ACTIVE TRAVEL SAFETY: BUILT AND SOCIAL ENVRIONMENT PERCEPTIONS OF PARENTS AND STUDENTS

by

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ABSTRACT OF THE DISSERTATION

Active Travel Safety: Built and Social Environment Perceptions of Parents and Students

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Little research on children's mode of travel had been completed until Safe Routes to School became a widespread program in the 1990s. Since then, active travel has been shown to influence children's current health status, in addition to their future health and wellbeing. Long run benefits arise because past behaviors influence future behaviors, and many habits created in childhood can last a lifetime. Many studies have reported parental perceptions, barriers and facilitators to active travel when considering how their children will travel to school. However, very little research has addressed children's perceptions of the built and social environment or components of environmental and personal safety. Children's perceptions, particularly those of safety and their environment, may be an important link to not only their present health and travel behaviors, but also their health and behaviors in the future.

Perceptions have been studied primarily through caregiver surveys, with few studies talking to or surveying children themselves. Youth may have different perceptions, additional concerns, or ideas to improve safety, all of which may influence their current travel mode or route, and their travel habits into the future. Notably, few

studies of parents and fewer of students have used qualitative methods to gain a deeper understanding, rationale, or description of safety concerns and potential improvements to safety. The research presented here goes beyond prior work by providing both quantitative models and qualitative analyses from middle school students, to better understand perceptions of safety in the built and social environment. This dissertation poses two broad research questions. First, what are students' perceptions of safety in the built and social environment as they relate to mode choice? And do students' perceptions of safety vary based on demographics? Second, what are parents and children's perceptions of the built and social environment, specifically regarding their child's trip to and from school? Why? Are parents and students' perceptions different? If so, how so?

ACKNOWLEDGEMENTS

Thank you to the principals, faculty and staff at the Vroom School, Academy Middle School, Washington Middle School, Highland Park Middle School, Franklin Middle School, and Valley Road School. Without the willingness of these schools, these projects would be dramatically different or nonexistent today. In addition, I'd like to thank all of my participants, both students and adults alike for helping me by volunteering their valuable time and sharing their experiences and perceptions with me. The participants gave a lot of knowledge, ideas, and perspectives that are important as we continue to increase safety and active travel rates into the future.

I want to also thank my committee spent countless hours working with me to refine my objectives and methods, and then of course reading and re-reading the chapters to form a coherent whole. The chair of my committee, Dr. Joel Cantor, provided a great deal of guidance throughout the process and assisted me when prior projects became too unwieldy and when methodological difficulties seemed too challenging to overcome. Dr. Bob Noland worked with me to improve the overall readability of the dissertation, helping me to remember the importance of telling a story. Lastly, Dr. Michael Smart and Dr. Peter Guarnaccia provided excellent feedback and critique of this research.

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Table of Contents

LIST OF TABLES

LIST OF ILLUSTRATIONS

CHAPTER 1. INTRODUCTION

Walking is man's best medicine.

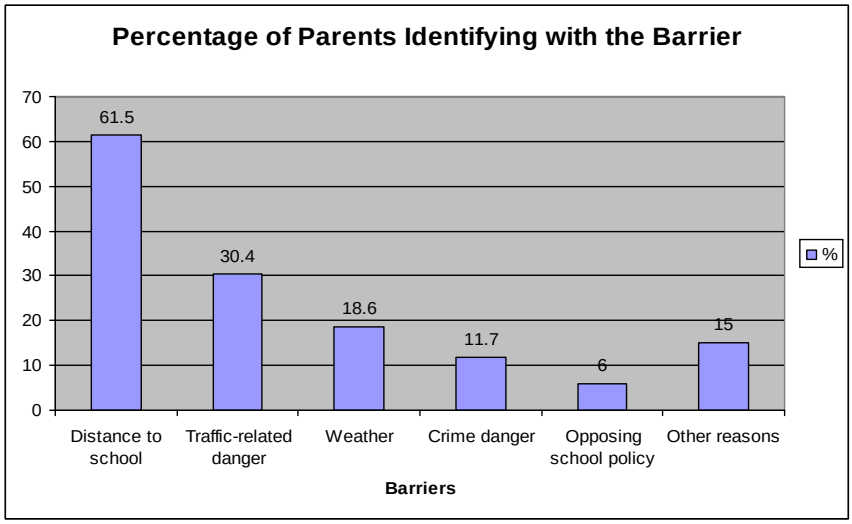
-Hippocrates

This dissertation examines the relationship between both adults' and children's perceptions of the built and social environment and physical activity, more specifically, children's active travel to school. Although factors including traffic, crime, distance to school, and weather are principal considerations when choosing children's trip mode, equally critical to active travel to school are perceptions of parents and children (Figure 1-1). Research demonstrates that perceptions of the built environment and safety are at least as important as the environment itself (Panter, Jones, van Sluijs, & Griffin, 2010b). Furthermore, "prior experiences and memories of a setting may influence one's perceptions about its safety" (Loukaitou-Sideris, 2006, p. 222). Thus, examining how both children and adults perceive their built and social environment and what informs these perceptions will lead to a better understanding of mode choice, and how to increase active travel rates to in turn increase physical activity and improve the health and wellness in communities.

Although there are many possible travel modes for local trips such as buses, cars, trains, walking, and bicycling, the key two categories are: motorized (passive) travel and active travel. Motorized travel is motor-powered transportation such as cars or buses, while active travel is people-powered transportation, mainly walking or bicycling, which provides physical activity (Sallis, Frank, Saelens, & Kraft, 2004). Despite the well-documented health benefits, the prevalence of physical activity in the United States is low (U.S. Department of Health and Human Services, 2014b). Active travel provides a way to

incorporate physical activity into one's daily routine; however, active travel prevalence is also low (McDonald, 2007).

Figure 1-1. Parent Identified Barriers to Child Active Travel, US, 2004



Source: Centers for Disease Control and Prevention, 2005

Over the past 40 years, active travel has been on the decline, especially for children. Only 12.9% of all US schoolchildren used active travel to school in 2001 compared to 40% in 1969 (McDonald, 2007). Active travel decline occurred even for those living close to school. In the 1960's, more than 85% of students living within a mile walked to school, while by the early 2000's fewer than half walked (McDonald, 2007). During this same time, driving to school increased from approximately 20% to 55% (McDonald, 2007). Active travel decline and the simultaneous increase in passive travel is a concern for declining physical activity rates, rising obesity, worsening air quality, and increased traffic (McDonald & Aalborg, 2009). Declining physical activity, on which this dissertation will focus, has become a grave enough situation to seize the attention of

physicians, public health officials, parents, schools, planners, and policymakers, who are now seeking possible solutions.

Physical activity has been on the decline for a variety of reasons, including both individual and broader societal or community factors. Individual factors are those that are personal and may include physiological, behavioral and psychological elements (Sallis, Hovell, Hofstetter, & Barrington, 1992). These range from lack of time to preference for sedentary leisure-time activities, such as television viewing, to a lack of motivation or confidence to exercise (Centers for Disease Control and Prevention, 2014b). Societal factors are those that occur at the community scale or broader, such as increased car use (World Health Organization, 2009), which has led to automobile dominance. Over time, roads with high traffic speeds and volumes have conspired to make walking in many areas inhospitable at best and life-threatening at worst.

High traffic speeds and volumes and lack of sidewalks are elements of the built environment. The term built environment has many definitions throughout the literature. They, however, all have the same basic notion: the built environment is any physical space that people "deliberately constructed" (Tester, 2009, p. 1591) or was "made by people for people" (Northridge, Sclar, & Biswas, 2003, p. 558). The built environment (often also called physical environment) therefore includes, but is not limited to streets, open spaces, houses, and transportation systems (L. Frank, Engelke, & Schmid, 2003; Northridge et al., 2003; Tester, 2009). All these elements play a role as to how people travel in their environment.

Closely related to the built environment is the social environment, which includes the people, institutions, and culture that accompany physical structures. As defined by

Barnett & Casper (2001, p. 465), it encompasses "the immediate physical surroundings, social relationships, and cultural milieus within which defined groups of people function and interact…embedded within contemporary social environments are historical social and power relations that have been institutionalized over time." Thus, as stated by Yen & Syme (1999, p. 288), "the physical and social environments do not exist independently of each other; any environment is the result of the continuing interaction between natural and man-made components, social processes, and the relationships between individuals and groups." Therefore, discussions of the built environment, particularly of mode choice, where a variety of elements are non-physical social factors should also include the social environment. The social environment thus also influences travel and should be included to better understand mode choice.

Mode choice is influenced not only by the built and social environment, but also by people's perceptions of their environment. Built and social environment perceptions have been shown to be in poor agreement with measured features. In one study that examined both perceptions of traffic through telephone survey and measured features through GIS, few associations were found (McGinn, Evenson, Herring, Huston, & Rodriguez, 2007). Thus, perceptions will be examined with the goal of improving interventions to increase currently low physical activity and active travel rates and improve safety in the built and social environment.

Physical Activity

Physical activity is an essential part of living a healthy lifestyle. The World Health Organization (WHO) defines physical activity as "any bodily movement produced by skeletal muscles that requires energy expenditure" (2014). Individuals who spend

most of their time expending little to no more energy than they would resting, are physically inactive or sedentary. More specifically, US physical activity is commonly measured by the Physical Activity Guidelines for Americans, evidence-based national guidelines released in 2008 (U.S. Department of Health and Human Services, 2008). The guidelines recommend that adults (18+) achieve 150 minutes of moderate to vigorous intensity activity per week, in a minimum of 10-minute increments known as bouts, along with some muscle-strengthening activities, such as push-ups, lifting weights, and yoga. In the past, only vigorous forms of physical activity such as running were thought to contribute to health benefits, but current evidence suggests that moderate-intensity physical activities are also beneficial for health. Moderate-intensity activities include those that increase the heart rate and cause slightly heavier breathing than normal (U.S. Department of Health and Human Services, 2008). A primary way to achieve moderate-intensity physical activity is through brisk walking, which can be incorporated into daily routines through active travel. Thus, the guidelines now call for a mix of both moderate and vigorous activities to improve health and wellness in adults.

The Physical Activity Guidelines for Americans have separate guidelines for children. The guidelines suggest more physical activity for children age 6-17 than for adults. One hour or more of physical activity per day is recommended for children, of which at least three days be comprised solely of vigorous activities (U.S. Department of Health and Human Services, 2008). On the remaining four days, an hour or more of at least moderate intensity activities are recommended, such as walking or bicycling, along with muscle building activities. The children's guidelines also suggest activities in a minimum of 10-minute bouts, an amount of time that many children's trips to or from

school might meet (U.S. Department of Health and Human Services, 2008). Overall, the establishment of these guidelines aims to help children and adults alike to maintain a healthy weight and lifestyle and reduce the risk of disease.

Physical Activity Benefits

The benefits of physical activity are numerous, including reduction of early mortality, hypertension, stroke, diabetes, depression, and several types of cancer (Mathers, Fat, & Boerma, 2008). It also improves cardio-respiratory fitness, and helps with weight maintenance and control (World Health Organization, 2009). Studies consistently demonstrate a dose-response relationship, where higher levels of physical activity lead to lower rates of mortality (Kohl 3rd, 2001; I.-M. Lee & Skerrett, 2001; Paffenbarger Jr, Hyde, Wing, & Hsieh, 1986). In one study, men who engaged in regular, moderate-intensity physical activity had a risk of 30% fewer fatal events than the least active men (Leon, Connett, Jacobs, & Rauramaa, 1987). Another study, by following 19,000 people with very similar genetic structure who grew up in the same environments for 20 years, demonstrated that even when controlling for genetics and childhood environments, the risk of premature death declined with higher rates of physical activity for both men and women (Kujala, Kaprio, Sarna, & Koskenvuo, 1998). While other studies demonstrate the protective effect physical activity has on specific diseases such as coronary heart disease, diabetes, and breast and colon cancers (Bauman, 2004; World Health Organization, 2009). Warburton, Nicol, & Bredin (2006) confirmed in their review that "there is irrefutable evidence of the effectiveness of regular physical activity in the primary and secondary prevention of several chronic diseases and premature death" (p. 801) and demonstrated that there is a linear relationship between physical activity and

overall health status. The literature in the field highlight the benefits of even moderate-intensity physical activity are well documented in adults and lead to a life with reduced risk of burden from disease.

The demonstrated health benefits for physical activity from age 5-17 are also strong. A 2005 systematic review of 850 articles showed an advantageous effect of physical activity on cardiovascular health, metabolic syndrome, asthma, musculoskeletal health, triglycerides, and aerobic fitness, among other outcomes for school-aged youth (Strong et al., 2005). A more recent systematic review of children confirmed a reduction in adiposity, cholesterol, systolic blood pressure, depression, and anxiety symptoms (Janssen & LeBlanc, 2010). This review also found a dose-response relationship, demonstrating the more physical activity, the greater the health benefit, even in children. Becoming physically active early in life also sets beneficial health patterns (Malina, 2001), predicts physical activity in adulthood (Telama et al., 2005), and reduces the likelihood of suffering from diseases that can later decrease the quality and length of life (Sallis & Owen, 1998). Higher levels of physical activity can be achieved through children participating in active travel, even for those children who are already meeting the recommended amount of physical activity. From childhood through adulthood, physical activity has been strongly and consistently associated with improved overall health status.

Physical Inactivity Risks

For those who are physically inactive, many risk factors predominate. Worldwide, physical inactivity is the fourth leading risk factor for death, associated with approximately 3.2 to 5.3 million deaths each year (I.-M. Lee et al., 2012; World Health

Organization, 2009). Although no estimate exists specific to the United States, 400,000 deaths were attributed to poor diet and physical inactivity in 2000 (Mokdad, Marks, Stroup, & Gerberding, 2004). Physical inactivity has also been found to be a leading cause of several diseases. Between 21-25% of breast and colon cancers, approximately 27% of diabetes, and 30% of ischemic heart disease have been attributed to physical inactivity (World Health Organization, 2009). Moreover, physical inactivity has been found to be responsible for approximately 7% of type 2 diabetes and 9% of total premature mortality (I.-M. Lee et al., 2012). If physical inactivity were decreased by 10-25%, it has been estimated that between 533,000 and 1.3 million deaths may be eliminated each year, increasing the life expectancy of the world by about 0.68 years (I.-M. Lee et al., 2012). Increasing physical activity remains an important goal for reducing the burden of disease and improving overall health.

Physical Activity Trends

Despite the known health benefits, the prevalence of physical activity in US adults is low (U.S. Department of Health and Human Services, 2014b). At present, more than 80% of adults do not meet the federal guidelines (described above) for aerobic and muscle-strengthening activities (U.S. Department of Health and Human Services, 2014b). In New Jersey specifically, a 2013 Gallup poll found that only 47.7% of residents reported exercising three or more days a week for at least 30 minutes, compared to the national average of 51.6% (Sharpe, 2014). This is consistent with Behavioral Risk Factor Surveillance System (BRFSS) data, where 47% of New Jersey adults surveyed participated in 30 or more minutes of moderate physical activity five or more days per week between 2003-2009. Even so, about a quarter of New Jersey respondents, 26.4% in

2011 and 24.9% in 2012, reported no leisure-time physical activity in the past month (Centers for Disease Control and Prevention, 2011a, 2012). With low physical activity prevalent across the US and in New Jersey, increasing physical activity, even in small amounts of moderate-intensity activities, remains an important goal to improve overall health.

Similar to adults, the prevalence of physical activity in US children is also low. In 2012, only 25% of US youth aged 12-15 met the federal guidelines of participating in at least 60 minutes of daily physical activity (Fakhouri et al., 2014). Physical activity, even in youth, declines with age (Centers for Disease Control and Prevention, 2010b). Only 15.3% of US high school students met the guidelines in 2010 (Centers for Disease Control and Prevention, 2011c), though these figures vary state-by-state. In New Jersey specifically, 28% of high school students met the guidelines 2011, up from 15.6% in 2005 (Agrawal, 2012). No figures were available for younger students. Despite this improvement in the state, a majority of New Jersey children and adults do not participate in regular physical activity, which can be improved by increased walking or bicycling.

Increasing Physical Activity

Community interventions are currently occurring across the globe to increase physical activity in populations. Over 80% of WHO member states have created policies and plans to increase physical activity, 56% of which are currently operational (World Health Organization, 2009). Efforts have focused on workplace policies encouraging physical activity; increasing physical education and sports and recreation facilities; developing and implementing both health promotion initiatives emphasizing physical activity along with national guidelines for physical activity and surveillance; and creating

programs and enacting policies that ensure active travel is safe and accessible for everyone. Establishing safe locations for people to engage in active travel is manifested in different programs around the world and remains an important way to increase physical activity and wellbeing.

Healthy People. In the US, the national health promotion and disease prevention initiative that incorporates physical activity and active travel is called Healthy People. Healthy People has many goals, one of which is to "improve health, fitness, and quality of life through daily physical activity." This goal has 15 objectives, ranging from increasing regularly scheduled elementary school recess, to growing the number of adolescents who participate in daily physical education, and decreasing the proportion of adults who engage in no leisure time physical activity. Two of these 15 objectives specifically target increasing active travel to increase physical activity. PA-13 and PA-14 aim to increase the proportion of trips made by walking and bicycling, respectively. These objectives are then further broken down to 1.) Increase the proportion of trips of one mile or less made to school by walking by children and adolescents aged 5-15 years (PA-13.2); and 2.) Increase the proportion of trips of two miles or less made to school by bicycling by children and adolescents aged 5-15 years (PA-14.2). Healthy People 2020 cites these evidence-based goals as "ambitious, yet achievable" to improve the nation's health (U.S. Department of Health and Human Services, 2014a). In addition, New Jersey has a health improvement plan, Healthy New Jersey 2020, which also seeks to increase physical activity as a way to improve the overall health status in the state (State of New Jersey Department of Health). These goals reflect the importance of physical activity and, specifically, active travel in achieving a healthier population.

Safe Routes to School. One US program that has been working to increase active travel rates on the trip to and from school while improving safety is Safe Routes to School. Safe Routes to School is a federally funded program, which began in July 2005. Between 2005 and 2009, $612 million dollars have been allocated towards programs (Safe Routes to School, 2014). The program relies on the five E's namely, Encouragement, Education, Enforcement, Engineering, and Evaluation, to increase active travel rates and improve safety.

Successful programs typically incorporate all five E's, demonstrating increasing active travel rates takes more than built environment engineering and infrastructure improvements (Safe Routes to School, 2014). Encouragement, education, and enforcement are also critical and are the components where perceptions and the social environment are manifested. Lastly, evaluation can help to determine what improvements have been effective and, more broadly, evaluation of communities needs may help to frame what improvements are needed to improve health and wellness. All five of the E's will be discussed below to demonstrate what they are and how they work in Safe Routes to School programs.

All the five E's have been used in successful programs in Portland, OR, Longmont, CO, and Marin County, CA. Descriptions of each component and how they work together follow. The encouragement component helps stimulate excitement about walking or bicycling to school. Encouragement examples include "challenge months," where the students in a school or classroom with the highest number of participants win prizes (e.g. bike horns or air pumps). This allows those who cannot always walk or cycle to school to focus their efforts and feel good about participating (Portland Bureau of

Transportation, 2014a). Some programs have “phantoms” who randomly reward individual students who bicycle or walk with stickers and pencils (Portland Bureau of Transportation, 2014a; Safe Routes to School Marin County, 2012). For those who live too far from school to walk or bicycle the whole way, there are “Stop & Walk” programs where parents drive their child to particular stops from where they complete their trip to school by cycle or on foot (Portland Bureau of Transportation, 2014c). These stops also often have walking school buses (particularly at the elementary school level) where parents volunteer to walk with children making stops to pick up other children en route. Many programs also seek to change the culture of schools making it “cool” to walk or bike by forming a club for students, giving out stickers, and sending information about activities and progress (Portland Bureau of Transportation, 2014c). Parents and teachers are also encouraged to participate and attend orientations not only to learn about the program, but also how to promote an enjoyable active travel experience every day. Through these efforts, the encouragement component inspires and motivates children to participate in walking and bicycling to school.

The education component of Safe Routes to School exists inside and outside the classroom in successful programs. Teachers in Portland integrate walking and biking into the curriculum by using classroom examples, including math problems to teach about the benefits (Portland Bureau of Transportation, 2014c). In Marin County, many teachers are trained bicycle safety instructors and incorporate environmental and health lessons into classes. Students can also participate in walkability audits, taking a trip from one pre-identified place to school and noting the potential walking hazards (Safe Routes to School Marin County, 2012). Some schools host informational sessions to learn about

Safe Routes to School, provide a calendar of events, and describe ways to get to school safely, such as through an online route mapping tool or a walkpool tool to help find walking buddies (Portland Bureau of Transportation, 2014b). Sharing information about walking and bicycling makes parents and students alike more aware of both the benefits and how to safely participate. By increasing understanding and familiarity through education, programs have experienced increased active travel rates.

Enforcement enhances compliance with policies and laws designed to keep pedestrians and cyclists safe. Police departments have an active and strong relationship with successful Safe Routes to School programs and incorporate safety in active travel into their mission. Police officers perform random stings, give warnings and tickets to those who do not stop for children in crosswalks, and have an online request form to alert the department to issues where passersby see problems (Portland Bureau of Transportation, 2014a; Safe Routes to School Marin County, 2012). “Your speed” signs can be requested from police departments and positioned either permanently or temporarily near schools to further attempt to slow drivers and comply with laws while enhancing safety with the aim to increase active travel rates (Portland Bureau of Transportation, 2014a). Although policies and laws are often well intentioned to keep students safe, it is important to keep a consistent watch that the rules are being followed to continue to allow students to walk, bicycle, and feel safe.

The engineering component typically receives much attention and credit in enhancing safety and increasing active travel rates. Engineering as part of a Safe Routes to School program is the visible addition of sidewalks, crosswalks, speed bumps, and/or other physical interventions. Although these physical components are very important,

they are most effective when they occur as part of a cohesive package, including encouragement and education of students and parents, along with enforcement of motorists to obey laws (Safe Routes to School, 2014). By introducing parents and students to the benefits of active travel, and providing organized, safe, and fun options to walk or bike, along with new physical components, parents and students are more likely to seek opportunities to use them (Safe Routes to School, 2014).

Lastly, evaluation provides evidence to determine whether programs are successful in increasing bicycling and walking rates, and what components are most effective. Teachers sometimes take logs of students' travel mode on random days and distribute surveys to students about their trip to and from school. Parent/caregiver surveys have been administered as well (Portland Bureau of Transportation, 2014c), though without much detail as to how and why the mode to and from school was chosen. Ways to measure the impact of interventions on the community outside the school are also generally lacking. Overall, evaluation is often the most overlooked E, with little academic literature available on successes or failures. More research is needed distinguishing which programs or program components increase active travel and safety and why. More research is also necessary to evaluate and understand communities' needs before programs are implemented to ensure safety and mode choice concerns are properly addressed.

This doctoral work therefore, contributes to the fields of planning and public health by providing in depth information from both students and parents on how they perceive their built and social environment. Furthermore, information was collected on factors that inform mode choice and what improvements participants feel would improve

safety and increase active travel. By asking students and parents alike for these perceptions, we may be able to design more effective interventions to increase participation in active travel to enhance the health and wellbeing of populations.

Research Objectives

The objectives of this research are:

1.) What are students' perceptions of safety in the built and social environment as it relates to mode choice? What elements do students find safe or unsafe?

2.) Do students' perceptions of safety in the built and social environment vary based on demographic characteristics? If so, which characteristics?

3.) What are parents' perceptions of their built and social environment, specifically regarding their child's trip to and from school? What informs these perceptions? What built and social environment changes would they like to see?

4.) What are children's perceptions of their built and social environment, particularly regarding their trip to and from school? What informs these perceptions? Are they different than their parents? If so, how so? What built and social environment changes would they like to see?

Two methodologies are used to address the research questions above. First, to answer research questions one and two and understand students' perceptions, students rated 17 photographs in an individually administered survey, identified elements of safety, and provided opportunities to improve safety through in-class discussions. The

themes that emerged from the discussions were then examined and compared to students' ratings of photographs. Paired t-tests and multi-level ordinal logistic regression models were applied to the numerical ratings. Combining the visual survey with interactive classroom discussions achieved a deeper understanding of students' perceptions of safety. By adding in-class discussion to the rating of the photographs, children's rationale for their perceptions are revealed, which is missing from the current literature.

Second, to answer research questions three and four and understand both parent/guardian's (hereby after called parents) and children's perceptions of their built and social environment more deeply, I interviewed pairs of parents and children, first interviewing the parent and then the child separately. By talking to both parents and children individually, similarities and differences in parents and children's perceptions can also be studied, and an understanding of what informs these perceptions can be unearthed. Information about what parents and children would like to see improved in their communities to enhance safety and increase active travel can also be gained. Youth perceptions may be different from their parents, and may impact their current and future mode choice; therefore, both children and parents were asked similar questions during one-on-one consecutive interviews. Mixed methods and direct interaction with parents and children may improve our understanding of perceptions of active travel. In turn, this may help us improve interventions aimed at increasing safety and rates of active travel.

Structure of the Dissertation

This dissertation is organized into six chapters. Each chapter begins with a brief overview, followed by subsections, and concludes with an overview of the chapter. The first chapter presents the overall context of the problem, provides some background

information on the current trends, describes the research objectives, and outlines the dissertation's structure.

Chapter two describes literature from various fields impacting mode choice such as public health and planning and the history of the intersection of these two fields. The chapter also reviews a built environment and activity patterns framework and adds the elements of perceptions and social environment to better understand what influences activity patterns and mode choice. Lastly, the current literature on what influences adults and children's mode choice is reviewed and I argue that more work is needed on active travel perceptions, particularly the perceptions of children.

Chapter three reviews relevant methods literature, demonstrating the lack of qualitative methods in this area, while describing why these methods are most appropriate to elicit parents and children's perceptions. Information on the data and methods used, including information on research design, site selection, sampling, data collection, and analysis is also provided.

Chapter four presents the results of the visual survey and in-class discussions. Five themes emerged from the visual survey and student conversations, in addition to two additional themes that emerged in conversations that could not be tested quantitatively using the visual survey scores. Students were consistently eager to share their safety perceptions and concerns, and enthusiastically brainstormed ideas to improve safety in the built environment.

Chapter five provides the results of the one-on-one interviews with parents and students. Among the 48 parent-child interview pairs in three communities, several unique themes emerged in each community, in addition to themes common among all three

communities. Differences in student and parent perceptions are presented and discussed, along with ideas from both groups to improve safety and active travel in these three communities.

The final chapter summarizes the findings of the research, and provides implications for schools, school districts, municipalities, and researchers alike. This research leads to several avenues of future research, including evaluating specific programs, policies and physical interventions, in addition to using the survey instrument and methods in more communities. This dissertation concludes with recommendations to conduct future research, improve safety, and increase active travel rates for researchers and practitioners alike.

CHAPTER 2. LITERATURE REVIEW

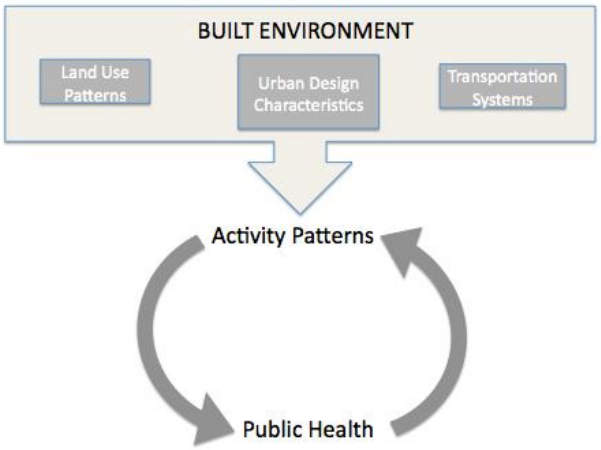
This dissertation examines the relationship between both adults' and children's perceptions of the built and social environment and mode choice. To understand this relationship, a review of public health, urban planning and design, land use, and transportation literature follows. The built environment shapes human behavior. The layout of cities, suburbs, and towns influence how people use them to work, play, and live. How streets connect, the density of residences, the locations of buildings and parks, and the transportation available all impact how people move around, spend their time, and the activities they pursue (L. Frank et al., 2003). Frank et al., (2003) demonstrate the interconnections among the built environment, physical activity, and public health using the framework below (Figure **2-1**). They describe the built environment as being comprised primarily of three main factors: land use patterns, urban design characteristics, and transportation systems. Land use patterns describe how close places are to each other and how much open space exists, while urban design characteristics are small-scale features or details. Lastly, transportation systems link places and move people from one place to another. The combination of these three factors constitutes the built environment as a whole and influences what mode of transportation people are likely to use to get from one place to another.

The built environment is then connected to public health through activity patterns (L. Frank et al., 2003). Communities can be designed in ways to promote physical activity, safety, and choices for how people get around and spend their time. By designing communities to make physical activity possible or even desirable, improved health outcomes are possible. Although other factors can also lead to positive public

health outcomes, physical activity is an important contributor and is the factor on which this framework and dissertation focus. By understanding how the built environment impacts physical activity and in turn, overall health, we can see where improvements can be made to encourage health-promoting behaviors such as walking and bicycling.

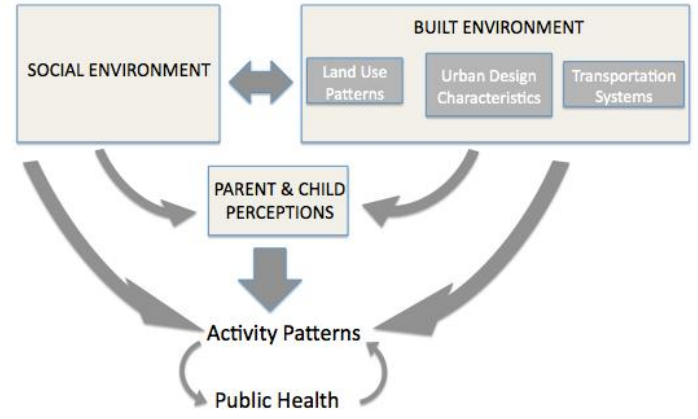
The framework below by Frank et al. (2003) (Figure **2-1**) depicts the importance of the built environment on physical activity and the important impact of physical activity on overall public health. However, to best describe how the environment influences physical activity, it must also include two important elements: the social environment and that of perceptions of the built environment. The social environment goes beyond the mere physical features to include the policies, institutions, customs, and culture that often influence people's physical activity. Perceptions, too, influence the decisions people make, through the interpretation of mental impressions. Thus, by adding these two elements, we can form a clearer picture of how physical activity patterns form and, more specifically, how active travel choices are made. By better understanding the environmental factors that influence physical activity and mode choice, we may be able to come up with better solutions to increase physical activity and overall health. Therefore, a revised framework will best explain the connections among these topics, including perceptions and the social environment (see Figure 2-2).

Figure 2-1. Link among Built Environment, Activity Patterns and Public Health as seen by Frank et al., 2003



Links among the built environment, physical activity and public health. Adapted from: Frank et al., 2003

Figure 2-2. Revised Conceptual Framework of Proposed Studies and Reviewed Literatures



Links among the built environment, social environment, perceptions of these environments, physical activity and public health.
Adapted from: Frank et al., 2003

Chapter Outline

The literature review begins with a brief history of the built environment and physical activity, including how the current development plan with an emphasis on motorized travel became commonplace. I then review the importance of active travel,

particularly in children, as their travel behaviors as adults may be influenced by their actions as children. I examine what specific built and social environment elements have been demonstrated to be associated with physical activity and active travel in both adults and children, including objective measures of land use, sidewalks and pathways, traffic, public transit, and urban design. During this examination, I consider the issue of residential self-selection and explore the poor alignment of objective built and social environment assessments to those of perceptions. A review of adults' personal safety perceptions, traffic perceptions, aesthetics perceptions and their influence on both adults' physical activity and active travel and children's activity patterns are then discussed. The importance of considering children's perceptions is reviewed, followed by what literature exists on the relationship between active travel and students' perceptions of personal safety, traffic, and other built and social environment factors. Lastly, I consider the evidence-based benefits of active travel, how active travel contributes to physical activity, and the methods of studies used.

Through a review of the literature, I argue that these built and social environment perceptions are equally important as the environment itself. Thus, this research addresses: 1) students' perceptions of the built environment and social environment; and 2) how parents and students' views of their built and social environment relate to mode choice to and from school.

History of Built Environment and Physical Activity

A century ago, it was not challenging to be physically active in one's everyday life. People walked to and from the majority of destinations to fulfill their basic daily needs because cities were built compactly out of necessity. For longer trips, cities had

horse-drawn streetcars then trolley systems, which allowed cities to stay relatively compact (Dieleman & Wegener, 2004). Compactness despite its benefits, led to its own problems. Cities were crowded and dirty. Typhoid and yellow fever, among other infectious diseases, were common and spread easily leading to regular outbreaks of illness, often leading to death. Thus, during the late nineteenth and early twentieth century, the compact city was often replaced by cleaner, healthier decentralized cities, where residential, industrial and commercial uses would be separated. Lawns and trees would dominate the landscape; clean air would permeate the environment; and diseases would cease to flourish. Rail and then the invention of the automobile allowed locations that were once all within walking distance to be set miles apart (L. Frank et al., 2003). Criticism of this decentralized built environment model gained traction in the last few decades primarily revolving around traffic congestion and environmental concerns, including air pollution. Even more recently, the field of public health has expanded the criticisms of the modern physical layout of cities, concerned with physical inactivity and lack of active travel, (Sloane, 2006) on which this dissertation will focus.

Active Travel

Active travel is a specific type of physical activity that is non-recreational and used as transportation. Active travel can be a convenient way for adults and children to receive regular moderate-intensity physical activity, which is beneficial to their overall health and wellness. It is important for children, in particular, to begin using active travel as how individuals' travel as children may impact how they travel in adulthood. The theory of habit formation (Andrews, 1903; Watson, 1998) indicates that active travel among adults is likely associated with how they behaved as children. Therefore, travel

behaviors and associated feelings formed early on may last a lifetime. Empirically, studies have demonstrated that gender preference also may start in childhood, as adolescent boys are more likely to walk or cycle to school and get more physical activity than girls, (McDonald & Aalborg, 2009; McMillan, Day, Boarnet, Alfonzo, & Anderson, 2006; Timperio, Crawford, Telford, & Salmon, 2004) and men are more likely to participate in active travel, particularly in cycling in the US (Garrard, Handy, & Dill, 2012; Pucher, Buehler, Merom, & Bauman, 2011). Additionally, bicycling in youth for boys is correlated with bicycling in adulthood (Emond, Tang, & Handy, 2009). Since active travel trends that begin in childhood may influence future behavior, it is important to study children and create interventions targeted at youth.

Not only do adults' habits begin to form in childhood, but children also model their behaviors on adults. Social learning theory demonstrates that children learn through observation and seek imitation (Bandura, 1977). Therefore, children's travel mode is influenced in part by parent behaviors, attitudes, and the travel mode parents use, (McMillan et al., 2006; Panter, Jones, van Sluijs, & Griffin, 2010a) which in the US infrequently is walking or cycling. In addition, parent physical activity and support has also been shown to influence how physically active children are (Sallis, Prochaska, & Taylor, 2000), demonstrating the influence parents encouragement and actions can have. In sum, the literature shows that adults' behaviors may begin to form in childhood and then influence the next generation, again revealing the importance of studying children's active travel and the need for physical activity to begin in childhood.

The Built & Social Environment and Physical Activity

The standard model for how the built environment impacts walking or active travel is a microeconomic model: travel behavior theory based on utility maximization (Ben-Akiva & Lerman, 1985). In utility maximization, rational behavior is followed, meaning a calculated decision process exists and the individual weighs their choices and follows their objectives, whatever they may be (Ben-Akiva & Lerman, 1985). Demand for travel is "derived demand," meaning that individuals travel to reach a destination and thus demand stems from demand for activities. Land use and the built environment influence travel options and the price of travel, which in turn determine how travel is consumed. Subconsciously, the individual gathers and analyzes large amounts of information to make a choice on their travel mode such as the length of trip, the comfort level, and expense. Econometric trip making and discrete choice models are used to model travel behavior, assuming that individuals select the mode that maximizes their utility, which typically is associated with minimizing travel time and other related travel costs and uncertainties (S. L. Handy, Boarnet, Ewing, & Killingsworth, 2002).

When weighing walking as a possible mode choice, factors in addition to travel time and cost may be considered more heavily, such as the pleasure from area aesthetics and the perceptions of crime and traffic safety (S. L. Handy et al., 2002). Although objectively the built environment is the same for everyone in the same neighborhood, people's perceptions of the built and social environment may be more important when examining the decision to use active travel compared to other mode choices. Thus, perceptions enter the utility calculation and ultimately, can influence mode choice.

Therefore, it is important to study perceptions when examining the built environment and how mode choice decisions are made.

The built environment and physical activity can be measured in a variety of ways. To determine how the built environment shapes behavior, specifically active travel, "efforts to characterize the link… [must] start with the non-trivial task of developing appropriate measures" (S. L. Handy et al., 2002, p. 65). There are many built and social environment predictive characteristics including land use mix, connectivity of street networks, density, sidewalks, traffic, aesthetics, and safety, among others, all of which can be measured in a variety of ways (S. L. Handy et al., 2002). When examining just one dimension of the built environment— land use mix, for example— common independent variables include: ratio of commercial floor space to land space; distance from houses to stores or parks; share of total land for each different use; and indices to measure the similarity of the land uses. Additionally, some studies measuring the outcome physical activity use self-reported activity, while others use more objective methods of quantification, including accelerometers, also increasing the variability of the physical activity variable. Therefore, there is variation among studies when examining some built environment characteristics and their association to physical activity.

A review of important characteristics and the strength of the association to physical activity are discussed below for both adults and children. Although some similarities may exist, there may be specific features that are of more or less importance when considering the needs of smaller people who are still growing and learning. Despite this, less literature exists specifically examining the impact of the built and social environment on children's physical activity and active travel use, though physical activity

trends may begin in childhood and last a lifetime. Therefore, a review of the current literature examining the impact of the built and social environment on both adult's physical activity and active travel and children's physical activity and active travel follows.

Land Use

Despite the variety of exposure measures, there are some built environment characteristics that are consistently associated with increased physical activity in adults. Areas with a mixture of land uses, high street connectivity, and increased residential or population density are often called walkable due to their association with increased walking and overall physical activity (L. D. Frank & Pivo, 1994). Mixed use neighborhoods with a combination of residential, commercial, and retail uses, with shorter distances between locations fall into this walkable category (L. D. Frank & Pivo, 1994). Many groups including the New Urbanists, who emphasize the pedestrian, promote a mixed-use design scheme in part based on evidence that it increases walking and bicycling (L. Frank et al., 2003). The relationship between some important built environment variables and walking or physical activity is further described below.

Individual empirical studies demonstrate the importance of land use mix on walking and physical activity more generally. Residents who moved to a new neighborhood that had an increased mix of businesses reported increased walking and bicycling, even a year after their move (S. Handy, Cao, & Mokhtarian, 2006), similarly, the number of different businesses within 800 meters of home has been shown to be positively associated with walking frequency (Cao, Mokhtarian, & Handy, 2007). In one study employing accelerometers, individuals who lived in neighborhoods with the highest

walkability (as measured in an index comprised of net residential density, street connectivity, and land-use mix) were 2.4 times as likely to participate in 30 or more minutes a day of physical activity compared to those who lived in the lowest walkability neighborhoods, controlling for demographics (L. D. Frank, Schmid, Sallis, Chapman, & Saelens, 2005). The authors concluded that when people have destinations of interest near their homes and direct routes to access these destinations, they are more apt to engage in 30 or more minutes of moderate-physical activity on a random day (L. D. Frank et al., 2005). Residents in neighborhoods with higher population density, land use mix, and street connectivity have also been shown to report higher levels of overall physical activity. This increased physical activity has been attributed to the built environment, as simultaneously walking for exercise has been shown to be similar in neighborhoods of varying levels of walkability (Saelens, Sallis, & Frank, 2003). Residents in these higher walkability areas report almost two times more walking trips than residents in areas of lower population density, more uniform land use, and poorer street connectivity. The majority of the difference in physical activity among the residents of the two varying density areas was from walking to work and walking for errands, demonstrating the impact built environment features can have on walking (Saelens et al., 2003).

Land Use: Children. Similar to adults, land use mix has been consistently associated with walking and physical activity in children. A 2011 systematic review of 65 studies found that 66% of those examining land use and reported active travel showed a positive association, while 68% of those examining residential density and reported active travel showed a positive association (Ding, Sallis, Kerr, Lee, & Rosenberg, 2011). In one study of two-day travel diaries of over 3000 five to 20 year olds in Atlanta, it was

found that for adolescents 12 and older, the odds of reporting a walk trip were 3.7 times higher for those in the highest density tertile compared to the lowest and 2.5 times higher for those living within a mixed use neighborhood compared to those who did not (L. Frank, Kerr, Chapman, & Sallis, 2007). Lastly, a study of over 20,000 nationally representative youth found that after controlling for demographics, adolescents living in older suburbs were 11% more likely to be active than those living in newer suburbs, which typically have less gridded street networks, bigger lots, and are lower population density (M. C. Nelson, Gordon-Larsen, Song, & Popkin, 2006). These studies, combined with those examining adult populations, demonstrate the importance of mixed land use to promote physical activity and active travel in people of all ages.

One land use that is of particular importance and strongly associated with children using active travel to get to and from school is the distance children live from school. Distance has consistently been demonstrated to be a primary factor determining child's mode of transportation. In one study, children were more likely to use active travel if their route to school was less than 800 meters (Timperio et al., 2006), and in another study those living less than a mile from their school were three times as likely to use active travel than those living over a mile from the school (McMillan et al., 2006). Almost three times the number of students (grades 1-7) who lived under one kilometer from school walked compared to those who lived 1.1 to 3 kilometers from school in another study (Ziviani, Scott, & Wadley, 2004). Lastly, travel time, which is closely related to distance to school, has been shown to have the strongest effect on the decision to walk to or from school. A one-minute increase in walking corresponded with a 0.2% decline in the probability of walking, and a 10% increase in walk time equaled a 7.5%

decline in walking (McDonald, 2008a). Thus, the distance that children live from school is critically important to determining whether parents see active travel as a feasible option.

Sidewalks and Pathways

Another built environment feature often associated with physical activity in adults is the presence of sidewalks and pathways. These features are built for pedestrians and bicyclists to separate these users from vehicular traffic. Studies of pathways have had mixed results regarding increasing walking and cycling, with one study associating the installment of a greenway with increases in walking and bicycling (Fitzhugh, Bassett Jr, & Evans, 2010), while others have found counterintuitive reductions in overall physical activity after construction (Burbidge & Goulias, 2009; Evenson, Herring, & Huston, 2005). This inconsistency may be related to the location and connectivity of specific paths, in addition to the attributes and amenities available on each path. These results may also be influenced by individual's awareness of the completion of new paths and individuals' perceptions, particularly of personal safety, demonstrating the potential influence of perceptions when evaluating engineering interventions.

Sidewalks, however, have been more consistently associated with increased walking (Addy et al., 2004; Owen, Humpel, Leslie, Bauman, & Sallis, 2004) and overall physical activity (Brownson, Baker, Housemann, Brennan, & Bacak, 2001). The presence of sidewalks was also demonstrated to be the most important neighborhood variable among those of higher incomes in one study (Brownson et al., 2001); likewise, another study found that almost four times as many people walk when roads have sidewalks (Qin & Ivan, 2001). People who reported having access to sidewalks tend to be more likely to

walk for transportation, after adjusting for demographics and car ownership (Giles-Corti & Donovan, 2002). The authors concluded that one of the top interventions to increase walking and possibly vigorous activity is to increase sidewalk access (Giles-Corti & Donovan, 2002). Thus, the presence of sidewalks continues to be an important positive factor in increasing active travel and walkability in adults.

Sidewalks and Pathways: Children. Although sidewalks and paths have been less consistently shown to be an important built environment feature associated with physical activity in adults, there is evidence that sidewalks and paths are more highly associated with physical activity in children. In ten diverse elementary schools in California, the Safe Routes to School program installed sidewalks, installed or widened crosswalks, and installed or widened bicycle lanes. Children whose trip to school passed these completed projects showed an increase in active travel compared to children whose trip did not pass by these projects (Boarnet, Anderson, Day, McMillan, & Alfonzo, 2005). The increase in active travel for those whose trip passed these projects may be due to parents' hesitance sending their children to school without a dedicated facility for walking separated from traffic, which was somewhat alleviated through the engineering additions. The authors noted that some education and encouragement program components were associated with the infrastructure projects. However, all children and parents, regardless of residential location received the education and encouragement information equally, demonstrating the importance of dedicated facilities separated from traffic to increase children's active travel (Boarnet et al., 2005). Studies measuring physical activity with accelerometers also demonstrate the importance of paths for physical activity in children. One study of over 1500 sixth grade girls from six middle schools in six US urban cities demonstrated that

walking paths were associated with higher non-school moderate to vigorous physical activity (Cohen et al., 2006), and in another study of over 200 boy scouts, sidewalk presence, location, material, and number of trees were positively associated with moderate intensity physical activity (Jago, Baranowski, Zakeri, & Harris, 2005). Lastly, over 80% of studies in a 2011 systematic review demonstrated a positive association between children's reported active travel and sidewalks (Ding et al., 2011), showing the benefit sidewalks and paths can have to increase children's active travel.

Traffic

Automobile traffic, on the other hand, has been shown to be a barrier to walking and bicycling for adults. Studies regularly cite both traffic volume and speed as a reason for not walking or bicycling (Jacobsen, Racioppi, & Rutter, 2009). In one study, having to cross a busy street was associated with bikeway non-use (Troped et al., 2001), and another study found an inverse correlation between volumes and speeds of traffic and levels of walking and bicycling (Jacobsen et al., 2009). In Forsynth, North Carolina, traffic volume and traffic speed were negatively associated with active travel, while in Jackson, Mississippi, traffic volume was negatively associated with active travel (McGinn, Evenson, Herring, Huston, et al., 2007). Higher traffic volume also commonly means more vehicle lanes, making these roads more unpleasant for pedestrians and harder to cross. One study found that more than six times as many people have been shown to walk along a two lane road compared to a four lane road (Qin & Ivan, 2001). Despite this evidence that traffic volume is a barrier to physical activity, one study demonstrated that high volume streets were associated with more minutes walking (Nagel, Carlson, Bosworth, & Michael, 2008). This is likely due to downtown areas often

having both more pedestrians and more motorists. Despite this, traffic safety is a regularly documented active travel barrier and is associated with declines in physical activity and walking.

Traffic: Children. As with adults, both traffic speed and traffic volume have been negatively associated with children participating in physical activity, specifically using active travel to and from school. McMillan (2005) reported that streets nearby schools are dangerous to children given the traffic volume around arrival and dismissal times when children are participating in active travel and due to the lack of attentiveness of parents after they pick up or drop off their own child. One study demonstrated that 24% of vehicles in school zones did not come to a full stop at marked crosswalks while pedestrians were crossing (Cody & Hanley, 2003). Thus, even on neighborhood streets with low traffic speeds, traffic volume can be difficult to negotiate for children on foot. In one study of over 400 Dutch children living in six cities in the Netherlands, heavy traffic was statistically significantly inversely correlated to physical activity after adjusting for demographics (De Vries, Bakker, Van Mechelen, & Hopman-Rock, 2007). Similarly, another study of over 200 5-6 year olds and over 650 ten to 12 year olds in Melbourne, Australia, found that children who had to walk along a freeway, highway, or arterial road were 90% less likely to use active travel to school, while adolescents who had to walk along these roads were 70% less likely to use active travel to school, after controlling for demographics (Timperio et al., 2006). This demonstrates the negative impact heavy traffic has on a wide age of students, and also shows that traffic negatively impacts younger students' ability to use active travel more than older students. Finally, roads with a posted traffic speed of over 30 miles per hour have been demonstrated to decrease the

odds children walking and cycling by over 60% compared to roads with a posted traffic speed under 30 miles per hour (McMillan, 2007). These studies, combined with those examining adults, demonstrate the negative association of traffic volume and traffic speed on physical activity generally and on active travel.

Public Transit

While automobile use is related to both sedentary behavior and increases in traffic, a commonly cited barrier to active travel, varied transportation options are associated with increases in walking for adults (Pucher et al., 2011). Little information is available for children; in part since many children do not have public transit available to get to and from school and many do not take transit alone. Since public transit users tend to have starting or final destinations outside the exact location of their transit stop, these trips often also involve walking. It is estimated that 90% of public transit trips in the US involve walking at both ends (Pucher et al., 2011). Furthermore, these walking trips to and from public transit have a median of 19 minutes daily (Besser & Dannenberg, 2005), helping users to meet physical activity guidelines. One study showed that public transit users in large urban areas with rail systems were 72% more likely to walk 30 or more minutes per day than those without rail systems (Freeland, Banerjee, Dannenberg, & Wendel, 2013), similarly another demonstrated that public transit users (defined as those who used public transit at least once in the previous week) were more likely to meet moderate-intensity physical activity guidelines than non-public transit users (Zwald, 2014). Therefore, the built environment, including varied travel options, remains a priority to enhancing active travel and walkability.

Urban Design and Aesthetics

Urban design and aesthetics have also been associated with physical activity. Urban design characteristics include an area's appearance, pedestrian scale details, and neighborhood character. Pedestrian scale details are those that are designed at human-scale to keep areas visually interesting and delineate spaces for pedestrians. Pedestrian scale details that are common include lighting, which is closer to the ground to illuminate sidewalks and paths instead of roads and wide buildings visually broken into smaller scale units to help avoid pedestrians feeling small and out of place (R. H. Ewing, 1999). These characteristics may be outlined by zoning codes and make the built environment more pleasant to encourage pedestrians or physical activity. A systematic review examining the built and social environment and adults' physical activity found an "aesthetics" or "neighborhood character" variable significant in all four studies where it was measured (Humpel, Owen, & Leslie, 2002). Another study found only pedestrian scale street lighting to be associated with increased physical activity (Addy et al., 2004). Despite these findings, one study using a neighborhood environment scale comprised of neighborhood character, neighborhood features, and perceived safety found no relationship to physical activity (Sallis, Johnson, Calfas, Caparosa, & Nichols, 1997). The authors hypothesized that individuals may be participating in physical activity outside their neighborhoods if they do not perceive it to be safe. Therefore, neighborhood features would be of no consequence to individuals who do not perceive they live in an area that is safe enough to be physically active. Lastly, a systematic review of six studies measuring street-scale urban design, such as aesthetics and pedestrian scale street features found a 35% median increase in physical activity in areas with these features (Heath et

al., 2006). Despite mixed evidence, urban design characteristics appear to influence physical activity patterns for adults to some extent and are important to consider to more fully understand the built environment's influence on physical activity and active travel.

Urban Design and Aesthetics: Children. A few studies have found a positive relationship between a measure of neighborhood aesthetics or pleasantness and children's physical activity. In one study of over 1100 adolescents, children who reported being active were 30% more likely to agree with the importance of having aesthetically pleasing areas for walking than those who were inactive (Mota, Almeida, Santos, & Ribeiro, 2005). In another study, girls who reported more trees, interesting things to look at, and a lack of litter were more likely to report participating in physical activity than those who did not (Evenson et al., 2006), while the presence of street trees has also been found to be associated with active travel for students regardless of gender (Larsen et al., 2009). Conversely, physical and social disorder has been found to be associated with lower levels of physical activity, after controlling for demographics (Molnar, Gortmaker, Bull, & Buka, 2004). Physical and social disorder were measured both through video and direct observation and included public intoxication, drug trafficking, prostitution, graffiti, empty beer bottles, and used needles. Despite these findings, more studies are needed examining children's perceptions of aesthetics to confirm they are an important part of the relationship between the built and social environment and physical activity.

Despite the potential association between urban design, aesthetics, and physical activity, these studies were all cross-sectional and therefore, were unable to measure residential self-selection as it relates to mode choice. Residential self-selection could account for the variation in physical activity as residents who want to walk more may

choose to live in walkable areas with pedestrian scale design features and thus, should be examined closely.

Residential Self-Selection

Residential or neighborhood self-selection may be a confounder in the relationship between built environment characteristics and physical activity (S. L. Handy et al., 2002; Van Dyck, Cardon, Deforche, Owen, & De Bourdeaudhuij, 2011). Residential self-selection is the idea that people who want to walk more may choose to live in locations that are more walkable. An area's walkability has been shown to be an important characteristic for residential selection (Van Dyck et al., 2011). Thus, higher density neighborhoods, for example, may have more people walking in them not due to the built environment, but also perhaps, at least in part, due to the fact that people who want to walk seek out more walkable environments in which to live. Studies have a difficult time eliminating this possible confounder since most study designs are observational with no temporality and randomized controlled trials, which could isolate possible causal variables, are not practical or ethical. Therefore, it is not clear if residential self-selection is the factor responsible for the association between aspects of the built environment and physical activity.

Some studies have examined residential self-selection specifically to determine the possible magnitude of the effect. However, the results have been inconsistent. One study found that the association between walking and the built environment was largely explained by neighborhood self-selection (Bagley & Mokhtarian, 2002), while a more recent study showed that even after accounting for attitudes and preferences, the built environment had an impact on walking behavior (S. Handy et al., 2006). In addition to

this conflicting evidence, people's neighborhood preference may also not correspond to where they actually live (Schwanen & Mokhtarian, 2005). Although people may want to live in a walkable neighborhood, they may be unable to find, afford, or be able to conveniently locate in one. Some believe this is because there is insufficient supply of walkable environments (Boarnet & Crane, 2001; Levine & Inam, 2004). Although debate around to what extent residential self-selection impacts the built environment and physical activity association, it is important to consider when designing research. Thus, part of the approach in this doctoral work examining students' and parents' perceptions of their built and social environment as it relates to mode choice to school is qualitative. By interviewing parents directly, questions about when and why they moved to their neighborhood can be asked to help address residential selection as it relates to active travel.

Personal Safety

Active travel and physical activity more generally are also related to characteristics of the social environment, such as personal safety. Although crime may constrain physical activity, heterogeneous measures of both safety and physical activity, in combination with geographic variation among studies provides inconsistent evidence. In one study, reported incidents of serious crime were associated with a 23% decreased likelihood of individuals engaging in the highest category of physical activity (Gordon-Larsen, McMurray, & Popkin, 2000). Other studies demonstrate that effects of crime are often manifested differently for women than men, with women more often constraining physical activity (S. Foster & Giles-Corti, 2008). However, one study found that violent neighborhood crimes were significantly associated with lower odds of physical activity

among elderly men, but not elderly women, further demonstrating the inconsistencies. Humpel et al. (2002) in a systematic review of 19 quantitative studies, found safety to be only weakly associated with physical activity. They attributed the weak association to the measurement of total activity, not just outdoor activity, since people are likely to be physically active indoors as well. The authors called for additional research focusing on safety and physical activity, though they concluded that "in light of the available evidence…research on environmental influences has considerable promise for the purpose of identifying significant and potentially modifiable influences on physical activity behavior" (Humpel et al., 2002, p. 198), despite the current inconclusive evidence.

Personal Safety: Children. Neighborhood crime statistics have also been inconsistently associated with children's physical activity and active travel. In one study, reported incidents of serious crime were associated with a 23% decreased likelihood of being in the highest category of physical activity (Gordon-Larsen et al., 2000), crime more generally has also been negatively associated with children's participation in physical activity (Davison & Lawson, 2006). One study showed an inverse correlation between the density of crime (incidents per acre) along the child's route to school and walking to and from school, demonstrating that those children whose route had more crime were less likely to walk (Banerjee, Uhm, & Bahl, 2014). However, other studies have reported inverse associations between crime rates, area deprivation, and self-reported physical activity for girls only (Brodersen, Steptoe, Williamson, & Wardle, 2005; Gomez, Johnson, Selva, & Sallis, 2004), and a systematic review including articles on crime and reported physical activity found that only 34% of articles showed a

statistically significant inverse relationship (Ding et al., 2011), demonstrating the variability of findings.

The relationship between safety and physical activity may be inconsistent because physical activity may be influenced not only by objective crime statistics, but also by people's perceptions of crime and safety. In a review of 41 articles examining personal safety and physical activity both objectively and subjectively, the authors noted that "the social environment and its influence on physical activity may be mediated by crime and perceived safety, and this warrants attention" (S. Foster & Giles-Corti, 2008, p. 249). The authors also stated that "perceived safety may mediate any direct association," of objective safety and physical activity (S. Foster & Giles-Corti, 2008, p. 249). This review demonstrates the importance not only of safety, but also of perceptions of safety, an area on which this dissertation will focus.

Adults' Perceptions

Perceptions inform our thoughts and influence the way we make decisions in our environment (Goldstein, 2013). Perceptions are important to examine, as they not only have been shown to influence how people decide to travel, but also because they may conflict with evidence from objective measures. In one study, almost 1300 adults in a telephone survey in Forsyth County, NC and Jackson, MS were asked about high-speed traffic and lack of sidewalks as barriers to physical activity (McGinn, Evenson, Herring, Huston, et al., 2007). Speed, volume, and street connectivity were also evaluated objectively using GIS. Participants' perceptions and objective measures were shown to be in poor agreement. However, when both measures were combined in the same model, independent associations with physical activity were observed. The authors concluded

that evaluating both perceived and objective measures may be necessary when examining the built environment and physical activity, since the combined model had the highest explanatory power (McGinn, Evenson, Herring, Huston, et al., 2007). Additionally, a 1987 telephone survey of US parents with at least one child under 13 showed that parents were far more concerned about abductions from strangers relative to the data based on actual rates (Eichelberger, Gotschall, Feely, Harstad, & Bowman, 1990). In addition, parents were less concerned about pedestrian injuries, automobile accidents, bicycle injuries, and drowning, the risks of which were substantially higher than abduction (Eichelberger et al., 1990), showing the importance of perceptions. The poor agreement between objective and subjective measures demonstrates the importance of examining the relationship of both to physical activity and active travel.

Perceptions and objective measures have also shown to be in poor agreement when examining natural environment features and physical activity. Natural elements such as weather and hills, measured by GIS were not aligned with respondents perceptions obtained by surveys (McGinn, Evenson, Herring, & Huston, 2007). Objective measures were not associated with any physical activity outcomes, while those who perceived hills not to be a problem in their neighborhood were almost twice as likely to meet physical activity recommendations and those who perceived trees for shade not being a problem were also more physically active. The authors demonstrated that models with perceived measures were a better fit than objective measures or of both combined, demonstrating the importance of perceptions (McGinn, Evenson, Herring, & Huston, 2007). Others have suggested that both perceived and objective measures should be included in studies in addition to studying the relationship between perceptions and

objective measures. This is of particular importance for characteristics such as safety, where inconclusive evidence exists as to the influence on physical activity (Saelens & Handy, 2008).

Perceptions of Personal Safety

Despite the importance of examining perceptions, adults' perceptions of crime and personal safety have been inconsistently associated with physical activity, walking, and active travel. Adults who perceive their environment to be safe from crime had higher levels of physical activity according to a 1996 Morbidity and Mortality Weekly Report using Behavioral Risk Factor Surveillance System data from Maryland, Montana, Ohio, Virginia, and Pennsylvania (Centers for Disease Control Prevention, 1999). This is consistent with a more recent study of over 15,000 UK adults that showed those who felt safe "during the day" and "during the night" were more likely to be physically active (Harrison, Gemmell, & Heller, 2007). However, some studies have revealed gender differences in perceptions of crime and physical activity. Women have been more likely to agree that crime deterred them from walking (C. Foster, Hillsdon, & Thorogood, 2004; Spence et al., 2006), suggesting that men and women have different perceptions of personal safety. While another study of over 200 african-american women in Baltimore found no significant association between crime-related safety and physical activity (Rohm Young & Voorhees, 2003) though, whites who have perceived their neighborhood to be safe from crime have been associated with more walking (Hooker, Wilson, Griffin, & Ainsworth, 2005). Therefore, perceptions seem to be specific not only to the location's built and social environment, but also individual factors. In order to better understand these factors, to in turn, have a more complete picture of the influence of safety on

physical activity and more specifically active travel, we need to use methods that allow participants to more fully describe their concerns and their background. Thus, qualitative methods will be a methodological focus of this doctoral work.

Although adults' perceptions of safety have been shown to inconsistently influence their own physical activity, adults' perceptions are more in agreement when it comes to children. Adults' negative perceptions of safety have been more consistently associated with reduced active travel to school. In one study, caregivers rated their perceptions of neighborhood personal safety by ranking their agreement with the following statement, "the neighborhood is not safe for child to walk/bike to/from school alone." For every unit increase, (an increase in lack of perceived safety,) the odds of walking to school declined 13% (McMillan, 2007). Therefore, the more safe caregivers perceived the neighborhood to be, the higher the odds their children used active travel to get to or from school. In London, children of parents who were worried about abduction or molestation were four or more times as likely to drive their children to or from school compared to those who were "not at all" worried about abduction or molestation (DiGuiseppi, Roberts, Li, & Allen, 1998). Similarly, Kerr et al. (2006) found that a combination of factors in an overall parental concern variable had the strongest explanatory power to determine whether a child participated in active travel (Kerr et al., 2006). Parents who had "few concerns" were five times as likely to allow their child to participate in active travel compared to those who had "many concerns" (Kerr et al., 2006). Thus, parents' perceptions of safety may be a more important factor influencing their child's travel mode than their own.

Perceptions of Traffic

Parents not only form perceptions about personal safety that may influence mode, but they also form perceptions about traffic safety. These perceptions of traffic may also influence the mode that they use and their child uses. A meta-analysis of 16 studies demonstrated that the perception that traffic is not a safety threat was positively associated with physical activity in adults (Duncan, Spence, & Mummery, 2005). Other studies on adults' perceptions of traffic primarily examine the relationship to children's travel mode.

Although traffic is commonly a cited barrier to children's active travel (Centers for Disease Control and Prevention, 2005; Centers for Disease Control Prevention, 2002) several studies have found no relationship between parents' perceptions of traffic and children's mode of travel to school (DiGuiseppi et al., 1998; Kerr et al., 2006; Timperio et al., 2006). In studies that have found an association, parental perceptions of traffic have varied by age and sex. Parents of older children have expressed less concern over traffic safety than parents of younger children (Timperio et al., 2004) and parental perceptions of heavy traffic were negatively associated with active travel for boys, though not for girls in one study (Carver et al., 2005). More recently, in a study using multivariate ordered response models, parents of boys and older children in the Los Angeles – Riverside – Orange County metropolitan statistical area were less likely to be concerned about crime and traffic speed than were parents of girls and younger children (Seraj, Sidharthan, Bhat, Pendyala, & Goulias, 2012a). Parents may be more protective of these two groups because younger children are less likely to be able to negotiate situations if any problems arise and parents may have social tendencies to characterize girls as more

vulnerable. These possible gender differences remain important when examining how to increase active travel rates, despite inconclusive evidence of their impact.

In addition to parents, school principals, superintendents, and school board chairs have been surveyed about their active travel concerns and how to improve active travel rates. Similar to perceptions of parents, these school officials perceived traffic to be a concern and viewed the most important ways to increase the number of children walking to school to be enhancing street crossing safety and increasing the number of sidewalks (Price, Pluto, Ogoussan, & Banda, 2011). Overall, limited evidence exists about parental perceptions of traffic and active travel. Furthermore, these perceptions tend to be of traffic safety broadly, including multiple components such as speed and volume, which may have different impacts on active travel. More in depth information on traffic perceptions should be collected to better understand the role, if any, traffic perceptions have when examining active travel.

Aesthetic Perceptions

Perceptions of aesthetics may also influence adult's physical activity and walking. One study found that respondents were more likely to walk if they stated their neighborhood was attractive (Giles-Corti & Donovan, 2002). This is consistent with King et al., (2000), who found that enjoyable scenery was associated with physical activity, particularly walking, in women over 40, and Spence et al., (2006), who found that women who reported "interesting scenery" were more likely to report walking at least 30 minutes a day at least five times a week. Although these studies have focused on recreational walking, aesthetics may also influence utilitarian walking. In one study examining the rationale for travel behavior, attitudinal statements relating to urban life

had the best explanatory power, more than socioeconomic characteristics and neighborhood characteristics (Kitamura, Mokhtarian, & Laidet, 1997). Although it remains unclear if aesthetics impact physical activity and walkability more specifically, there is evidence that they may play a role and should be examined more closely. Although adult's perceptions of aesthetics may influence their own walking habits, no study could be found that measured the impact of parent's perceptions of aesthetics and the influence on children's active travel. This may be because many studies emphasize parents' perceptions of crime and traffic (Kerr et al., 2006; Timperio et al., 2006; Timperio et al., 2004), although parents' aesthetics perceptions may impact children's travel mode.

Other Perceptions

A few studies have examined other aspects of what perceptions influence parents to drive their children or what influences them to allow their children to walk to school. Individual student characteristics may influence active travel. In one study of over 700 parents of 4-13 year old children in eight cities in Australia, parents who worried their child would take risks were 40% less likely to use active travel than those who did not (Salmon, Salmon, Crawford, Hume, & Timperio, 2007). Although other studies on the role of child characteristics are lacking, age and gender have been demonstrated to influence the mode children use to travel to and from school (McDonald, 2008a, 2008b; N. M. Nelson, Foley, O'gorman, Moyna, & Woods, 2008). Thus, additional personal characteristics such as the parent's perceptions of the child's responsibility level may also be important. Lastly, parents' values and habits in addition to their perception of convenience may influence mode choice. One study found caregivers who valued social

interaction had children who were more likely to use active travel, while caregivers who reported that driving was more convenient or fit their schedule better were found to have children who were more likely to be driven (McMillan, 2007). Another study found that parents walking behavior mediated the gender difference in active travel (McMillan et al., 2006), indicating that parents own behaviors may influence mode to and from school. Additional evidence was not found, however, these more individual factors may also play a role in the mode children use to get to and from school. Therefore, individual level factors such as parents' perceptions of their child's responsibility and the parents' views on the advantages, disadvantages, and convenience of various transportation modes will also be examined in this work.

Children's Perceptions

Adults are typically seen as the decision makers over what activities children are allowed to participate in, including what mode of travel they use to get to or from school. Evidence exists that changing household structure with more households with two working parents has led to increased influence from children on family decisions (Foxman, Tansuhaj, & Ekstrom, 1989). Children initiate requests for a variety of daily decisions including grocery purchases (O'Dougherty, Story, & Stang, 2006), purchases of technology equipment, and even cars, with marketing experts attributing over $1 trillion dollars in purchases to children and adolescents influences (Robinson & Robinson, 2012). Children, therefore, have influence over daily decisions and may also influence the mode they use to get to or from school by initiating a request, complaining about their current mode, or lobbying to use another. Although some children may not have a choice in the mode they use due to parents' work schedules or other individual household

factors, some do and may sway mode choice. Thus, understanding if these children ask for rides or ask to walk or bike may be an important component of how mode decisions are made.

Many children also travel to or from school without an adult. Children who walk or bike to school and certainly those who take the bus, take this trip without parent accompaniment and therefore, may have unique perspectives that are unknown by or not held by adults, who design safety improvements. Children's perceptions may influence their level of enjoyment of the trip, and in turn, their desire to continue using that mode. Children may also have unique perspectives on how to make their trip safer and how to increase the number of active travel users. Despite this, children's perceptions have been examined less frequently than adults. It is important to understand what is currently known about children's perceptions of physical activity and active travel and to continue to explore their perceptions to enhance safety and increase active travel rates.

In the limited number of studies that have explored the topic, students have been shown to perceive their environment differently than their parents. Timperio, Crawford, Telford & Salmon (2004) surveyed 10-12 year olds and their parents in Melbourne, Australia and found that both boys and girls perceived their parents to have more negative views of the environment and safety than their own (Timperio et al., 2004). In another study of 10-11 year olds, students were also found to have more favorable views of their neighborhood than their parents (Banerjee et al., 2014). While parents felt traffic was the most likely barrier to walking, students reported that elements of the social environment such as cleaner streets, less graffiti, and less crime were seen as more important to students (Banerjee et al., 2014). Lastly, parents and 10-12 year old children

ranked the probability of 11 active travel risks and identified what they perceived to be the most serious. There was almost no correlation between the rank orderings of parents and children, with 67%, of parents perceiving traffic to be the most serious, followed by bullying at 13%, and abduction at 8% (T. Lee & Rowe, 1994). Children, in contrast, were most worried about encountering people smoking, being approached by a stranger, and bullying. Due to the poor agreement of perceptions to objective measures it is important to study perceptions, but these perceptions should not be only of adults. Given the different perceptions that children have demonstrated in the few studies available, children's perceptions should continue to be explored as children may also have different ideas both on how to improve safety and increase rates of active travel.

Perceptions of Personal Safety: Children

Children's perceptions of their own personal safety may influence active travel. Panter, Jones, van Slujis & Griffin in a cross-sectional population-based study performed in Norfolk, UK, demonstrated that children's perceptions of whether their neighborhood was "safe to play" was the strongest predictor of active travel (Panter et al., 2010a). This finding demonstrates the importance of communicating with children, even through surveys, to determine what they think. Furthermore, in a study of over 600 sixth, seventh and eighth grade girls from six US urban centers, students who perceived it was safe to walk or jog in their neighborhood were more than twice as likely to report physical activity than those who disagreed (Evenson et al., 2006). This is consistent with 7th grade girls living in San Antonio, Texas who perceived that their neighborhood was safe for physical activity reported more physical activity outside of school (Gomez et al., 2004). Other studies, however, such as one of 110 college students (Sallis et al., 1997) and one

of 500 Hispanic sixth graders in Houston (Murray, Kelder, Orpinas, & Marshall, 1995) found no correlation between perceived neighborhood crime and reported physical activity. This variability may be explained in part by geographic and subgroup demographic differences among the studies. Once again, there also may be some differences based on gender. One study found boys had more positive views of their environment, particularly pertaining to personal safety (Page, Cooper, Griew, & Jago, 2010), which is consistent with studies of male adults (C. Foster et al., 2004; Spence et al., 2006). Overall, children's perceptions of safety should be further explored to better understand the influence they may have on physical activity and active travel more specifically.

Perceptions of Traffic: Children

Few studies have sought children's perceptions about traffic and the relationship to physical activity. Of those that have, the results have also been partially dependent on gender. Having "safe roads" in the neighborhood has been associated with increased walking to destinations in adolescent girls (Carver et al., 2005), which is consistent with a study of over 600 girls that found that those who agreed "it is safe to walk or jog in my neighborhood" were more than twice as likely to report higher levels of physical activity (Evenson et al., 2006). Moreover, boys have been found to have more positive views of traffic safety, including safe places to cross, and perceptions of traffic volume (Page et al., 2010). Whereas in another study, both boys and girls who perceived walking to be safe were more likely to walk to school. However, when controlling for gender, girls who thought walking was not safe were significantly less likely to walk than boys (Banerjee et al., 2014). Children's first concern for walking safety was "fast-moving cars" and

students who walked cited having “safe places to cross the road” as their top concern (Banerjee et al., 2014, p. 131). However, in the same study walking along busy streets was perceived to be safer since children were more apt to see other people or “bump into” friends and walk by familiar commercial establishments (Banerjee et al., 2014, p. 131), in essence citing Jane Jacobs’ “eyes on the street” (Jacobs, 1961). Thus providing some contradictory evidence on the perceptions of traffic and physical activity, walking and active travel. Despite this, examining children’s traffic perceptions may be important to understand how to increase children’s active travel. The importance of traffic perceptions relative to personal safety perceptions is also unclear and will be investigated as part of this doctoral work.

Perceptions of the Built and Social Environment: Children

Lastly, children may have perceptions of their built and social environment that influence their mode or their desire or comfort in using one mode over another. When 100 children in low-income communities outside Los Angeles were asked what they thought would make walking to school safer, “cleaner streets” was the most frequent answer with 69% of respondents, followed by “no crime” (66%), and “less crime in my neighborhood” (65%). Overall, these social elements along with gangs and areas of violence were more commonly cited than built environment or traffic elements (Banerjee et al., 2014), demonstrating the importance of perceptions of the social environment. Another social environment factor found to be associated with active travel is roaming dogs. Reports of anxiety about dogs roaming (from both boys and girls) was negatively associated with active travel in one study (Carver et al., 2005). Thus, there may be additional perceptions that children hold, at least in certain communities, which may

influence their mode to and from school. The presence of these perceptions, if any, should be explored to help understand why children are using the mode they do and how to allow children to use active travel and feel safe doing so.

Although some evidence does exist demonstrating that children's perceptions may influence physical activity and active travel to and from school, the number of studies emphasizing the perspective of school children is limited. Furthermore, these studies did not use methods best suited to deeply understand the perceptions that children hold. By asking students not only what they think, but also why, and having the ability to ask follow up questions and ask them to brainstorm ways to improve safety or increase active travel, we may gain a useful perspective to improve the quantity and experience of those using active travel.

Active Travel Benefits

Active travel, specifically to school, is important because it has been shown to have many benefits to those who use it. Although the primary benefit is the exercise students receive on their way to and from school, studies have shown that walking to school is also associated with higher physical activity throughout the day (Alexander et al., 2005; Cooper, Page, Foster, & Qahwaji, 2003). Furthermore, school support for active travel has been associated with increased physical activity. Faulkner et al., (2014) demonstrated that fifth and sixth grade students who attended schools with support for active travel accumulated significantly more minutes of physical activity per school week than students who attended schools that did not. Support for active travel was scored on a variety of factors including Safe Routes to School newsletters, policies allowing bicycling and bicycles on school grounds, walk to school days, presence of crossing

guards, and active travel programs and events. The authors concluded that schools may play an important role in facilitating active travel and that heightened support for schools to develop and implement active travel strategies may be beneficial. This heightened support may also lead to some objective or subjective changes to the built or social environment, which may additionally improve safety or the perception of safety of this mode. Given the low amounts of physical activity that most children participate in (Fakhouri et al., 2014), even minutes of additional exercise that active travel provides during the activity itself or associated with it is important to achieve improved health status.

There are also benefits of active travel in addition to the physical activity gained on the trip to or from school. Students who use active travel may also gain more independence (Stewart, 2011) and gain more traffic safety skills, which has been demonstrated to improve pedestrian behavior (Barton, Schwebel, & Morrongiello, 2007). Walking to school is also associated with reduced air pollution (Rabl & De Nazelle, 2012). Motor vehicles emit air pollutants including carbon monoxide and particulate matter, which can cause short-term health problems, particularly in children (Environmental Protection Agency, 2009). Children are more vulnerable to the negative health effects of headaches, and nose, throat, and lung irritation because children breathe 50% more air per pound of body weight compared to adults (Centers for Disease Control and Prevention, 2014a). This influences childhood asthma, which impacts more than seven million US children and leads to 14 million lost school days per year (Natural Resources Defense Council, 2014). Local air quality has been demonstrated to be higher

quality at schools in neighborhoods with sidewalk networks where more students utilize active travel (Environmental Protection Agency, 2003).

Furthermore, the transportation sector is responsible for one third of carbon dioxide emissions in the US (Ross Morrow, Gallagher, Collantes, & Lee, 2010) and cars, trucks, motorcycles and SUVs account for 62% of transportation-related greenhouse gas emissions (J. Davies, Grant, Venezia, & Aamidor, 2007). The EPA has estimated that walking to school can reduce greenhouse gas emissions by an average of 0.164 metric tons per year and contribute to the overall health of the environment (Environmental Protection Agency, 2014b). If half of the students at an average-sized elementary school walked, 39 tons of greenhouse gas emissions would be prevented from being released, which is the equivalent of the carbon-removing abilities of 1,000 trees (Environmental Protection Agency, 2014a, 2014b). Thus, the potential benefits of increased walking simultaneous with decreased driving also have both respiratory and environmental benefits.

Engineering projects that enhance and encourage active travel also lead to reduced collisions and traffic (Stewart, 2011). Safety evaluations demonstrate that police enforcement and speed humps, common components of Safe Routes to School projects, slow motorists and decrease pedestrian-vehicle accidents (Dumbaugh & Frank, 2007). Sidewalks and raised medians, also common in engineering improvement projects, equally decrease these collisions by separating pedestrian and vehicular traffic (Dumbaugh & Frank, 2007). Furthermore, increases in the number of students walking and bicycling may lead to reduced vehicular congestion. It is estimated that 5-7% of vehicle miles traveled and 10-14% of all personal vehicle trips are from taking K-12

students to school in the morning (National Center for Safe Routes to School, 2011). Therefore, engineering projects that encourage active travel may be able reduce some vehicular traffic, while simultaneously increasing safety for bicyclists and pedestrians.

In addition to benefits outside the classroom, active travel has demonstrated benefits inside the classroom. Students who are physically active have been shown to perform better academically in school. The odds of passing math and English standardized tests increased as the number of fitness tests passed increased in a school district in Massachusetts (Chomitz et al., 2009). Another study demonstrated a positive linear relationship between fitness scores and academic scores in California schools (Singh & McMahan, 2006). A longitudinal study in West Virginia demonstrated that students with higher aerobic capacity had higher standardized test scores (Wittberg, Northrup, & Cottrell, 2012), and a review of 43 studies showed that school-based physical education, recess, classroom based physical activity studies, and extracurricular physical activity were positively associated with cognitive skills, attitudes, academic behavior, and academic achievement. Furthermore, none of the studies found negative associations (Centers for Disease Control and Prevention, 2010a). A survey of over 20,000 Danish students aged 5-19 showed that students who used active travel performed better on concentration tasks, such as solving puzzles compared to their non-active counterparts; a greater impact than eating breakfast or lunch. These effects lasted up to four hours (Goodyear, 2013), demonstrating the prolonged beneficial impact physical activity can have on academic skills.

Physically active students not only do better academically, but principals also perceive that students are better behaved in school after participating in physical activity.

In a 2010 Gallup Poll of over 2000 elementary school principals nationwide sponsored by the Robert Wood Johnson Foundation, two thirds of principals felt students focused and listened better after recess, 80% believed it had a positive impact on academic success, and 96% believed it had a positive impact on social development and general well-being (Robert Wood Johnson Foundation, 2010). Active travel has many of the same social and active components that the majority of elementary school principals valued in recess and therefore, combined with the academic, physical, and social benefits, ways to safely increase active travel should continue to be examined.

Some districts have promoted active travel while reducing or eliminating bussing to encourage students to walk or bicycle. Reducing bussing for those students who live within short distances of schools (such as within a mile) can also have substantial cost savings for municipalities and school districts. The average expenditure per student who travelled by bus in 2009-2010 (the most recent data available) was $871, the equivalent of $915 in 2011-2012 dollars (U.S. Department of Education, 2013). Thus, school districts are spending more money on transportation between the fluctuating cost of fuel and fewer students walking or bicycling. This price increase was confirmed in Maine. The state saw its school transportation costs increase six-fold from 1970 to 1995, despite declining enrollment (Nathan & Thao, 2007). Therefore, increasing active travel rates can do more than improve student's physical activity and test scores; it may also be able save school districts and states money. However, school districts should be careful not to simply shift the travel mode from bus to personal vehicle by ensuring there are safe and accessible ways for children to arrive to school on foot or by bicycle in order to achieve the health and wellness benefits for students.

Despite local successes and the health and societal benefits active travel can produce, active travel has been on the decline. Even when accounting for distance, in 2001, 49.9% of students who lived within a mile of school walked, down from 85.9% in 1969 (McDonald, 2007). Thus, other factors, such as land use, traffic, personal safety and perceptions of these factors have been influencing mode choice, culminating in this active travel decline. In order to better understand why current mode choices are being made, what influences these mode choices, and how to make improvements to increase active travel, we need to speak directly to both those who we perceive are making mode choices, the parents, and those participating in the trip to and from school, the children. By speaking to both parents and children using in-depth qualitative methods, instead of only surveys, we may gain additional insights to help build more successful interventions in the future.

Qualitative Studies

Few studies currently exist that have used qualitative methods to elicit perceptions about the built and social environment and physical activity or active travel; however, qualitative methods are ideal for exploring questions about how people think and what informs their thoughts. A 1998 study examining barriers of physical activity for minority women used focus groups to explore factors preventing participation. The study showed that safety, availability of facilities, and cost were the primary environmental barriers to physical activity. Despite the focus group method, the study didn't reveal perceptions on why the women felt the way they did about their surroundings or what influenced their perceptions. Additionally, the participants were limited to minority women over 40 in California and Missouri (Eyler et al., 1998). Why the focus group method was employed

also is unclear as little seemed to be gained from the interaction among the women, a primary reason for the use of focus groups. However, the study demonstrated the feasibility of using the focus group method to discuss physical activity barriers.

Several additional studies have used qualitative methods to better understand perceptions of the environment and physical activity. An Australian study used focus groups to have residents both describe their built environment and their attitudes in order to determine factors conducive to leading an active lifestyle (Hahn & Craythorn, 1994). According to the study, making the built environment more attractive, accessible, and safe were factors that should be addressed to improve physical activity (Hahn & Craythorn, 1994). Although these findings are important, no deeper understanding about how and why the environment is perceived were revealed and could be examined using qualitative methods.

Parents have also been interviewed about their perceptions of the environment and the influence on children's physical activity. Authors of a study of children's active free-play conducted 78 interviews with parents living in Melbourne, Australia to better understand where children play and why (Veitch, Bagley, Ball, & Salmon, 2006). The interviews revealed the importance of parents' perceptions of their children's level of independence and attitudes towards free-play. However no interviews were conducted with children to determine if their own perceptions influenced their play locations, which may bring more in depth understanding to how children's play locations are determined.

Several studies have examined perceptions and active travel more specifically using qualitative methods. Thirty-seven parents of elementary school students in Toronto, Canada were interviewed about how mode choice decisions were made. A two-stage

decision process was revealed whereby parents first made a choice about escorting their child to school, followed by a mode choice decision primarily about convenience, including factors of time and distance (G. E. Faulkner, Richichi, Buliung, Fusco, & Moola, 2010). The study revealed the complex process of mode choice decisions, though children were not interviewed to better understand if their perceptions and mode preferences influence mode choice decisions. Given that the students were in primary school, mode decisions may be primarily informed by parents' perceptions, though as students age they are likely to be more influential and therefore, should also be interviewed about their perceptions to better understand mode choice. Lastly, 64 parents participated in fifteen-minute interviews about how they handled barriers when they travelled with their children to school in Denver, Colorado (Zuniga, 2012). Themes of barrier negotiation and barrier elimination emerged, the former being a barrier that does not prevent active travel participation, while the latter does. Many parents perceived barriers, though felt many were surmountable and still used active travel with their child to get to school (Zuniga, 2012). Furthermore, those families who used active travel more, seemed to have lessened or diminished perceptions of barriers, however, it is unclear if their children still perceived active travel barriers. Using qualitative methods with both parents and students' could help to better understand how mode choice decisions are made and how they are influenced by perceptions.

Some studies examining physical activity have used qualitative methods with children. One study used focus groups to examine how 10-11 year olds perceive their parents encouragement of physical activity and how physical activity may be undertaken as a family. The study concluded that although almost all parents encouraged physical

activity that creating interventions that engaged the whole family may be more effective to increase physical activity (Brockman et al., 2009). Similar to this study, by asking students how they perceive their parents perceptions of the environment, we also may be able to gain additional insights into mode choice decisions. Focus groups have also been used with 10-13 year old students in Scotland about their perceived barriers and ideas for promoting active travel (Kirby & Inchley, 2009). Students perceived personal safety, weather and time/distance to be the most important barriers and wanted incentive programs and rewards to further active travel motivation. They also sought groups to walk or cycle to school with (Kirby & Inchley, 2009). Although similar intervention strategies may be effective in other communities, it is important to examine perceptions in context to derive context-specific strategies to increase walking and bicycling. By interviewing both parents and students we may be able to not only understand the perceptions of both of these groups and how they influence active travel, but also create more effective strategies to increase active travel rates in the future.

One study was found that used qualitative methods to examine barriers and facilitators of active travel and had both parent and student participants. Thirty-seven parents and thirty-seven fourth and fifth grade students who lived close enough to their school to participate in active travel (where there was no bussing, under 1.5 miles) participated in one of twelve focus groups in North Carolina (Ahlport, Linnan, Vaughn, Evenson, & Ward, 2008). Separate focus groups were held for parents and students, in addition a short pre-survey was used to divide participants into different focus groups by whether or not their child used active travel. Three categories of findings arose: interpersonal and intrapersonal characteristics, environmental characteristics of the

neighborhood, and policies at the school. Abduction was the primary concern among both children and parents. However, children and parents who did not use active travel appeared to have heightened awareness of this issue. The study found that students and parents perceptions were similar, though this may be due to the age of participants. Older students may be less likely to have perceptions aligned with their parents and thus, their perceptions should also be examined. The authors cited strengths of the research design that they were able to speak with both parents and students and that "the use of qualitative methods allow[ed] us to uncover rich detail enabling a full exploration of the determinants of active school travel" (Ahlport et al., 2008, p. 240). Given that only one study was identified that used qualitative methods to have both parents and students fully describe their perceptions to better understand what these perceptions are, and that additional perspectives, particularly from students' may influence our interventions, an opportunity exists to use qualitative methods to speak directly with parents and students. By doing so, we may also gain additional insight into what informs these perceptions and what changes parents and students would like to see to improve safety and active travel.

Despite the use of interviews and focus groups in some studies to garner information about perceptions of the built and social environment with respect to physical activity and active travel, the deeper understanding that can be obtained through qualitative methods is still lacking in this area of research. Using qualitative methods can provide this important and timely area of research an opportunity to more deeply explore how parents and children view their built and social environment when making mode decisions and what informs these perceptions. This information will enrich the current

literature and possibly inform questions for more qualitative methods in future research, in addition to better-designed interventions to increase active travel participation.

Chapter Summary

This chapter reviewed the relationship between elements of the built and social environment, perceptions of the built and social environment and physical activity, more specifically, active travel. Active travel, primarily walking or bicycling, allows users to participate in physical activity while en route to a destination. Despite the well-documented health benefits of active travel and physical activity more broadly, active travel has been on the decline. Interventions are needed to increase active travel to realize not only the physical activity benefits, but also the associated academic performance benefits, reduced collisions, along with the reduced air pollution and corresponding respiratory problems. Active travel in children is of particular importance as travel behaviors in childhood may last a lifetime. Thus, understanding how elements of the built and social environment and perceptions of these elements impact active travel is of critical importance for the health and wellbeing of future generations.

Using a variety of exposure measures, studies of mixed use neighborhoods, sidewalk presence, and decreased traffic have been shown to be most associated with increased physical activity and walking in adults and even more so in children. However, perceptions, particularly of traffic and crime, may be as important as the environment itself when examining mode choice. Some evidence exists examining adults' perceptions, both as it applies to adults own travel behaviors and their children's, but little exists examining children's perceptions of the built and social environment, despite being the

primary travelers. Children's perceptions may help us to better design interventions to improve safety and increase active travel rates.

Studies of perceptions have generated inconsistent results and typically used surveys to obtain information. However, what people think, how they make decisions, and what informs their choices would be best investigated using qualitative methods, which allow for open-ended responses, follow-ups and justification. Furthermore, speaking both to parents, who are seen as the primary decision makers, and to their children, who may influence mode choice, may help us to better understand mode decisions. Only one study was found that used qualitative methods to directly ask parents and students about their perceptions of the built and social environment and the influence on mode choice. At the same time, this comparison interview method has been used in medicine, family studies, and in the social exclusion literature (B. Davies, Davis, Cook, & Waters, 2008; Hsiao, Evan, & Zeltzer, 2007; Yarosh & Abowd, 2009) to help understand the differences in parent and student perceptions. Therefore, I seek to further enhance our understanding of these perceptions by using qualitative methods with children and parents alike and add "thick description" of parents and students perceptions (Geertz, 1994). By bringing the voices of parents and students to the center of this research, we may learn more about what they both think and be able to apply this information to inform better interventions, enhance safety, and increase students' active travel rates.

CHAPTER 3. DATA AND METHODS

The literature review presented above (Chapter 2) reveals that perceptions, along with objective features of the built environment, are an important part of the framework for understanding mode choice and activity patterns. Perceptions may be best understood when described by the individual to gain in-depth information about what they think and what influences these thoughts. However, few studies have used qualitative methods, such as interviews and focus groups, to more deeply understand both how parents and perhaps more importantly, how children perceive their built and social environment as it relates to mode choice. Children specifically, may have different perceptions of their built and social environment, which in turn, may influence their mode choice, primarily on their trip to and from school. Despite this, most studies have emphasized parent perceptions and rationale. By having students participate in research and by speaking with them directly, we may be able to create more effective interventions to increase active travel rates and improve safety in communities.

Two methodologies were used to address the research questions described in Chapter 1. First, a visual survey and in-class discussions were used to determine students' perceptions of safety and the built and social environment as it relates to a specific mode: active travel (research question 1). Students both rated photographs and provided demographic information that was used to model students' safety scores. Then students qualitatively discussed their rationale for their rankings, including specific elements of the environment they felt were safe and unsafe and why (research question 2). Second, in depth one-on-one interviews with parent and student pairs in three communities were used to examine parent and student perceptions of the trip to and from

school. These parent and student perceptions were compared and contrasted to determine what, if any, differences in perceptions students and parents had, how possible differences might manifest themselves and what informed these perceptions (research questions 3 and 4). Together, these methods provide a greater understanding of parents' and students' perceptions of their built and social environment on the mode of travel to and from school.

This chapter is organized as follows. The visual survey and discussions are described first, followed by the one-on-one parent and child interviews. Each study's participants, site selection, instruments, procedures, and methods of data analysis are discussed prior to the conclusion, which reviews the overall rationale for the methodology.

Visual Survey and In-Class Discussions

Since traditional surveys are often long and require high literacy or feel like schoolwork, which can be intimidating to children, a visual survey was selected for the first study to ensure the design was "fair and respectful" (Barker & Weller, 2003). Visual preference surveys, where participants rate photographs, have been used in a variety of studies with adults including community design, landscaping, and transit design (R. Ewing, 2001; Nelessen, 1994; Zheng, Zhang, & Chen, 2011). Photographs have also been commonly used in children's research as a catalyst for children to express their opinions and perceptions (Barker & Weller, 2003; Hesketh, Waters, Green, Salmon, & Williams, 2005; Hume, Salmon, & Ball, 2005). However, a visual survey alone would not provide a deep understanding of children's perceptions or allow their voice to be heard and themes

to emerge; central goals of the dissertation. Therefore, the visual survey was combined with interactive classroom discussions to better capture student's perceptions of safety.

Participants. Three middle schools in three municipalities in Hudson County, New Jersey were selected for their similar urban built environments: Harrison, Bayonne, and Jersey City. Relationships with these schools were formed first through the Hudson Transportation Management Association. Researchers met with school administration to present the research plan, which was integrated into a classroom lesson. All three locations are poor, old urban areas within fifteen miles of midtown Manhattan with diverse student populations. While these municipalities vary by size and demographics (Table **3-1**) school neighborhoods and the schools themselves have similar characteristics and serve disadvantaged youth. All students were in sixth, seventh, or eighth grade. In Harrison, 294 students or 70% of the school student body participated, while in Jersey City 394 students participated or 95% of the schools' students. One hundred eight students participated in Bayonne, also equating to 95% of the schools' students in grades 6-8. The 95% of students participating at Academy I in Jersey City and Vroom in Bayonne were all students present and in regularly scheduled classes that day (in school suspension students were not able to participate.)

Table 3-1. Key Demographic Information for Visual Survey Communities

	Harrison	**Bayonne**	**Jersey City**
Population	13,620	63,024	247,597
Median Household Income ($)	52,598	53,587	54,280
Population Density (per sq mile)	11,319.3	10,858.3	16,093.7
% White in School	26	40	16
% Free or Reduced Lunch	83	62	74

Communities.

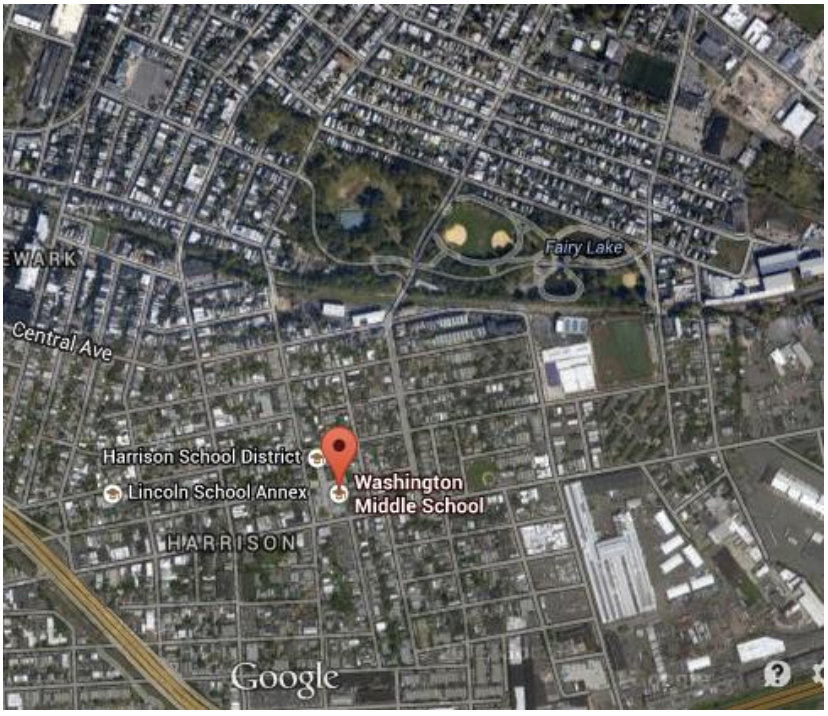
Washington Middle School, Harrison. Harrison is a municipality of just over 13,600 people in just over 1.3 square miles, equating to a density of about 11,300 people per square mile. In 2010, the median household income was just over $52,500, just under the US median household income of $53,046 and well under the New Jersey median household income of $71,637. Washington Middle School is the only 6-8 school in the district and eighty-three percent of students at the school qualify for free or reduced lunch. During the 2011-2012 school year, 26% of students were white, with another 64% Hispanic. The municipality has undergone substantial community redevelopment with the opening of Red Bull Arena in March of 2010. Harrison has a gridded street network with sidewalks and a PATH subway station that offers service to Newark, Hoboken, Jersey City, and New York City.

Vroom School, Bayonne. Bayonne is a municipality of just over 63,000 residents in 11 square miles, with a density of just over 10,800 people per square mile. Vroom is one of 11 PreK-8 schools in the district that all feed into one high school. In 2010, the median household income was $53,587. During the 2011-2012 school year, 40% of students were white, with another 40% Hispanic and 62% of students qualified for free or reduced lunch. The municipality has a gridded street network and the Hudson-Bergen light rail line has four stops in Bayonne. The school is on 26th between the 22nd and 34th street light rail stops past Avenue E, one and a half blocks away.

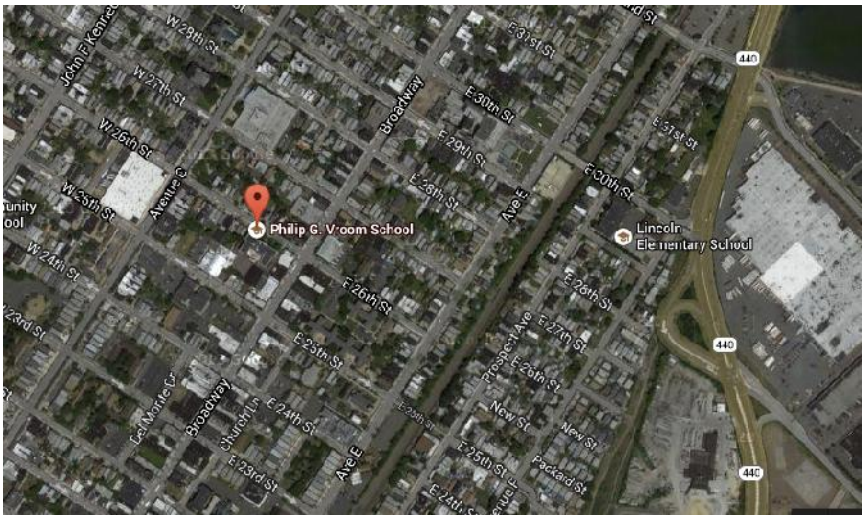
Academy I, Jersey City. Jersey City is the largest of the three study municipalities, with over 247,000 residents. It is also the most densely populated of the three communities with over 16,000 people per square mile. The 2010 median household income was also the highest at $54,280. During the 2011-2012 school year, 16% of students were white,

37% of students Asian or Asian/Pacific Islander, 27% of students were black, and 17% were Hispanic. Seventy-four percent of students qualified for free or reduced lunch. Jersey City covers just over 21 square miles, thus, the built environment can vary throughout the city. The area near Academy I is primarily single-family residential, with a gridded street network and sidewalks. A high school is situated next to the middle school. Both the Hudson-Bergen Light rail and PATH have stations throughout the city. Academy I is situated between the West Side Ave and MLK Drive light rail stations.

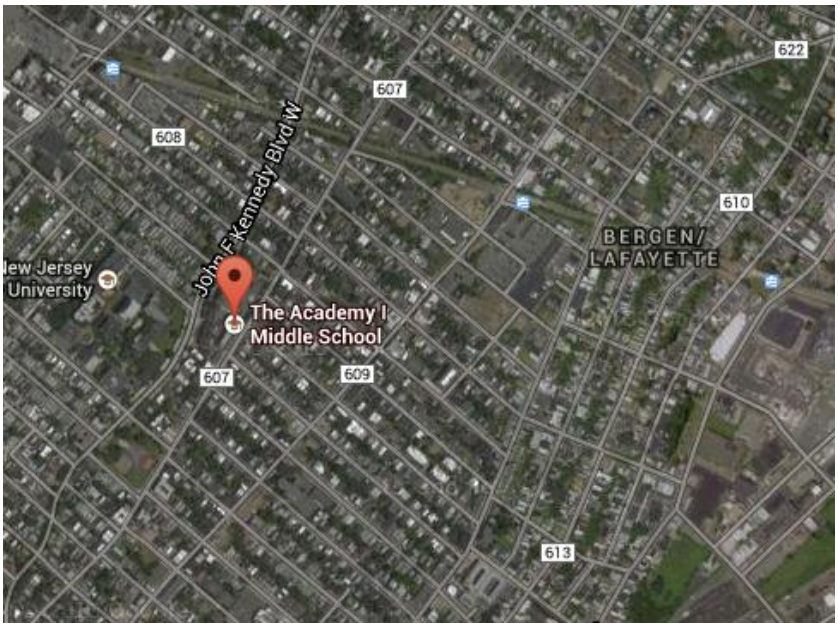
Figure 3-1. Map of Three Visual Survey School Locations



Washington Middle School, Harrison



Vroom School, Bayonne



Academy I, Jersey City

Instruments. A visual survey was developed with 17 photographs for students to rate on a five-point scale (described further below). The images were taken by the researchers and included several important empirical and theoretical safety issues per photograph, representing real-life scenarios, including: students crossing a road safely with a crosswalk, without a crosswalk, with a crossing guard, with and without adults,

jaywalking, crossing at a signalized intersection, bicycling with and without helmets, walking on sidewalks, walking on the side of the road, and walking on roads with and without speed bumps present.

In-class questionnaires, including demographic questions, were administered and discussions were held in all 39 classrooms to identify students' safety perceptions. During in-class discussions, students were asked to identify safe and unsafe elements in three of the images, as well as improvements to safety. No description or definition of safety was provided and the research team made no distinction between traffic safety and personal safety, allowing the students to interpret safety on their own. The goal of the qualitative discussion was to allow students to voice the rationale for their quantitative ratings, a limitation of using only the visual survey method. See Appendix 1 for photographs.

Procedure. All research was conducted between June 3 and July 17, 2013 (the end of the school year and during several 6th grade summer school classes in Harrison, which were free and widely attended by residents). The data collection, both the visual survey and in-class discussion, were created as parts of an overall lesson about careers in planning to appeal to administrators and students and to teach students about planning. At the beginning of the lesson students were asked to think about a career they were interested in pursuing. They were then asked if they wanted to become planners or if they knew what planners were or what they did. Students were then told that one of the parts of being a planner was improving safety. After this, we led the class through the visual survey and in-class discussions, where they shared what they thought was safe and unsafe in the images. At the end of the discussions, they were told they thought like planners:

critically assessing information and seeking improvements. They were then presented with information on how and why people become planners, their teachers and administrators specifically requested that we reinforce good grades and discuss our educational backgrounds. We emphasized that planners work with communities and create a vision for the future. When time allowed, students shared their visions for their municipalities' future. Additional information on transportation planning, environmental planning, housing, economic development and parks and recreation were presented. Students were then asked at the end of the discussion to name one-thing planners do, with many citing "improve their communities," "think of a better future," and "improve safety."

Classroom periods ranged in length of time, but approximately 12 minutes were allotted to the survey explanation and quantitative data collection. Each of the seventeen images was projected onto a large screen in the students' classrooms and each student was given a questionnaire, a corresponding sheet of paper with small thumbnails of the images and corresponding image numbers to follow along. Students circled one of the five numbers on their papers for each image. Unsafe was indicated with a "thumbs down" placed next to the number one and safe was indicated with a "thumbs up," placed next to the number five to aid students' memory on the directionality of the scale. Data on demographic characteristics, including gender, race, ethnicity, age, and primary mode of transportation to school was also collected. Based on a convenience sample in a pilot test of middle schoolers, students were given 25 seconds to view and rate each of the photographs. The pilot testing was a full mock lesson, including data collection, followed by a review of the students' questionnaires. The visual survey and in-class discussion

were then reviewed question-by-question with the pilot students to determine that the photographs, questions, and format were understood by middle-school aged participants. Small adjustments were made based on pilot student questions.

Rutgers University Institutional Review Board approved the research protocol and students were told and reminded not to write their names on the papers to ensure there was no link between individual student responses and the data. Students were also told that their participation was voluntary: this was not a test. Once a photograph was displayed, students could not go back and review it again or change their answers. Students were asked to be quiet while the photographs were shown as not to influence other students thinking and rating.

Following administration of the questionnaire, for consistency, the investigator, with classroom teachers present, led a discussion on safety using three of the images the students saw and rated. The discussion focused on what elements students considered when rating the photographs and took approximately an additional 20-25 minutes. Students were asked to identify elements that were safe and unsafe in the images, asked why they believed them to be safe or unsafe, and to share their suggestions on what they would do to improve the safety in the images. They were also asked to think about the images in relation to what they saw in their neighborhood and the neighborhood around their school, what was safe, unsafe, and what they would do to improve the safety of their environment. Qualitative data analysis was conducted using field notes taken by a separate member of the research team to ensure students' quotes were captured verbatim. The discussions allowed for a deeper understanding of what the students thought and provided justifications for their ratings.

Data Analysis. The analysis was conducted in two stages. First, safety-related themes emerging from the class discussions of the photographs were identified. Data were analyzed according both to sensitizing concepts and inductive emergent themes, using thematic analysis (Eisner, 1998; Patton, 2001). First order coding was open, and continuous cross-referencing was used to avoid duplication and omission (Patton, 2001).

Next, survey data were analyzed to test whether the safety themes identified in the discussions were consistent with the rating on the visual survey. Each photograph was examined for absence or presence of the theme and thus, received a binary "theme present" or "theme absent" code. Then, two types of quantitative analyses were undertaken: paired t-tests to determine if the mean scores for images with the theme present differed from those with the theme absent, and multivariate analyses to examine the predictors of safety perceptions as identified in the discussions. Due to the three levels of independent variables represented: the photographs, the schools, and the students; three-level generalized linear latent and mixed models (GLLAMM) with an ordinal dependent variable were run using STATA/MP 13.1. GLLAMM provides a maximum likelihood framework for a multilevel model, while still allowing for the ordinal nature of the dependent variable (Skrondal & Rabe-Hesketh, 2004). Since the same theme was present in multiple images and each student rated each of the images individually, student responses were pooled for analysis. Therefore, a single dependent variable "SCORE," maintaining five ordered categories, was created from individual photograph score variables with the final dataset at the "student-score" level of analysis. With 776 unique students and 17 images, this led to 13,192 observations in the pooled data set. Each of the models controls for age, gender, race, and ethnicity while examining

one independent thematic variable of interest pertaining to the photograph that emerged from the discussion with students. The themes arose from the in-class discussion and each photograph was examined to determine whether the theme was absent or present in that photograph. A binary score for each theme was then recorded. Thus, photograph three, for example, which pictured six children and two adults crossing the street, but not in a crosswalk, had the theme of group and adult present, but the theme of in-crosswalk absent. This photograph was coded "unexpected" since the group was not using a crosswalk, and due to the presence of the school bus, it was coded to be near a school. If a photograph did not apply to the theme, it was dropped from that analysis entirely (which is why the theme on crosswalk has a lower N). A separate model with the four themes that included all of the photographs was also run. Lastly, Cronbach's Alpha was also examined for the group of photographs as a whole and each of the themes presented to examine internal consistency.

Parent and Student One-on-One Interviews

Since some literature has identified barriers and facilitators of active travel, primarily through caregiver surveys, qualitative interviews were selected to more thoroughly "understand the world as seen by respondents" (Patton, 2001, p. 21). Qualitative methods emphasize descriptions of lived experiences and "facilitate the study of issues in depth or detail" (Patton, 2001, p. 14). By performing interviews instead of using traditional surveys, more flexibility in response could be achieved, in addition to allowing unanticipated issues that may be important to arise. Although focus groups were also considered, their primary benefit is the interaction among participants and the group dynamic. Since participants' perspectives on mode choice may vary widely and be

influenced by personal experiences and context, individuals' opinions may be concealed or subject to interpersonal bias if the majority of respondents feel one way in a focus group setting. Some parents may also feel mode choice and active travel is a somewhat personal or sensitive topic, with some potentially feeling that their choice reflects the quality of their parenting and thus, may have perceptions and concerns they would rather not share in a group. Therefore, interviews were selected to speak one-on-one with parents and students' alike to be conscious of personal concerns and provide more time to understand individual's perceptions.

Parent and students thoughts, in their own words, may also further enhance the conversation around mode choice and allow barriers, facilitators, and concerns of all modes to become more tangible. Presenting quotes from parents and students alike may better reveal the full scope of mode choice and built and social environment perceptions and may also be able to be used as an impetus for change. By interviewing both parents and children, whose voices are largely missing from the literature, these perspectives could be compared and contrasted and the deeper understanding of their perceptions could be gained in addition to what informs these perceptions. Lastly, a better understanding of the variation in perceptions among participants in communities, if any, may better inform and target interventions in the future.

Participants. Middle schools in three municipalities in Central New Jersey were selected for their varied, but suburban built environments: Highland Park, Franklin Township, and Stanhope. These locations were purposefully selected to examine variations among communities of varying densities and socioeconomic status. Furthermore, past studies have primarily emphasized urban environments and the same

perceptions may not exist in more suburban areas. Parents and students (a child of the parent) were interviewed about their perceptions of the built and social environment and mode choice, specifically active travel, in their neighborhood and around their school area. Fourteen to eighteen parent/child pairs were interviewed in each community. All children were in sixth, seventh, or eighth grade. More detailed information on participants can be found in Table **3-2** below.

Table 3-2. One-on-One Interview Participant Information

	Highland Park	**Stanhope**	**Franklin**
Total N	18	16	14
6th graders	5	3	0
7th graders	5	6	5
8th graders	8	7	9
Male student	9	7	6
Male parent	7	0	4

Highland Park, Highland Park Middle School: With the cooperation of the school district superintendent in Highland Park, an e-mail was sent to all middle school parents with information about the study. Parents called or e-mailed and set up times to be interviewed. In addition, snowball sampling was used to recruit additional participants. More parents in Highland Park contacted the investigator about the study from the initial school e-mail than in the other two communities, and thus, less snowball sampling was done.

Franklin Township, Franklin Middle School: The principal, a vice-principal, and the head of the parent-teacher-student association (PTSO) assisted with the communication of the project to parents. The school did not have an e-mail distribution system for all parents, so the request was sent to the 100 parents who were registered in the PTSO, asking

parents to forward the request, and notices were left at the school front desk where parents must check in when entering school grounds and at the eighth grade graduation events. An announcement was also made at "Back to School Night," which many parents attend to learn about their child's classes. Parents also called or e-mailed to set up times to be interviewed and snowball sampling was also used to recruit additional participants. Most parents were recruited through the "Back to School Night" event, which was widely attended. However, parents who were neither involved in the PTSO and did not attend the "Back to School Night," were less likely to find out about the study.

Stanhope, Valley Road School: With cooperation from the school district superintendent, principal, and head of the home-school association (HSA), an e-mail was sent to all parents of children in grades 6, 7, and 8. Parents called or e-mailed and set up times to be interviewed. In addition, snowball sampling was used to recruit additional participants. Snowball sampling was used the most frequently in Stanhope, as parents more commonly referred other parents into the study than in the other communities.

Communities. Since perceptions may vary given the built and social environment context, the three communities selected are described below.

Highland Park Middle School, Highland Park. Highland Park is a community of just 1.8 square miles and just under 14,000 residents outside New Brunswick with a 2010 median household income of $78,821. There are about 7,728 people per square mile. There is one middle school with 325 students between sixth and eighth grade and there is no busing available for the majority of the town, though for one section across the train tracks busing is available. During the 2011-2012 school year, 44% percent of middle school students were white, with another 20% Hispanic. Over 30% qualified for free or

reduced lunch. Highland Park has a gridded street pattern, with a downtown and sidewalks are ubiquitous. The main county road, Route 27, serves as the main street with shops and restaurants, though it divides Highland Park into two residential sections, with the middle school sitting on the North side of town, attached to the high school. Route 27 has signalized intersections with countdown clocks and crosswalks and there is a crossing guard at one location on Route 27. There are also bicycle racks along Route 27 in addition to one outside the Middle School.

The borough is dominated by graduate students and Rutgers University faculty, with almost 24% of the 25 and over population holding a bachelors degree and an additional 40% having a masters degree, doctorate, or professional degree. Almost 56% of the housing units are renter occupied and the median age is 34.8. The borough is also liberal with almost 73% of voters voting for President Obama in the 2012 election and 76% voting for the incumbent democratic Senator from New Jersey, Bob Menendez. When examining crime in 2012 in the borough and adjusting per 100,000 residents, the extrapolated figures are: 21 robberies, 28 assaults, 403 burglaries, and 1231 thefts. Several algorithms exist to compare crime among communities. In 2012, using the city-data.com algorithm Highland Park's crime rate was 106.9 compared to a US average of 300. Although the crime rate fluctuates from year to year, since 2001, the average crime rate in Highland Park is 109.6. Thus, Highland Park has less crime than many US municipalities, however, it is above the crime rate in Stanhope, and below the crime rate in Franklin Township, when comparing the crime rates among municipalities in this study.

Franklin Middle School, Franklin Township. Fewer than four miles from Highland Park Middle School is Franklin Middle School in Franklin Township. Franklin Township is a community of just over 46 square miles and 62,000 people in Somerset County with a 2010 median household income of almost $90,000, although over 40% qualified for free or reduced lunch, demonstrating the income disparity in the township. There is one middle school with just over 1,000 students in seventh and eighth grade. Busing is available to those students who live over two miles from the school. There is a bicycle rack outside the main entrance to the school. During the 2011-2012 school year, 45% of middle school students were black, with another 24% Hispanic. Franklin Township is comprised of over 15 census-designated places that have their own identities, but are unincorporated, thus all students are districted to Franklin Township public schools. There is no primary main street in Franklin Township and more curving roads and dead ends surround the middle school than in Highland Park. The school is near busy county road 514 and a busy township road, Franklin Boulevard where sidewalks are intermittent. The township is also liberal with 71% voting for both President Obama in the 2012 election and the incumbent democratic Senator from New Jersey, Bob Menendez. When examining crime in 2012 in the borough and adjusting per 100,000 residents, the extrapolated figures are: 40 robberies, 139 assaults, 317 burglaries, and 2696 thefts. To compare the crime rate to the other municipalities, the city-data.com algorithm in 2012 was 181.2, making this the highest crime municipality among the three communities, however, it is still well below the 300 US average crime rate. Although this figure varies from year to year, the average for this figure since 2001 is 146, making it consistently the highest crime community of the three included in this study. However, the municipality

spans a larger geographic area than Highland Park or Stanhope and crime data is unavailable at smaller geographic units, which is likely to be quite variable across the township.

Since all the interviewees lived within two miles of the school, which comprise two census tracts, more detailed information about these census tracks is presented below. The two census tracks are 053103 and 053200, on either side of the middle school. Even these two census tracts are distinct; the one closer to New Brunswick has a population density of 6,120 people per square mile, a median household income of $71,176, a median age of 33.3, and just over 14% of the over 25 population in the census tract hold a bachelors degree with an additional almost 6% holding a masters, doctorate, or professional degree. In contrast, the census track further from the New Brunswick border is lower density at 3,136 people per square mile, higher income with a median income of $112,500, older with a median age of 41.3, and has a higher educational attainment, with 31% of the population over 25 holding on a bachelors degree, and an additional 18% holding a masters, doctorate, or professional degree. Crime information was unavailable at the census tract level.

Valley Road School, Stanhope. Approximately 38 miles northwest of Highland Park near the intersections of US 206 and I-80 sits Stanhope. Stanhope is a municipality of just over 3,600 people in just over two square miles in Sussex County with a 2010 median household income of just over $78,000. There are about 1,966 people per square mile. There is one school near the top of a hill with grades K-8 with about 400 students and one high school nearby via a walking path. There is a bicycle rack outside the school, though on the opposite side from where students can enter in the morning, a bit out of sight.

Since 2004, there has been no busing to Valley Road School. Fifteen percent of K-8 students qualified for free or reduced lunch. During the 2011-2012 school year, 81% of students were white, with another 9% Hispanic. Stanhope has a small walkable downtown area with sidewalks; however, many side streets do not have sidewalks. Outside of the small downtown the street network is not gridded and a busy, curving, high-speed road, runs through the town.

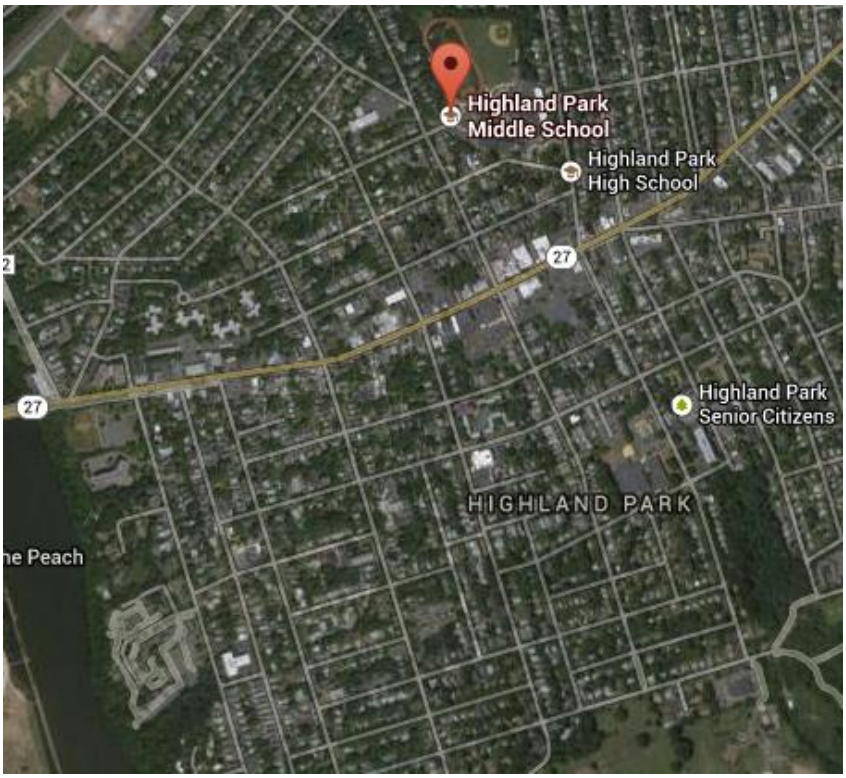
Stanhope is a more conservative municipality, with just 46% of voters voting for President Obama in 2012 and 45% of voters voting for the democratic incumbent senator, Bob Menendez. The municipality population is also not as well educated as the Highland Park population, with 22% of the population over 25 holding a bachelors degree, with an additional 9% holding a masters, doctorate, or professional degree. The median age is 39.5. When examining crime in 2012 in the borough and adjusting per 100,000 residents, the extrapolated figures are: 0 robberies, 0 assaults, 554 burglaries, and 720 thefts. When using the city-data.com algorithm to compare the crime rate to other municipalities, it has a crime rate of 95.7. Again, over the last twelve years this crime rate has varied, but the municipality has an average crime rate of 96.1, the lowest crime of the three communities in the study.

Table 3-3. Key Demographic Information for One-on-One Interview Communities

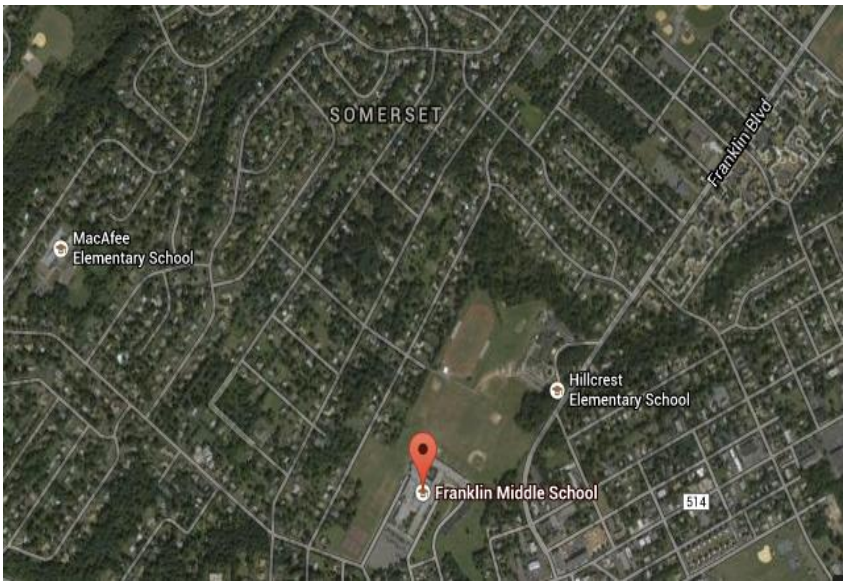
	Highland Park	**Franklin Township**	**Stanhope**
Population	13,982	62,300	3,610
Median Household Income ($)	78,821	89,992	78,625
Population Density (per sq mile)	7,728.1	1,350	1,966.3
% White in School	44	18	81
% Free or Reduced Lunch	32	41	15

	Franklin: Census Tract 053103	**Franklin: Census Tract 053200**
Population	4,901	7.427
Median Household Income ($)	112,500	71,176
Population Density (per sq mile)	3,136.7	6,120
% White	48.0	26.7

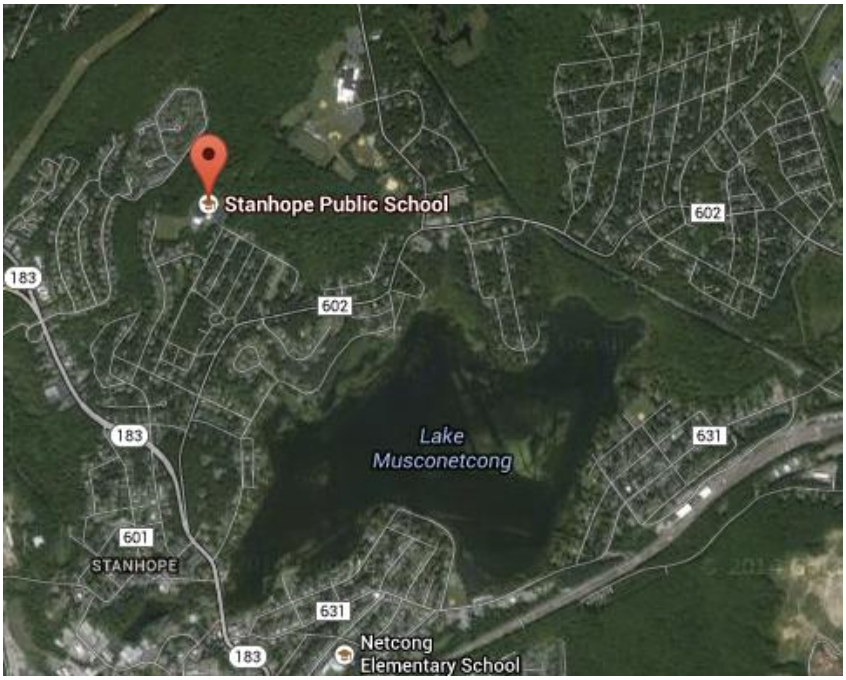
Figure 3-2. Map of Three One-on-One Interview School Locations



Highland Park Middle School, Highland Park



Franklin Middle School, Franklin Township



Valley Road School, Stanhope

Instruments. Semi-structured, in-person, in-depth qualitative interviews lasting approximately 40 minutes were conducted with each parent. The interviews focused on the rationale for mode choice, risks, barriers, and facilitators on their children's trip to

and from school in order to examine parental perceptions. Interviews asked directly how the student got to and from school, but there was no discussion of active travel as a policy goal. Parents were asked near the end of the interview if they thought the school or municipality could or should do anything to increase walking and cycling. Iterative questioning was used to seek deeper understanding (see Appendix for protocol.) Following the parent interviews, in-person, in-depth interviews of a middle school student of the parent selected for the parent interview was also conducted. The interview protocol was similar, but the student interview was only 20-30 minutes in length.

Procedure. Disabled children who could not participate in active travel were excluded. For parents who had several children meeting the sampling criteria, the child interviewed was selected alphabetically by first name to avoid any potential biases. The interviews took place either in mutually convenient public locations or in participants' homes. All interviews were conducted in English. The protocol was approved by Rutgers University Institutional Review Board and all interview responses were kept confidential. Participation was voluntary. Participants in Highland Park did not receive compensation or reimbursement for their participation, however, the parent participant in Franklin Township and Stanhope received $20 for their participation due to the difficulty of participant recruitment in these locations and the availability of funding from Voorhees Transportation Center. Interviews were performed with individuals who met two sampling criteria: 1.) Parent of at least one child currently in grades 6-8 at the designated schools, and 2.) Parent and children live without access to busing to school. This second criterion was included to ensure children did not live so far from school that they had no option to bicycle or walk. Thus, by only including parents whose children were not

eligible to take the bus to school, parents could talk about their mode choice decision and not state that they lived too far from the school for their children to walk or bicycle and therefore, did not have a true decision to make. There is no busing in Stanhope or in the majority of Highland Park; however, busing is available for those students who live farther than two miles from the middle school in Franklin Township.

Eight pilot interviews were completed prior to data collection and showed that middle-school aged participants understood the questions. The pilot interviews took place in mutually convenient public locations, such as coffee shops and libraries between March, 30, 2012 and April 17th, 2012. Emergent themes were parent's concern over traffic, transit mode choice based on convenience (although what convenient meant may vary by parent), active travel as a benefit to use some of the student's energy, safety in numbers, and parental caution based on the personality of the child.

Data Analysis. The parent and student interviews were audio-recorded (when acceptable to participant) and used to ensure quotes are verbatim. Field notes were taken by hand, then typed and expanded upon promptly after each interview to ensure accuracy and to improve richness of responses for coding. Audio-recordings were checked to support field notes. Data were analyzed according to both sensitizing concepts and inductive emergent themes, using comparative content analysis and thematic analysis. First order coding was open, and continuous cross-referencing was used to avoid duplication and omission (Eisner, 1998; Patton, 2001).

Chapter Summary

To determine how children perceive safety and how parents and children perceive their built and social environment when considering the trip to and from school, a visual

survey combined with in-class discussions, and in-depth paired parent and child interviews were employed. This unique set of methods allowed for students to both quantitatively rate photographs and by including discussions, use them as a catalyst to discuss elements of safety, a limitation of using solely a visual survey method. The qualitative discussions allowed students, who make the trip to and from school every day, to be placed at the center of this research. Furthermore, some of the data was collected as part of a classroom lesson on careers in planning and safety and thus, was not just approved by the principals and teachers, but was truly supported by them, as they viewed even the data collection as educational. The parent/child paired interviews, although in different, more suburban communities, on which there is not even much quantitative data, then allowed for a deeper understanding of mode choice and the perceptions of the built and social environment. Although these perceptions may vary based on the context of each of the individual locations, the variation, if any, may also reveal ways to improve interventions to increase walking and bicycling along with possible planning and policy implications. The results and discussions are presented in Chapters 4 (Visual Survey and In-Class Discussions) and 5 (One-on-One Interviews). Chapter 6 (Implications and Conclusions) contains implications of the research, avenues for future research and a synthesis of the doctoral work.

CHAPTER 4. ADULTS, GROUPS, CROSSWALKS, AND AESTHETICS

Although built environment features have been demonstrated to play an important role determining what mode of transportation people use, perceptions, particularly of safety, have also been shown to impact mode choice (Chapter 2). However, information on how students themselves perceive safety in the built and social environment is less well documented, particularly in the form of qualitative data. This research contributes to the existing literature by emphasizing the important perspective of students' perceptions of safety as it relates to mode choice, specifically active travel, with the goal of improving safety and increasing walking and bicycling to school.

In total, 776 6-8th grade students in 39 classrooms in three schools in Hudson County were surveyed and participated in class discussions. Overall, 49% of the students were male and the racial breakdown was 38% mixed (self-identified as more than one race), 25% white, 21% Asian, and 13% black. About 42% of students self-identified as Hispanic, and almost 51% walked to school.

First, a visual survey was administered and students ranked their perceived safety of the photographs on a scale of one to five, followed by a discussion of specific elements in that photograph that they perceived to be safe, unsafe, and ways to improve safety. Safety-related themes emerging from the class discussions of the photographs were identified and multivariate modeling was conducted to examine the predictors of safety perceptions as identified in the discussions. Seven consistent themes emerged from the classroom discussions across all three schools. These themes are tested below using results of individual student surveys. The themes often emerged through a combination of the students stating the presence of the theme was safe, the absence of it was unsafe, or

they offered it as a suggestion to improve safety. The themes were: safe when adults present; safety in expected behaviors; safety of a group; safe on crosswalks and near markings; safe near school; safe in daylight and safe near good aesthetics. These themes are discussed in detail below.

Learning from In-Class Discussions: Emergent Themes

Safe when adults present. The presence of adults was reported to be safe by the students because adults supervise and watch out for children. The students identified that adults "help" or "protect" children, improving their personal safety. Furthermore, adults "watch" children and can both prevent and respond to danger if an unsafe situation occurs. Students described children in the photographs as safe as "they are with an adult, which helps them not get shot." Other students said:

> *There is a parent or guardian in case something happens they can protect them [the children].*
>
> *Adults can help if something goes wrong.*
>
> *They [children in the photograph] are with a parent so no one will take them away and they aren't in danger.*

In addition to talking about adults generally, students commonly specifically cited parents, police, or security and crossing guards as providing heightened levels of safety. Many students did not make a fine distinction among these groups. For some students, the latter two groups of adults were seen as being more responsible for keeping students safe and students in this study recognized them as "a sign of authority." Students seemed to respect and appreciate their presence, both in increasing their personal safety and particularly in the case of crossing guards, increasing their feelings of safety from traffic.

> *[It's safe because] there is a lot of protection from the police.*

There's police, so no one can get kidnapped.

Security guards are outside the school to watch children.

Add the crossing guard to stop cars from coming while children are walking for safety.

When students were asked what they thought would improve the safety of the images, students stated, "There should be a cop around the school" or "a cop should sit in the driveway so nothing happens." Students also suggested increasing the presence and number of security or crossing guards to improve both the personal and traffic safety in the images. Students suggested having "security guards in front of the school so they can tell you to cross at the corner of the street" and "having a crossing guard help them cross the street so they have supervision."

Safety in expected behaviors. The students identified that in order to stay safe from traffic, pedestrians and motorists must exhibit certain expected behaviors, such as paying attention and following the rules. They recognized certain common anticipated actions as safe, such as students being aware of their surroundings and obeying rules and laws, while other unexpected actions such as not wearing bicycle helmets, not crossing the road properly (midblock), or crossing a railroad track, as unsafe. Students were aware of these dangerous behaviors and quickly identified them in the photographs.

[They should] go to the corner and look both ways and be smart when crossing.

Others also noticed not obeying the rules or paying attention as unsafe:

They are jaywalking which is crossing without a crosswalk, you could get hit by a car because the car doesn't see you.

It's unsafe because kids are in the street and a car could come up from behind them.

They look like they aren't paying attention and not looking for cars, which is not safe.

> *They aren't paying attention to their surroundings and there could be a rock or car.*

Students also recognized the need for safety equipment. Most commonly helmets, (but elbow pads and knee pads were sometimes mentioned as well,) and consistently stated how important they were. For example, when examining a photograph of students crossing midblock, students said:

> *The kid has a helmet. It's safe for himself or if he gets knocked over he won't have brain damage.*
>
> *Them boys should use helmets to avoid concussions.*
>
> *They are wearing helmets so they won't hit their heads if they fall.*

Despite this, when students were asked if they wore protective equipment while cycling, the vast majority said no. Students told us it "wasn't cool" and often stated that they had participated in one of the unsafe behaviors pictured (a child riding on the handlebars) because it was "fun."

Safety of a group. The students also identified being in a group as safer than being alone. Students were asked to think about safety broadly, though perceived the group as being primarily safer from crime. Being in a group was consistently mentioned as safer for four reasons. 1.) The group "protects" you as everyone keeps an eye out for each other (primarily in the case of crime); 2.) It makes something dangerous (such as crime) less likely to occur; 3.) It allows someone to call for help (in the case of crime or traffic, though crime was referred to more often); 4.) It improves visibility by drivers. When describing one photograph of children in a group, students said it was safe because:

> *The group look[s] out for one another.*
>
> *They are walking in a group so are less vulnerable.*

It's more than one child so they have their backs.

They can be seen better by cars in that group.

Students also discussed the lessened "chance" of something happening to people in a group and therefore, concluded it was safer. Students said:

You are with friends and people don't attack if you're in a group.

There is a bunch of people so they would be harder to rob.

Children are travelling in a group so it's harder to be preyed upon.

Students in this study felt that "being together discourages predators" and other people looking to cause trouble, which could lead to an unsafe situation. Therefore, being in a group was perceived as safe because the other people present are more likely to prevent unsafe acts from occurring. If something does occur, being in a group turns into a safety mechanism as "one of them could call an ambulance if one gets hurt." Students also discussed the people with or around them could serve as "witnesses" if a crime or accident occurred. Students stated:

There are a lot of other people walking so there are witnesses for kidnappings.

A lot of people around is safe because it helps to have witnesses to call the cops.

Additionally, some students considered the visibility of a group over an individual as safer from traffic. Students said:

Big groups are easier to see by drivers.

[They are] easily visible by passing cars because they are in a group.

Lastly, the discussion of walking in a group in most classrooms led into a discussion of also walking in a populated area because there are "more eyes watching," "a lot of people," or "lots of houses" to improve personal safety. Students felt safe when

they were walking in a residential area and people were around or watching for the same reasons they felt safe in a group: namely, people in the residential area may keep an eye out for you (primarily in the case of crime); it makes something more dangerous (such as crime) less likely to occur; and it allows someone to call for help. Students said:

> *[They are] close to a building so people are probably watching.*
>
> *There are a lot of people in the city to look after each other.*
>
> *It's crowded so you're less likely to get kidnapped.*
>
> *They are by houses so if something happens you can knock on the door.*
>
> *There's people around that could help in a dangerous situation.*
>
> *Your neighbor can call 911 because there are houses nearby.*

Safe on crosswalks and near markings. The students also identified being on crosswalks as safer from traffic than crossing midblock. Students commonly offered crosswalks as suggestions to improve safety. The majority also wanted more signs telling drivers they were near a crosswalk that children commonly use, or drawing attention to the crosswalk to further improve the crosswalks' safety. One student recommended "adding pedestrian crossing signs" to make the crosswalks more obvious. Others stated:

> *There should be a school zone sign [near the crosswalk] to slow the cars down.*
>
> *There should be writing on the ground near a crosswalk that says slow down.*
>
> *They should also have a yield or stop sign where you would want the crosswalk.*

Students also were knowledgeable about and interested in expanding bicycle lanes for bicycles to avoid conflict with cars. Students stated:

> *Make a bicycle lane so the kids can ride bikes to school without interfering with traffic.*
>
> *Add a bicycle lane so cars notice the space for bicyclists.*

Separate an area just for bikes to go on so an accident won't happen.

Safe near school. Being in the presence of a school was also perceived to enhance personal safety by these students, primarily because schools are commonly populated by trusted adults, or because the school building itself is physically safe. Students stated that schools were safe because:

You can go to school if anything bad happens.

[You] can get help right away and it's protective.

The school is safe because there are adults, security guards, and it's a shelter.

Much less frequently, students commented that they perceived schools to be safe because of the different traffic rules or laws that typically surround them. Students said:

The speed limit is slow in a school zone, so if people are crossing the street there won't be as many accidents.

It's near the school so the cars will be careful.

Qualitative themes. Two qualitative themes emerged that could not be further examined quantitatively in the absence of comparative photographs: light and aesthetics. In order to quantitatively compare photographs the theme had to be absent in some photographs and present in others. However, all of the photographs were taken in the daylight, leaving no ability to compare students' scores of photographs taken under varied lighting conditions. The concept of aesthetics on the other hand, is too subjective to categorize photographs into a binary code of being aesthetically pleasing or not. Thus, the themes are presented qualitatively and were not entered into quantitative models. Importantly, the themes of daylight and aesthetics are commonly cited strategies to improve safety through environmental design (Loukaitou-Sideris, 2006).

Daylight. Without being prompted, these students regularly mentioned that they would rate photographs lower if they were taken at night. This was for two reasons, because visibility decreases in the dark and the propensity for crime increases. Students said daytime was safe because it "makes visibility improved" and daylight means, "everyone can see well." In addition, a majority of students discussed that they perceived more crimes to occur when it was dark. Students described that being out at dark was not as safe as being in the same location during the day. Students stated:

> *[The students in the photo] are walking in daylight, because you get mugged at night.*
>
> *[You are] less likely to get shot in daylight.*

One student commented that she might use a different route during the evening compared to day, while another said he would "walk right by [the house in the photograph] because it's in broad daylight and no one would bother me, I would cross the street if it was night for safety." Students suggested increasing streetlights to both improve visibility and reduce crime, One student suggested that the town:

> *Add more lights to help when it's dark out [to improve safety]*.

Aesthetics. In addition to light, these students commonly discussed aesthetics. One of the photographs students rated pictured a boarded up house, which some students perceived "might be a bad neighborhood because of the wood on the windows." When asked to improve the safety of this image, students consistently suggested improving the appearance, making the connection that improving an area's beauty would improve their perceived safety. Without realizing it, these students cited the Broken Windows theory (Wilson & Kelling, 1982), which indicates that maintaining environments to prevent small crimes helps more serious crimes from happening. Additionally, crime may be

"contagious," and smaller problems left unattended may accumulate and more serious problems may arise (Wilson & Kelling, 1982). In more than half of the classrooms, students mentioned that if an area looked cleaner and more taken care of, it would lead to improved safety. Students said:

Put flowers around the house to make it safer.

Paint it so it looks safer. Or trim the lawn.

Add more parks and buildings and make everything more beautiful.

More flowers and gardens and a cleaner place for more safety.

Another suggested that the owner improve the safety by "tak[ing] the wood off the windows to make it look prettier," while a different student wanted "more trees" to improve safety, and that "birds make [her] feel safe." Students also wanted to see public order, the garbage picked up, and the environment to "look clean" because that made them feel safer and felt it led to "more community."

Learning from the Visual Survey

Five of the themes that were identified from the in-class discussions with students – 1.) safe when adults present, 2.) safe when following expected norms, 3.) safe when in a group, 4.) safe on crosswalks and near street markings and signs, and 5.) safe when in presence of a school – were tested first by using paired-sample t-tests to compare mean scores of photographs. Each t-test was conducted by separating the photographs into two groups, one containing photographs with a specific feature and the other containing similar photographs without the feature. For example, to test the hypothesis that students feel safe when in a group, photographs showing children walking in a group (three or more children) were compared with similar photographs with children not walking in a

group. Photographs were similarly divided into two groups to compare their mean scores. In the second step, a modeling effort was undertaken to compare the ordinal scores of photograph themes by controlling for the characteristics of the students. The five thematic variables and the control variables used in the subsequent modeling are described in Table 4-1.

Table 4-1. Study Variable Names and Descriptions

Variable	**Variable description**
Score	Dependent Variable, 5 ordinal categories (1-5) 1=unsafe, 5=safe
Male	Child is male
Black	Child is black
Age	Age of child
Hispanic	Child is Hispanic
Adult Present	Adult(s) present in photograph
Expected Behavior	Absence of an unexpected or dangerous behavior (i.e. no personal protective equipment, jaywalking)
Group	Three or more people in photograph
On Crosswalk	Student(s) crossing road on crosswalk
School Present	School building or bus present in photograph

Note: If the image did not contain students crossing a road, the image was dropped, not given a 0.

The results of the t-tests are shown in Table 4-2. There were significant differences between the mean scores for each of the five thematic variables. The statistical significance and the signs of the t-values are consistent with all five themes that arose from the in-class discussions. Positive signs on the five variables indicate that students feel safer when adults are present, when expected behaviors are followed, when

children walk in groups, when children walk on crosswalks or in areas with proper street marking and signage, and when children walk near a school.

Table 4-2. Comparison of Mean Scores by Presence of Safety Themes, N=776

Variable	**Mean Theme Present**	**Mean Theme Absent**	**Mean Difference**	**t**
Adult Present	3.83	3.25	0.58	31.78***
Expected Behavior	2.81	3.85	-1.04	45.61***
Group	3.87	2.61	1.26	58.50***
On Crosswalk	4.11	3.38	0.73	22.79***
School Present	3.64	3.17	0.47	20.45***

*** Significant at the 1% level.

Multivariate Models

Although the t-test results in Table 4-2 are consistent with the five safety themes that emerged from the in-class discussions, the tests do not take into account variations among the students that may stem from difference in their age, gender, race, or ethnicity. To control for those variations, a multivariate statistical approach was used to compare the scores of photographs grouped according to the presence or absence of a theme. Only photographs with relevant images were used to test each theme, for example in photographs where no street crossing occurred, those photographs were dropped from that analysis. To model the themes, it was necessary to analyze each separately, then a model with all the themes that included every photograph was estimated. A model with all five themes could not be estimated, as the theme walk on crosswalks did not include photographs where no street crossing was being made. Following convention with multi-level ordinal data, a Generalized Linear Latent and Mixed Model (GLAMM) was used to account for the three levels of data collection. The individual model results are presented in Table **4-3**. Multi-theme model results with two dummy variables to examine the

variation in school locations are presented in Table **4-4**. The multi-theme model results are presented in Table 4-5.

Table 4-3. Multivariate Model Results

	Model 1:		Model 2:		Model 3:		Model 4:		Model 5:	
Variable	Estimate	Z	Estimate	Z	Estimate	Z	Estimate	Z	Estimate	Z
Adult Present	2.04	5.05***	---	---	---	---	---	---	---	---
Expected Behavior	---	---	1.92	4.17***	---	---	---	---	---	---
Group	---	---	---	---	2.28	4.5***	---	---	---	---
On Crosswalk	---	---	---	---	---	---	1.31	2.56***	---	---
School Present	---	---	---	---	---	---	---	---	0.59	1.11
Male	0.16	4.64***	0.16	4.64***	0.16	4.64***	0.07	1.41	0.15	4.64***
Age	0.12	7.12***	0.12	7.12***	0.12	7.11***	0.15	6.26***	0.12	7.11***
Black	0.22	4.22***	0.22	4.23***	0.22	4.23***	0.16	2.11**	0.22	4.23***
Hispanic	0.04	0.96	0.04	0.94	0.04	0.94	-0.03	-0.47	0.04	0.94
Level-1 N	12676		12676		12676		5963		12676	
Level-2 N	51		51		51		24		51	
Level-3 N	17		17		17		8		17	
Log Likelihood	-16354		-16351		-16349		-7932		-16354	

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Table 4-4. Multivariate Model Results with School Variables

	Model 1:		Model 2:		Model 3:		Model 4:		Model 5:	
Variable	Estimate	Z	Estimate	Z	Estimate	Z	Estimate	Z	Estimate	Z
Adult Present	1.14	19.38***	---	---	---	---	---	---	---	---
Expected Behavior	---	---	1.92	4.45***	---	---	---	---	---	---
Group	---	---	---	---	2.37	4.81***	---	---	---	---
On Crosswalk	---	---	---	---	---	---	1.32	2.63***	---	---
School Present	---	---	---	---	---	---	---	---	0.62	11.9***
Male	0.16	4.65***	0.16	4.67***	0.16	4.67***	0.07	1.47	0.16	4.67***
Age	0.12	7.23***	0.12	7.23***	0.12	7.22***	0.16	6.46***	0.12	7.23***
Black	0.22	4.20***	0.22	4.20***	0.22	4.20***	0.15	2.00**	0.22	4.20***
Hispanic	0.04	1.08	0.04	1.08	0.04	1.08	-0.007	-0.14	0.04	1.08
Jersey City	-0.29	-0.50	0.08	1.16	0.08	1.15	0.24	2.81***	0.10	1.79*
Bayonne	0.04	0.54	0.23	2.79***	0.23	2.78***	0.37	3.69***	0.11	1.46
Level-1 N	12676		12676		12676		5963		12676	
Level-2 N	51		51		51		24		51	
Level-3 N	17		17		17		8		17	
Log Likelihood	-16362		-16347		-16348		-7926		-16361	

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

The dependent variable in the models represents the photograph score given by students, which ranges from 1 to 5, with 1 being unsafe and 5 being safe. For example, the theme that students feel safe when adults are present is tested by the first model by comparing the ordinal scores of the photographs where adults were present with the scores of the photographs where adults were not present. As indicated at the bottom of the table, all 17 photographs (Level-3 N) in three schools (51 observations for Level-2 N), and a total of 12,676 individual scores (Level-1 N) were used for this comparison.

Every model controlled for student-reported age, gender, race, and ethnicity. In Table **4-3** Models 1 to 4, the variables representing the themes are significant with expected signs, but the variable is not significant in Model 5, which tests the validity of the theme that students feel safe near schools. The first four models confirm the results of the paired-sample t-tests by showing that students give higher scores to photographs when adults are present, when children walk in groups, when children walk on crosswalks and in locations with proper street markings and signage, but give lower scores when children do use expected behaviors. These results demonstrate a consistency between the perceptions expressed by the students in classroom discussions with the scores they gave to specific photographs in the survey.

When adding in variables to account for the variation in school location in Table 4-4, all the thematic variables and the demographic variables remain significant with the same signs. The variable school present also becomes significant at the 1% level. However, these school variables demonstrate that there is some variation in student responses among the schools for some variables. This may reflect actual variations in

student responses at specific schools or may reflect the variation in the N among the schools, particularly when examining Bayonne. Although students' qualitative responses were consistent across schools there were variations in the visual survey scores, demonstrated in the school variables.

In every model, age and race were significant predictors of students' safety perceptions. In four of the five models, gender was also a significant predictor of students' perception of safety. Older students, boys, and those who self-identified as African American rated the images as safer, while younger students, girls, and students who did not self-identify as African American rated the images as less safe. The results are consistent with Seraj et al. (2012) who found that boys and older students are less likely to be concerned about crime and traffic speed than girls and younger students (Seraj, Sidharthan, Bhat, Pendyala, & Goulias, 2012b).

In the joint model examining the four themes where all 17 photographs were used – adult present, expected behavior, group, and school present – three of the four variables were significant at the 1% level. Since a crosswalk was only present in eight of the seventeen photographs, the theme "On Crosswalk" had to be dropped from the analysis. Having an adult present was not significant, which may be due to the variation of adults pictured, (a parent, a crossing guard, etc), how many adults were pictured, and how the child interpreted the safety of the adult, given that the adults in the photographs were unfamiliar to them.

Table 4-5. Students' Perception of Safety: Joint Model

Variable	**Estimate**	**Z**
Adult Present	0.16	0.37
Expected Behavior	1.99	4.69***
Group	1.70	4.06***
School Present	1.05	2.51**
Male	0.16	4.64***
Age	0.12	7.11***
Black	0.22	4.23***
Hispanic	0.04	0.94
Level-1 N	12676	
Level-2 N	51	
Level-3 N	17	
Log Likelihood	-16341	

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Cronbach's Alpha was examined as a measure of internal consistency. It has been used to estimate reliability, as the scale increases when at least two items being measured are correlated (Cronbach, 1951). It is most commonly used in psychology, though it has been used in other fields. It is best used when items in a scale all seek to measure one common factor. However, the impact of dimensionality is unclear and, therefore, may be less appropriate for multiple-dimensioned social science work (Cortina, 1993). When independent dimensions of the same variable are examined, Alpha scores tend to be low. Typically, an Alpha above 0.6 is considered acceptable, while a score above 0.7 is considered good, though judgment of acceptability must consider context. Furthermore, higher Alphas are more apt to be achieved with higher numbers of items in a scale (Cortina, 1993); therefore, even this measurement statistic has limitations.

Table 4-6. Cronbach's Alphas

	Cronbach's Alpha	**Number of photographs with theme present**
All Photographs	0.77	17
Adult Present	0.34	5
Expected Behavior	0.68	7
Group	0.72	11
On Crosswalk	0.64	4*
School Present	0.71	9

*Only 8 photographs depicted street crossings

Cronbach's Alpha exceeds the 0.6 convention for acceptability in the overall scale for four of the five themes (Table **4-6**). The theme adults present had the lowest Cronbach's Alpha, which was also the theme that was statistically insignificant in the joint model. This theme also has the fewest number of photographs with the theme present, and as mentioned above may also be due to the multiple dimensions of how many adults were in each photograph. Furthermore, almost all of the photographs have elements from multiple themes and thus, are not measuring one single common factor, which may in part explain why the Alpha's overall are not higher.

Discussion

Five safety themes emerged from discussions with students. These themes were tested by paired-sample t-tests and multivariate models that controlled for age, gender, race and ethnicity. The t-tests showed validity of all five themes, whereas the individual models showed validity of four of the five themes and the joint model, which could only test four themes, found validity in three. Strong evidence was found in support of the themes that students feel safer when following expected norms, when they are in a group,

and when they use crosswalks and weaker evidence was found that students feel safe when adults are present and when they are near a school.

The consistency between the qualitative perceptions and quantitative rating shows that middle-school students have consistent safety perceptions. A review of scores on individual photographs provided additional support to these themes. For example, the photograph with the highest safety score was a group of children walking in a crosswalk with a crossing guard present, with a mean of 4.77: 96% of students rated the image a 4 or 5. Additionally, students consistently discussed their increased feeling of safety in the presence of adults, especially crossing guards and security guards.

The students were also knowledgeable about unsafe behaviors, such as jaywalking and bicycling without a helmet, and saw them as an exception to the norm. Students consistently rated images lower when children in the photographs behaved dangerously. They pointed to wearing helmets (and sometimes elbow pads and knee pads), looking both ways when crossing roads, and crossing in crosswalks or at corners as ways to improve safety. The photograph with the lowest safety score was that of a teen walking on railway tracks, followed by an image of one teen riding a bicycle with another sitting on the handlebar. An image of two boys on the same street riding bicycles without helmets was rated significantly lower than a similar image with the same two boys wearing helmets, even though the distinction was not brought to the students' attention. However, in almost every classroom, students who suggested helmets were laughed at by at least some of their peers (commonly males). This was particularly true in classrooms with older students. When asked if they had participated in unsafe behaviors or bicycled without helmets, students, particularly males, regularly confirmed such behavior. Some

students indicated that it wasn't "cool" to wear helmets, although they confirmed that they were taught by adults to do so.

Being in a group was also perceived to be safe, due to crime prevention, the ability for some members in the group to help respond to a situation, and visibility by drivers. Students wanted "witnesses" present in case something happened and thought they were less likely to be "preyed on" in a group. Students also said they would prefer to travel in a populated residential area where others could see them, whether they were travelling alone or in a group.

Students were well aware of crosswalks as the proper location to cross streets and rated images of children using them highly. The majority of students also wanted additional markings and signs to draw attention to crossings. Though being in proximity to a school appeared to be important in discussions, and the t-tests showed evidence in support of this perception, it was statistically insignificant in the model. The scores for photographs with school present could be influenced by other factors. In one of the schools, Jersey City, the middle school was next to a high school where several instances of bullying and other altercations were reported both by the teachers and the students. This led more than half of the students saying that being near a school was safe unless it was a high school with bullies. However, students at that school mentioned that they could run into their own school or seek their teachers' help when bullied. This example shows that being near a school may or may not be considered safe, depending on whether the school is their own or another school. This variation can be seen in the model in Table **4-4** where the Jersey City school variable is significant.

Limitations. Although purposeful selection criteria aided in the identification of study schools, and discussions were had and surveys were taken by high percentages of students in each school, participants were from three different schools with a varying number of students in each school, in three municipalities. Though the neighborhoods were similar, this geographic diversity (see Table **3-1**) may have increased the variability of responses and some variability of visual survey scores can be seen in the models accounting for school variation. Furthermore, in one school, Harrison, field trips on the data collection days prevented collecting data from a higher percentage of students. However, given the limited information on safety perceptions of youth, the difficulty in accessing schools, and the limited availability of data from students, these findings advance our knowledge about students' perceptions of safety. Furthermore, the findings should not be generalized outside schools and municipalities with similar urban characteristics, as perceptions are influenced both by geographic context and experience. Therefore, some perceptions are likely to be more common in some areas based on student experiences, compared to others.

It is possible that students may have given socially desirable responses during the in-class discussions. Their classroom teachers were present, although they were told they were not being evaluated and there were no wrong answers. They may have given responses that they felt guest speakers from Rutgers and their teachers wanted to hear. However, the responses from the in-class discussions were confirmed in anonymous surveys, which is less like to be subject to social desirability bias, suggesting this was not a large issue for these students. Simply engaging in the visual survey may have also influenced the discussions, as examining the photographs could have altered some

students' perceptions. Therefore, in future work, some one-on-one interviews with randomly selected students may be useful to ask more detailed questions after the visual survey.

Although schools prohibited the recording of our conversations with students, a separate member of the research team took notes and captured students' quotes verbatim. Thus, we were not able to listen to students' quotes after the discussions; however, thorough note taking provided direct quotes for analysis. It is possible that schools would allow audio recording in the future. Notwithstanding, in this study we were unable to audio-record given the substantial pushback from all three schools.

The photograph instrument was developed in conjunction with transportation experts, although the themes that emerged did not allow all photographs to be used in the coding of each image. Thus, the joint model only contained four of the five individual model's themes. Additionally, reliability methods were not undertaken. Performing a test-retest could test the stability and reliability of the instrument (even of a smaller subset of students) and would provide greater confidence in the ability to repeat the results. Despite this, Cronbach's Alpha was provided above (Table **4**-**6**).

Chapter Summary

The 776 sixth, seventh, and eighth grade students from three schools in Hudson County, New Jersey described seven safety themes through in-class discussions and a visual survey. The themes were: safety when adults present; safety in expected behaviors; safety of a group; safe on crosswalks and near markings; safe near school; safe in daylight; and safe near good aesthetics. The first five of these themes were tested using multivariate models and the first four were found to be statistically significant without

examining the variation among schools and all five were significant in the models with school variables. However, variations among student scores at the three schools exist. These themes, discussed by students who are making the trip to and from school—often alone, should be emphasized when designing and implementing school and municipal programs, policies, and interventions to improve active travel and safety. Implications and recommendations based on these themes are provided in Chapter 6.

CHAPTER 5. STRANGER DANGER, TRAFFIC, AND CELL PHONES

While some evidence exists that perceptions of the built and social environment may be as important as the environment itself when examining mode choice, few studies have sought to more deeply understand what influences mode choice decisions. By determining what people think in context, in addition to why and how they make mode choice decisions, we may be able to improve interventions aimed at increasing active travel rates. This chapter presents the results of the one-on-one paired interviews, which allowed participants to discuss their perceptions of the built and social environment and the variety of elements that may influence mode choice on any given day. By talking to parents and students directly, we can gain insight on how both groups perceive the environment around their school and use these perceptions to better understand possible intervention strategies to increase active travel.

Talking to children is particularly important, as children are the primary travelers to and from school. Children may have views different from their parents and may desire different interventions, yet their voice is largely absent from current studies. This research contributes to the existing literature by using one-on-one interviews to talk with both parents and students about the trip to and from school, how the mode decision was made, how the environment is viewed, and what changes, if any, parents and students would like to see to enhance safety and increase active travel rates. If perceptions vary by community, or vary between students and parents, interventions should be targeted to address the concerns of specific communities and include the student perspective. Thus, the perceptions of community members are of the utmost importance.

In total, 48 parent-child pairs from three New Jersey communities participated in semi-structured, in-person, in-depth qualitative interviews about the trip to and from school. Eighteen of these interviews were with parents and students living in Highland Park, 16 with parents and students living in Stanhope, and 14 with parents and students living in Franklin. These communities were selected for their similar demographics and varying suburban built environment features. Interviews with parents lasted approximately 40-60 minutes, while the student interview was only 20-30 minutes in length. Parents and students were selected using two inclusion criteria: 1.) Parent of at least one child currently in grades 6-8 at the designated schools, and 2.) Parent and children live without access to busing to school to ensure distance from home to school was not the primary barrier discussed in the interview.

Parents' perceptions of the built and social environment regarding their child's trip to and from school centered on themes that facilitated active travel or were seen as benefits and themes that were barriers to active travel or concerns. Parents then identified additional themes throughout the interviews about how and why their mode choice decision was made, and what influenced this choice, along with improvements they would like to see to encourage active travel and safety. Students also discussed facilitators and barriers to active travel along with perceptions about their parents' concerns, "coolness" and their desires (or lack thereof) to use active travel.

Although the three communities were intentionally selected for their built and social environment, the three communities vary demographically. Perceptions of parents and students are likely to be very contextual, and thus it is important to understand the similarities and differences of the three municipalities. Highland Park is the mid-sized

community with about 14,000 residents. It is a diverse community that is politically liberal and well educated with many residents working for Rutgers University. The municipality has a gridded street pattern, with a main street downtown and sidewalks are ubiquitous. Stanhope is a smaller community of about 3,600 residents. Overall, it is whiter, more politically conservative, and has lower educational attainment. There is a small downtown with sidewalks, but many side streets do not have sidewalks and a busy, curving high-speed road runs through the town. Franklin Township is the largest of the three municipalities with over 62,000 residents in 46 square miles. However, all participants lived within two miles of the school. Although the township is liberal and diverse, all participants lived in two census tracts that comprise the area around the school. These two census tracts are quite different with one having a higher median household income than Stanhope or Highland Park ($112,500) and one having a slightly lower median income than Stanhope or Highland Park ($71,176). The higher income census tract is also less densely populated, older, whiter, and higher educational attainment. More detailed information on the municipalities can be found in Chapter 3.

First, a prototype of each municipality's typical participant, with names having been changed to provide anonymity, will be described. Then emergent themes from each municipality will be presented separately and parents and children's perceptions will be compared and contrasted. Then themes common to the three municipalities will be discussed. The chapter will conclude with a discussion, including limitations of the research.

Highland Park Parent Results

Matt was a typical participant in the Highland Park interviews. We met at his South side Highland Park home about seven tenths of a mile from the middle school. He's lived in town for fifteen years, having moved to be near Rutgers University where he worked (and thus, revealed he felt inclined to participate in the interview.) He liked the diversity of the town, the proximity to his job, the big park near his house, and the community feeling. He knew his neighbors and felt people looked out for each other. His daughter, Sarah, was in 7th grade; her older sister was in 9th grade at Highland Park High School. Sarah typically walked to school in the morning, aside from the two days a week she participated in 655am early morning band, as her dad wanted her to stick with it and did not think she would if she had to walk there herself, with her trumpet. Occasionally when it was really rainy or she was running late she would get a ride, though Matt said she did not really ask for a ride anymore, probably because she did not want to be seen with him. Both Matt and his wife, Linda, enjoyed the fact that they could get ready for work without having to worry about getting the girls to school and did not need to leave early to fetch them. The girls were also allowed to walk to a friends' house, into town, and to the park, so long as they had their cell phones on and their parents knew where they were going. Both girls owned bicycles, but rarely used them, which Matt thought was fine, as he believed they were more dangerous with the traffic and higher speeds.

Matt started letting Sarah, with their older daughter, walk home from school when Rachel was in 5th grade as he believed they were responsible enough to handle the trip without an adult after their mom observed their traffic skills walking to and from school with them the previous year. She practiced with them for several weeks, first meeting

them a block from the school, then several blocks away, until they walked home together without her. Then they started walking to school together when Matt and Linda believed they would be on time. When Sarah entered 6th grade Matt and Linda pleaded to have Rachel walk with her to cross busy Route 27 (Rachel previously always went with friends), but this year with Rachel getting to the high school earlier, Sarah could walk by herself. In the morning she often walked alone, but in the afternoon she almost always walked with friends, stopping at the library or at Rite-Aid for a soda on the way home. She had a cell phone and had to call or text her dad when she got home if no one was home or if she went to a friend's house instead.

Matt was primarily concerned with Sarah getting to school on time in the morning and that she paid attention while crossing roads, particularly Route 27, as he had seen students dart out in between the cars when they were being impatient or running late. He was happy with the level of physical activity Sarah received since she did gymnastics several nights after school and swam on a team in the summer, and saw her walk to and from school as healthy, but probably not contributing much to her overall physical activity.

Sarah, like her dad, liked living in Highland Park. She had a lot of friends in town, though many lived on the North side. She liked walking to and from school, though she liked walking home more because she got to hang out with friends and wasn't in a rush. She wished she lived near more people to walk to school with in the morning, but when it was nice out and she left on time, she found the walk relaxing. When it was really rainy, she said and her sister got rides or when her sister hogged the bathroom and made her run late. She also was also mostly concerned about traffic, as she felt drivers' sped through

town particularly in the morning and often run lights. She was annoyed that some of her friends who lived really close to the school regularly got rides in the morning when she had offered to walk by their house and walk with them the last couple blocks, which she thought would make it more fun for her too. She liked that she got a Smartphone early since she walks to and from school and did not mind checking in with her parents if she went to a friend's house after school, though she knows she is not supposed to, she admitted to sometimes texting and walking with friends, but she knew where she really had to pay attention to not get hit. Although she thought that many students walked to and from school, she thought it if the school made it more fun and encouraged students to walk maybe by entering them into raffles for walking on certain days, that even more students would use active travel.

Although Matt and his daughter Sarah exemplify almost 80% of the study participants, several participants were more like Jackie, who lived in one of the many apartment complexes sprinkled throughout the town. Her complex was in "the triangle," a small section of town between the North and South sides about six tenths of a mile from the middle school. Jackie was a single mom, who said she was on a tight budget. She liked living in Highland Park as she could save money on gas by doing errands on foot and felt it was a good location to get to her job as a bank teller nearby. She had two sons in 7th and 8th grade, who always walked the six tenths of a mile to school together (per her request so they would arrive on time), though they were allowed to walk home alone or with friends (she noted they liked to tattle on each other so she always knew if one did something wrong). She liked being able to send them out for an errand on foot and felt it was important that they made trips alone, knew their way around town, and became

independent. She also thought it was healthy for them and allowed them to get some fresh air and exercise. She said she wished she could take them to and from school when it was rainy or they had a lot to carry, but she often picked up other odd jobs and didn't have the time to take them and manage the apartment. Upon occasion she said a neighbor brought her boys home and she was grateful there were always people watching out for her and her boys. She really enjoyed the community in the town and in her apartment complex. Both boys owned bicycles and although they never rode to school because they chose not to, though they commonly rode down to the park or around town leisurely. Jackie was more concerned about them bicycle riding than walking as she knew they rode fast and rode with traffic and one of her sons had hit a pot hole and fallen off his bike the previous year and got very scraped up.

Between the two boys, they had one prepaid cell phone because she could not afford anything else, and although they were not required to call or text her; she wanted them to have it on them for emergencies. Her older son, Adam, liked walking to and from school, especially because there were always a lot of kids walking at the same time and he could hang out with his friends on the way to and from school. He felt bad for the kids who did not live near their friends and thought there must be some map where kids could see where other friends lived. He wasn't too concerned about anything on the trip as he had been walking for several years, never had seen anything happen, and knew where to go if he needed help, like when his brother fell off his bike and got all cut up. He said falls happen and he and his brother were still bicycling around town and they wore helmets.

Community. Like Matt and Jackie described above, Highland Park parent participants described their town as "really small and connected," a place where "everyone knows each other," and a "quiet, nice, small town." Parents commonly stated that they liked the sense of community and the fact that "everything is close," such as a bank, grocery store, pharmacy, and restaurants. The average participants trip to school was just over .6 miles. Parents stated that they "worried less because people are generally around," such as " the self-employed, and graduate students," and that they could rely on friends to "help them out" and be their "eyes and ears."

Highland Park parents were the most likely parents of the three municipalities to report that their children "typically" used active travel to get to or from school (

Table 5-1.) "Typically" was common language used by parents, and operationally defined here means four times a week three quarters of the year or more (as described by parents). The liberal town tout's itself as "New Jersey's first green community," and has recently passed a complete streets policy to promote multi-modal transportation options. Many of the parents interviewed stated that one of the things they most liked about the town was its "walkable nature," with some parents saying it was one of the primary reasons they selected to live in the town. Three moms said:

> *It's a walking town, that's why we live in Highland Park, because it's walkable.*
>
> *Everything is all so close, within walking and biking distance, it's one of the reasons we live here.*
>
> *Moving here was an easy choice, I'm close to the middle school, high school, town, the bank, it was an easy decision, we can walk everywhere. Everything is walkable.*

Participants who chose to live in Highland Park because of its walkability may have different perceptions of the built and social environment than those parents who did not

choose their home location for this reason. These parents seemed more eager and willing to let their children walk, however, no other primary differences in perceptions emerged. Some of these parents who selected Highland Park for its walkable nature were more similar to Matt's socioeconomic status, while others were more similar to Jackie's.

Table 5-1: Typical Trip Mode To and From School

	Walk	**Bike**	**Drive**
Highland Park: AM	12*	2*	4
Highland Park: PM	15	2	1
Franklin: AM	1	1	12
Franklin: PM	5	1	8
Stanhope: AM	1	0	15
Stanhope: PM	7	0	9

* Eight of these students were in early morning band and were always driven on those mornings

Benefits of active travel. When Highland Park parent participants were asked if they saw any benefits to active travel, they all mentioned that they believed walking was "healthy," regardless of the mode of transportation their children used or the satisfaction they reported with their child's level of physical activity. Like Jackie, parents stated walking or bicycling was "better for overall health," and an "important form of exercise."

> *Walking is better for her, the exercise, the independence.*
>
> *Nowadays with computers and technology kids don't get enough exercise, so it's important she walks.*

Those parents who were most satisfied with their child's level of physical activity attributed little to walking as a moderate form of physical activity. Like Matt, the majority of parents listed the students' extracurricular sports activities and discussed the importance of these more vigorous activities as being the primary contribution to their child's overall fitness. Although parents recognize active travel provides a health benefit, parents may overestimate the amount of physical activity children get from sports

practices and underestimate the health benefits from moderate physical activity such as walking or bicycling to and from school. The majority of parents stated that the walk to and from school "likely does something, but it's just a walk," and if their children didn't walk "it's okay if it's raining and he doesn't walk, he has so many afterschool activities that keep him healthy."

> *He walks, it's something, but he also does karate and gets most of his exercise there.*
>
> *She does soccer and cheerleading afterschool, so walking is good, but compared to the other activities it's not much.*
>
> *I'm very satisfied with the level of physical activity with afterschool sports and I guess the walk from school might add something too.*

Some parents also mentioned the environmental benefits of active travel and the independence children derive from getting to and from places on their own, though this was almost always discussed after describing the health benefits. One mom, Lola, who described herself as environmentally conscious said:

> *Walking encourages them to be independent. That's huge and with a bike you get even more autonomy.*

Other parents described similar feelings:

> *She was very unaware before she walked, didn't know where things were, now she can get places on her own while being green and saving gas.*
>
> *It's good for her, with everyone all around, she enjoys it. It improves her social life and gives her the ability to learn to be on time for herself.*

Despite most parents discussing that walking was a health benefit, when parents were asked why the mode their child used was selected, no parents interviewed stated their child walked for physical activity. Lola, the mom quoted above, also stated her child walked for environmental reasons because using the car "involved a family discussion."

(Her daughter later admitted she knew her mom was “an environmental nutjob.”) While several other parents stated their child walked because they “needed to release energy,” and another said their child is “hyperactive and it clears her head.” However, most parents described the mode choice being a matter of “convenience,” though “convenience” had different meanings to different parents and at different times of the day.

Convenience. Although many parents used the word “convenience,” different parents found different mode choices to be convenient. Many parents described convenience as their middle schooler independently getting to and from school so that the parent could help other children or get to work on time.

> *It’s great, she gets herself out the door on her own so I can do my own thing. Super convenient.*
>
> *It’s just the most convenient them getting themselves to school, so I can get to work on time.*

However, a few parents found convenience in dropping their child off at school, particularly in the morning as they were “on the way to work anyways,” demonstrating the convenience of trip chaining when parents and students were leaving the house at the same time. These parents also wanted to make sure their child “arrived to school, so dropping them off is worth it for the peace of mind.” However, parents described a substantial difference in convenience, mode choice, and rationale for getting their child to school in the morning compared to getting their child home from school in the afternoon. Although only four parents typically drove their student to school in the morning, many more exceptions were made in the morning when their child was running late or due to

weather factors than drive their child home from school in the afternoon. One dad similar to Matt said:

> *I drive them if they're going to be late in the morning, otherwise they walk.*

While other parents expressed a similar sentiment:

> *I don't like when she's late, when she's tardy, so I end up taking her sometimes in the morning.*
>
> *In the morning if it's really raining or something, I'll drive them or if they're running late. If it's really raining it seems like everyone is running late and driving their kid.*

Although the majority of respondents reported their child walked to school, one Highland Park Middle School morning activity was consistently mentioned that prevented students, like Sarah, from walking: early morning band. Half of the parents interviewed in Highland Park had a child who was in early morning band, which begins at 6:55am twice a week (which may have been in part due to snowball sampling.) Although the majority of these parents stated that their child usually walked or bicycled in the morning and usually walked or bicycled home, no parents interviewed stated that their child walked or bicycled to early morning band. This was for a combination of reasons including, the early hour, the need for additional sleep, the lack of light at that hour during some of the year, the band equipment their student had to carry, and the fewer number of students walking at that hour. Matt said:

> *For early morning band we drive them, that was the incentive to get them to participate, otherwise they wouldn't ever go if they had to walk that early, because it's just so early. We do a carpool with five children on those mornings.*

Other parents had similar perspectives:

> *For early morning band, it's at 6:55, I drive them, it's really early and dark at that time, but then they walk home.*

In the afternoon almost all parents reported their child "typically" walked or bicycled home. Parents stated that they were not concerned about their child "being poky" on the way home, especially as many students came home to a house without parents for a couple hours. Some parents, such as Jackie, admitted they "didn't really have other options" and had to let their child walk home, though most like Matt, admitted it was the most "convenient" for their child to walk home, "let themselves in, and get going on their homework" so that parents could finish their work day.

Traffic. Regardless of the time of day that children were walking to and from school, parents in Highland Park, such as Matt and Jackie, were uniformly most worried about traffic. The majority of parents mentioned the speed of traffic as a worry, despite speed bumps on side streets, which "people now just speed between." Several mentioned wide avenues as encouraging higher speed traffic and noted that some local streets were used as a "cut through" for cars seeking to avoid traffic on main roads, such as Route 27. One dad said:

> *People speed around here, it's terrible.*

Other parents expressed similar sentiments:

> *Intersections are rolling stops, people are so-self centered and oblivious, they are speeding, texting while driving, and that crap. It's a mess.*
>
> *I'm more worried about them getting hit by a car than kidnapped. I'm worried about cars on 27 doing stupid things.*
>
> *It's a congested town with a major road through it, so I'm worried they'll get run over.*

Parents, like Matt, were particularly concerned about their children crossing Route 27. Although there is a crossing guard stationed at the intersection with 5th Avenue, it would be out of the way for many students coming from the South side, meaning that many

students cross the street in a location without a crossing guard. Almost every parent who had a child who crossed 27 mentioned it as a concern either because drivers sped, ran lights, or didn't pay attention, which they said they had experienced themselves as a driver or pedestrian in town. In contrast, only two parents of the 18 interviewed mentioned that they were concerned about abduction or sex offenders on their child's trip to and from school. Although several additional parents mentioned the school sending a notification of a suspicious maroon van a few years back, none of them discussed it as a current concern. One mom, however, Maria, who lived in an apartment complex on the South side said:

> *Her father drives her in the morning because I read a report that more children are abducted en route to school than the way home. More people are paying attention and home in the afternoon. I prefer her to be driven because I watch too much forensic TV I guess and think she'll be kidnapped. I also check a website for sex offenders and then showed my daughter places to avoid.*

Another mom, whose child bicycled to school said:

> *I'm concerned about traffic. Actually I'm more concerned about strangers than traffic. All the news stories, it's scary!*

Like Matt, most parents reported that they were more nervous to let their child bicycle to and from school compared to walking, primarily because of the traffic. Parents stated they were "unsure" if students were "allowed" to ride on the sidewalks and those couple of parents whose children rode to and from school encouraged them to ride on the sidewalk regardless of whether they were supposed to.

> *Biking is more dangerous than walking, they're moving faster.*

> *I leave it up to them how they get places, biking is not my preference. I'd feel more comfortable if they walked because of the traffic, but I will not dictate. I would be more nervous if they bicycled, you are more likely to be injured.*

> *Bicycling is faster, but more dangerous than walking. When you're going fast you can't watch the cars as easily. You can look around and watch signals while you're walking, going slow is better.*

Furthermore, several parents stated that bicycles had been damaged or "stolen, even with bike locks," while others reported them being taken "right in town in daylight" and "at the middle school." A couple parents found it "less expensive to walk" and said there's "less to be worried about in terms of theft and damage," despite the bicycle rack at school. Almost all the children in Highland Park owned bicycles, though few rode them to school. Many parents reported taking their kids to nearby Johnson or Donaldson Parks to ride recreationally where there was limited traffic and they didn't need to worry about locking up the bicycles.

Trust and responsibility. Once again, similar to Matt, parents whose children walked or bicycled consistently mentioned that they didn't pick a particular age for them to begin walking or bicycling, but that they began using active travel when they trusted their children to be responsible and make good choices. They had to trust their children to do a variety of things: to know how to get to school, get to school on time, know the rules of the road, and watch out for traffic. Parents noted that teaching rules of the road, praising their children when they followed directions, and practicing walking routes could encourage these abilities, but acknowledged that despite these efforts, sometimes responsibility comes at different ages for different children. Parents stated that a trustworthier walking or bicycling companion, such as sibling, parent or friend, could aid less responsible students. One mom of twins stated:

> *I let them walk in 6th grade because they could handle it. I do expect them to walk TO school together, because it's more time-sensitive that they both make it. I need both of them to get each other to school on time.*

While a dad and mom respectively, similar to Matt said:

> *I liked the feeling of independence they would get, I was nervous letting them walk on their own in 5th grade, but they had showed me they could do it and that's why they could go.*
>
> *It wasn't the age, he was responsible enough, listened enough, we started with the walk home and he had to come straight back. Then to school, then he could make stops.*

Cell phones. One element that many parents mentioned helped them feel more comfortable with their child walking to and from school was buying them a cell phone. The majority of parents, including Matt, reported their child had a cell phone, with many saying they purchased it for their child because they were walking to and from school. Although no parents said having a cell phone alone made them feel walking or bicycling was safe, parents said it eased their minds that their child could call or text when they got to school or got home.

> *Getting him a cell phones makes a huge difference [in allowing him to walk], he takes the phone, his mom calls him and knows where he is.*
>
> *Walking matures him we realize. We got him a cell phone in 4th grade for him to walk, it gives him more freedom and we can find out he's safe.*
>
> *With walking they have cell phones. It's not a smart phone, though they're lobbying for it.*
>
> *Walking allowed her to get a cell phone earlier. It made sense to know where she is.*

Several parents instituted rules that their child must have the phone with them to walk or bicycle to school or they must text when they got home if no one was there when they arrived. Despite the comfort that cell phones provided parents overall, a few were worried that their child was walking and texting and "paying less attention to the road." Several parents specifically mentioned that they sat their child down and talked to them

about “distracted walking,” with their phones and one parent saw their child texting and walking across an intersection while they were driving to work and reprimanded their child.

> *It’s difficult because the phone can be used if they get into trouble, so I don’t want to take that or the walking away, but it could get them into trouble by not paying attention.*

Borough/school encouragement. Although most parents stated that their child typically walked or biked, almost all parents also felt that the borough or school could do more to encourage continued participation in walking and bicycling to and from school. Several parents, such as Kara who works at Rutgers and drives her son when he’s running late, noted “substantial” traffic around the school particularly at drop-off and believed that this could be somewhat alleviated by “doing more than simply acknowledging we live in a walking town.” Many parents mentioned engineering improvements such as replacing sidewalks that are in poor condition, while others targeted enforcement of speeding traffic and helping students better socially integrate to consistently use active travel. Lola, the “environmental nutjob” stated:

> *We can do more to get kids walking more, Princeton does a zillion times better job and we can do that, right now it’s half-assed in nature, we’re not doing what it takes in Highland Park.*

Other parents expressed similar sentiments:

> *The town can continue to encourage more sidewalk replacement and repairs [to encourage more walking]. Many are in poor condition.*
>
> *We need more social pressure and mom guilt, it has huge power to do good.*
>
> *There are students who aren’t as socially integrated, we could use a teen center or a welcome group for the social network and encourage walking, particularly with new friends.*

> *They [the borough tries] to promote walking with sidewalks and bike racks, but we could do more and be better, even just more bike racks. We could also do something about the speeding traffic, some kind of enforcement. They have been enforcing snow removal, which helps… I heard people are getting tickets.*

Social desirability. Although most parents and students seemed to answer the interview questions honestly parents and student's perspectives on how often they used active travel compared to how often they were driven varied. One parent described their student as "usually" walking to school, even if after further discussion, that meant just twice a week (that child is listed as a driver above.) There also seemed to be some concern or anxiety from a couple parents in this study when they told me they occasionally drove their children. After several Highland Park parents in the study who drove their children told me this information, they wanted to let me know that they saw benefits to walking or knew the harms of driving. Although these were questions that were later in the interview protocol, those parents who drove seemed particularly anxious to discuss particular walking trips though they were infrequent, talk about the benefits of walking or the acknowledgement of the lack of benefits received from driving. Students on the other hand seemed much more willing to discuss when they walked or bicycled and when they were driven and why. This social desirability may come from the liberal, relatively high socioeconomic status of the town. As participant parents in Highland Park seemed to believe that the researcher wanted to hear about the environmental and health benefits of active travel.

Highland Park Students Results

Overall, students interviewed in Highland Park described the town similarly to their parents, like Sarah. They said it was "a nice place," "easy to get places" and "a small, safe town where most people are good people." Students overall did not have

many concerns and were not very worried about their trip to and from school. Over half of the students described walking as "a regular thing" that they were "used to by now." However, Lola's daughter commented "although people walk to school, they don't try to walk to other places hard enough. We could make a better effort."

Students felt the small town feel led to them "knowing a lot of people," and like Adam, they "knew where to go if something happened," or that "people would help [them] out." Students described that there were commonly people walking around town "not in a creepy way, but in a good way" and attributed some sense of security to this. One student said that knowing that people are around meant that she "didn't feel alone, even if I'm walking alone, you know?"

Benefits of active travel. The majority of students said they enjoyed walking and bicycling to and particularly home from school. Students drew a distinction between the trip to and from school. Students said they had to "rush in the morning to be on time" and could "relax" more and "hang out" on the trip in the afternoon.

> *I like walking in the afternoon, I don't have to be anywhere fast. With walking in the morning, being late, you get punished. That's not true with driving, it's someone else's fault then and it doesn't matter on the way home.*
>
> *On the way home we can stop at Rite Aid, and buy candy, we can go to the library, take our time. On the way there, it's just get there fast, that's not as fun.*

Fewer than half of the participants were concerned about being late, although these students said that they are "cutting it close pretty often, sometimes we run not to be late" and that they have "barely made it before when I'm feeling slow or the light is long." Although only two students "typically" bicycled, several others reported bicycling sometimes, particularly when it's nice out "because it's faster" so they can "leave later" and because they can "make up more time" on a bicycle if they leave extra late.

Over half of the students said “getting fresh air” was one of the best things about walking, in addition to the fact it “builds muscles” and is “good for your health.” Students who ever bicycled to school liked that it was “faster” and that they liked the “wind in their face.” Students who walked alone described it as “peaceful,” while those who walked with friends, like Adam, thought it was “fun” and “ a good time to hang out.” Several students mentioned that they “walk a bit out of the way intentionally to try to see friends,” and that being with friends “made the walk quick,” which contributed to their enjoyment. Several students were excited to “be on their own” and have time when they “don’t have to be stuck with [their] parents.” Lastly, several students also pointed out that they felt they were being “green” or that “driving is polluting, which walking avoids.”

Traffic. The one concern the majority of students mentioned was traffic. Students who had to cross 27, like Sarah, were worried about “people running lights” and that it “takes forever to cross so sometimes we just run out, which probably isn’t safe.” Students also said, “there are crazy drivers who zoom” and that people “don’t pay attention.” Several students said they “wish the speed limit would be lower.” While another student commented that “almost everybody breaks the speed limit, but having it be lower would help.”

All of the students were driven to school at least a handful of times over the course of the year, most citing specific circumstances that led to the difference in mode choice. These circumstances were commonly weather related, having something large to carry like a diorama, lateness, tiredness or a personal request on a special day like photo day or an early school trip. Students did not seem to mind being driven, particularly in the

morning or if they had a "reason," however, on a "typical" day students expressed enjoying walking home with their friends and getting some time without their parents. None of the students mentioned concern around their parents speeding or not abiding by traffic laws.

> *On the way to school, getting a ride is fine, sometimes I'm running late, but in the afternoon it's way better to get a break from my mom and hang out with friends.*

Only one student, Maria's daughter, mentioned that they sometimes thought about a "stranger taking them," and discussed that her mother, who was concerned about strangers (see above), told her to "never talk to strangers, even police officers and never get in anyone's car, ever." One other student said they "always checked to make sure no one was following me, but no one ever is." They said they were told to always "pay attention to your surroundings" and that looking around was part of their process to follow the rules to be allowed to continue to walk.

Student improvements. About half of the student participants in Highland Park were pretty satisfied with their walking conditions and didn't see that much improvement was needed aside from "reducing speeders" and "the police giving speeding tickets." The other half of students thought that the borough and school could and should do more to both encourage students to walk to school, around town, and improve safety in the town. One student similar to Sarah said, "people not walking kind of frustrates me, nowhere is that far, it's easy and there are *lots* of cars at school in the morning."

Students proposed both incentivizing walking and bicycling in addition to educating students on the continued importance from both an environmental and health standpoint. Several students suggested "a fun assembly" while another one commented, "not just on earth day to really show students that walking is good." Other students

suggested “advertising” walking on local television, at the local street fairs and at businesses in town. They thought “getting rewarded” would get more kids to do it or the kids who do it sometimes to do it even more. One student also stated that “seeing people walk is an influence, so if we keep reminding people to do it then more people will and then they will get their friends to too.” Students thought businesses, teachers or police giving out prizes for “regular walkers” would convince kids to walk “even if there’s a little rain.” All the students who bicycled said they wished “bikes didn’t get stolen so much,” and saw it as a large disincentive to bicycle. Students also mentioned that they often didn’t wear a helmet, one boy saying he “knew he was supposed to” and would be more likely to if “people noticed.” He said a friend of his in another town got a $5 giftcard for iTunes from a police officer for wearing a helmet and he would “definitely” wear it then, if he thought that might happen.

Lastly, students commented on the aesthetics and conditions of some catwalks, which are pathways that connect primary streets in Highland Park on the North side. Students mentioned wishing there was better lighting on the catwalks and that they were shoveled more in winter. Students also discussed the “fun” feeling of using them and the “pretty” walk.

> *The catwalks are pretty good, sometimes too snowy and dark, but no cars and pretty and nice in nature.*
>
> *The paths, you know, the catwalks, let us have fun walking and sort of take in the birds, trees, flowers, squirrels. A few have big cracks and planks over mud that are kind of making them more ugly and gross though.*

Franklin Parent Results

Much like in Highland Park, there were two “typical” participants. Rhonda was the primary quintessential subject. We met at her house about 1.2 miles from Franklin

Middle School. She worked in New Brunswick and drove her 7th grade daughter to school on her way to work because she felt there was too much traffic, not enough sidewalks, and too many crazies out there for her daughter to be on her own. She had been living in Franklin for three years and liked the good proximity to New Brunswick and 287. Having an only child who received busing in Franklin's intermediate school, she was not aware of the lack of busing for the Middle School in her neighborhood until she received a letter in the mail from the school a few weeks before classes were to begin. She called the transportation department asking what the alternatives were, explaining that she worked and that there were not sidewalks most of the route and she had safety concerned. She said they told her it was a policy and there were no exceptions. They also provided no additional information on transportation or safety and no alternatives although she said she was willing to pay for a bus. She understood it could not be free to everyone, but she felt she had no options, and was annoyed. She looked into alternatives for an after school pick up, but could not find any, so she drove home from work to pick her daughter up from school, dropped her off at home, and then headed back to work. Other participants similar to Rhonda had in-laws pick their child up and one paid for an afterschool program that provided busing from the middle school.

In addition to not walking to or from school, Rhonda didn't allow her daughter, Kimmie, to do any walking for any reasons. Although she used to let her walk to the bus stop, it was only two short blocks. In fifth grade, she walked with her every morning and in sixth grade she watched her from the window, in the afternoons, Kimmie texted when she got on the bus and called when she got home. Other than that trip, she said there wasn't really anything her daughter would want to walk to. She did not really have any

friends who lived nearby, and Rhonda did not want Kimmie walking, so she felt that worked out. She had heard way too many stories on the news about students being taken and never heard from again and she was not going to let that happen to her only child. She was very concerned with abduction and felt it was even riskier since she had a girl. Kimmie owned a bike, but did not really ride it. Rhonda said if Kimmie had to get somewhere on her own, although she could not picture a situation where that would be true, she would prefer her to bike. She felt bicycling was safer since students are much less likely to be kidnapped off a bicycle as they could get away faster.

Rhonda thought the best way to improve safety was to allow students to ride the bus. Other than that she was not sure much could be done. She thought parents under a mile should be able to decide whether they wanted to pay for the bus, but students over a mile should get busing free since it was too far to walk. If that was not possible, she thought allowing parents under two miles to be able to pay for busing, even if that meant having the students walk four or five blocks to the bus stop. She would have Kimmie text her when she got on the bus in the morning and when she got on the bus and got home in the afternoon.

Kimmie, like her mom, enjoyed living in Franklin. She liked that it was quiet and she had a nice yard. Kimmie preferred to be driven to and from school, even compared to using the bus last year. She did not like standing and waiting for the bus, especially in the cold, and she thought it was loud. She also got to sleep later now that her mom takes her to school and is still on time. However, she thought the bus would be better than walking, which would take longer, and she might be late, if she made it there at all, as she might also be taken by someone crazy. She knew her mom was worried about her being

kidnapped as well, which is why she came home from work to pick her up and bring her home, because it was too far and too unsafe to walk. She got a Smartphone when she used to have to walk home alone after school and she said she would commonly call her mom to have her keep her company on walk her home, since she had to call her mom when she got home anyway. Walking home from the bus was less annoying than walking to the bus because when you get dropped off in the afternoon you can go straight home quickly and are not waiting around.

Kimmie, like her mom, thought providing more busing would help kids be safer. She thought she lived too far to participate in any active travel to or from school, but did say she would prefer to walk to and from the bus stop with friends and wished she knew if any lived near by. She also said although she preferred to be driven she knows it was inconvenient for her mom to come get her in the afternoon, so if she could take a bus, even if she had to walk longer than she used to from the bus stop, she would. Although on really cold or rainy days she thought her mom would come pick her up anyways, but it would be easier than what she does now.

Leila was another participant that represented about 30% of the Franklin participants. She lived seven tenths of a mile from the middle school and liked the area as she thought it was quiet, she her home had a good amount of space for the money, and she enjoyed the diversity. Her husband gave her 8th grade son, Ricardo, a ride to school in the morning mostly since he was on his way to work anyways and Leila thought he could use the extra sleep. When his dad had to be at work earlier, Ricardo chose to ride his bike so he could sleep later as the trip was faster that way. When Ricardo got a ride to school, he walked home because they owned one car and his dad was still at work. Leila was a

stay at home mom. Ricardo had three siblings, but they all were at different schools in Franklin Township, so none could travel together. Leila thought the middle school was not very far and commented that she walked much farther as a child. However, she thought the traffic volume and speeds were pretty high and although she was grateful for a crossing guard, she wished there were more sidewalks. She was more nervous when he biked because she had seen children riding between cars and said she had multiple conversations with her children not to do that, as it was dangerous.

When Ricardo began walking home, Leila would walk out a couple blocks to meet him until he asked her to stop, explaining that he could do it on his own. He walked about half way with friends before they split off in their own directions, which led him to enjoy walking more than bicycling as fewer kids biked. He was not concerned about much on his walk home, though he wished there were sidewalks for the whole trip as sometimes he described jumping into the bushes to get out of the way for cars. He said there were always people nearby in the afternoon and nothing ever happened to him or his friends so he felt safe. He also rode a slightly different and longer way than when he walked to be on side roads more, but walking that way he thought took too long. He had a cell phone and was lobbying for a Smartphone, though his mom said he only needs to be able to make calls and texts and not play games. When he leaves school he texts her and then if he stops somewhere that will make his trip home longer than 20 minutes, he's supposed to let his mom know, otherwise she will contact him.

Ricardo thought more kids who lived nearby would walk if they had more friends to walk with. He also thought that the school could do more to help encourage kids to walk and bicycle and thought that they could provide some activities like bringing a

police officer to school to tell kids that walking and bicycling is safe, as he thought police officers were cool. Other students similar to Ricardo thought the school could provide incentives, as they already do with their anti-bullying program, where students can get bracelets and apparel for participating in anti-drug events, and their token program, where students can earn tokens for good behavior throughout the year and redeem them for prizes.

Community. Like Leila, parent participants in Franklin Township described the town as "relatively quiet." Although several parents mentioned liking their neighbors, no parents discussed enjoying the community or described a community of any kind. Parents liked the "diversity" of the area and the "more affordable" housing costs compared to nearby towns. Parents, such as Rhonda, also described the location as "convenient to Easton, 287 and New Brunswick," but did not discuss their ability to walk when asked what they like about living in Franklin. The average participant's trip to school was 1.2 miles.

Parents interviewed lived within two miles of the school, as that is what Franklin Middle School considers "too close" for busing. Parents primarily complained that two miles was an unreasonable distance for children to walk, even when they lived closer. They felt it was just too far, particularly in the morning when their students needed extra sleep and would have to get up earlier to walk compared to being driven.

> *It would take too long to get her ready and walk. It's easily 25 minutes to walk there. It's easier to drop her off on my way in to work. I'm sure she got there on time more often that way.*
>
> *It's in his best interest that he gets extra sleep in the morning, not walk miles [1.5 miles]. It's too far.*
>
> *A couple blocks would take a couple minutes, this [a mile] isn't going to happen, it takes too long and she's too tired.*

Lack of options. Parents were consistently very dissatisfied with the lack of options provided to the students who live within the two-mile radius and the method by which information on the lack of busing arrived. Many parents reported making phone calls as Rhonda did to try to garner more information about transportation and safety. Parents reported that in August prior to the start of 7th grade they were informed through a letter in the mail that the state did not require busing within two miles of the school and therefore, busing would not be provided to them. Although some parents were aware of this beforehand from having an older student at the school or a neighbor, several said they were very surprised. Parents from both census tracts had similar reactions to Rhonda:

> *I think less than a month before they told us. I have no chance, I mean wow, to do anything. I called them, they told me your son is a walker, I had no chance to air out my concerns, no one replied or acknowledge my email either.*
>
> *A letter was sent in the summer, I knew it was coming because our neighbors didn't get bused when they were there, but there's no information in the letter, nothing about safety, it's just you have no busing, you live too close and we don't have to provide it, that's it.*
>
> *The letter the school sent, in August, was horrible, it had no information other than your child will not be bussed, no options, no information, just a no. We are paying for busses in our taxes it seems to me. I understand if the bus stops had to be further apart, maybe four blocks, but we get nothing.*

Several parents stated they were willing to pay for busing or would be more satisfied if the school provided information on alternative options. Rhonda said:

> *I understand why it cannot be free, the busing, I get that, but why can't I have a choice? In Nebraska, the bus wasn't always free, give us some options, my thing with her walking is that some of the areas are ehhh, so then I don't see her for 10-14 years, no. Times are different, there are not that many kids walking, where's the safety? The concern for the kids? Hell no.*

Other parents expressed similar frustrations:

> *I'm frustrated that there is no busing, because we live too close, but at least give me the option.*
>
> *The worst part of living here is they don't always give all kids buses, it's inconvenient. I'm willing to pay for it even, but they have nothing to offer.*

Parents were particularly upset that no busing was offered since many roads near the school did not have sidewalks. Consistent with the literature, parents, such as Leila, commonly mentioned the importance of sidewalks to separate the children from the traffic, the lack of which was a concern.

> *I know it's expensive to get busing, but it's pretty cheap to get some sidewalks, if they can't decrease the range for busing.*
>
> *I will never agree to her walking to school with no sidewalks, that's crazy.*
>
> *I told them then we have to have sidewalks by the school if there's no busing, nothing has been done. It's a budget problem apparently, we have enough money for fireworks, for people to come out and watch them, but not for the safety of our children on neighborhood streets next to our schools, come on.*

Abductions. Parent participants in Franklin commonly mentioned their concern over potential abductions and strangers; several said it was their primary concern. Parents commonly stated "times have changed" from when they were growing up and that even if they walked to and from school, they were very hesitant or did not allow their child to walk. Parents interviewed pointed to books, news, and media outlets as informing their perceptions on abductions. Rhonda said:

> *My daughter does no walking at all for safety reasons. You look on the news and there is just too much going on all over. It's personal safety, you read about all the different things that are happening nearby and it's scary. There are incidents with strange people, you know?*

Parents from both census tracts agreed:

> *You never know where the creeps are coming from, I read a book once and a girl who was 12 years old gets picked up from a bus stop. It was based on a true story, so you never know. No matter how much you can tell the kids don't talk to*

> *strangers and all that, they can intimidate the kids with guns and knives and take them, they're just kids.*
>
> *My primary concern is abduction, that I wouldn't see my little girl again. It's all over the news.*
>
> *In the news you hear it, kids getting taken, you know, so it's a worry even if there's been nothing in our area.*
>
> *There's a sheer safety aspect, the world we live in, there's too many whackos out there for her to walk.*
>
> *You hear about safety in the news nowadays… it's always in the back of your mind, kids being taken.*

In addition to kidnapping, several parents mentioned sexual predators or offenders specifically. Three parents stated that they checked sex offender registries and that the site informed their concerns. All three of these parents had daughters, though not all of the daughters were the student interviewee. One mom similar to Rhonda commented:

> *I also look at the sexual offenders and the area gang activity online.*

Two dads also stated:

> *I checked the sex offenders list when we were looking at houses, my wife is really against living near them and always is on the lookout on the site, so we're definitely concerned about that and traffic second.*
>
> *There's a site for sex offenders that is good to look at to know what could happen to your child.*

Gender may play a role in the perceptions of active travel and specifically, the perceived importance of sex offenders. Several parents who had daughters mentioned the gender of their child specifically as playing a role in their perceptions. Although the parents did not indicate that they set different rules for daughters compared to sons, the child's gender came up in several conversations as a reason that parents aren't confident with their child walking or part of the reason that the child doesn't walk. Rhonda said:

> *She'd be a girl in the middle of the road alone. I don't know who's in the neighborhood, who is going to grab my child, what stray animals there are, what people are driving crazy, just no.*

Two moms similar to Rhonda agreed:

> *The last two weeks she walked home, she gets exercise. Though as a girl, I don't know that she should be out for that long.*
>
> *She doesn't walk. It's dark in the morning and she's a girl.*

Cell phones. Most of the parents interviewed stated that their child had a cell phone that they took with them to school, regardless of the mode of travel they used. Parents often reported getting their children cell phones when they attended the intermediate school (or before) as they were often walking a few blocks to the bus stop. Parents said having their child have a cell phone helped them to know that they got on and off the bus and thus to school safely. Parents overall felt that having a cell phone made them feel more secure about their child using active travel, even for short trips. Parents discussed rules their family had for checking in to make sure parents knew where their child was. Leila said:

> *He has a cell phone and we have a system. I don't want him to text while he's walking or biking, he has to call or text when he leaves, he can't answer texts when he's biking, but I'll text him if he's gone past 20 minutes and I don't see him.*

Other parents felt similarly that cell phones gave them peace of mind when their child was walking:

> *She has a cell phone and she will tell me when she gets home if I'm not picking her up, it helps me feel more confident with her walking.*
>
> *They have GPS on their phones and I haven't looked into this, but there is a need to have some way to track the kids. The school should support an app of some kind, I bet there is one, I should look into it.*
>
> *She walked to and from the bus stop alone, there were always other kids present at the bus stop, and she had a cell phone and when she got on the bus she had to*

> *send me a text saying she was on it, then I knew she'd get to school safely. When she got into the house after school she had to call. I had to know where she was.*

Parent improvements. When participants in Franklin were asked what the school or municipality could or should do to improve safety, parents were commonly pessimistic that anything could be done. Parents typically suggested "more sidewalks," increasing the number of crossing guards, or increasing the number of busses, though didn't typically have additional ideas. Rhonda said:

> *Maybe more kids could take the bus with fewer stops so everyone walks a couple blocks, but more can take a bus.*

Other parents had similar ideas:

> *I would say more crossing guards, but maybe also improve the ones we have? They walk out right in the middle of traffic.*

> *There are only crossing guards at the main intersections like at the school, we need them a little farther out.*

> *Other than getting sidewalks and maybe giving us busing over say a mile, I don't know what we could propose to do.*

> *The school won't let her walk to the bus stop over there, even though it's closer than walking to school. The kids should be able to get on.*

Franklin Student Results

Like Ricardo and Kimmie, students felt similarly to their parents that they thought their neighborhood was "nice and quiet." Students primarily reported liking their neighborhood, with students commonly mentioning that they liked "having a nice yard," or "parks nearby," but that "not too many friends live close."

Lateness. Students were primarily concerned about being late in the morning. Their fear of being late and getting in trouble was one of the primary reasons students wanted to be

driven or take a bus in the morning, along with their desire to sleep in, since they all noted that walking took longer than being driven. Kimmie said:

> *Being driven is the best, then it wouldn't be my fault if I'm late, it's quicker and easier. I don't need to depart the house at like a certain time or be at a bus stop and stand there.*

Other students expressed similar sentiments:

> *I ride with my mom, because it's hard to wake up.*
>
> *I like being driven in the morning. It's less stressful. I don't have to worry about being on time. It's less than 5 minutes away in a car and 30 minutes walking.*
>
> *I like being driven to school because I know I will get there on time then, on the way home it's more okay to walk.*
>
> *It's cold in the morning, kids are tired, and we don't get there on time.*
>
> *I like to walk home more, not in the morning. If I walked to school, I would have to wake up earlier and I'd probably be late, the kids in the morning walk slow they are so tired and if they're late they could get ISS.* [in school suspension]

Fewer fears. Franklin students interviewed were generally more optimistic about their built and social environment, commonly viewing it as safer than their parents. Although students may be overly optimistic and thus, not aware enough of their surroundings, students who used active travel generally reported that they were not concerned about the trip. Students who walked generally discussed where they walked and why that was safe. Students perceived their trip to be safe for three reasons: 1.) It was safe from traffic; 2.) There were people nearby who could see them and; 3.) They experienced the trip without problems.

> *There is a crossing guard the way I go, it's safe.*
>
> *The way I go is safe, my dad told me the route, it's the shortest. We were riding in the car last year and he pointed it out and then he used to meet me and teach me about traffic.*

> *There are people on Hamilton and you can't get snatched near people, so I took all main roads [to get home] and so it's fine.*
>
> *I've never had a problem, walking is fine.*
>
> *I've never saw or heard anyone get hurt, so kids shouldn't be worried.*

Students who didn't use active travel seemed to be more concerned about their built and social environment. These students also commonly had parents whose primary concern was abduction. Students who had parents whose primary concern was abduction also tended to mention that they themselves were concerned about abduction and correctly identified their parent's abduction concern. Kimmie said:

> *I'm worried about crazy people, like getting murdered, but really crazy people in general.*

Some other students had similar perceptions:

> *There are dangers, someone could ummm jump out of the bushes and take me.*
>
> *I could get snatched walking, I know it and my mom does too.*
>
> *There's always something you don't know about. Someone could take me all of the sudden.*

Sidewalks. Franklin student participants like Ricardo, similar to their parents, commonly discussed that there are not sidewalks on many of the roads near the school. Students saw areas with sidewalks as safer than areas without sidewalks, and commonly stated that they wish there were more sidewalks between their house and the school to improve safety. Ricardo said:

> *I wish there were more sidewalks on the way home. Near Hillcrest, I like dive into the grass when I'm walking to not be near the cars on Franklin.*

Other students agreed:

> *Arden is not a safe road because there are no sidewalks. My parents told me not to use it, so I use a parallel road that has sidewalks for the majority.*

> *If I didn't have to worry about traffic as much and there were sidewalks I'd be okay walking somewhere.*
>
> *I wish they would add more sidewalks so I'm not in the road and replace the ones where I trip because they are uneven.*

Student improvements. Student participants were more optimistic that the school in particular could facilitate improved safety. One idea that students commonly mentioned was that walking with a friend was both fun and safe and that the school could potentially make meeting points for students to walk together.

> *Have a meeting point so you could be certain there would be a witness, you need spots where kids can come and walk together for a little while.*
>
> *We want to be with our friends so make sure our friends walk and then we're together, that's also safer.*

The second idea that was commonly mentioned was making walking and safety cool and fun. Sometimes incentives were also mentioned as encouragement. Ricardo said:

> *Have police officers come maybe and teach us, they are pretty cool.*

Other students of both genders had similar thoughts:

> *Make safety fun so it's what you're supposed to do, like we got these plastic bracelets for 'No Drugs in Sight', they're great and we know who else supports that. T-shirts and other apparel and accessories are also cool.*
>
> *We need activities like dancing or sports to teach kids about safety and get kids to walk; we might stay focused on that because it's something we enjoy a lot.*
>
> *The school gives out these tokens and at the end of a year you can get prizes depending on how many tokens you have. You can get them for a bunch of stuff and the big prize is like a PS3, it's a pretty good, but I don't know all the things you can get them for, maybe walking or being safe would be good.*

Stanhope Parent Results

Kathy was a typical participant in the Stanhope interviews. Kathy had been living in Stanhope for 12 years and chose to live there with her husband because of the small

town feel and nice community. Since she moved, she had made wonderful friends and felt that everyone really looked out for each other, similar to Matt's perspective of Highland Park. We met at her home about seven tenths of a mile down the hill from the school mid-day on a Tuesday. Kathy had been a stay at home mom for the last several years, but began working part-time again when her younger daughter entered 2nd grade last year. She drove both her 3rd grade and 7th grade daughter, Madeline, to and from school because there were so many news reports about children being taken, assaulted, and abused and she thought it was the best thing to do to be the best parent she could be. She also said being a mother of girls made her more nervous, because they were little and could be more easily preyed on. She checked the sexual offenders website and noticed that there were several offenders in town and wanted to make sure she always had an eye on her children. In addition, there was a busy road the girls would have to cross and on top of her primary fear of abduction, the busy street made her nervous as well. Kathy said she could not take a full-time job even though both of her children were now in school full-time because she needed to take them to and from school with no busing in the town. She also wanted to be home with her girls in the afternoons and had to take them to soccer practice as well.

Kathy said Madeline had a cell phone, as it was important to check in with her when she was at a friend's house or for emergencies. Madeline owned and knew how to ride a bike and recently had been allowed to go around a couple blocks in a loop, which was almost half a mile on her own, though she had to wave to her mom or check-in between loops. She was recently allowed to walk her dog, Bingo, down the street since

their road was one of those that had sidewalks, and could walk to a friend's house within sight of her parent's house this year.

Last year, Madeline asked her mom if she could walk to Sal's, the pizza place at the bottom of the school hill, on half days. Sal's was about a half mile from the school on her way home before a large intersection Madeline would have to cross (Route 183) to get home and a very popular location for middle school students to gather after school. Kathy told her daughter maybe and never gave Madeline an answer, hoping she would forget. Madeline continued to ask and Kathy let her go once at the end of last year and picked her up from there. Kathy described herself as being a wreck and made Madeline text her when she was leaving school, when she got half way there, and when she arrived. She said she felt more secure knowing that dozens of students were all going together. However, if Madeline did not have a cell phone, Kathy did not think she would have been able to let her go. Although she had not tracked her using an iPhone app, she wanted to look into it, as she foresaw Madeline wanting to walk more places with her friends. Luckily, she said it was a little rainy the day she walked to Sal's, and Madeline was so happy she got to go that she was not too frustrated with her mom for picking her up there.

Kathy thought more police presence would help alleviate some of her concerns. She thought the students needed more supervision on the way to and from school to keep them safe from strangers and from cars flying on side roads and Route 183. She also wanted more sidewalks, as they were intermittent on many of the streets down to Sal's. Kathy was really happy her daughter had only asked to walk to Sal's out of her sight so far and that it was a popular enough location where students were in large mixed-gender groups.

Madeline, like her mom, liked Stanhope. She thought it was a nice town and she had good friends, though she said there was not very much for kids her age to do. Madeline liked being driven to school in the morning because it was up a big hill, which would take a long time to walk up and she wanted to sleep in, eat breakfast and did not want to be late. In the afternoon, she said she used to like being picked up, but she wished she got to go to Sal's more with her friends, at least on half days when she said a lot of her friends went. She said it was so fun to hang out after school and leisurely walk there the day she was allowed and she wanted to make sure she proved to her mom that she was responsible enough to do it again. When her mom asked her to text her the three times on the walk, she thought that was a lot, but she wanted to do everything she could to be allowed to go again in the future, so she obliged. Madeline said she wished there were sidewalks the whole way to Sal's, but there was not much traffic until you got there since it was back roads to the school. Madeline said she would not want to walk alone and would be nervous that someone might take her, but that since she was in a group she felt fine. Madeline thought more students might walk if they convinced their parents they were responsible and if they really wanted to, like she did. She thought more students would want to walk if Sal's were involved, or maybe a dance since those were fun activities that students already enjoyed.

Although Kathy and her daughter, Madeline, were very typical participants in the Stanhope interviews, there were several students, like Liam, whose parents let him walk home after school. Liam was in 8th grade and had friends to walk with most of the way, which made his mom, Diane feel confident. Diane was worried about students being kidnapped, but since he was in a group she felt reassured. She wished the sidewalks were

more ubiquitous as they just ended on several larger roads. Liam felt safe since he said he knew almost everyone in town. He figured if something happened there were lots of people's houses he could run to, but he had never heard anything going wrong. He remembered his parents talking about a white van a few years back and he thought that might have worried his mom, but he was still allowed to walk home with his cell phone and friends. He said he was more worried about the traffic because one time when his friends are hanging out on the way home they sort of wander towards the middle of the road and since the roads are curvy with no sidewalks, someone has honked at them, and he thought almost got hit. Liam did not want to walk to school because none of his friends did. He thought kids did not walk in the morning because the school was up a hill, parents were on their way to work anyways, and parents wanted their kids to get more sleep and eat breakfast without being rushed.

Although the school recently had a "Walk to School" day, to encourage active travel, Liam did not participate, despite walking home nearly every day. He thought it would be easier to start encouraging kids to walk home from school, since not too many did and then the school could see if more students would be willing to walk in the morning. He thought if the school wanted more students to walk that they should put in more sidewalks and get Sal's to raffle pizza or randomly give away small giftcards to walkers as an incentive. Some of Liam's friends thought the school should either offer homework passes for students who walk, (that could later be used to improve a homework grade), have a fun activity encouraging walking, and maybe give out stickers or pencils.

Community. Like Kathy, parent participants in Stanhope, similar to Highland Park, described the town as "small, quiet community" where "people watch out for children," a place that is "very, very family-oriented," where "everyone knows everyone." There is no busing in the borough for the one K-8 school and thus, every student is considered a "walker." The average participant's trip to school was .75 miles. Although there was variation in how students got home from school, almost all students were "always driven" to school. See Table 5-1.

Abductions. Again like Kathy, almost every parent interviewed in Stanhope mentioned that they were concerned about strangers, abductions, or sexual predators; most stating it was their primary concern. Many parents said they felt informed by the news. Kathy said:

> *Since I've been a mom, I'm overprotective, I think it's a mom thing, it only takes one freakin' time, you know, it doesn't matter the size of the town or if you think it's safe, people could be out there, we shouldn't take chances.*

Other moms in town had similar perspectives:

> *This is a safe neighborhood, but any neighborhood has the ability to have predators, that's my biggest concern, predators.*

> *I have in the back of my mind this story I saw on the news about a girl who was killed going to school and I know I bring those incidents with me.*

> *We [mom and her daughter] talked about that 12-14 year olds are the most commonly abducted on the news. I'm very concerned about strangers.*

Kathy was one of the several moms who discussed how they use websites to check for sexual offenders, which inform their perceptions and often discourages them from allowing their children to walk or bike. Kathy said:

> *I've checked several sexual predator websites and we talk about him [one man in town with a middle schooler] all the time, I'm not alone in thinking this. I have told the kids under no circumstances do you get in the car with him, he's not officially on watchdogusa.com, but I'm keeping my eye out.*

Other moms had similar comments:

> ***T****here are 25 pedophiles within a four-mile radius, I've looked. I checked for that on my own. It does not make me feel safe. There have also been three suspicious sightings of vans, two near the middle school and one near the high school in recent years.*
>
> *There are pedophiles in the area, I've looked on a website, there are tons right in the neighborhood.*

Several parents also mentioned specific alerts the school sent out about regional or more local problems, such as "suspicious vehicles" that had been reported in the town or surrounding towns. Although the administration said no alerts about suspicious vehicles had been sent for almost a year, a couple of parents who allowed their children to walk home said that alerts about suspicious people or vehicles impact their mode decisions. Parents stated that students who typically walk home would be picked up or were picked up after alerts of suspicious activity to keep their children safe.

> *I would probably go get him if I heard about a suspicious vehicle around or something like that.*
>
> *I do know people who stopped letting their kids walk for a little after van sightings, I was actually one of them.*
>
> *I heard of sightings of cars that were inconspicuous, I heard of children being approached, so she wasn't walking then.*

Being in a group. Despite parents' hesitations to allow their children to walk, parents, like Kathy and Diane, felt that students being in a group helped to ward off predators or strangers. Students being in a group made parents feel more secure and parents commonly mentioned it as a requirement for their child to walk.

> *I'm not as concerned now, because a person doing something disgusting, they wouldn't approach a group. I wouldn't let him walk alone, anywhere, he knows that, someone might steal one kid, but not ten. That's terrible, but your perspective will change when you have kids, it's scary.*

> *He's really good about texting and being in a group, he has to be in a group, because coming from the city, I assume everyone is a predator, that's probably so bad, but I do.*
>
> *I'm concerned about them being alone, especially in the woods alone, it's a matter of personal safety, but when they are out of visibility of others, alone, anything can happen. I know, I'm extremely overprotective.*

Diane said:

> *They can walk so long as they aren't alone, I don't want someone jumping out of the bushes and grabbing them, that scares me.*

Gender differences. Some parent participants in Stanhope also mentioned the gender of their child when discussing their concerns about walking. Parents of girls, even if the daughter was not the child being interviewed, mentioned that their child's gender influenced the concern they had. Parents thought that girls were more likely to be picked up or harassed, even in groups, than groups of boys or mixed gender groups.

> *I envision them pulling her into the car, she's a little girl and she hangs out with gitty little girls, they are tiny things with little legs and they are too vulnerable, I don't know if she could take care of herself.*
>
> *I'm worried about like perverts, jumping out, though I'm concerned about people picking up the girls, like my daughter.*
>
> *They are still girls, maybe I'm sexist, I guess, but even a group of girls, I don't know. Max, is a junior, he can walk them, there are seedy people.*
>
> *I don't feel as comfortable with them out there because they are girls. If they had to, I guess they would walk home.*

Cell phones. All of the parents interviewed stated that their middle schooler had a cell phone. Most parents reported that they felt more comfortable that their child had a cell phone, regardless of the mode of transportation they used. Parents felt having a cell phone allowed them to more easily know where their child was or contact their child, particularly if something went wrong. Overall, parents preferred their child to have a cell

phone, particularly if they were walking so the child can contact their parents and let them know where they are. Thus, cell phones may be a facilitator of active travel. Although Kathy had only thought about looking into an iPhone app, one parent already had it downloaded and described watching her daughter walk home from school via a GPS-enabled mobile application to ensure she got home safely. Kathy said:

> *They are required to have it on [cell phone] and text me all the time. I've toyed with watching her cellularly, I've joked that I would do it, I haven't yet though, I know I'm overprotective.*

Other parents made similar comments about cell phones:

> *They won't walk anywhere without the phone, I prefer for them not to, so it's win-win, they don't want to and I don't want them to.*
>
> *My son wanted to walk and asked, I agreed. I got him a cell phone for it. He has to call when he's leaving and when he's home.*
>
> *I want to know where she is, what she's doing, so she has to have the cell phone on. I got it so I would know where she is after school.*
>
> *I can watch her from my office with the Find My iPhone app, you watch the bubble move, it makes me feel like I can see her.*

Parent improvements. When parents were asked what the town or school could or should do to enhance safety or promote active travel, parents were generally pessimistic that anything could be done. Those parents who did suggest changes, such as Kathy, primarily emphasized two possible avenues: 1.) more police presence to both decrease speeding and increase supervision and like Diane, 2.) more sidewalks and infrastructure change to separate pedestrians from motorists.

> *I wish there were more cops out, we have a one square mile town, can there be more supervision when they let the kids out from school? It could be just me, but I'm always like what are they doing? Who is that? I'm suspicious of everyone and watch everyone.*

> *The cops sit out, which has helped the speeding, but we need them to do that more. More supervision.*
>
> *The road is so narrow, it would be major construction to put a sidewalk there, which is unfortunately isn't possible I guess, but it would be great.*
>
> *The town does nothing, but they want the kids to walk. Maybe there's not a ton of sidewalks they could put in, but there is traffic calming, better-lit signs and crosswalks they could add also.*

Stanhope Student Results

Stanhope students, such as Madeline, described their borough similarly to their parents. They said it's a "quiet community" where "nothing happens" and that "everyone knows each other." Some students said they liked that there were "lots of kids nearby to play with," while others thought there "isn't anything to do here" and that the small size of the town allows "drama [to] get around really fast."

Morning and afternoon differences. Students in Stanhope, like Liam and Madeline, drew a very large distinction in their mode preference based on the time of day. Only one student interviewee used active travel in the morning (and she lived just two blocks from the school) and no others stated they wanted to (despite a couple participants living just five or so blocks away). Students did not want to wake up earlier in the morning to walk and few other students were walking in the morning, which also provided a disincentive for students to want to. Liam said:

> *I have more time to get ready when I get driven, I get to sleep more. There's not a big group in the morning maybe one or two people. Not a lot of people walk in the morning, it's easier to walk home.*

Other male and female students agreed:

> *My mom usually drive us in morning since we don't wake up early enough, I'm the last out the door.*
>
> *If I walked, I'd have to get up a lot earlier and I don't like to get up early.*

> *I get to sleep in later when I get a ride. In spring sometimes I get up early and walk, but I have to get up half hour earlier. Mostly I'm driven in the morning but can walk home.*

However, students regularly commented that they walked home or wanted to walk home when it was nice out. On half days, almost every student interviewed, like Madeline, wanted to walk at least to Sal's, a local pizza shop, about a half-mile trip down the hill from the school to get pizza. Students described this trip as a " fun tradition" that the middle school students partook in. Sal's pizza is on busy Route 183 and although there is a crossing guard there, some students, like Madeline, were picked up from Sal's instead of continuing their walk home. Madeline said:

> *Before 6th grade I asked them if I could go places with friends without them, like to Sal's. They took their sweet time thinking about it. I explained to them that we're like continuing a tradition, I wanted to be a part of it and I wouldn't ever be by myself.*

Other students echoed her sentiment:

> *On a half-day we all walk together to Sal's, which is so fun.*
>
> *On half-days everyone walks to Sal's and eats there, it's expected.*

Abductions. Stanhope students interviewed were more optimistic about their built and social environment than their parents. Most students, like Liam, stated they were primarily concerned about traffic and that the sidewalks were intermittent or absent on much of their route compared to other concerns such as abductions.

> *There are barely any sidewalks and when you're going across street no one will stop for you, it's usually pretty busy, that's the kind of stuff I worry about, nothing else.*
>
> *I'm not too worried about being taken or anything, but the cars flying when I'm on the side of the road scare me.*

Although a few students mentioned abductions, more students stated it was a concern of their parents and not their own. Several students did mention being nervous, however, after the school sent home alerts about suspicious vehicles. Madeline said:

> *My mom has told me about kids being kidnapped while being asked for directions, to be careful. I guess it could happen.*

Other students had similar perceptions:

> *Mom says there may be someone hiding out in the path and that's not safe, but nothing ever happens here.*
>
> *Attempted abductions was a concern last year, most people had to be driven after the school told everyone about that, every time we'd see a van we'd run away, like at the playground.*

The primary reasons students provided for feeling relatively secure from strangers is that they stated they typically travelled in groups, knew neighbors were watching, and knew people and places they could run to for help. Liam said:

> *It's a small town, we know people and the area if anything happened, know places you could run to if you got hurt or yards you could cut through, we know where to go.*

Other students also emphasized the importance of being in groups and knowing people in town:

> *If you're in a group, I'm never alone, nothing is going to happen.*
>
> *Everyone feels safe from abduction because everyone knows each other. I've never been too scared of that.*
>
> *This is a small town so you know everybody. It's easy to get places and everybody is friendly with everybody. I could find someone to go to if there was trouble.*
>
> *I know my way, I know everyone around, I know people here, I'm not worried.*
>
> *I know people, I'd bring someone to my friends house if something happened, I know a lot of people on the street.*

Responsibility. Stanhope students stated that they thought they were able to walk home because they demonstrated to their parents that they were responsible enough to pay attention and get home safely. Students felt it wasn't simply about being old enough, but also about showing their parents that they could take on the task of walking home through completing other tasks successfully and exhibiting mature behaviors. A friend of Madeline's said:

> *When they told me they would think about it [letting their child walk], they said they would, then I had to ask again, but I tried to show them I could be responsible, because that's important, and I timed it perfectly. I made sure my dad saw me do the dishes and I would clean the kitchen so my mom would see me and I would get home and do my homework immediately, like our book reports, I would stay on top of that, keep my room clean, I even cleaned the playroom, so I really tried to prove to them to let me walk to Sal's.*

Other students also discussed the requirement of being responsibility to walk:

> *I'm more alert, I didn't pay attention as much before, you learn a lot as you get older and now I'm more responsible.*
>
> *I can walk home in a big group. She [his mom] thought I was old enough because I was taking on responsibilities like with my brother.*
>
> *It's not about age. Some people in my grade can't handle walking, the way they act, the littlest bit of ADHD could get you hurt, if you want to look at something you could end up in the road, while others are responsible they've shown they can walk just fine.*

Student improvements. When Stanhope students were asked what the school could or should do to increase safety and active travel, students generally discussed incentive programs and education. Almost all parents commented that even those students who did not walk anywhere else wanted to walk to Sal's on half days. Students loved Sal's and many thought Sal's promoting walking or safety would encourage students to use active travel more. Students also suggested other items that would incentivize students to

participate and commented that they enjoyed the incentives given at their Walk to School day. A friend of Liam's said:

> *The school gives out like $5 gift cards to iTunes and Xbox for some stuff like perfect attendance, so maybe that or gift cards to Sal's or like a free slice, since on half days everyone goes to Sal's and eats there so then maybe more kids would walk.*

Several other students expressed similar ideas:

> *Give them a homework pass if the crossing guard sees someone is wearing a helmet, take away one if not maybe if you don't look both ways, like that. They hand out homework passes for other things, like special things, workshops, coming to anti-bullying night, getting straight A's or something.*

> *Sal's is cool so maybe they could give out like slices to kids who were good at walking.*

> *At walk to school day they gave out stickers, which girls liked and key chains, which I think more boys likes, but we also got our name on a poster.*

Liam said:

> *We had a walk to school day, I didn't do it, I walk home, why isn't there walk home from school day when there are groups of kids walking? We could get more.*

Some students also suggested an assembly to encourage walking and teach safe active travel habits. Although this could be perceived as uncool since the school would promote it, students thought they could be well received if they were "interactive" and "fun."

> *Maybe an assembly or video about how to be safe while walking and show us it's fun.*

> *Some kids would pay attention if we did like an assembly with funny skits.*

> *Maybe we could have like an earth day theme inspired dance where we all walk there and we could make posters as decorations to line the halls about walking. Mostly because we all look forward to the dances, the school is cool when they do those.*

Lastly, several female students discussed aesthetics, specifically when mentioning a path they commonly took through the woods to get to school.

The path should be better maintained, the woods are pretty and make you want to walk, but the path could use some sprucing to make it feel safer.

Sometimes the animals could seem scary, but really it's pretty with the trees and birds, though I wish the ugly metal gate at the end were removed to make it feel less creepy and maybe some lights on the path.

Discussion

Although Highland Park and Stanhope were described very similarly by participants, the perceptions, particularly of the parents, were quite different between the two municipalities. Since snowball sampling was used, the primary group of parents interviewed may represent just one social network. This may be particularly true in Stanhope where snowball sampling was used the most heavily, while it was only used to recruit one participant in Franklin, and a handful in Highland Park. In Stanhope, the social network interviewed seemed to perpetuate fear, while in Highland Park, it seemed to encourage walking. In Franklin, on the other hand, the parents primarily wanted to talk about the lack of busing. Although Stanhope had eliminated busing years prior, this was not discussed as often in the interviews.

In Highland Park, kidnapping or sexual assault was only mentioned by two parents as a concern, while in Stanhope, almost every parent perceived this to be a primary concern. This is despite that fact that both towns were characterized as a "small town where everyone looks out for everyone else." Stanhope parent participants' perceptions were much more similar to the parent participants perceptions in Franklin, a much bigger town where no interviewees described the community, than those of Highland Park. Although Stanhope and Highland Park had similar household median incomes, Highland Park is more densely populated, more liberal, with a more highly educated population, which may account for some of the variation in perceptions. This

demonstrates the importance of context when examining these issues, as towns that may appear similar, may have very different issues they want addressed and therefore, different interventions may be necessary. Highland Park parents were not worry-free, but the interviews were less likely to focus on strangers and more likely to focus on traffic concerns, perhaps due to the number of people walking in town and thus, eyes on the street and safety in numbers may be alleviating those fears.

Students' perceptions of strangers in the three communities tended to echo the perceptions of the parents in the community, as seen in the prototypes of Madeline and Kimmie, though to a lesser extent. No students in Highland Park mentioned kidnapping or sexual offenders. While students in Franklin and Stanhope did mention these concerns, it was less often than their parents. Furthermore, students who did mention these concerns tended to have parents who mentioned them as well. Students in all three municipalities were more optimistic about strangers than their parents and tended to describe their local knowledge of people they knew and where to go if something happened as a rationale for why they perceived their community to be safe.

How parents from the three municipalities viewed bicycling was strongly dependent on parents' perceptions of their primary concern. The vast majority of parents in Highland Park perceived bicycling to be more dangerous than walking due the faster speed and increased likelihood of being injured falling off the bike.

> *I let him choose how he wants to get to school, although seeing the kids in the road with the bicycles does make me more nervous than walking since they're going faster and are more likely to have a higher-speed altercation with traffic.*
>
> *Walking is safer, it's just a sheer speed aspect and you need skills for the bike, which take more time to develop.*

In contrast, in Stanhope and Franklin the majority of parents perceived bicycling to be safer than walking as you could ride away from a personal safety problem more quickly. Parents in Stanhope and Franklin seldom mentioned concerns of falling or traffic accidents with bicycles.

> *If she had to walk or bike, I say bike [is safer], since you're able to pedal away from any strangers.*

> *Bicycling, you can just get away, walking you just get snatched up.*

The majority of students in all three communities perceived bicycling as more dangerous than walking as students were most concerned about traffic and falling off the bicycle. Several students also discussed the fact that they didn't ride a bicycle very often and weren't very good at it, which led to their concern for falling. Adam said:

> *I thought you could fall bicycling, so that's more dangerous, but after my brother fell last year, I know bicycling is worse.*

Other students agreed:

> *I don't ride my bike that often, so like in the park it's probably okay, but with traffic, I could get nervous and make a wrong move and get hit or fall. I'm probably not going to fall walking.*

> *I have a bike, but it's just more dangerous and I don't ride too often so I might need more practice to not get hurt with the street and stuff.*

A few students in Stanhope and one in Franklin mentioned being able to bike away from strangers more quickly and thus, perceived it to be safer. However, this perception was not as prevalent for students as parents.

> *Bicycling is probably safer because if someone is going to snatch you, on a bike you just pedal away.*

> *Walking you can get snatched, but on a bicycle it's hard to get taken since it's faster.*

Other parent perceptions also varied by location. In Franklin, even parents who lived within a mile of the school mentioned the two-mile radius in which no busing was provided and students were considered "walkers" as being too far. The CDC states that an adult "walking briskly" takes 15 minutes to cover a mile (Centers for Disease Control and Prevention, 2011b), while many planners assume healthy adults walk a mile comfortably in 20 minutes, though children may be slower. Therefore, a two-mile walk would take around 40 minutes. Although, bicycling would reduce the time required to about 15 minutes, the terrain and weather may be more important considerations for children bicycling compared to walking, in addition to the important components of bicycle ownership and school facilities for bicycles, such as bike racks. Due to the time required to get to and from school by walking, Franklin parents, such as Rhonda, overwhelmingly mentioned reducing the no busing radius to one mile, which they felt was a more reasonable time and distance for students to travel. Parents also felt strongly that the municipality should be working to increase the sidewalks around the school, particularly if no busing exists.

A few parents in Stanhope also stated that they believed the distance from their house to the school was too far for walking or that the pedestrian facilities in town in combination with the distance was too far to walk safely. These parents lived "across town" on the other side of a busy state road with narrow, curving travel lanes and no sidewalk. They felt that instead of having one no busing policy for the whole town, the road and pedestrian conditions should have been examined. Only one parent mentioned they perceived it a "bit far" to walk, yet their child walked home "in good weather" anyway.

Franklin parents were not only upset by the distance and the time it would take their child to walk, but like Rhonda, they were frustrated by what they described as "poor communication" and lack of options the school provided. Given the perception that most parents found over a mile too far to walk, particularly without sidewalks for much of the route, parents wanted the school to provide more information on the alternatives of how to get their child to and from school. Parents also wanted the information that their child would not be receiving busing earlier than two or three weeks before the school year began. The majority of parents stated that they understood that busing may not be able to be free, but they wanted the option to pay for busing, even if that meant having their child walk to a bus stop already in existence. The lack of travel options frustrated parents in Franklin, this coupled with the up to two-mile distance the school expected the children to walk and the lack of sidewalks led parents to be concerned about their child arriving to school safely and on time in the morning.

The gender of the child also emerged as a theme of parents in Franklin and Stanhope. Parent participants from these municipalities often stated that their child's gender influenced their perceptions and the decision around mode choice, as Kathy mentioned above. Parents of girls were more likely to be worried about abduction and sexual offender issues, to perceive the environment more negatively, and to drive their child to and from school. However, no parent interviewed in Highland Park discussed their child's gender. Highland Park's walking culture with eyes on the street may mediate the concern that parents of girls have in Stanhope and Franklin.

The majority of parents from all three municipalities perceived walking to have health and environmental benefits, though many parents in Franklin and Stanhope felt

their personal safety concerns, primarily of traffic and abductions, outweighed the benefits. Parents in all three municipalities also felt that their child having a cell phone, regardless of the mode of travel they used, alleviated some parent concerns. The majority of parents of students who walked in all three municipalities stated that they got their child a cell phone, often at a younger age than they had anticipated, because their child used active travel to get to and from school. A few parents discussed tracking their child through an app wirelessly and a few others commented on their concern that their child would be using the phone and not paying attention while walking. The majority of parents also had rules that their child text or call when they got home, while many also required a text as the child was leaving school and a few required an additional text at a certain location or point along the journey, as Kathy did above. Overall, parents in all three communities reported feeling more at ease that they could contact their child and find out where they were after school since they had a cell phone. Some parents reported they would not let their child walk without a cell phone, thus, cell phones seemed to facilitate active travel. Students also preferred walking with cell phones and did not seem bothered about having to keep in contact with their parents on the trip home, though some occasionally forgot.

In all three municipalities parents and students alike discussed the difference in their travel mode choice in the morning compared to the afternoon. Parents and students, particularly in Stanhope and Franklin, where fewer students use active travel were concerned about being late to school. Many parents also perceived it to be easier to drop their child off at school in the morning on the way to work than pick them up in the afternoon, which facilitated some students walking home from school due to a lack of

alternatives. All students preferred walking home from school than to school in the morning because they felt less rushed, often could make stops, and meet up with their friends. The majority of students enjoyed this time to talk about their day and unwind, particularly if the weather was pleasant. Additionally, there is evidence that schools begin too early in the morning for students to achieve the recommended amount of sleep (Wahistrom, 2002; Wolfson, Spaulding, Dandrow, & Baroni, 2007). Studies show that postponing school morning start time allows students to get more sleep without delaying evening bed times, leading to improved attendance, fewer tardies, less sleeping in school, and less-student reported depression (Wahistrom, 2002; Wolfson et al., 2007). Thus, the additional sleep potentially gained by being driven compared to walking in the morning may be important to students' health and school performance.

Despite some similarities among perceptions of parents in the three towns, Stanhope and Franklin students' and parents' perceptions were more similar than those of students and parents in Highland Park. Parent participants in Highland Park quickly stated the benefits of walking after describing they sometimes drove their child. This may be because the interviewees believed it was what the interviewer wanted to hear. As discussed above, the higher educational status in among the Highland Park participants may have also increased the desire that parents had to look health-conscious or environmentally conscious to the interviewer. Additionally, since snowball sampling was used, the interviews may primarily represent one social network in Highland Park that is concerned about these issues. Although the interviewer attempted to stay neutral and discuss whatever mode parents had selected for their children, societally walking and bicycling are seen as more "green" and healthy and thus, parents, especially those with

higher educational status may want to appear to embody these traits or be knowledgeable of these benefits. This finding could also have implications for surveys that are commonly conducted around active travel, as parents may over report walking rates or their perceived benefits of walking. However, since surveys are done without in-person contact with a researcher, it seems that this trend might be more common in qualitative work than survey research, but quantitative researchers in this field should be aware of this possibility.

In contrast to Highland Park, in Franklin parents were more likely to discuss the need for more busing, although just one participant joined the study through snowball sampling. Lastly, in Stanhope, the less densely populated, more conservative, and lower socioeconomic status municipality where snowball sampling was heavily used, parents were very concerned about kidnapping. Again, this may be due to one social network being represented through the snowball sampling process, however, it may also represent different perceptions in the municipalities. Thus, it is important to consider the perceptions of parents and students when designing interventions to increase active travel, as different interventions may be needed when different perceptions of the barriers exist.

Despite an interviewee led discussion of benefits of walking in Highland Park, in Stanhope and Franklin, parents were more apt to quickly discuss their safety concerns and demonstrate that they were knowledgeable about the risks of active travel more than they were eager to discuss the benefits. The social desirability that was palpable to discuss health and the environment in Highland Park seemed to be replaced by a desirability to discuss safety concerns and child supervision in Franklin and Stanhope.

Reasons for this difference may be related to the population interviewed, which has a higher educational attainment in Highland Park and may have been more politically liberal, in addition to the location variation. No parents in Highland Park reported not letting their child walk anywhere, while a couple parents in both Franklin and Stanhope reported that their child did no walking at all "for safety reasons" that they needed to "protect" their children and that they were not anticipating letting their middle schooler walk anytime soon.

Overall, students in all three municipalities did not seem to be aware of or concerned about giving socially desirable answers. Although the majority of children were aware of and discussed the health and environmental benefits of active travel, most did so when specifically asked what they thought the benefits were. Students may be less aware of what researchers want to hear and more likely to reply to answers directly and honestly, making them excellent interview candidates. However, more research should be conducted to see if this social desirability trend exists more broadly, if it is more similar among certain locations compared to others, whether children are more apt to be immune from this bias and the implications for additional research and practice.

Parents' perceptions on how to improve safety and increase active travel were very similar across all three municipalities, yet varied from students' perceptions. The majority of students like Sarah, Ricardo, Madeline, and Liam stated they wanted incentives and education to increase the rate of active travel participants and enhance safety, while parents stated they wanted additional supervision and infrastructure changes. Parents' desired changes, particularly in the form of supervision, seem to be associated with parents' heightened concern of abductions, as in the case of Kathy. While

students' desired changes seem to be more associated with their desire to have fun and be in a group. Students may also perceive education to be more effective since they are in school every day being taught about a variety of important topics. However, this variation between parents and students perceptions and desires to implement changes to improve safety and increase active travel has implications for practice, which will be discussed in Chapter 6.

Lastly, parents in all three communities were asked how they got to school in middle school and if the community they lived in growing up was similar to the one in which they live in now. Four parents living in Highland Park grew up in Highland Park and attended the Middle School, while only one parent in Stanhope grew up there and attended Valley Road School. All of these parents walked to the school their child walks to today. More parents reported walking to school themselves than having their children walk today, commonly stating "the times have changed." Parents said today, "there are more whackos in the world," and "that the world is a scarier place." However, those parents who described walking to school as a positive experience seemed to desire that experience more for their children than those who described it as a long trip for which they had no other options. Some parents stated they moved to Highland Park specifically, because of the ability of their children to walk to school as they did as a child, while others, said they wished they could allow their children to walk, but they didn't perceive their community as having conducive built environment features or perceived there to be too much stranger danger that was not as common when they were growing up.

Limitations. Limitations arose through participant selection, particularly since the sampling was convenience and snowball. Although this technique helped to achieve

larger numbers, interviewees shared traits making the sample non-representative, which is common in qualitative methods. Despite this, this research may demonstrate an in-depth perspective of the social network interviewed, particularly in Stanhope where the most snowball sampling occurred. In addition, although a description of the demographics, politics, and socio-economic status of participants who comprise these towns were included, these participants were not representative of their communities with respect to their gender, educational, or racial background. All women were interviewed in Stanhope and a majority in Highland Park, and white participants were overrepresented in Highland Park.

Despite these limitations, interviewees met two purposeful inclusion criteria: 1.) Parent of at least one child currently in grades 6-8 at the designated schools and; 2.) Parent and children live without access to busing to school. By defining these inclusion criteria, participants had common geographies and children of similar age. In addition, the study was designed to elicit perceptions and was descriptive in nature. Individuals' perceptions are not being used to generalize their specific concerns or rationales to the community at large or other communities. Instead, the study demonstrated the importance of context when potentially investing in interventions to improve active travel, as given the variation in parent concerns, a one-size fits all approach is unlikely to be effective.

The compensation also varied among the three towns. Participants in Highland Park were not compensated, while participants in Franklin Township and Stanhope received $20 cash as funding became available and recruitment was more difficult. Although it is unlikely that this introduced any additional bias into the findings since all members of each community were recruited with the same information.

Although qualitative methods allow for detailed descriptions, in addition to follow-ups and the time and ability to ask for justifications and rationale for perceptions, they may also introduce a social desirability bias. During the interviews, some parents seemed to quickly tell the interviewer the benefits of walking or the high level of concern they have for their child's safety to perhaps tell the interviewer what they thought she wanted to hear or demonstrate that they are a good parent. Despite that in each town the social desirability seemed to vary from discussing health and the environment in Highland Park to discussing the safety and protection of students in Stanhope. This limitation is present in most qualitative in-person research and has also been found to be present in survey methods as well, though to a lesser extent with self-administered questionnaires (Phillips & Clancy, 1972; Sjöström & Holst, 2002). Despite this limitation, it was noted, and more in-depth information emerged than could be gathered using a self-administered survey to address the research questions.

Chapter Summary

Forty-eight student-parent pairs in three New Jersey communities participated in in-depth one-on-one interviews about their perceptions of their built and social environment regarding the trip to and from school, what informs these perceptions, and what changes they would like to see. Students in all three communities were more likely to be more optimistic about their environment with fewer overall fears and particularly, fewer fears of strangers. Students were more likely to recommend incentives or educational programs as ways to increase walking and bicycling in their communities, while parents typically suggested engineering or supervision suggestions. Both groups perceived differences in their mode decision for morning and afternoon travel and felt

more comfortable travelling with a cell phone. Policy and research implications, along with a comparison and synopsis of the two research methods, and avenues for future research will be discussed in Chapter 6.

CHAPTER 6. IMPLICATIONS, SYNERGIES, AND CONCLUSIONS

This research used two methodologies to examine how students perceive their built and social environment. The first method used a visual survey to elicit perceptions from 776 middle school students in Hudson County, New Jersey. Students rated the safety of seventeen photographs and then participated in in-class discussions where a better understanding of their perceptions and rationale for their ratings emerged (Chapter 4). The second method used in-depth in-person one-on-one interviews with 48 parents and students in three New Jersey communities to compare and contrast how parents and students' view their built and social environment, what informs these perceptions, and what improvements both parents and students desire (Chapter 5). This chapter will discuss the major themes of this research, the implications and policy recommendations, and avenues for future research to continue to examine how to improve safety and increase active travel.

Comparison of Major Themes

When comparing the findings from both methods, several common themes emerged. Students consistently discussed feeling safer walking in groups and parents agreed. Although a few parents in Stanhope were nervous about all female walking groups, these parents were in the minority. Students also discussed the importance of aesthetics to make walking feel safer in both the one-on-one interviews (in two towns) and the in-class discussions. Students in the one-on-one interviews in particular mentioned the importance of the maintenance of off-road pathways to keep them feeling "pretty" and not "creepy." The barrier of traffic was also consistent between the methods and also mentioned by parents, though less so in Stanhope. The majority of students and

parents proposed increasing the number and quality of sidewalks, crosswalks, speed bumps, and signs to give students a separate facility to walk on and to alert drivers of the presence of pedestrians in the road way and encourage them to slow down. Lastly, students saw adults, specifically, crossing guards and police, as contributing to their safety using both methods. Not only were adults or crossing guards seen as facilitating active travel by aiding in street crossing, but additionally, they were seen as aiding safety by being eyes on the street. Therefore, despite the difference in geographies and methodology, common themes were found.

Despite the common themes between the methods, some themes that emerged were specific to a single method, in part due to the questions asked. For example, no images of cell phones were found in the visual survey. However, cell phones were discussed in the one-on-one interviews. Parents felt cell phones may facilitate active travel by increasing the comfort level in allowing their child to walk or bicycle to or from school. In contrast, students may not be gaining as much independence by their parents watching them wirelessly or asking them to call in the beginning, sometimes middle, and end of their walk. Furthermore, students should be taught to be careful while using phones and walking, as distracted walking could become dangerous, particularly while crossing an intersection. However, the pros may outweigh the cons, as parents and students seem more comfortable walking with cell phones and therefore, cell phones seem to aid participation in active travel due to parents perceptions.

The one-on-one interviews also revealed that students were much more likely to state that their active travel concerns were from local or personal experience, while parents were more likely to state that the Internet, books, or the media informed their

concerns. Therefore, parents, particularly in Stanhope and Franklin, were much more likely to be concerned about abductions and sexual offenders than students. However, students in the one-on-one interviews also mentioned stranger danger with much greater frequency than those in the in-class discussions, where the concern of bullying, particular at Academy I in Jersey City, which is next to a high school was mentioned more frequently. In the one-on-one interviews students' view of the built and social environment was more optimistic than their parents. Although their perceptions may be too optimistic, students were more likely to report that knowing people along their route, knowing where to go if something happened, and having "eyes on the street" made them feel confident about being able to make their trip to or some school safely. This same "eyes on the street" concept also emerged in some of the in-class discussions, that students felt the images were safer where people could be seen. However, it was less frequently mentioned in the in-class discussions, perhaps due to the format of drawing justifications for safety ratings from photos. The theme of being near a school emerged in the in-class discussions, often for similar reasons, that it was a place where trusted adults were located, however, the safety of a school specifically did not emerge during the one-on-one interviews.

During the one-on-one interviews, parent participants commonly discussed the level of communication the school provided, particularly around safety or the lack thereof. Parents, particularly in Franklin, stated their dissatisfaction with not only the options they received to get their children to and from school, but also the level of communication. Although Franklin has a phone tree system for alerts, many parents described the system as "useless," as it didn't provide the information they most cared

about, such as safety. Parents primary complaint was the letter parents received two to three weeks prior to the start of school indicating their child would not be bused. In contrast to Franklin, parents in Highland Park were satisfied with the communication the school provided through the school's parent portal online. Parents in Stanhope felt the e-blasts provided by the school were "almost overwhelming" involving many "alerts," that were often unnecessary and few discussed travel to or from school or safety, areas that parents expressed information in receiving. Most parents also perceived that they was not enough information on the school website about getting to and from school safely, and in Franklin, several parents specifically commented that they weren't sure if facilities were available for bicyclists. The visual survey was not able to address parents concerns, nor ask students about barriers outside safety.

The one-on-one interviews were also able to reveal three additional themes that the in-class discussions could not due to the scope of the research questions and the timing allotted. Students and parents alike discussed the benefits of active travel from a physical activity, environment, and sometimes convenience or independence perspective. Although overall each of the interviewees varied on whether these benefits outweighed active travel's perceived risks, at least one of these benefits emerged in every interview. Parents in Stanhope primarily did not feel the benefits of active travel outweighed the risks, while those in Highland Park primarily did, demonstrating the importance of examining these issues in context and making specific recommendations based on the local views and concerns of stakeholders.

Parents and students also consistently discussed the difference between the morning trip to school, where students had to arrive at a certain time or face academic

consequences, and the trip home from school, which often had fewer timing constraints. This difference has previously been lost in quantitative work. Due to school's early morning start time; several parents and students' reflected that they would prefer the benefits that can be gained from additional time sleeping instead of those associated with active travel. This may be of particular importance when interventions to increase active travel are designed.

Lastly, parents and students were asked if and how they thought they could improve safety and increase active travel in their communities. The majority of students in all three municipalities sought incentives such as coupons, stickers, pencils, and small monetary awards or "fun" interactive assemblies to help teach them about the benefits. In contrast, parents more commonly sought enforcement and engineering solutions such as increased police presence with more ticketing, and more crosswalks, sidewalks, and speed bumps. Students in the in-class discussion more commonly sought out enforcement or engineering solutions as they were asked how they would enhance the safety in the photo opposed to what they would propose doing to enhance safety and active travel overall. Thus, the variation in the question and method likely explains the differences in students' responses.

Methods Synergy

The two methods in this research, the visual survey coupled with in-class discussions and the one-on-one interviews, could be better combined in the future to examine the same community to enhance synergies. Additionally, since the visual survey method specifically was targeting perceptions of safety, the one-on-one interview guide could be altered to provide questions more focused on safety, instead of perceptions of

the built and social environment more broadly. Although this research benefitted from the wider angle of the current interview instrument, future research with these two methods done in conjunction may benefit from a more similar scope. By selecting several communities to conduct both methods, we could more deeply understand the variation in parent and student perceptions, while simultaneously gaining information from many students about their specific safety concerns. Since this study demonstrated, in part, the importance of understanding local and contextual elements that may vary when considering implementing interventions to increase active travel, these methods that seek to reveal contextual elements may be useful to continue to use in the future. Additionally, by tailoring the one-on-one interview focus, the most important issues around safety may emerge. Although each method is useful on its own to answer questions about both safety and built and social environment perceptions, combining the methods will allow for greater data triangulation and the ability to compare communities in the future with the ultimate goal of increasing safety and rates of active travel.

School/Municipal Policy Recommendations

These findings have implications for schools and school administrators in similar municipalities seeking to improve safety and promote active travel. Some of the findings can be translated into policies and practical steps and used to promote active travel in schools with similar characteristics.

More adults. Given the perception that adults may contribute to safety, and the qualitative importance of crossing guards, an increase in use of crossing guards may be a valuable policy option for municipalities and districts to improve safety. Since the finding of the visual survey demonstrate, though weakly, that students already perceive being

near their own school as safe, placement of crossing guards in neighboring blocks could expand the area where they felt safe and thus, promote walking to school. The presence of crossing guards not only allows children to more easily cross roads with both high volumes and high-speed traffic, but also helps students feel safer from crime and bullying. Schools could also assign security guards or teachers to consistently stand outside before and after school to improve safety perceptions, and thus promote active travel. Historically, older students were assigned to tasks as informal crossing guards, and this policy option could be examined in the future as well.

In addition to crossing guards, students perceived other adults as also contributing to their safety. Schools can create "Corner Captain" programs where parent or community volunteers stand at designated intersections to supervise and assist with traffic, increasing the number of adults en route and further enhancing students' perceptions of safety. Schools and municipalities can also teach young students to identify safe areas that they could go if there were a problem, such as a library or certain local businesses in addition to the more well-identified police and fire stations where trusted adults are likely to be in case of a problem.

Marketing and incentives. Some students mentioned that "coolness" influenced their helmet use and safe on-street behavior. Students, especially older students, admitted to not wearing helmets despite the knowledge of proper helmet use, because many perceived the use of protective gear not to be "cool." A statewide or national campaign may be best able to address this issue with celebrities and athletes encouraging helmet use. However, schools or municipalities may also be able to undertake educational, marketing approaches and incentives that market safe behavior as "cool" to guide

children to adopt safe behavior. In some municipalities in New Jersey, crossing guards, security guards, and police distribute prizes to randomly selected children for wearing helmets and exhibiting safe on-street behaviors. More schools and municipalities can emulate this approach. Students indicated that the coolness of the prize, commonly a coupon for a free small frozen yogurt or ice cream, stickers, temporary tattoos, bubbles, and inexpensive DVDs (from the dollar store), outweighed the negative feelings about helmet use and incentivized safe on-street behavior. Additionally, some schools and municipalities have had success in increased helmet use after children attend an after-school helmet decorating class. Some communities have also had success bringing in professional or semi-professional bicyclists, such as BMX cyclists, and having them both discuss and demonstrate the importance of wearing helmets and safe-riding skills. Police may also be seen as "cool" enough to encourage helmet use, particularly for middle school boys. Expansion of such programs with a focus on marketing safety could motivate more children to wear helmets and use safe on-street behaviors.

In the one-on-one interviews, students commonly proposed incentives for more than just encouraging helmet use, but also for more generally encouraging active travel to school. Students who perceived that incentives would be most effective, often coupled these ideas with an in-school lesson, while others discussed specifically what cool or useful incentives were, such as being entered into a raffle, stickers, or small gift cards or coupons to fun local businesses that students already frequent. Students who suggested educational activities were unanimous that the programs should be "fun" and "interactive." Most suggested something dramatic either scary, funny, or sad to make an

impact and many wanted an in-school demonstration or skit, in addition to a video or something they could view again.

Incentives have been shown to have large influences with children in other areas of research, particularly with healthy food consumption (List & Samek, 2015). In an experimental design on food choice with over 1,600 students, List and Samek (2015) found that while incentives were successful in increasing healthy food choice, educational messaging alone had little influence. However, they also found that the combination of incentives and education provided an important influence, greater than either intervention alone. The effects of the education and inventive program also lasted beyond the treatment period, which the authors attribute to habit formation. The findings, that students are interested and motivated by incentives and educational resources to change behavior, coupled with these recent food choice findings, suggest that programs should emphasize education and encouragement through incentives together with education to increase active travel and safe travel behaviors and perhaps move away from interventions that only have an student educational component.

Educating parents, in conjunction with student education and incentives, may also be a valuable endeavor. Although parents were aware of that walking or bicycling provided a health benefit, it was unclear if parents were aware how beneficial moderate physical activity is. Parents commonly began discussing more vigorous physical activity as why they were satisfied with the level of physical activity their child received, only attributing a small portion of their child's overall physical activity to the walk to and from school. Although the walk may be short, the US children's physical activity guidelines recommend an hour of physical activity per day in ten-minute bouts in either

moderate of vigorous form (U.S. Department of Health and Human Services, 2008). Thus, if the child's walk to school is ten minutes, that's one third of the daily-recommended physical activity on each of the five-week days before other activities are considered. Additionally, some activities that were mentioned as vigorous, such as "an hour soccer practice," may not involve physical activity for the entire hour. Thus, walking to and from school should not be overlooked because children "get enough" physical activity from other activities and walking "doesn't do much." Schools and municipalities looking to promote active travel can send parents information about the specific and perhaps also lesser known benefits active travel has been shown to have in addition with posting these benefits to their website, preferably in conjunction with student education and incentives. Additional education, and statistics if possible, of the rarity of kidnappings and stranger danger could be folded into this information provided to parents.

Walk-pools. Students and parents both perceived travelling in a group to be desirable and enhanced safety. While some children already walk to school in a group, many students indicated that they walked alone and would prefer not to do so. In the beginning of each school year, schools should consider forming "walk-pools" so that children could walk together with other students living in the same area. Schools could also designate "meet-up" locations, similar to walking school bus stops that are used with younger children so that students could take at least part of their trip to or from school with other students living nearby. These locations could be named by students and maps with the locations and common routes could be sent home and placed on the school website as an inexpensive way for schools to encourage safe, group active travel. The school could also

suggest a departure time from each location to help parents and students understand how long a walking trip might be and to encourage students to arrive on time. Based on students' comments during the in-class discussion and one-on-one interviews, some students desired to walk in a group and would be willing to walk a block out of the way for company, if meet-up locations and routes were known. As student populations change, the meet-up locations should be revised as needed.

Prioritize maintenance in school zones. Students perceived walking in a crosswalk or near street signs or markings to also enhance their safety. Therefore, municipalities should prioritize maintenance in school zones. This can be achieved by re-painting crosswalks, placing signs indicating a school zone, and painting "school zone" on the ground to enhance students' and motorists' visibility of crosswalks and the likelihood of children crossing. Nicely painted and well-maintained built environment features may also enhance students' perceptions of cleanliness and upkeep, leading to better-perceived safety through an aesthetically pleasing environment. Lastly, school ground aesthetics could also be prioritized, as a clean and well-maintained property may enhance more than beauty, and add to students' perceptions of safety.

Walk from School Day. Given the variation in perceptions between morning and afternoon travel mode, schools and municipalities seeking to encourage the number of students using active travel may want to consider hosting both "Walk to School" and "Walk from School" days. Walk to School days are common. The first Wednesday in October is identified as Walk or Bike to School Day and thousands of schools in all 50 states and 40 countries participate (National Center for Safe Routes to School, 2014b). However, Walk from School days are rare, perhaps because schools can better facilitate

getting all students to the same location and the traffic may be more concerning during morning rush hour. However, many of the benefits associated with active travel, such as physical activity and reduced traffic and emissions can be achieved by encouraging walking to or from school. Encouraging active travel both to and from school and hosting events in both directions allows for more opportunities for involvement. Since parents and students perceive walking from school to be the easier, less stressful, and more fun option, specifically encouraging walking home as also beneficial may increase overall active travel participation. Walking home from school may also be able to serve as a catalyst to also encourage walking to school, for students to find walking companions, and can act as an additional opportunity to help students form beneficial travel habits into the future.

Lastly, in addition to Walk from School days as a way to encourage students to participate in active travel, schools could push back start times. In addition to the potential increase in active travel and the associated benefits, studies show that postponing school morning start time allows students to get more sleep without delaying evening bed times, leading to improved attendance, fewer tardies, less sleeping in school, and less-student reported depression (Wahistrom, 2002; Wolfson et al., 2007). Although students and parents may still opt for the additional sleep, and the concern of lateness would still exist, delayed start times could encourage some additional active travel.

Technology. School districts and municipalities that want to build on the confidence parents have in technology such as cell phones to increase active travel and may also consider technology programs, such as Boltage, which uses RFID chips and wirelessly transmits information such as distance walked and trips made (KidCommute Inc, 2014).

The information can also be used by parents to ensure their child has arrived at school safely. Although some districts have had success with this system, it is expensive (approximately $5000 with $1000 annual maintenance fee) and requires additional support in the form of encouragement and incentives to achieve optimal results. However, given parents increased comfort level with cell phones, schools and municipalities may be able to utilize technology to further encourage parents and students to participate in active travel and reduce fears.

School communication. Lastly, schools should make travel information available on their website, clearly outlining, busing, walking, and bicycling policies, in addition to if and where bicycle racks are located. These procedures could also be sent home in the letters outlining dismissal times and procedures. Additionally, to address parents' complaints about the level of communication, at the beginning of the year, schools could send a survey to parents asking what information they would most like to receive. While some important information could be sent to all parents, other information parents could opt in or out of. Parents of walkers or bicyclists may have different information they find important than those who take the bus or get picked up. This may help parents to receive information that they find relevant and are more likely to read. By clarifying walking and bicycling procedures along with emphasizing safety, parents and students are likely to become more informed and perhaps, thus, more likely to use active travel. Additional information about the benefits of active travel, along with parent and student frequently asked questions, and maps of the school district with information on neighborhoods that do not have access to school busing could also be found on the website to help to create a more informed parent population.

Safe Routes to School Policy and Practice Implications

In addition to lessons for school and municipal policies and practice, this research has implications for improving Safe Routes to School policies and practices statewide and nationally. The National Center for Safe Routes to School currently recommends four approaches incorporating four of the five "E's:" encouragement, education, engineering, and enforcement to increase active travel to and from school. Most of this information is disseminated through their website, which indicates that although the E's can be used alone, the most successful programs incorporate all four and includes a current toolkit with ways to increase active travel in communities. Although Safe Routes to School emphasizes the importance of the E's, the current toolkit is not actually organized around these four themes and was last updated in 2002. Aside from reorganizing their website to make finding relevant materials more quickly and easily, (which would be immensely helpful), I recommend an update of the toolkit to reflect some of this study's findings.

First, all counts, surveys, and tallies of mode choice to and from school should separate morning and afternoon trips, given the amount of variation that may exist. Although some forms request counts of both information, some only ask about the trip to school in the morning, which likely underestimates the number of students using active travel. Although classroom teachers are commonly asked to do these counts, despite the fact that they report having limited classroom time to do them, if possible, it would be beneficial to randomly select several students and ask them why they used the mode they did to get to school that morning or home the previous afternoon to continue data collection in context with rationale for mode choices. Although ongoing counts

throughout the year are important, this activity could perhaps be emphasized during last few weeks of the year when classroom time is more flexible. Furthermore, Safe Route to School could include a Walk from School Day as an event to encourage active travel on both the morning and afternoon trips.

As part of the toolkit, the National Center for Safe Route to School website provides some worksheets on classroom activities to teach students about active travel. While the lessons provided are educational, many of them could work in a data collection component to better understand how many students use active travel, how students perceive the mode they use, and improvements students would like to see to increase active travel. At least one tally session could be incorporated with a classroom lesson about active travel and safety. Thus, the lesson can serve a dual purpose of educating students and collecting data or conducting program evaluation. Several of the educational program worksheets also have an encouragement component, however, more emphasis should be placed on ensuring the vast majority if not all educational components also use encouragement and incentives together. This research showed the desire for students to be incentivized to use active travel and past research has demonstrated the increased impact of using education and incentives together for a greater impact (List & Samek, 2015).

The audience the toolkit is geared to, particularly the lesson plan component, could be expanded. The current lesson plans assume those reading it have access to schools or are classroom teachers themselves. Although this may be some of the audience, there may be researchers trying to access schools, or other student group leaders interested in Safe Routes to School lesson plans. Thus, reviewing the more

flexible end of year timing for lessons, and the importance of an interactive lesson plan that emphasizes critical thinking and asks students about their personal experiences may be important to gain access and engage students in the classroom. The lesson plan in this research emphasized careers in planning and the importance of safety, which administrators seemed to value more than simply teaching about bicycling and walking to school. Thus, although discussing bicycling and walking is important, there may be various "hooks," which grant school access, which can then be ideally coupled with data collection and incentives.

The National Center for Safe Routes to School website instructs communities to "use research data, innovation, and imagination to develop a program that best suits your school and community (National Center for Safe Routes to School, 2014a)," without providing much guidance on what research data to use or what research methods to undertake. Thus, both more clearly summarizing findings from previous research in communities and proposing what research might be appropriate for communities to undertake might be helpful when consider designing interventions and should be added to their website. Building upon the success of this doctoral work in speaking directly with students and parents about their perceptions of the built and social environment, I recommend adding a "possible research design" section to this website. This section could summarize the use of the one-on-one interviews, provide example questions or a protocol, and explain the use of the visual survey and its use in classrooms, along with other methods, such as focus groups. The section could then explain which methods might work best to address different questions before designing and implementing an intervention. As this study demonstrates in part, similar communities may have different

contexts from which different perceptions arise. These perceptions may be an important factor to the success of interventions to increase active travel. Thus, providing guidance on how to examine these perceptions, even through small community-based research studies, would be worthwhile information to those seeking to increase active travel rates.

In addition to providing information on research methods on the website, both national and statewide Safe Route to School funding applications could give extra points to communities who engaged in research, even simply those that conducted several student and parent one-on-one interviews, or used a visual survey to better understand student perceptions of their built and social environment and what changes community members see as important. Additional points could also be awarded to those programs that get students themselves involved in the planning process, as this doctoral work has demonstrated that students are knowledgeable of their own communities and were engaged discussing possible improvements. Encouraging student participation may not only increase engagement in events and programs, but also may make students more aware of the importance of active travel, and empower students to seek changes in the future.

Lastly, when evaluating Safe Routes to School programs and events, students' perceptions should be considered. Most evaluation tools are surveys and many are sent home for parents to fill out. By only using surveys, it is more difficult to understand the why behind participation. By surveying only parents, students' thoughts and perceptions are overlooked, despite being the target of interventions. By holding several (even short) one-on-one interviews with students as part of the evaluation process to determine why they participated in the event, what they thought could be improved in future years, or

how and why they were using the new infrastructure, additional information could be gained. This information could help continually improve events and programs in the future with the goal of increasing participation and keeping events and programs relevant to students. Lastly, evaluations of events tend to only be done with participants. Programs and events should aim to collect at least some data from the students and parents who do not participate to determine why. Why students do not participate in Safe Routes to School events may be of equal or greater importance when trying to increase active travel rates. By finding out what prevented participation, programs and events may be able to be designed differently to further increase participation in the future.

The National Center for Safe Routes to School along with state centers provide valuable information to municipalities, teachers, and parents about the importance of increasing active travel in communities. However, by viewing the walk to and from school as separate trips, enhancing proposed classroom lessons to include data collection and incentives, incorporating information on research methods and then rewarding communities' funding applications that include research components, including the student perspective in intervention design, funding applications, and evaluation, and seeking to understand both why parents and students participate and do not participate in events, better information can be collected and disseminated about Safe Routes to School with the ultimate goal of increasing active travel rates and health and safety in communities.

Data Collection and Methods Lessons

This doctoral work's design also has implications for data collection from students. Since access to students is difficult to obtain and data hard to collect, in part due

to the increasing limitations on flexibility in classroom time, researchers should plan data collection around classroom lessons to benefit students. In this work, principals and teachers were pleased with the methods used as they encouraged students to think critically and justify responses. Each principal attended at least one lesson and praised the education provided due to both the content on safety and the photo survey method coupled with discussions, which captured students' interests. In-class discussions were seen as learning opportunities, not simply data collection.

Qualitative methods with students and parents should be seen as a useful tool to gather built and social environment perceptions and should also be used in evaluation processes of interventions in the future as they provide additional depth, rationale, and context, on which the design and use of interventions may depend. Students specifically were more than capable of describing their perceptions of safety and brainstorming potential improvements and should be directly asked questions in the future, particularly since many interventions are targeted at students. Although one-on-one interviews allowed more in-depth information on students' perceptions to emerge, the use of focus groups for students to collaborate and for researchers to determine the most salient improvements and interventions may also be useful in the future.

Limitations and Future Research

Future research should continue to explore students' perceptions of safety. However, examining all students in a single school, district, or community may further enhance the usefulness of the findings for specific schools or school districts. By doing so, photographs and interview questions could be tailored to the specific community and perceptions of specific intersections and locations could be examined and discussed in

further depth. The creation and selection of photographs is an important part of this research and deeper understanding about perceptions may be derived from students ranking locations of greater familiarity to them. However, more familiar locations may also be biased by familiarity of the locations or memories of events in the locations. Thus, the selection of photographs should be planned carefully considering what they depict, where they are taken, and potential biases. They should also be selected with possible analytic procedures in mind.

In contrast, the visual survey method could also be applied to a larger number of more diverse schools to improve generalizability, particularly if schools were systematically or randomly selected to draw more reliable inferences about differences across communities. However, due to school's limited available time, even at the end of the year, strong relationships would need to be formed with the administrators and teachers to gain enough classroom time and likely, not all randomly selected schools would be willing and able to accommodate the time required. Municipalities that are seeking to make safety improvements or applying for Safe Routes to School grants could be targeted both for the visual survey and for one-on-one interviews and reports could also be provided to the municipalities and schools to aid in program and intervention creation. This research has demonstrated, in part, the importance of context when considering possible interventions. Although the communities of Highland Park and Stanhope may seem somewhat similar, the perceptions, particularly of parents in these communities varied substantially. Thus, future research should continue to examine local perceptions that may drive the rationale for a particular mode choice when considering possible interventions, as some interventions will address particular concerns better than

others. Interventions can and should be targeted to community concerns and these concerns may best be discovered through qualitative methods.

Additionally, future research in specific communities could also entail objective built and social environment data collection, such as crash and crime data along with possible data on vehicle speeds. This research could then compare parent and student perceptions to these local objective measures. Future research should also consider continuing to embed data collection in lesson plans to benefit students, particularly near the end of the school year after testing, where flexibility in classroom time is greater. Even without examining one district in-depth, collecting objective data, or conducting random sampling, this work shows the importance and variation of perceptions among communities, the differences in parents and students perceptions, and begins to identify perceptions that may be able to be used to design interventions to improve health and safety.

The use of qualitative methods with students and parents also has implications for future research. The vast majority of students were engaged and very willing to express their perceptions about the built environment and the trip to and from school. Students' brainstormed potential solutions to areas of concern on their trip, in addition to ways to encourage more students to use active travel and walk and bicycle safely. Qualitative methods should be seen as a feasible option with students given the familiar topic area of how they travel locally. No students younger than the sixth grade were interviewed, though given the level of detail the majority of sixth graders provided, students slightly younger are also likely to provide sufficient detail about their perceptions. Therefore, a combination of these methods should be considered in future research, perhaps in the

same community to more deeply understand specific concerns, address problems, and be able to compare communities' perceptions and active travel in the future. As we can see here the perceptions and concerns of parents and students in Highland Park vary greatly from those in Stanhope and variation exists among students and parents as well. Therefore, incorporating student perceptions in future work with the goal of understanding local community perceptions and in turn using these perceptions to design and implement specific interventions may make interventions more successful at increasing active travel rates in the future.

Conclusion

Students were consistently knowledgeable and engaged about their own safety concerns. Students seemed to appreciate and want their opinions to be heard. Furthermore, the majority of students enthusiastically brainstormed and described "potential solutions" to improve the built and social environment and their communities in both the in-class discussions and the one-on-one interviews, and may become more empowered to make changes by engaging in participatory research. Student's perceptions of the built and social environment were more optimistic than their parents. Students were more likely to state their perceptions of the built and social environment were based on local incidents combined with personal experience and knowledge than from the media. Students also had more varied and creative ideas to encourage students to participate in active travel through incentives and engage in safe behaviors.

Qualitative methods should be embraced as a feasible methodological approach to more deeply understand students' perceptions and should continue to be used in future research with youth. This is consistent with the findings of the limited qualitative prior

work with middle school children in this area. The authors of another mixed methods study stated, “when given a chance, children are more than capable of forming and expressing their thoughts about the issues pertaining to the planning and design of their everyday surroundings” (Banerjee et al., 2014, p. 136). Combining these methods with visual surveys or perhaps more traditional surveys for adults would help further triangulate findings and serve as a catalyst for discourse and learning, and should be considered when studying students’ perceptions in the future. By speaking with students directly, having them describe their experiences and perceptions, and seeking to understand location variation in perceptions, we can better understand how to make improvements to both increase the use of active travel and improve safety in communities.

APPENDICES

Appendix A Visual Survey Instrument

Careers in Planning

On a scale of 1 to 5, with 1 being UNSAFE and 5 being SAFE, answer the following questions by circling the number that best describes what you think

Image 1.

How safe would you feel in this setting?

 1 2 3 4 5 

Image 2.

How safe are these bicyclists?

 1 2 3 4 5 

Image 3.

How safe would you feel in this setting?

 1 2 3 4 5 

Image 4.

How safe is this child?

 1 2 3 4 5 

Image 5.

How safe would you feel in this setting?

 1 2 3 4 5 

Image 6.

How safe are these bicyclists?

1 2 3 4 5

Image 7.

How safe would you feel in this setting?

1 2 3 4 5

Image 8.

How safe would you feel in this setting?

1 2 3 4 5

Image 9.

How safe would you feel in this setting?

1 2 3 4 5

Image 10.

How safe would you feel in this setting?

1 2 3 4 5

Image 11.

How safe would you feel in this setting?

1 2 3 4 5

Image 12.

How safe is this setting?

1 2 3 4 5

Image 13.

How safe would you feel in this setting?

1 2 3 4 5

Image 14.

How safe would you feel in this setting?

1 2 3 4 5

Image 15.

How safe are these bicyclists?

1 2 3 4 5

Image 16.

How safe would you feel in this setting?

 1 2 3 4 5 

Image 17.

How safe would you feel in this setting?

 1 2 3 4 5 

18.) What is your gender?

- ❍ Male
- ❍ Female

19.) What is your age? _____ years

20.) Are you of Hispanic, latino or Spanish origin?

- ❍ No, not of Hispanic, latino or Spanish origin
- ❍ Yes, of Hispanic, latino or Spanish origin

21.) What is your race? (choose ONE)

- ❍ White
- ❍ African American
- ❍ American Indian or Alaska Native
- ❍ Asian
- ❍ Mixed

22.) What is the primary way you get to school? (choose ONE)

- ❍ School bus
- ❍ Family Vehicle (only children in your family)
- ❍ Carpool (with children from another family)
- ❍ Public Transit
- ❍ Walk
- ❍ Bicycle
- ❍ Other, please list _____

Appendix B Protocol for One-on-One Interviews

Protocol for Parent Interviews

Thank you for agreeing to be interviewed. Before we begin I'd just like to go over the informed consent with you and give you the opportunity to ask any questions. This will remain confidential and you are not obliged to answer any of questions for any reason.

I'll just start with a **few basic questions**:
1.) How far is your child's school from your house? (check on google maps)
2.) What grade is your child/children in? (If multiple children meet selection criteria, interviewee will be directed to discuss both, but child who is interviewed will be the child with the first name alphabetically first).

I'd like to hear about the street that you live on. Could you tell me what it is like?

What do you like about your town/neighborhood? Why? Don't like? Why do you live here?
Probe: size, street network, shopping, accessibility, school district, friendliness, crime, location, near transit/highways

Where did you grow up? Was your community growing up different than the one you live in now? If so, how?
How did you typically get to and from school at their age? **Why?**
Probe: What kind of neighborhood did you grow up in?

<u>Now I'm going to ask you some questions about how your child's trip TO school:</u>
How does your child typically get to school? **Why was this mode selected? How?**
Do they go with other children or adults? **Who goes with them**? Why?

When did your child begin using this form? Has it changed over time? If so, why? (what form of travel did they use at a previous school? Do you have other children, what modes do they use, why?)
If child doesn't walk/bicycle: Is there an **age** at which your children might bike or walk to get to and from school? Why?
(probe: is it about age or other personal attributes?)
Does your child **own** a bicycle?

Why was this mode selected over other possible options? (walking, biking, car)

How many days of the week do they use this mode? (what is typical?)
Followup: Do they ever use other modes of travel? If so, **why?**
(probe: weather, projects, schedule changes)
Do you know **the route** your child takes to go to school? How was it determined/who selected it? Is it the same going to and from school?
(probe: test run?)

If they walk, are there sidewalks the whole way? If they bicycle do they bicycle in the road?
Is someone here in the morning to "send them off" to school?

Now I'm going to ask you some questions about how your child's trip FROM school:
How does your child typically get home from school? **Why?**
How many days of the week do they use this mode? (what is typical?)
Followup: Do they ever use other modes of travel? If so, **why?**
(probe: weather, projects, schedule changes, after school activities)
Are there any **rules** that were discussed/put in place to allow your child to use this mode? If so, what are they? How were they decided/presented?
Is your child allowed to **make stops** on the way home from school? If so where?
Is someone **here in the afternoon** when they arrive home from school? (Does this influence mode choice?)

How **do you feel** about how your child gets to and from school?
(If multiple modes do you/them prefer one to the other)
Do you feel any **pressure** to select a particular mode? If so what mode and why? Where is the pressure coming from?
Are there any **particular conditions that prevent** you from allowing your child to walk or bicycle? If so what?

How satisfied are you with **the level of physical activity** your child gets?
Probe: How do they get their physical activity?

Suppose I was with your child on their walk/bike to school, what would I see?
Experience? What is the trip like? What are the intersections like?
How long would it take?

What if we drove, what would I see? Experience?
How long would it take?

Could you describe the **traffic** around your child's school in the morning? What do you see? What about the afternoon? Which is worse traffic-wise? Does this impact what you choose? Why or why not?

What are the **advantages** to walking? **Disadvantages**?
What are the advantages to bicycling? Disadvantages?
What are the advantages to driving? Disadvantages?
What are the advantages to taking the bus? Disadvantages?

What are your biggest **concerns** surrounding walking (if any)? **Why?**
What is the biggest concern?
What are your biggest concerns surrounding bicycling (if any)? Why?
What are your biggest concerns surrounding driving (if any)? Why?
What are your biggest concerns surrounding the bus (if any)? Why?

Probe: Are these concerns from a personal experience?

Have there been any **experiences/incidents in your town** that have shaped your view around walking or bicycling? If so, could you describe it/them?

How **does your child feel about the mode they use?**
Probe: do they complain? Did they ask to use this? How do most of their friends get to/from school?
How does your child view biking to school?
How does your child view walking to school?
If they don't walk or bicycle, **do you think they would like to**? Why or why not?
Does your **child have any concerns** about going to and from school? If so, what?
Does your child own a **cell phone?** Do they have to use it at certain times?
Does your child perceive a certain mode of travel to be **cooler?**

What, if anything, does your child's **school to promote** walking or bicycling?
Your neighbors/neighborhood? What do you think of these efforts?

More broadly, how do you feel walking is viewed in your community?
How do you feel bicycling is viewed in your community?
Probe: Is it common? If yes, why? If not, why do you think not?

What if anything, do you think could be done to **increase the number of children walking** or bicycling in your neighborhood? Or to make you feel most comfortable about walking or bicycling?
Anything the **town** could do? Or the school?
Anything specific that could be done to increase the frequency that your child walks or bicycles?
Probe: sidewalks, crossing guards, traffic calming, safety, lighting, snow removal

Are there any **crossing guards** on your child's trip? Do these influence your decision or would they change your decision? What about **snow removal?**

What way to get your child to and from school would you recommend to others in your neighborhood? Why?

Do you have any other comments you'd like to include or something you feel I've missed about this topic?

Do you know anyone else who might be interested in participating in an interview who has a child at your school?

Thank you again so much for your time. I really appreciate it! If you know someone else who might be interested in participating, please let me know.

Protocol for Student Interviews

Thank you for agreeing to be interviewed. Your parent already gave me permission to talk to you, but I'd like your permission too. No one will know you're in my study and you don't have to answer any question you don't want to. There are no wrong answers, I just want to know what you think.

I'll just start with a **few basic questions**:
1.) How far is your school from your house? (check on google maps)
2.) What grade are you in?

Do you like your neighborhood, why or why not?
What about it do you like? Don't like?

<u>Now I'm going to ask you some questions about how your trip TO school:</u>
How do you typically get to school? **Why?**
Do you go with other children or adults? Why?

When did you start using this form? Has it changed over time? If so, why? (what form of travel did you use at a previous school?)
Are there any attributes/characteristics that you think your parents think you have to let you walk/bicycle?
If no walk/bike: Do you think your parents will let you walk or bike at some age? What age?

Why do you think you get to school this way?

How many days of the week do you use this mode? (what is typical?)
Followup: Do you ever use other modes of travel? If so, **why?**
(probe: weather, projects, schedule changes)
Could you tell me the roads you use to get to school or your route? How was it determined? Is it the same going to and from school?
Is someone here in the morning to "send you off" to school?
(probe: test run?)

Now I'm going to ask you some questions about how your trip FROM school:
How do you typically get home from school? **Why?**
How many days of the week do you use this mode? (what is typical?)
Followup: Do you ever use other modes of travel? If so, **why?**
(probe: weather, projects, schedule changes)
Are you allowed to **make stops** on the way home from school? If so where?
Are there any **rules** that were discussed/put in for you to use this mode? If so, what are they? How were they decided/presented?
Is someone **here in the afternoon** when you arrive home from school?

Are there any conditions when you use a different mode?
(probe: weather, before/after school activities, projects)

Could you describe the **traffic** around your school in the morning? What do you see?
What about the afternoon? Which is worse traffic-wise? Why do you think this is?

What are the **advantages** to walking? **Disadvantages**?
What are the advantages to bicycling? Disadvantages?
What are the advantages to driving? Disadvantages?
What are the advantages to taking the bus? Disadvantages?

What are your biggest **concerns** surrounding walking (if any)? **Why?**
What is your biggest concern?
What are your biggest concerns surrounding bicycling (if any)? Why?
What are your biggest concerns surrounding driving (if any)? Why?
What are your biggest concerns surrounding the bus (if any)? Why?

Why do you think you get to and from school the way you do?
What advantages and concerns do you think your parents have with you using this mode?

Could you describe what you see/experience on your trip to and from school?

Have there been any **experiences/incidents in your town** that have shaped your view around walking or bicycling? If so, could you describe it/them?

Do you like the mode you use?
What mode would you like more?
What mode would you not like?
Is there one mode that is cooler than the others? Less cool?

Do you have a cell phone? When do you use it?

What, if anything, does your **school do to promote** walking or bicycling?
Your neighbors/neighborhood? What do you think of these efforts?

What, if anything, do you think could be done to **increase the number of children walking** or bicycling in your neighborhood? What would make you feel more comfortable walking or bicycling?
Anything the **town** could do? Or the school?
Anything specific that could be done to increase the frequency that you walk or bicycle?
Probe: sidewalks, crossing guards, traffic calming, safety, lighting, snow removal

Are there any **crossing guards** on your trip? Are they helpful?
If they walk, are there sidewalks the whole way? Are they clear of snow in winter?

If a new middle schooler moved in on your street, how would you recommend they get to school? Why?

Thank you again so much for your time. I really appreciate it!

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