Active school travel in Fleetwood, Surrey, BC, Canada

by

Jordan Magtoto

B.A., Simon Fraser University, 2009

Research Project Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Urban Studies

in the
Urban Studies Program
Faculty of Arts and Social Sciences

SIMON FRASER UNIVERSITY

Summer 2016

Approval

Name:	**Jordan Magtoto**
Degree:	**Master of Urban Studies**
Title:	***Active school travel in Fleetwood, Surrey, BC, Canada***
Examining Committee:	**Chair:** Patrick J. Smith Professor Urban Studies Program and Department of Political Science
	Peter V. Hall Senior Supervisor Professor Urban Studies Program
	Anthony Perl Supervisor Professor Urban Studies Program and Department of Political Science
	Meghan Winters External Examiner Assistant Professor Faculty of Health Sciences
Date Defended/Approved:	July 26, 2016

Abstract

Objective: Understand what factors motivate caregivers'/parents' decisions of how their children travel to and from school so that policy can be designed to increase Active School Travel (AST).

Methods: Follow-up surveys were distributed to five schools in the 2013-2014 school year, and again to three schools in 2014-2015 (22.0% and 40.6% effective response rates). Binomial logistic regression models determined the influence of household variables on caregiver/parental decisions of children's mode of travel to and from school.

Results: Models identified significant effects of accompaniment, distance from home to school, language spoken at home, and perception of neighbourhood safety. Interaction models also identified first-level effects.

Conclusions: Caregivers agreed that neighbourhoods were safe, but STP did not increase from AST because STP failed to address moderating attitudinal factors. Interdepartmental/agency coordination with focus on addressing mediating and moderating factors of AST should increase AST.

Keywords: Active School Travel; AST; School Travel Planning; STP; Fleetwood; Surrey

Acknowledgements

First and foremost, Dr. Peter Hall, please accept my gratitude for challenging me to think harder, encouragement when I struggled, and your patient guidance through this. You were instrumental in my success in the program and in this thesis. I will miss working with you.

To my examining committee, thank you for your thoughtful questions and comments. This thesis is stronger because of your help.

To City of Surrey staff, especially Megan Fitzgerald and Kristen Tiede, thank you for making STP data and reports available for my use, and for inspiring this research.

To my classmates, thank you for inspiring me to rise to your level. To Stephanie Allen, thank you for reminding me to ask the questions that nobody wants to acknowledge matter the most. To Linda Gillan, thank you for reminding me to always remain humble.

To all of my family, love and thanks. I am no more intelligent than any of you; if I can do this, then you can too.

To my partner, my inspiration, Joanne Magtoto, without you this would not have been possible. Thank you for encouraging me to keep my head in the clouds *while* grappling with my privilege. You are my favourite.

Table of Contents

Approval ... ii
Abstract ... iii
Acknowledgements ... iv
Table of Contents ... v
List of Tables ... vii
List of Figures ... viii
List of Acronyms and Glossary ... ix

Chapter 1. Introduction ... 1

Chapter 2. Research Question ... 3

Chapter 3. Context ... 6
3.1. History of School Travel Planning ... 6
3.2. History of Development in Fleetwood, Surrey ... 7
3.3. Surrey School District 36 ... 10
3.4. Surrey School Travel Planning - Process ... 13
3.5. The Current State of School Travel Planning ... 18

Chapter 4. Literature Review ... 19
4.1. Public Health ... 20
4.1.1. Childhood Obesity Trends ... 20
4.1.2. Benefits of Active School Travel ... 21
4.2. Children's Behaviour and Caregivers ... 22
4.2.1. Decision Modeling ... 22
4.2.2. Influence of Caregiver Demographics ... 23
4.2.3. Influence of Caregiver Perceptions ... 25
4.3. Urban Form ... 27
4.3.1. Neighbourhood and Community ... 28
4.3.2. Relevant Measurements ... 29
4.4. Conceptual Framework ... 32

Chapter 5. Methodology ... 35
5.1. Background ... 35
5.2. Survey Data ... 36
5.3. Binomial Logistic Regression ... 39
5.3.1. Assumption Tests ... 39

Chapter 6. Analysis ... 41
6.1. Effect of School Travel Planning ... 41

6.2. Urban Form and AST 43
6.3. Variable Associations 56
6.3.1. Accompaniment and Mode to School 57
6.3.2. Distance and Mode to School 58
6.3.3. Distance and Mode from School 60
6.3.4. Child Age and Mode to School 61
6.3.5. Child Age and Mode from School 63
6.3.6. Child Gender and Mode to School 63
6.3.7. Child Gender and Mode from School 64
6.3.8. Child Count and Mode to School 64
6.3.9. Child Count and Mode from School 65
6.3.10. Caregiver Perception of Safety and Mode to School 66
6.3.11. Caregiver Perception of Safety and Mode from School 67
6.3.12. Language and Mode to School 68
6.3.13. Language and Mode from School 69
6.4. Binomial Logistic Regression 70
6.4.1. Variable Structures 71
6.4.2. Mode to School 73
Mode to School: Interactions 76
6.4.3. Mode from School 77
Mode from School: Interactions 79
6.4.4. Significant Findings 80
Child Accompaniment 80
Distance from Home to School 83
Language Spoken at Home 84
Caregiver Perception of Neighbourhood Safety 86
Mode to School: Interactions 88
Mode from School: Interactions 88

Chapter 7. Conclusions: STP facilitators and Cities must do better 90
7.1. Implications for School Travel Planning 91
7.2. Implications for City Policy 97
7.3. Limitation/Opportunities for Further Research 99

References 103
Appendix A: Regression Assumption Tests 115
Appendix B: Variable Associations 135
Appendix C: Regressions with Interaction Terms 154
Appendix D: Independent Variables Associations 171
Appendix E: Regressions of School Subsets 182
Appendix F: HASTe Follow-Up Survey 189

List of Tables

Table 3.1. Agency Goals and Research Focus 14
Table 3.2. Survey Variables and Agency Responsibilities 15
Table 3.3. Summary of STP in Fleetwood (2013-2015) 16
Table 5.1. Survey Sample Sizes 38
Table 6.1. Crosstabulation: School Mode Shares 2013-2015 42
Table 6.2. Mode-Split per School per Year 55
Table 6.3. AST Rates by School by Survey Sample 56
Table 6.4. Categorical Variables 72
Table 6.5. Continuous Variables 73
Table 6.6. Regression: Mode to School 73
Table 6.7. Omnibus Tests of Model Coefficients: Mode to School 75
Table 6.8. Model Summary: Mode to School 75
Table 6.9. Hosmer and Lemeshaw Test: Mode to School 75
Table 6.10. Model Classification Table *without* Independent Variables: Mode to School 75
Table 6.11. Model Classification Table *with* Independent Variables: Mode to School 76
Table 6.12. Regression: Mode from School 77
Table 6.13. Omnibus Tests of Model Coefficients: Mode Home from School 78
Table 6.14. Model Summary: Mode Home from School 78
Table 6.15. Hosmer and Lemeshaw Test: Mode Home from School 78
Table 6.16. Model Classification Table *without* Independent Variables: Mode Home from School 79
Table 6.17. Model Classification Table *with* Independent Variables: Mode Home from School 79
Table 6.18. Distance and Time Costs 84
Table 6.19. Distance and AST Rates 84
Table 7.1. 2014 Coyote Creek and Serpentine Heights (1-year STPs) vs 2014 Coast Meridian, Frost Road, and Walnut Road (2-year STPs) 94
Table 7.2. 2014 Coast Meridian, Frost Road, and Walnut Road vs 2015 Coast Meridian, Frost Road, and Walnut Road 95

List of Figures

Figure 3.1. Fleetwood STP Schools (2013-2015) 9
Figure 3.2. Surrey School District 36 Elementary Schools 12
Figure 4.1. "Diagram of the Conceptual Framework of an Elementary-Aged Child's Travel Behavior" (McMillan, 2005) 33
Figure 6.1. Coast Meridian Elementary School... 45
Figure 6.2. Coast Meridian Elementary School – Catchment 46
Figure 6.3. Coyote Creek Elementary School... 47
Figure 6.4. Coyote Creek Elementary School – Catchment 48
Figure 6.5. Frost Road Elementary School 49
Figure 6.6. Frost Road Elementary School – Catchment.. 50
Figure 6.7. Serpentine Heights Elementary School 51
Figure 6.8. Serpentine Heights Elementary School – Catchment.............................. 52
Figure 6.9. Walnut Road Elementary School 53
Figure 6.10. Walnut Road Elementary School – Catchment....................................... 54

List of Acronyms and Glossary

AST	Active School Travel. An umbrella term to describe all modes of travel to and/or from school by students that involve the use of human powered momentum. Typical activities that this term denotes include: cycling, skating, scooting, walking, running, etc.
STP	School Travel Planning. A term referring to the active-transportation focussed intervention that take place primarily in elementary schools. These interventions usually include four components: education of students, enforcement of traffic rules, special events, and engineering solutions.

Chapter 1.

Introduction

Fleetwood is one of Surrey's seven neighbourhoods, and home to one of six designated town centres (City of Surrey, 2015b). Centrally located within Surrey, it was named after Lance Corporal Arthur Thomas Fleetwood, a resident who served and died in World War I (City of Surrey, 2015a). The community attracted Dutch, British, German, and Japanese settlers in the mid-1800s, and, as recent family surveys will illustrate, it has only become more diverse since this time.

Within Metro Vancouver, Surrey is an outer-ring suburban municipality where there is almost one vehicle for every two adult residents and almost 85% of the trips to work and school are made by vehicle (City of Surrey, 2015c). The City of Surrey is a city where private automobile use is still the norm, and although transit and active transportation modes' shares are growing, there is still room to shift share to sustainable modes.

The City of Surrey recognized the need for more sustainable forms of transportation and the opportunity to combat automobile-based travel to and from elementary schools with School Travel Planning (STP) through their Safe and Active Schools Program in 2009 (City of Surrey, 2015d). Surrey's program was adapted from similar European programs, and piloted in Canada in 2007. The STP intervention framework aims to increase Active School Travel (AST) in elementary schools, educate children on the benefits of sustainable transportation practices, combat childhood obesity, and reduce carbon emissions (Green Communities Canada, 2007).

The STP program utilizes four major strategies to encourage an active transportation mode shift: education of students, enforcement of traffic rules, special events, such as Walk and Ride to School Week, and engineering solutions, such as the construction of sidewalks, bike lanes, and traffic calming, to increase neighbourhood walkability (Buliung, Faulkner, Beesley, & Kennedy, 2011). STP engages with students, teachers, school administrators, and children's caregivers to accomplish these goals.

Hopes were high that STP would have an impact on AST rates when it was first introduced in Canada. Unfortunately, the underwhelming results across the country puzzled researchers (e.g. Mammen et al., 2014). To solve this puzzle, researchers attempted to isolate the relative influence of different variables, of homes and neighbourhoods, on rates of AST (e.g. de Vries, Hopman-Rock, Bakker, Hirasing, & van Mechelen, 2010; Giles-Corti et al., 2011; Wong, Faulkner, & Buliung, 2011). Of these investigations, most focused on American and international communities; there is a dearth of research focused on suburban communities in western Canada. Because of this, it is difficult to postulate how much influence these variables' have on AST in Surrey and Fleetwood, making effective policy and STP design challenging.

This research project investigated the impact of household-level demographic and spatial variables on local AST rates. The project used survey data collected by HASTe; an STP facilitator that was hired by the City of Surrey to facilitate STP in five Fleetwood schools between 2013 and 2015.

Before these analyses, I explore the history of STP in Surrey and Canada, the local context Fleetwood, and the school district. From here, I review the relevant public health, active school travel, and urban form literature. These literatures form the foundation of my analyses' interpretation. Then I explain the methodology used. Finally, I will go through the results and interpretation of the analyses, both associations and regressions, using the blocks of the literature review to interpret these Fleetwood-specific analyses. From these I make policy recommendations to refine STP practice and refine city policies to deliver AST from beyond the engineering department. Lastly, I identify the limits of my research and opportunities for further research.

Chapter 2.

Research Question

My research question is: “How do family demographic and caregiver perceptions influence active school travel in Fleetwood, Surrey?”

I arrived at this question from my childhood, graduate school, and professional experiences.

I was born and raised in Surrey, so I have a personal connection to the community I studied. As a child, despite living about 700m from my elementary school, one of my parents drove me to and from school daily because they feared that my siblings and I could be abducted en route.

Later, between January and June of 2015, I worked as a Planning Intern at HASTe, a School Travel Planning facilitator operating throughout BC. While there, I worked with Coquitlam STP projects to develop a GIS technique to visualize the paths that children travelled to and from school by, so that HASTe could understand how children travelled on-street and off-street. During this internship, I became aware of STP and the work that suburban cities engage in to increase AST in elementary schools.

Then, in February of 2015 I joined the City of Surrey as a Transportation Planning Assistant. At the City I worked with other staff on public transit projects, but I also learnt that the City was working with HASTe to deliver STP in Fleetwood.

Putting together my childhood experience of growing up in a Surrey where most children I knew were driven to and from school, my experience at HASTe, and my knowledge that the City was engaged in STP, I arrived at my research question. I wanted to know why some Surrey students walked to school and why some were driven to school, as my siblings and I had been nearly 20 years earlier.

Canada has been engaging in School Travel Planning projects since 2007, and Surrey has been engaging in it since 2009. Initially, there was great enthusiasm for these projects, and hopes that STP interventions would increase AST rates, reduce carbon emissions, and improve children's health outcomes (Buliung et al., 2011). In the years that followed this enthusiasm, evaluations of post-STP outcomes showed only marginal increases in AST; the honeymoon phase of Canada's relationship with STP was over (Mammen, Stone, Faulkner, et al., 2014). From this disillusionment, current research seems focused on improving STP practice by isolating which spatial and household variables most influence AST rates. This vein of recent research inspired my question in two ways.

First, these five Fleetwood schools offer a unique sample to understand if a 2-year STP program is more effective than a 1-year STP program in the same neighbourhood with otherwise similar conditions. It could be that if STP programs were longer, then they would deliver more of the promised benefits. While attempting to understand the effect of longer STP programs, it is important to note that each schools' survey samples are not directly comparable because families and children were unidentified, not traceable between samples, and different students were sampled each year as earlier students graduated and new students began at these elementary schools.

Second, these five schools are ripe for statistical analysis because HASTe's STP and data collection at the schools was conducted in parallel, in schools that are proximally located, creating datasets that are directly comparable. During STP, HASTe administered surveys to collect baseline data in October 2013 and different surveys to collect follow-up data in October 2014. At the three schools that continued for a second year of STP, Coast Meridian, Frost Road, and Walnut Road, HASTe collected a second round of follow-up with more surveys in October 2015. This consistency across data samples from these schools' controls for some of the weather and precipitation effects on AST rates. For instance, if weather during a particular week of data collection in a particular year affected the AST data at schools, then it would have affected all of these proximate schools similarly, such that rates of AST would be comparable amongst these school. This is opposed to comparing schools in different neighbourhoods or cities who engaged in STP during the same period.

My research study objective is to shed light on what influences Active School Travel in Surrey. Results of this study will contribute to STP practices in Surrey by providing contextual information on the influence of household variables and caregiver perceptions specific to Surrey.

Among the 21 municipalities, one First Nations, and one Electoral Area in Metro Vancouver, Surrey is projected to experience the most population and residential housing growth (Metro Vancouver, 2014). Metro Vancouver projects that the City of Surrey will accommodate 28% of the population growth and 24% of the residential growth between 2014 and 2040, within the region of Metro Vancouver municipalities. In comparison, Vancouver will accommodate 14% of the region's population growth and 19% of its residential housing growth.

With a growing population comes a growing student population. If my research is able to identify variables that predict AST the most, then the City could design land use and planning policy to encourage more students to travel actively to and from school. Without STP planning for this increase in population many future Surrey students will be driven to and from school as they are now, instead of being healthier and happier by traveling by AST, as research suggests they would be (Flynn et al., 2006; Parsons, Power, Logan, & Summerbell, 1999; Ramanthan, O'Brien, Faulkner, & Stone, 2014).

Chapter 3.

Context

3.1. History of School Travel Planning

Municipal governments around the world recognize that Active School Travel (AST) by elementary school students, typically aged 4-13 years old, is declining as childhood obesity is increasing. To address this concern, Green Communities Canada, a non-government organization, adapted the United Kingdom's Travelling to School Initiative's Safe and Active Routes to School Program for use in Canadian schools (Green Communities Canada, 2015). The Safe and Active Routes to School Program uses a School Travel Planning (STP) framework to encourage higher rates of AST. Green Communities Canada setup pilot programs throughout Canada in 2007 after reviewing the best School Travel Planning practices. Going forward from these pilots, they partner with local facilitators to enact their program (Green Communities Canada, 2007).

Since Canadian adaptation of the UK's Travelling to School Initiative, British researchers have concluded that their program only marginally increased average AST rates and marginally decreased carbon emissions (Department for Education, 2010). Despite these results, there was a strong perception by caregivers and residents that their work was having a positive effect on AST rates and sustainable travel behaviour.[1] This perception is partially explained by the Department for Education report cited above (2010), which explained that although the measurable benefits of the UK program were underwhelming, if the program delivers only a portion of its other promised benefits of

[1] In the context of this body of research "caregivers" is usually preferred over "parents" because the former is a more inclusive term and is useful to capture the range of family structures present in communities.

reduced congestion during peak hours and/or population health benefits, then the investment will still have a positive benefit-to-cost ratio. This review recognized that the Travelling to School Initiative had a positive effect in communities beyond affecting children's travel behaviour, including the delivery of public education information promoting active travel and possible travel time savings from reduced peak hour traffic, thus, the Safe Routes to School initiative has been transformed into the Safe Routes in Communities programme (Llywodraeth Cymru Welsh Government, 2015). Government offices can continue to invest in active transportation infrastructure, education, and engagement to encourage active travel modes, through this new program.

In Canada, STP's four intervention strategies (i.e. education of students, enforcement of traffic rules, special events, such as Walk and Ride to School Week, and engineering solutions) all assume that the built environment of a neighbourhood influences whether or not students use active transportation to and from school or are driven by caretakers. If elementary school students' modes of travel are chosen by their caregivers, then many other influences, such as sociocultural norms, caregivers' sociodemographic, caregivers' perceptions of safety, caregivers' own transportation behaviour, caregivers' household structure, *and* urban form characteristics likely influence caregivers' decisions regarding their child(ren)'s travel mode (McMillan, 2005).

3.2. History of Development in Fleetwood, Surrey

The five schools studied in the Fleetwood neighbourhood of Surrey are Coast Meridian, Coyote Creek, Frost Road, Serpentine Heights, and Walnut Road elementary schools (see Figure 3.1). These schools were built in the same area of Surrey with some of their catchment areas bordering each other. Given their proximity, it is unsurprising that legal subdivision drawings of the areas within 400 metres of each school show that the area around each of the schools was developed during the same period. Between 1979 and 2003, residential developments defined each neighbourhood's circuitous street network and cul-de-sacs of today by subdividing the previous owners' ¼ and ½ acre lots and adding penetrating streets to what was previously a 800 metre by 800 metre grid system of major streets (City of Surrey, 2015k, 2015l, 2015m, 2015n, 2015o).

New developments replaced large homes on larger lands with smaller, single-family detached homes on less land, connected to the city via cul-de-sacs and dead-end streets. Consideration for pedestrian connectivity was secondary at the time, and thus may explain the lack of sidewalk coverage on local streets and only occasional inclusion of walkways and pedestrian connections to collector streets and schools. Subsequent to this wave of development which defined the street system and connectivity of the area, some properties have been further subdivided to allow for additional residential density (City of Surrey, 2015o). But the street network disconnection and absence of pedestrian infrastructure will continue without wholesale redevelopment, which is unlikely at this point.

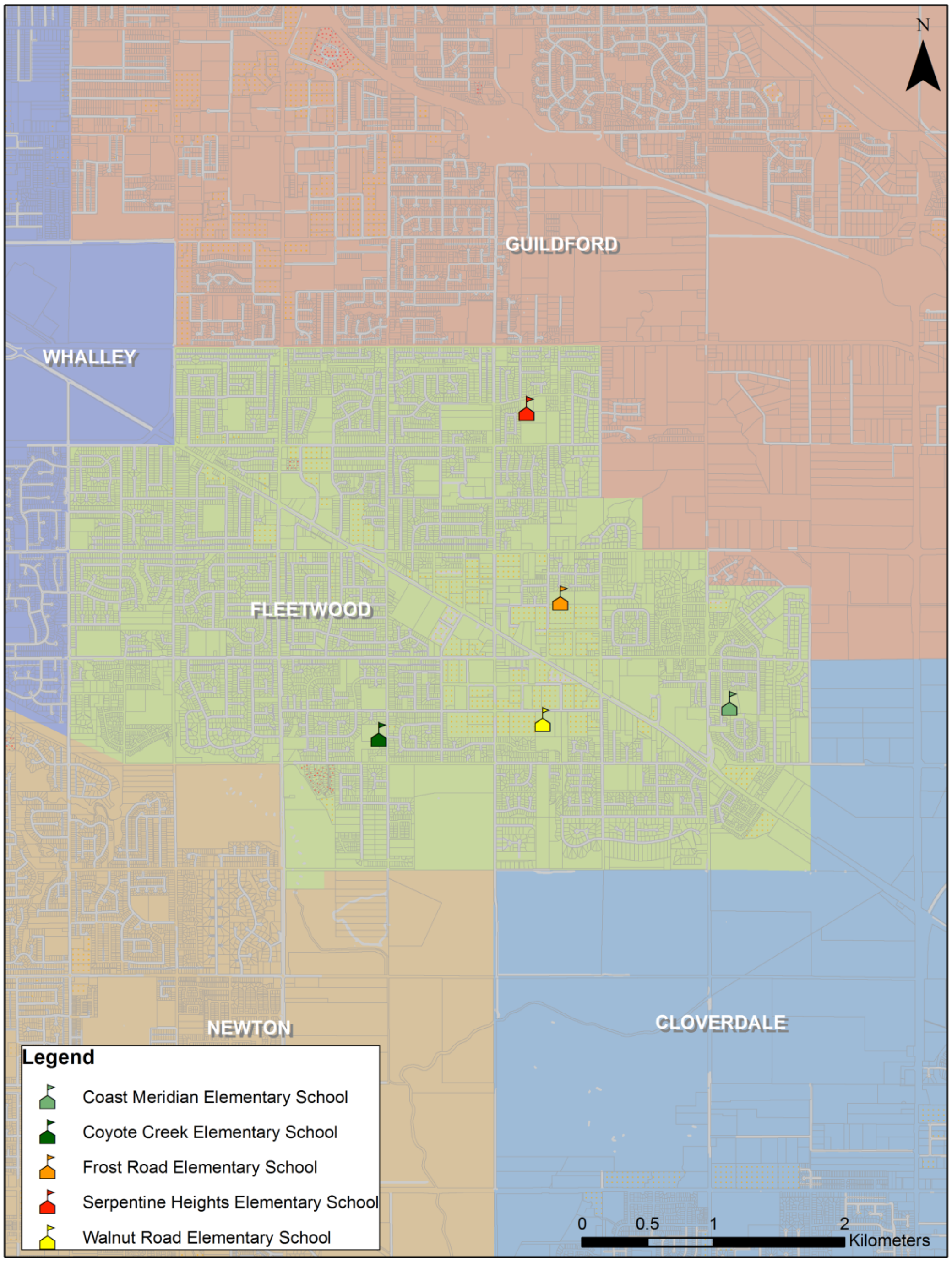

Figure 3.1. Fleetwood STP Schools (2013-2015)
Source: City of Surrey

3.3. Surrey School District 36

School District 36 administers all public and private schools in the City of Surrey. In total, there are 102 open elementary schools in the District, including two in a neighbouring municipality to the south - White Rock.

From informational interviews with Surrey and HASTe staff, and observed general STP best practices in literature, School Travel Planning is only appropriate at elementary schools because elementary students are seen as more easily influenced than older adolescents (Green Communities Canada, 2007). To-date, only elementary schools have been engaged in STP within the City of Surrey. Among elementary schools, not all are eligible, or appropriate for, School Travel Planning.

Enrollment at most of Surrey schools is determined by catchments; if residents live within a school catchment, then any children living with that catchment are given priority placement at the nearby school (Surrey School District 36, 2015b). If a family prefers that their child(ren) attend a public (or private) school outside of the catchment where they live, then they can apply to enroll at that school. The school district also offers a number of “Choice Programs” schools, including Montessori, fine arts, and language programs (Surrey School District 36, 2015a). Of the 102 elementary schools in the district, 16 are “Choice Programs”. These special programs do not have local a catchment area, thus, registration is available to all Surrey residents, pending capacity. Similarly, private schools in British Columbia do not have local catchment areas.

City of Surrey staff told me, in informal, non-interview conversations, that a school must meet two criteria to be eligible for STP facilitation in Surrey: be an elementary school with a regular curriculum and catchment. The City’s rationale for this decision is that there is a higher likelihood that children attending a regular program school live within walking or cycling distance of the school compare to children attending special “Choice Program” schools, which attract students from across the City. During my internship HASTe staff told me, in informal, non-interview conversations, that they have not facilitated STP in a private, special program, or magnet school in the Metro Vancouver region for these reasons.

Of the 102 elementary schools in the district, 86 schools are eligible for STP. As of September 2015, the City of Surrey completed STP facilitations in 21 of these 86 schools (see Figure 3.1). The City has engaged schools in multiple neighbourhoods simultaneously, at other times engaged schools in the same neighbourhood simultaneously, and with different STP facilitators than HASTe in the past. The program has evolved over the years, but all recent projects follow a similar format and focus on education, enforcement, special events, and engineering.

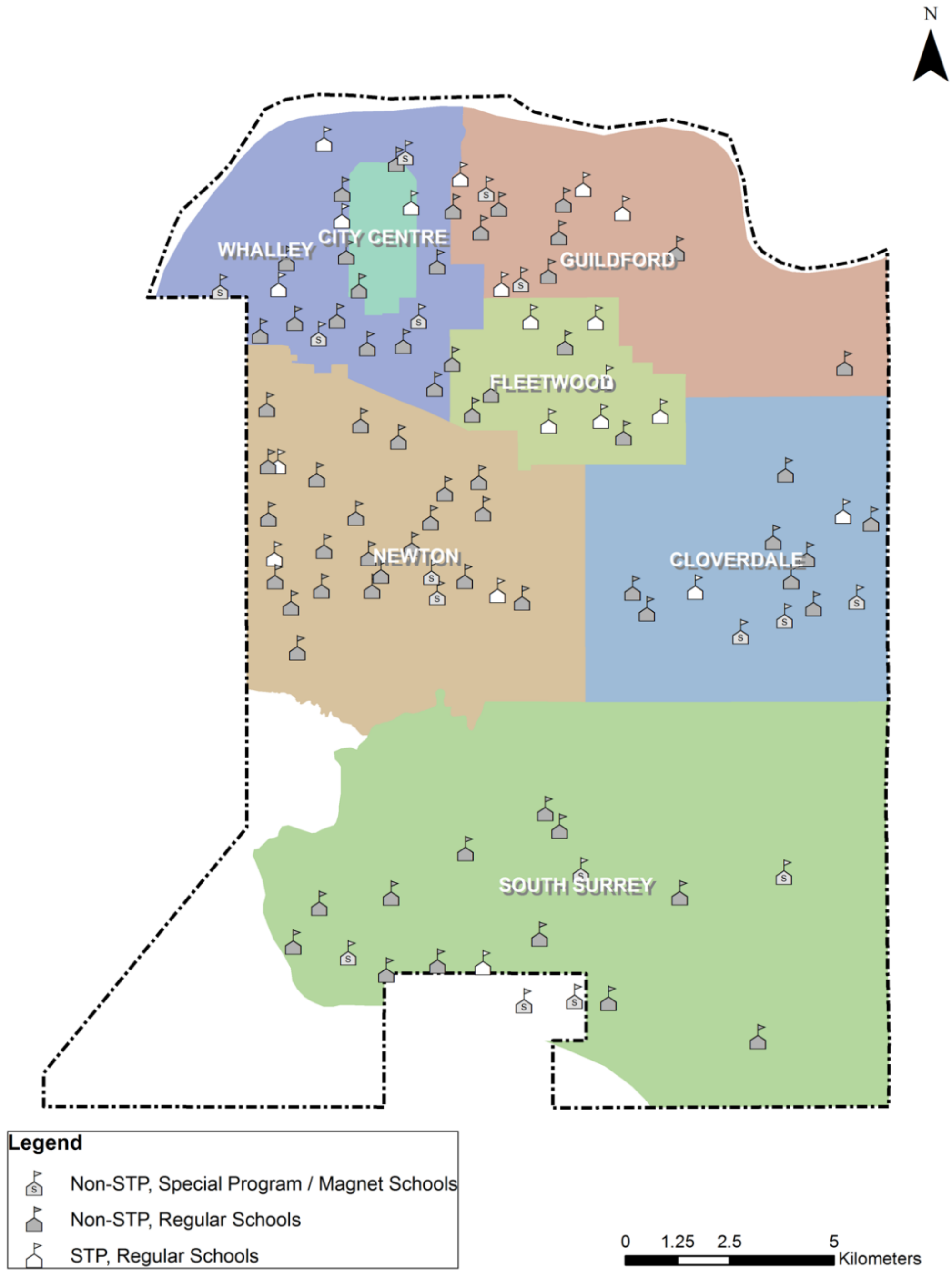

Figure 3.2. Surrey School District 36 Elementary Schools
Sources: City of Surrey, School District 36

3.4. Surrey School Travel Planning - Process

The following information was collected from informal, non-interview conversations with City of Surrey and HASTe staff, and my experience as a Planning Intern with HASTe in 2015. This information added context to the publicly-available information about Surrey STP available online at the City's website, and publicly-available service agreement contracts with STP facilitators.

The City recruits schools to participate in School Travel Planning in two ways. First, the City may approach a school's principal and vice principal(s) to inform them about the program, and invite them to participate. Second, a school, upon learning about the program from School District 36 administration or a colleague in another school, may approach the City to request the opportunity to participate in a future STP process. Regardless of how the school is engaged to participate, without support from school administrators and the school's Parental Advisory Committee (PAC), the City will not engage the school in STP.

Following recruitment, and pending available funding, 1-5 Surrey schools are engaged to participate each year. The School Travel Planning process usually commences over one school year, beginning in September of year one, and concluding with follow-up surveys in the autumn of the next year.

The City and the School Travel Planning facilitator, HASTe in this case, have goals that they aim to achieve through STP. Broadly, both agencies aim to deliver the positive health, emotional, and cognitive benefits that researchers suggest come with increased AST, and reduce traffic and congestion around schools (see Table 3.1.). My research focused on measuring the increase or decrease of AST at each school during STP, and the measured variables' ability to predict whether how children travelled to and from school. Because my research focuses on AST rates, it will only be able to measure the City of Surrey and HASTe's success at achieving their goal of increasing AST so that more students can reap the benefits of AST.

My research is informed by McMillan's (2005) conceptual framework of how urban form and sociodemographic variables interact at a household level to inform caregivers' choices of how children travel to and from school. This framework, and an explanation of its implications, can be found below in 4.4. Conceptual Framework. McMillan's work reduces the value of STP interventions and actions to their ability to increase AST. If an infrastructure improvement does not increase perceived safety, or if a behavioural intervention does not change caregiver attitudes, then they will likely not increase AST. These actions could achieve HASTe and the City's other goals, for example decreasing traffic around schools, to reduce congestion and GHG emissions, but my research is focused on their ability to increase AST. I do not evaluate STP's ability to achieve their other goals in my research.

Table 3.1. Agency Goals and Research Focus

	City of Surrey	HASTe	My Research Focus
Stated Goals of STP	1. Increase AST (for positive health and community safety benefits)[2] 2. Reduce traffic (for GHG, congestion, and community safety benefits)[2]	1. Increase AST (for health and emotional benefits, and for environment benefits)[3] 2. Reduced traffic congestion around schools[3]	How much did STP increase or decrease AST?

[2] (City of Surrey, 2015j)

[3] (City of Surrey, 2015e, 2015f, 2015g, 2015h, 2015i)

In year one, initial baseline surveys and follow-up family surveys measure a baseline AST level and gather input from caregivers on the safe and unsafe streets and paths in their community. In the school year that follows, STP contractors facilitate special events, educational school assemblies, and otherwise build student excitement for AST. In addition, events with RCMP, TransLink, and other allied organizations support STP with additional education and resources for children, parents, and administration. Concurrent to these processes, and partially flowing from initial household surveys, the City of Surrey reviews the requested engineering improvements in the neighbourhood according to their own warranting process. The City's measures whether traffic volumes, pedestrian volumes, and other site-specific conditions support expensive engineering solutions before these engineering solutions are constructed. If warranted, then these engineering projects usually go ahead for construction over the summer when regular classes are out.

During STP, the City and the STP facilitator have different roles to play in their shared goal of increasing AST. The STP is largely responsible for affecting the attitudes of caregivers and parents making decisions of how children travel to school, while the City is responsible for delivering the infrastructure improvements (e.g. traffic calming, sidewalks, crosswalks, etc.) to create safe neighbourhoods for children to walk to and from school. These agency responsibilities by survey-measured variables are detailed below.

Table 3.2. Survey Variables and Agency Responsibilities

Survey Variable	Survey Question (Appendix F)	Valid Response Rate	City Responsibility	STP Responsibility
Accompaniment	3	85.9%	-	Changing caregiver attitudes about children travelling without caregivers (e.g. removing stigma)
Distance (home to school)	4	95.5%	Residential density, via community planning	Changing caregiver attitudes about distance
Child age	6	96.2%	-	Changing caregiver attitudes about child age
Child gender	6	94.4%	-	Changing caregiver attitudes about child gender
Child count (siblings attending same school)	6	100%	-	Changing caregiver attitudes about child count
Caregiver perception of safety	7	97.6%	Engineering infrastructure improvements (e.g. traffic calming, sidewalks, crosswalks, etc.)	Changing caregiver attitudes about neighbourhood safety with special events, identifying opportunities for engineering solutions
Language spoken at home	5	88.4%	Offering City-produced literature (e.g. STP Handbook) in multiple languages	Offering caregiver-focused outreach (reports, surveys, etc.) in multiple languages

Following the yearlong STP program, HASTe distributed surveys to students' families that measured AST rates, basic family demographics, and other information including how safe parent feel their neighbourhood is. Of the five Fleetwood schools that began STP in 2013, Coyote Creek Elementary and Serpentine Heights Elementary completed a standard 1-year program, but Coast Meridian Elementary, Frost Road Elementary, and Walnut Road Elementary continued for a second year of STP.

Table 3.3. Summary of STP in Fleetwood (2013-2015)

	Coast Meridian	Coyote Creek	Frost Road	Serpentine Heights	Walnut Road
School Committee	Principal (2013) Principal (2014) PAC Chair PAC Parents	Principal Vice-Principal PAC Chair PAC Parents	Principal Vice- Principal (2013) Vice- Principal (2014) PAC Chair PAC Parents	Principal PAC Chair PAC Commas PAC Parents	Principal Vice Principal PAC Chair (2014) PAC Chair (2015) PAC Comms PAC Parents
Behavioural Interventions	Best Routes to School Maps Bike to School Week Travel Smart Youth Engagement Program Walk & Roll Week	Best Routes to School Maps Bike to School Week Walk & Roll Week Travel Smart Youth Engagement Program	Best Routes to School Maps Pick-Up/Drop-Off Area – Teacher monitoring BCAA Safety Patrol Program Take back Bucci Park Travel Smart Youth Engagement Program	Best Routes to School Maps Bike to School Week Travel Smart Youth Engagement Program	Best Routes to School Maps Bike to School Week Walk & Roll Week Golden Shoe Award Travel Smart Youth Engagement Program
Infrastructure Improvements Requests	School Crosswalk Crossing 168 A St at 84 Ave East Sidewalk 168 A St Traffic Calming 84 Ave Pathway Connection Fence Removal	Parking On Sidewalks Traffic Congestion at 156 St & 82 Ave Crossing 80 Ave at 155 St Pick-Up Drop-Off Area	School Crosswalk Pick-Up/Drop-Off Area New Bike Racks Crosswalk at 164 St Crosswalk At 160 St And 86 Ave	No-Parking Signs Crossing 96 Ave at 161 St New Bike Racks Pick-Up Drop-Off Area School Crosswalk Crossing 92 Ave at 162 St Traffic Congestion 156 St And 82 Ave	West School Crosswalk Crosswalk 84 Ave and Venture Way Crosswalk 84 Ave and 159 St 80 Ave Crosswalk Pick-Up Drop-Off Area Stop Sign Improvements

According to HASTe's STP Reports from each of the five Fleetwood elementary schools, they seemed to usually focus on identifying local pedestrian infrastructure needs, and leave other STP partners to deliver the behavioural interventions (City of

Surrey, 2015e, 2015f, 2015g, 2015h, 2015i). See Table 3.3. for a full breakdown of behaviour interventions and recommended infrastructure improvements at each school. For example, Travel Smart delivered their Youth Engagement Program to empower AST leadership at all of the five schools, but this is administered through TransLink, a regional public transit provider, not HASTe (TransLink, 2016). Likewise, The City of Surrey supports Walk & Roll Week, not HASTe (City of Surrey, 2016). HASTe does produce and deliver Best Routes to School Maps for caregivers and stakeholders, but this is one of the few behavioural interventions that they are responsible for delivering.

In contrast, HASTe's STP Reports detail the local needs for infrastructure improvements that stakeholders identified during the neighbourhood walkabout that HASTe facilitates at each school with PAC representative, caregivers, school staff, and other stakeholders (City of Surrey, 2015e, 2015f, 2015g, 2015h, 2015i). It could be that HASTe's evident focus on infrastructure needs could reflect the community's desires, but it could also reflect that HASTe is contracted by the City of Surrey's engineering department, so they tailor their report to focus on items deliverable by engineering. Unfortunately, by focusing on infrastructure they deliver fewer behavioural interventions to challenge suburban school travel norms.

From my conversations with City of Surrey staff involved with the Fleetwood STP projects, they grouped these five schools together for simultaneous STP facilitations because the City felt that the cumulative effect of five schools' worth of engineering improvements would be greater than the sum of the individual projects. In other words, the City felt that they could significantly improve the built form of that community and encourage more AST by focusing in one community that year. The rationale for this strategic consideration of the wider community is similar to the UK's rationale for realigning their STP program from a school-focused to a community-focused program (Department for Education, 2010). Despite this similarity, the City of Surrey program focuses primarily on schools, rather than communities. In the 2015-2016 school year that followed HASTe's facilitation in Fleetwood, the City of Surrey engaged elementary schools in Newton and South Surrey in STP, focusing on schools rather than on specific neighbourhoods or communities.

3.5. The Current State of School Travel Planning

Green Communities Canada piloting Safe and Active Routes to School in Canadian cities in 2007, and since then School Travel Planning has engaged many schools in cities across Canada (Green Communities Canada, 2015). Researchers evaluated these early projects and found an increase in Active School Travel from 43.8% to 45.9% among elementary school aged children (Buliung et al., 2011). Despite these early successes, success was not long lasting, and thus, failing to affect the positive mode shift that STP is designed to inspire (Boarnet, Anderson, Day, McMillan, & Alfonzo, 2005). Other research has validated these concerns by evaluating AST rates one year after STP intervention in Canadian schools who participated in programs between 2010 and 2012 (Mammen, Stone, Faulkner, et al., 2014). This research found that there was an increase in AST at 21/53 schools reviewed but no AST increase in the other schools one year after STP was completed (Mammen, Stone, Faulkner, et al., 2014).

Most agree that Active School Travel is a goal, that declining participation rates are worrying, that parents and the built environment influence AST rates, and that School Travel Planning is a good idea. Unfortunately, cities struggle to achieve the mode shift that they expect from their investment in the education of students, enforcement of traffic rules, special promotional events, and engineering solutions in neighbourhoods.

Chapter 4.

Literature Review

The previous chapter established the history of STP in Fleetwood, and identified the basic eligibility criteria for schools to enroll in STP.

This chapter reviews the relevant bodies of literature examining the public health implications of AST, existing research examining how children travel to and from school, and the influence of caregiver perceptions and demographics, and finally, the relationship between AST and neighbourhood urban form. These bodies of research will be invaluable when I attempt to understand why some Fleetwood students walked/skated/scooted to/from school while others were driven/carpooled in Chapter 6.

AST rates in schools have public health implications because higher rates could help combat childhood obesity trends and promote healthy lifestyles for students as children *and* as adults who actively travelled to school. If these are the goals of governments and schools, then it is essential to understand who makes decisions regarding *how* children travel to and from school, and what factors influence the outcomes of these decisions, so that, if possible, agencies can craft policy to encourage decision makers to choose AST.

I include some policy suggestions in the conclusion, however, modifying municipal policy to increase AST may not be simple because city policies that influence AST are housed within both the engineering and planning departments of Surrey, and any policy changes must be endorsed by city council to become adopted, actionable policy. At the City, the engineering department is responsible for designing and delivering city road infrastructure, including pedestrian infrastructure, and for reviewing the designs of infrastructure delivered by redevelopment. In pursuit of increased AST, the engineering department determines the standards of sidewalks, bike lanes, and sets the usage warrant criteria that prescribe the level of pedestrian activity required for the delivery of crosswalks, pedestrian-controlled intersections, and the vehicular warrant criteria for the installation of traffic-calming curb bulges and speed bumps/humps. Importantly, STP is contracted out through the engineering department, and engineering department staff are the primarily liaisons between the City, schools undergoing STP, and the STP contractor/facilitator. One floor down, the City's planning department is responsible for determining residential density of areas within neighbourhoods and around schools, thus determining how many students live very near to school. The City's engineering department does not engage or liaise with the planning department to coordinate efforts to increase AST in Surrey, or suggest that the areas immediately proximate to schools have higher residential densities so that more students can enjoy short walks to school. This failure of two city departments to share their goals and coordinate their efforts is emblematic of the challenge that agencies face when attempting to redesign public policy to increase AST.

4.1. Public Health

4.1.1. Childhood Obesity Trends

Research suggests overweight and obese Canadian children are more common than they were previously (Roberts, Shields, de Groh, Aziz, & Gilbert, 2012). While in the 1980s only 11% of boys were overweight or obese, in the 1990s this rate tripled, resulting in over 30% of male Canadian children being overweight or obese (Flynn et al., 2006).

Recent trends of increased obesity among school-aged children are the product of many factors. These include, but are not limited to, high-caloric foods, reduced physical activity, and changes in the foods offered in schools (Anderson & Butcher, 2006). Although some of these high-caloric foods and cafeteria options may be new, research suggests that exercise and walking to school may reduce obesity and related chronic disease risk in children and youth (Flynn et al., 2006). Depending on how far away children live from the school that they attend, daily commutes to and from school offer an opportunity for children to engage in at least a base modicum of physical activity *if* they engage in AST. Limited research suggests that this base may constitute up to 30% of adolescents' daily physical activity (Frazer et al., 2015). It may be that the precipitous decline in AST contributed to these increased childhood obesity rates.

4.1.2. Benefits of Active School Travel

Previous generations of Canadian and American students walked to and from school much more often do their children, today's students. In the US, rates of AST decreased from 40.7% of children in 1969 to only 12.9% in 2001 (McDonald, 2007a). Nearer to home, in a Canadian study of Metro Toronto children's active school travel decreased between the 1986 and 2006 less, but by 2006 most children were being driven to and from school (Buliung, Mitra, & Faulkner, 2009). Children who engage in active school travel receive two major benefits: reduced health risk and increased positive emotional dispositions than students who are driven to school (Flynn et al., 2006; Parsons et al., 1999; Ramanthan et al., 2014).

Regarding reduced health risk benefits, exercise and walking to school can reduce obesity and related chronic disease risk in children and youth (Flynn et al., 2006). Given the already-established trend line of children's expanding waistlines, participation in active school travel is seen as a low-hanging fruit in the battle to engrain daily exercise routines in children's lives. Research examining AST among a sample of Downtown Vancouver and Surrey grade 8-10 students found that AST contributed about 30% of students' total daily physical activity (Frazer et al., 2015). Furthermore, active children may go on to become active adults more often than do inactive children, thus active school travel may defend against weight gain as an adult in later life (Parsons et al., 1999).

Regarding emotional benefits, parents and children who are active travelers reported more positive emotions than passive travelers (Ramanthan et al., 2014). In a study of parents' perceptions of their own feelings when they accompany their children to school, and parents' perceptions of their child(ren)'s feelings, parents of children who walked reported that they perceived their child(ren) felt positivity towards their commute (Ramanthan et al., 2014). In addition, of the 69% of all parents who accompanied their children, those who walked with their child(ren) reported more positive feelings than parents who drove their child(ren) to school (Ramanthan et al., 2014).

4.2. Children's Behaviour and Caregivers

4.2.1. Decision Modeling

A small but significant body of research has stepped back from studying children's travel to and from school to focus on STP decision making. If STP and similar programs are going to be effective at shifting children's travel modes, then they will need to engage with caregivers, because children rarely make decisions regarding their own mode choices.

Most students, especially for younger children, are accompanied on their trips to school by caregivers, other adults, siblings, and/or friends. Literature has presented decision-making as a balance of parental obligations and travel behaviour as determined by employment, availability of a vehicle, travel time as determined by distance and mode, perceptions of safety, and confidence in their child(ren)'s ability to manage the trip independently (Ermagun, Hossein Rashidi, & Samimi, 2014; McDonald, 2008a). Interestingly, other modeling has emphasized the impact of child and parental self-efficacy as a highly influential factor among children who use active travel to school (Lu et al., 2015). In this context, self-efficacy refers to a children and parents' positive attitude and grit toward active transportation when faced with inclement weather, traffic conditions, distance, and other environmental barriers to active transportation.

Some environmental barriers are static (e.g. distance) and some dynamic (e.g. weather), and caregivers' decisions may reflect their ability to overcome static barriers but also flexibly respond to dynamic barriers. On one hand, once a parent and child have walked from home to school the distance becomes less of a barrier to AST in the future because it is now a known spatial and temporal distance. On the other hand, if wet, cold weather presents itself, then even typically walking children and caregivers could choose to drive if an automobile is available for use.

Children may be enthusiastic for the opportunity to walk through the rain and splash in puddles, but not if parents are accompanying them, which Hern (2007) suggests is the exception, not the norm. In these cases, the accompanying caregivers are deciding to drive because of the rain, or walk because of road construction and traffic congestion. In other words, their decisions to drive or walk are designed to maximize the productivity and avoid inconvenience, rather than choose to walk for the health and emotional benefits.

Research suggests that caregivers' decisions whether their children walk or are driven to school are primarily motivated by environmental barriers and caregivers' schedules. If AST rates are to increase, STP planning must include caregivers' needs. Unfortunately, despite the best engineering solutions available to improve the neighbourhood's urban form, AST interventions have limited success in increasing active school travel because even if STP reduces some barriers, such as traffic safety, others, such as weather patterns, persist.

4.2.2. Influence of Caregiver Demographics

Research focused on caregivers' STP decision-making struggles with understanding what factors influence decisions regarding child(ren)'s mode of travel to and from school. It is difficult to find clear direction that fosters positive change in children's travel behaviour without identifying these factors. Focusing on sociodemographic influences, researchers have identified that children's gender and race, and parental race, income, educational attainment, car ownership, marital status, and *maternal* work patterns may have an influence, but the magnitude of these influences results vary.

Regarding children's gender, while some studies have found no difference in active school travel between gender (Martin, Lee, & Lowry, 2007), others have found that being female reduced active school travel rates by up to 36%, with a reduced impact as children age (McMillan, Day, Boarnet, Alfonzo, & Anderson, 2006). As females age their travel behaviour more resembles that of males. Other researchers found a difference among active travel choices, with more males cycling to school than females, and more females walking to school than females (Panter, Jones, van Sluijs, & Griffin, 2010).

Research focusing on students and parents race is similarly nuanced. American researchers, usually operationalizing racial categories as either Caucasian, Hispanic, or Black, have reported that race does not have large influence on mode choice (McDonald, 2008a). Other, similar research suggests that Black and Hispanic students use active transportation more often than Caucasian students (McDonald, 2008b). Given the intersection between race and income, especially in the United States, it could be possible that racial disparities in active school travel rates can be at least partially explained by income disparities between the sampled American Caucasian, Hispanic, and Black populations.

Interestingly, most research has found that the children of wealthier households engage in active school travel less often than the children of lower and middle income households (Larsen et al., 2009; Martin et al., 2007; McDonald, 2008b). The relationship between income and AST may not be linear, because other research has found that children of middle income households engage in AST more often than children in lower or higher income households (Mammen, Stone, Buliung, & Faulkner, 2014).

Income could be related to distance from home to school. At least in suburban areas, higher income families with children could afford to purchase or rent more land, in bigger homes, in lower density areas. In other suburban neighbourhoods, lower income families with children who may only be able to afford smaller homes in apartment buildings in higher density developments. Assuming similar school capacity to catchment size ratios, the higher density, lower household income area would have a smaller catchment, and students would have a shorter distance to travel from home to school. In the lower density, wealthier neighbourhood the catchment would be much larger, and students would have a longer distance to travel from home to school. The most distantly located students living within their school catchment in wealthier neighbourhoods would have longer to travel to school than the most distantly located, lower income students, thus, if a vehicle was available, there would be a relatively greater utility in the wealthier children driving to school, perhaps explaining some of the wealth effect identified.

Household ownership of a vehicle, a component of household wealth, was found to be negatively correlated with children's active school travel in the UK (Panter, Jones, & van Sluijs, 2008). Swiss researchers confirmed this, but found that it was especially among children who traveled to school *alone*, as opposed to siblings, who more often walked (Bringolf-Isler et al., 2008). Although the Swiss and the English are very different, it could be that parents choose to drive their child to school when their child *would otherwise travel alone*, but that they would allow their children to walk to school, if their child had a sibling to travel with.

Research has also focused on the influence of parental education on children's AST rates. Somewhat counterintuitively, researchers have found an inverse relationship between parental education attainment and their children's AST rates. The children of college and university educated parents are less likely to engage in AST than the children of high-school graduates (Martin et al., 2007; Panter, Jones, Van Sluijs, & Griffin, 2010). This could reflect socioeconomic status, assuming that more highly-educated parents have greater incomes than lower educated parents, but this data was unavailable here.

4.2.3. Influence of Caregiver Perceptions

Caregiver and household sociodemographic may influence AST in other ways as well, such as informing caregivers' perceptions of safety, which in turn has a profound effect on the decisions made regarding children's Active School Travel rates. For example, researchers have found that parental education attainment can influence parental weight challenges and physical activity (Parsons et al., 1999), which itself influences children's AST rates (Martin et al., 2007; Parsons et al., 1999). Furthermore, researchers in the Netherlands have found that the children of households where parents engaged in active travel themselves, for work or for errands, engaged in AST much more often than the children of parents who drove to work (Van Kann, Kremers, de Vries, de Vries, & Jansen, 2015).

It could be that if parents engage in active travel themselves, then they may not perceive the neighbourhood to be unsafe for walking or cycling. These same Dutch researchers found that parents who walked or cycled to work themselves less often reported either "stranger danger" or traffic safety concerns for their child(ren)'s unaccompanied AST (Van Kann et al., 2015). This is profound because parental perception of safety has an outsized influence on their decisions of whether their child(ren) engage in AST or not; parental safety concerns are negatively related to independent student travel (Bringolf-Isler et al., 2008). Part-time employed and unemployed caregivers, especially mothers, were most likely to be the accompanying adult (Carver, Timperio, & Crawford, 2013; Fyhri, Hjorthol, Mackett, Fotel, & Kyttä, 2011). In a related study, mothers accompanied approximately half of students' AST, as their work patterns allowed (McDonald, 2008c). Overall, adult accompaniment increases child and parental perception of safety, but because of caregiver work patterns and other obligations, AST accompaniment isn't always an option (Sweeney, Shannon, 2015).

The parents of children who lived further away from school most often drove their children to school, often citing traffic and stranger danger as motivating this choice (Carver et al., 2013). Traffic concerns, distance, and the opportunity to complete other tasks on the way and afterwards with the car, were most commonly cited reasons given by parents' choice to drive their child(ren) to and from school (Carver et al., 2013). Ironically, of parents who drove their child(ren) to school, 70% were able to admit that this contributed to congestion and negatively influenced the traffic safety of the neighbourhood, but justified driving their own child(ren) because other drivers drove recklessly (Lang, Collins, & Kearns, 2011)

To contextualize current students' travel and accompaniment patterns we must reflect on the evolution of parenting practices. Unfortunately, no historical records are available regarding student accompaniment rates by parents or caregivers. Despite this lack of documentation, it is reasonable to speculate that fewer children were accompanied by their parents in the past than today's children are accompanied by their parents. This notion arises from Hern's (2007) research in the field regarding safety, and how ideas of safety, letting children be more independent, play unsupervised, and otherwise be responsible for themselves, have shifted over time. This shift in accompaniment partially explains the decreased rates of AST observed in literature. Hern (2007) points out that if parents are considered responsible for children's well-being, then if children are harmed, injured, or are perceived to be doing something unsafe, it may lead to a perception of the parent being neglectful rather than the child exploring their world and being a child. Research has supported this theory (Curtis, Babb, & Olaru, 2015).

Parents' decisions regarding their child(ren)'s AST can be partially motivated by their anxieties regarding how their decision will be perceived by other parents. These parents reported worry that they perceived as bad parents and potentially negligent by their peers if they allowed their child(ren) to engage in AST unaccompanied (Curtis et al., 2015). Such negative perceptions are unfortunate because parental and friend group support and encouragement has been found to empower children's independent AST (Panter et al., 2010). In cases where parental or adult accompaniment is not an option researchers have found that accompaniment by other students can serve to alleviate parental fears (McDonald & Aalborg, 2009; Pojani & Boussauw, 2014; Timperio et al., 2006; Yu & Zhu, 2013). STP interventions combat these accompaniment expectations and anxieties by normalizing AST, encouraging accompanying adults to walk their children to school, and removing the stigma of unaccompanied, or peer-group accompanied, children travelling to school independently.

If caregivers feel their neighbourhood is not safe for children, then they likely will not allow their child(ren) to engage in unaccompanied AST for fear of their child(ren) safety and how their decisions will be regarded by neighbours. If children are accompanied by caregivers, then caregivers may choose whatever transportation mode best suites their schedule, and not what is best for the long-term health of their child(ren).

4.3. Urban Form

Beyond parental anxieties of how others will perceive their decisions regarding their child(ren)'s travel mode, caregivers often cite urban form dimensions as motivating their decisions to drive their child(ren) to school. In a survey of District of Columbia parents that asked what motivated their decisions to drive their child(ren) to school most reported distance from the school to their home, stranger danger, and some variation of convenience/speed of motorized travel (McDonald & Aalborg, 2009). This suggests that neighbourhood urban form characteristics may influence caregivers' decisions regarding whether or not their child(ren) engage in AST.

4.3.1. Neighbourhood and Community

How children and parents perceive their neighbourhood and home must be understood before we can understand the role that urban form has on AST. Children's neighbourhood exploration and play, and caregivers' allowance for this exploration and play, is highly variable among children and generations. Although no reviewed literature has linked AST to outdoor play, it is reasonable to suggest a connection between children being allowed to explore their neighbourhoods and those same children being allowed to travel to and from school without adult accompaniment. Furthermore, if a child is permitted by their caregivers to explore and play in their neighbourhood within the range of their school, then their parents would likely grant them permission to travel to school unaccompanied by an adult. This range, between home and the spatial limits of exploration and play, has been defined as "home range" (Gaster, 1995).

According to research on home range, parents usually limit the range of their child(ren)'s permissible exploration by the distance to certain personal points of interests and landmarks, rather than by a Euclidean distance and measured radius from children's' homes (Spilsbury, Korbin, & Coulton, 2009; Woolley & Griffin, 2015). For example from research interviews, parents often described their children's independent travel home ranges as them being able to travel alone to school, to specific parks, to friends' homes, and/or to relatives' homes (Spilsbury et al., 2009; Woolley & Griffin, 2015). The link between these destinations' and home range was contextual though; parental permission to travel a certain distance to a friend's home did not also grant permission to travel that same distance in another direction to a different destination (e.g. to school). In this way, children's autonomous travel ranges are severely restricted.

Somewhat intuitively, when children are accompanied by another child or sibling their home range increases (Spilsbury, 2005). In a survey of child and parent pairs in Cleveland, OH, children's home range perimeters as much as doubled if parents knew that they would be travelling with a friend, even in high-violence neighbourhoods (Spilsbury, 2005). In interviews, these parents expressed that their fears were alleviated by knowing that their child(ren) were not alone (Spilsbury, 2005).

Gender and age were factors of home range in all of the reviewed home range literature. Although universalizing these relationships to all populations, in all contexts, is problematic, the overall pattern observed and noted by authors was that males have further home ranges than females (Spilsbury et al., 2009; Spilsbury, 2005; Woolley & Griffin, 2015). Also, children of both genders' home ranges increase as they age, so that a 15-year-old has a much further home range than a 7-year-old (Spilsbury et al., 2009; Spilsbury, 2005). If these relationships are true in Surrey then older and more often male children should be accompanied to school less often than younger males and females.

Limited research focusing on generational expressions of home range among Sheffield, UK families found that in four generations, between the 1930s and 2000s, home range decreased from a peak of 5km for great granddad, to a low of 60m for great grand-daughter (Woolley & Griffin, 2015). Interviews with members of these families identified that while older generations did not require parental permission prior to setting off for "adventure", more recent generations' required permissions and their outdoor exploration was strictly time-limited (Woolley & Griffin, 2015). As Hern (2007) suggested, today's parents do not treat childhood independent mobility and play the same as former generations. Within the current western paradigm of limited home range for children and permission, parents seem particularly concerned by the possibility of their children travelling in unsafe parts of the neighbourhood (Woolley & Griffin, 2015).

4.3.2. Relevant Measurements

Many environmental factors, such as the distance between home and school, the presence of sidewalks, need to cross busy streets, and other characteristics of the built environment may influence students' active transportation rates (Sallis & Glanz, 2006). Of these factors, research is conclusive regarding the influence of some, and less conclusive regarding the influence of others (e.g. Wong et al., 2011).

There is strong evidence for distance from home having an impact on AST rates. This can be measured from GIS coordinates, GPS routes, parental self-reports, and parental perceptions of travel time. Researchers found that as the distance between the home and school increases, so does parental anxiety (McDonald & Aalborg, 2009), and AST rates decrease (Larsen et al., 2009; Mammen, Stone, Buliung, et al., 2014; McDonald, 2007b; McMillan, 2007; Merom, Tudor-Locke, Bauman, & Rissel, 2006; Panter et al., 2010; Schlossberg, Greene, Phillips, Johnson, & Parker, 2006; Timperio et al., 2006; Van Kann et al., 2015; Ziviani, Scott, & Wadley, 2004). Interestingly, some researchers have found that 1.6 km distance from home to school is an important distance; student Active School Travel rates decreases from 38% of students who live within 1.6 km of school engaging in AST to just 5% AST among those who live further away than 1.6 km (McDonald, 2007b).

The presence of sidewalks, on one or both sides of the street, is also often a focus of School Travel Planning's engineering improvements (Buliung et al., 2011). According to Jane Jacobs, sidewalks and streets importantly demarcate the boundary of public space and private space, communicating to residents where they are welcome, and where they are not (Jacobs, 1961). However, unless these sidewalks and streets are well used, they may be perceived as unsafe, thus deterring potential users from walking or walking on these less-used streets.

Although intuitively related to active transportation and neighbourhood walkability, there is less evidence than expected that the presence of sidewalks, or sidewalk density, increases AST rates. Researchers found a positive effect of sidewalks on students rates of walking (Lin & Chang, 2009), but other researchers have emphasized that sidewalk coverage is an easier intervention for cities to make to encourage AST than relocating students nearer to schools (Fulton, Shisler, Yore, & Caspersen, 2005).

Whether or not streets have sidewalks researchers suggest that it will not make parents feel more secure in their decision to allow their child(ren) to travel to school alone if they walk on deserted, isolated streets (McMillan, 2007). Jane Jacobs' concept of "eyes on the street" informed research investigating the influence of AST in neighbourhoods where buildings had forward facing windows, and found a positive relationship; neighbourhoods with more “eyes on the street” had greater rates of AST (McMillan, 2007).

Jacobs (1961) considered “eyes on the street”, a demarcation between public and private space, and well-used sidewalks to be three requisite qualities that an urban street had to have in order to be successful. According to Jacobs (1961), well-used, well-defined sidewalks would attract the attention of street-fronting building residents and other walkers, thus constituting the “eyes” which form a community surveillance on the street. Jacobs (1961) only considered a street “well-used” when it was nearly continuously used, in all hours of the day. In this study context, sidewalk demarcation is being studied, but Fleetwood’s suburban sidewalks are only near-continuously used during AM and PM peak school travel to and from school. According to Jacobs’ (1961) reasoning, if form allows it, neighbourhood eyes would be most likely focused on the street during these periods, because the streets would be most active then. This may have implications for AST rates outside of normal AM and PM peak periods to and from school, since caregivers may correctly perceive that the streets are less activated outside of these periods, and thus, will have a lower degree of community surveillance and perceived safety by pedestrians.

If “eyes on the street” is a product of front-facing windows, and the presence of other walkers, then neighbourhood density could also have an influence on parental decision-making. Following this line of reasoning, researchers have found a positive association between increased residential density, in urban and suburban environments, and rates of unaccompanied AST (Carlson et al., 2015; Frank, Kerr, Chapman, & Sallis, 2007; McMillan, 2007). Concordantly, other researchers have found that unaccompanied AST rates decrease as density decreases (Larsen et al., 2009). Researchers explain the relationship between density and unaccompanied AST as originating from caregivers’ experiences of denser environments, given that caregivers are making decisions regarding children’s travel modes.

As density increases, residents encounter more of their neighbours during their daily lives. Parents with a high degree of social trust for their community were more likely to allow their child(ren) to walk to and from school independently (Leyden, 2003). This social trust was built from interactions with neighbours, most commonly in highly walkable neighbourhoods (Leyden, 2003). In less walkable neighbourhoods, unfortunately including the Fleetwood neighbourhood of Surrey, caregivers may not walk as often, and if they do walk, then they may not interact with other residents because likely fewer residents walk in less walkable environments, thus not building social trust. Without this walking, and development of social trust, research suggests that caregivers will allow their child(ren) to engage in unaccompanied AST less often.

If AST promotes physical health and happiness while combating childhood obesity, which research suggests it does, then research should focus on how to increase AST. To-date, research has found strong evidence for the influence of some environmental and urban form variables (e.g. distance from home to school) and less strong, or conflicting, evidence for the influence of other demographic variables (e.g. children's gender, ethnicity, etc.), but I need a conceptual framework to understand how these variables could influence AST.

4.4. Conceptual Framework

From the above review of literature researchers have found evidence that urban form variables, including perceived safety and distance from home to school, and socio/cultural and demographic variables, including cultural norms and children ages, influence caregivers'' decisions of how their children travel to and from school. McMillan (2005) offers a helpful diagram to visualize the relationship between these different variables and caregivers' decisions:

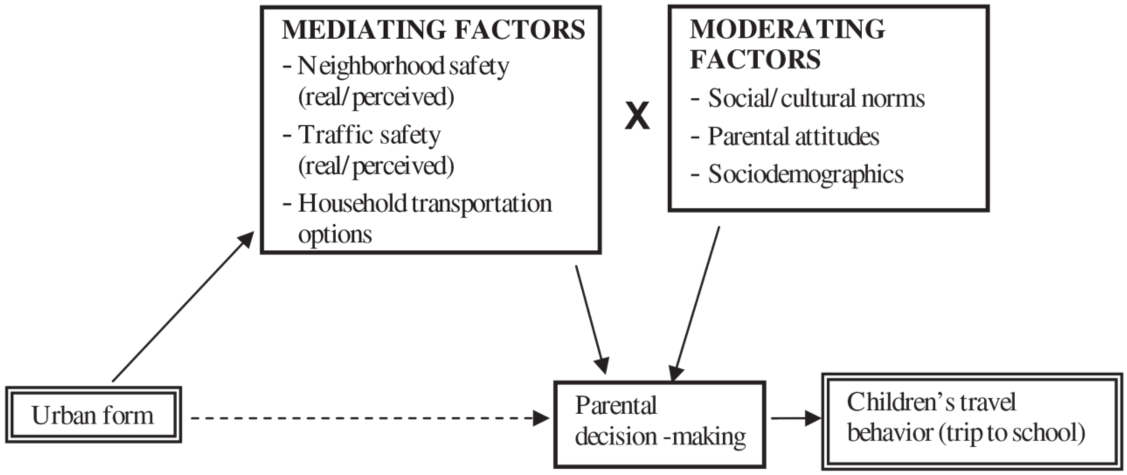

Figure 4.1. "Diagram of the Conceptual Framework of an Elementary-Aged Child's Travel Behavior" (McMillan, 2005)

1. Solid arrows are direct relationships, dotted arrows are indirect relationships, and "X" is an interaction between mediating and moderating factors

This framework conceptualizes that household's urban form factors influence caregivers' decisions of how children travel to and from school because they inform caregivers' perceptions of the neighbourhood. The impact of these perceptions on caregivers' choices is moderated by household's demographic factors, so that the ultimate decision of how a child travels to school results from the interactions of urban form and demographic variables in each household. For example, research has strongly suggested that increased distance from school to home decreases AST, perhaps because with increased distance there is increased exposure to danger, but it could be that in some households there is a strong social/cultural value of grit and autonomy for the children such that their caregivers do not consider the increased distance as a reason that their children cannot walk to school.

When STP is understood using this framework the real goals of pedestrian infrastructure improvements are not the structures themselves, but rather their ability to increase perceived safety concerns, as determined by local moderating factors. For instance, if a city delivers improved sidewalk letdowns and tactile paving to create more pleasant and accessible pedestrian environments, but this improvement fails to increase perceived safety, then it will likely not affect AST rates, despite delivering an objective accessibility improvement to the neighbourhood. Furthermore, STP's attitudinal and behaviour interventions are only as successful as their ability to challenge anti-AST moderating factors. For example, if Walk and Roll to School Week is successful at temporarily increasing awareness of AST, but it is unsuccessful at changing parental attitudes about the safety of the neighbourhood, then it is unlikely to result in more caregivers choosing AST for their children.

My research will use this model to inform my examination of the influence of available urban form and demographic variables on AST in Fleetwood at the household level, contributing to this body of knowledge at the local scale. Ideally this knowledge will be used by the City to increase AST in Fleetwood, through future STP work, but the City of Surrey could apply it broadly if they feel that the insights gleaned from studying Fleetwood apply to other communities in the City.

Chapter 5.

Methodology

Logistical regression analyses of household demographic variables and children's mode of travel to and from school will produce the explanatory magnitude of each independent variable. From this, we will understand how much influence distance from home to school, household language, number of siblings, etc. has on parents'/caregivers' decisions of how their child(ren) travel to and from school. With this knowledge we can design policy to encourage parents/caregivers to choose AST for their children so that they can receive the health and emotional benefits identified by literature.

The five Fleetwood elementary schools that I am studying went through School Travel Planning (STP) programs between 2013 and 2015 with HASTe BC, a school travel planning facilitator.

It is also worth noting that my research did not require an ethics review, because my analyses use publicly-available documents and survey data from the City of Surrey.

5.1. Background

During my time at HASTe as a Planning Intern working on GIS projects, and at the City of Surrey as a Transportation Planning Assistant working on transit, I had informal, non-interview conversations with fellow staff members about STP. These conversations inspired my research interest, and give context to my survey analyses.

To provide more context, I draw upon City of Surrey contracts with HASTe, the STP reports and literature that HASTe produces at the conclusion of their facilitations, and other publicly-available City of Surrey documents.

5.2. Survey Data

As a part of this school travel planning process, surveys were sent out in October 2013, October 2014, and October 2015 to be completed by children's caregivers. During collection, it was explained that this data could be used for research purposes.

The data that HASTe collected in these surveys included student(s) modes of travel to and from school for each child of the household, and demographic information such as children's ages, genders, number of children attending the same school, language spoken at home, caregivers' perception of neighbourhood safety, and the distance from home to school. For mode of travel to and from school caregivers chose between walk/scoot/skate, walk part-way, bicycle, school bus, public transit, carpool, and car. Of these available responses, no children reported travelling to school by school bus or public transit, probably because these Fleetwood schools do not offer school bus service for able-bodied students, and public transit in Surrey is infrequent and located along arterials, away from these schools. Next, fewer than 1% of respondent reported cycling to school, so these responses were discarded. Finally, for the purposes of my regression analyses, carpooling and driving were merged into a variable value of "drive/carpool," so that my regression models' dependent variable is dichotomous.

This rich data is completely anonymous, and caregivers' surveys cannot be matched across time to discern respondents' identities. HASTe also collected data from students in classrooms with baseline surveys, but they did not collect the demographic and caregiver perception information from students here.

HASTe collected this data from all five schools in 2013 to establish a pre-STP mode-split baseline and in 2014 to evaluate post-STP outcomes on mode-split at each school. Three of the schools, Coast Meridian, Frost Road, and Walnut Road, engaged in a second year of STP, so additional post-STP follow-up survey data were collected from them in October 2015. Unfortunately, HASTe did not also collect AST and survey data from other schools during this period, so I do not have a control group of schools to compare the effect of STP in Coast Meridian, Coyote Creek, Frost Road, Serpentine Heights, and Walnut Road against.

It is important to note that although these different points of survey offer an indirect means to compare rates of walking/skating/scooting and driving/carpooling across time at each school, such comparisons are problematic. HASTe collected data anonymously and did not track respondents across time, thus, an ethics review was not required to use this data. Student populations of each school changed each year as new students enrolled and old students moved away or graduated. Because of this each survey dataset is treated as a different sample of students at each school from each year. This treatment makes comparisons of AST across time less controlled than ideal, albeit useful to broadly understand the effect of STP.

To collect follow-up survey data HASTe sent out survey forms with students for their caregivers to complete. Household follow-up surveys collected data from between 86 and 362 families each year at each school. These surveys were not always returned complete, thus, the different sample sizes for to and from school travel for at each school for each year. Survey samples represent between 20.2% and 58.5% of the student populations at each school for each year. Of these, rates of fully valid surveys (i.e. effective response rates) for use in my regressions, isolated by direction of travel, for 2014 and 2015, are between 22.0% and 40.6% of total enrollment per year, with a 0% valid survey response rate for 2013 at all schools because baseline survey data collected in 2013 was not appropriate for use in my regressions. This exclusion does not bias my regression data because all samples were administered to all students each year. These effective response rates are similar to other research studying children's' school travel with regression analyses (Boarnet et al., 2005; Curtis et al., 2015; McDonald, 2008c; Panter et al., 2010). HASTe offers no explanation for the variation in response rates from school to school in their STP reports. See Table 5.1 for full breakdown of sample sizes and enrollment per school per year.

Table 5.1. Survey Sample Sizes

			Enrollment	Received Surveys (% of enrollment)	Effective Response Rate/Valid for Regression Use
2013 (baseline survey)	CM	To	377	25.2%	0%
		From			0%
	CC	To	608	28.9%	0%
		From			0%
	FR	To	562	44.8%	0%
		From			0%
	SH	To	387	45.2%	0%
		From			0%
	WR	To	652	39.0%	0%
		From			0%
2014 (follow-up survey)	CM	To	351	40.5%	30.8%
		From			29.0%
	CC	To	621	43.2%	22.7%
		From			22.0%
	FR	To	557	58.5%	45.1%
		From			44.0%
	SH	To	414	36.0%	23.9%
		From			24.0%
	WR	To	629	51.8%	34.3%
		From			34.0%
2015 (follow-up survey)	CM	To	327	37.9%	27.5%
		From			25.0%
	CC	To	610	n/a	n/a
		From			n/a
	FR	To	579	47.8%	37.1%
		From			35.0%
	SH	To	416	n/a	n/a
		From			n/a
	WR	To	651	55.6%	40.6%
		From			40.0%

5.3. Binomial Logistic Regression

Binomial logistic regressions are the ideal tool to understand the influence of demographic variables, such as children's ages, and genders, on caregivers' decisions of how their children travel to and from school. This technique predicts the probability that any single student walked/scooted/skated or was driven/carpooled to and from school. In this regression, students' mode of travel is the dependent variable. Students must travel to and from school by one of these means, and by adding independent variables to the regression model we can more accurately predict how children traveled to and from school. The model will provide the explanatory contribution of each independent variable for the subset of Surrey students who attended and completed surveys at these five Fleetwood elementary schools between 2014 and 2015.

To understand the explanatory value of the logistic regression models that I've built with HASTe's data, I must compare the outputs of *these* models with the outputs of baseline models without independent variable data. These baseline models predict the dependent variable's value (mode of travel) by the rate of each value's occurrence, predicting that all students travel by the most common mode of travel. Comparison between pairs of logistic regression models and baseline models indicate whether the inclusion of HASTe's independent variable data increases or decreases the explanatory value of the logistic regression models.

In order for a binomial logistic regression to be valid, the data must meet some key assumptions. The model's dependent variable must be dichotomous and the independent variables must be continuous or categorical. Next, there must be a linear relationship between the continuous independent variables and the log transformation of the dependent variable. Lastly, independent variables must not show multicollinearity.

5.3.1. Assumption Tests

The Box-Tidwell (1962) procedure confirmed the linearity of all continuous independent variables with relation with the logit of the dependent variables. As Tabachnick & Fidell (2007) recommend, I applied a Bonferroni correction using the nine terms present in the model, thus statistical significance would be $p < .0055$. From these tests, I confirmed all linear relations of continuous independent variables to the logit of the dependent variable. See Appendix A, Tables A.1. and A.2. for full outputs from these tests.

Next, I examined the model for collinearity, ie. the strong correlation of dependent variables with each other. To do this, I transformed categorical independent variables into a series of binary-valued dummy variables and checked the Variance Inflation Factor (VIF) using collinearity diagnostics in a series of linear regressions using my independent variables only. From these diagnostics, VIF was less than 3.0 in all cases except between different values of the same categorical variables in a few instances. This is not a concern because I need the test to identify correlation *between* variables only. Thus, the models' included independent variables are not highly correlated and I met requirement of non-collinearity. See Appendix A, Tables A.3. thru A.26. for output from these diagnostics.

With the sample sizes accounted for and critical assumptions of logistical regressions satisfied, below are my analyses. First, I examine associations between each independent variable and dependent variable and identify which correlate with each other and identify any sample size concerns. Following this, I examine and discuss logistical regression models for the to-school and from-school journeys, and any significant findings. A clearer picture of what matters to Fleetwood parents/caregivers will emerge from these analyses.

Chapter 6.

Analysis

An examination of STP's affect in Fleetwood, and a review of the local urban form, are both necessary before my analyses examine the influence of household variables on AST in Fleetwood and inform policy to increase AST. Unfortunately, this rich information can only offer *context;* a statistical examination of STP's affects, and/or inclusion of urban form into my regression models, are both problematic for reasons detailed below.

6.1. Effect of School Travel Planning

HASTe engaged in School Travel Planning at these schools between 2013 and 2014, with three of the schools continuing for second year, completing their work at these schools in 2015. The data collected in 2013 is from before HASTe began STP, so there is a baseline from which to compare post-STP, 2014 and 2015 levels of walking/scooting/skating vs driving/carpooling to and from school.

As noted earlier, because HASTe's surveys were anonymous, and HASTe did not track respondents across time, there is no way of knowing whether the same students and families provided data at more than one-time interval. Furthermore, student composition at each school changed each year as new students enrolled and previously students graduated, moved away, or enrolled elsewhere. For these reasons, it is not fully valid to compare modes of travel to and from school between school years. That being said, it could be that STP had a lasting influence on the schools' cultures and made institutional changes that are detected in the years of STP, despite the schools' populations being somewhat different.

If STP had the intended effect at these five Fleetwood elementary schools then there would be a decrease in rates of driving/carpooling students to and from school, and an increase in walking/skating/scooting to and from school. Between 2013 and 2014 walking/skating/scooting rates changed between -16.7% and +3.2%. Those three schools that completed a second year of STP should show a further decrease in driving/carpooling and increase in walking/scooting/skating between 2014 and 2015, and an overall increase in walking/scooting/skating from 2013 to 2015. Between 2014 and 2015 rates of walking/scooting/skating at these three schools increased between 1.4% and 12.2%. Between 2013 and 2015 rates of walking/scooting/skating at these three school changed between -4.5% and +5.6%.

Table 6.1. Crosstabulation: School Mode Shares 2013-2015

				Survey School						
Survey Year				Coast Meridian Elementary (CM)	Coyote Creek Elementary (CC)	Frost Road Elementary (FR)	Serpentine Heights Elementary (SH)	Walnut Road Elementary (WR)	Total (CM, FR, WR)	Total (all)
2013	Student(s) Mode to School (DriveRef)?	Drive / Carpool	Count	28	50	107	66	64	199	315
			% within Survey School	32.6%	36.0%	48.6%	46.8%	29.5%	38.0%	39.2%
		Walk / Scoot / Skate	Count	58	89	113	75	153	324	488
			% within Survey School	67.4%	64.0%	51.4%	53.2%	70.5%	52.0%	60.8%
2014	Student(s) Mode to School (DriveRef)?	Drive / Carpool	Count	70	139	148	84	111	329	552
			% within Survey School	49.3%	51.9%	45.4%	56.4%	34.0%	41.4 %	45.6%
		Walk / Scoot / Skate	Count	72	129	178	65	215	465	659
			% within Survey School	50.7%	48.1%	54.6%	43.6%	66.0%	58.6%	54.4%
			% Change from 2013	-16.7%	-15.9%	+3.2%	-9.6%	-4.5%		

2015	Student(s) Mode to School (DriveRef)?	Drive / Carpool	Count	46	No Data	119	No Data	118	283	283
			% within Survey School	37.1%		43.0%		32.6%	37.1%	37.1%
		Walk / Scoot / Skate	Count	78	No Data	158	No Data	244	480	480
			% within Survey School	62.9%		57.0%		67.4%	62.9%	62.9%
			% Change from 2013	-4.5%	N/A	+5.6%	N/A	-3.1%		
			% Change from 2014	+12.2%	N/A	+3.2%	N/A	+1.4%		

Unfortunately, there is little evidence that STP by HASTe at these five Fleetwood elementary schools had a positive effect on the rates of walking/skating/scooting. Both slightly different student populations at each school each year, and inclimate weather, could have affected these AST rates. As noted in HASTe's reports, weather during the latter half of October 2013 when data collection was warm, clear, and ideal for active travel, whereas weather during the October 2014 week of data collection was rainy and cold (City of Surrey, 2015e, 2015f, 2015g, 2015h, 2015i; Environment Canada, 2013, 2014). It could be that the inclement 2014 weather masked the positive effect of School Travel Planning at these five schools, but it is impossible to know for sure. Weather during the latter half of October 2015 was more conducive to walking than 2014, but still not as warm or dry as 2013 (Environment Canada, 2015).

6.2. Urban Form and AST

Although there is not a sufficient sample size to incorporate urban form characteristics into regression analyses, it is worth reflecting on the possible influence of each schools' unique surrounding built form. Unfortunately, given the meagre sample size, these observations can only offer context to interpret regressions. An expanded analysis of urban form and inclusion of these variables into a regression analysis is an opportunity for further research in a much larger research project.

Below are urban form maps capturing the land use within 400m of each school, denoted by a zoning map with a 400m buffer. Maps of each schools' catchment areas accompany these. These catchment maps illustrate the selection of distances from home to school available to parents/caregivers to select when they completed HASTe's surveys use circular buffers.

The five schools offer interesting variations in urban form measurements. Some schools, like Coast Meridian (see Figure 6.1.) and Frost Road (see Figure 6.5.) have a diverse range of housing types in the immediate vicinity of the schools. Single-family residential developments surround Coyote Creek (see Figure 6.3.) and Serpentine Heights (see Figure 6.7.). Lastly, Walnut Road (see Figure 6.9.) has intensively dense suburban multi-family residential developments to the north, but only single-family homes to the south.

These different development patterns affect the shape and size of their catchments. Neighbourhoods with low-density, single-family and semi-rural development patterns like Coast Meridian, Coyote Creek, and Serpentine Heights have large sprawling catchments where students on the outer edges are 3.0km or further away from their schools (see Figures 6.2., 6.4., and 6.8.). Conversely, neighbourhoods with multifamily, relatively dense suburban development patterns like Frost Road and Walnut Road have much smaller school catchments where most students are within 1.6km of school (see Figure 6.6. and 6.10).

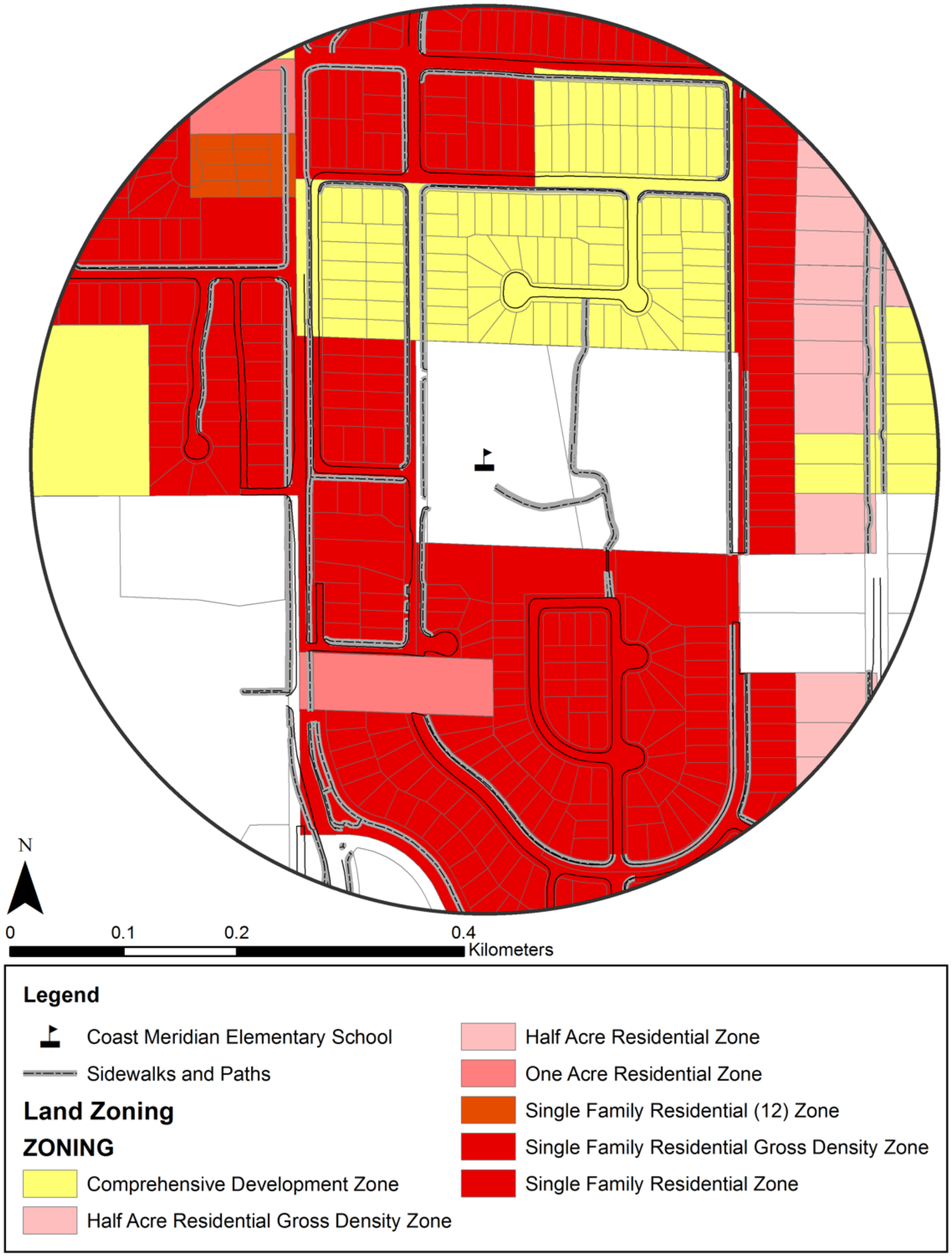

Figure 6.1. Coast Meridian Elementary School
Source: City of Surrey

Figure 6.2. Coast Meridian Elementary School – Catchment
Source: City of Surrey

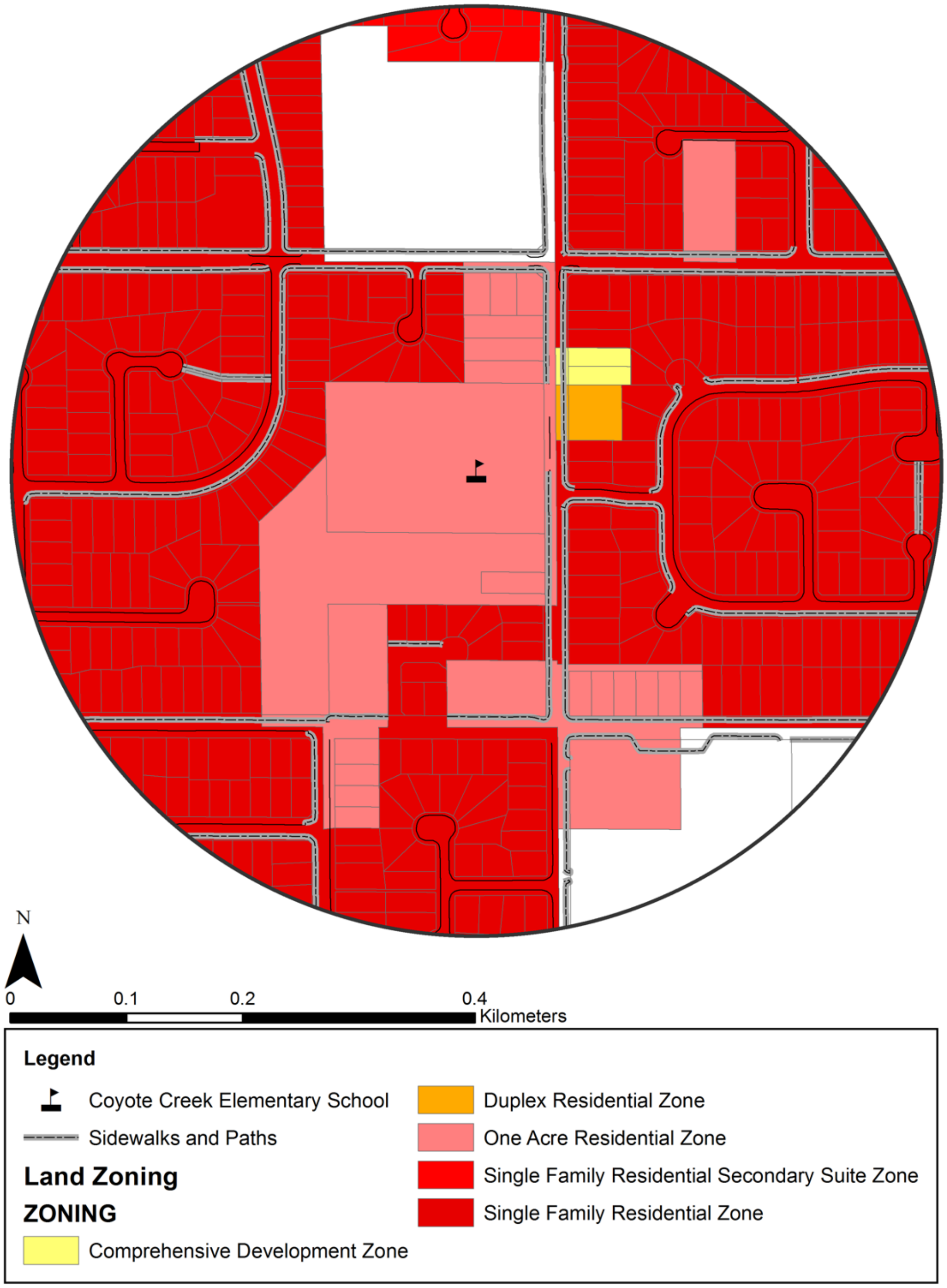

Figure 6.3. Coyote Creek Elementary School
Source: City of Surrey

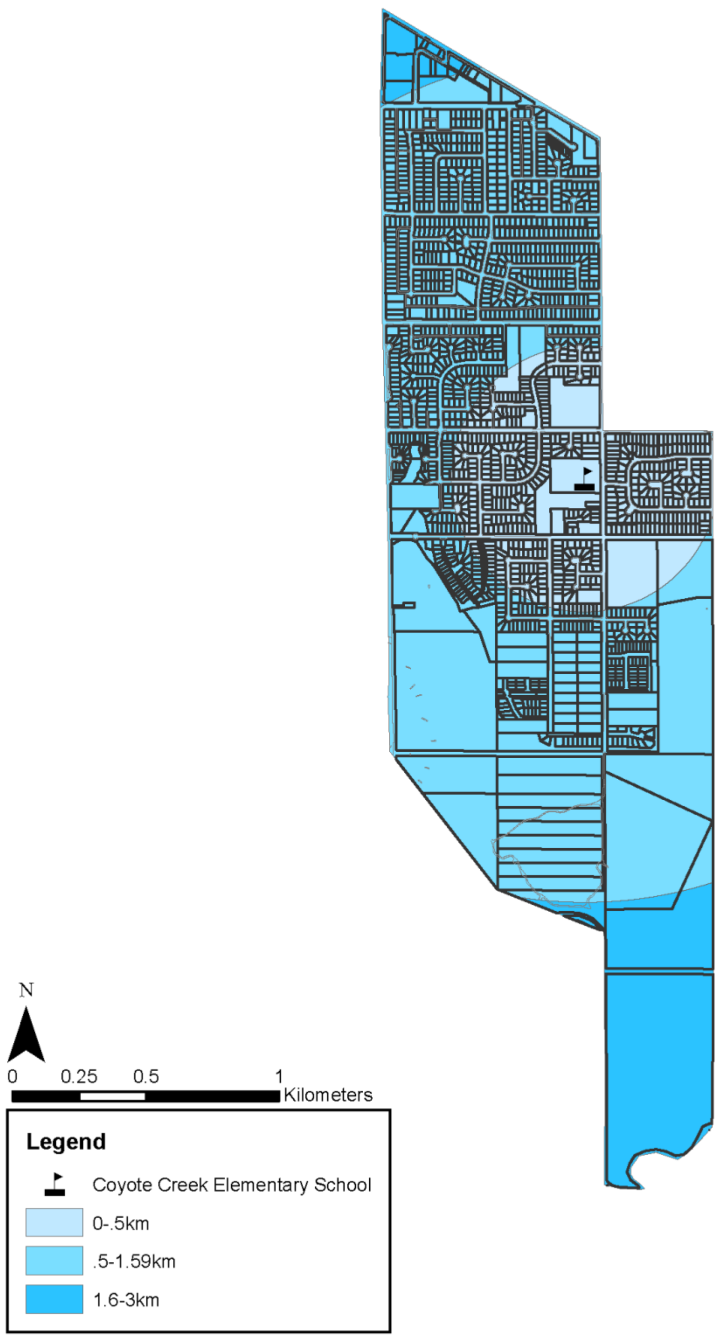

Figure 6.4. Coyote Creek Elementary School – Catchment
Source: City of Surrey

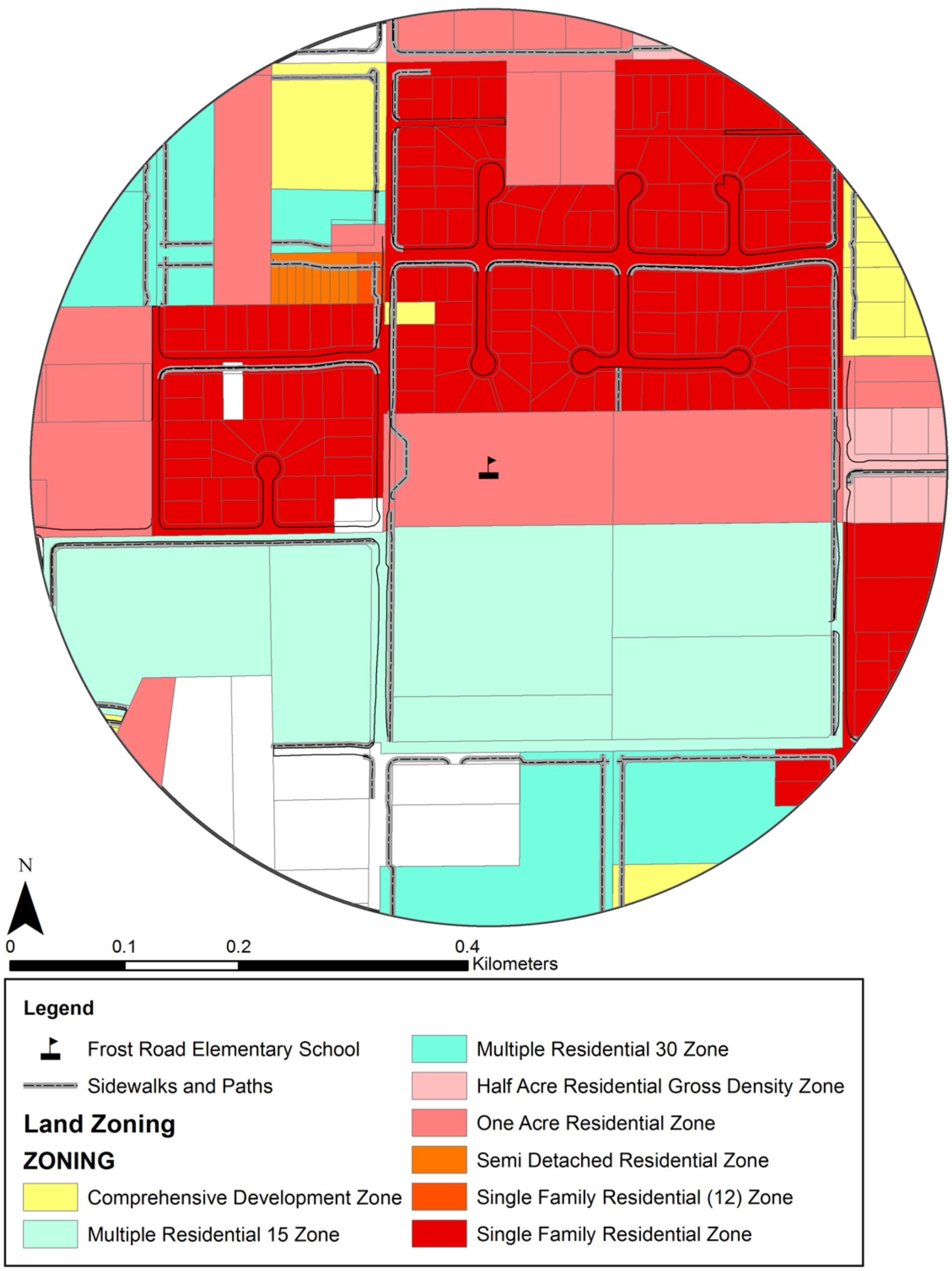

Figure 6.5. Frost Road Elementary School
Source: City of Surrey

Figure 6.6. Frost Road Elementary School – Catchment
Source: City of Surrey

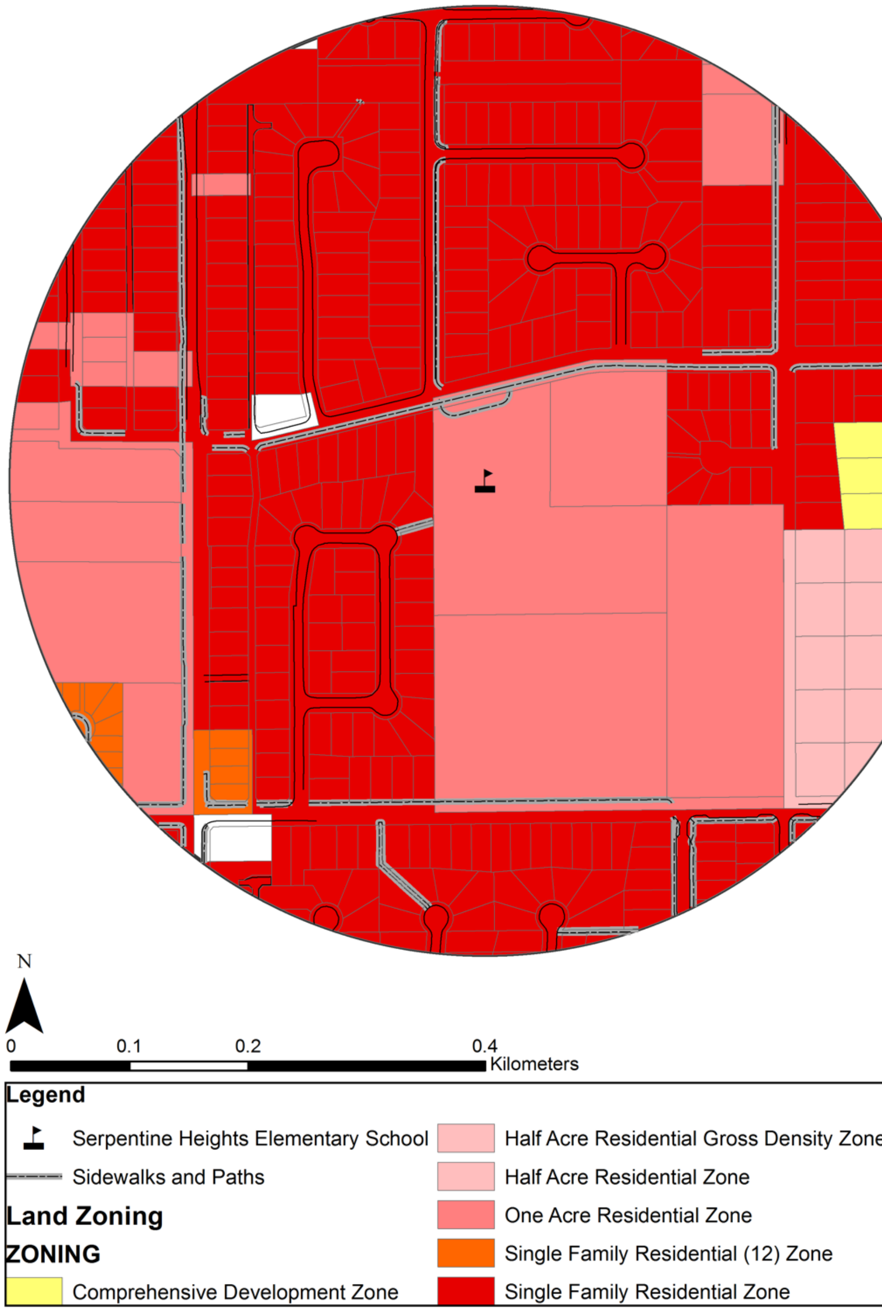

Figure 6.7. Serpentine Heights Elementary School
Source: City of Surrey

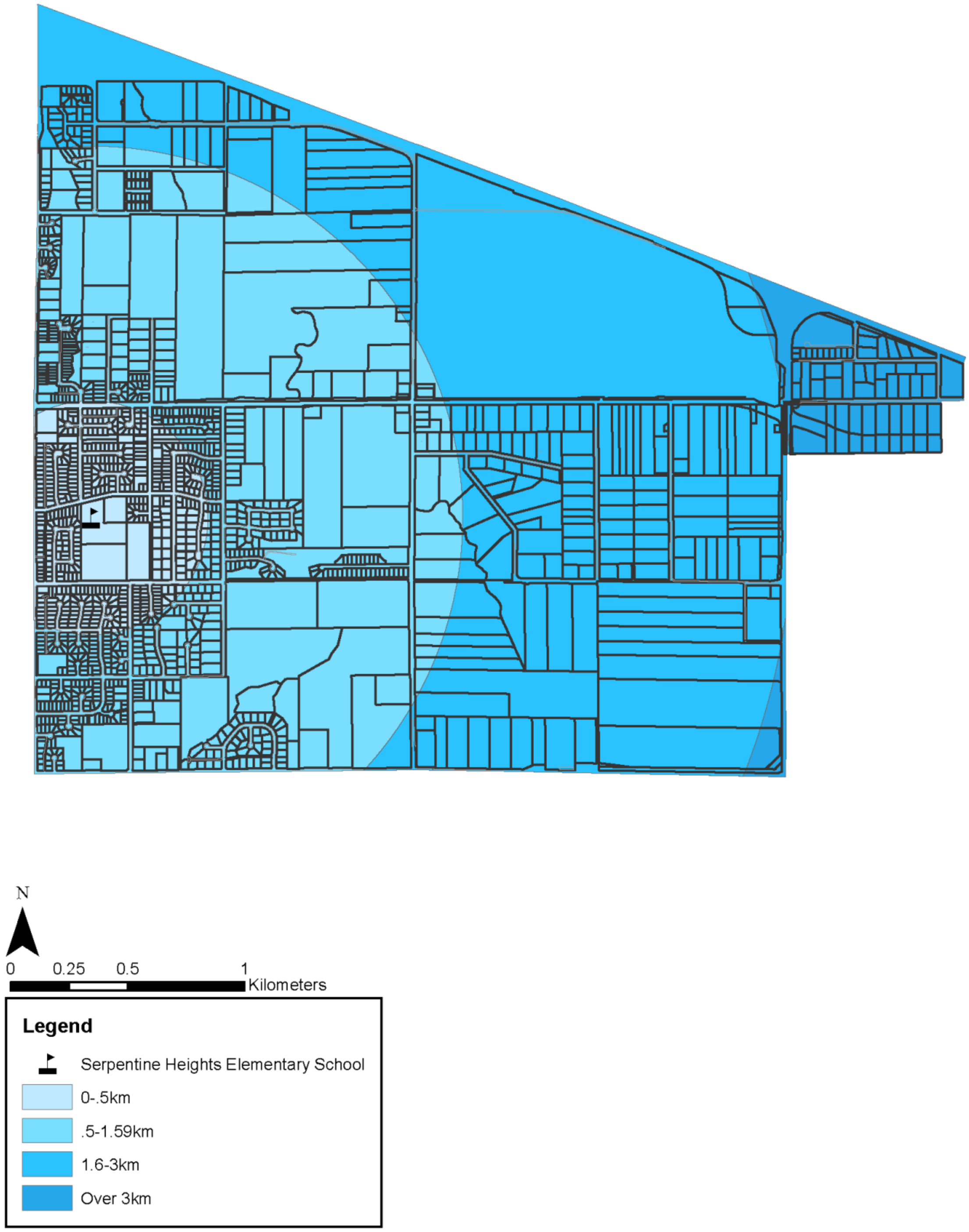

Figure 6.8. Serpentine Heights Elementary School – Catchment
Source: City of Surrey

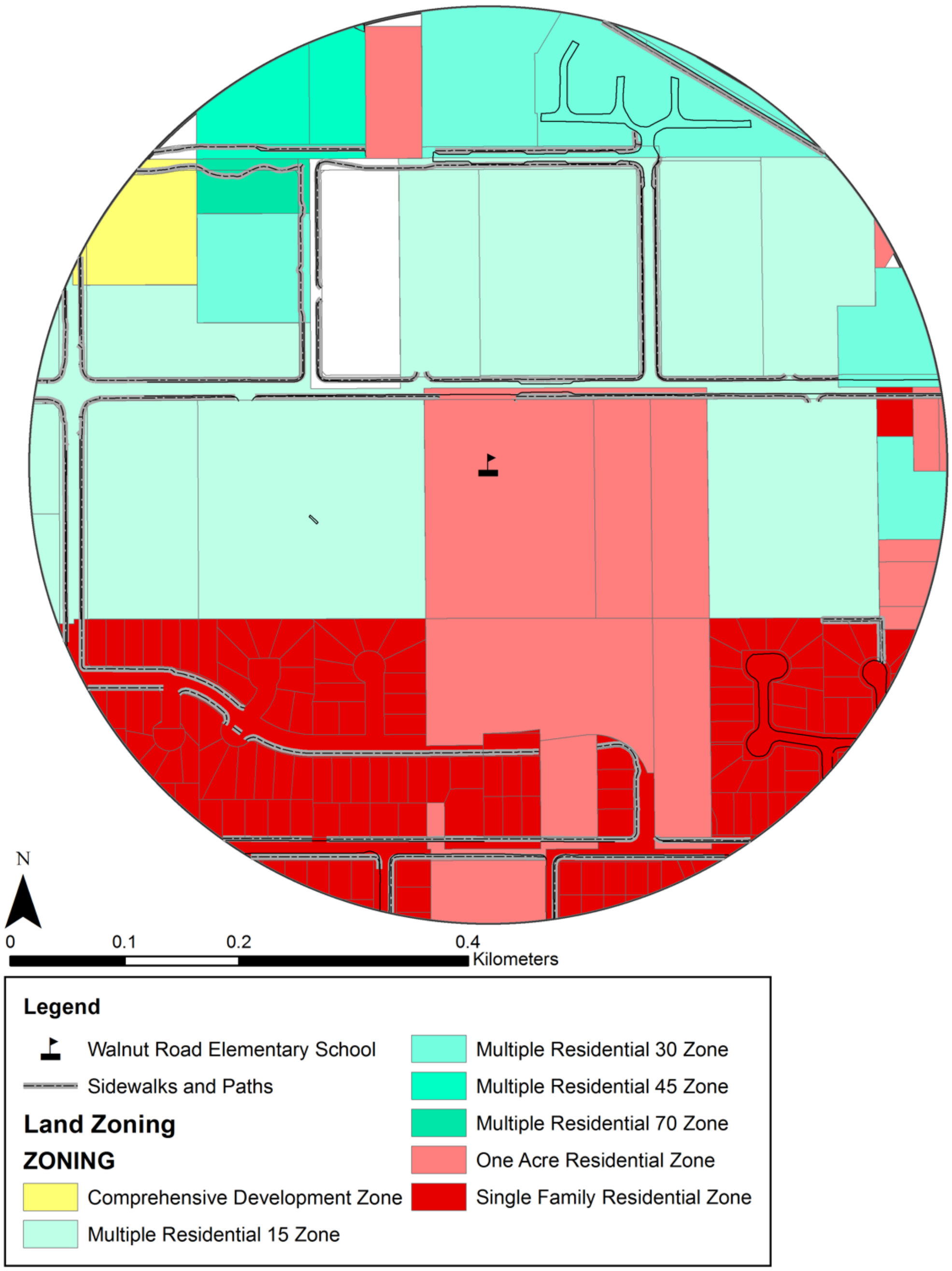

Figure 6.9. Walnut Road Elementary School
Source: City of Surrey

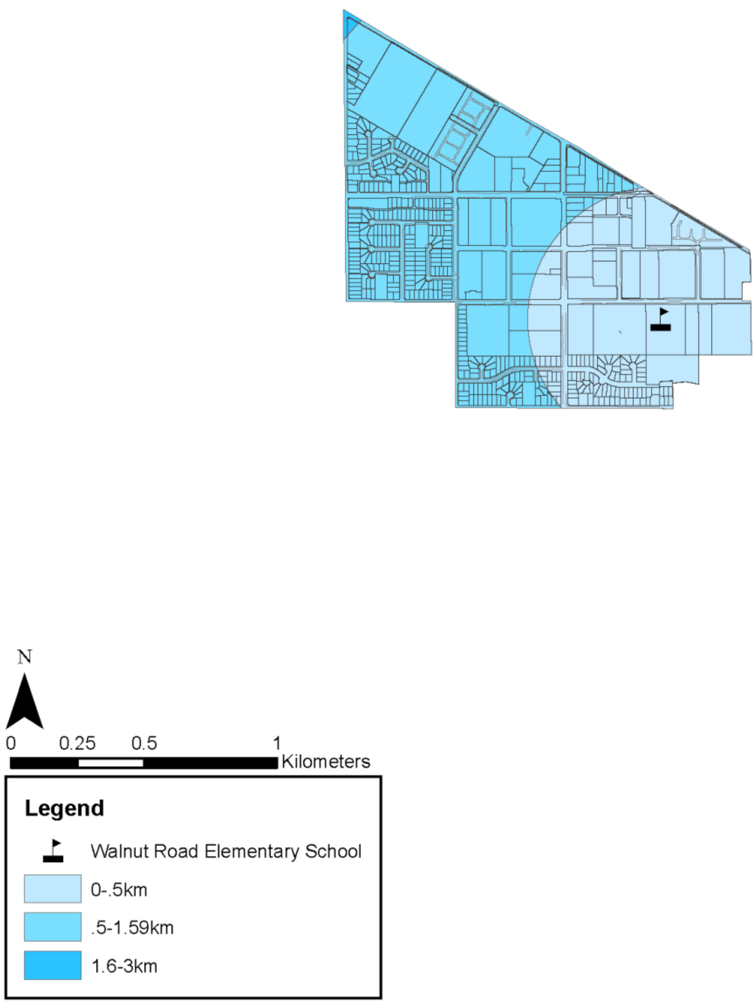

Figure 6.10. Walnut Road Elementary School – Catchment
Source: City of Surrey

Follow-up surveys show variation of walking/skating/scooting and driving/carpooling rates each year at each school (see Table 6.2.). Walnut Road consistently reported strong rates of AST. Likewise, Serpentine Heights consistently reported nearly equal rates of walking/skating/scooting and driving/carpooling. In both 2013 and 2014, the only years when HASTe collected data at Serpentine Heights, the school reported the lowest rates of AST among the five elementary schools for both the to and from school journeys.

Table 6.2. Mode-Split per School per Year

	2013				2014				2015			
	To School		From School		To School		From School		To School		From School	
	Walk / Scoot / Skate	Drive / Carpool	Walk / Scoot / Skate	Drive / Carpool	Walk / Scoot / Skate	Drive / Carpool	Walk / Scoot / Skate	Drive / Carpool	Walk / Scoot / Skate	Drive / Carpool	Walk / Scoot / Skate	Drive / Carpool
Coast Meridian	67%	33%	71%	29%	51%	49%	62%	38%	63%	37%	61%	40%
Coyote Creek	64%	36%	73%	27%	48%	52%	58%	42%	n/a	n/a	n/a	n/a
Frost Road	51%	49%	61%	39%	55%	45%	58%	43%	57%	43%	69%	31%
Serpentine Heights	53%	47%	54%	46%	44%	56%	49%	51%	n/a	n/a	n/a	n/a
Walnut Road	78%	33%	68%	23%	66%	34%	70%	30%	67%	33%	71%	29%

The urban form immediately surrounding Serpentine Heights Elementary School is low-density, single-family suburban. The area is fully developed with suburban cul-de-sacs and a disconnected pedestrian environment typical of Fleetwood subdivision developments. Interestingly, the urban form immediately proximate to Serpentine Heights Elementary is not unlike that of urban form of the area surrounding Coyote Creek Elementary. Although Coyote Creek has higher AST rates in 2013 both had similarly underwhelming 2014 AST rates according to HASTe survey data.

Walnut Road Elementary, the consistently high-AST school, has a distinctly higher density development pattern in the area surrounding the school. Instead of single-family suburban homes Walnut Road Elementary has low, medium, and medium-high density multi-family condominium developments in approximately 60% of the residential space within 400m of the school. These developments have interior, dead-end circulation streets and lanes, but the city street grid in this area is rich in pedestrian connections, albeit at an automobile scale.

Neighbourhoods' residential density helps determine their school's catchment size. The catchment size determines the maximum distance required to travel to school for in-catchment students. Residential density cannot be the only factor that determines caregivers' choice of how their child(ren) travel to school however because although Frost Road has a catchment approximately the same size at Walnut Road, students walked/scooted/skated to and from school much less at Frost Road than at Walnut Road. The variable association and binomial logistic regression models below will hopefully provide addition insight to explain why some children walked/scooted/skated to and from school while others were driven/carpooled.

6.3. Variable Associations

During STP HASTe collected 3272 surveys from the five Fleetwood elementary schools. Of these 3200+ surveys, 29.1% of surveys (n=952) are 2013 baseline surveys, completed by students and their caregivers/parents. Next, 43.5% (n=1422) are 2014 follow-up surveys completed by caregivers/parents. Finally, 27.4% (n=898) are 2015 follow-up surveys collected by caregivers/parents of students from the three schools that continued for a second STP year. The format of the baseline surveys differed from the follow-up surveys such that although each collected information on how children travelled to and from school, the two surveys did not collect the same household-level independent variables. All AST rates by school by year is below, in Table 6.3..

Table 6.3. AST Rates by School by Survey Sample

		2013		2014		2015	
		To School	From School	To School	From School	To School	From School
Coast Meridian	Baseline Survey	67.4%	71.1%	-	-	-	-
	Follow-up Survey	-	-	50.7%	61.9%	62.9%	60.5%
Coyote Creek	Baseline Survey	64.0%	73..2%	-	-	-	-

	Follow-up Survey	-	-	48.1%	58.2%	n/a	n/a
Frost Road	Baseline Survey	51.4%	61.0%	-	-	-	-
	Follow-up Survey	-	-	54.6%	57.5%	57.0%	69.0%
Serpentine Heights	Baseline Survey	53.2%	53.8%	-	-	-	-
	Follow-up Survey	-	-	43.6%	48.6%	n/a	n/a
Walnut Road	Baseline Survey	70.5%	75.0%	-	-	-	-
	Follow-up Survey	-	-	66.0%	70.2%	67.4%	70.6%

Before I use a regression model to analyze how the household-level independent variables predicted the caregivers' decisions of how their children travel to and from school, it is prudent to examine the correlation of each variable independently.

Wherever valid, I use Crosstabulation and Chi-Square tests to examine association between each independent variable and the two possible dependent variables. All expected cell frequencies are greater than five, unless otherwise noted. The strength, or Phi (φ), of the association between the independent and dependent variable pairs will be reported, along with the significance of this association. See Appendix B for full output of these association tests.

6.3.1. Accompaniment and Mode to School

Children who traveled to school alone, with a sibling, or with a friend, walked/scooted/skated more often than children who traveled to school with adults. Obviously, primary school age students cannot drive themselves to school because they do not have drivers' licences or vehicles. Only follow-up surveys completed by caregivers collected this variable, and even some of these surveys were not fully completed, so only 53.1% (n=1736) of all cases contained data for both accompaniment and mode of travel to school. In this sample there was a statically significant, moderately strong association between accompaniment and mode of travel to school, $\varphi = 0.287$, $p < .0005$5. See Tables B.1. thru B.3. in Appendix B for full outputs.

As could be expected, almost all students who traveled to school alone walked/skated/scooted to school. Of the students who traveled to school with their parent/grandparent/caregiver, their mode of travel was almost equally divided between those who drove/carpooled and those who walked/skated/scooted. Students most commonly traveled to school with parents/grandparents, with 80.2% of households reporting this. Only 4.9% of students travelled alone, 4.3% of students travelled with another adult, and 10.6% travelled with a sibling or friend. The vast majority, more than 95% of students, travelled to school *with someone* according to their caregivers.

Other adults led "walking school buses" of convoyed children to school about 50% more often than they drove a carpool of children, but accompaniment by other adults was relatively rare. Finally, both siblings and friends' accompanied children much more frequently by walking/scooting/skating than by automobile. When students travelled with a parent/grandparent/caregiver, other circumstances, such as parental employment and work patterns and aging grandparent mobility challenges could have influenced which mode of travel the *parent or grandparent choose* for the trip to school. In some places, like New Jersey, the likelihood that an child accompanied by a parent walks or cycles to school is cut in half or more if *either* parent works part-time or full-time in two-parent households (Park, Noland, & Lachapelle, 2013). This could reflect employment and residency patterns. Research has identified that American parents' mode of travel to work is strongly influenced by distance from home to work. If working parents drive to work, either because it is far away or because they live in a low-density neighbourhood, *and* they escort their children to school, then their children are much more likely to be driven to school (Deka, 2013).

6.3.2. Distance and Mode to School

Children living nearest to school walked/scooted/skated to school the most often, and the further that students lived from school, the less often that they walked/scooted/skated to school. All surveys collected this variable. Baseline surveys of students included school catchment maps where caregivers marked their home and any neighbourhood safety concerns. This data recorded how students travelled to and from school during the week of data collection. The map and baseline survey data cannot be matched with the latter surveys, so they are treated as two independent data points. In surveys caregivers checked boxes indicating the distance between home and school instead of marking their homes on a map.

Because this data was collected at every survey point at each school, 81.7% (n=2673) of all cases contained data for both distance from home to school and mode of travel to school. There was a statically significant, strong association between distance and mode of travel to school, $\varphi = 0.574$, $p < .0005$5. See Tables B.4. thru B.6. in Appendix B for full outputs.

Interestingly, almost half of all students in the surveyed Fleetwood elementary school lived within .5km of their school. This could be because caregivers choose to live near their children's schools, or that students are more likely to attend in schools that they live near, possibly because of Surrey School District 36's catchment-based school enrollment system. School catchments in the surveyed schools are irregularly shaped polygons; some very wide and others tall (see maps and discussion in 6.4. Urban Form and AST). They range in size also, with between 1667m and 3786m from the schools to the furthest edge of the catchment area, with an average of 2384m for this distance. This irregularity partially explains why so few families lived more than 3km from their child(ren)'s school; only some catchments are large enough for this to be possible. In Surrey, families are able to apply to attend a school outside of the catchment where they live if that school has spare student capacity, so some families could live outside of the schools' catchments and comprise a portion of the sample that reported living beyond 3km from the school.

Of the five schools being studied, out-of-catchment enrollment is not available at Coast Meridian Elementary, Frost Road Elementary, or Walnut Road Elementary because these schools are at, or beyond, their capacity (Surrey School District 36, 2016). Over the last number of years, the Surrey School District was overwhelmed by the number of students enrolled in its schools, thus, many school buildings have a number ancillary structures, or “portables,” to provide additional classrooms (McElroy, 2015; Sherlock, 2016). Over enrollment at schools can result in a catchment boundary contraction to rebalance enrollment among surrounding schools. If new schools open, then all catchment areas in the neighbourhood of the new school will be redefined.

Of the students who reported walking/scooting/skating to school, 69.9% (n=1099) of them lived within .5km, and 27.8% (n=438) lived between .051 and 1.59km, of the school they attended, with only 36 children in the sample actively travelling to school from more than 1.6km from school. This pattern, where active travel rates drop off precariously after 1.6km, has been observed by other research (McDonald, 2007a). In my sample, 90.5% who lived 1.6 to 3.0km from school, and 93.5% of students who lived more than 3.0km from school, were driven to school.

Of the 1573 students who walked/scooted/skated to school, only 84 of them travelled alone, whereas approximately 700 students travelled to school with a parent or grandparent, and the rest with a sibling, friend, or other adult. The further from school the family lives, the longer the journey will take, and if the accompanying party’s final destination is not the school (e.g. parents, grandparents, other adults), then the time cost of actively travelling to school with their child, and home alone, would increase with increased distance, especially compared to the relative time-cost of driving. Time costs of walking can be very significant for accompanying adults. Working parents, grandparents, or other adults choose between walking to their child to school then home and driving to work, or simply driving to school and driving to work. The time cost of walking would be greater at longer distances, so travel mode of the accompanying adult could have a strong interaction with distance from home to school. Parental work pattern data could an area for further research. See Distance from Home to School, in 6.2.4. Significant Findings, for more on this.

6.3.3. Distance and Mode from School

Again, all surveys collected this variable. Slightly fewer cases contained data for both distance from home to school and mode of travel from school to home, with 77.5% (n=2536) of all cases containing data for both distance from home to school and mode of travel to school. There was a statically significant, strong association between distance and mode of travel from school, $\varphi = 0.552$, $p < .00055$. See Tables B.7. thru B.9. in Appendix B for full outputs.

The relationship between distance and caregivers' decisions of how students traveled from school to home is similar to that of distance and caregivers' decisions of how their children traveled *to school.* Students who live nearer to school walked/scooted/skated home more often than do students who live further away, especially beyond 1.59km. Perplexingly, there were still between 100 and 200 students driven to school and living within .5km. This short distance takes only 7 minutes at 4.3km/hr, the observed walking speed of American school children aged 5-13 included in 2001's National Household Travel Survey, via McDonald (2007a). This suggests that although distance from home to school is strongly associated with children's' mode of travel to and from school, there must be other factors that caregivers weighed when making their decisions, otherwise more or all children who lived so near to school would have walked/cycled/scooted to and from school.

Unfortunately, HASTe's surveys did not ask respondents who accompanied children on their trip home from school, so we cannot speculate on the relationship between accompaniment and distance from home on the trip from school to home. Rates of each mode from school do not differ greatly from rates of each mode to school, i.e. students of each relative distance walked/scooted/skated or were driven at approximately the same rates on each leg of their daily commutes. If the same relationship between mode of travel to school and accompaniment is present is present on the trip home from school, then a surprisingly high number of parents or grandparents are escorting children home from school. Data of accompaniment and mode from school would be another area for future research to collect data on and examine.

6.3.4. Child Age and Mode to School

All surveys recorded reports of student's ages. Cases include expected frequencies of children aged 5-12, because these are the typical ages of children who are enrolled in elementary school. According to BC's School Act, children are eligible to enroll in school if they are 5 years old on or before December 31st of the year of enrollment (Ministry of Education - Province of British Columbia, 2016). Between enrollment regulations and HASTe's surveys, in October of each year, survey data may capture some 4-year-old students whose birthdays are between October and December 31st, but the majority of students will be at least 5 years old. Lastly, students graduate elementary school at 12, unless they repeat a grade or enroll late, which HASTe did not collect any data on.

This preamble is necessary because HASTe's survey data captured data on a minority of elementary students aged one, 3, and 13-16 years of age. Together these make up 21 cases, or about 0.6% of the total cases included in my dataset. These cases are the product of incorrectly submitted surveys or students enrolling early or enrolling late and/or repeating grades in elementary school. Regardless, for the purposes of my analyses I have excluded any students not aged 4-12.

Following exclusion of any children younger than 4 years or older than 12, and any cases with incomplete data, 86.1% (n=2442) of all cases remain. Analyses detected only a statically insignificant, weak association between children's age and mode of travel to school, $\varphi = 0.062$, $p = .317$. See Tables B.10. thru B.12. in Appendix B for full outputs.

The available data does not support the notion that younger children are driven to school any more frequently than older elementary students, disagreeing with the body of literature which suggests that home range increases as children age (Spilsbury et al., 2009; Spilsbury, 2005). Across all age groups, approximately 4/10 students were driven/carpooled to school and 6/10 walked/scooted/skated to school. The only outlier from this pattern are 4-year-old students, where 52.2% were driven/carpooled to school, but there are only 23 included in the dataset, so this may not be representative of 4-year-old students more widely.

Beyond the lack of association between children's' ages and their travel modes there is a silver lining in how the available dataset from HASTe has nearly equal representation of students aged 5-12 in their dataset.

6.3.5. Child Age and Mode from School

On the return trip from home to school, there are fewer cases to analyze. Following exclusion of any children younger than 4 or older than 12, and any cases with incomplete data, 82.5% (n=2339) of all cases remain. There was a slightly stronger, but still statically insignificant, weak association between children's age and mode of travel from school, $\varphi = 0.066$, $p = .257$. See Tables B.13. thru B.15. in Appendix B for full outputs.

Here too the available data does not support the notion that younger children are driven to school any more frequently than older elementary students. Children of some ages reported walking/scooting/skating home from school more frequently than they did on the way to school, i.e. slightly fewer students of particular ages are driven/carpooled home from school than are driven/carpooled to school.

6.3.6. Child Gender and Mode to School

All surveys recorded reports of students' gender. There is nearly equal representation of each gender in the surveys, with survey data from 1255 female students and 1143 male students. Of all cases, 73.3% (n=2398) contained data for child gender and mode of travel from home to school. Analyses detected a statically significant, weak association between children's gender and mode of travel to school, $\varphi = 0.058$, $p = .004$. See Tables B.16. thru B.18. in Appendix B for full outputs.

The available data shows that a greater proportion of boys walked/scooted/skated to school than did girls, with 61.6% of boys walking/scooting/skating versus 55.9% of girls. Obviously, with mode being binary, this means that proportionally more girls than boys were driven/carpooled to school.

If caregivers are choosing how their children travel to school, then it could be that caregivers have more confidence, or less fear, albeit marginally, of boys walking/scooting/skating to school versus girls. Research supports this notion. In a historical analysis of six datasets collected between 1977 and 2009, of AST by American students, boys travelled to school actively 1-2% more often than did girls (McDonald, 2012).

6.3.7. Child Gender and Mode from School

Again, all surveys recorded reports of students' gender. Here too there is nearly equal representation of each gender in the surveys, with survey data from 1226 female students and 1069 male students. Of all cases, 70.1% (n=2295) contained data for child gender and mode of travel from home to school. There was a very weak association, but statically insignificant, relationship between children's gender and mode of travel from school, $\varphi = 0.014$, $p = .505$. See Tables B.19. thru B.21. in Appendix B for full outputs.

On the trip home from school there was more data on female students' mode of travel than male students, thus, there were greater numbers of more girls walking/ scooting/skating home from school than boys *and* more girls being driven/carpooling home from school. Proportionally more boys walked/scooted/skated home from school than did girls, but the gap was closed; only 1.3% more boys walked/scooted/skated than girls. This figure more represents the historical trends identified by McDonald (2012), of between 1% and 2% more male students engaging in AST than female students

6.3.8. Child Count and Mode to School

HASTe's follow-up surveys included a question on how many of the caregivers' children attended the same elementary school where STP was taking place. From this data, households reported whether they had one, two, three or four children attending the same elementary school between 2014 and 2015; no families reported having more than four children attending the same elementary school. From these reports, only four families (16 children) reported having four children attending the same school. These 16 children represent 0.7% of all cases with data on this variable. Because of this small sample, I have recoded this variable, grouping children of three sibling households with children of four sibling households, so that the CHILD_COUNT variable's possible values are "missing," one child, two children, and three or more children.

Surprisingly, there are almost equal numbers of single-child households and 2-child households where both children attended the same school between 2014 and 2015; there are many fewer households where 3 or more children attend the same school. Of all cases, 60.3% (n=1974) contained data of children's' siblings attending the same school and mode of travel from home to school. Analyses identified a very weak, statically insignificant association between child count and mode of travel to school, φ = 0.040, p = .204. See Tables B.22. thru B.24. in Appendix B for full outputs.

Interestingly, children with a single sibling attending the same school reported walking/scooting/skating to school no more frequently than did children without any siblings attending the same school, i.e. the much lauded buddy system seems ineffective on mode of travel to school. It could be that siblings do not always travel to school together. Available data suggests some power in numbers though, since children with two or more siblings attending the same school reported walking/scooting/skating to school more often than their single sibling or only-child classmates. These larger families are rare; cases where three or more children attended the same school make up only 7.3% (n=161) of valid students' cases, i.e. conclusions drawn from such a small subgroup should be made cautiously. A larger dataset with representation of all family structures could identify a statistically significant relationship between mode of travel to school and three or more child households, but HASTe's data falls short in this regard.

Spilsbury's (2005) interviews with families identified that accompaniment by a trusted adult or older siblings increased children's home ranges. Parents allowed their children to travel further from home with an older sibling than alone. However, no reviewed research to-date has found a statistically significant relationship between accompaniment to and/or from school by a sibling and AST.

6.3.9. Child Count and Mode from School

Even fewer follow-up surveys completed by caregivers included data on the number of only children attending the school and mode of travel from school to home. Of all cases, 58.7% (n=1921) contained data of children's siblings attending the same school and mode of travel from school to home. There was a very weak, statistically insignificant association between child count and mode of travel to school, φ = 0.040, p = .215. See Tables B.25. thru B.27. in Appendix B for full outputs.

Here again it is unclear what conclusions can be interpreted from the correlation of these two variables, given the weak, and statistically insignificant relationship that they have to each other. Marginally more children without siblings walked/scooted/skated home from school than did children with 1 or 2 siblings attending the same school. In other words, children with more siblings attending the same school were driven home from school more often than were children without siblings, but only marginally. The number of siblings, or even presence of siblings attending the same school, seems to have very little bearing on caregivers' choice of mode for their children's return trip home from school.

6.3.10. Caregiver Perception of Safety and Mode to School

Most caregivers in HASTe's sample felt that their neighbourhood was safe for children to walk to and from school. Only follow-up surveys collected data on caregivers' perception of safety in their neighbourhood. Surveys asked caregivers how much they agreed or disagreed with the statement: "Our neighbourhood is safe for children to walk to and from school." The available degrees of agreement and disagreement were arranged on a four-point Likert scale; caregivers chose between "Strongly Agree," "Agree," "Disagree," and "Strongly Disagree."

Of the available choices, only 1.9% (n=61) of caregivers indicated that they strongly disagreed with the statement. Presumably, if residents strongly felt that their neighbourhood was unsafe, and if they had sufficient means, then they would move to another neighbourhood that they thought was safer for their children. I have recoded the data to resolve the relative infrequency of "strongly disagree" as a selected answer. I have done this by combining "strongly disagree" and "disagree" into an amalgamated "disagree", and "strongly agree" and "agree" into "agree."

Perhaps unsurprisingly, the overwhelming majority of caregivers agreed that their neighbourhood *is* safe for children to walk to and from school. More caregivers agreed with this statement than allowed their children to walk/scoot/skate to school, so although some caregivers agreed, they still drove/carpooled their children to school. Of all cases, 83.0% (n=2716) contained data of caregivers' perceptions of neighbourhood safety and mode of travel from home to school. Analyses identified a statically significant association between caregiver perception of neighbourhood safety and mode of travel to school, $\varphi = 0.260$, $p < .00055$. See Tables B.28. thru B.30. in Appendix B for full outputs.

Although these two variables are associated with each other, questions arise from cases where the two seemingly are not. For instance, of cases where students were driven/carpooled to school, 75% (n=838) of these children's caregivers agreed with the statement that their neighbourhood was safe for children to *walk* to school. Similarly, of the students who walked/scooted/skated to school, 6.6% (n=105) of their caregivers disagreed with the statement that their neighbourhood is safe for children to walk to school. Some children were driven/carpooled to school, despite the safe neighbourhood, and others are walked/scooted/skated, despite their neighbourhood's perceived dangers.

6.3.11. Caregiver Perception of Safety and Mode from School

There are slightly fewer reports of how children traveled from school to home. Of all cases, 79.2% (n=2590) contained data of caregivers' perception of neighbourhood safety and mode of travel from school to home. There was a statically significant association between caregiver perception of neighbourhood safety and mode of travel home from school, $\varphi = 0.262$, $p < .00055$. See Tables B.31. thru B.33. in Appendix B for full outputs.

The association of these two variables is relatively consistent among students' mode to school and from school to home. Again the vast majority of caregivers agreed that their neighbourhood is safe for children to walk to and from school, and many of these same caregivers drove/carpooled their children from school to home, just as many of them did on the trip from home to school each morning.

6.3.12. Language and Mode to School

Only follow-up surveys collected data on the primary language spoken in students' homes. Caregivers were able to select between Surrey-specific options: "English," "Punjabi/Hindi," "Mandarin/Cantonese/Chinese," "Korean," "Philippine/Tagalog," or "Other (specify) ____." Commonly submitted alternative answers to this question at these five Fleetwood schools between 2014 and 2015 included: "Japanese," "Somali/Arabic," "Spanish," and "Vietnamese." Of the submitted answers to this question, "Japanese" was the least common, with only 10 children (0.5% of valid sample) of Japanese-speaking households, and all of them walked to school. Given that Japanese Canadians were some Fleetwood's first post-colonization residents in the mid-1800s, there is an irony in the greatly reduced population of Japanese-speaking households.

Unsurprisingly to any Surrey residents with knowledge of their City's diversity, fewer than half of children' households reported that English is the spoken language at home. Language spoken at home may actually undercount diversity, since second or third generation immigrants could assimilate and begin speaking English at home, so there could be great diversity even among the English-speaking households. Of all cases, 53.3% (n=1743) contained data of language spoken at home and mode of travel from home to school. There was a weak but statistically significant association between language spoken at home and mode of travel to school, $\varphi = 0.141$, $p < .00055$. See Tables B.34. thru B.36. in Appendix B for full outputs.

Again, language spoken at home is a poor proxy measurement of diversity. Generational language-speaking differences may be present among members of the same cultural group, thus, the spoken language of choice could depend on how long they have lived in Canada rather than their cultural background. Although some interesting relationships between language and mode of travel to school can be seen above, generalizing these to any specific language-speaking group in Fleetwood, Surrey, or Metro Vancouver, is problematic because of the relatively small sample sizes captured in these five schools between 2014 and 2015.

Given that HASTe's follow-up surveys did not collect data on income, home-language data could be capturing socioeconomic differences such as those between new immigrants to Canada and established residents. According to the City of Surrey and Immigrant Services Society of BC, because of housing prices in Metro Vancouver, Surrey has become a primary destination for refugees in the region (Sherrell & Immigrant Services Society of BC, 2009). Although the available data shows that some home language groups had higher or lower AST rates than others, it could be that this data is identifying some immigrant groups who have less income or do not have access to a vehicle. Other researchers have identified a correlation between access to a vehicle and children being driven to and from school (Panter et al., 2010), with the chance of children being driven to school increasing with each additional vehicle a household owns (Frank et al., 2007).

Despite these notes, there were comparable walking/scooting/skating and driving/carpooling rates among all language groups with more than 100 members except for the children of Hindi/Punjabi speaking households. Children of this group reported being driven/carpooling to school more often than walking/scooting/skating to school. On other side of the spectrum, students of Mandarin/Cantonese/Chinese, Korean, and Philippine/Tagalog speaking households were the most actively travelling household language groups with substantial sample sizes. Students of English-speaking households walked/scooted/skated to school 58% of the time, i.e. English-speaking households walked/scooted/skated less often than Mandarin/Cantonese/Chinese, Korean, and Philippine/Tagalog speaking households, but more often than Hindi/Punjabi and Vietnamese speaking households.

6.3.13. Language and Mode from School

Again, only follow-up surveys collected data on this variable. Of all cases, 51.9% (n=1698) contained data of language spoken at home and mode of travel from school to home. All expected cell frequencies were greater than five except for one; there were no Japanese-speaking households where children were driven or carpooled home from school. There was a statistically significant association between language spoken at home and mode of travel to home from school, $\varphi = 0.190$, $p < .00055$. See Tables B.37. thru B.39. in Appendix B for full outputs.

Again, language-spoken at home is a poor proxy measurement of diversity, given generational differences that may be present among members of the same cultural group, and the possibility that home language data is capturing important, but unmeasured, socioeconomic differences between each language-speaking group. With these caveats in mind, the available data and analyses indicated greater rates of walking/scooting/skating and lower rates of being driven/carpooling on the trip home versus the trip to school among those language groups of with more than 100 members. Data and analyses of language groups with fewer members did not achieve statistical significance.

Of the five language groups with more than 100 members, students of Hindi/Punjabi speaking households reported walking/scooting/skating home from school the least frequently, although they walked/scooted/skated home from school more often than they did to school. Students of these households were driven or carpooled home from school 45% of the time. The students of Mandarin/Cantonese/Chinese, Korean, and Philippine/Tagalog speaking households most frequently reported walking/scooting/skating home from the school; 70-80% of students from these households walked/scooted/skated home from school. Lastly, students of English-speaking households walked/scooted/skated home from school less often than the high-performers, and more often than the low-performers, walking/skating/scooting home from school 60% of the time.

6.4. Binomial Logistic Regression

The previous statistical analyses were helpful to understand which of HASTe's collected variables had statistically significant bivariate relationships with students' modes of travel, and the magnitude of this relationship, but further analyses are required to understand the influence of each of these variables on mode choices in relation to other variables. These analyses will not bring us all the way to causation from the above correlations, but they will bring us nearer. Because the dependent variable is binary, students either walk/scoot/skate or are driven/carpool to and/or from school, a binomial logistic regression is the ideal tool to isolate the predictive power of each independent variable.

These analyses will use all of the previously analyzed independent variables, thus, any exclusions made thus far are carried over to these analyses. Further, if any cases are missing data of *any independent variable* then that case are excluded. This exclusion discards all data from baseline surveys since they collected data on only half of the independent variables that the follow-up surveys did.

Any cases where the students were younger than 4 or older than 12 years old have been excluded from the binomial analyses here, as they were from the previous analyses, for the same reasons that they were previously excluded. Cases where surveys reported either Japanese or Spanish as the household spoken language are also excluded from the regressions because early regression analyses of these small sample groups where they were included resulted in problematic, nonsensical output.

I have also added a variable to the regressions, CHILD_AGE_SQ, which is a transformation of the child age variable's data. The results of Homer and Lemeshaw tests in early regression models identified a non-linear relationship. The inclusion of the new CHILD_AGE_SQ along with the original CHILD_AGE improved the regression models, resulting in insignificant ($p = .197$) Homer and Lemeshaw test result, indicating that the model was no longer a poor fit.

6.4.1. Variable Structures

Two types of independent variables, categorical and continuous, are included in the binomial logistic regressions. The regressions treat each of these variables differently, thus, output tables of each variables' predictive power are displayed differently.

When independent variables of a binomial regression are categorical, the model uses a specified value of the variable, a category, as a reference, or omitted, value to compare the other variable values/categories against. In each regression, the predictive value of each included variable category is calculated based on a comparison with the reference category of that variable. Below, in Table 6.4., the omitted/reference categories for each categorical variable are listed. For example, in the regression analyses, the odds ratio (Exp(B)) of being male (a compared category) and walking/scooting/skating to or from school (dependent variables) is relative to being female (the reference/omitted category) and walking/scooting/skating to or from school (dependent variables).

Table 6.4. Categorical Variables

Categorical Variable	Omitted/Reference Category	Compared Categories
CHILD_ACCOMPANIMENT	Parent/Grandparent/Caregiver	Other Adult
		Sibling
		Friend
		None (Child Travels Alone)
DISTANCE_HomeToSchool	Less than 0.5km	0.51km to 1.59km
		1.60km to 3km
		over 3km
HOME_LANGUAGE	English	Hindi/Punjabi
		Mandarin/Cantonese/Chinese
		Korean
		Philippine/Tagalog
		Vietnamese
		Arabic/Somali
CHILD_SEX	Female	Male
CAREGIVER_SAFE_BINARY	Disagree (with the statement "Our neighbourhood is safe for children to walk to and from school.")	Agree (with the statement "Our neighbourhood is safe for children to walk to and from school.")

When the independent variables of a binomial regression are continuous, the model uses the numeric values of the independent variables and the value of the independent variable to calculate incremental value of greater independent variables on the dependent variable. In other words, the regression determines how much more likely the dependent variable's value is 1 rather than 0 per single-point increase in the continuous independent variable's value. A primary assumption of this is that each continuous independent variable has a linear relationship with the dependent variable. A list of continuous variables is below, in Table 6.5.

Table 6.5. Continuous Variables

Categorical Variable	Value Range
CHILD_AGE	4-12 Years Old
CHILD_AGE_SQ	1-256 Years Old
CHILD_COUNT	1-3 Or More Children Per Household Attending The Same School

Lastly, the dependent variable of these regressions is dichotomous and coded as either 0 or 1, where 0 equals students travelling to or from school by car or carpool and 1 equals students travelling to or from school by walking or scooting or skating. Given this coding, the calculated predictive values of each independent variable below are of students walking/scooting/skating to and/or from school rather than driving/carpooling. To interpret the positive or negative impact of each independent variable on AST, look to the odds ratio. If an odds ratio is greater than 1 then the likelihood of students walking or scooting or skating increases, but if an odds ratio is less than 1, then the likelihood of students walking or scooting or skating decreases.

6.4.2. Mode to School

Of cases where caregivers reported their children's mode of travel to school, and where students were aged 4-12 years old and didn't speak Japanese or Spanish at home, 69.9% (n=1358) contained data on accompaniment, distance from home to school, children's age, children's gender, child count, caregiver perception of neighbourhood safety, and language spoken at home.

Table 6.6. Regression: Mode to School

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	CHILD_ACCOMPANIMENT *(parent/grandparent/caregiver)*			46.836	4	**.000**			
	CHILD_ACCOMPANIMENT (Other Adult)	1.242	.366	11.499	1	**.001**	3.461	1.689	7.094
	CHILD_ACCOMPANIMENT (Sibling)	1.745	.371	22.122	1	**.000**	5.727	2.767	11.850

CHILD_ACCOMPANIMENT (Friend)	.764	.377	4.122	1	**.042**	2.148	1.027	4.492
CHILD_ACCOMPANIMENT (Child Travels Alone)	3.885	1.054	13.579	1	**.000**	48.670	6.163	384.325
DISTANCE_HomeToSchool *(less than 0.5km)*			260.194	3	**.000**			
DISTANCE_HomeToSchool (0.51km to 1.59km)	-1.937	.153	160.311	1	**.000**	.144	.107	.195
DISTANCE_HomeToSchool (1.60km to 3km)	-3.832	.326	137.991	1	**.000**	.022	.011	.041
DISTANCE_HomeToSchool (over 3km)	-4.294	.543	62.563	1	**.000**	.014	.005	.040
HOME_LANGUAGE *(English)*			21.963	6	**.001**			
HOME_LANGUAGE (Hindi/Punjabi)	-.462	.197	5.507	1	**.019**	.630	.429	.927
HOME_LANGUAGE (Mandarin/Cantonese/ Chinese)	.221	.199	1.234	1	.267	1.248	.844	1.845
HOME_LANGUAGE (Korean)	.135	.290	.217	1	.641	1.145	.648	2.022
HOME_LANGUAGE (Philippine/Tagalog)	-.153	.291	.276	1	.599	.858	.486	1.517
HOME_LANGUAGE (Vietnamese)	-1.207	.378	10.166	1	**.001**	.299	.143	.628
HOME_LANGUAGE (Arabic/Somali)	.828	.599	1.913	1	.167	2.288	.708	7.396
CHILD_AGE	.393	.260	2.280	1	.131	1.481	.890	2.466
CHILD_AGE_SQ	-.024	.016	2.273	1	.132	.977	.947	1.007
CHILD_SEX (Male)	.260	.144	3.263	1	.071	1.297	.978	1.719
CHILD_COUNT	-.035	.119	.087	1	.768	.966	.765	1.218
CAREGIVER_SAFE_BINARY (Agree, (*disagree*))	1.211	.233	27.047	1	**.000**	3.357	2.127	5.298
Constant	-1.157	1.091	1.123	1	.289	.315		

a. Variable(s) entered on step 1: CHILD_ACCOMPANIMENT, DISTANCE_HomeToSchool, HOME_LANGUAGE, CHILD_AGE, CHILD_SEX, CHILD_COUNT, CAREGIVER_SAFE_BINARY, CHILD_AGE_SQ.

Table 6.7. Omnibus Tests of Model Coefficients: Mode to School

		Chi-square	df	Sig.
Step 1	Step	622.236	18	.000
	Block	622.236	18	.000
	Model	622.236	18	.000

Table 6.8. Model Summary: Mode to School

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	1232.543[a]	.368	.494

a. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

Table 6.9. Hosmer and Lemeshaw Test: Mode to School

Step	Chi-square	df	Sig.
1	11.081	8	.197

Table 6.10. Model Classification Table *without* Independent Variables: Mode to School

	Observed		Predicted: Student(s) Mode to School (DriveRef)? Drive / Carpool	Walk / Scoot / Skate	Percentage Correct
Step 0	Student(s) Mode to School (DriveRef)?	Drive / Carpool	0	582	.0
		Walk / Scoot / Skate	0	776	100.0
	Overall Percentage				57.1

a. Constant is included in the model.

b. The cut value is .500

Table 6.11. Model Classification Table *with* Independent Variables: Mode to School

			Predicted		
			Student(s) Mode to School (DriveRef)?		
	Observed		Drive / Carpool	Walk / Scoot / Skate	Percentage Correct
Step 1	Student(s) Mode to School (DriveRef)?	Drive / Carpool	449	133	77.1
		Walk / Scoot / Skate	149	627	80.8
	Overall Percentage				79.2

a. The cut value is .500

This first logistic regression ascertained the effects of child accompaniment, distance from home to school, language spoken at home, age, gender, number of siblings attending school together, and caregiver perception of neighbourhood safety on the likelihood that students walked/scooted/skated to school in the five Fleetwood elementary schools in 2014 and 2015. The logistic regression was statistically significant, $X^2(18) = 622.236$, $p < 00055$. The model explained between 36.8% (Cox & Snell R^2) and 49.4% (Nagelkerke R^2) of the variance in mode of travel to school and correctly classified 79.2% of all cases (versus 57.2% in the baseline model, see Table 6.10.), 77.1% students who drove/carpooled to school, and 80.8% of students who walked/scooted/skated to school.

Mode to School: Interactions

It is possible that the effect of independent variables on mode to school is itself affected, or moderated, by another independent variable in the model. To test this I ran a model with all previously included independent variables, and first level interaction terms, to examine if any interaction variables have a statistically significant effect on the dependent variable, mode to school. This model isolated the association of each dependent variable pair on the dependent variable. When dependent variables are categorical, this technique pairs each possible value of each categorical variable with every other possible categorical variable value and continuous variables, thus, it is unlikely to identify significant interactions where the counts of categorical values are low because the sample size of combinations between two low-count categorical values will be minuscule.

From this interaction model, two first level interaction effects were statistically significant: caregiver perception of safety by home language, specifically perception by Mandarin/Cantonese/Chinese-speaking households, and caregiver perception of safety by number of children per household attending the same school. See Table C.1. in Appendix C for full output.

6.4.3. Mode from School

Of cases where caregivers reported their children's mode of travel home from school, and where students were aged 4-12 years old and didn't speak Japanese or Spanish, 76.3% (n=1483) of cases included data on distance from home to school, children's age, children's gender, child count, caregiver perception of neighbourhood safety, and language spoken at home.

Table 6.12. Regression: Mode from School

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	DISTANCE_HomeToSchool *(less than 0.5km)*			258.036	3	**.000**			
	DISTANCE_HomeToSchool (0.51km to 1.59km)	-1.846	.156	139.647	1	**.000**	.158	.116	.214
	DISTANCE_HomeToSchool (1.60km to 3km)	-3.274	.233	198.002	1	**.000**	.038	.024	.060
	DISTANCE_HomeToSchool (over 3km)	-6.318	1.018	38.503	1	**.000**	.002	.000	.013
	HOME_LANGUAGE *(English)*			34.399	6	**.000**			
	HOME_LANGUAGE (Hindi/Punjabi)	-.350	.184	3.639	1	.056	.705	.492	1.010
	HOME_LANGUAGE (Mandarin/Cantonese/ Chinese)	.662	.200	10.983	1	**.001**	1.939	1.311	2.868
	HOME_LANGUAGE (Korean)	.594	.282	4.428	1	**.035**	1.811	1.042	3.148
	HOME_LANGUAGE (Philippine/Tagalog)	.432	.289	2.239	1	.135	1.540	.875	2.713
	HOME_LANGUAGE (Vietnamese)	-.948	.365	6.740	1	**.009**	.388	.190	.793
	HOME_LANGUAGE (Arabic/Somali)	-.215	.470	.209	1	.648	.807	.321	2.027

CHILD_AGE	.363	.248	2.136	1	.144	1.438	.884	2.339
CHILD_AGE_SQ	-.014	.015	.910	1	.340	.986	.958	1.015
CHILD_SEX (Male)	-.014	.138	.010	1	.920	.986	.752	1.293
CHILD_COUNT	.038	.113	.113	1	.737	1.039	.832	1.297
CAREGIVER_SAFE_BINARY (Agree, (*disagree*))	1.299	.196	43.842	1	**.000**	3.667	2.496	5.387
Constant	-1.172	1.034	1.284	1	.257	.310		

a. Variable(s) entered on step 1: DISTANCE_HomeToSchool, HOME_LANGUAGE, CHILD_AGE, CHILD_SEX, CHILD_COUNT, CAREGIVER_SAFE_BINARY, CHILD_AGE_SQ.

Table 6.13. Omnibus Tests of Model Coefficients: Mode Home from School

		Chi-square	df	Sig.
Step 1	Step	606.777	14	.000
	Block	606.777	14	.000
	Model	606.777	14	.000

Table 6.14. Model Summary: Mode Home from School

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	1327.923[a]	.336	.461

a. Estimation terminated at iteration number 7 because parameter estimates changed by less than .001.

Table 6.15. Hosmer and Lemeshaw Test: Mode Home from School

Step	Chi-square	df	Sig.
1	4.949	8	.763

Table 6.16. Model Classification Table *without* Independent Variables: Mode Home from School

	Observed		Predicted: Student(s) Mode from School (DriveRef)? Drive / Carpool	Walk / Scoot / Skate	Percentage Correct
Step 1	Student(s) Mode from School (DriveRef)?	Drive / Carpool	531	.0	531
		Walk / Scoot / Skate	952	100.0	952
	Overall Percentage				64.2

a. The cut value is .500

Table 6.17. Model Classification Table *with* Independent Variables: Mode Home from School

	Observed		Predicted: Student(s) Mode from School (DriveRef)? Drive / Carpool	Walk / Scoot / Skate	Percentage Correct
Step 1	Student(s) Mode from School (DriveRef)?	Drive / Carpool	324	207	61.0
		Walk / Scoot / Skate	115	837	87.9
	Overall Percentage				78.3

a. The cut value is .500

The second logistic regression ascertained the effects of distance from home to school, language spoken at home, age, gender, number of siblings attending school together, and caregiver perception of neighbourhood safety on the likelihood that students walked/scooted/skated home from school in the five Fleetwood elementary schools in 2014 and 2015. The logistic regression was statistically significant, $X^2(14) = 606.777$, $p < .00055$. The model explained between 33.6% (Cox & Snell R^2) and 46.1% (Nagelkerke R^2) of the variance in mode of travel to school and correctly classified 78.3% of cases (versus 64.2% in the baseline model, see Table 6.16.), 61.0% of students who drove/carpooled to school, and 87.3% of students who walked/scooted/skated to school.

Mode from School: Interactions

In a test of interactions effects with the same technique as used above, but examining mode from school rather than to school, one first level interaction effect was statistically significant: caregiver perception of safety by number of children per household attending the same school. See Table C.2. in Appendix C for full output.

6.4.4. Significant Findings

Of the seven independent variables included in the to-school model, only four had a statistically significant correlation with travel mode: child accompaniment, distance from home to school, language spoken at home, and caregiver perception of neighbourhood safety (as shown in Table 6.6.). Of the six independent variables included in the from-school model, only three had a statistically significant correlation with travel mode: distance from home to school, language spoken at home, and caregiver perception of neighbourhood safety (as shown in Table 6.12.). Of all first level interaction terms included in the to-school IV interaction model, two had a statistically significant correlation with travel mode: perception of neighbourhood safety by home language, and perception of neighbourhood safety by number of household children attending the same school. Of all first level interaction terms included in the from-school IV interaction model, had a statistically significant correlation with travel mode: caregiver perception of safety by number of children per household attending the same school.

Child Accompaniment

Students who travelled to school with an adult other than their parent, a friend, or a sibling were more likely to have walked/scooted/skated to school compared to students who travelled to school with their parent or grandparent, the reference/omitted category.

The 4.9% of students who travelled alone only walked/scooted/skated because they could only walk/scoot/skate; they were too young to drive and, it seems safe to assume, did not own vehicles. Because every student in this group walked/scooted/skated to school, they were 48.68 times more likely to have walked/scooted/skated compared to student who travelled with their parents or grandparents (95%CI=6.163 to 384.325). If caregivers allowed children the autonomy to travel alone, then they will travel actively. Unfortunately, very few caregivers in

Fleetwood had the confidence to grant their children the freedom to travel to school unaccompanied (n = 85).

Students who travelled to school with a sibling had the second greatest increased probability of having walked/scooted/skated; they were 5.53 times more likely to have walked/scooted/skated to school than students who travelled with their parents/grandparents (95%CI=2.767 to 11.850). If caregivers are choosing how students travel to school, then it could be that increased numbers of siblings travelling together increases caregivers' confidence in students' ability to navigate the neighbourhood safely. There is a statistically significant relationship between the number of siblings attending the same school and accompaniment, $\varphi = 0.249$, $p < .00055$ (see Tables D.1 thru D.3. in Appendix D). More than half of households where students who travelled to school with siblings had just two children attending the same school, but nearly 20% had only a single child attending the particular elementary school but reported to-school accompaniment by a sibling. In these cases, the accompanying sibling is likely attending a nearby secondary school on a similar school schedule, and hence accompanying their younger sibling to elementary school.

Next, students who travelled to school with an adult other than their parent or grandparent were 3.34 times more likely to have walked/scooted/skated to school than students who travelled with their parents/grandparents (95%CI=1.689 to 7.094). As previously described, the data suggests that other adults led "walking school buses" of walking/scooting/skating students to school about 50% more often than they drove carpools of students to school. Beyond this, I have little explanation to offer for the relatively high AST rates among students accompanied by adults other than their parents or grandparents; rates of AST and motorized travel are as expected by distance from home to school, children's ages, and children's genders. It could be that those adults who organized groups of children to travel to school together are motivated to do so actively and sustainably, or perhaps these other adults simply did not have access to vehicles large enough to transport all of the children in their travel group.

Finally, students who travelled to school with a friend were 2.15 times more likely to have walked/scooted/skated to school than students who travelled with their parents or grandparents (95%CI=1.027 to 4.492). Students' age may have been a factor here; there was a statistically significant relationship between accompaniment and students ages $\varphi = 0.399$, $p < .00055$. More students aged 9-12 travelled to school with friends than did younger students, suggesting that this accompaniment option may become as available as a choice by caregivers once children become more mature, and/or stronger friendships, with friends that caregivers approve of, form (see Tables D.4 thru D.6. in Appendix D). Alternatively, it could be that caregivers of these relatively older children gave their children's wish to travel with friends, rather than an adult, more consideration as the children became more mature.

Another benefit of maturity is that parents entrust older children with mobile phones. Fyhri et al. (2011) presents an argument that mobile phone ownership could impact children's travel patterns, citing Hjorthol's (2008) research indicating that 80-90% of 10-11 year old Finnish children own mobile phones. The relatively recent phenomenon of ubiquitous communication between parents and children may change parents' accompaniment calculus, giving them confidence in their children's ability to travel to school alone, because at any point parents can call their children or track their movements with the use of mobile applications. There is limited recent research establishing mobile phone ownership rates among Canadian youth and children. Media Smarts, a Canadian non-profit established by the Canadian Radio-television and Telecommunications Commission (CRTC), surveyed 5400+ Canadian students of every province and territory in grades 4 to 11 in 2013. This survey found that approximately 25% of grade 4 students (typically aged 8-9 years old) owned their own cell phone, and that the rate of ownership increased with age, so that approximately 52% of grade 7 students (typically aged 12-13 years old) owned their own cell phones. The rate of ownership continued to increase, peaking in grade 10, with about 86% of students owning their own cell phones.

Accompaniment and distance from home to school also shared a statistically significant relationship, $\varphi = 0.172$, $p < .00055$. Their parent/grandparent/caregiver, or another adult accompanied students who lived further than 0.51km from school more often than statistically expected (see Tables D.7 thru D.9. in Appendix D). Similarly, a friend or sibling accompanied students who lived within 0.5km of school more than statistically expected. Finally, children who travelled to school alone did so at higher rates within 0.5km of school, and lower rates beyond 0.51km, than statically expected. These accompaniment decisions could reflect time costs, because siblings and friends do not usually drive to school, or it could reflect the physical limits of caregivers' confidence in children's' ability to navigate on their own (Spilsbury, 2005; Woolley & Griffin, 2015).

Distance from Home to School

Unsurprisingly, students who lived nearer to school walked/scooted/skated to school more than did students who lived further away from school. Students who lived between 0.51km and 1.59km from school were 85.6% less likely (95%CI=0.107 to 0.195) to walk/scoot/skate to school compared to students who lived within 0.5km of school ($p < .00055$). Rates of active travel continued to decline as distance increased. Students who lived between 1.6km and 3.0km from school were 97.8% less likely (95%CI=0.011 to 0.041) to walk/scoot/skate to school as students who lived within 0.5km of school ($p < .00055$). Lastly, the most distantly located students, who lived further than 3.0km from school, were 98.6% less likely (95%CI=0.0055 to 0.040) to walk/scoot/skate to school compared with students who lived within 0.5km of school ($p < .00055$).

Distance from home to school continued to have a large effect on students' mode of travel on their return trip from school to home ($p < .00055$). Students who lived within 0.5km of school had the greatest probability of having walked/scooted/skated home from school. Students who lived between 0.51km and 1.59km from school were 84.2% less likely (95%CI=0.116 to 0.214) to walk/scoot/skate to school compared to students who lived within 0.5km of school ($p < .00055$). Students who lived between 1.6km and 3.0km from school were 96.2% less likely (95%CI=0.024 to 0.060) to walk/scoot/skate to school as students who lived within 0.5km of school ($p < .00055$). Lastly, the most distantly located students, who lived further than 3.0km from school, were 99.8% less likely (95%CI=0.000 to 0.013) to walk/scoot/skate to school compared with students who lived within 0.5km of school ($p < .00055$).

It could be that from the perspective of the planner or population health professional comparing these modes is like comparing "like" items, apples to apples, but as distances increase, from caregivers' perspectives these modes become different, and the comparison becomes like comparing apples to oranges. Differences between the time costs of walking/scooting/skating to school versus driving increases with distance from home to school such that the increased cost of AST, or increased savings of driving, increases dramatically the further away from school you live (see Table 6.18.).

Table 6.18. Distance and Time Costs

	Walking (4.3km/h) [a]	Driving (30 km/h) [b]
Less than 0.5km	7 minutes	1 minute
0.51km to 1.59km	7-22 minutes	1-3 minutes
1.6km to 3.0km	22-42 minutes	3-6 minutes
Over 3.0km	More than 42 minutes	More than 6 minutes

a. The observed speed limit of American schoolchildren aged 5-13, in 2001's National Household Travel Survey, via McDonald (2007a).

b. The British Columbia school zone speed limit.

Factoring in a walking return trip by the accompanying parent/grandparent/caregiver or other adult, the already great time costs of AST at longer distances would double, imposing a significant penalty on their productivity if they had work or other responsibilities to attend. This time waste could help explain the dramatic decrease of AST rates as distance increases (see Table 6.19.).

Table 6.19. Distance and AST Rates

	AST Rate to School (all schools, all years, to school)	AST Rate from School (all schools, all years, to school)
Less than 0.5km	85.3%	88.3%
0.51km to 1.59km	45.2%	55.4%
1.6km to 3.0km	9.5%	19.5%
Over 3.0km	6.5%	5.0%

Language Spoken at Home

The models also identified that language spoken at home has a significant effect on how children travel to school ($p = .001$). Of the six household-speaking languages analyzed, not including English-speaking households – the categorical reference value, analyses identified significant effects of two languages on mode to school. Compared to English-speaking households, students of Hindi/Punjabi-speaking households were 37% less likely (95%CI=0.429 to 0.927) to walk/scoot/skate to school rather than drive/carpool ($p = .019$). Likewise, compared to English-speaking households, students of Vietnamese-speaking households are 70.1% less likely (95%CI=0.143 to 0.628) to walk/scoot/skate to school ($p = .001$).

Similarly, the models identified that language spoken at home has a significant effect on how children travelled home from school ($p < .00055$). Of the eight household-speaking languages analyzed, analyses identified significant effects of three languages on mode home from school. Compared to English-speaking households, students of Mandarin/Cantonese/Chinese-speaking households were 1.9 times more likely (95%CI=1.311 to 2.868) to have walked/scooted/skated home from school rather than drove/carpooled ($p = .001$). Students of Korean-speaking households were 1.8 times more likely (95%CI=1.042 to 3.148) to have walked/scooted/skated home from school compared to English-speaking households ($p = .035$). Lastly, compared to English-speaking households, students of Vietnamese-speaking households were 61.2% less likely (95%CI=0.190 to 0.793) to have walked/scooted/skated home from school ($p = .009$).

It is worth noting again that language spoken at home is a poor proxy for student or parental ethnicity. The question only captures those households that speak another language other than English, thus, any immigrant families who have begun speaking English at home are not differentiated, despite potentially being ethnically diverse. In this sense, the “diversity” measured by the question probably underreported the actual diversity of these communities. Furthermore, it could be that immigrant families, who ardently speak English at home, make decisions regarding their children’s mode of travel to and from school according to their cultural beliefs, and not the language spoken at home. It could be that the insignificant results for most of the language groups, but significance of language as a whole, are a reflection of these problematic characteristics of measuring language spoken at home. Unfortunately for intellectual curiosity, any attempt at measuring ethnic background in a nation as culturally pluralistic as Canada is fraught with methodological issues and many, many possible groups and subgroups, making meaningful classification challenging.

Caregiver Perception of Neighbourhood Safety

Students of households where caregivers agreed that their neighbourhood was safe for children to walk to and from school were 3.36 times more likely (95%CI=2.127 to 5.298) to have walked/scooted/skated to school as children where parents disagreed with this statement ($p < .00055$). For the return trip, students of households where caregivers agreed that their neighbourhood was safe for children to walk to and from school were 3.67 times more likely (95%CI=2.496 to 5.387) to have walked/scooted/skated to school as children where parents disagreed with this statement ($p < .00055$).

Interestingly, although there was a statistically significant relationship between who accompanied students to school and caregiver perception of neighbourhood safety, $\varphi = 0.091$, $p < .009$, a shockingly high number of parents who agreed with that their neighbourhood was safe for children to walk to school accompanied their children to school. Caregivers of over 1100 students, 68.1% of all cases with accompaniment and perception of neighbourhood safety data, agreed that their neighbourhood was safe for children to walk to school *and* chose a parent/grandparent/caregiver to accompany their child/grandchild to school (see Tables D.10 thru D.12. in Appendix D). Recalling that approximately half of these parents/grandparents accompanied their walking/scooting/skating child actively (see Table B.1.), this could demonstrate support for literature's suggestion that parents who travel actively with their child form positive perceptions of their neighbourhood and neighbours as they actively travel through throughout (Ramanthan et al., 2014).

Most caregivers who disagreed with this statement accompanied their children to school; 86.1% of children were accompanied to school by a parent/grandparent/caregiver, with another 10% being accompanied by other adults, siblings, and friends. Only three children whose parents disagreed travelled to school alone; of all the children who travelled to school alone, 95.9% of their caregivers agreed that their neighbourhood was safe. A positive perception of safety by caregivers seems to be an almost necessary condition for independent student travel.

Caregivers' agreement or disagreement with this statement was also related to the distance from their home to the school ($\varphi = 0.208$, $p < .00055$). Caregivers who lived 0.51km to 1.59km or 1.6km to 3.0km from school disagreed with this statement more often than was statistically expected (see Tables D.13 thru D.15. in Appendix D). This suggests that as distance increased, they perceived an increased exposure to neighbourhood dangers, and that there was tipping point beyond 0.5km. On the other hand, 55 caregivers (6.6% of caregivers within 0.5km of school) lived within 0.5km of school and still disagreed with this statement, while fewer than statistically expected, it could be that some caregivers are fearful of their neighbourhood regardless of the distance between their children and their school. On a similar note, 71 caregivers (81.6% of caregivers further than 3km from school) agreed that their neighbourhood was safe for children to walk to school *and* lived more than 3.0km from school. Distance from home to school may have a statically significant relationship with neighbourhood perception of some, or even most caregivers, but it is not the only influence. Some caregivers will feel that their neighbourhood is unsafe for their children despite living close to school and others will feel that their neighbourhood is safe for their children to walk, despite living relatively far away.

Panter et al. (2010) examined Norfolk, UK, parents' perceptions of neighbourhood safety in more detail by breaking different components that made up their overall perception of the neighbourhood as safe or unsafe. Interestingly, they found that although some components, like parents' concerns around dangerous traffic en route to school *were* statistically related to distance from home to school among students who walked or cycled to school. Other components, like concerns about the risk of something happening to students as they walked or cycled from home to school, *were not* statistically related to distance from home to school. This latter component fluctuated very little between parents who lived less than 1km from school, between 1 and 2 km from school, and parents who lived further than 2km from the school their children attended. This more nuanced research suggests that the sampled Fleetwood families could have felt that their neighbourhoods' performed better on some aspects of safety than others, but that HASTe's question was too broad to capture this degree of specificity.

Mode to School: Interactions

In a model where first level interaction terms are included, and the dependent variable is mode to school, two interactions are significant.

First, caregivers who agreed that their neighbourhood is safe for children to walk to school significantly interacts with the language spoken at home ($p = .030$), but of the languages reported spoken, this is only present among Mandarin/Cantonese/Chinese-speaking households. Children of families that agree with this statement and speak Mandarin/Cantonese/Chinese at home were 20.517 times more likely (95%CI=2.839 to 148.256) to walk/skate/scoot to school compared with English-speaking households that disagree that their neighbourhood is safe for children to walk ($p = .003$).

Next, caregivers who agreed that their neighbourhood is safe for children to walk to school also significantly interacts with the number of children per household attending the same school ($p = .029$). Those caregivers who agree with this statement were 2.84 times more likely (95%CI=1.113 to 7.261) to allow their child(ren) to walk/skate/scoot to school for each additional child they have attending the same school, as compared with caregivers who disagreed with the statement and have the same number of children. See Appendix A, Table A.1. for the full model output. See Appendix B, Table B.1 for the full model output.

Mode from School: Interactions

In a model where first level interaction terms are included, and the dependent variable is mode from school, another two interactions are significant.

The number of siblings attending the same school has a significant interaction with home language ($p = .052$), and more specifically, between the number of siblings attending the same school and Hindi/Punjabi being spoken at home ($p = .008$). Students of homes where Hindi/Punjabi were spoken at home were 3.419 times more likely (95%CI=1.380 to 8.469) to have walked/scooted/skated home from school for each additional sibling they had attending the same school, compared with English-speaking households with the same number of children.

Again, there is interaction between caregivers who agreed that their neighbourhood is safe for children to walk to school and the number of children per household attending the same school ($p = .010$). Those caregivers who agreed with this statement were 3.49 times more likely (95%CI=1.342 to 9.081) to have allowed their child(ren) to walk/skate/scoot home from school for each additional child they have attending the same school, compared with caregivers who disagreed with this statement and have the same number of children. See Appendix B, Table B.2 for the full model output.

Chapter 7.

Conclusions: STP facilitators and Cities must do better

My research provides some insight in to the main factors influencing caregivers' decisions of how their children travel to and from school. In the context of success or failure as measured by the increase or decrease in AST by STP, HASTe and the City failed to deliver their goal, using McMillan's conceptual framework to evaluate STP interventions' value (2005). The outcome of their other goal, reducing traffic congestion around schools, was not measured.

Dooming the outcome of STP, neither Surrey nor HASTe addressed the most important factors identified by my analyses during STP. Of these, distance from home to school had the greatest effect on students' mode of travel, but there was also evidence that child accompaniment, language spoken at home, and perception of neighbourhood safety influenced caregivers' decisions.

In addition, there is no evidence that the STP process delivered by HASTe increased AST rates in the five Fleetwood schools studied. The STP consultant's (HASTe) education and special events, or the City's traffic enforcement and engineering solutions, or a combination of these, failed to affect caregivers'/parents' choices. This suggests that there is a disconnection between what the City/consultant deliver during STP, and what motivates caregivers/parents choices. STP delivery must address this disconnection. Cities can incentivize this redesign, and mandate deliverable AST increases, with performance-based contracts. If cities are serious about increasing AST, and there indications that Surrey is, then they will need to make additional policy changes.

These policy changes cannot remain solely in the engineering department because the planning department and other stakeholders are responsible for other policies that influence AST rates. As previously noted, the planning and engineering departments are each responsible for policies that researchers suggest affect AST, but engineering does not liaise with planning to work together to increase AST through policy. The City's planning and engineering departments must work together to incorporate this research's findings into their policies, *and* do a better job of engaging with school boards and caregivers/parents. If the engineering department engaged with the planning department to locate family-sized units of residential density around schools, so that more children live close to school, then more children may engage in AST than if planning continues to not consider AST when designing the neighbourhood concept plans that designate zoning and development. Also, any communications with caregivers/parents should engage residents in a range of languages representative of Surrey's diversity.

Unfortunately, my sample size and the data collected limit these insights. With additional data my recommendations could be more broadly applied, and a greater number of cases collected from a broader geographic area.

7.1. Implications for School Travel Planning

As Table 3.1. laid out, the City and the STP facilitator share the goal of increasing AST, but deliver different contributions toward this goal. Within the established STP process, the City produces STP handbooks for caregivers/parents and delivers engineering infrastructure improvements to increase the safety of pedestrians, especially children, travelling to school actively. The STP facilitator is responsible for affecting attitudinal change in caregivers/parents, encouraging them to choose AST for their children, and for identifying opportunities for the City to contribute these infrastructure improvements. From the available survey data in Fleetwood, the City and HASTe, the STP facilitator in Fleetwood during this period, each failed to meet components of their responsibility in delivering increase AST.

These failures are evident in the lack of increased AST. STP had no discernable effect in these five Fleetwood elementary schools, nor did a second year of STP have any discernable additional benefit for the three schools that received it. Between 2013 and 2014, AST rates *decreased* at four of the five schools between 16.7% and 4.5%, *increasing* at the one remaining school by 3.2%. Between 2013 and 2015, AST rates at the three schools that continued STP for a second school year decreased by 4.5% and 3.1% at two schools, and increased by 5.6% at the remaining school (see Table 6.1.). Whether schools received one year of STP programming or two, it did not increase AST rates at 4/5 of the Fleetwood schools.

The underwhelming result of STP in Fleetwood should be understood in the context of the relatively high baseline AST rates at the schools however. Compared to American studies of AST and STP, where 15-20% of students walk to school in the most active schools, Fleetwood AST rates are already high in 2013 (Boarnet et al., 2005; McDonald, 2008c). International AST and STP research found rates of AST that are more comparable in Australia and the UK, where 40-60% of students walk to school (Curtis et al., 2015; Panter et al., 2010). Finally, Fleetwood's AST rates are slightly above Metro Toronto AST rates among 14-15 year olds, and approximately on-par with Vancouver grade 8-10 students (Buliung et al., 2009; Frazer et al., 2015). It could be that Fleetwood students are already walking/scooting/skating to school as frequently as possible without higher level policy changes, but the fact that the City chose to engage in STP at these schools, and the schools' participation in STP, suggests that the stakeholders involved in Fleetwood believed that STP *could* increase AST rates even further.

The evident failure of STP to positive affect AST rates contrasts with official Surrey reports of STP results, where AST rates increased between "up to 28%" (Russell & Bottrill, 2011), and "as much as 30%" (City of Surrey, 2011a). Given these reports, it could be that either AST is much more effective at other schools, because of between school differences or STP facilitator differences, or that official City of Surrey reports only include very positive results.

Even if the studied Fleetwood schools' results are atypical among schools that have completed STP, there are dozens of Surrey schools that have not engaged in STP to-date, so insights from Fleetwood may prove useful to their success. I will elaborate on these by considering STP's dual strategies to increase AST: address infrastructure safety concerns, and encourage and normalize active travel behaviour with attitudinal shifts.

A central component of STP, and a central objective of Surrey's engineering policy, is constructing "physical measures to improve safety of all road users (City of Surrey, 2008)." Cities are responsible for the delivery of these improvements, and STP facilitators are responsible to help identify opportunities for safety improvement and engage with attitudinal AST factors during the STP process.

In residential areas around schools, this mandate has meant that Surrey has prioritized the retrofit of older, suburban street networks. This usually involves the installation of traffic calming measures (e.g. speed bumps, curb bulges, etc.) to reduce vehicle speeds on local streets, reducing the number of cul-de-sacs and increasing the connectivity of neighbourhoods with a grid-pattern of streets, and trying to create more pleasant walking environments with greater sidewalk and tree shade coverage (City of Surrey, 2011b). During STP, parents/caregivers on the Parental Advisory Committee, Teachers, School Administrators, and STP facilitators suggest infrastructure improvements for the City to deliver. Outside of STP and citywide, City engineers and planners identify needs and design measures to increase the safety of neighbourhoods. STP participants, facilitators, and City staff all hope that by making neighbourhoods safer, they will also increase AST by students and sustainable, non-motorized transportation by other residents.

In Fleetwood, there is evidence that the City met its mandate to deliver safe pedestrian infrastructure: 85.9% of parents/caregivers agreed that their neighbourhood was safe for their child to walk to school. Unfortunately, neighbourhood safety was not enough to motivate caregivers/parents to let their children walk/scoot/skate to school: 35.9% of these parents'/caregivers' children were driven to school, and 30% of them were driven home from school. There is a disconnection between the perception that neighbourhoods are safe for children to walk to school and caregivers/parents actually choosing to allow their children to walk to and from school. According to McMillan's conceptual framework, this disconnection is with Fleetwood caregivers' moderating factors, i.e. caregivers' sociodemographics, attitudes and cultural norms are not transforming the positive perception of neighbourhood safety into increased AST rates.

The STP facilitator, HASTe, is responsible for addressing this disconnection by positively affecting caregivers'/parents' attitudes and norms regarding AST. In Fleetwood, there is evidence that HASTe failed to do that. Among the variables measured during STP at the five Fleetwood schools, the significance and positive or negative influence on AST rates was consistent among the 1-year STP schools and 2-year STP schools in the 2013-2014 school year in most cases (see Table 7.1.). In cases where I have sufficient sample sizes, this demonstrates that each measured variable affected caregivers' choices consistently along all the schools, except where noted below.

Table 7.1. 2014 Coyote Creek and Serpentine Heights (1-year STPs) vs 2014 Coast Meridian, Frost Road, and Walnut Road (2-year STPs)

	CC/SH 2014 (to-school)	CC/SH 2014 (from-school)	CM/FR/WR 2014 (to-school)	CM/FR/WR 2014 (from-school)
Accompaniment	P > .05	n/a	P < .05 (+AST)	n/a
Distance	P < .05 (-AST)	P < .05 (-AST)	P < .05 (-AST)	P < .05 (-AST)
Child Age	P < .05 (+AST)	P > .05	P > .05	P > .05
Child Gender	P > .05	P > .05	P > .05	P > .05
Child Count	P < .05 (+AST)	P > .05	P > .05	P > .05
Safety	P < .05 (+AST)	P < .05 (+AST)	P < .05 (+AST)	P < .05 (+AST)
Language	P > .05	P < .05 (+AST Mandarin/ Cantonese/ Chinese)	P > .05	P < .05 (+AST Mandarin/ Cantonese/ Chinese, Korean, P < .05 (-AST Arabic/ Somali)

See Appendix E, Tables E.1. to E.4. for full model outputs

In addition, the significance and positive or negative influence on AST rates was consistent among the 2013-2014 surveys and 2014-2015 surveys in the 2-year STP schools in most cases (see Table 7.2.). Again, in cases where I have significant sample sizes, this demonstrates that STP did not affect the significance or influence of the measured variables through their STP intervention. If STP was successful at addressing attitudinal barriers to AST than significant 2013-2014 variables would be insignificant or flip the direction of their influence from positive to negative, or negative to positive. Again, each measured variable affected caregivers' choices consistently across the two surveys, except language on the from-school trip. Given that STP did not offer any events or literature in Mandarin/Cantonese/Chinese or Arabic/Somali, this may be a statistical anomaly rather than indicative of an STP success.

Table 7.2. 2014 Coast Meridian, Frost Road, and Walnut Road vs 2015 Coast Meridian, Frost Road, and Walnut Road

	CM/FR/WR 2014 (to-school)	CM/FR/WR 2014 (from-school)	CM/FR/WR 2015 (to-school)	CM/FR/WR 2015 (from-school)
Accompaniment	P < .05 (+AST)	n/a	P < .05 (+AST)	n/a
Distance	P < .05 (-AST)	P < .05 (-AST)	P < .05 (-AST)	P < .05 (-AST)
Child Age	P > .05	P > .05	P > .05	P > .05
Child Gender	P > .05	P > .05	P > .05	P > .05
Child Count	P > .05	P > .05	P > .05	P > .05
Safety	P < .05 (+AST)	P < .05 (+AST)	P < .05 (+AST)	P < .05 (+AST)
Language	P > .05	P < .05 (+AST Mandarin/ Cantonese/ Chinese, Korean	P > .05	P > .05
		P < .05 (-AST Arabic/ Somali)		

See Appendix E, Tables E.3. to E.6. for full model outputs

Just as there is no discernable increase in AST at the five schools during STP, there are no discernable changes in attitudinal factors at the five schools during STP. HASTe's STP reports (City of Surrey, 2015e, 2015f, 2015g, 2015h, 2015i) focused almost entirely on identifying opportunities for these infrastructure improvements, with little to no description of activities taken to challenge caregiver attitudes. HASTe's exclusive strategy to influence caregivers' attitudes was to educate their children on the environmental benefits of AST, in hope that they will convince their caregivers/parents to allow them to walk/scoot/skate or ride a bicycle to school. There is no evidence that this strategy was successful.

If previous City Corporate Reports are accurate then Surrey *has* had successful STP facilitations and these Fleetwood schools' STP shortcomings are an anomaly. Going forward, I have two recommendations for Surrey to revise its STP practice and increase AST.

First, the City must produce and offer its own STP handbook in languages representative of the City as a whole. Currently, the City only produces its handbook in English. City-wide, only about 40% of Surrey households speak English at home (City of Surrey, 2006). Surrey's own social planning policies recommend that the City's communications account for "the diversity of languages spoken in Surrey (City of Surrey, 2006)." The Engineering Department, as the lead group responsible for STP, should heed this recommendation of the Social Planning Section, and perhaps consult with them internally to gain additional insights from Social Planning's work.

Second, the City must redesign STP facilitator contracts. These new contracts should incentivize AST delivery by mandating that AST rates should demonstrably increase during STP. With a performance-based payment structures these new contracts would incentivize greater AST increases by rewarded STP facilitators with greater payments.

The City of Surrey is already delivering safer neighbourhoods with infrastructure improvements designed to make walking/scooting/skating to and from school safe for children. STP facilitators need to compliment the retrofit of neighbourhoods by challenging parents'/caregivers attitudes regarding AST. This attitudinal focus needs to offer outreach and literature in multiple languages to accommodate Surrey's diversity.

These changes to STP practice may increase AST, but the Surrey must go further than revising STP to address the most influential variables my research identified. Distance from home to school had the greatest influence on caregivers' choices of how their child(ren) travelled to and from school, and STP does not address this variable. To address this, and increase AST further, Surrey must make changes outside of STP.

7.2. Implications for City Policy

In the context of AST, distance from home to school is a function of street connectivity, residential density, school catchment design, and new school delivery. Street connectivity is a function of Surrey's Engineering Department, and they are addressing this by redesigning neighbourhoods during redevelopment to increase connectivity (City of Surrey, 2008). Residential density is within the purview of Surrey's Community Planning Section, and they address this through their Neighbourhood Community Plans (NCPs). Catchment design is the responsibility of Surrey School District 36. Finally, the Province of British Columbia is responsible for funding new school delivery (Province of British Columbia, 2016).

For Community Planning, the clearest policy implication is that children should live as close to their school as possible. Surrey can accomplish this by increasing residential density around schools. Where Surrey has done this, it resulted in decreased catchment sizes, decreasing the maximum distance from home to school. Unfortunately, Surrey's goal of locating residential density along transit corridors conflicts with the School District's preference of where school facilities are located.

The City has a policy of facilitating transit-oriented residential development along arterial streets and busy roads, because the routes provide access to transit services (City of Surrey, 2008). This policy emerged from their goal of shifting residents' travel modes from automobile to transit and more sustainable forms of transportation (City of Surrey, 2008). Land use planners also consider community amenities, road and public transit connectivity, and other factors when recommending areas for dense residential development.

From informational interviews with Surrey School District 36 staff responsible for designing catchment boundaries, staff stated that catchment design specifically avoids crossing busy streets because of the perceived danger to children walking/scooting/skating to or from school. District 36 staff redesigns school catchments constantly, contracting boundaries when neighbourhoods densify and enrollment increases, and expanding boundaries when other surrounding boundaries contract and when enrollment decreases. In addition, the District prefers to locate schools away from arterial streets and busy roads because more land is available at lower costs for the school, parking lot for teachers/staff, and sport fields for children. In short, unless the school design criteria in Surrey are going to shift, schools are unlikely to move to property along arterial roads near existing residential density. If the City of Surrey is serious about its goal of increasing AST then it should consult with the School District on how best to increase residential density around schools while creating safe spaces around schools.

This problem is especially pressing considering Surrey's growing population. If Surrey continues to add 800-1000 new residents per month then it will soon need more schools (Metro Vancouver, 2014).

In Canada, land use is usually within the jurisdiction of elected municipalities, however, funding for new schools is a provincial responsibility (Province of British Columbia, 2016). Currently in the Province of British Columbia, resource planning for new schools is considered on the basis of *current enrollment*, not *projected enrollment*, so provincial investment in new schools will lag behind new, especially high-density resident development and increased local school enrollment (Johnston, 2016). To-date, this has resulted in Surrey residents expressing frustration at municipalities for residential development and increased school enrollment and frustration at the province for not building new schools in growing neighbourhoods (Johnston, 2016; Pawson, 2016).

If the City presents research to communities, espousing the health benefits of AST, and making the connection between residential development density and increased AST, then the City and residents could ally to pressure the province for new schools to accommodate these students. Residents have not made a connection between increased residential density, increased AST, and healthier children because of the disconnection between residential development and new school delivery. Residential density could be a local benefit rather than a disbenefit if residents and the City made a connection between increased density and increased AST rates.

To-date, there is no indication that Community Planning, through Neighbourhood Community Plans (NCPs), consider the location of school when designating the location and intensity of land use in neighbourhoods. This shortcoming suggests that the Engineering Department should work more closely with Community Planning to deliver greater residential density around schools, and communicate AST goals when consulting with residents and/or council during community planning exercises. Between consultation with Surrey School District 36, greater departmental coordination in the City, and pressure applied to deliver new schools by connecting residential densification with increased AST, the City should be able to increase AST by reducing the distance from home to school for many residents.

These recommendations propose changes at multiple agencies on the municipal level, and they will be challenging to achieve, but it could be that even with all of these changes AST rates in Surrey will not approach 100%. Caregivers choose how their children travel to and from school within the policies of other governmental levels, and these governments control policies over mobility pricing, gas taxes, vehicle registration, and other industries that have an impact on caregivers' choices. Furthermore, real estate developers shape the transformation of community subdivision developments, transforming greenfield sites or low-density single family neighbourhoods into new suburban communities. Cities review and approve the shape of these new communities, and influence the configuration of the modified street network that these large projects deliver, but in most case cities are reliant on residential development to reshape neighbourhoods. Given this reliance, it could be decades before the best municipal efforts are successful at reforming serpentine suburban street patterns and cul-de-sacs into pedestrian-friendly grid patterns. Until policy changes are made at these higher levels, until neighbourhoods are reconfigured by redevelopment, and possibly even after policy and redevelopment are delivered, some caregivers will continue to drive their children to and from school.

7.3. Limitation/Opportunities for Further Research

As mentioned above, my research suffers from sample size, geographic boundary, and survey breadth limitations. Despite these, my research and regression models offer a rigorous quantitative examination of active school travel in Surrey's Fleetwood neighbourhood. Future research can build upon the models that I have built here, including more variables and data, but using the same structure to identify those variables that facilitate healthy, active school travel behaviour.

First, although I received HASTe data for 3000+ students from 2013-2015, I only had approximately half of the possible data for my regressions because of unreturned surveys and returned incomplete surveys, but this was primarily because HASTe's baseline preliminary surveys' only included limited scope. I gained some statistically significant insights from this reduced dataset, and my research hinted that there were more insights to be gained, but these were only hints because they lacked statistical significance thanks to low variable value counts.

Identifying and understanding interaction effects, where an independent variable moderated the effect of another one independent variable on the dependent variable, especially suffered from this problem. In some cases, survey designs could have collected variable data as continuous data, rather than categorical data, to resolve this statistical issue. For example, "distance from home to school" data could have been collected as continuous data (e.g. .1km, .2km, .3km, etc.), rather than as a categorical data (e.g. < .5km, .51-1.59km, etc.). If distance data *were* continuous, then an examination of its interaction with other categorical variables, such as accompaniment, would not suffer from low sample sizes because of the way that regression models treat continuous data. In these cases, an interaction model could identify statistically significant interaction effects where we could not previously with a pair of categorical independent variables.

Additionally, HASTe's survey could have included survey questions on other household demographic variables, such as household income, parental educational attainment, and other variables that researcher has suggested influence AST rates. Future research should re-examine survey designs for research consideration, collect continuous variables wherever possible, and definitely include accompaniment home from school in surveys. The perfect survey would not yield a perfect regression model than what I've produced, but it may help to produce a better model, and this would be valuable.

Of the data that I used for my regressions, I cannot rule out a systemic survey data bias because the survey data was not validated with any additional data collection. This is a limitation because it could be HASTe received surveys from caregivers of children who walked/scooted/skated more often than from caregivers who drove their children, perhaps because of embarrassment of their problematized behaviour. Without a screenline survey, were research or STP staff count how many children walk/scoot/skate or are driven to school, to compare the survey results against, I cannot rule out the possibility that HASTe's survey data contains a systemic bias. Future STP engagements should include a screenline survey during the week of survey collection, so that survey data can be validated.

Next, although my research purposely only included data from a single neighbourhood in Surrey, BC, Canada, the boundary of my sample undermines the usefulness of my insights. Distance from home to school has a sizable effect on AST rates, but because my research is limited to Fleetwood, it is challenging to apply this insight to policy in other neighbourhoods of Surrey, or other cities in Metro Vancouver. Future research should expand the area of study to include schools City-wide or even throughout Metro Vancouver, so that insights can be more broadly acted up through policy.

If research expanded to include a greater number of schools than urban form variables, such as sidewalk coverage, street lighting, traffic calming, and other environmental variables could be included in any regression models alongside household variables. Because these variables would apply to schools, and not households, this expanded research would require a greater sample of schools, ideally with a variety of urban form characteristics, so that statistical significance does not suffer from a small sample.

Lastly, insights from my binomial logistic regression are limited by the independent variables included in the data, because the value of each independent variables' influence is relative to the other included independent variables. In other words, it could be other, unmeasured, not included variables like socioeconomic status and parental employment have a very great influence on caregivers' decisions of how their children travel to and from school, and that distance from home to school has a much smaller effect than these, but because they are not included, distance has a great effect. For this to be the case, distance would have to be correlated with the value of whatever this missing independent variable is, but still, only knowing the value of the included variables relative to each other *is* a limitation. Future research should include as many other variables as possible, but also check for multicollinearity among the independent variables, so that we can gain insights from a more comprehensive, rigorous model.

References

Anderson, P. M., & Butcher, K. F. (Kristin F. E. (2006). Childhood Obesity: Trends and Potential Causes. *The Future of Children / Center for the Future of Children, the David and Lucile Packard Foundation*, *16*(1), 19–45. doi:10.1353/foc.2006.0001

Boarnet, M. G., Anderson, C. L., Day, K., McMillan, T., & Alfonzo, M. (2005). Evaluation of the California Safe Routes to School legislation: urban form changes and children's active transportation to school. *American Journal of Preventive Medicine*, *28*(2 Suppl 2), 134–40. doi:10.1016/j.amepre.2004.10.026

Bringolf-Isler, B., Grize, L., Mäder, U., Ruch, N., Sennhauser, F. H., & Braun-Fahrländer, C. (2008). Personal and environmental factors associated with active commuting to school in Switzerland. *Preventive Medicine*, *46*, 67–73. doi:10.1016/j.ypmed.2007.06.015

Buliung, R., Faulkner, G., Beesley, T., & Kennedy, J. (2011). School travel planning: Mobilizing school and community resources to encourage active school transportation. *Journal of School Health*, *81*(11), 704–712. doi:10.1111/j.1746-1561.2011.00647.x

Buliung, R., Mitra, R., & Faulkner, G. (2009). Active school transportation in the Greater Toronto Area, Canada: An exploration of trends in space and time (1986–2006). *Preventive Medicine*, *48*(6), 507–512. doi:10.1016/j.ypmed.2009.03.001

Carlson, J. a., Saelens, B. E., Kerr, J., Schipperijn, J., Conway, T. L., Frank, L. D., … Sallis, J. F. (2015). Association between neighborhood walkability and GPS-measured walking, bicycling and vehicle time in adolescents. *Health & Place*, *32*, 1–7. doi:10.1016/j.healthplace.2014.12.008

Carver, A., Timperio, A., & Crawford, D. (2013). Parental chauffeurs: what drives their transport choice? *Journal of Transport Geography*, *26*, 72–77. doi:10.1016/j.jtrangeo.2012.08.017

City of Surrey. (2006). *Action Plan for the Social Well-Being of Surrey Residents*. Surrey.

City of Surrey. (2008). *Transportation Strategic Plan*. Surrey. Retrieved from http://www.surrey.ca/files/TransportationStrategicPlan2008.pdf

City of Surrey. (2011a). *2011 Report on Transportation*. Surrey. Retrieved from http://www.surrey.ca/files/2011-Transportation-Report.pdf

City of Surrey. (2011b). *Walking Plan*. Surrey. Retrieved from http://www.surrey.ca/files/Surrey_Walking_Plan_2011.pdf

City of Surrey. (2015a). About Fleetwood. OpenText CMS. Retrieved from http://www.surrey.ca/community/6800.aspx

City of Surrey. (2015b). About Fleetwood Community. OpenText CMS. Retrieved from http://www.surrey.ca/culture-recreation/2412.aspx

City of Surrey. (2015c). City of Surrey: Sustainability Dashboard. Retrieved December 5, 2015, from http://dashboard.surrey.ca/#transportation/modeoftravel

City of Surrey. (2015d). Safe and Active Schools Program. OpenText CMS. Retrieved from http://www.surrey.ca/city-services/4791.aspx

City of Surrey. (2015e). *School Travel Plan: Coast Meridian Elementary*.

City of Surrey. (2015f). *School Travel Plan: Coyote Creek Elementary*.

City of Surrey. (2015g). *School Travel Plan: Frost Road Elementary*.

City of Surrey. (2015h). *School Travel Plan: Serpentine Heights Elementary*.

City of Surrey. (2015i). *School Travel Plan: Walnut Road Elementary*.

City of Surrey. (2015j). *School Travel Planning: Handbook and Resource Guide*. Surrey. doi:10.5325/transportationj.51.1.0080

City of Surrey. (2015k). *Subdivision Drawings of area within 400m radius of Coast Meridian Elementary School, 1989-1998*. Surrey.

City of Surrey. (2015l). Subdivision Drawings of area within 400m radius of Coyote Creek Elementary School, 1990-1997.

City of Surrey. (2015m). Subdivision Drawings of area within 400m radius of Frost Road Elementary School, 1989-2003.

City of Surrey. (2015n). Subdivision Drawings of area within 400m radius of Serpentine Heights Elementary School, 1979-1990.

City of Surrey. (2015o). Subdivision Drawings of area within 400m radius of Walnut Road Elementary School, 1990-2000.

City of Surrey. (2016). Walk & Roll to School Week. Retrieved August 3, 2016, from http://www.surrey.ca/city-services/15876.aspx

Curtis, C., Babb, C., & Olaru, D. (2015). Built environment and children's travel to school. *Transport Policy*, *42*, 21–33. doi:10.1016/j.tranpol.2015.04.003

de Vries, S. I., Hopman-Rock, M., Bakker, I., Hirasing, R. A., & van Mechelen, W. (2010). Built environmental correlates of walking and cycling in dutch urban children: Results from the SPACE study. *International Journal of Environmental Research and Public Health*, *7*(5), 2309–2324. doi:10.3390/ijerph7052309

Deka, D. (2013). An explanation of the relationship between adults' work trip mode and children's school trip mode through the Heckman approach. *Journal of Transport Geography*, *31*, 54–63. doi:10.1016/j.jtrangeo.2013.05.005

Department for Education. (2010). *An Evaluation of the "Travelling to School Initiative" Programme*.

Environment Canada. (2013, October 31). Daily Data Report for October 2013. Retrieved March 27, 2016, from http://climate.weather.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=BC&StationID=747&dlyRange=1964-01-01%7C2016-03-21&Year=2013&Month=10&cmdB1=Go#

Environment Canada. (2014, October 31). Daily Data Report for October 2014. Retrieved March 27, 2016, from http://climate.weather.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=BC&StationID=747&dlyRange=1964-01-01%7C2016-03-21&Year=2014&Month=10&cmdB1=Go#

Environment Canada. (2015, October 31). Daily Data Report for October 2015. Retrieved March 27, 2016, from http://climate.weather.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=BC&StationID=747&dlyRange=1964-01-01|2016-03-21&Year=2015&Month=10&Day=01

Ermagun, A., Hossein Rashidi, T., & Samimi, A. (2014). A joint model for mode choice and escort decisions of school trips. *Transportmetrica A: Transport Science*, *11*(3), 270–289. doi:10.1080/23249935.2014.968654

Flynn, M. A., McNeil, D. A., Maloff, B., Mutasingwa, D., Wu, M., Ford, C., & Tough, S. C. (2006). *Reducing obesity and related chronic disease risk in children and youth: a synthesis of evidence with "best practice" recommendations*. *Obes Rev* (Vol. 7 Suppl 1). doi:OBR242 [pii]\n10.1111/j.1467-789X.2006.00242.x

Frank, L., Kerr, J., Chapman, J., & Sallis, J. (2007). Urban form relationships with walk trip frequency and distance among youth. *American Journal of Health Promotion*, *21*(4 SUPPL.), 305–311. doi:10.4278/0890-1171-21.4s.305

Frazer, A., Voss, C., Winters, M., Naylor, P. J., Higgins, J. W., & McKay, H. (2015). Differences in adolescents' physical activity from school-travel between urban and suburban neighbourhoods in Metro Vancouver, Canada. *Preventive Medicine*

Reports, *2*, 170–173. doi:10.1016/j.pmedr.2015.02.008

Fulton, J. E., Shisler, J. L., Yore, M. M., & Caspersen, C. J. (2005). Active transportation to school: findings from a national survey. *Research Quarterly for Exercise and Sport*, *76*(3), 352–357. doi:10.5641/027013605X13080719840997

Fyhri, A., Hjorthol, R., Mackett, R. L., Fotel, T. N., & Kyttä, M. (2011). Children's active travel and independent mobility in four countries: Development, social contributing trends and measures. *Transport Policy*, *18*(5), 703–710. doi:10.1016/j.tranpol.2011.01.005

Gaster, S. (1995). Rethinking the children's home-range concept. *Architecture & Comportement*, *11*(1), 35–42.

Giles-Corti, B., Wood, G., Pikora, T., Learnihan, V., Bulsara, M., Van Niel, K., … Villanueva, K. (2011). School site and the potential to walk to school: The impact of street connectivity and traffic exposure in school neighborhoods. *Health and Place*, *17*(2), 545–550. doi:10.1016/j.healthplace.2010.12.011

Green Communities Canada. (2007). *Review of international school travel planning best practices*. Retrieved from http://www.saferoutestoschool.ca/downloads/STP-Best-Practice-Final.pdf

Green Communities Canada. (2015). About | Active & Safe Routes to School. Retrieved November 5, 2015, from http://www.saferoutestoschool.ca/about

Hjorthol, R. (2008). The mobile phone as a tool in family life: impact on planning of everyday activities and car use. *Transport Review*, *28*(3), 303–320.

Jacobs, J. (1961). *The Death and Life of Great American Cities*. *New York* (Vol. 71). doi:10.2307/794509

Johnston, J. (2016, May 26). Surrey School Board chair wants a system overhaul to address overcrowding. *CBC News*. Vancouver. Retrieved from http://www.cbc.ca/news/canada/british-columbia/surrey-school-board-chair-wants-a-system-overhaul-to-address-overcrowding-1.3601137

Lang, D., Collins, D., & Kearns, R. (2011). Understanding modal choice for the trip to school. *Journal of Transport Geography*, *19*(4), 509–514. doi:10.1016/j.jtrangeo.2010.05.005

Larsen, K., Gilliland, J., Hess, P., Tucker, P., Irwin, J., & He, M. (2009). The Influence of the Physical Environment and Sociodemographic Characteristics on Children's Mode of Travel to and From School. *American Journal of Public Health*, *99*(3), 520–526. doi:10.2105/AJPH.2008.135319

Leyden, K. M. (2003). Social Capital and the Built Environment: The Importance of Walkable Neighborhoods. *American Journal of Public Health*, *93*(9), 1546–1551. doi:10.2105/AJPH.93.9.1546

Lin, J.-J., & Chang, H.-T. (2009). Built Environment Effects on Children's School Travel in Taipai: Independence and Travel Mode. *Urban Studies*, *47*(4), 867–889. doi:10.1177/0042098009351938

Llywodraeth Cymru Welsh Government. (2015). Safe Routes in Communities. Retrieved December 5, 2015, from http://gov.wales/topics/transport/walking-cycling/saferoutes/?lang=en

Lu, W., McKyer, E. L. J., Lee, C., Ory, M. G., Goodson, P., & Wang, S. (2015). Children's active commuting to school: an interplay of self-efficacy, social economic disadvantage, and environmental characteristics. *International Journal of Behavioral Nutrition and Physical Activity*, *12*(1), 1–14. doi:10.1186/s12966-015-0190-8

Mammen, G., Stone, M. R., Buliung, R., & Faulkner, G. (2014). School travel planning in Canada: Identifying child, family, and school-level characteristics associated with travel mode shift from driving to active school travel. *Journal of Transport & Health*, *1*(4), 288–294. doi:10.1016/j.jth.2014.09.004

Mammen, G., Stone, M. R., Faulkner, G., Ramanathan, S., Buliung, R., O'Brien, C., & Kennedy, J. (2014). Active school travel: An evaluation of the Canadian school travel planning intervention. *Preventive Medicine*, *60*, 55–59. doi:10.1016/j.ypmed.2013.12.008

Martin, S. L., Lee, S. M., & Lowry, R. (2007). National Prevalence and Correlates of Walking and Bicycling to School. *American Journal of Preventive Medicine*, *33*(2), 98–105. doi:10.1016/j.amepre.2007.04.024

McDonald, N. C. (2007a). Active Transportation to School. Trends Among U.S. Schoolchildren, 1969-2001. *American Journal of Preventive Medicine*, *32*(6), 509–516. doi:10.1016/j.amepre.2007.02.022

McDonald, N. C. (2007b). Travel and the social environment: Evidence from Alameda County, California. *Transportation Research Part D: Transport and Environment*, *12*(1), 53–63. doi:10.1016/j.trd.2006.11.002

McDonald, N. C. (2008a). Children's mode choice for the school trip: The role of distance and school location in walking to school. *Transportation*, *35*(1), 23–35. doi:10.1007/s11116-007-9135-7

McDonald, N. C. (2008b). Critical Factors for Active Transportation to School Among Low-Income and Minority Students. *American Journal of Preventive Medicine*, *34*(4), 341–344. doi:10.1016/j.amepre.2008.01.004

McDonald, N. C. (2008c). Household interactions and children's school travel: the effect of parental work patterns on walking and biking to school. *Journal of Transport Geography*, *16*(5), 324–331. doi:10.1016/j.jtrangeo.2008.01.002

McDonald, N. C. (2012). Is there a gender gap in school travel? An examination of US children and adolescents. *Journal of Transport Geography*, *20*(1), 80–86. doi:10.1016/j.jtrangeo.2011.07.005

McDonald, N. C., & Aalborg, A. E. (2009). Why Parents Drive Children to School:

Implications for Safe Routes to School Programs. *Journal of the American Planning Association*, *75*(3), 331–342. doi:10.1080/01944360902988794

McElroy, J. (2015). Surrey schools seek solution to portable problem. *Global News*. Retrieved from http://globalnews.ca/news/1967590/surrey-schools-seek-solution-to-portable-problem/

McMillan, T., Day, K., Boarnet, M., Alfonzo, M., & Anderson, C. (2006). Johnny walks to school-does Jane? Sex differences in children's active travel to school. *Children, Youth and Environments*, *16*(1), 75–89. Retrieved from http://www.uctc.net/papers/781.pdf\npapers2://publication/uuid/377D12A6-C8FC-4A3A-AAA8-D80BA20CE301

McMillan, T. E. (2005). Urban Form and a Child's Trip to School: The Current Literature and a Framework for Future Research. *Journal of Planning Literature*, *19*(4), 440–456. doi:10.1177/0885412204274173

McMillan, T. E. (2007). The relative influence of urban form on a child's travel mode to school. *Transportation Research Part A: Policy and Practice*, *41*(1), 69–79. doi:10.1016/j.tra.2006.05.011

Merom, D., Tudor-Locke, C., Bauman, A., & Rissel, C. (2006). Active commuting to school among NSW primary school children: implications for public health. *Health & Place*, *12*(4), 678–87. doi:10.1016/j.healthplace.2005.09.003

Metro Vancouver. (2014). *Progress Toward Shaping Our Future: 2014 Annual Report*. Retrieved from http://www.metrovancouver.org/services/regional-planning/PlanningPublications/MV_2040_Progress_toward_Shaping_our_Future_2014_Annual_Report.pdf

Ministry of Education - Province of British Columbia. School Act, Part 2 — Students and Parents, Division 1 — Students. , Pub. L. No. [RSBC 1996] CHAPTER 412 (2016). Canada. Retrieved from http://www.bclaws.ca/civix/document/LOC/complete/statreg/-- S --/05_School Act

[RSBC 1996] c. 412/00_Act/96412_02.xml

Panter, J. R., Jones, A. P., & van Sluijs, E. M. (2008). Environmental determinants of active travel in youth: a review and framework for future research. *The International Journal of Behavioral Nutrition and Physical Activity*, *5*, 34. doi:10.1186/1479-5868-5-34

Panter, J. R., Jones, A. P., van Sluijs, E. M. F., & Griffin, S. J. (2010). Attitudes, social support and environmental perceptions as predictors of active commuting behaviour in school children. *Journal of Epidemiology & Community Health*, *64*(01), 41–48. doi:10.1136/jech.2009.086918

Panter, J. R., Jones, A. P., Van Sluijs, E. M. F., & Griffin, S. J. (2010). Neighborhood, Route, and School Environments and Children's Active Commuting. *American Journal of Preventive Medicine*, *38*(3), 268–278. doi:10.1016/j.amepre.2009.10.040

Park, H., Noland, R. B., & Lachapelle, U. (2013). Active school trips: Associations with caregiver walking frequency. *Transport Policy*, *29*, 23–28. doi:10.1016/j.tranpol.2013.04.001

Parsons, T. J., Power, C., Logan, S., & Summerbell, C. D. (1999). Childhood predictors of adult obesity: a systematic review. *International Journal of Obesity and Related Metabolic Disorders : Journal of the International Association for the Study of Obesity*, *23 Suppl 8*(August), S1–S107.

Pawson, C. (2016, April 24). Halt development for sake of education, says Surrey trustee Laurae McNally. *CBC News*. Vancouver. Retrieved from http://www.cbc.ca/news/canada/british-columbia/halt-development-for-sake-of-education-says-trustee-laurae-mcnally-1.3551179

Pojani, D., & Boussauw, K. (2014). Keep the children walking: Active school travel in Tirana, Albania. *Journal of Transport Geography*, *38*, 55–65. doi:10.1016/j.jtrangeo.2014.05.012

Province of British Columbia. (2016). Capital Planning. Retrieved June 6, 2016, from http://www2.gov.bc.ca/gov/content/education-training/administration/resource-management/capital-planning

Ramanthan, S., O'Brien, C., Faulkner, G., & Stone, M. (2014). Happiness in Motion: Emotions, Well-Being, and Active School Travel. *Journal of School Health*, *84*(8). doi:10.1111/josh.12172

Roberts, K., Shields, M., de Groh, M., Aziz, A., & Gilbert, J.-A. (2012). Overweight and obesity in children and adolescents: Results from the 2009 to 2011 Canadian Health Measures Survey. *Statistics Canada*. Retrieved December 10, 2015, from http://www.statcan.gc.ca/pub/82-003-x/2012003/article/11706-eng.htm

Russell, P., & Bottrill, D. (2011). *Corporate Report - Surrey Sustainability Charter - Progress Report for 2009-2010*. Surrey.

Sallis, J. E., & Glanz, K. (2006). The role of built environments in physical activity, eating, and obesity in childhood. *The Future of Children*, *16*(1), 89–108.

Schlossberg, M., Greene, J., Phillips, P. P., Johnson, B., & Parker, B. (2006). School Trips: Effects of Urban Form and Distance on Travel Mode. *Journal of the American Planning Association*, *72*(3), 337–346. doi:10.1080/01944360608976755

Sherlock, T. (2016). Overcrowding challenges Surrey schools. *Vancouver Sun*. Retrieved from http://vancouversun.com/news/local-news/surrey-schools-overcrowded

Sherrell, K., & Immigrant Services Society of BC. (2009). *At home in Surrey? The housing experiences of refugees in Surrey, BC*.

Spilsbury, J. C. (2005). "We Don"t Really Get To Go Out in the Front Yard'—Children's Home Range and Neighborhood Violence. *Children's Geographies*, *3*(February 2015), 79–99. doi:10.1080/14733280500037281

Spilsbury, J. C., Korbin, J. E., & Coulton, C. J. (2009). Mapping Children's Neighborhood

Perceptions: Implications for Child Indicators. *Child Indicators Research*, *2*, 111–131. doi:10.1007/s12187-009-9032-z

Surrey School District 36. (2015a). Choice Programs. Retrieved December 8, 2015, from https://www.surreyschools.ca/programsandservices/choice/Pages/Default.aspx

Surrey School District 36. (2015b). Student Registration - Surrey Schools. Retrieved December 8, 2015, from https://www.surreyschools.ca/K-12Schools/StudentRegistration/Pages/default.aspx

Surrey School District 36. (2016). Student Registration - Surrey Schools. Retrieved May 29, 2016, from https://www.surreyschools.ca/K-12Schools/StudentRegistration/Pages/default.aspx

Sweeney, Shannon, M. (2015). Middle School Students' Perceptions of Safety: A Mixed-Methods Study. *Journal of School Health*, *85*(10), 688–696.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using Multivariate Statistics*. *PsycCRITIQUES* (Vol. 28). doi:10.1037/022267

Timperio, A., Ball, K., Salmon, J., Roberts, R., Giles-Corti, B., Simmons, D., … Crawford, D. (2006). Personal, Family, Social, and Environmental Correlates of Active Commuting to School. *American Journal of Preventive Medicine*, *30*(1), 45–51. doi:10.1016/j.amepre.2005.08.047

TransLink. (2016). Home - TravelSmart.ca. Retrieved from http://www.travelsmart.ca/

Van Kann, D. H. H., Kremers, S. P. J., de Vries, S. I., de Vries, N. K., & Jansen, M. W. J. (2015). Parental Active Transportation Routines (PATRns) as a Moderator of the Association Between Neighborhood Characteristics and Parental Influences and Active School Transportation. *Environment and Behavior*. doi:10.1177/0013916515574548

Wong, B. Y.-M., Faulkner, G., & Buliung, R. (2011). GIS measured environmental correlates of active school transport: a systematic review of 14 studies. *The*

International Journal of Behavioral Nutrition and Physical Activity, *8*(1), 39. doi:10.1186/1479-5868-8-39

Woolley, H. E., & Griffin, E. (2015). Decreasing experiences of home range, outdoor spaces, activities and companions: changes across three generations in Sheffield in north England. *Children's Geographies*, *13*(6), 677–691. doi:10.1080/14733285.2014.952186

Yu, C.-Y., & Zhu, X. (2013). Impacts of Residential Self-Selection and Built Environments on Children's Walking-to-School Behaviors. *Environment and Behavior*. doi:10.1177/0013916513500959

Ziviani, J., Scott, J., & Wadley, D. (2004). Walking to school: Incidental physical activity in the daily occupations of Australian children. *Occupational Therapy International*, *11*(1), 1–11. doi:10.1002/oti.193

Appendix A: Regression Assumption Tests

Table A.1. Regression Assumptions: Test for Linearity Relationship (To School)

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	95% C.I.for EXP(B) Upper
Step 1[a]	CHILD_ACCOMPANIMENT *(parent/grandparent/caregiver)*			45.460	4	.000			
	CHILD_ACCOMPANIMENT (Other Adult)	1.145	.358	10.253	1	.001	3.142	1.559	6.332
	CHILD_ACCOMPANIMENT (Sibling)	1.737	.373	21.693	1	.000	5.680	2.735	11.798
	CHILD_ACCOMPANIMENT (Friend)	.716	.376	3.623	1	.057	2.047	.979	4.280
	CHILD_ACCOMPANIMENT (Child Travels Alone)	3.912	1.055	13.735	1	.000	49.981	6.315	395.560
	DISTANCE_HomeToSchool *(less than 0.5km)*			261.776	3	.000			
	DISTANCE_HomeToSchool (0.51km to 1.59km)	-1.903	.151	158.096	1	.000	.149	.111	.201
	DISTANCE_HomeToSchool (1.60km to 3km)	-3.864	.325	141.595	1	.000	.021	.011	.040
	DISTANCE_HomeToSchool (over 3km)	-4.286	.542	62.621	1	.000	.014	.005	.040
	HOME_LANGUAGE *(English)*			22.899	8	.003			
	HOME_LANGUAGE (Hindi/Punjabi)	-.451	.196	5.302	1	.021	.637	.434	.935
	HOME_LANGUAGE (Mandarin/Cantonese/Chinese)	.230	.199	1.347	1	.246	1.259	.853	1.858
	HOME_LANGUAGE (Korean)	.120	.288	.175	1	.676	1.128	.641	1.985
	HOME_LANGUAGE (Philippine/Tagalog)	-.075	.288	.067	1	.796	.928	.527	1.633
	HOME_LANGUAGE (Spanish)	.768	.689	1.243	1	.265	2.156	.559	8.319
	HOME_LANGUAGE (Vietnamese)	-1.186	.377	9.915	1	.002	.306	.146	.639
	HOME_LANGUAGE (Japanese)	18.055	12929.714	.000	1	.999	6.94×10^{7}	.000	.
	HOME_LANGUAGE (Arabic/Somali)	.832	.601	1.916	1	.166	2.299	.707	7.471

	CHILD_AGE	.364	1.925	.036	1	.850	1.439	.033	62.544
	CHILD_SEX (Male)	.262	.142	3.400	1	.065	1.300	.984	1.717
	CHILD_COUNT	.183	.371	.243	1	.622	1.201	.580	2.484
	CAREGIVER_SAFE_BINARY (Agree, (*disagree*))	1.155	.227	25.835	1	.000	3.175	2.034	4.957
	CHILD_AGE_SQ	-.015	.064	.059	1	.808	.985	.869	1.116
	CHILD_AGE by ln_CHILD_AGE	-.027	.954	.001	1	.977	.973	.150	6.314
	CHILD_AGE by ln_CHILD_COUNT	-.037	.071	.276	1	.599	.963	.838	1.107
	Constant	-1.219	3.577	.116	1	.733	.295		

a. Variable(s) entered on step 1: CHILD_ACCOMPANIMENT, DISTANCE_HomeToSchool, HOME_LANGUAGE, CHILD_AGE, CHILD_SEX, CHILD_COUNT, CAREGIVER_SAFE_BINARY, CHILD_AGE_SQ, CHILD_AGE * ln_CHILD_AGE , CHILD_AGE * ln_CHILD_COUNT .

Table A.2. Regression Assumptions: Test for Linearity Relationship (From School)

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	CHILD_ACCOMPANIMENT *(parent/grandparent/caregiver)*			25.738	4	.000			
	CHILD_ACCOMPANIMENT (Other Adult)	.770	.369	4.359	1	.037	2.160	1.048	4.450
	CHILD_ACCOMPANIMENT (Sibling)	1.433	.421	11.608	1	.001	4.192	1.838	9.560
	CHILD_ACCOMPANIMENT (Friend)	.650	.406	2.564	1	.109	1.916	.864	4.248
	CHILD_ACCOMPANIMENT (Child Travels Alone)	2.417	.775	9.726	1	.002	11.207	2.454	51.177
	DISTANCE_HomeToSchool *(less than 0.5km)*			220.071	3	.000			
	DISTANCE_HomeToSchool (0.51km to 1.59km)	-1.897	.175	117.914	1	.000	.150	.107	.211
	DISTANCE_HomeToSchool (1.60km to 3km)	-3.453	.265	170.392	1	.000	.032	.019	.053
	DISTANCE_HomeToSchool (over 3km)	-6.519	1.035	39.664	1	.000	.001	.000	.011
	HOME_LANGUAGE *(English)*			34.217	8	.000			
	HOME_LANGUAGE (Hindi/Punjabi)	-.398	.205	3.783	1	.052	.671	.449	1.003

	HOME_LANGUAGE (Mandarin/Cantonese/Chinese)	.606	.219	7.678	1	.006	1.833	1.194	2.815
	HOME_LANGUAGE (Korean)	.545	.308	3.132	1	.077	1.725	.943	3.157
	HOME_LANGUAGE (Philippine/Tagalog)	.550	.329	2.802	1	.094	1.734	.910	3.303
	HOME_LANGUAGE (Spanish)	.325	.636	.262	1	.609	1.385	.398	4.819
	HOME_LANGUAGE (Vietnamese)	-1.236	.388	10.158	1	.001	.291	.136	.621
	HOME_LANGUAGE (Japanese)	17.889	13280.465	.000	1	.999	5.88×10^7	.000	.
	HOME_LANGUAGE (Arabic/Somali)	-.327	.518	.398	1	.528	.721	.261	1.990
	CHILD_AGE	-1.216	1.997	.371	1	.542	.296	.006	14.841
	CHILD_SEX (Male)	-.017	.151	.013	1	.910	.983	.731	1.322
	CHILD_COUNT	.091	.390	.054	1	.815	1.095	.510	2.351
	CAREGIVER_SAFE_BINARY (Agree, (*disagree*))	1.286	.216	35.322	1	.000	3.618	2.368	5.529
	CHILD_AGE_SQ	-.070	.067	1.075	1	.300	.933	.817	1.064
	CHILD_AGE by ln_CHILD_AGE	.802	.996	.648	1	.421	2.229	.316	15.706
	CHILD_AGE by ln_CHILD_COUNT	.000	.075	.000	1	.998	1.000	.864	1.158
	Constant	1.599	3.695	.187	1	.665	4.949		

a. Variable(s) entered on step 1: CHILD_ACCOMPANIMENT, DISTANCE_HomeToSchool, HOME_LANGUAGE, CHILD_AGE, CHILD_SEX, CHILD_COUNT, CAREGIVER_SAFE_BINARY, CHILD_AGE_SQ, CHILD_AGE * ln_CHILD_AGE , CHILD_AGE * ln_CHILD_COUNT .

Table A.3. Regression Assumptions: Multicollinearity – Child's Age

		Collinearity Statistics	
Model		Tolerance	VIF
1	Household children attending the same school?	.921	1.086
	WALKS_ALONE_DUMMY	.930	1.076
	OTHER_ADULT_DUMMY	.962	1.040
	SIBLING_DUMMY	.926	1.080
	FRIEND_DUMMY	.970	1.031
	FROM0.51KMTO1.59KM_DUMMY	.824	1.214
	FROM1.6KMTO3KM_DUMMY	.842	1.188
	OVER3KM_DUMMY	.925	1.081

	HINDIPUNJABI_DUMMY	.828	1.208
	MANDARINCANTONESECHINES_DUMMY	.808	1.238
	KOREAN_DUMMY	.892	1.121
	PHILLIPPINETAGALOG_DUMMY	.883	1.133
	SPANISH_DUMMY	.971	1.030
	VIETNAMESE_DUMMY	.947	1.055
	JAPANESE_DUMMY	.960	1.041
	ARABICSOMALI_DUMMY	.969	1.032
	BOY_DUMMY	.985	1.015
	NHSAFE_AGREE_DUMMY	.920	1.087

a. Dependent Variable: Child's Age?

Table A.4. Regression Assumptions: Multicollinearity – Child Count

		Collinearity Statistics	
Model		Tolerance	VIF
1	WALKS_ALONE_DUMMY	.862	1.160
	OTHER_ADULT_DUMMY	.966	1.035
	SIBLING_DUMMY	.908	1.101
	FRIEND_DUMMY	.942	1.062
	FROM0.51KMTO1.59KM_DUMMY	.824	1.214
	FROM1.6KMTO3KM_DUMMY	.840	1.191
	OVER3KM_DUMMY	.921	1.086
	HINDIPUNJABI_DUMMY	.824	1.213
	MANDARINCANTONESECHINES_DUMMY	.822	1.216
	KOREAN_DUMMY	.887	1.127
	PHILLIPPINETAGALOG_DUMMY	.880	1.136
	SPANISH_DUMMY	.971	1.030
	VIETNAMESE_DUMMY	.948	1.055
	JAPANESE_DUMMY	.959	1.043
	ARABICSOMALI_DUMMY	.970	1.031
	BOY_DUMMY	.980	1.020
	NHSAFE_AGREE_DUMMY	.922	1.085
	Child's Age?	.852	1.173

a. Dependent Variable: Household children attending the same school?

Table A.5. Regression Assumptions: Multicollinearity – Accompaniment: Alone

Model		Collinearity Statistics	
		Tolerance	VIF
1	PARENT_GRANDPARENT_DUMMY	.250	3.993
	OTHER_ADULT_DUMMY	.487	2.052
	SIBLING_DUMMY	.434	2.304
	FRIEND_DUMMY	.573	1.744
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	HINDIPUNJABI_DUMMY	.824	1.214
	MANDARINCANTONESECHINES_DUMMY	.807	1.239
	KOREAN_DUMMY	.887	1.127
	PHILLIPPINETAGALOG_DUMMY	.880	1.137
	SPANISH_DUMMY	.970	1.031
	VIETNAMESE_DUMMY	.947	1.056
	JAPANESE_DUMMY	.959	1.043
	ARABICSOMALI_DUMMY	.968	1.033
	BOY_DUMMY	.980	1.020
	NHSAFE_DISAGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091

a. Dependent Variable: WALKS_ALONE_DUMMY

Table A.6. Regression Assumptions: Multicollinearity – Accompaniment: Parent/grandparent/caregiver

Model		Collinearity Statistics	
		Tolerance	VIF
1	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	HINDIPUNJABI_DUMMY	.824	1.214
	MANDARINCANTONESECHINES_DUMMY	.807	1.239

	KOREAN_DUMMY	.887	1.127
	PHILLIPPINETAGALOG_DUMMY	.880	1.137
	SPANISH_DUMMY	.970	1.031
	VIETNAMESE_DUMMY	.947	1.056
	JAPANESE_DUMMY	.959	1.043
	ARABICSOMALI_DUMMY	.968	1.033
	BOY_DUMMY	.980	1.020
	NHSAFE_DISAGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.855	1.170

a. Dependent Variable: PARENT_GRANDPARENT_DUMMY

Table A.7. Regression Assumptions: Multicollinearity – Accompaniment: Other Adult

		Collinearity Statistics	
Model		Tolerance	VIF
1	SIBLING_DUMMY	.420	2.382
	FRIEND_DUMMY	.557	1.795
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	HINDIPUNJABI_DUMMY	.824	1.214
	MANDARINCANTONESECHINES_DUMMY	.807	1.239
	KOREAN_DUMMY	.887	1.127
	PHILLIPPINETAGALOG_DUMMY	.880	1.137
	SPANISH_DUMMY	.970	1.031
	VIETNAMESE_DUMMY	.947	1.056
	JAPANESE_DUMMY	.959	1.043
	ARABICSOMALI_DUMMY	.968	1.033
	BOY_DUMMY	.980	1.020
	NHSAFE_AGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.476	2.102

	PARENT_GRANDPARENT_DUMMY	.275	3.636

a. Dependent Variable: OTHER_ADULT_DUMMY

Table A.8. Regression Assumptions: Multicollinearity – Accompaniment: Sibling

Model		Collinearity Statistics	
		Tolerance	VIF
1	FRIEND_DUMMY	.628	1.593
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	HINDIPUNJABI_DUMMY	.824	1.214
	MANDARINCANTONESECHINES_DUMMY	.807	1.239
	KOREAN_DUMMY	.887	1.127
	PHILLIPPINETAGALOG_DUMMY	.880	1.137
	SPANISH_DUMMY	.970	1.031
	VIETNAMESE_DUMMY	.947	1.056
	JAPANESE_DUMMY	.959	1.043
	ARABICSOMALI_DUMMY	.968	1.033
	BOY_DUMMY	.980	1.020
	NHSAFE_AGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.565	1.769
	PARENT_GRANDPARENT_DUMMY	.340	2.937
	OTHER_ADULT_DUMMY	.560	1.786

a. Dependent Variable: SIBLING_DUMMY

Table A.9. Regression Assumptions: Multicollinearity – Accompaniment: Friend

Model		Collinearity Statistics	
		Tolerance	VIF
1	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	HINDIPUNJABI_DUMMY	.824	1.214
	MANDARINCANTONESECHINES_DUMMY	.807	1.239

	KOREAN_DUMMY	.887	1.127
	PHILLIPPINETAGALOG_DUMMY	.880	1.137
	SPANISH_DUMMY	.970	1.031
	VIETNAMESE_DUMMY	.947	1.056
	JAPANESE_DUMMY	.959	1.043
	ARABICSOMALI_DUMMY	.968	1.033
	BOY_DUMMY	.980	1.020
	NHSAFE_AGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.450	2.224
	PARENT_GRANDPARENT_DUMMY	.214	4.662
	OTHER_ADULT_DUMMY	.448	2.234
	SIBLING_DUMMY	.378	2.645

a. Dependent Variable: FRIEND_DUMMY

Table A.10. Regression Assumptions: Multicollinearity – Distance: < 0.5km

		Collinearity Statistics	
Model		Tolerance	VIF
1	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	HINDIPUNJABI_DUMMY	.824	1.214
	MANDARINCANTONESECHINES_DUMMY	.807	1.239
	KOREAN_DUMMY	.887	1.127
	PHILLIPPINETAGALOG_DUMMY	.880	1.137
	SPANISH_DUMMY	.970	1.031
	VIETNAMESE_DUMMY	.947	1.056
	JAPANESE_DUMMY	.959	1.043
	ARABICSOMALI_DUMMY	.968	1.033
	BOY_DUMMY	.980	1.020
	NHSAFE_AGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091

	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072

a. Dependent Variable: LESSTHAN0.5KM_DUMMY

Table A.11. Regression Assumptions: Multicollinearity – Distance: 0.51-1.59km

		Collinearity Statistics	
Model		Tolerance	VIF
1	FROM1.6KMTO3KM_DUMMY	.859	1.164
	OVER3KM_DUMMY	.922	1.084
	HINDIPUNJABI_DUMMY	.824	1.214
	MANDARINCANTONESECHINES_DUMMY	.807	1.239
	KOREAN_DUMMY	.887	1.127
	PHILLIPPINETAGALOG_DUMMY	.880	1.137
	SPANISH_DUMMY	.970	1.031
	VIETNAMESE_DUMMY	.947	1.056
	JAPANESE_DUMMY	.959	1.043
	ARABICSOMALI_DUMMY	.968	1.033
	BOY_DUMMY	.980	1.020
	NHSAFE_AGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	LESSTHAN0.5KM_DUMMY	.794	1.259

a. Dependent Variable: FROM0.51KMTO1.59KM_DUMMY

Table A.12. Regression Assumptions: Multicollinearity – Distance: 1.6-3.0km

		Collinearity Statistics	
Model		Tolerance	VIF
1	OVER3KM_DUMMY	.728	1.374
	HINDIPUNJABI_DUMMY	.824	1.214

	MANDARINCANTONESECHINES_DUMMY	.807	1.239
	KOREAN_DUMMY	.887	1.127
	PHILLIPPINETAGALOG_DUMMY	.880	1.137
	SPANISH_DUMMY	.970	1.031
	VIETNAMESE_DUMMY	.947	1.056
	JAPANESE_DUMMY	.959	1.043
	ARABICSOMALI_DUMMY	.968	1.033
	BOY_DUMMY	.980	1.020
	NHSAFE_AGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	LESSTHAN0.5KM_DUMMY	.342	2.923
	FROM0.51KMTO1.59KM_DUMMY	.363	2.753

a. Dependent Variable: FROM1.6KMTO3KM_DUMMY

Table A.13. Regression Assumptions: Multicollinearity – Distance: < 3.0km

Model		Collinearity Statistics	
		Tolerance	VIF
1	HINDIPUNJABI_DUMMY	.824	1.214
	MANDARINCANTONESECHINES_DUMMY	.807	1.239
	KOREAN_DUMMY	.887	1.127
	PHILLIPPINETAGALOG_DUMMY	.880	1.137
	SPANISH_DUMMY	.970	1.031
	VIETNAMESE_DUMMY	.947	1.056
	JAPANESE_DUMMY	.959	1.043
	ARABICSOMALI_DUMMY	.968	1.033
	BOY_DUMMY	.980	1.020
	NHSAFE_AGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091

	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	LESSTHAN0.5KM_DUMMY	.169	5.908
	FROM0.51KMTO1.59KM_DUMMY	.176	5.686
	FROM1.6KMTO3KM_DUMMY	.328	3.045

a. Dependent Variable: OVER3KM_DUMMY

Table A.14. Regression Assumptions: Multicollinearity – Language: English

Model		Collinearity Statistics	
		Tolerance	VIF
1	HINDIPUNJABI_DUMMY	.824	1.214
	MANDARINCANTONESECHINES_DUMMY	.807	1.239
	KOREAN_DUMMY	.887	1.127
	PHILLIPPINETAGALOG_DUMMY	.880	1.137
	SPANISH_DUMMY	.970	1.031
	VIETNAMESE_DUMMY	.947	1.056
	JAPANESE_DUMMY	.959	1.043
	ARABICSOMALI_DUMMY	.968	1.033
	BOY_DUMMY	.980	1.020
	NHSAFE_AGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087

a. Dependent Variable: ENGLISH_DUMMY

Table A.15. Regression Assumptions: Multicollinearity – Language: Hindi/ Punjabi

Model		Collinearity Statistics	

		Tolerance	VIF
1	MANDARINCANTONESECHINES_DUMMY	.612	1.634
	KOREAN_DUMMY	.767	1.304
	PHILLIPPINETAGALOG_DUMMY	.755	1.324
	SPANISH_DUMMY	.935	1.070
	VIETNAMESE_DUMMY	.871	1.148
	JAPANESE_DUMMY	.945	1.058
	ARABICSOMALI_DUMMY	.937	1.067
	BOY_DUMMY	.980	1.020
	NHSAFE_AGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	ENGLISH_DUMMY	.529	1.890

a. Dependent Variable: HINDIPUNJABI_DUMMY

Table A.16. Regression Assumptions: Multicollinearity – Language: Mandarin/ Cantonese/ Chinese

		Collinearity Statistics	
Model		Tolerance	VIF
1	KOREAN_DUMMY	.746	1.341
	PHILLIPPINETAGALOG_DUMMY	.738	1.355
	SPANISH_DUMMY	.935	1.070
	VIETNAMESE_DUMMY	.862	1.161
	JAPANESE_DUMMY	.945	1.059
	ARABICSOMALI_DUMMY	.928	1.077
	BOY_DUMMY	.980	1.020
	NHSAFE_AGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179

	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	ENGLISH_DUMMY	.496	2.015
	HINDIPUNJABI_DUMMY	.585	1.708

a. Dependent Variable: MANDARINCANTONESECHINES_DUMMY

Table A.17. Regression Assumptions: Multicollinearity – Language: Korean

Model		Collinearity Statistics	
		Tolerance	VIF
1	PHILLIPPINETAGALOG_DUMMY	.509	1.965
	SPANISH_DUMMY	.846	1.182
	VIETNAMESE_DUMMY	.706	1.417
	JAPANESE_DUMMY	.917	1.091
	ARABICSOMALI_DUMMY	.840	1.190
	BOY_DUMMY	.980	1.020
	NHSAFE_AGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	ENGLISH_DUMMY	.253	3.960
	HINDIPUNJABI_DUMMY	.340	2.944
	MANDARINCANTONESECHINES_DUMMY	.345	2.895

a. Dependent Variable: KOREAN_DUMMY

Table A.18. Regression Assumptions: Multicollinearity – Language: Philippine/ Tagalog

Model		Collinearity Statistics Tolerance	VIF
1	SPANISH_DUMMY	.859	1.165
	VIETNAMESE_DUMMY	.720	1.388
	JAPANESE_DUMMY	.913	1.095
	ARABICSOMALI_DUMMY	.853	1.173
	BOY_DUMMY	.980	1.020
	NHSAFE_DISAGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	ENGLISH_DUMMY	.272	3.681
	HINDIPUNJABI_DUMMY	.363	2.753
	MANDARINCANTONESECHINES_DUMMY	.371	2.697
	KOREAN_DUMMY	.552	1.811

a. Dependent Variable: PHILLIPPINETAGALOG_DUMMY

Table A.19. Regression Assumptions: Multicollinearity – Language: Spanish

Model		Collinearity Statistics Tolerance	VIF
1	VIETNAMESE_DUMMY	.286	3.498
	JAPANESE_DUMMY	.712	1.405
	ARABICSOMALI_DUMMY	.478	2.091
	BOY_DUMMY	.980	1.020
	NHSAFE_AGREE_DUMMY	.920	1.087

	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	ENGLISH_DUMMY	.052	19.089
	HINDIPUNJABI_DUMMY	.079	12.726
	MANDARINCANTONESECHINES_DUMMY	.082	12.180
	KOREAN_DUMMY	.160	6.234
	PHILLIPPINETAGALOG_DUMMY	.150	6.662

a. Dependent Variable: SPANISH_DUMMY

Table A.20. Regression Assumptions: Multicollinearity – Language: Vietnamese

Model		Collinearity Statistics	
		Tolerance	VIF
1	JAPANESE_DUMMY	.854	1.171
	ARABICSOMALI_DUMMY	.702	1.424
	BOY_DUMMY	.980	1.020
	NHSAFE_AGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	ENGLISH_DUMMY	.129	7.767
	HINDIPUNJABI_DUMMY	.184	5.424

	MANDARINCANTONESECHINES_DUMMY	.191	5.248
	KOREAN_DUMMY	.337	2.967
	PHILLIPPINETAGALOG_DUMMY	.317	3.155
	SPANISH_DUMMY	.720	1.389

a. Dependent Variable: VIETNAMESE_DUMMY

Table A.21. Regression Assumptions: Multicollinearity – Language: Japanese

		Collinearity Statistics	
Model		Tolerance	VIF
1	ARABICSOMALI_DUMMY	.253	3.955
	BOY_DUMMY	.980	1.020
	NHSAFE_DISAGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	ENGLISH_DUMMY	.020	50.282
	HINDIPUNJABI_DUMMY	.031	32.777
	MANDARINCANTONESECHINES_DUMMY	.032	31.377
	KOREAN_DUMMY	.067	14.975
	PHILLIPPINETAGALOG_DUMMY	.061	16.311
	SPANISH_DUMMY	.273	3.659
	VIETNAMESE_DUMMY	.130	7.676

a. Dependent Variable: JAPANESE_DUMMY

Table A.22. Regression Assumptions: Multicollinearity – Language: Arabic/ Somali

		Collinearity Statistics	
Model		Tolerance	VIF
1	BOY_DUMMY	.980	1.020
	NHSAFE_AGREE_DUMMY	.920	1.087

	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	ENGLISH_DUMMY	.057	17.497
	HINDIPUNJABI_DUMMY	.086	11.609
	MANDARINCANTONESECHINES_DUMMY	.089	11.213
	KOREAN_DUMMY	.174	5.736
	PHILLIPPINETAGALOG_DUMMY	.163	6.134
	SPANISH_DUMMY	.523	1.911
	VIETNAMESE_DUMMY	.305	3.277
	JAPANESE_DUMMY	.720	1.389

a. Dependent Variable: ARABICSOMALI_DUMMY

Table A.23. Regression Assumptions: Multicollinearity – Sex: Girl

Model		Collinearity Statistics	
		Tolerance	VIF
1	BOY_DUMMY	.980	1.020
	NHSAFE_AGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	HINDIPUNJABI_DUMMY	.824	1.214

	MANDARINCANTONESECHINES_DUMMY	.807	1.239
	KOREAN_DUMMY	.887	1.127
	PHILLIPPINETAGALOG_DUMMY	.880	1.137
	SPANISH_DUMMY	.970	1.031
	VIETNAMESE_DUMMY	.947	1.056
	JAPANESE_DUMMY	.959	1.043
	ARABICSOMALI_DUMMY	.968	1.033

a. Dependent Variable: GIRL_DUMMY

Table A.24. Regression Assumptions: Multicollinearity – Sex: Boy

Model		Collinearity Statistics	
		Tolerance	VIF
1	NHSAFE_DISAGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	HINDIPUNJABI_DUMMY	.824	1.214
	MANDARINCANTONESECHINES_DUMMY	.807	1.239
	KOREAN_DUMMY	.887	1.127
	PHILLIPPINETAGALOG_DUMMY	.880	1.137
	SPANISH_DUMMY	.970	1.031
	VIETNAMESE_DUMMY	.947	1.056
	JAPANESE_DUMMY	.959	1.043
	ARABICSOMALI_DUMMY	.968	1.033
	GIRL_DUMMY	.980	1.020

a. Dependent Variable: BOY_DUMMY

Table A.25. Regression Assumptions: Multicollinearity – Caregiver Perception of Neighbourhood Safety: Disagree

Model		Collinearity Statistics	
		Tolerance	VIF
1	NHSAFE_AGREE_DUMMY	.920	1.087
	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215
	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	HINDIPUNJABI_DUMMY	.824	1.214
	MANDARINCANTONESECHINES_DUMMY	.807	1.239
	KOREAN_DUMMY	.887	1.127
	PHILLIPPINETAGALOG_DUMMY	.880	1.137
	SPANISH_DUMMY	.970	1.031
	VIETNAMESE_DUMMY	.947	1.056
	JAPANESE_DUMMY	.959	1.043
	ARABICSOMALI_DUMMY	.968	1.033
	BOY_DUMMY	.980	1.020

a. Dependent Variable: NHSAFE_DISAGREE_DUMMY

Table A.26. Regression Assumptions: Multicollinearity – Caregiver Perception of Neighbourhood Safety: Agree

Model		Collinearity Statistics	
		Tolerance	VIF
1	Child's Age?	.848	1.179
	Household children attending the same school?	.916	1.091
	WALKS_ALONE_DUMMY	.855	1.170
	OTHER_ADULT_DUMMY	.961	1.040
	SIBLING_DUMMY	.892	1.121
	FRIEND_DUMMY	.933	1.072
	FROM0.51KMTO1.59KM_DUMMY	.823	1.215

	FROM1.6KMTO3KM_DUMMY	.839	1.192
	OVER3KM_DUMMY	.920	1.087
	HINDIPUNJABI_DUMMY	.824	1.214
	MANDARINCANTONESECHINES_DUMMY	.807	1.239
	KOREAN_DUMMY	.887	1.127
	PHILLIPPINETAGALOG_DUMMY	.880	1.137
	SPANISH_DUMMY	.970	1.031
	VIETNAMESE_DUMMY	.947	1.056
	JAPANESE_DUMMY	.959	1.043
	ARABICSOMALI_DUMMY	.968	1.033
	BOY_DUMMY	.980	1.020
	NHSAFE_DISAGREE_DUMMY	.920	1.087

a. Dependent Variable: NHSAFE_AGREE_DUMMY

Appendix B: Variable Associations

Table B.1. Crosstabulation: Accompaniment and Mode to School

			Who Accompanies the Child to School?					
			Child Travels Alone	Parent/ Grandparent	Other Adult	Sibling	Friend	Total
Student(s) Mode to School (DriveRef)?	Drive / Carpool	Count	1	689	30	14	15	749
		Expected Count	36.7	600.6	32.4	51.8	27.6	749.0
		% within Student(s) Mode to School (DriveRef)?	0.1%	92.0%	4.0%	1.9%	2.0%	100.0%
		% within Who Accompanies the Child to School?	1.2%	49.5%	40.0%	11.7%	23.4%	43.1%
		% of Total	0.1%	39.7%	1.7%	0.8%	0.9%	43.1%
	Walk / Scoot / Skate	Count	84	703	45	106	49	987
		Expected Count	48.3	791.4	42.6	68.2	36.4	987.0
		% within Student(s) Mode to School (DriveRef)?	8.5%	71.2%	4.6%	10.7%	5.0%	100.0%
		% within Who Accompanies the Child to School?	98.8%	50.5%	60.0%	88.3%	76.6%	56.9%
		% of Total	4.8%	40.5%	2.6%	6.1%	2.8%	56.9%
Total		Count	85	1392	75	120	64	1736
		Expected Count	85.0	1392.0	75.0	120.0	64.0	1736.0
		% within Student(s) Mode to School (DriveRef)?	4.9%	80.2%	4.3%	6.9%	3.7%	100.0%
		% within Who Accompanies the Child to School?	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	4.9%	80.2%	4.3%	6.9%	3.7%	100.0%

Table B.2. Chi-Square: Accompaniment and Mode to School

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	142.839[a]	4	.000

Likelihood Ratio	176.316	4	.000
Linear-by-Linear Association	23.462	1	.000
N of Valid Cases	1736		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 27.61.

Table B.3. Symmetric Measures: Accompaniment and Mode to School

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.287			.000
	Cramer's V	.287			.000
Interval by Interval	Pearson's R	.116	.021	4.875	.000[c]
Ordinal by Ordinal	Spearman Correlation	.061	.023	2.564	.010[c]
N of Valid Cases		1736			

Table B.4. Crosstabulation: Distance and Mode to School

			Caregivers: Distance Home to School?				
			Less than 0.5km	0.51km to 1.59km	1.6km to 3km	Over 3km	Total
Student(s) Mode to School (DriveRef)?	Drive / Carpool	Count	189	530	266	115	1100
		Expected Count	530.0	398.4	121.0	50.6	1100.0
		% within Student(s) Mode to School (DriveRef)?	17.2%	48.2%	24.2%	10.5%	100.0%
		% within Caregivers: Distance Home to School?	14.7%	54.8%	90.5%	93.5%	41.2%
		% of Total	7.1%	19.8%	10.0%	4.3%	41.2%
	Walk / Scoot / Skate	Count	1099	438	28	8	1573
		Expected Count	758.0	569.6	173.0	72.4	1573.0
		% within Student(s) Mode to School (DriveRef)?	69.9%	27.8%	1.8%	0.5%	100.0%
		% within Caregivers: Distance Home to School?	85.3%	45.2%	9.5%	6.5%	58.8%
		% of Total	41.1%	16.4%	1.0%	0.3%	58.8%
Total		Count	1288	968	294	123	2673

Expected Count	1288.0	968.0	294.0	123.0	2673.0
% within Student(s) Mode to School (DriveRef)?	48.2%	36.2%	11.0%	4.6%	100.0%
% within Caregivers: Distance Home to School?	100.0%	100.0%	100.0%	100.0%	100.0%
% of Total	48.2%	36.2%	11.0%	4.6%	100.0%

Table B.5. Chi-Square: Distance and Mode to School

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	881.324[a]	3	.000
Likelihood Ratio	969.914	3	.000
Linear-by-Linear Association	836.765	1	.000
N of Valid Cases	2673		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 50.62.

Table B.6. Symmetric Measures: Distance and Mode to School

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.574			.000
	Cramer's V	.574			.000
Interval by Interval	Pearson's R	-.560	.013	-34.897	.000[c]
Ordinal by Ordinal	Spearman Correlation	-.570	.015	-35.878	.000[c]
N of Valid Cases		2673			

Table B.7. Crosstabulation: Distance and Mode from School

			Caregivers: Distance Home to School?				
			Less than 0.5km	0.51km to 1.59km	1.6km to 3km	Over 3km	Total
Student(s) Mode from School (DriveRef)?	Drive / Carpool	Count	141	412	231	115	899
		Expected Count	427.2	327.2	101.7	42.9	899.0

		% within Student(s) Mode from School (DriveRef)?	15.7%	45.8%	25.7%	12.8%	100.0%
		% within Caregivers: Distance Home to School?	11.7%	44.6%	80.5%	95.0%	35.4%
		% of Total	5.6%	16.2%	9.1%	4.5%	35.4%
	Walk / Scoot / Skate	Count	1064	511	56	6	1637
		Expected Count	777.8	595.8	185.3	78.1	1637.0
		% within Student(s) Mode from School (DriveRef)?	65.0%	31.2%	3.4%	0.4%	100.0%
		% within Caregivers: Distance Home to School?	88.3%	55.4%	19.5%	5.0%	64.6%
		% of Total	42.0%	20.1%	2.2%	0.2%	64.6%
Total		Count	1205	923	287	121	2536
		Expected Count	1205.0	923.0	287.0	121.0	2536.0
		% within Student(s) Mode from School (DriveRef)?	47.5%	36.4%	11.3%	4.8%	100.0%
		% within Caregivers: Distance Home to School?	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	47.5%	36.4%	11.3%	4.8%	100.0%

Table B.8. Chi-Square: Distance and Mode from School

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	773.228[a]	3	.000
Likelihood Ratio	827.935	3	.000
Linear-by-Linear Association	761.860	1	.000
N of Valid Cases	2536		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 42.89.

Table B.9. Symmetric Measures: Distance and Mode from School

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by	Phi	.552			.000

Nominal	Cramer's V	.552			.000	
Interval by Interval	Pearson's R	-.548	.014	-32.997	.000c	
Ordinal by Ordinal	Spearman Correlation	-.541	.016	-32.370	.000c	
N of Valid Cases		2536				

Table B.10. Crosstabulation: Child Age and Mode to School

			Child's Age?									
			4	5	6	7	8	9	10	11	12	Total
Student(s) Mode to School (DriveRef)?	Drive / Carpool	Count	12	125	153	139	134	129	144	96	83	1015
		Expected Count	9.6	130.1	138.8	143.8	128.8	126.4	136.7	107.2	93.5	1015.0
		% within Student(s) Mode to School (DriveRef)?	1.2%	12.3%	15.1%	13.7%	13.2%	12.7%	14.2%	9.5%	8.2%	100.0%
		% within Child's Age?	52.2%	39.9%	45.8%	40.2%	43.2%	42.4%	43.8%	37.2%	36.9%	41.6%
		% of Total	.5%	5.1%	6.3%	5.7%	5.5%	5.3%	5.9%	3.9%	3.4%	41.6%
	Walk / Scoot / Skate	Count	11	188	181	207	176	175	185	162	142	1427
		Expected Count	13.4	182.9	195.2	202.2	181.2	177.6	192.3	150.8	131.5	1427.0
		% within Student(s) Mode to School (DriveRef)?	.8%	13.2%	12.7%	14.5%	12.3%	12.3%	13.0%	11.4%	10.0%	100.0%
		% within Child's Age?	47.8%	60.1%	54.2%	59.8%	56.8%	57.6%	56.2%	62.8%	63.1%	58.4%
		% of Total	.5%	7.7%	7.4%	8.5%	7.2%	7.2%	7.6%	6.6%	5.8%	58.4%
Total		Count	23	313	334	346	310	304	329	258	225	2442

Expected Count	23.0	313.0	334.0	346.0	310.0	304.0	329.0	258.0	225.0	2442.0
% within Student(s) Mode to School (DriveRef)?	.9%	12.8%	13.7%	14.2%	12.7%	12.4%	13.5%	10.6%	9.2%	100.0%
% within Child's Age?	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
% of Total	.9%	12.8%	13.7%	14.2%	12.7%	12.4%	13.5%	10.6%	9.2%	100.0%

Table B.11. Chi-Square: Child Age and Mode to School

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.305[a]	8	.317
Likelihood Ratio	9.313	8	.317
Linear-by-Linear Association	1.971	1	.160
N of Valid Cases	2442		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.56.

Table B.12. Symmetric Measures: Child Age and Mode to School

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.062			.317
	Cramer's V	.062			.317
Interval by Interval	Pearson's R	.028	.020	1.404	.160[c]
Ordinal by Ordinal	Spearman Correlation	.027	.020	1.340	.180[c]
N of Valid Cases		2442			

Table B.13. Crosstabulation: Child Age and Mode from School

	Child's Age?	Total

			4	5	6	7	8	9	10	11	12	
Student(s) Mode from School (DriveRef)?	Drive / Carpool	Count	8	114	125	115	113	98	110	83	67	833
		Expected Count	7.8	105.8	111.5	120.4	102.6	104.3	112.9	87.3	80.5	833.0
		% within Student(s) Mode from School (DriveRef)?	1.0%	13.7 %	15.0 %	13.8 %	13.6 %	11.8 %	13.2 %	10.0 %	8.0%	100.0 %
		% within Child's Age?	36.4 %	38.4 %	39.9 %	34.0 %	39.2 %	33.4 %	34.7 %	33.9 %	29.6 %	35.6 %
		% of Total	.3%	4.9%	5.3%	4.9%	4.8%	4.2%	4.7%	3.5%	2.9%	35.6 %
	Walk / Scoot / Skate	Count	14	183	188	223	175	195	207	162	159	1506
		Expected Count	14.2	191.2	201.5	217.6	185.4	188.7	204.1	157.7	145.5	1506.0
		% within Student(s) Mode from School (DriveRef)?	.9%	12.2 %	12.5 %	14.8 %	11.6 %	12.9 %	13.7 %	10.8 %	10.6 %	100.0 %
		% within Child's Age?	63.6 %	61.6 %	60.1 %	66.0 %	60.8 %	66.6 %	65.3 %	66.1 %	70.4 %	64.4 %
		% of Total	.6%	7.8%	8.0%	9.5%	7.5%	8.3%	8.8%	6.9%	6.8%	64.4 %
Total		Count	22	297	313	338	288	293	317	245	226	2339
		Expected Count	22.0	297.0	313.0	338.0	288.0	293.0	317.0	245.0	226.0	2339.0
		% within Student(s) Mode from School (DriveRef)?	.9%	12.7 %	13.4 %	14.5 %	12.3 %	12.5 %	13.6 %	10.5 %	9.7%	100.0 %
		% within Child's Age?	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %	100.0 %

	% of Total	.9%	12.7 %	13.4 %	14.5 %	12.3 %	12.5 %	13.6 %	10.5 %	9.7%	100.0 %

Table B.14. Chi-Square: Child Age and Mode from School

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.118[a]	8	.257
Likelihood Ratio	10.154	8	.254
Linear-by-Linear Association	5.838	1	.016
N of Valid Cases	2339		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.83.

Table B.15. Symmetric Measures: Child Age and Mode from School

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.066			.257
	Cramer's V	.066			.257
Interval by Interval	Pearson's R	.050	.021	2.419	.016[c]
Ordinal by Ordinal	Spearman Correlation	.050	.021	2.400	.016[c]
N of Valid Cases		2339			

Table B.16. Crosstabulation: Child Sex and Mode to School

			Child's Sex?		
			Girl	Boy	Total
Student(s) Mode to School (DriveRef)?	Drive / Carpool	Count	554	439	993
		Expected Count	519.7	473.3	993.0
		% within Student(s) Mode to School (DriveRef)?	55.8%	44.2%	100.0%
		% within Child's Sex?	44.1%	38.4%	41.4%
		% of Total	23.1%	18.3%	41.4%
	Walk / Scoot / Skate	Count	701	704	1405
		Expected Count	735.3	669.7	1405.0
		% within Student(s) Mode to School (DriveRef)?	49.9%	50.1%	100.0%

	% within Child's Sex?	55.9%	61.6%	58.6%
	% of Total	29.2%	29.4%	58.6%
Total	Count	1255	1143	2398
	Expected Count	1255.0	1143.0	2398.0
	% within Student(s) Mode to School (DriveRef)?	52.3%	47.7%	100.0%
	% within Child's Sex?	100.0%	100.0%	100.0%
	% of Total	52.3%	47.7%	100.0%

Table B.17. Chi-Square: Child Sex and Mode to School

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.111[a]	1	.004
Likelihood Ratio	8.122	1	.004
Linear-by-Linear Association	8.108	1	.004
N of Valid Cases	2398		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 473.31.

Table B.18. Symmetric Measures: Child Sex and Mode to School

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.058			.004
	Cramer's V	.058			.004
Interval by Interval	Pearson's R	.058	.020	2.852	.004[c]
Ordinal by Ordinal	Spearman Correlation	.058	.020	2.852	.004[c]
N of Valid Cases		2398			

Table B.19. Crosstabulation: Child Sex and Mode from School

			Child's Sex?		
			Girl	Boy	Total
Student(s) Mode from School (DriveRef)?	Drive / Carpool	Count	443	372	815
		Expected Count	435.4	379.6	815.0
		% within Student(s) Mode from School (DriveRef)?	54.4%	45.6%	100.0%

		% within Child's Sex?	36.1%	34.8%	35.5%
		% of Total	19.3%	16.2%	35.5%
	Walk / Scoot / Skate	Count	783	697	1480
		Expected Count	790.6	689.4	1480.0
		% within Student(s) Mode from School (DriveRef)?	52.9%	47.1%	100.0%
		% within Child's Sex?	63.9%	65.2%	64.5%
		% of Total	34.1%	30.4%	64.5%
Total		Count	1226	1069	2295
		Expected Count	1226.0	1069.0	2295.0
		% within Student(s) Mode from School (DriveRef)?	53.4%	46.6%	100.0%
		% within Child's Sex?	100.0%	100.0%	100.0%
		% of Total	53.4%	46.6%	100.0%

Table B.20. Child Sex and Mode from School

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.444[a]	1	.505		
Likelihood Ratio	.445	1	.505		
Linear-by-Linear Association	.444	1	.505		
N of Valid Cases	2295				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 379.62.

Table B.21. Symmetric Measures: Child Sex and Mode from School

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.014			.505
	Cramer's V	.014			.505
Interval by Interval	Pearson's R	.014	.021	.666	.505[c]
Ordinal by Ordinal	Spearman Correlation	.014	.021	.666	.505[c]
N of Valid Cases		2295			

Table B.22. Crosstabulation: Child Count and Mode to School

			Household children attending the same school?			
			1 Child	2 Children	3 or more Children	Total
Student(s) Mode to School (DriveRef)?	Drive / Carpool	Count	377	397	61	835
		Expected Count	387.5	379.4	68.1	835.0
		% within Student(s) Mode to School (DriveRef)?	45.1%	47.5%	7.3%	100.0%
		% within Household children attending the same school?	41.2%	44.3%	37.9%	42.3%
		% of Total	19.1%	20.1%	3.1%	42.3%
	Walk / Scoot / Skate	Count	539	500	100	1139
		Expected Count	528.5	517.6	92.9	1139.0
		% within Student(s) Mode to School (DriveRef)?	47.3%	43.9%	8.8%	100.0%
		% within Household children attending the same school?	58.8%	55.7%	62.1%	57.7%
		% of Total	27.3%	25.3%	5.1%	57.7%
Total		Count	916	897	161	1974
		Expected Count	916.0	897.0	161.0	1974.0
		% within Student(s) Mode to School (DriveRef)?	46.4%	45.4%	8.2%	100.0%
		% within Household children attending the same school?	100.0%	100.0%	100.0%	100.0%
		% of Total	46.4%	45.4%	8.2%	100.0%

Table B.23. Chi-Square: Child Count and Mode to School

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.184[a]	2	.204
Likelihood Ratio	3.194	2	.203
Linear-by-Linear Association	.059	1	.808
N of Valid Cases	1974		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 68.10.

Table B.24. Symmetric Measures: Child Count and Mode to School

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.040			.204
	Cramer's V	.040			.204
Interval by Interval	Pearson's R	-.005	.022	-.242	.808[c]
Ordinal by Ordinal	Spearman Correlation	-.011	.022	-.510	.610[c]
N of Valid Cases		1974			

Table B.25. Crosstabulation: Child Count and Mode from School

			Household children attending the same school?			
			1 Child	2 Children	3 or more Children	Total
Student(s) Mode from School (DriveRef)?	Drive / Carpool	Count	308	325	67	700
		Expected Count	325.4	313.7	60.9	700.0
		% within Student(s) Mode from School (DriveRef)?	44.0%	46.4%	9.6%	100.0%
		% within Household children attending the same school?	34.5%	37.7%	40.1%	36.4%
		% of Total	16.0%	16.9%	3.5%	36.4%
	Walk / Scoot / Skate	Count	585	536	100	1221
		Expected Count	567.6	547.3	106.1	1221.0
		% within Student(s) Mode from School (DriveRef)?	47.9%	43.9%	8.2%	100.0%
		% within Household children attending the same school?	65.5%	62.3%	59.9%	63.6%
		% of Total	30.5%	27.9%	5.2%	63.6%
Total		Count	893	861	167	1921
		Expected Count	893.0	861.0	167.0	1921.0
		% within Student(s) Mode from School (DriveRef)?	46.5%	44.8%	8.7%	100.0%
		% within Household children attending the same school?	100.0%	100.0%	100.0%	100.0%
		% of Total	46.5%	44.8%	8.7%	100.0%

Table B.26. Chi-Square: Child Count and Mode from School

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.077[a]	2	.215
Likelihood Ratio	3.072	2	.215
Linear-by-Linear Association	3.046	1	.081
N of Valid Cases	1921		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 60.85.

Table B.27. Symmetric Measures: Child Count and Mode from School

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.040			.215
	Cramer's V	.040			.215
Interval by Interval	Pearson's R	-.040	.023	-1.746	.081[c]
Ordinal by Ordinal	Spearman Correlation	-.040	.023	-1.752	.080[c]
N of Valid Cases		1921			

Table B.28. Crosstabulation: Caregiver Perception of Safety and Mode to School

			"Our neighbourhood is safe for children to walk to and from school"		
			Disagree	Agree	Total
Student(s) Mode to School (DriveRef)?	Drive / Carpool	Count	279	838	1117
		Expected Count	157.9	959.1	1117.0
		% within Student(s) Mode to School (DriveRef)?	25.0%	75.0%	100.0%
		% within "Our neighbourhood is safe for children to walk to and from school"	72.7%	35.9%	41.1%
		% of Total	10.3%	30.9%	41.1%
	Walk / Scoot / Skate	Count	105	1494	1599
		Expected Count	226.1	1372.9	1599.0
		% within Student(s) Mode to School (DriveRef)?	6.6%	93.4%	100.0%
		% within "Our neighbourhood is safe for children to walk to and from school"	27.3%	64.1%	58.9%

	% of Total	3.9%	55.0%	58.9%
Total	Count	384	2332	2716
	Expected Count	384.0	2332.0	2716.0
	% within Student(s) Mode to School (DriveRef)?	14.1%	85.9%	100.0%
	% within "Our neighbourhood is safe for children to walk to and from school"	100.0%	100.0%	100.0%
	% of Total	14.1%	85.9%	100.0%

Table B.29. Chi-Square: Caregiver Perception of Safety and Mode to School

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	183.623[a]	1	.000
Likelihood Ratio	182.847	1	.000
Linear-by-Linear Association	183.555	1	.000
N of Valid Cases	2716		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 157.93.

b. Computed only for a 2x2 table

Table B.30. Symmetric Measures: Caregiver Perception of Safety and Mode to School

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Nominal by Nominal	Phi	.260			.000
	Cramer's V	.260			.000
Interval by Interval	Pearson's R	.260	.018	14.028	.000[c]
Ordinal by Ordinal	Spearman Correlation	.260	.018	14.028	.000[c]
N of Valid Cases		2716			

Table B.31. Crosstabulation: Caregiver Perception of Safety and Mode from School

			"Our neighbourhood is safe for children to walk to and from school"		
			Disagree	Agree	Total
Student(s) Mode	Drive /	Count	242	668	910

from School (DriveRef)?	Carpool	Expected Count	128.9	781.1	910.0
		% within Student(s) Mode from School (DriveRef)?	26.6%	73.4%	100.0%
		% within "Our neighbourhood is safe for children to walk to and from school"	65.9%	30.0%	35.1%
		% of Total	9.3%	25.8%	35.1%
	Walk / Scoot / Skate	Count	125	1555	1680
		Expected Count	238.1	1441.9	1680.0
		% within Student(s) Mode from School (DriveRef)?	7.4%	92.6%	100.0%
		% within "Our neighbourhood is safe for children to walk to and from school"	34.1%	70.0%	64.9%
		% of Total	4.8%	60.0%	64.9%
Total		Count	367	2223	2590
		Expected Count	367.0	2223.0	2590.0
		% within Student(s) Mode from School (DriveRef)?	14.2%	85.8%	100.0%
		% within "Our neighbourhood is safe for children to walk to and from school"	100.0%	100.0%	100.0%
		% of Total	14.2%	85.8%	100.0%

Table B.32. Chi-Square: Caregiver Perception of Safety and Mode from School

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	178.039[a]	1	.000
Likelihood Ratio	169.511	1	.000
Linear-by-Linear Association	177.970	1	.000
N of Valid Cases	2590		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 128.95.

b. Computed only for a 2x2 table

Table B.33. Symmetric Measures: Caregiver Perception of Safety and Mode from School

	Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.

Nominal by Nominal	Phi	.262			.000
	Cramer's V	.262			.000
Interval by Interval	Pearson's R	.262	.020	13.821	.000[c]
Ordinal by Ordinal	Spearman Correlation	.262	.020	13.821	.000[c]
N of Valid Cases		2590			

Table B.34. Crosstabulation: Home Language and Mode to School

			Language at Home?									
			English	Hindi/ Punjabi	Mandarin/ Cantonese / Chinese	Korean	Philippine / Tagalog	Spanish	Vietnamese	Japanese	Arabic/ Somali	Total
Student(s) Mode to School (DriveRef)?	Drive / Carpool	Count	302	168	118	40	52	6	35	0	8	729
		Expected Count	302.8	139.3	129.7	51.0	57.7	8.4	24.7	4.2	11.3	729.0
		% within Student(s) Mode to School (DriveRef)?	41.4%	23.0%	16.2%	5.5%	7.1%	0.8%	4.8%	0.0%	1.1%	100.0%
		% within Language at Home?	41.7%	50.5%	38.1%	32.8%	37.7%	30.0%	59.3%	0.0%	29.6%	41.8%
		% of Total	17.3%	9.6%	6.8%	2.3%	3.0%	0.3%	2.0%	0.0%	0.5%	41.8%
	Walk / Scoot / Skate	Count	422	165	192	82	86	14	24	10	19	1014
		Expected Count	421.2	193.7	180.3	71.0	80.3	11.6	34.3	5.8	15.7	1014.0
		% within Student(s) Mode to School (DriveRef)?	41.6%	16.3%	18.9%	8.1%	8.5%	1.4%	2.4%	1.0%	1.9%	100.0%
		% within Language at Home?	58.3%	49.5%	61.9%	67.2%	62.3%	70.0%	40.7%	100.0%	70.4%	58.2%
		% of Total	24.2%	9.5%	11.0%	4.7%	4.9%	0.8%	1.4%	0.6%	1.1%	58.2%
Total		Count	724	333	310	122	138	20	59	10	27	1743
		Expected Count	724.0	333.0	310.0	122.0	138.0	20.0	59.0	10.0	27.0	1743.0

	% within Student(s) Mode to School (DriveRef)?	41.5%	19.1%	17.8%	7.0%	7.9%	1.1%	3.4%	0.6%	1.5%	100.0%
	% within Language at Home?	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	41.5%	19.1%	17.8%	7.0%	7.9%	1.1%	3.4%	0.6%	1.5%	100.0%

Table B.35. Chi-Square: Home Language and Mode to School

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	34.470[a]	8	.000
Likelihood Ratio	38.089	8	.000
Linear-by-Linear Association	2.220	1	.136
N of Valid Cases	1743		

a. 1 cells (5.6%) have expected count less than 5. The minimum expected count is 4.18.

Table B.36. Symmetric Measures: Home Language and Mode to School

		Value	Approximate Significance
Nominal by Nominal	Phi	.141	.000
	Cramer's V	.141	.000
N of Valid Cases		1743	

Table B.37. Crosstabulation: Home Language and Mode from School

			Language at Home?									
			English	Hindi/ Punjabi	Mandarin/ Cantonese / Chinese	Korean	Philippine / Tagalog	Spanish	Vietnamese	Japanese	Arabic/ Somali	Total
Student(s) Mode from School	Drive / Carpool	Count	276	150	73	28	37	7	32	0	13	616
		Expected Count	251.0	120.4	105.2	44.6	50.8	8.0	21.4	3.6	10.9	616.0

(DriveRef)?		% within Student(s) Mode from School (DriveRef)?	44.8%	24.4%	11.9%	4.5%	6.0%	1.1%	5.2%	0.0%	2.1%	100.0%
		% within Language at Home?	39.9%	45.2%	25.2%	22.8%	26.4%	31.8%	54.2%	0.0%	43.3%	36.3%
		% of Total	16.3%	8.8%	4.3%	1.6%	2.2%	0.4%	1.9%	0.0%	0.8%	36.3%
	Walk / Scoot / Skate	Count	416	182	217	95	103	15	27	10	17	1082
		Expected Count	441.0	211.6	184.8	78.4	89.2	14.0	37.6	6.4	19.1	1082.0
		% within Student(s) Mode from School (DriveRef)?	38.4%	16.8%	20.1%	8.8%	9.5%	1.4%	2.5%	0.9%	1.6%	100.0%
		% within Language at Home?	60.1%	54.8%	74.8%	77.2%	73.6%	68.2%	45.8%	100.0%	56.7%	63.7%
		% of Total	24.5%	10.7%	12.8%	5.6%	6.1%	0.9%	1.6%	0.6%	1.0%	63.7%
Total		Count	692	332	290	123	140	22	59	10	30	1698
		Expected Count	692.0	332.0	290.0	123.0	140.0	22.0	59.0	10.0	30.0	1698.0
		% within Student(s) Mode from School (DriveRef)?	40.8%	19.6%	17.1%	7.2%	8.2%	1.3%	3.5%	0.6%	1.8%	100.0%
		% within Language at Home?	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	40.8%	19.6%	17.1%	7.2%	8.2%	1.3%	3.5%	0.6%	1.8%	100.0%

Table B.38. Chi-Square: Home Language and Mode from School

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	61.101[a]	8	.000
Likelihood Ratio	65.580	8	.000

Linear-by-Linear Association	5.896	1	.015
N of Valid Cases	1698		

a. 1 cells (5.6%) have expected count less than 5. The minimum expected count is 3.63.

Table B.39. Symmetric Measures: Home Language and Mode from School

		Value	Approximate Significance
Nominal by Nominal	Phi	.190	.000
	Cramer's V	.190	.000
N of Valid Cases		1698	

Appendix C: Regressions with Interaction Terms

Table C.1. Regression: Mode to School, with IV Interaction Terms

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	CHILD_ACCOMPANIMENT *(PARENT/GRANDPARENT/ CAREGIVER)*			1.477	4	.831			
	CHILD_ACCOMPANIMENT (OTHER ADULT)	-2.713	2.232	1.477	1	.224	.066	.001	5.272
	CHILD_ACCOMPANIMENT (SIBLING)	-28.508	14122.457	.000	1	.998	.000	.000	.
	CHILD_ACCOMPANIMENT (FRIEND)	-306.747	22464.648	.000	1	.989	.000	.000	.
	CHILD_ACCOMPANIMENT (CHILD TRAVELS ALONE)	-55.283	1.79×10^5	.000	1	1.000	.000	.000	.
	DISTANCE_HomeToSchool *(less than 0.5km)*			3.159	3	.368			
	DISTANCE_HomeToSchool (0.51km to 1.59km)	-.920	1.057	.758	1	.384	.398	.050	3.163
	DISTANCE_HomeToSchool (1.60km to 3km)	-4.053	2.326	3.037	1	.081	.017	.000	1.658
	DISTANCE_HomeToSchool (over 3km)	-40.467	11114.757	.000	1	.997	.000	.000	.
	HOME_LANGUAGE *(English)*			11.680	6	.070			
	HOME_LANGUAGE (HINDI/PUNJABI)	-2.442	1.399	3.048	1	.081	.087	.006	1.349
	HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	-3.214	1.462	4.836	1	.028	.040	.002	.705
	HOME_LANGUAGE (KOREAN)	2.665	2.215	1.447	1	.229	14.364	.187	1103.135
	HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	1.575	2.177	.523	1	.469	4.830	.068	344.231
	HOME_LANGUAGE (VIETNAMESE)	-4.435	18462.452	.000	1	1.000	.012	.000	.
	HOME_LANGUAGE (ARABIC/SOMALI)	5.812	5.773	1.013	1	.314	334.151	.004	2.74×10^7
	CHILD_AGE	-.061	.189	.106	1	.745	.940	.650	1.362

CHILD_SEX (MALE)	1.278	.965	1.754	1	.185	3.590	.541	23.805
CHILD_COUNT	-.460	.722	.406	1	.524	.631	.153	2.599
CAREGIVER_SAFE_BINARY (AGREE, (*DISAGREE*))	-1.092	1.545	.499	1	.480	.336	.016	6.941
CHILD_ACCOMPANIMENT * DISTANCE_HomeToSchool			.808	10	1.000			
CHILD_ACCOMPANIMENT (OTHER ADULT) by DISTANCE_HomeToSchool (0.51km to 1.59km)	.625	.980	.407	1	.524	1.869	.274	12.769
CHILD_ACCOMPANIMENT (OTHER ADULT) by DISTANCE_HomeToSchool (1.60km to 3km)	.892	1.871	.227	1	.634	2.439	.062	95.456
CHILD_ACCOMPANIMENT (OTHER ADULT) by DISTANCE_HomeToSchool (over 3km)	86.961	13887.211	.000	1	.995	5.843×10^{37}	.000	.
CHILD_ACCOMPANIMENT (SIBLING) by DISTANCE_HomeToSchool (0.51km to 1.59km)	.725	1.215	.356	1	.551	2.064	.191	22.344
CHILD_ACCOMPANIMENT (SIBLING) by DISTANCE_HomeToSchool (1.60km to 3km)	-16.817	14122.459	.000	1	.999	.000	.000	.
CHILD_ACCOMPANIMENT (FRIEND) by DISTANCE_HomeToSchool (0.51km to 1.59km)	-72.438	4995.417	.000	1	.988	.000	.000	.
CHILD_ACCOMPANIMENT (FRIEND) by DISTANCE_HomeToSchool (1.60km to 3km)	-141.203	29513.214	.000	1	.996	.000	.000	.
CHILD_ACCOMPANIMENT (FRIEND) by DISTANCE_HomeToSchool (over 3km)	-88.353	41109.868	.000	1	.998	.000	.000	.
CHILD_ACCOMPANIMENT (CHILD TRAVELS ALONE) by DISTANCE_HomeToSchool (0.51km to 1.59km)	.729	18840.411	.000	1	1.000	2.072	.000	.

CHILD_ACCOMPANIMENT (CHILD TRAVELS ALONE) by DISTANCE_HomeToSchool (1.60km to 3km)	-8.507	9200.186	.000	1	.999	.000	.000	.
CHILD_ACCOMPANIMENT * HOME_LANGUAGE			4.372	19	1.000			
CHILD_ACCOMPANIMENT (OTHER ADULT) by HOME_LANGUAGE (HINDI/PUNJABI)	-1.543	1.126	1.876	1	.171	.214	.024	1.944
CHILD_ACCOMPANIMENT (OTHER ADULT) by HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	15.720	11016.341	.000	1	.999	6.72×10^5	.000	.
CHILD_ACCOMPANIMENT (OTHER ADULT) by HOME_LANGUAGE (VIETNAMESE)	-5.712	43010.239	.000	1	1.000	.003	.000	.
CHILD_ACCOMPANIMENT (SIBLING) by HOME_LANGUAGE (HINDI/PUNJABI)	17.866	8280.175	.000	1	.998	5.75×10^7	.000	.
CHILD_ACCOMPANIMENT (SIBLING) by HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	-2.932	1.842	2.532	1	.112	.053	.001	1.972
CHILD_ACCOMPANIMENT (SIBLING) by HOME_LANGUAGE (KOREAN)	-1.790	1.692	1.119	1	.290	.167	.006	4.601
CHILD_ACCOMPANIMENT (SIBLING) by HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	16.487	19177.276	.000	1	.999	1.45×10^7	.000	.
CHILD_ACCOMPANIMENT (SIBLING) by HOME_LANGUAGE (VIETNAMESE)	14.927	15310.316	.000	1	.999	3.04×10^6	.000	.
CHILD_ACCOMPANIMENT (FRIEND) by HOME_LANGUAGE (HINDI/PUNJABI)	-261.860	14170.963	.000	1	.985	.000	.000	.

CHILD_ACCOMPANIMENT (FRIEND) by HOME_LANGUAGE (MANDARINCANTONESE/ / (CHINESE	-99.191	14628.951	.000	1	.995	.000	.000	.
CHILD_ACCOMPANIMENT (FRIEND) by HOME_LANGUAGE (KOREAN)	65.915	13011.739	.000	1	.996	4.23×10^{31}	.000	.
CHILD_ACCOMPANIMENT (FRIEND) by HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	-72.338	4135.527	.000	1	.986	.000	.000	.
CHILD_ACCOMPANIMENT (FRIEND) by HOME_LANGUAGE (VIETNAMESE)	-147.674	29161.976	.000	1	.996	.000	.000	.
CHILD_ACCOMPANIMENT (CHILD TRAVELS ALONE) by HOME_LANGUAGE (HINDI/PUNJABI)	7.231	90907.576	.000	1	1.000	1381.120	.000	.
CHILD_ACCOMPANIMENT (CHILD TRAVELS ALONE) by HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	-.201	19004.661	.000	1	1.000	.818	.000	.
CHILD_ACCOMPANIMENT (CHILD TRAVELS ALONE) by HOME_LANGUAGE (KOREAN)	6.924	15257.249	.000	1	1.000	1016.420	.000	.
CHILD_ACCOMPANIMENT (CHILD TRAVELS ALONE) by HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	-10.530	29371.763	.000	1	1.000	.000	.000	.
CHILD_ACCOMPANIMENT (CHILD TRAVELS ALONE) by HOME_LANGUAGE (VIETNAMESE)	-22.324	30076.244	.000	1	.999	.000	.000	.
CHILD_ACCOMPANIMENT (CHILD TRAVELS ALONE) by HOME_LANGUAGE (ARABIC/SOMALI)	-9.178	41122.022	.000	1	1.000	.000	.000	.
CHILD_AGE * CHILD_ACCOMPANIMENT			3.466	4	.483			

CHILD_AGE by CHILD_ACCOMPANIMENT (OTHER ADULT)	.217	.226	.922	1	.337	1.243	.797	1.937
CHILD_AGE by CHILD_ACCOMPANIMENT (SIBLING)	.466	.291	2.563	1	.109	1.593	.901	2.818
CHILD_AGE by CHILD_ACCOMPANIMENT (FRIEND)	43.522	2416.940	.000	1	.986	7.97×10^{16}	.000	.
CHILD_AGE by CHILD_ACCOMPANIMENT (CHILD TRAVELS ALONE)	5.953	2890.896	.000	1	.998	385.011	.000	.
CHILD_ACCOMPANIMENT * CHILD_SEX			.636	4	.959			
CHILD_ACCOMPANIMENT (OTHER ADULT) by CHILD_SEX (MALE)	.510	.975	.274	1	.601	1.666	.247	11.249
CHILD_ACCOMPANIMENT (SIBLING) by CHILD_SEX (MALE)	.742	1.232	.363	1	.547	2.100	.188	23.504
CHILD_ACCOMPANIMENT (FRIEND) by CHILD_SEX (MALE)	-27.413	4709.101	.000	1	.995	.000	.000	.
CHILD_ACCOMPANIMENT (CHILD TRAVELS ALONE) by CHILD_SEX (MALE)	11.608	10266.873	.000	1	.999	1.10×10^{5}	.000	.
CHILD_COUNT * CHILD_ACCOMPANIMENT			.899	4	.925			
CHILD_COUNT by CHILD_ACCOMPANIMENT (OTHER ADULT)	.138	.872	.025	1	.875	1.148	.208	6.339
CHILD_COUNT by CHILD_ACCOMPANIMENT (SIBLING)	1.401	1.495	.877	1	.349	4.057	.217	76.036
CHILD_COUNT by CHILD_ACCOMPANIMENT (FRIEND)	-191.693	10424.491	.000	1	.985	.000	.000	.
CHILD_COUNT by CHILD_ACCOMPANIMENT (CHILD TRAVELS ALONE)	4.447	90293.963	.000	1	1.000	85.384	.000	.
CAREGIVER_SAFE_BINARY * CHILD_ACCOMPANIMENT			1.813	4	.770			

	CAREGIVER_SAFE_BINARY (AGREE) by CHILD_ACCOMPANIMENT (OTHER ADULT)	1.824	1.355	1.813	1	.178	6.196	.436	88.155
	CAREGIVER_SAFE_BINARY (AGREE) by CHILD_ACCOMPANIMENT (SIBLING)	24.296	14122.456	.000	1	.999	3.56×10^{10}	.000	.
	CAREGIVER_SAFE_BINARY (AGREE) by CHILD_ACCOMPANIMENT (FRIEND)	280.845	18923.509	.000	1	.988	9.32×10^{121}	.000	.
	CAREGIVER_SAFE_BINARY (AGREE) by CHILD_ACCOMPANIMENT (CHILD TRAVELS ALONE)	8.768	86638.419	.000	1	1.000	6423.451	.000	.
	DISTANCE_HomeToSchool * HOME_LANGUAGE			11.900	16	.751			
	DISTANCE_HomeToSchool (0.51km to 1.59km) by HOME_LANGUAGE (HINDI/PUNJABI)	-.119	.439	.073	1	.787	.888	.375	2.101
	DISTANCE_HomeToSchool (0.51km to 1.59km) by HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	-1.016	.512	3.937	1	.047	.362	.133	.988
	DISTANCE_HomeToSchool (0.51km to 1.59km) by HOME_LANGUAGE (KOREAN)	.616	.650	.898	1	.343	1.851	.518	6.614
	DISTANCE_HomeToSchool (0.51km to 1.59km) by HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	-.531	.670	.627	1	.429	.588	.158	2.188
	DISTANCE_HomeToSchool (0.51km to 1.59km) by HOME_LANGUAGE (VIETNAMESE)	-19.294	15310.316	.000	1	.999	.000	.000	.
	DISTANCE_HomeToSchool (0.51km to 1.59km) by HOME_LANGUAGE (ARABIC/SOMALI)	1.873	1.935	.938	1	.333	6.510	.147	288.730

DISTANCE_HomeToSchool (1.60km to 3km) by HOME_LANGUAGE (HINDI/PUNJABI)	-18.168	7190.011	.000	1	.998	.000	.000	.
DISTANCE_HomeToSchool (1.60km to 3km) by HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	.360	1.068	.114	1	.736	1.433	.177	11.630
DISTANCE_HomeToSchool (1.60km to 3km) by HOME_LANGUAGE (KOREAN)	-18.907	10412.958	.000	1	.999	.000	.000	.
DISTANCE_HomeToSchool (1.60km to 3km) by HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	-20.028	24898.266	.000	1	.999	.000	.000	.
DISTANCE_HomeToSchool (1.60km to 3km) by HOME_LANGUAGE (VIETNAMESE)	-18.461	19645.732	.000	1	.999	.000	.000	.
DISTANCE_HomeToSchool (1.60km to 3km) by HOME_LANGUAGE (ARABIC/SOMALI)	6.262	2.732	5.255	1	.022	524.489	2.479	110957.166
DISTANCE_HomeToSchool (over 3km) by HOME_LANGUAGE (HINDI/PUNJABI)	17.563	4049.225	.000	1	.997	4.24×10^7	.000	.
DISTANCE_HomeToSchool (over 3km) by HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	-103.428	20702.491	.000	1	.996	.000	.000	.
DISTANCE_HomeToSchool (over 3km) by HOME_LANGUAGE (KOREAN)	-2.204	25955.265	.000	1	1.000	.110	.000	.
DISTANCE_HomeToSchool (over 3km) by HOME_LANGUAGE (VIETNAMESE)	14.671	24504.780	.000	1	1.000	2.35×10^6	.000	.
CHILD_AGE * DISTANCE_HomeToSchool			.922	3	.820			

CHILD_AGE by DISTANCE_HomeToSchool (0.51km to 1.59km)	-.002	.080	.000	1	.983	.998	.853	1.168
CHILD_AGE by DISTANCE_HomeToSchool (1.60km to 3km)	-.157	.197	.634	1	.426	.855	.580	1.258
CHILD_AGE by DISTANCE_HomeToSchool (over 3km)	.563	1.137	.245	1	.621	1.755	.189	16.288
CHILD_SEX * DISTANCE_HomeToSchool			1.697	3	.638			
CHILD_SEX (MALE) by DISTANCE_HomeToSchool (0.51km to 1.59km)	-.361	.339	1.135	1	.287	.697	.359	1.354
CHILD_SEX (MALE) by DISTANCE_HomeToSchool (1.60km to 3km)	.368	.833	.195	1	.659	1.445	.282	7.398
CHILD_SEX (MALE) by DISTANCE_HomeToSchool (over 3km)	16.545	4614.957	.000	1	.997	1.53×10^8	.000	.
CHILD_COUNT * DISTANCE_HomeToSchool			3.997	3	.262			
CHILD_COUNT by DISTANCE_HomeToSchool (0.51km to 1.59km)	-.498	.288	2.985	1	.084	.608	.346	1.069
CHILD_COUNT by DISTANCE_HomeToSchool (1.60km to 3km)	.330	.676	.238	1	.625	1.391	.370	5.233
CHILD_COUNT by DISTANCE_HomeToSchool (over 3km)	-16.862	3859.148	.000	1	.997	.000	.000	.
CAREGIVER_SAFE_BINARY * DISTANCE_HomeToSchool			.228	3	.973			
CAREGIVER_SAFE_BINARY (AGREE) by DISTANCE_HomeToSchool (0.51km to 1.59km)	.063	.706	.008	1	.928	1.065	.267	4.247
CAREGIVER_SAFE_BINARY (AGREE) by DISTANCE_HomeToSchool (1.60km to 3km)	.645	1.373	.221	1	.639	1.906	.129	28.092

CAREGIVER_SAFE_BINARY (AGREE) by DISTANCE_HomeToSchool (over 3km)	16.046	8439.370	.000	1	.998	9.33×10^6	.000	.
CHILD_AGE * HOME_LANGUAGE			11.3566		.078			
CHILD_AGE by HOME_LANGUAGE (HINDI/PUNJABI)	.063	.101	.383	1	.536	1.065	.873	1.298
CHILD_AGE by HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	.240	.109	4.853	1	.028	1.271	1.027	1.574
CHILD_AGE by HOME_LANGUAGE (KOREAN)	-.214	.152	1.974	1	.160	.808	.599	1.088
CHILD_AGE by HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	.016	.143	.012	1	.911	1.016	.768	1.345
CHILD_AGE by HOME_LANGUAGE (VIETNAMESE)	.108	.329	.107	1	.743	1.114	.585	2.122
CHILD_AGE by HOME_LANGUAGE (ARABIC/SOMALI)	-.914	.606	2.275	1	.131	.401	.122	1.315
CHILD_SEX * HOME_LANGUAGE			5.544	6	.476			
CHILD_SEX (MALE) by HOME_LANGUAGE (HINDI/PUNJABI)	.242	.441	.301	1	.583	1.274	.537	3.025
CHILD_SEX (MALE) by HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	.027	.448	.004	1	.952	1.027	.427	2.472
CHILD_SEX (MALE) by HOME_LANGUAGE (KOREAN)	.321	.638	.252	1	.615	1.378	.394	4.815
CHILD_SEX (MALE) by HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	.380	.678	.314	1	.576	1.462	.387	5.526
CHILD_SEX (MALE) by HOME_LANGUAGE (VIETNAMESE)	2.575	1.463	3.097	1	.078	13.138	.746	231.292

CHILD_SEX (MALE) by HOME_LANGUAGE (ARABIC/SOMALI)	-3.146	2.295	1.879	1	.170	.043	.000	3.866
CHILD_COUNT * HOME_LANGUAGE			6.115	6	.410			
CHILD_COUNT by HOME_LANGUAGE (HINDI/PUNJABI)	.174	.397	.192	1	.662	1.190	.547	2.590
CHILD_COUNT by HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	-.403	.384	1.103	1	.294	.668	.315	1.418
CHILD_COUNT by HOME_LANGUAGE (KOREAN)	.007	.501	.000	1	.989	1.007	.377	2.686
CHILD_COUNT by HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	-.969	.548	3.123	1	.077	.379	.129	1.112
CHILD_COUNT by HOME_LANGUAGE (VIETNAMESE)	.620	1.205	.265	1	.607	1.859	.175	19.710
CHILD_COUNT by HOME_LANGUAGE (ARABIC/SOMALI)	1.553	1.783	.758	1	.384	4.724	.143	155.569
CAREGIVER_SAFE_BINARY * HOME_LANGUAGE			12.401	5	**.030**			
CAREGIVER_SAFE_BINARY (AGREE) by HOME_LANGUAGE (HINDI/PUNJABI)	1.349	.899	2.252	1	.133	3.853	.662	22.427
CAREGIVER_SAFE_BINARY (AGREE) by HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	3.021	1.009	8.965	1	**.003**	20.517	2.839	148.256
CAREGIVER_SAFE_BINARY (AGREE) by HOME_LANGUAGE (KOREAN)	-1.387	1.230	1.271	1	.260	.250	.022	2.785
CAREGIVER_SAFE_BINARY (AGREE) by HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	-.213	1.538	.019	1	.890	.808	.040	16.462

		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
	CAREGIVER_SAFE_BINARY (AGREE) by HOME_LANGUAGE (VIETNAMESE)	1.360	18462.452	.000	1	1.000	3.895	.000	.
	CHILD_AGE by CHILD_SEX (MALE)	.004	.077	.002	1	.961	1.004	.864	1.166
	CHILD_AGE by CHILD_COUNT	-.016	.061	.069	1	.793	.984	.873	1.110
	CAREGIVER_SAFE_BINARY (AGREE) by CHILD_AGE	.015	.143	.011	1	.916	1.015	.768	1.343
	CHILD_COUNT by CHILD_SEX (MALE)	-.198	.269	.540	1	.462	.820	.484	1.391
	CAREGIVER_SAFE_BINARY (AGREE) by CHILD_SEX (MALE)	-.868	.577	2.269	1	.132	.420	.136	1.299
	CAREGIVER_SAFE_BINARY (AGREE) by CHILD_COUNT	1.045	.478	4.770	1	**.029**	2.843	1.113	7.261
	Constant	2.133	1.871	1.300	1	.254	8.444		

a. Variable(s) entered on step 1: CHILD_ACCOMPANIMENT, DISTANCE_HomeToSchool, HOME_LANGUAGE, CHILD_AGE, CHILD_SEX, CHILD_COUNT, CAREGIVER_SAFE_BINARY, CHILD_ACCOMPANIMENT * DISTANCE_HomeToSchool , CHILD_ACCOMPANIMENT * HOME_LANGUAGE , CHILD_AGE * CHILD_ACCOMPANIMENT , CHILD_ACCOMPANIMENT * CHILD_SEX , CHILD_COUNT * CHILD_ACCOMPANIMENT , CAREGIVER_SAFE_BINARY * CHILD_ACCOMPANIMENT , DISTANCE_HomeToSchool * HOME_LANGUAGE , CHILD_AGE * DISTANCE_HomeToSchool , CHILD_SEX * DISTANCE_HomeToSchool , CHILD_COUNT * DISTANCE_HomeToSchool , CAREGIVER_SAFE_BINARY * DISTANCE_HomeToSchool , CHILD_AGE * HOME_LANGUAGE , CHILD_SEX * HOME_LANGUAGE , CHILD_COUNT * HOME_LANGUAGE , CAREGIVER_SAFE_BINARY * HOME_LANGUAGE , CHILD_AGE * CHILD_SEX , CHILD_AGE * CHILD_COUNT , CAREGIVER_SAFE_BINARY * CHILD_AGE , CHILD_COUNT * CHILD_SEX , CAREGIVER_SAFE_BINARY * CHILD_SEX , CAREGIVER_SAFE_BINARY * CHILD_COUNT ..

Table C.2. Regression: Mode from School, with IV Interaction Terms

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	DISTANCE_HomeToSchool			2.914	3	.405			
	DISTANCE_HomeToSchool (0.51km to 1.59km)	-.077	.984	.006	1	.938	.926	.135	6.366
	DISTANCE_HomeToSchool (1.60km to 3km)	-2.558	1.601	2.552	1	.110	.077	.003	1.787
	DISTANCE_HomeToSchool (over 3km)	-180.276	22434.822	.000	1	.994	.000	.000	.
	HOME_LANGUAGE			2.429	6	.876			

HOME_LANGUAGE (HINDI/PUNJABI)	-.330	1.234	.071	1	.789	.719	.064	8.083
HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	-1.800	1.332	1.826	1	.177	.165	.012	2.249
HOME_LANGUAGE (KOREAN)	.921	1.665	.306	1	.580	2.512	.096	65.725
HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	19.871	10475.538	.000	1	.998	4.26×10^8	.000	.
HOME_LANGUAGE (VIETNAMESE)	-18.979	10664.057	.000	1	.999	.000	.000	.
HOME_LANGUAGE (ARABIC/SOMALI)	-20.248	21413.514	.000	1	.999	.000	.000	.
CHILD_AGE	-.016	.156	.011	1	.916	.984	.725	1.335
CHILD_SEX (MALE)	-.845	.856	.974	1	.324	.429	.080	2.301
CHILD_COUNT	-.777	.641	1.472	1	.225	.460	.131	1.613
CAREGIVER_SAFE_BINARY (AGREE)	-1.482	1.218	1.482	1	.223	.227	.021	2.469
DISTANCE_HomeToSchool * HOME_LANGUAGE			23.238	17	.142			
DISTANCE_HomeToSchool (0.51km to 1.59km) by HOME_LANGUAGE (HINDI/PUNJABI)	-1.287	.462	7.758	1	.005	.276	.112	.683
DISTANCE_HomeToSchool (0.51km to 1.59km) by HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	-1.527	.621	6.041	1	.014	.217	.064	.734
DISTANCE_HomeToSchool (0.51km to 1.59km) by HOME_LANGUAGE (KOREAN)	.319	.612	.272	1	.602	1.376	.415	4.566
DISTANCE_HomeToSchool (0.51km to 1.59km) by HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	-.520	.665	.612	1	.434	.594	.161	2.189
DISTANCE_HomeToSchool (0.51km to 1.59km) by HOME_LANGUAGE (VIETNAMESE)	-.046	.885	.003	1	.959	.955	.169	5.411

DISTANCE_HomeToSchool (0.51km to 1.59km) by HOME_LANGUAGE (ARABIC/SOMALI)	.853	1.339	.406	1	.524	2.347	.170	32.376
DISTANCE_HomeToSchool (1.60km to 3km) by HOME_LANGUAGE (HINDI/PUNJABI)	-3.145	1.140	7.607	1	.006	.043	.005	.402
DISTANCE_HomeToSchool (1.60km to 3km) by HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	-.802	.802	1.000	1	.317	.449	.093	2.159
DISTANCE_HomeToSchool (1.60km to 3km) by HOME_LANGUAGE (KOREAN)	.756	1.081	.489	1	.485	2.129	.256	17.723
DISTANCE_HomeToSchool (1.60km to 3km) by HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	-38.697	16399.021	.000	1	.998	.000	.000	.
DISTANCE_HomeToSchool (1.60km to 3km) by HOME_LANGUAGE (VIETNAMESE)	-19.373	11731.313	.000	1	.999	.000	.000	.
DISTANCE_HomeToSchool (1.60km to 3km) by HOME_LANGUAGE (ARABIC/SOMALI)	3.337	1.711	3.805	1	.051	28.137	.984	804.556
DISTANCE_HomeToSchool (over 3km) by HOME_LANGUAGE (HINDI/PUNJABI)	12.310	7285.249	.000	1	.999	2.22×10^5	.000	.
DISTANCE_HomeToSchool (over 3km) by HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	38.688	16948.713	.000	1	.998	6.34×10^{16}	.000	.
DISTANCE_HomeToSchool (over 3km) by HOME_LANGUAGE (KOREAN)	-3.426	28282.729	.000	1	1.000	.033	.000	.

DISTANCE_HomeToSchool (over 3km) by HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	-8.067	28156.241	.000	1	1.000	.000	.000	.
DISTANCE_HomeToSchool (over 3km) by HOME_LANGUAGE (VIETNAMESE)	-2.886	13401.488	.000	1	1.000	.056	.000	.
CHILD_AGE * DISTANCE_HomeToSchool			1.530	3	.675			
CHILD_AGE by DISTANCE_HomeToSchool (0.51km to 1.59km)	-.053	.076	.478	1	.489	.949	.818	1.101
CHILD_AGE by DISTANCE_HomeToSchool (1.60km to 3km)	-.141	.116	1.491	1	.222	.868	.692	1.089
CHILD_AGE by DISTANCE_HomeToSchool (over 3km)	14.802	1726.539	.000	1	.993	2.68×10^6	.000	.
CHILD_SEX * DISTANCE_HomeToSchool			.190	3	.979			
CHILD_SEX (MALE) by DISTANCE_HomeToSchool (0.51km to 1.59km)	-.132	.337	.155	1	.694	.876	.453	1.694
CHILD_SEX (MALE) by DISTANCE_HomeToSchool (1.60km to 3km)	-.179	.542	.109	1	.741	.836	.289	2.416
CHILD_SEX (MALE) by DISTANCE_HomeToSchool (over 3km)	-2.420	5047.371	.000	1	1.000	.089	.000	.
CHILD_COUNT * DISTANCE_HomeToSchool			3.678	3	.298			
CHILD_COUNT by DISTANCE_HomeToSchool (0.51km to 1.59km)	-.551	.289	3.633	1	.057	.577	.327	1.016
CHILD_COUNT by DISTANCE_HomeToSchool (1.60km to 3km)	-.287	.435	.436	1	.509	.750	.320	1.761
CHILD_COUNT by DISTANCE_HomeToSchool (over 3km)	-16.613	3463.599	.000	1	.996	.000	.000	.
CAREGIVER_SAFE_BINARY * DISTANCE_HomeToSchool			2.886	3	.410			

CAREGIVER_SAFE_BINARY (AGREE) by DISTANCE_HomeToSchool (0.51km to 1.59km)	.032	.570	.003	1	.956	1.032	.338	3.152
CAREGIVER_SAFE_BINARY (AGREE) by DISTANCE_HomeToSchool (1.60km to 3km)	1.607	1.016	2.502	1	.114	4.989	.681	36.559
CAREGIVER_SAFE_BINARY (AGREE) by DISTANCE_HomeToSchool (over 3km)	17.109	7747.330	.000	1	.998	2.69×10^{7}	.000	.
CHILD_AGE * HOME_LANGUAGE			6.141	6	.408			
CHILD_AGE by HOME_LANGUAGE (HINDI/PUNJABI)	-.067	.092	.533	1	.465	.935	.781	1.120
CHILD_AGE by HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	.162	.107	2.298	1	.130	1.175	.954	1.449
CHILD_AGE by HOME_LANGUAGE (KOREAN)	-.062	.123	.250	1	.617	.940	.738	1.197
CHILD_AGE by HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	-.017	.142	.015	1	.904	.983	.743	1.300
CHILD_AGE by HOME_LANGUAGE (VIETNAMESE)	-.044	.213	.043	1	.836	.957	.630	1.454
CHILD_AGE by HOME_LANGUAGE (ARABIC/SOMALI)	-.387	.268	2.095	1	.148	.679	.402	1.147
CHILD_SEX * HOME_LANGUAGE			3.225	6	.780			
CHILD_SEX (MALE) by HOME_LANGUAGE (HINDI/PUNJABI)	.094	.417	.050	1	.822	1.098	.485	2.488
CHILD_SEX (MALE) by HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	.265	.443	.358	1	.550	1.304	.547	3.108

CHILD_SEX (MALE) by HOME_LANGUAGE (KOREAN)	-.066	.566	.014	1	.907	.936	.309	2.836
CHILD_SEX (MALE) by HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	.391	.678	.332	1	.564	1.478	.391	5.585
CHILD_SEX (MALE) by HOME_LANGUAGE (VIETNAMESE)	1.528	.974	2.463	1	.117	4.609	.684	31.081
CHILD_SEX (MALE) by HOME_LANGUAGE (ARABIC/SOMALI)	-.652	1.512	.186	1	.667	.521	.027	10.104
CHILD_COUNT * HOME_LANGUAGE			9.624	6	.141			
CHILD_COUNT by HOME_LANGUAGE (HINDI/PUNJABI)	.985	.377	6.818	1	.009	2.678	1.278	5.610
CHILD_COUNT by HOME_LANGUAGE (MANDARINCANTONESE/ / (CHINESE	.479	.383	1.564	1	.211	1.615	.762	3.423
CHILD_COUNT by HOME_LANGUAGE (KOREAN)	.597	.488	1.500	1	.221	1.818	.699	4.729
CHILD_COUNT by HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	.870	.639	1.850	1	.174	2.386	.682	8.355
CHILD_COUNT by HOME_LANGUAGE (VIETNAMESE)	-.170	.811	.044	1	.834	.844	.172	4.138
CHILD_COUNT by HOME_LANGUAGE (ARABIC/SOMALI)	1.071	1.088	.968	1	.325	2.917	.346	24.618
CAREGIVER_SAFE_BINARY * HOME_LANGUAGE			7.987	6	.239			
CAREGIVER_SAFE_BINARY (AGREE) by HOME_LANGUAGE (HINDI/PUNJABI)	-.145	.661	.048	1	.826	.865	.237	3.160
CAREGIVER_SAFE_BINARY (AGREE) by HOME_LANGUAGE (MANDARIN/CANTONESE/ CHINESE)	1.598	.739	4.680	1	.031	4.944	1.162	21.035

CAREGIVER_SAFE_BINARY (AGREE) by HOME_LANGUAGE (KOREAN)	-1.177	.881	1.784	1	.182	.308	.055	1.733
CAREGIVER_SAFE_BINARY (AGREE) by HOME_LANGUAGE (PHILLIPPINE/TAGALOG)	-20.467	10475.538	.000	1	.998	.000	.000	.
CAREGIVER_SAFE_BINARY (AGREE) by HOME_LANGUAGE (VIETNAMESE)	18.449	10664.057	.000	1	.999	1.03×10^{8}	.000	.
CAREGIVER_SAFE_BINARY (AGREE) by HOME_LANGUAGE (ARABIC/SOMALI)	20.870	21413.513	.000	1	.999	1.16×10^{9}	.000	.
CHILD_AGE by CHILD_SEX (MALE)	.102	.068	2.233	1	.135	1.108	.969	1.267
CHILD_AGE by CHILD_COUNT	.016	.056	.079	1	.779	1.016	.910	1.134
CAREGIVER_SAFE_BINARY (AGREE) by CHILD_AGE	.117	.111	1.106	1	.293	1.124	.904	1.399
CHILD_COUNT by CHILD_SEX (MALE)	-.065	.253	.066	1	.798	.937	.570	1.540
CAREGIVER_SAFE_BINARY (AGREE) by CHILD_SEX (MALE)	.117	.473	.061	1	.805	1.124	.445	2.841
CAREGIVER_SAFE_BINARY (AGREE) by CHILD_COUNT	.894	.412	4.708	1	**.030**	2.444	1.090	5.478
Constant	2.116	1.527	1.921	1	.166	8.299		

a. Variable(s) entered on step 1: DISTANCE_HomeToSchool, HOME_LANGUAGE, CHILD_AGE, CHILD_SEX, CHILD_COUNT, CAREGIVER_SAFE_BINARY, DISTANCE_HomeToSchool * HOME_LANGUAGE , CHILD_AGE * DISTANCE_HomeToSchool , CHILD_SEX * DISTANCE_HomeToSchool , CHILD_COUNT * DISTANCE_HomeToSchool , CAREGIVER_SAFE_BINARY * DISTANCE_HomeToSchool , CHILD_AGE * HOME_LANGUAGE , CHILD_SEX * HOME_LANGUAGE , CHILD_COUNT * HOME_LANGUAGE , CAREGIVER_SAFE_BINARY * HOME_LANGUAGE , CHILD_AGE * CHILD_SEX , CHILD_AGE * CHILD_COUNT , CAREGIVER_SAFE_BINARY * CHILD_AGE , CHILD_COUNT * CHILD_SEX , CAREGIVER_SAFE_BINARY * CHILD_SEX , CAREGIVER_SAFE_BINARY * CHILD_COUNT .

Appendix D: Independent Variables Associations

Table D.1. Crosstabulation: Accompaniment and Child Count

			Household children attending the same school?			
			1 Child	2 Children	3 or more Children	Total
Who Accompanies the Child to School?	Parent/Grandparent	Count	612	608	117	1337
		Expected Count	632.9	593.0	111.1	1337.0
		% within Who Accompanies the Child to School?	45.8%	45.5%	8.8%	100.0%
		% within Household children attending the same school?	77.3%	81.9%	84.2%	79.9%
		% of Total	36.6%	36.3%	7.0%	79.9%
	Other Adult	Count	47	34	3	84
		Expected Count	39.8	37.3	7.0	84.0
		% within Who Accompanies the Child to School?	56.0%	40.5%	3.6%	100.0%
		% within Household children attending the same school?	5.9%	4.6%	2.2%	5.0%
		% of Total	2.8%	2.0%	0.2%	5.0%
	Sibling	Count	22	74	17	113
		Expected Count	53.5	50.1	9.4	113.0
		% within Who Accompanies the Child to School?	19.5%	65.5%	15.0%	100.0%

		% within Household children attending the same school?	2.8%	10.0%	12.2%	6.8%
		% of Total	1.3%	4.4%	1.0%	6.8%
	Friend	Count	47	17	0	64
		Expected Count	30.3	28.4	5.3	64.0
		% within Who Accompanies the Child to School?	73.4%	26.6%	0.0%	100.0%
		% within Household children attending the same school?	5.9%	2.3%	0.0%	3.8%
		% of Total	2.8%	1.0%	0.0%	3.8%
	Child Travels Alone	Count	64	9	2	75
		Expected Count	35.5	33.3	6.2	75.0
		% within Who Accompanies the Child to School?	85.3%	12.0%	2.7%	100.0%
		% within Household children attending the same school?	8.1%	1.2%	1.4%	4.5%
		% of Total	3.8%	0.5%	0.1%	4.5%
Total		Count	792	742	139	1673
		Expected Count	792.0	742.0	139.0	1673.0
		% within Who Accompanies the Child to School?	47.3%	44.4%	8.3%	100.0%

	% within Household children attending the same school?	100.0%	100.0%	100.0%	100.0%
	% of Total	47.3%	44.4%	8.3%	100.0%

Table D.2. **Chi-Square: Accompaniment and Child Count**

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	103.883[a]	8	.000
Likelihood Ratio	115.768	8	.000
Linear-by-Linear Association	21.670	1	.000
N of Valid Cases	1673		

Table D.3. **Symmetric Measures: Accompaniment and Child Count**

		Value	Approximate Significance
Nominal by Nominal	Phi	.249	.000
	Cramer's V	.176	.000
N of Valid Cases		1673	

Table D.4. **Crosstabulation: Accompaniment and Child Age**

			Child's Age?									
			4	5	6	7	8	9	10	11	12	Total
Who Accompanies the Child to School?	Parent/ Grandparent	Count	13	196	194	196	188	180	180	103	87	1337
		Expected Count	12.8	167.8	173.4	179.8	175.8	172.6	191.0	135.1	128.7	1337.0
		% within Who Accompanies the Child to School?	1.0%	14.7%	14.5%	14.7%	14.1%	13.5%	13.5%	7.7%	6.5%	100.0%
		% within Child's Age?	81.3%	93.3%	89.4%	87.1%	85.5%	83.3%	75.3%	60.9%	54.0%	79.9%
		% of Total	0.8%	11.7%	11.6%	11.7%	11.2%	10.8%	10.8%	6.2%	5.2%	79.9%
	Other Adult	Count	1	12	16	10	13	8	11	8	5	84

		Expected Count	.8	10.5	10.9	11.3	11.0	10.8	12.0	8.5	8.1	84.0
		% within Who Accompanies the Child to School?	1.2%	14.3%	19.0%	11.9%	15.5%	9.5%	13.1%	9.5%	6.0%	100.0%
		% within Child's Age?	6.3%	5.7%	7.4%	4.4%	5.9%	3.7%	4.6%	4.7%	3.1%	5.0%
		% of Total	0.1%	0.7%	1.0%	0.6%	0.8%	0.5%	0.7%	0.5%	0.3%	5.0%
	Sibling	Count	1	2	4	15	14	13	22	18	24	113
		Expected Count	1.1	14.2	14.7	15.2	14.9	14.6	16.1	11.4	10.9	113.0
		% within Who Accompanies the Child to School?	0.9%	1.8%	3.5%	13.3%	12.4%	11.5%	19.5%	15.9%	21.2%	100.0%
		% within Child's Age?	6.3%	1.0%	1.8%	6.7%	6.4%	6.0%	9.2%	10.7%	14.9%	6.8%
		% of Total	0.1%	0.1%	0.2%	0.9%	0.8%	0.8%	1.3%	1.1%	1.4%	6.8%
	Friend	Count	1	0	2	4	3	10	12	13	19	64
		Expected Count	.6	8.0	8.3	8.6	8.4	8.3	9.1	6.5	6.2	64.0
		% within Who Accompanies the Child to School?	1.6%	0.0%	3.1%	6.3%	4.7%	15.6%	18.8%	20.3%	29.7%	100.0%
		% within Child's Age?	6.3%	0.0%	0.9%	1.8%	1.4%	4.6%	5.0%	7.7%	11.8%	3.8%
		% of Total	0.1%	0.0%	0.1%	0.2%	0.2%	0.6%	0.7%	0.8%	1.1%	3.8%
	Child Travels Alone	Count	0	0	1	0	2	5	14	27	26	75
		Expected Count	.7	9.4	9.7	10.1	9.9	9.7	10.7	7.6	7.2	75.0
		% within Who Accompanies the Child to School?	0.0%	0.0%	1.3%	0.0%	2.7%	6.7%	18.7%	36.0%	34.7%	100.0%
		% within Child's Age?	0.0%	0.0%	0.5%	0.0%	0.9%	2.3%	5.9%	16.0%	16.1%	4.5%

	% of Total	0.0%	0.0%	0.1%	0.0%	0.1%	0.3%	0.8%	1.6%	1.6%	4.5%
Total	Count	16	210	217	225	220	216	239	169	161	1673
	Expected Count	16.0	210.0	217.0	225.0	220.0	216.0	239.0	169.0	161.0	1673.0
	% within Who Accompanies the Child to School?	1.0%	12.6%	13.0%	13.4%	13.2%	12.9%	14.3%	10.1%	9.6%	100.0%
	% within Child's Age?	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	1.0%	12.6%	13.0%	13.4%	13.2%	12.9%	14.3%	10.1%	9.6%	100.0%

Table D.5. Chi-Square: Accompaniment and Child Age

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	266.828[a]	32	.000
Likelihood Ratio	262.755	32	.000
Linear-by-Linear Association	197.276	1	.000
N of Valid Cases	1673		

Table D.6. Symmetric Measures: Accompaniment and Child Age

		Value	Approximate Significance
Nominal by Nominal	Phi	.399	.000
	Cramer's V	.200	.000
N of Valid Cases		1673	

Table D.7. Crosstabulation: Accompaniment and Distance

			Caregivers: Distance Home to School?				
			Less than 0.5km	0.51km to 1.59km	1.6km to 3km	Over 3km	Total
Who Accompanies the Child to	Parent/Grandparent	Count	526	530	155	68	1279
		Expected Count	566.1	504.7	146.7	61.4	1279.0

School?		% within Who Accompanies the Child to School?	41.1%	41.4%	12.1%	5.3%	100.0%
		% within Caregivers: Distance Home to School?	74.1%	83.7%	84.2%	88.3%	79.7%
		% of Total	32.8%	33.0%	9.7%	4.2%	79.7%
	Other Adult	Count	32	33	13	4	82
		Expected Count	36.3	32.4	9.4	3.9	82.0
		% within Who Accompanies the Child to School?	39.0%	40.2%	15.9%	4.9%	100.0%
		% within Caregivers: Distance Home to School?	4.5%	5.2%	7.1%	5.2%	5.1%
		% of Total	2.0%	2.1%	0.8%	0.2%	5.1%
	Sibling	Count	64	33	7	4	108
		Expected Count	47.8	42.6	12.4	5.2	108.0
		% within Who Accompanies the Child to School?	59.3%	30.6%	6.5%	3.7%	100.0%
		% within Caregivers: Distance Home to School?	9.0%	5.2%	3.8%	5.2%	6.7%
		% of Total	4.0%	2.1%	0.4%	0.2%	6.7%
	Friend	Count	35	22	5	1	63
		Expected Count	27.9	24.9	7.2	3.0	63.0

		% within Who Accompanies the Child to School?	55.6%	34.9%	7.9%	1.6%	100.0%
		% within Caregivers: Distance Home to School?	4.9%	3.5%	2.7%	1.3%	3.9%
		% of Total	2.2%	1.4%	0.3%	0.1%	3.9%
	Child Travels Alone	Count	53	15	4	0	72
		Expected Count	31.9	28.4	8.3	3.5	72.0
		% within Who Accompanies the Child to School?	73.6%	20.8%	5.6%	0.0%	100.0%
		% within Caregivers: Distance Home to School?	7.5%	2.4%	2.2%	0.0%	4.5%
		% of Total	3.3%	0.9%	0.2%	0.0%	4.5%
Total		Count	710	633	184	77	1604
		Expected Count	710.0	633.0	184.0	77.0	1604.0
		% within Who Accompanies the Child to School?	44.3%	39.5%	11.5%	4.8%	100.0%
		% within Caregivers: Distance Home to School?	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	44.3%	39.5%	11.5%	4.8%	100.0%

Table D.8. Chi-Square: Accompaniment and Distance

	Value	df	Asymptotic Significance (2-sided)

Pearson Chi-Square	47.634[a]	12	.000
Likelihood Ratio	51.036	12	.000
Linear-by-Linear Association	33.852	1	.000
N of Valid Cases	1604		

Table D.9. Symmetric Measures: Accompaniment and Distance

		Value	Approximate Significance
Nominal by Nominal	Phi	.172	.000
	Cramer's V	.099	.000
N of Valid Cases		1604	

Table D.10. Crosstabulation: Caregiver Perception of Safety and Accompaniment

			Who Accompanies the Child to School?						
			Parent	Grandparent	Other/Adult	Sibling	Friend	Child Travels Alone	Total
"Our neighbourhood is safe for children to walk to and from school"	Disagree	Count	195		7	8	7	3	220
		Expected Count	175.9		10.9	14.9	8.4	9.9	220.0
		% within "Our neighbourhood is safe for children to walk to and from school"	88.6%		3.2%	3.6%	3.2%	1.4%	100.0%
		% within Who Accompanies the Child to school?	14.9%		8.6%	7.2%	11.1%	4.1%	13.4%
		% of Total	11.9%		0.4%	0.5%	0.4%	0.2%	13.4%
	Agree	Count	1118		74	103	56	71	1422
		Expected Count	1137.1		70.1	96.1	54.6	64.1	1422.0
		% within "Our neighbourhood is safe for children to walk to and from school"	78.6%		5.2%	7.2%	3.9%	5.0%	100.0%

	% within Who Accompanies the Child to School?	85.1%	91.4%	92.8%	88.9%	95.9%	86.6%
	% of Total	68.1%	4.5%	6.3%	3.4%	4.3%	86.6%
Total	Count	1313	81	111	63	74	1642
	Expected Count	1313.0	81.0	111.0	63.0	74.0	1642.0
	% within "Our neighbourhood is safe for children to walk to and from school"	80.0%	4.9%	6.8%	3.8%	4.5%	100.0%
	% within Who Accompanies the Child to School?	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	80.0%	4.9%	6.8%	3.8%	4.5%	100.0%

Table D.11. Chi-Square: Caregiver Perception of Safety and Accompaniment

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.488[a]	4	.009
Likelihood Ratio	16.075	4	.003
Linear-by-Linear Association	11.155	1	.001
N of Valid Cases	1642		

Table D.12. Symmetric Measures: Caregiver Perception of Safety and Accompaniment

		Value	Approximate Significance
Nominal by Nominal	Phi	.091	.009
	Cramer's V	.091	.009
N of Valid Cases		1642	

Table D.13. **Crosstabulation: Caregiver Perception of Safety and Distance**

			Caregivers: Distance Home to School?				
			Less than 0.5km	0.51km to 1.59km	1.6km to 3km	Over 3km	Total
"Our neighbourhood is safe for children to walk to and from school"	Disagree	Count	55	121	57	16	249
		Expected Count	114.3	94.2	28.6	11.9	249.0
		% within "Our neighbourhood is safe for children to walk to and from school"	22.1%	48.6%	22.9%	6.4%	100.0%
		% within Caregivers: Distance Home to School?	6.6%	17.6%	27.3%	18.4%	13.7%
		% of Total	3.0%	6.7%	3.1%	0.9%	13.7%
	Agree	Count	780	567	152	71	1570
		Expected Count	720.7	593.8	180.4	75.1	1570.0
		% within "Our neighbourhood is safe for children to walk to and from school"	49.7%	36.1%	9.7%	4.5%	100.0%
		% within Caregivers: Distance Home to School?	93.4%	82.4%	72.7%	81.6%	86.3%
		% of Total	42.9%	31.2%	8.4%	3.9%	86.3%
Total		Count	835	688	209	87	1819
		Expected Count	835.0	688.0	209.0	87.0	1819.0
		% within "Our neighbourhood is safe for children to walk to and from school"	45.9%	37.8%	11.5%	4.8%	100.0%

	% within Caregivers: Distance Home to School?	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	45.9%	37.8%	11.5%	4.8%	100.0%

Table D.14. Chi-Square: Caregiver Perception of Safety and Distance

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	78.765[a]	3	.000
Likelihood Ratio	79.138	3	.000
Linear-by-Linear Association	60.761	1	.000
N of Valid Cases	1819		

Table D.15. Symmetric Measures: Caregiver Perception of Safety and Distance

		Value	Approximate Significance
Nominal by Nominal	Phi	.208	.000
	Cramer's V	.208	.000
N of Valid Cases		1819	

Appendix E: Regressions of School Subsets

Table E.1. Regression: Mode to School (2014, Coyote Creek and Serpentine Heights)

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	CHILD_ACCOMPANIMENT *(parent/grandparent/caregiver)*			6.142	4	.189			
	CHILD_ACCOMPANIMENT (Other Adult)	1.106	1.075	1.059	1	.304	3.022	.368	24.838
	CHILD_ACCOMPANIMENT (Sibling)	2.376	1.034	5.284	1	.022	10.762	1.419	81.606
	CHILD_ACCOMPANIMENT (Friend)	20.874	14876.532	.000	1	.999	1.62×10^9	.000	.
	CHILD_ACCOMPANIMENT (Child Travels Alone)	20.453	12227.311	.000	1	.999	7.63×10^8	.000	.
	DISTANCE_HomeToSchool *(less than 0.5km)*			39.927	3	**.000**			
	DISTANCE_HomeToSchool (0.51km to 1.59km)	-2.225	.437	25.946	1	**.000**	.108	.046	.254
	DISTANCE_HomeToSchool (1.60km to 3km)	-4.408	1.121	15.471	1	**.000**	.012	.001	.110
	DISTANCE_HomeToSchool (over 3km)	-4.762	1.288	13.659	1	**.000**	.009	.001	.107
	HOME_LANGUAGE *(English)*			11.185	6	.083			
	HOME_LANGUAGE (Hindi/Punjabi)	.091	.437	.043	1	.835	1.095	.465	2.582
	HOME_LANGUAGE (Mandarin/Cantonese/ Chinese)	1.036	.742	1.951	1	.162	2.817	.659	12.051
	HOME_LANGUAGE (Korean)	2.385	1.378	2.998	1	.083	10.860	.730	161.568
	HOME_LANGUAGE (Philippine/Tagalog)	-1.151	1.085	1.125	1	.289	.316	.038	2.655
	HOME_LANGUAGE (Vietnamese)	-2.296	1.061	4.687	1	.030	.101	.013	.805
	HOME_LANGUAGE (Arabic/Somali)	21.069	17762.920	.000	1	.999	1.41×10^9	.000	.
	CHILD_AGE	1.889	.752	6.303	1	**.012**	6.611	1.513	28.887
	CHILD_AGE_SQ	-.107	.045	5.672	1	.017	.899	.823	.981
	CHILD_SEX (Male)	.330	.397	.691	1	.406	1.391	.639	3.031

		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
	CHILD_COUNT	-.913	.354	6.645	1	**.010**	.401	.200	.803
	CAREGIVER_SAFE_BINARY (Agree, (*disagree*))	2.415	.868	7.740	1	**.005**	11.186	2.041	61.303
	Constant	-7.570	3.134	5.833	1	.016	.001		

a. Variable(s) entered on step 1: CHILD_ACCOMPANIMENT, DISTANCE_HomeToSchool, HOME_LANGUAGE, CHILD_AGE, CHILD_AGE_SQ, CHILD_SEX, CHILD_COUNT, CAREGIVER_SAFE_BINARY.

Table E.2. Regression: Mode from School (2014, Coyote Creek and Serpentine Heights)

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	DISTANCE_HomeToSchool *(less than 0.5km)*			54.659	3	**.000**			
	DISTANCE_HomeToSchool (0.51km to 1.59km)	-2.382	.456	27.270	1	**.000**	.092	.038	.226
	DISTANCE_HomeToSchool (1.60km to 3km)	-5.305	.896	35.018	1	**.000**	.005	.001	.029
	DISTANCE_HomeToSchool (over 3km)	-5.301	1.175	20.349	1	**.000**	.005	.000	.050
	HOME_LANGUAGE *(English)*			12.937	6	**.044**			
	HOME_LANGUAGE (Hindi/Punjabi)	-.373	.408	.833	1	.361	.689	.310	1.533
	HOME_LANGUAGE (Mandarin/Cantonese/ Chinese)	1.913	.835	5.251	1	**.022**	6.772	1.319	34.775
	HOME_LANGUAGE (Korean)	.874	1.751	.249	1	.618	2.397	.077	74.210
	HOME_LANGUAGE (Philippine/Tagalog)	2.194	1.130	3.769	1	**.052**	8.969	.979	82.138
	HOME_LANGUAGE (Vietnamese)	-1.038	.877	1.401	1	.236	.354	.063	1.975
	HOME_LANGUAGE (Arabic/Somali)	.622	1.136	.300	1	.584	1.863	.201	17.269
	CHILD_AGE	1.065	.686	2.405	1	.121	2.899	.755	11.132
	CHILD_AGE_SQ	-.050	.040	1.525	1	.217	.952	.880	1.030
	CHILD_SEX (Male)	-.463	.372	1.546	1	.214	.630	.304	1.306
	CHILD_COUNT	-.282	.291	.942	1	.332	.754	.427	1.333
	CAREGIVER_SAFE_BINARY (Agree, (*disagree*))	1.442	.482	8.949	1	**.003**	4.231	1.644	10.885
	Constant	-3.373	2.781	1.471	1	.225	.034		

a. Variable(s) entered on step 1: DISTANCE_HomeToSchool, HOME_LANGUAGE, CHILD_AGE, CHILD_AGE_SQ, CHILD_SEX, CHILD_COUNT, CAREGIVER_SAFE_BINARY.

Table E.3. Regression: Mode to School (2014, Coast Meridian, Frost Road and Walnut Road)

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	CHILD_ACCOMPANIMENT *(parent/grandparent/caregiver)*			22.493	4	**.000**			
	CHILD_ACCOMPANIMENT (Other Adult)	2.242	.665	11.349	1	**.001**	9.409	2.554	34.671
	CHILD_ACCOMPANIMENT (Sibling)	2.463	.733	11.278	1	**.001**	11.734	2.788	49.386
	CHILD_ACCOMPANIMENT (Friend)	.491	.520	.892	1	.345	1.635	.590	4.531
	CHILD_ACCOMPANIMENT (Child Travels Alone)	20.201	7814.996	.000	1	.998	5.93×10^8	.000	.
	DISTANCE_HomeToSchool *(less than 0.5km)*			107.731	3	**.000**			
	DISTANCE_HomeToSchool (0.51km to 1.59km)	-2.011	.239	70.498	1	**.000**	.134	.084	.214
	DISTANCE_HomeToSchool (1.60km to 3km)	-3.436	.447	59.028	1	**.000**	.032	.013	.077
	DISTANCE_HomeToSchool (over 3km)	-3.953	.745	28.120	1	**.000**	.019	.004	.083
	HOME_LANGUAGE *(English)*			12.251	6	.057			
	HOME_LANGUAGE (Hindi/Punjabi)	-.687	.318	4.681	1	.030	.503	.270	.937
	HOME_LANGUAGE (Mandarin/Cantonese/ Chinese)	.453	.306	2.192	1	.139	1.573	.864	2.863
	HOME_LANGUAGE (Korean)	-.018	.421	.002	1	.966	.982	.430	2.242
	HOME_LANGUAGE (Philippine/Tagalog)	.258	.463	.311	1	.577	1.295	.522	3.211
	HOME_LANGUAGE (Vietnamese)	-.773	.626	1.522	1	.217	.462	.135	1.576
	HOME_LANGUAGE (Arabic/Somali)	-.632	.863	.536	1	.464	.532	.098	2.887
	CHILD_AGE	.085	.396	.046	1	.829	1.089	.501	2.369
	CHILD_AGE_SQ	-.006	.024	.074	1	.785	.994	.949	1.041

CHILD_SEX (Male)	.373	.226	2.736	1	.098	1.453	.933	2.261
CHILD_COUNT	.029	.187	.025	1	.874	1.030	.714	1.485
CAREGIVER_SAFE_BINARY (Agree, (*disagree*))	1.105	.337	10.765	1	**.001**	3.020	1.561	5.846
Constant	.058	1.682	.001	1	.973	1.060		

a. Variable(s) entered on step 1: CHILD_ACCOMPANIMENT, DISTANCE_HomeToSchool, HOME_LANGUAGE, CHILD_AGE, CHILD_AGE_SQ, CHILD_SEX, CHILD_COUNT, CAREGIVER_SAFE_BINARY.

Table E.4. Regression: Mode from School (2014, Coast Meridian, Frost Road and Walnut Road)

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	DISTANCE_HomeToSchool *(less than 0.5km)*			86.066	3	**.000**			
	DISTANCE_HomeToSchool (0.51km to 1.59km)	-1.746	.237	54.525	1	**.000**	.174	.110	.277
	DISTANCE_HomeToSchool (1.60km to 3km)	-2.948	.359	67.309	1	**.000**	.052	.026	.106
	DISTANCE_HomeToSchool (over 3km)	-22.704	7576.455	.000	1	.998	.000	.000	.
	HOME_LANGUAGE *(English)*			28.656	6	**.000**			
	HOME_LANGUAGE (Hindi/Punjabi)	-.206	.292	.499	1	.480	.814	.459	1.442
	HOME_LANGUAGE (Mandarin/Cantonese/ Chinese)	.925	.301	9.440	1	**.002**	2.523	1.398	4.552
	HOME_LANGUAGE (Korean)	1.080	.425	6.463	1	**.011**	2.944	1.281	6.767
	HOME_LANGUAGE (Philippine/Tagalog)	.748	.497	2.267	1	.132	2.112	.798	5.590
	HOME_LANGUAGE (Vietnamese)	-1.043	.617	2.857	1	.091	.352	.105	1.181
	HOME_LANGUAGE (Arabic/Somali)	-1.950	.865	5.086	1	**.024**	.142	.026	.775
	CHILD_AGE	.485	.379	1.635	1	.201	1.624	.772	3.417
	CHILD_AGE_SQ	-.026	.023	1.326	1	.250	.974	.932	1.018
	CHILD_SEX (Male)	.208	.217	.919	1	.338	1.231	.805	1.885
	CHILD_COUNT	.070	.185	.143	1	.706	1.072	.746	1.542

		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
	CAREGIVER_SAFE_BINARY (Agree, (*disagree*))	1.394	.300	21.622	1	**.000**	4.029	2.239	7.250
	Constant	-1.876	1.602	1.372	1	.241	.153		

a. Variable(s) entered on step 1: DISTANCE_HomeToSchool, HOME_LANGUAGE, CHILD_AGE, CHILD_AGE_SQ, CHILD_SEX, CHILD_COUNT, CAREGIVER_SAFE_BINARY.

Table E.5. Regression: Mode to School (2015, Coast Meridian, Frost Road and Walnut Road)

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	CHILD_ACCOMPANIMENT *(parent/grandparent/caregiver)*			15.934	4	**.003**			
	CHILD_ACCOMPANIMENT (Other Adult)	.538	.570	.891	1	.345	1.713	.560	5.237
	CHILD_ACCOMPANIMENT (Sibling)	1.206	.526	5.262	1	**.022**	3.339	1.192	9.355
	CHILD_ACCOMPANIMENT (Friend)	.616	.642	.922	1	.337	1.852	.526	6.519
	CHILD_ACCOMPANIMENT (Child Travels Alone)	3.868	1.199	10.400	1	**.001**	47.849	4.560	502.127
	DISTANCE_HomeToSchool *(less than 0.5km)*			86.717	3	**.000**			
	DISTANCE_HomeToSchool (0.51km to 1.59km)	-1.868	.245	58.064	1	**.000**	.154	.096	.250
	DISTANCE_HomeToSchool (1.60km to 3km)	-4.579	.643	50.682	1	**.000**	.010	.003	.036
	DISTANCE_HomeToSchool (over 3km)	-23.108	8650.570	.000	1	.998	.000	.000	.
	HOME_LANGUAGE *(English)*			12.115	6	.059			
	HOME_LANGUAGE (Hindi/Punjabi)	-.333	.355	.880	1	.348	.716	.357	1.438
	HOME_LANGUAGE (Mandarin/Cantonese/ Chinese)	-.194	.310	.391	1	.532	.824	.449	1.513
	HOME_LANGUAGE (Korean)	-.086	.447	.037	1	.848	.918	.382	2.204
	HOME_LANGUAGE (Philippine/Tagalog)	-.206	.452	.208	1	.648	.814	.336	1.972
	HOME_LANGUAGE (Vietnamese)	-1.457	.596	5.981	1	.014	.233	.072	.749
	HOME_LANGUAGE (Arabic/Somali)	2.949	1.308	5.080	1	.024	19.092	1.469	248.114

	CHILD_AGE	.271	.433	.391	1	.532	1.311	.561	3.065
	CHILD_AGE_SQ	-.015	.026	.325	1	.569	.985	.935	1.037
	CHILD_SEX (Male)	.135	.232	.341	1	.559	1.145	.727	1.803
	CHILD_COUNT	.236	.210	1.259	1	.262	1.266	.839	1.910
	CAREGIVER_SAFE_BINARY (Agree, (*disagree*))	1.071	.398	7.254	1	**.007**	2.919	1.339	6.364
	Constant	-.696	1.796	.150	1	.698	.498		

a. Variable(s) entered on step 1: CHILD_ACCOMPANIMENT, DISTANCE_HomeToSchool, HOME_LANGUAGE, CHILD_AGE, CHILD_AGE_SQ, CHILD_SEX, CHILD_COUNT, CAREGIVER_SAFE_BINARY.

Table E.5. Regression: Mode from School (2015, Coast Meridian, Frost Road and Walnut Road)

								95% C.I.for EXP(B)	
		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Step 1[a]	DISTANCE_HomeToSchool *(less than 0.5km)*			91.564	3	**.000**			
	DISTANCE_HomeToSchool (0.51km to 1.59km)	-1.798	.252	50.756	1	**.000**	.166	.101	.272
	DISTANCE_HomeToSchool (1.60km to 3km)	-3.334	.368	81.910	1	**.000**	.036	.017	.073
	DISTANCE_HomeToSchool (over 3km)	-23.685	7186.538	.000	1	.997	.000	.000	.
	HOME_LANGUAGE *(English)*			6.045	6	.418			
	HOME_LANGUAGE (Hindi/Punjabi)	-.484	.321	2.278	1	.131	.616	.329	1.156
	HOME_LANGUAGE (Mandarin/Cantonese/ Chinese)	.124	.301	.170	1	.680	1.133	.627	2.045
	HOME_LANGUAGE (Korean)	.012	.400	.001	1	.976	1.012	.462	2.217
	HOME_LANGUAGE (Philippine/Tagalog)	-.263	.401	.431	1	.512	.768	.350	1.687
	HOME_LANGUAGE (Vietnamese)	-1.031	.597	2.980	1	.084	.357	.111	1.150
	HOME_LANGUAGE (Arabic/Somali)	21.329	17440.680	.000	1	.999	1.83×10^9	.000	.
	CHILD_AGE	.193	.411	.221	1	.638	1.213	.542	2.717
	CHILD_AGE_SQ	-.001	.025	.001	1	.981	.999	.952	1.049
	CHILD_SEX (Male)	-.074	.223	.111	1	.739	.928	.600	1.436

	CHILD_COUNT	.006	.192	.001	1	.973	1.006	.691	1.467
	CAREGIVER_SAFE_BINARY (Agree, (*disagree*))	1.146	.347	10.878	1	**.001**	3.144	1.592	6.211
	Constant	-.178	1.690	.011	1	.916	.837		

a. Variable(s) entered on step 1: DISTANCE_HomeToSchool, HOME_LANGUAGE, CHILD_AGE, CHILD_AGE_SQ, CHILD_SEX, CHILD_COUNT, CAREGIVER_SAFE_BINARY.

Appendix F: HASTe Follow-Up Survey

School Travel Planning funder logo here
(Municipality / Org. / School District)

School Name

School Travel Planning

Date sent home,

Dear Parent (Guardian):

School Name is a Walking & Cycling School working together with the City of Surrey's School Travel Planning process to help reduce school traffic congestion and encourage more students to walk, scooter, skate or cycle on their journey to and from school.

School Name took part in this program to:

- Improve safety in our community.
- Increase health and well-being of our students.
- Increase the amount of students arriving alert and ready to learn.
- Reduce pollution where our students play.
- Reduce traffic congestion at and around the school.

Some highlights from last year include: (**EXAMPLE)** Pick-Up & Drop Off signage changes, a new crosswalk in front of the school, TravelSmart Youth Leadership Assemblies, HUB Cycling training, Walking Wednesdays and Bike to School Week Celebration.

Please take 5 minutes to complete this survey. This survey is to help us understand the impact School Travel Planning has had on travel behavior to and from School Name Elementary. **You only need to submit one survey per family and return it with your youngest child by October 21st, 2014.** There will be a prize for the first classroom that collects all of their surveys.

If you have any questions about the survey or the School Travel Planning process, please contact: Facilitator Name at Facilitator email.

Thank you,
Name of Principal & VP
Principal & Vice Principal

To protect your privacy this survey does not require you to provide your name. *All information will be kept strictly confidential.*

School Name – Municipality Name **FOLLOW-UP FAMILY SURVEY 1 of 5**

Family Transportation Survey

Please include the date (month/day/year) that you filled this survey out

(e.g. October / 15 / 2014): _______________/_____/________

Please complete ONE survey per family.

1. Did you complete the first Family Transportation Survey in October 2013? (Circle one)

   YES NO NOT SURE

2. How does your child(ren) **usually** get to and from school?
   CHOOSE ONLY ONE BOX FROM EACH COLUMN
   (If two modes are common, e.g. *walking* and *driving*, choose the one they do **most often.**)

	TO school	FROM school
Walk / Scooter / Skate	☐	☐
Walk part-way (at least one entire block)	☐	☐
Bicycle	☐	☐
School bus	☐	☐
Public transit (Translink)	☐	☐
Carpool (2 or more families)	☐	☐
Car (just your family)	☐	☐
Other	☐	☐

If Other (explain)____

3. Who usually accompanies your child on the way to school?

   ☐ Parent/Grandparent ☐ Other Adult ☐ Sibling ☐ Friend ☐ Child travels alone

4. How far away from school do you live? If you are not sure, check Google Maps.

   ☐ Less than 0.5 km ☐ 0.51 to 1.59 km ☐ 1.6 to 3 km ☐ Over 3 km

5. What language does your family speak at home?

☐ English ☐ Punjabi/Hindi ☐ Mandarin/ Cantonese / Chinese ☐ Korean
☐ Philippine/ Tagalog ☐ Other please specify : ______________________

6. Please fill in the age and sex of your child(ren) attending this school.

Child	Age	Sex: Boy	Sex: Girl
1		☐	☐
2		☐	☐
3		☐	☐
4		☐	☐

7. Our neighbourhood is safe for children to walk to and from school. (Please circle one answer).

STRONGLY AGREE AGREE DISAGREE STRONGLY DISAGREE

ONLY ANSWER Questions 8-10 if your child/ children are usually driven to or from school. If not, please skip to question 11

8. What are the main reasons your child(ren) is/are **usually** driven to/from school? (Choose up to three)

☐ Distance from home too far
☐ Convenience/time pressures
☐ Traffic danger
☐ Personal safety issues (e.g. bullying, stranger danger, etc.)
☐ I'm on my way somewhere else (e.g. to work)
☐ Weather
☐ Other (explain)____

9. I would allow my child(ren) to **walk** to school if… (choose up to three)

☐ He or she did not walk alone
☐ There was a safer or improved walking route
☐ There were reduced traffic dangers
☐ He or she were older
☐ He or she did not live so far from school
☐ Other (explain)____

10. I would allow my child(ren) to **cycle** to school if… (choose up to three)
☐ They did not cycle alone
☐ There was a safer or improved cycling route
☐ There were reduced traffic dangers
☐ They were older
☐ They did not live so far from school
☐ They received bicycle safety training
☐ They could lock their bicycle in a safe place
☐ Other (explain)____

Everyone continue at question 11 below

11. In what ways have your family's school travel habits changed, since the School Travel Planning process began?

☐ less driving (e.g. more carpooling, walking, cycling, taking public transit, etc.)
☐ not changed
☐ more driving

Comments:____

12. If you are driving less for trips to or from school, what are you or your child(ren) doing more of?

☐ Walking
☐ Cycling
☐ Transit
☐ Other: (explain):____

13. Has the volume of vehicle traffic outside this school changed since the School Travel Planning process began?

☐ decreased ☐ not changed ☐ increased

Comments:____

____

14. Please share any further comments about your child's journey to and from school.

____

____

15. Which school travel planning activities do you feel have been most effective for your family? (Check all that apply.)

☐ Infrastructure improvements, e.g. signage, crosswalk upgrades, speed bumps
☐ Pick-Up Drop-Off signage changes
☐ New Bike Racks
☐ School Walking & Cycling TravelSmart Assemblies
☐ Walk or Bike to School Week events and prizes
☐ Newsletter Announcements
☐ HUB cycle training for Gr.4 & Gr.5
☐ Best Routes to School Map Brochure
☐ Upcoming Walking Wednesday Promotion
☐ Other

16. Do you support ongoing School Travel Planning efforts to make the school area safer, healthier and better connected to the community, by focusing on ways to reduce the number of children traveling to and from school by car?

☐ YES ☐ NO

17. If you would like to continue to help with School Travel Planning efforts (e.g: attend Parent Advisory Council (PAC) Meetings or encourage Walking Wednesday promotion) please provide your name, email and telephone (Optional: if you prefer to be called) below:

____

____

THANK YOU FOR YOUR TIME. PLEASE HAVE THIS SURVEY COMPLETED AND RETURNED TO THE SCHOOL BY OCTOBER 21st, 2014

HASTe BC (The Hub for Active School Travel) is the provincial lead for School Travel Planning in British Columbia: (www.hastebc.org)
School Travel Planning in your municipality/ SD is sponsored by
Funder - Funder Website

For more information please visit both of our websites or join us on Facebook or Twitter.

School Travel Planning funder logo here
(Municipality / Org. / School District)

HASTe
HUB for ACTIVE SCHOOL TRAVEL