Other (please specify)						
H. _____	1	2	3	4	5	☐
I. _____	1	2	3	4	5	☐

Student Questions

9. What is the age of the child you are answering the survey for? _____

10. What is the grade of this child? _____ **11. This child is: ☐ Male ☐ Female**

11. How many cars are there in your household? _____

12. Is a school bus available to your child for transport to school? _____

13. Has your child asked you for permission to walk or bike to / from school in the last year? ☐ Yes ☐ No

14. At what grade would you allow your child to walk of bike to /from school without an adult?

(select a grade between PK, K, 1,2,3…) __ grade **(or)** ☐ I would not feel comfortable at any grade

15. In your opinion, how much does your child's school encourage or discourage walking and biking to / from school? (Please check the response that best describes your opinion)

☐ Strongly Encourages ☐ Encourages ☐ Neither ☐ Discourages ☐ Strongly Discourages

16. On a scale of 1 to 5, express your level of agreement (or disagreement) with the following statements. 1= strongly disagree.... 5= strongly agree [Circle a number for each statement]

A. For trips around town, driving is a more comfortable way of travel than walking or biking. 1 strongly disagree 2 3 neutral 4 5 strongly agree	B. Walking or biking, whenever possible, is a way to demonstrate one's commitment to protecting the environment. 1 strongly disagree 2 3 neutral 4 5 strongly agree
C. I generally prefer driving whenever I need to go places in this area. 1 strongly disagree 2 3 neutral 4 5 strongly agree	D. Walking or biking to school is a good way to increase children's physical activity. 1 strongly disagree 2 3 neutral 4 5 strongly agree
E. I have to drive around to do things – even if I would rather not. 1 strongly disagree 2 3 neutral 4 5 strongly agree	F. Walking or biking to school is a good way to help children know their neighborhood. 1 strongly disagree 2 3 neutral 4 5 strongly agree
G. Children who are always transported by adults to do things may develop a habit of relying on automobiles in their later life. 1 strongly disagree 2 3 neutral 4 5 strongly agree	H. I feel like I drive my car as much as other people do. 1 strongly disagree 2 3 neutral 4 5 strongly agree
I. In the place where we live I could let my child walk or bike to school if I wanted to. 1 strongly disagree 2 3 neutral 4 5 strongly agree	J. I believe that the layout of my neighborhood makes it a good place for my child to walk. 1 strongly disagree 2 3 neutral 4 5 strongly agree

17. Comments Area: _____

_____

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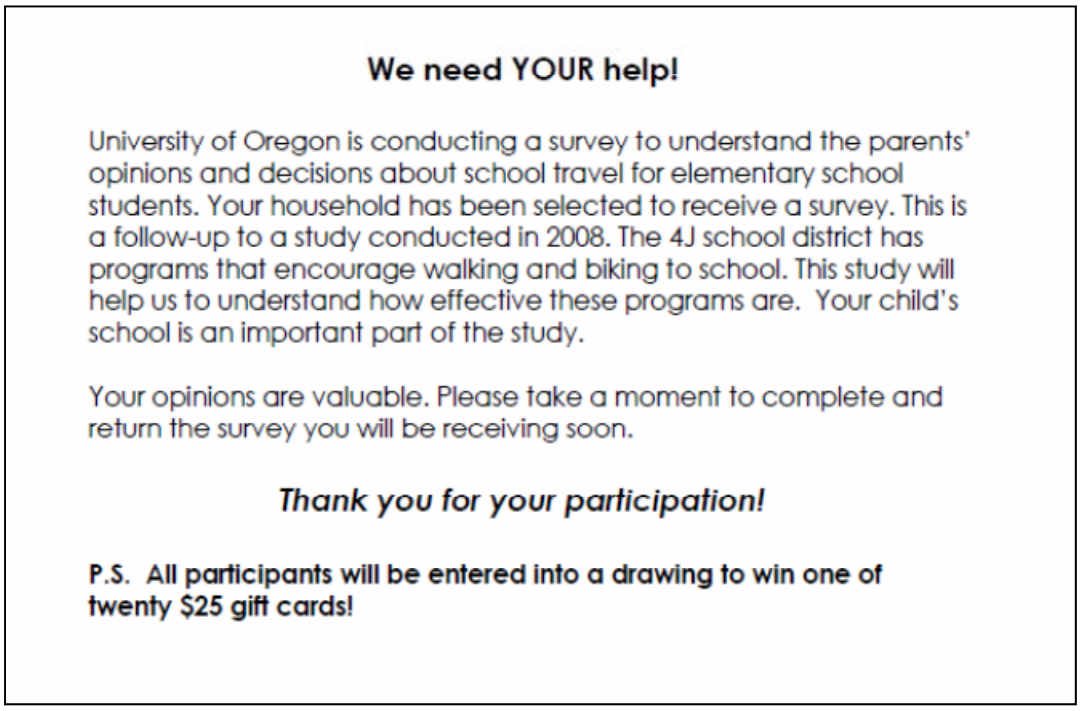
Postcard 1: Sent two weeks before survey



We need YOUR help!

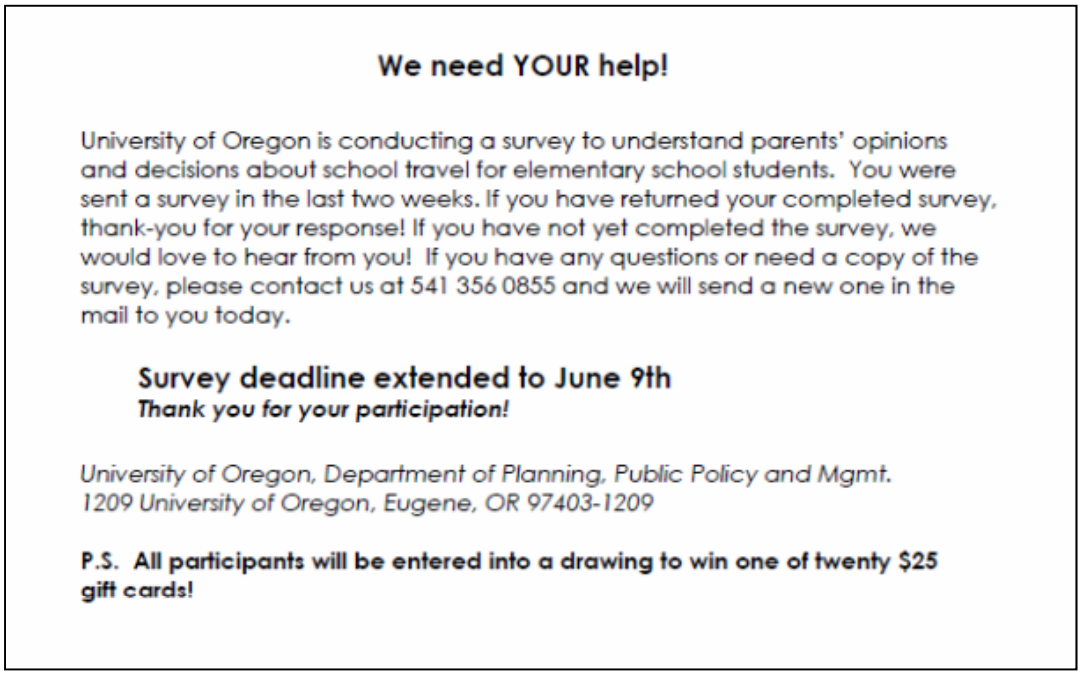
University of Oregon is conducting a survey to understand the parents' opinions and decisions about school travel for elementary school students. Your household has been selected to receive a survey. This is a follow-up to a study conducted in 2008. The 4J school district has programs that encourage walking and biking to school. This study will help us to understand how effective these programs are. Your child's school is an important part of the study.

Your opinions are valuable. Please take a moment to complete and return the survey you will be receiving soon.

Thank you for your participation!

P.S. All participants will be entered into a drawing to win one of twenty $25 gift cards!

Postcard 2: Sent two weeks after the survey



We need YOUR help!

University of Oregon is conducting a survey to understand parents' opinions and decisions about school travel for elementary school students. You were sent a survey in the last two weeks. If you have returned your completed survey, thank-you for your response! If you have not yet completed the survey, we would love to hear from you! If you have any questions or need a copy of the survey, please contact us at 541 356 0855 and we will send a new one in the mail to you today.

Survey deadline extended to June 9th
Thank you for your participation!

University of Oregon, Department of Planning, Public Policy and Mgmt.
1209 University of Oregon, Eugene, OR 97403-1209

P.S. All participants will be entered into a drawing to win one of twenty $25 gift cards!

Incentive Form

Thanks for your participation!

Enter to Win a $25 Gift Certificate

To show our appreciation, we are conducting a random drawing for twenty $25 gift cards. To be entered in the drawing, please provide the information below and include this form with your survey in the provided, postage paid, envelope. This form will be immediately removed from the survey and stored separately to maintain confidentiality of the survey responses. You do *not* need to complete the survey to be entered in the drawing. The winners will be contacted in July. The odds of winning a gift card are approximately 1 in 17.

Name _____

Address _____ City _____

Zip _____ Phone _____