TRAVEL BEHAVIOUR AND TRANSPORTATION CHALLENGES OF HOUSEHOLDS WITH PRE-SCHOOL AGED CHILDREN: A CHILD-CARE CENTRE BASED STUDY

by

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ABSTRACT

Sustainable transportation planning practices and current research lack in addressing the requirements of households that must travel with young children. It is important that planners have an understanding of the transportation challenges imposed on households so as to better inform which planning practices will have the most positive impact. The purpose of this study was to provide a baseline exploration to broadly investigate travel patterns and determine transportation challenges for households with pre-school aged children (<5 years) in the child-care centre setting of Halifax Regional Municipality, Nova Scotia. This study used a web-based survey that contained a questionnaire and a self-reported travel diary which was distributed to all licensed child-care facilities in the Halifax Regional Municipality. Descriptive statistics were used to identify trends and the factors that influence transportation choices for households with young children. Survey results showed that respondents felt traveling with young children was a barrier to choosing sustainable modes of transportation. Households with two or more children were less likely to walk, bike or take transit to travel to everyday destinations. Families often group their trip to child-care centres with other destinations and will choose sustainable travel behaviour more often for the trip to and from child-care centres compared to trips to other destinations. As families are inclined to use sustainable transportation more to access the child-care centre, there is opportunity to further encourage this by focusing sustainable transportation planning efforts toward the child-care centre destination.

LIST OF ABBREVIATIONS USED

HRM	Halifax Regional Municipality
STP	Sustainable Transportation Planning
TDM	Transportation Demand Management

GLOSSARY

Branch Logic	The use of branching to send participants down different paths in the survey based on variables within a question response.
Drive- Thru	A place or facility where one can be served without leaving one's car.
Household	One or more people who live in the same dwelling.
Primary Mode Choice	Primary mode choice is the mode of transportation that is most commonly used by the respondent or household to access their everyday destinations.
Sustainable Transportation Planning	Designing more connected communities to increase accessibility to service destinations and promote an increase in transit, biking and walking use.
Sustainable Travel Behaviour	Includes travelling via modes that consume less non-renewable energy such as taking public transit, walking, and biking.
Tour	A trip chaining event where the traveler starts at a destination and ends at the same destination and includes any destination stopped at in between.
Transportation Accessibility	A measure of the ease, influenced by infrastructure, service, frequency, etc., of the transportation network for accessing a destination in terms of driving, biking, walking, and transit.
Transportation Demand Management	The use of policies, programs and services to influence whether, why, when where and how people travel.
Travel Behaviour	A study of what activities people participate in and how people use transportation.
Trip Chaining	Combining destinations into a trip or travel chain to improve travel efficiency.

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CHAPTER 1: INTRODUCTION

Child-care is a necessary service which addresses the needs of modern families where both parents are employed outside the home. As a result, there is a demand for sustainable and affordable transportation options to access child-care facilities. The transportation network and infrastructure (e.g. bike lanes, buses routes, sidewalks, crosswalks, etc.) that support child-care centres have an influence on household transportation decisions, community development (Anderson, 2010; Hodgson, 2011), personal well-being (Bellows, et al., 2008; De Bock, et al., 2010; Zubrick, et al., 2010) and the efficiency of the overall transportation system (Danielson, 1999; Jha andIvan, 1997; Johansson, et al., 1994; Patridge, 2007).

Planning policies play an important role in ensuring accessibility of adequate childcare and as such provide social, economic and environmental benefits for households and their communities (Anderson, 2010; Hodgenson, 2011). Municipal planning strategies, land-use by-laws and development regulations are tools used in Nova Scotia to control growth. These tools, whether intended or not, have an impact on the overall transportation accessibility of important neighborhood features such as child-care facilities (Anderson, 2010; Hodgenson, 2011). Before implementing these types of controls, it is important that planners have an understanding of the transportation challenges experienced by households in order to create improved policies. Academic research plays the important role of filling knowledge gaps for practicing planners. This research supports them when addressing crucial community needs such as transportation accessibility. These informed

policies then create better communities by supporting families' well-being and happiness (Anderson, 2010; Evans, 2000; Hodgson, 2011), increasing activity levels and improving community health (Bellows, et al., 2008; De Bock, et al., 2010; Patridge, 2007), providing social equity by allowing access for low-income and environmentally conscious households (Navaco and Gonzalaz, 2009; Patridge, 2007; Spain, 2000), reducing traffic congestion and creating a more efficient transportation network (Danielson, 1999; Geller, 2003; Patridge, 2007), and influencing future behaviour by establishing healthy habits in upcoming generations (Atance and Jackson, 2009; Johansson, et al., 2011).

Based on an extensive literature review, it was found that limited information is available related to the traveling patterns of households with toddlers and pre-school age children and the associated trips to child-care facilities. This study investigates those gaps, specifically by addressing the travel pattern of households that have a child who attends a registered child-care facility in the Halifax Regional Municipality (HRM). This study examines the challenges and barriers faced by families during their everyday commute and offers opportunities for sustainable transportation planning. The data collected provides a baseline to help identify recommendations to encourage sustainable travel behaviour both as a means to access child-care facilities and influence every day travel patterns.

1.1 GOALS AND OBJECTIVES

The goal for this thesis is to provide a baseline study to broadly investigate travel patterns and determine transportation challenges for households with pre-school aged children (<5

years) in the child-care centre setting of Halifax Regional Municipality, Nova Scotia. This study addresses the project goal through the following objectives:

1. To understand travel patterns of households with children ranging in age from 18 months to 5 years (toddlers to preschoolers) in the child centre setting;
2. To examine transportation challenges, barriers and opportunities for households with children ranging in age from 18 months to 5 years (toddlers to pre-school).

1.2 THESIS OUTLINE

This thesis comprises six chapters. Chapter two develops an understanding of the child-care centre as a destination and the benefits of planning for families from a land-use, travel network, and social policy perspective. Chapter three establishes the research methodology. Chapter four reviews the results of the web-based survey through exploratory statistics of the household travel patterns. Chapter four also contains examples of travel patterns using a specific geographic point referencing four child-care centres identified by the web-based survey. Chapter five examines the transportation challenges and barriers identified in the previous chapter and looks for opportunities for sustainable transportation planning in order to better accommodate families in land use and transportation policies. Chapter six summarizes the findings of this thesis and discusses the implications of the research and recommendations for future research.

CHAPTER 2: LITERATURE REVIEW

2.1 TRANSPORTATION PLANNING FOR FAMILIES

Daily travel, when accompanied by young children, can place restrictions on household travel choices (Caltrans, n.d.; Collins, 2010; Jha, 1997; Johansson, 2011; Morrissey, 2009). Determinants of transportation decisions such as privacy (Caltrans, n.d.), time (Johnson, 1985; Spain, 2005) and spatial considerations (Anderson; 2010; Strathman, 1994) have resulted in private vehicle use being the preferred mode of transportation for households with young children (Bellows, 2008; Caltrans, n.d; Jha, 1997; Strathman, 1994). However, there is a requirement for sustainable (Steg, 2005) and affordable transportation (Anderson, 2010; Hodgson, 2011; Patridge, 2007) options so all types of families (low-income and environmentally conscious) may have access to their everyday destinations. Understanding the travel behaviour and challenges of households with young children will provide insight into how to plan for more family friendly communities.

While there is a lack in knowledge surrounding the travel patterns of households with young children, there is some information that is known about these households that can provide insight into their transportation choices and can offer direction for a study of their travel behaviour. Studies that examined transit use of parents found that the possibility of negative child behaviour (e.g. tantrums and crying) and items (e.g. strollers, diaper bags, and snacks) associated with traveling with a young child are large barriers that are preventing them from considering public transit as a viable option (Caltrans, n.d.). Several studies have found that families with children are challenged by the need to access childcare facilities between home and work (Axhausen, 2002; Evans, 2002; Jha,

1997; Strathman, 1994; Uzzell, 2007). This is enhanced by findings that in today's society more parents work outside of the home (Caltran, n.d.; Johansson, 2011; Morrissey, 2009; Shellenback, 2004; Spain, 2000). Morrissey (2009) examined the use of sustainable travel behaviour in the workplace environment and found that employees who have children are less likely to bike, walk or use transit because of the potential that their child may need them during the day. Preliminary investigation into the challenges of traveling with young children has provided insight into the issues that require further investigation and suggest that a focus on the child-care location may be appropriate.

Child-care is a necessary service to address the essentials of contemporary communities, where adults of the household are employed (Anderson, 2010; Caltrans, n.d.; Hodgson, 2011; Johnson, 1985). Households that require child-care can choose between in home child-care and outside child-care centres (Anderson, 2010; Hodgson, 2011). Studies have found that child-care centres are a major trip generator for households with children younger than school age (< 5 years) (Anderson, 2010; Caltrans, n.d.; Hodgson, 2011; Patridge, 2007). When households routinely use child-care centres, the location of the centre and the transportation accessibility (e.g. bike lanes, transit routes and shelters, sidewalks, cross-walks, incentive programs, and parking) may become determinants of their daily travel behaviour (Caltrans, n.d.). Researchers have found that the best way to study the behavioural patterns of families with young children is through their child-care centres. (Atance, 2009; Bellows, 2008; Caltrans, n.d.; Johansson, 2011).

2.2 TRANSPORTATION PLANNING FOR CHILD-CARE

> *"Child-care is a crucial component of liveable communities" - The American Planning Association's Policy Guide on the provision of child-care (1997)*

The accessibility of quality child-care permits both parents to participate in the work force, generate funds to support their household and balance their work and personal needs (Anderson, 2010; Hodgson, 2011; Morrissey and Warner, 2009; Patridge, 2007; Shellenback, 2004). The location of a child-care centre and the surrounding transportation infrastructure affects household decisions related to travel patterns and whether they are able to access child-care services (Johnson and Deitz, 1985; Patridge, 2007; Spain, 2000; Zubrick, et al., 2010). Research conducted by others has shown that creating mixed use communities and locating essential services in high density areas, along transit corridors with cycling and walking infrastructure, will result in an increase of sustainable travel behaviour (Danielson, 1999; Geller, 2003; Grant, 2009). These findings suggest that this strategy could also be applied to the child-care centre destination to improve transportation accessibility. However, development patterns in North American trend towards suburban low-density growth often zoned as a single-use and car-dependent (Al-Hindi et al.,2001; Grant, 2009). For this reason, most child-care centres are located either adjacent to the downtown core where parents work or in low density residential areas where parents are choosing to live (Anderson, 2010; Hodgson, 2011; Morrissey and Warner, 2009; Shellenback, 2004). This pattern and development practice means that most child-care centres are not accessible by sustainable transportation, thus creating barriers for households who do not own a vehicle or who wish to use sustainable travel

options (Hodgson, 2011; Patridge, 2007). An increase in planners' understanding of transportation behaviour and the challenges for households with toddlers and preschool age children will enhance planning policies and practices.

Local policies and planning can play an important role in ensuring adequate childcare and providing social, economic, and environmental benefits for children, households and communities (Anderson, 2010; Hodgenson, 2011). Current land development practices lead to child-care centres that are located in low density areas that are lacking sustainable transportation infrastructure, a common planning practice for addressing this is for municipalities to slowly expand the high density, transit-oriented compact urban realm into the current low density car dependent areas (Filion, 2003; Patridge, 2007).

Access to quality child-care through the use of sustainable, particularly active, transportation has been linked to an increase in well-being (Anderson, 2010; Evans, 2000; Hodgson, 2011; Navaco and Gonzalez, 2009; Russel and Snodgras, 1987; Underwood, 1999; Uzzell, 2007). Sustainable transportation planning supports households using sustainable travel behaviour leading to an increase in activity levels, improvement in mobility, and provided opportunity for young children to develop important motor skills. In addition, sustainable transportation planning improves equity by creating opportunity for those who do not own a vehicle to access child-care services (Bellows, et al., 2008; De Brock, et al., 2010; Patridge, 2007). With raising obesity rates in North American (Bellows, 2009), planning policies and practices that encourage using sustainable travel behaviour are an opportunity to increase daily physical activity (Anderson, 2010; Collins, 2010; De Bock, 2010; Hodgson, 2011l; Patridge, 2007).

Physical activity levels for children and adults have decreased over the past decade (Bellows, et al., 2008; De Bock, et al., 2010; Patridge, 2007; Johansson, et al., 2011). This lack of physical activity has been found to be a key contributor to obesity, which increases the likelihood of diseases such as heart disease, diabetes, sleep apnea, and osteoarthritis (De Bock, et al. 2010; Patridge, 2007). In addition, this reduction in physical activity has also been linked to declining motor skills and developmental issues in young children (Bellows, et al., 2008; De Bock, et al., 2010). Therefore, it is important to promote physical activity and engage all members of the household. It is not known at what age physical activity promotion should be instituted to be most effective. Few interventions in child-care centre environments exist and fewer have been documented in academic and peer-reviewed settings (Bellows, et al, 2008; De Bock, et al., 2010). However, it has been recognized that supportive environments that enable sustainable travel behaviour and social support for the household and child-care centre staff yield positive results in promoting behaviour change within both parents and children and increased activity levels (De Bock, et al., 2010). A physical activity intervention for children attending child-care is most effective when parents are actively involved. It has been found that the "social players" (e.g. parents, grandparents and caregivers), provide role models and establish patterns that reinforce everyday behaviour in young children (Bellows, et al, 2008; De Bock, et al., 2010). Parental behaviour has been found to be one of the strongest determinants of a child's physical activity and body mass index. Promoting the use of active transportation is one method of engaging in physical activity all members of the "social players" in a young child's life.

Planners are accountable for all groups of people and every group should be equally represented in plans and policies (Ross, et al., 2000). The provision of sustainable transportation infrastructure enables all groups of people, young, old, rich and poor, the ability to access their essential needs (Navaco and Gonzalaz, 2009; Patridge, 2007; Spain, 2000). Child-care centres are an essential service. Child-care that is accessible by all forms of transportation supports the ability for parents to participate in the work force, be economically self-sufficient and balance their work and household needs (Anderson, 2010; Hodgson, 2011). Accessing child-care that is convenient to home, work or school is a challenge for parents, particularly those who rely on public transit. When child-care facilities are not conveniently located, households are forced to spend more time commuting in vehicles, contributing to traffic congestion and greenhouse gas emissions, and spending less time physically active or participating in the community with their family (Anderson, 2010). A study of household transportation behaviour and challenges provides insight into transportation choices and assists planners to identify which transportation users are underrepresented in the planning process. Development practices that offer multiple transportation options and improve transportation accessibility to essential services have the potential to decrease single vehicle use, which in turn may have a positive impact on traffic congestion.

The major cause of traffic congestion is the inefficient operation of roadways during periods of high demand (Chen, et al., 2001). The availability of sustainable transportation options and infrastructure can balance the pressure placed on the transportation systems by vehicle use through distributing transportation demand amongst various modes (Danielson, 1999; Geller, 2003; Patridge, 2007). It has been found that single occupant

vehicle use is the most stressful and environmentally harmful transportation mode (Navaco and Gonzalaz, 2009; Russel and Snodgras, 1987; Underwood, 1999; Uzzell, 2007). The journey-based stress associated with daily vehicle travel can result in health problems such as higher blood pressure, lower frustration tolerance, negative moods, work absences, increase in colds and flus, and dissatisfaction with home and work life (Novaco and Gonzalaz, 2009). There are also vehicle related health concerns as a result of an increase in greenhouse gas emissions which degrade air quality and contributes to a risk of respiratory and cardiovascular problems for the general population (Jha, U., and Ivan, J. N, 1997). For this reason, it is important to understand transportation choices and patterns and provide alternative transportation options to residents to improve community health, happiness and prosperity (Anderson 2010; Danielson, 1999; De Bock, et al., 2010; Geller, 2003; Hodgson, 2011; Jha and Ivan, 1997; Patridge, 2007; Strathman, et al., 1994). A major trip generator for households with children ranging in age from 18 months to 5 years is a child-care centre (Anderson, 2010). Households often access child-care on the way to another location such as work or shopping (Strathman, et al., 1994). Child-care facilities are an opportunity site for implementing sustainable transportation initiatives and improving the efficiency of transportation systems (Collins, 2010). Thus, a child-care centre based study of households' transportation behaviour and challenges provides insight into opportunities for reducing traffic congestion and increase sustainable travel behaviour of families with young children which may in turn influence the future oriented behaviour of the children who reside in the household.

Studies have found that the behaviour of parents or "role-models" in a child's life contribute to their understanding of everyday behaviour which in turn will influence their

future decisions. A parent's every day choices can have an impact on their child's future and lifestyle. Research studies have shown that prospective memory and planning is present in toddlers (Atance and Jackson, 2009; Johansson, et al., 2011). Toddlers recognize events that happen in their daily life and can accurately predict what will happen the next day. Toddlers are also capable of predicting what they will require to prepare for regular events such as outdoor toys to go to the park or their bag to go to "school". It has been found that if toddlers recognize that their parents use sustainable travel behaviour they will begin to form habits and understand other modes of transportation over car oriented activities (Atance and Jackson, 2009). To address traffic congestion, environmental degradation and obesity in the future it is important to instigate positive behaviour changes within these households that will reduce the level of car reliance and encourage the use of less polluting modes of transportation. Some strategies the households may implement include changing destination choices, combining trips, and traveling less (Steg and Gifford, 2005). With more households switching to sustainable modes of transportation there will be a resulting improvement of air quality, urban quality of life and destination accessibility (Steg and Gifford, 2005). Sustainable transportation planning initiatives that target parents can have the potential to impact the choices of future generations. Knowledge of household travel patterns and choices is the first step to developing policies and strategies that aim to shift behaviour. Limited information is available related to the travel patterns of households that use child-care facilities (Patridge, 2007; Strathman, et al., 1994). There are many transportation barriers for households that use child-care facilities. Personal vehicle use is expensive and is not an affordable option for many households (Anderson, 2010; Hodgson, 2011). Households that can afford to own a vehicle and choose to drive must navigate congested roads

(Chen, et al., 2001), search for parking (McDonald, 2008) and through these suffer increased stress levels (Navaco, 2009). Finally, using sustainable travel behaviour can be challenging, as it requires navigation through busy streets with strollers and bike trailers that often results in safety concerns (Anderson, 2010; Hodgson, 2011; Johansson, et al., 2011; Zubrick, et al., 2010).

There are many factors that contribute to the livability of a community; child-care is just one critical component. Planners must address safety and health, local environmental conditions, the quality of social interactions, opportunities for recreation and entertainment, aesthetics, and existence of unique cultural and environmental resources through their policies. Based on these findings and the research gaps identified from this literature review, crucial or first step research questions to understanding this issue can be formulated including: 1) Who uses child-care centres? What are the structures of households? 2) How do households access child-care centres? What are household travel patterns? 3) What are transportation challenges for households with young children? 4) Are there opportunities to improve child-care facilities transportation accessibility?

Continued research will aid to fill the identified knowledge gaps and our comprehension of the transportation choices of households who use child-care centres, their travel patterns and their perceived transportation challenges. This research will support a more efficient transportation system for these families (Hodgson, 2011; Jha and Ivan, 1997), improve their activity levels (De Bock, et al., 2010; Zubrick, et al., 2010) and expand the transportation accessibility of the child-care centre (Anderson, 2010; Johnson and Deitz, 1985; Patridge, 2007). Research studies support planning for child-care centres with access to sustainable transportation infrastructure, education and incentive programs as

these types of initiatives have an overall positive impact on communities by encouraging parents and their children to engage in physical activity and a sustainable life style thus improving their overall quality of life. However, what is the best method for engaging households with young children to gain an understanding of their travel behaviour and challenges in order to identify opportunities for planning?

Through a literature review of best methods and practices for exploring the subject population, it has been found that households with young children prefer to be reached through web-based methods because of the easy access and the speed of response it provides (Caltrans, n.d.; Shannon, 2002). It was also found that investigations that looked at households that trip-chain or have a third destination outside their final destination (such as a child-care centre) successfully used household surveys to gather location information and then used geocoding by origin and destination and trip lengths using shortest path to analyze trip patterns (Strathman, 1994). In addition, studies that looked to gather enough data to provide a comprehensive baseline understanding of a specific population found detailed travel dairies to be the most rewarding method (Axhausen, 2002).

An extensive literature review was performed; through this process it was identified that there is a gap in travel behaviour research. Not much is known about the travel patterns of households with young children. These households are represented by a low-response rate to household travel surveys and are left understated in the research. The child-care centre is an important destination for these households as it is a common destination for all households with pre-school aged children and is accessed daily. In addition, there is opportunity to implement sustainable transportation planning at the child-care level, as

child-care centres are required to provide confirmation that they comply with local planning regulations prior to receiving their license. For this reason, this study looks to address this research gap through a web-based survey distributed at the child-care centre destination.

CHAPTER 3: METHODOLOGY

3.1 APPROACH

The researcher collected data within the child-care centre setting through an on-line survey method. The purpose of the survey was to collect data on the transportation behaviour of households with pre-school aged children in the Halifax Regional Municipality (HRM). Data collected was analyzed using descriptive statistics to identify trends and establish factors that may influence the transportation choices of households with young children. Based on the analysis, conclusions were drawn about the challenges and barriers faced and findings were then compared to recent literature in order to identify possible opportunities within the planning process

Data collected as part of this study is used to improve planners' understanding of the travel patterns and transportation challenges, barriers, and opportunities for households' with pre-school aged children. Results are then applied to build a case for research studies to promote policies and programs pertaining to sustainable travel behaviour and improved child-care access.

3.2 RESEARCH DESIGN

A web-based survey was designed and administered through Dalhousie's Opinio Survey Software to households with pre-school aged children that use licensed child-care facilities in HRM. The survey was a questionnaire that contained a letter of consent that explained the project and requested the respondents' participation, and a self-reported travel diary for a typical weekday. The travel diary portion of the web-based survey used branch logic conditions to direct participants to different survey elements based on question response variables and as a result respondents only saw questions relevant to

their travel patterns. This method also had the benefit of reducing the number of questions that participants were asked. Completed questionnaires were submitted electronically by the participants. The electronic survey method was used to reduce paper, cost and time which in turn enabled the researcher to collect data from a larger population. The survey findings were analyzed and conclusions drawn about transportation planning research, policies and programs for households with young children.

The survey was distributed in the summer of 2014 and a second time in the fall of 2014. Child-care centres were recruited through an e-mail that contained an electronic link to the web-based survey, a poster advertising the project, a letter inviting families to participate, and a request that the child-care centre confirm participation (see Appendix C). Every licensed child-care centre within the Halifax Regional Municipality received the e-mail. Child-care centres that confirmed their participation were then asked to distribute the survey to families who attend the centre through their preferred method. Some centres chose to have the survey available on a common computer for families to participate during pick-up and drop-off times. Other centres posted the survey to their social media sites such as Facebook and Twitter and encouraged families to share and participate. The most common method used by child-care centres to distribute the survey was to send out the electronic link through a list of family e-mails that they maintain. The survey provided instructions stating that the participant responding to the survey should be the person within the household who most often performs the trip to their child-care centre. The survey was available until the researcher reached the target response rate of 15% child-care centre participation with 10% household participation from child-care centres who agreed to partake. The questionnaire was available for a total period of eight

months from the date of distribution which is assumed to be a more than an adequate timeframe for households to respond.

Child-care centres were identified through a directory from the Early Childhood Development Services Section Household and Children's Services Division of the Nova Scotia Department of Community Services. In Nova Scotia, child-care centres are required to be licensed if they care for more than six children under school age on a regular basis. Through authority appointed by the Day Care Act of Nova Scotia, the Early Childhood Development Services Department is responsible for administering the licensing process for child-care centres. The Day Care Act defines child-care arrangements that are not required to be licensed as irregular or casual babysitting. Only licensed child-care centres were invited to participate in this study as it would be difficult to identify all, irregular and casual babysitting arrangements in the area. The Day Care Act of Nova Scotia requires, as part of the licensing application process, that centre administrators provide confirmation that the centre meets all Municipal by-laws and zoning regulations prior to approval. With this process in mind, there is a greater opportunity to create by-laws and zoning regulations that support sustainable travel behaviour by targeting licensed child-care facilities.

The survey was specific to households with pre-school aged children (<5 years) that use HRM child-care services and was used to collect information on households' travel patterns, location and socio-economics. The web-based survey took approximately 20-25 minutes to complete. The survey consisted of one-hundred and eighty-one questions. The web-based survey had three sections. The first two sections were a questionnaire that was used to understand 1.) The socio-economics of the participants and 2.) The child-care

centre environment and the household trip to the child-care centre. The questionnaire portion of the survey mainly consisted of multiple choice questions with the opportunity for respondents to expand and provide comments to some open ended questions. Included in the questionnaire were six 5-point Likert-type scale questions for participants to respond with their agreement or disagreement to statements such as the safety of their child-care centre neighbourhood and their ability to use sustainable travel behaviour while traveling with children. The third section was a self-reported travel diary for the person who most often performs the trip to the child-care centre.

3.2.1 SOCIO-ECONOMICS

All participants were required to answer questions 1-7 of the survey. These were questions regarding household income, number of household adults (>16 years), number of household children (<16 years), age range of household children, household vehicle access, and primary transportation mode choice. Question 7 used a 6-point Likert scale and asked respondents to rate a number of variables, including quick access to their child, convenience, sustainability, freedom (ability to perform unplanned activities), parking availability, cost, family time and exercise. All of the above were based on importance when choosing a transportation mode. Questions 8 and 9 used a 5-point Likert scale and respondents indicated their agreement to the following statements: 1. The neighbourhood surrounding my home is safe for using sustainable travel behaviour 2. There are barriers to using sustainable travel behaviour while traveling with young children. Those who felt strongly about questions 8 and 9 were then asked to explain their response through an open ended question. Other questions covering socio-economic matters were included in the Travel Diary portion of the survey. Instruction at the beginning of the Travel Diary

clearly stated that the questions should be answered by the person who most often travels with the child to the child-care centre. Socio-economic questions asked in the Travel Diary focused on the individual rather than the household and included sex, age, relationship to the child, marital status, employment status, home location and work location. Socio-economic questions were used to develop an understanding of the structure of households with young children and the person who most often performs the household trip to the child-care centre.

3.2.2 CHILD-CARE CENTRE

All participants were presented with questions 10-26 of the survey. These questions were related to the child-care centre itself and the neighbourhood surrounding the child-care centre. One hundred and eighty-seven child-care centres were identified as licensed facilities in the HRM. These centres were listed in a drop down menu and respondents were asked to identify which centre their child attended. Respondents were then asked to provide the postal code of their child-care location allowing the researcher to confirm the selection. Respondents were asked through multiple choice questions how many children from their household attended their identified child-care centre, the type of program they attend and how often they attend child-care. Question 15 used a 6-point Likert scale and asked respondents to rate a number of variables such as space availability, reputation, location to work, location to home, special care requirement, and cost. This question was used to understand how respondents selected their child-care centre. Other multiple choice questions asked if the respondent's child-care fees were subsidized, who most often picks up and drops-off the child by their relationship to the child, the household's primary mode of transportation to child-care, and the household's primary mode of

transportation from child-care. Participants were asked through an open ended question how many minutes on a typical weekday it took them to travel from their home to their child-care centre. Multiple choice questions asked if the household frequently groups the child-care centre trip with other trips and, if yes, what destinations they typically group with this trip. Participants were asked if they felt trip grouping was a barrier to using sustainable travel behaviour while traveling with a child and were asked to explain. Question 24 used a 6-point Likert scale and asked respondents to rate importance of a number of variables when choosing to drive to their child-care centre such as distance, convenience, safety, trip chaining and weather. Question 25 used a 6-point Likert scale and asked respondents to evaluate the barrier of a number of variables when choosing public transit such as distance from home to transit stop, distance from transit stop to child-care centre, length of transit trip, dealing with strangers on transit, carrying child and their belongings, cost of transit, lack of stroller and car seat storage, and the possibility of their child misbehaving. Question 26 used a 5-point Likert scale and asked respondents to rate their agreement to the statement: the neighbourhood surrounding my child-care centre is safe for using sustainable travel behaviour. Child-care centre questions were used to develop an understanding of the child-care centre environment, how households select their child-care centre and the impact the child-care centre has on household travel patterns.

3.2.3 PERSONAL TRAVEL DIARY

The personal travel diary was the remainder of the web-based survey. The person who most often travels with the child to the child-care centre was asked to complete the travel diary. Respondents were asked to self-report information about all the places that they

visited on the last week-day. Respondents were asked about each place they travel including the place name and address (including transit stops), exact times they arrive and depart, mode of travel, other travel options, number of travel companions, the transportation infrastructure available, and the activities they took part in at the place. Branching conditions were applied to the travel diary section of the survey. For example, if the respondent answered that they used public transit to arrive at the place the survey would then branch and ask questions related to transit such as route number, transit type, fare type, and need for transfer. In this circumstance, the survey would not ask questions unrelated to transit such as did they use a drive-thru and type of parking. Following the recording of a place, respondents were asked if they stayed at this place (final destination of the day) or if they continued traveling. If respondents indicated they were at the final destination of the day, the survey would then branch to the end. The data collected from the personal travel diary was used to reveal in-depth travel patterns and behaviour.

3.2.4 PARTICIPANT INCENTIVE

As an incentive, households who responded to the survey were eligible in a number of draws for a visa gift card. Respondents were asked if they would like to be entered in the draw and, if yes, they were required to provide their e-mail address and phone number. The winners were selected randomly. Winners were notified by e-mail that they had won and the prize was delivered via Canada Post.

3.2.5 RESEARCH ETHICS

The web-based survey was approved through the Dalhousie University Social Sciences and Humanities Research Ethics Board. The participant consent form, survey and

recruitment materials were reviewed and approved as part of this process (see Appendix C and D).

As an incentive, households who responded to the survey were eligible in a draw for Visa Gift Cards of $25 (four), $50 (two), and $100 (one) values. In addition, the child-care centre with the highest survey participation received a $200 Visa gift card.

3.3 SAMPLE DESCRIPTION

3.3.1 SAMPLE COMPARISON

Results of the web-based survey were compared to the 2006 Halifax County Census Data in order to determine if a valid sample was collected. Households who responded to the web-based survey contained a high proportion of females and adults within the 25-44 year age range. This is consistent with the target survey audience of households with pre-school aged children. Census data shows that households with adults in the 25-44 year age range have the highest number of young children under the age of 5 years. In addition, previous research studies have found that it is the female parent who most commonly performs the household trip to the child-care centre.

Survey participants had varied household income levels, however the largest proportion of respondents indicated that their household income is within the $80 000+ category.

Table 1 The sample population was compared to 2006 Halifax Census Data to determine if a valid sample was collected. Participants of the survey were between twenty-five and forty-four years of age and many were female.

Table 1 Sample Comparison

		Halifax County 2006 Census Data	Survey Results
Age	16-24 years	16%	4%
	25-34 years	16%	37%
	35-44 years	19%	54%
	45-54 years	19%	4%
	55-64 years	14%	0%
	65 years or older	14%	1%
Gender	Male	40%	19%
	Female	60%	81%
Household	Less than $20 000	23%	5%
Income	$20 000-$40 000	26%	9%
	$40 000-$60 000	22%	7%
	$60 000- $80 000	15%	7%
	$80 000 +	14%	63%
	No response		10%

3.3.2 RESPONSE RATE

Table 2 Responses were organized by the child-care centre that the household child attends. The number of responses were then divided by the capacity of the centre to establish a response rate for participating centres.

Centre	# of Responses	Capacity	Response Rate
1	2	Unlisted	N/A
2	1	77	1%
3	1	100	1%
4	1	14	7%
5	1	52	2%
6	2	104	2%
7	4	85	5%
8	15	54	28%
9	2	54	4%
10	2	50	4%
11	1	70	1%
12	1	32	3%
13	1	132	1%
14	14	106	13%
15	12	41	29%
16	2	30	7%
17	1	62	2%
18	1	91	1%
19	2	23	9%
20	11	104	11%
21	30	63	48%
22	3	78	4%
23	1	36	3%
24	1	75	1%
25	1	15	7%
26	9	58	16%
27	5	132	4%
28	15	132	11%
29	2	112	2%
30	13	42	31%
31	10	62	16%
32	7	76	9%

The target for the survey was to receive responses from households that attend a variety of child-care centres within HRM with a goal of having 15% of all child-care centres agree to distribute the survey to households that attend their centre. It was then hoped for an overall household response rate of 10% of those participating child-care centres.

The questionnaire was available for a total period of eight months from the date of distribution. One-hundred and eighty-seven licensed child-care centres were identified in the HRM and the researcher attempted to contact all. However, the contact information listed on the Early Child Hood Child-Care Centre Directory was dated in some cases with only one hundred and seventy-two of the listed centres still in operation and available to be contacted. An e-mail invitation was sent to all child-care centres with a link to the survey asking that they distribute the survey to households who have a child that attends the centre (see Appendix C). The recruitment e-mail requested that the child-care centre confirm that it would distribute the survey. Twenty-one centres, 12% of all child-care centres contacted, confirmed they would distribute and promote the survey to their families. Two follow-up e-mails were sent to the child-care centres that did not respond. In addition, when a child-care centre had a Facebook page, the researcher sent a follow-up through a private message.

As part of the questionnaire, households who responded were asked to identify which child-care centre their child attends. Responses were collected from households that identified thirty-one child-care centres, which accounts for 18% of all child-care centres in the HRM. Responses were received for all of twenty-one centres that were recruited and who had confirmed distribution. There was a discrepancy between the number of child-care centres that confirmed they would distribute the survey, twenty- one, and the

number of child-care centres identified by households that responded, thirty- two. It is possible that a centre distributed the survey without confirming. Child-care centres may have also encouraged households to share the survey on social media. Table 2 shows the response rate based on the child-care centre identified by respondents as the centre that their child attends and the number of child-care spaces available at the centre. The capacity of the child-care centre was obtained from the child-care license. The child-care centre with the highest response rate was Dalhousie University Child-Care (#21) with a participation rate of 48%.

The overall household response rate for the thirty-two child-care centres that were identified by respondents was 8%. This is 2% below the target response rate of 10%. Two reminder e-mails were distributed to the participating child-care centres reminding to distribute the survey link and encourage participation.

3.4 DATA ANALYSIS

The data collected from the web-based survey was cleaned by first coding the questions and responses, and then deleting unfinished surveys and outliers. Extensive data was collected from the web-based survey and in order to manage the data effectively two data sets were created; the first with the data obtained from the socio-economics and child-care sections and a second with the data collected from the travel diary portion of the survey.

All location specific data relating to a place name, postal code or address were geo-coded using an online program called find latitude and longitude (http://www.findlatitudeandlongitude.com/batch-geocode/). In instances where multiple references to a location were made by a respondent the location was “double checked”

with Google Maps to ensure that the location data and geo-coding process was correct. A preliminary spatial analysis provided visual representation of the personal travel diary results. The respondents' residential location, child-care and work coordinates were then inputted into Google Maps Map Maker to provide a visual representation.

Statistical analysis of the survey included descriptive statistics, specifically frequency distributions of household characteristics, importance, places traveled, activities, and travel time. Frequency variables were then compared to transportation choices through charts to identify patterns, trends and themes.

Responses to the Likert-scale statements of factors that influence the respondent's mode of transportation that they frequently use to access their daily destinations, their child-care centre selection, their decision to drive to child-care, and the barriers to public transit were explored. Simple graphs were used to demonstrate trends.

Qualitative data was collected from open-ended questions and examined. Many of the responses collected were location specific for destinations within the Halifax Regional Municipality. For this reason, the responses to the open-ended questions were grouped based on the respondent's child-care location. The data was then categorized based on the content and how it related to transportation behaviour for the specific child-care centre.

CHAPTER 4: RESULTS

4.1 SOCIO-ECONOMIC CHARACTERISTICS

The following section characterizes the households and the person who most often performs the child-care centre trip. Data was collected through the web-based survey and was used to identify and describe socioeconomic characteristics including gender, age, household income, employment status and household size.

4.1.1 AGE

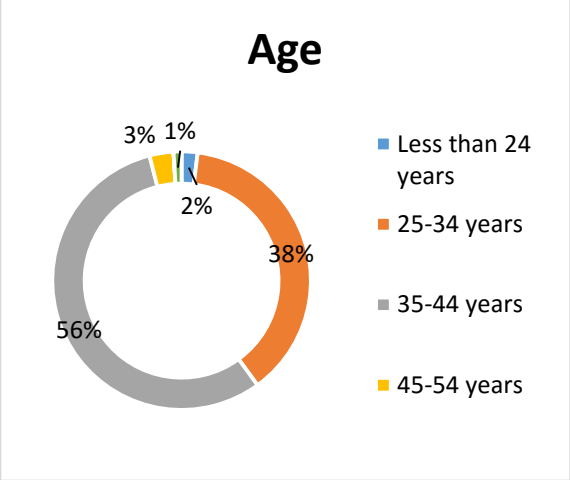


Figure 1 Age: This figure depicts the age of the household adult who most often performs that child-care trip.

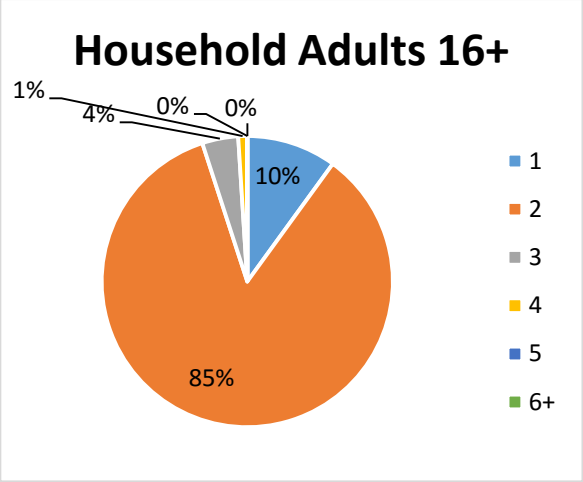


Figure 2 Household Adults 16+: This figure depicts the household adults older than sixteen years of age.

The sample is mainly comprised of adults of working age (25-44 years) with the highest percentage of respondents (56%) between 35 and 44 years (see Figure 1). Most (85%) of the respondents had two adults over the age of 16 years in their household, with one adult over the age of 16 years being the second most common (10%) (see Figure 2).

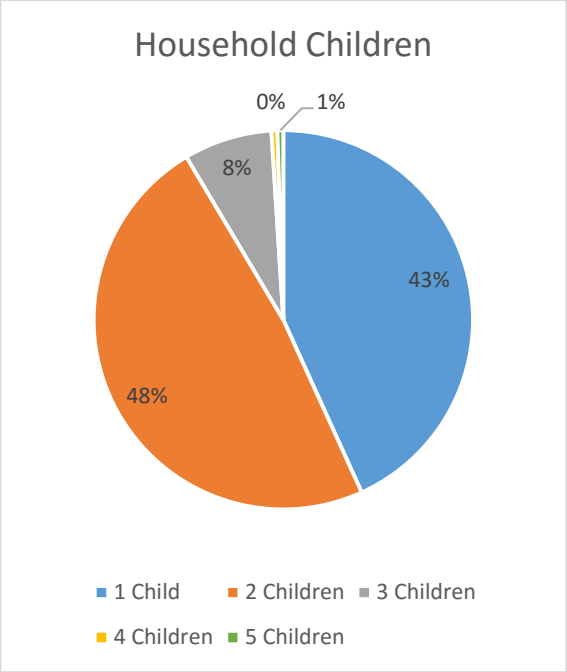


Figure 3 Household Children: This figure depicts the distribution of the number of children in a household.

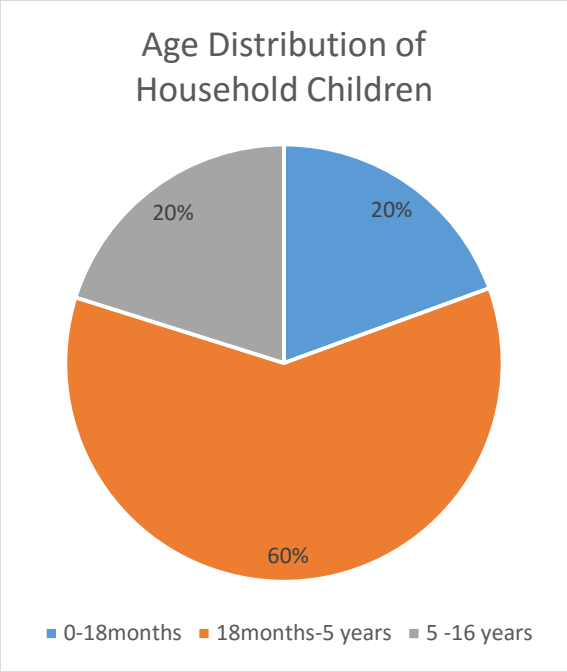


Figure 4 Age Distribution of Household Children: This figure depicts the distribution of age range of household children.

Twenty percent (20%) of households have a child under 18 months, 60% have a child between the ages of 18 months and 5 years. Forty-three percent (43%) of respondents had one child, 48% had two children, and 8% had three children. A small percentage (20%) of the respondents had children between 5 and 16 years.

4.1.2 HOUSEHOLD INCOME

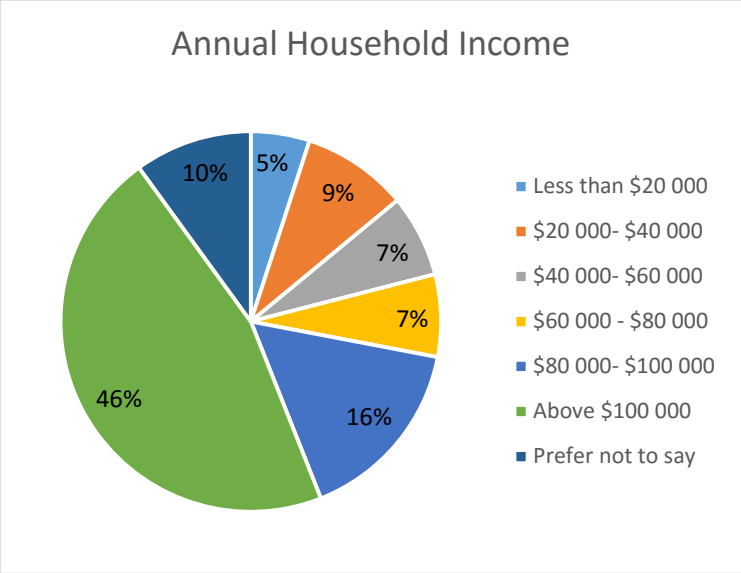


Figure 5 Annual Household Income: This figure depicts the distribution of annual household income.

Overall, respondents reported a high annual household income with 46% reporting above $100 000, 16% between $80 000 and $100 000 and 10% preferred not to report (Figure 5). Twenty-four (24%) of the respondents receive a subsidy to pay for their child-care.

4.1.3 GENDER

Female parents account for 81% of those who responded to the personal travel diary. Most of the female respondents are married (86%), and all of the respondents that identify as single parents were female (100%). Respondents were given the option to respond to marital status with "no response" as not all respondents may feel comfortable providing their marital status.

4.1.4 EMPLOYMENT STATUS

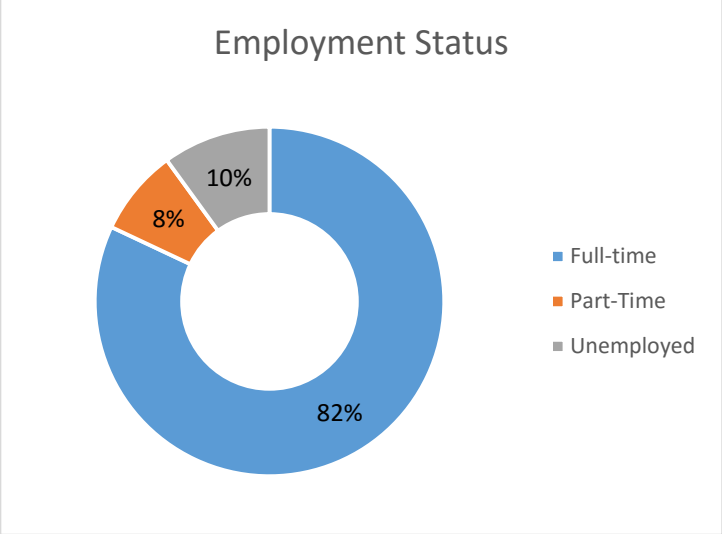


Figure 6 Employment Status: This figure depicts employment status distribution for respondents.

The majority (82%) of those who responded to the personal travel diary were full-time employees (see Figure 6). Ten percent (10%) of respondents were unemployed. Unemployed respondents may be taking their child to child-care for the social benefits opposed to necessity.

4.1.5 HOUSEHOLD VEHICLE OWNERSHIP

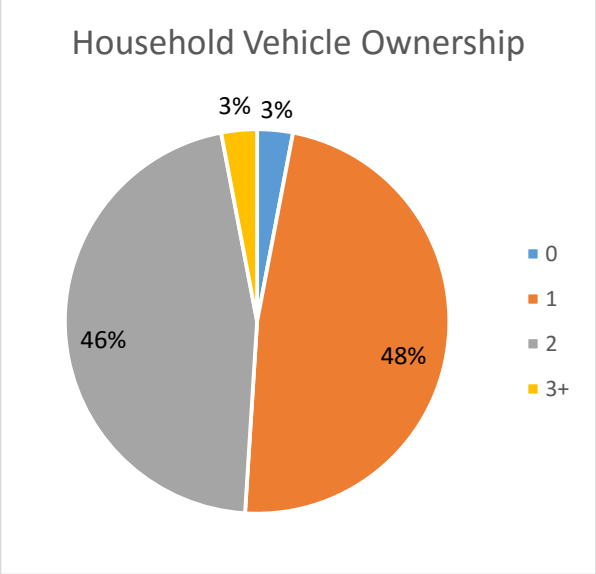


Figure 7 Household Vehicle Ownership: This figure depicts the distribution of vehicle ownership for respondents' households.

Forty-eight percent (48%) of respondents stated that their household owns one vehicle and 46% stated that they own two vehicles. Noteworthy, three percent (3%) of respondents stated they do not own a vehicle (see Figure 7).

4.2 TRAVEL BEHAVIOUR

The following section provides initial examination of daily tours for individuals followed by general travel patterns for the sampled population.

4.2.1 DAILY TOUR EXAMPLES

A time chart is used as an example of the travel patterns identified by respondents in the personal travel diary. The graphs shown in figures 8-11 each represent a daily tour for an individual respondent of the personal travel diary.

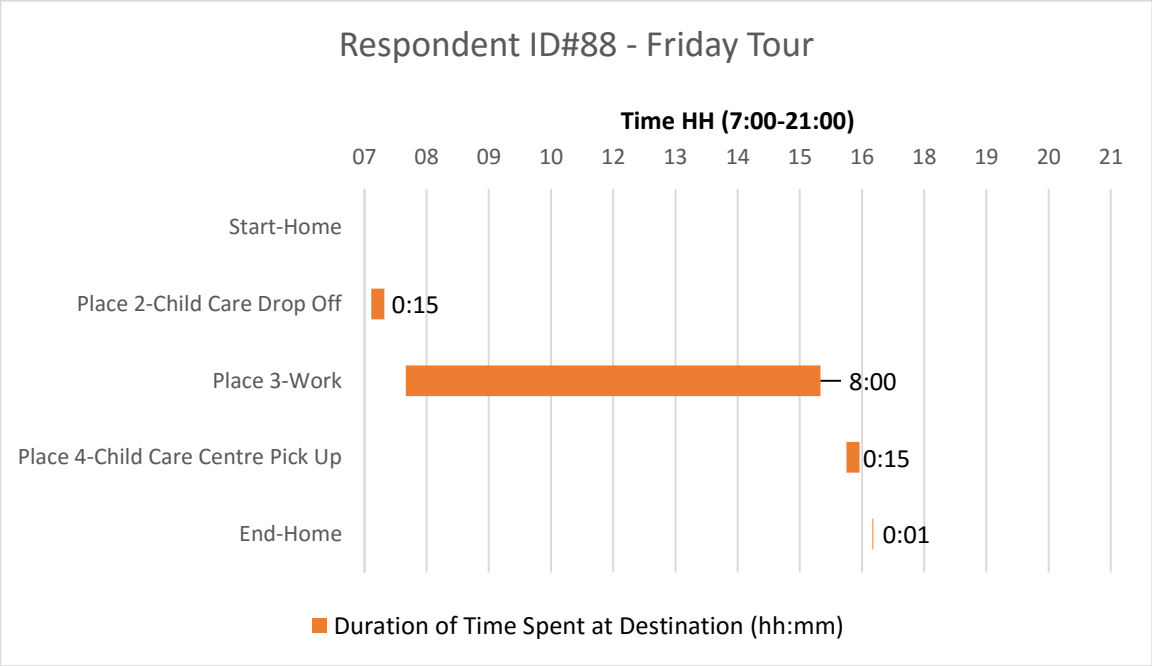


Figure 8 Respondent ID #88: The figure is an example of daily travel patterns from start and end with the home location.

Figure 8 shows the typical week day tour for respondent ID#88: she is a female parent, age 25-34 years, married, and working full-time. Her primary means of travel throughout the day is driving. The respondent starts her day at home at 7:00 am, travels to her child-care centre to drop off child at 7:20 am, proceeds to work for 8:00 am, and stays there until she picks up her child at 4:30 pm. She ends her travel when she arrives home at 5:00pm. This is a typical weekday tour for most of the respondents to the travel diary.

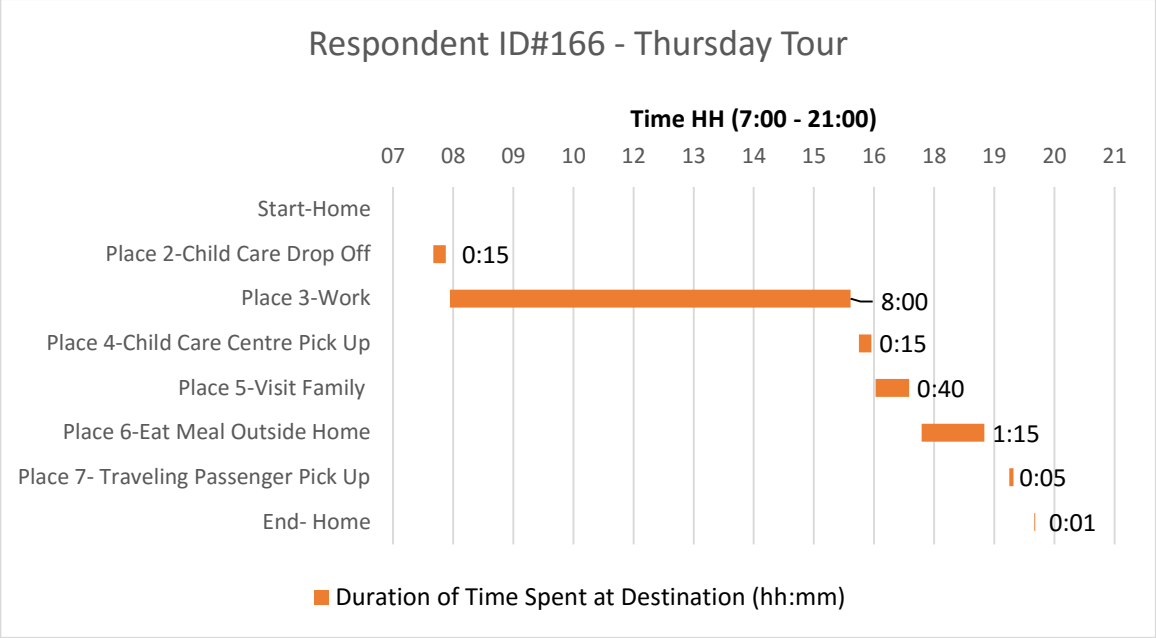


Figure 9 Respondent ID #166: This figure is an example of daily travel patterns start and end at the home location.

Figure 9 represents respondent ID#166: she is a female parent, age 35-44 years, married, and working full-time. Her primary means of travel throughout the day is driving. The respondent starts her day at home at 7:09 am, drops her child off at child-care for 8:00am, proceeds to work and arrives at 8:20. After work she picks her child up at 4:30 pm and they visit a family member at 4:50. She then goes, with her child, to a restaurant at 5:45 to eat a meal outside of the home, she picks up a passenger at 7:30 pm and arrives home, ending her day at 8:00pm. This is a relatively busy day for a respondent.

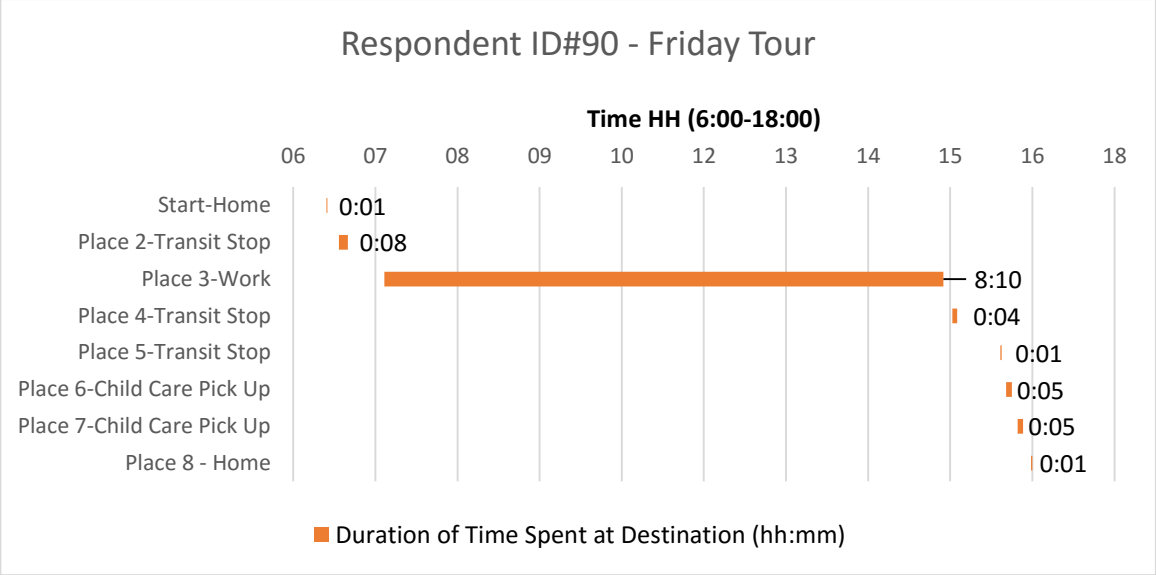


Figure 10 Respondent ID#90: This figure is an example of daily travel patterns from start and end at the home location.

Figure 10 represents respondent ID#90: she is a female parent, age 35-44 years, married, and works full-time. Her primary means of travel throughout the day is to walk or take transit. The respondent starts her day at home at 6:30 am; she walks to her transit stop for 6:40, and takes transit to work arriving at 7:20. After work she walks to her transit stop for 3:38 pm, picks her child up at 4:25 and then walks to pick up a second child at child-care for 4:35 pm. She then walks home with her two children ending her day at 4:47pm. This is a typical weekday tour for a parent that has two children and takes transit. Often a second adult in the household will use sustainable travel behaviour and will rely on the first adult to drop the household children off at child-care so they are only responsible to pick up. This is an example of a trend identified by respondents who indicated they frequently use sustainable travel behaviour on the trip to pick-up their child at child-care rather than the trip to drop-off.

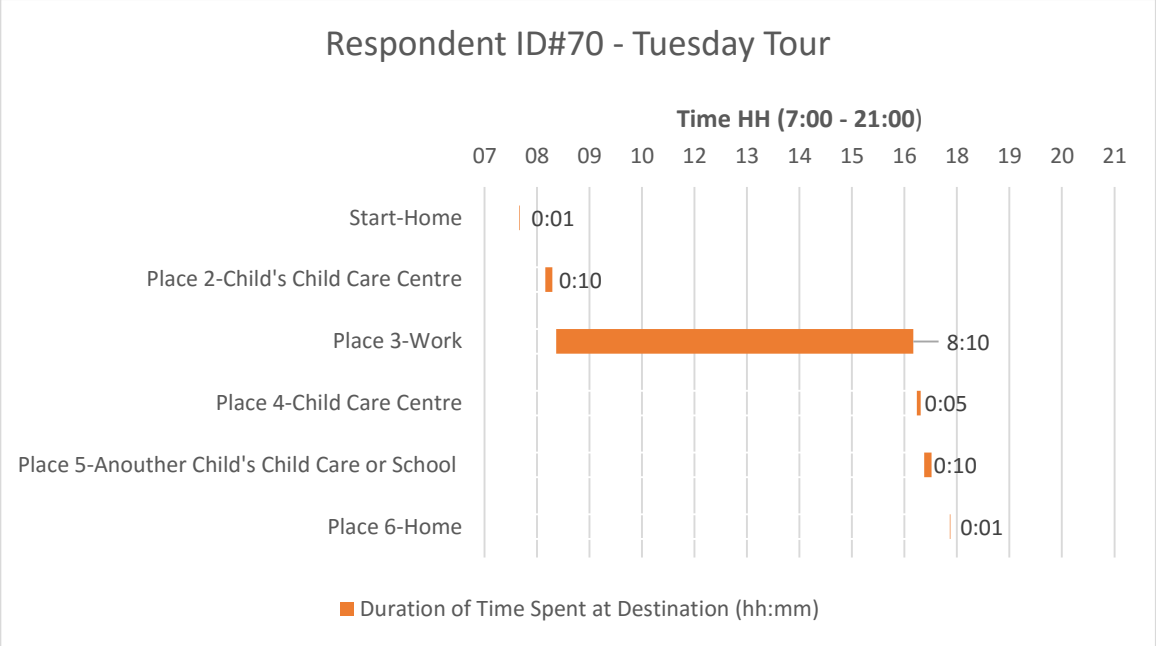


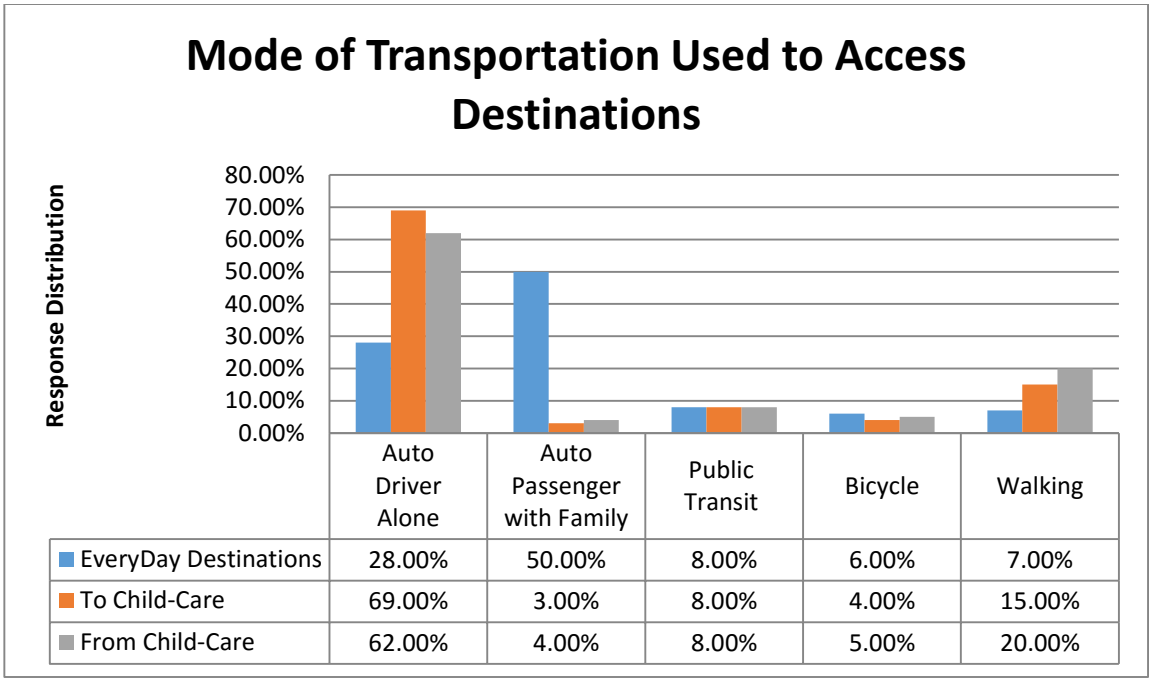
Figure 11 Respondent ID#70: This figure gives example of daily travel patterns starting and ending at the home location.

Figure 11 represents respondent ID#70: he is a male parent, age 35-44 years, married, and works full-time. His primary means of travel throughout the day is to drive or walk. The respondent starts his day at home at 8:00 am, then drives to drop his child off at child-care for 8:35. He then leaves his car at the child-care centre and walks to work arriving at 8:50. After work he walks to pick his child up for 5:05 pm. He then drives with his child to pick up a second child at school for 5:15. He then drives home with his children ending the day at 5:50pm. This is a typical weekday tour for a male parent that has two children. Investigation has found that male parents on average travel to fewer destinations in the day compared to female parents.

Observations of the daily tour examples show that daily travel patterns for the sample population are complex. Respondents visit many destinations throughout the day and have many schedules they must maintain. The challenges presented by complex travel

patterns for the sample population influence the type of transportation respondents choose to access their daily destinations.

4.2.2 TRAVEL CHARACTERISTICS



	Auto Driver Alone	Auto Passenger with Family	Public Transit	Bicycle	Walking
EveryDay Destinations	28.00%	50.00%	8.00%	6.00%	7.00%
To Child-Care	69.00%	3.00%	8.00%	4.00%	15.00%
From Child-Care	62.00%	4.00%	8.00%	5.00%	20.00%

Figure 12 Mode of Transportation by Destination: This figure depicts the distribution of type of transportation mode used by respondents to access their daily destinations.

The study reveals that twenty-eight percent (28%) of respondents drive alone, with their child (Auto-Driver Alone, Figure 12). The majority (50%) stated that their chosen form of transportation is to drive as a passenger in a car with other family members (Auto Passenger with Family). The number of respondents that travel as a passenger decreases, from 50% to 3%, when traveling to and from child-care. Eight percent (8%) of respondents stated that they use public transit. Transit use remains the same for all destinations, indicating that respondents whom primarily use public transit are continuing this behaviour for the trip to and from child-care. Few respondents (7%) stated that they

walk; however this number increases to 15% and 20% for the trip to and from child-care respectively. This is an indication that households are more likely to choose to walk when traveling to and from child-care. Few respondents (6%) said they prefer to bike to everyday destinations and fewer choose to bike for the trip to and from child-care. Previous Halifax-based travel studies have found that the mode distribution for residents is 12% biking, 20% transit and 22% walking which shows that the respondents to the survey use sustainable travel behaviour less than the general population of HRM (Salloum and Habib, 2015). This difference may be related to the complex tours that result from the need to use child-care centres.

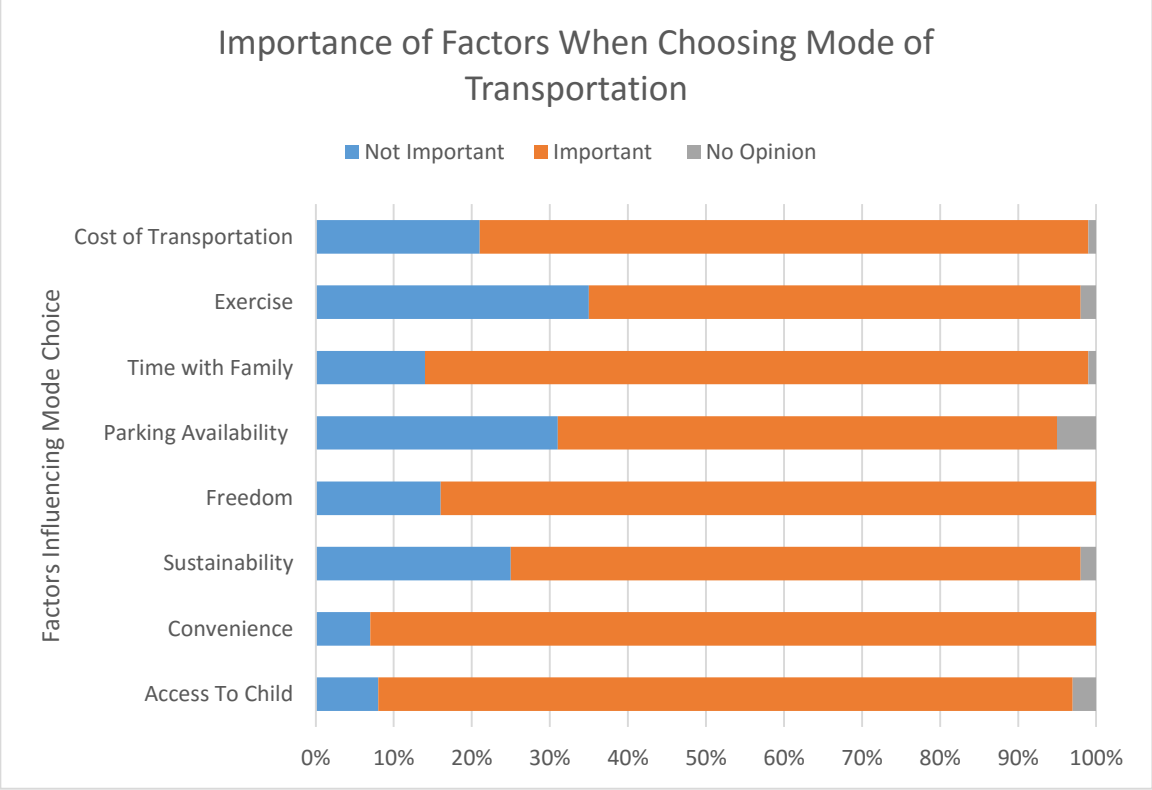


Figure 13 Importance of Factors when Choosing Mode of Transportation: This figure depicts the importance of factors to the respondent when choosing how to travel.

This study also explores that relative importance of factors including cost, exercise, time with family, parking availability, freedom, sustainability, convenience, and access to child when choosing a mode of transportation. Most families felt that access to their child (89%) and convenience (93%) were important when choosing how to travel (see Figure 13). Physical activity (63%) and sustainability (73%) were also important to families but were considered less important compared to other factors.

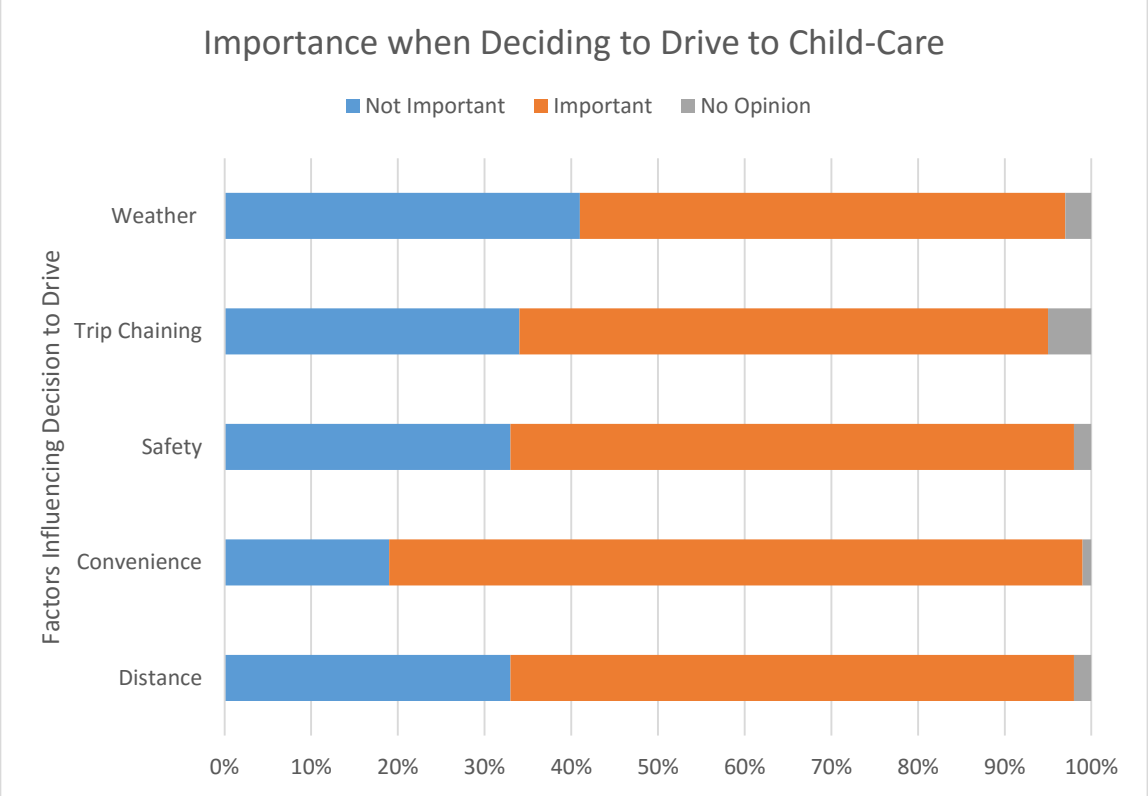


Figure 14 Importance when Choosing to Drive to Child-Care: This figure depicts the importance of factors to the respondent when choosing to drive to their child-care destination.

Convenience is very important to most (80%) of families when choosing to drive (see Figure 14). Weather is also important to most (56%) families when choosing to drive but was considered less important than other factors.

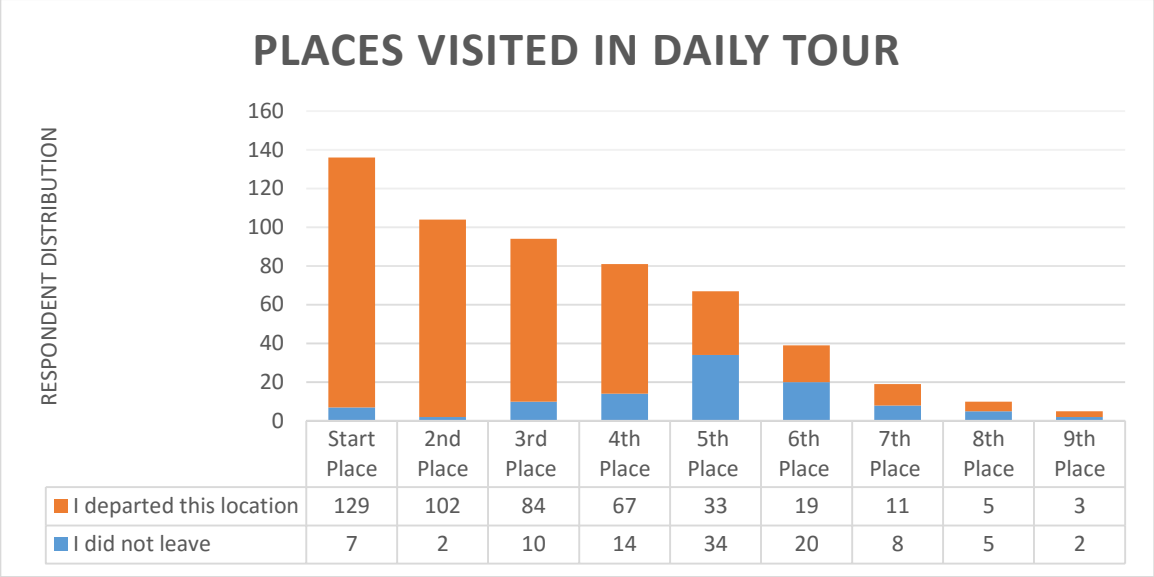


Figure 15 Places Visited in Daily Tour: This figure depicts the distribution of the number of places visited by the respondent throughout their daily tour. The travel diary allowed respondents to record a maximum of nine places they visited. Respondents that visited more than nine places were asked to indicate the time they reached their final destination.

Respondents were asked to identify, as part of their personal travel diary, if they departed or if they stayed at a location for every place they identified. Each place identified represents a place visited by the respondent during their daily tour with the place being numbered by the order which they arrived. Most respondents traveled to three or four places in a day. The fifth place had an even split for whether respondents continued to a sixth place or remained at the fifth place thus ending their daily travel (see Figure 15).

Respondents of the personal travel diary portion of the survey were asked to identify both the name of the place and the activities, primary and secondary, that they performed for each destination they visited throughout the day. The place name was used to explain the reason for stopping, while the response to the multiple choice activity question was used to provide an in-depth look at the reason for stopping at the destination. Respondents were also asked to indicate any secondary activity that they performed at a destination. Most (85%) stated that there was not a secondary reason or activity for stopping. An

example of a secondary reason for stopping at a destination would be if a respondent worked at a mall, their primary activity while visiting the destination would be working for pay however, a secondary activity may be to run personal errands or have a meal outside of the household while at this location as well.

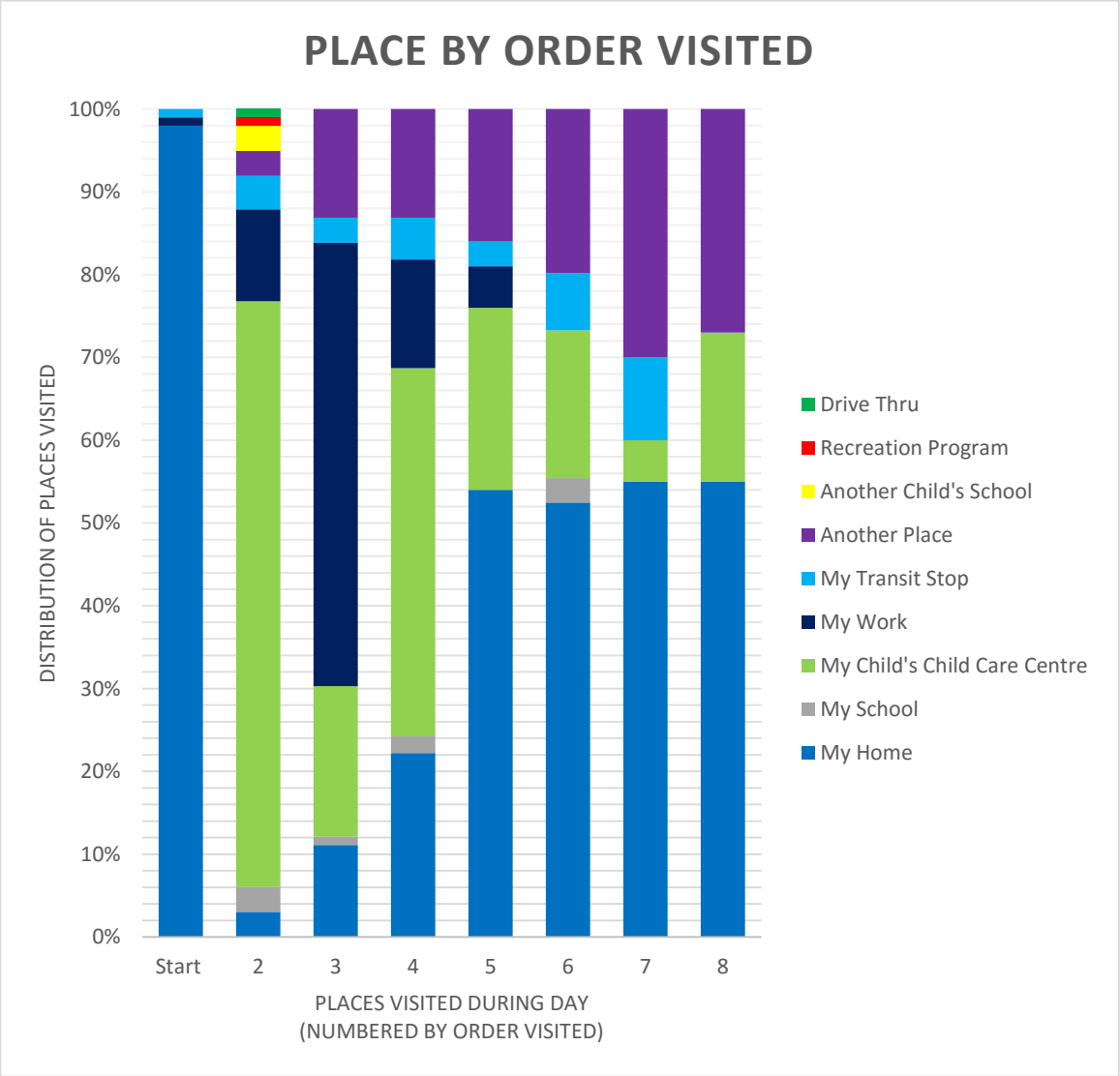
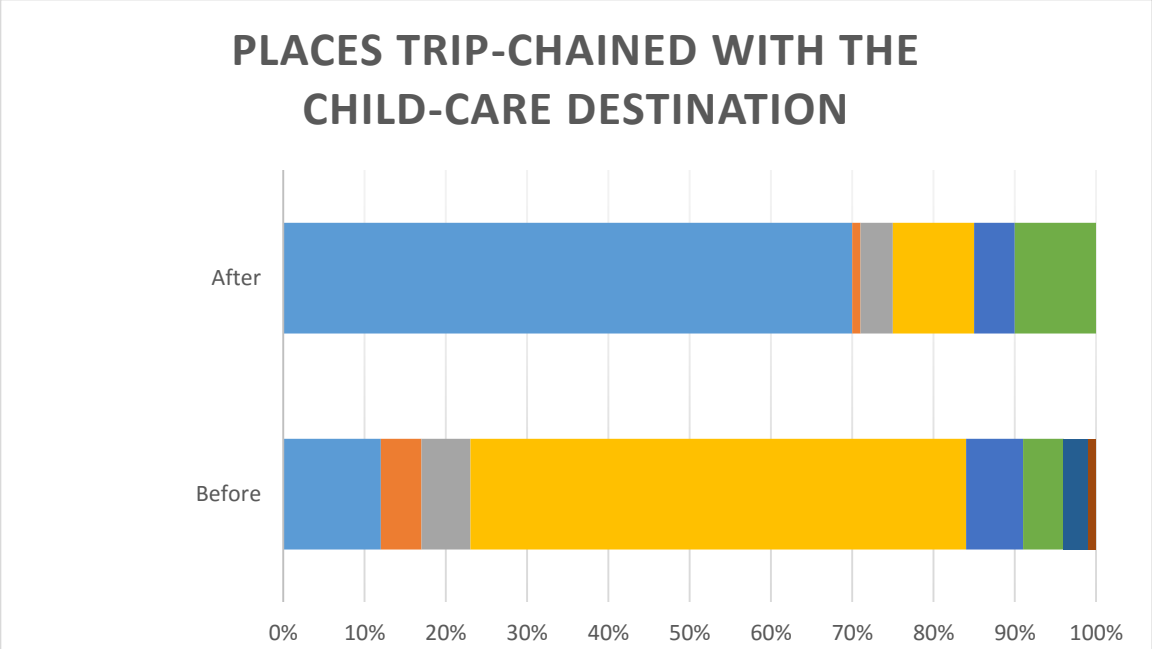


Figure 16 Place by Order Visited: This figure depicts the distribution of places visited compared to the order in which they were visited.

Respondents' destinations were compared to when they visited the place in their daily tour by Figure 16. Respondents were more likely to stop at a drive-thru at the second destination of the day, while their work location was often the third destination of their day (see Figure 16). Respondents most often stopped at child-care, transit stop or work as the second destination of their day. Most respondents begin their daily tour at home and end at home. Child-care is most often the second and fourth place that a respondent visits during the day.



	Before	After
Home	12%	70%
School	5%	1%
Child Care Centre	6%	4%
Work	61%	10%
Transit Stop	7%	5%
Another Place	5%	10%
Another Child's School	3%	0%
Drive Thru	1%	0%

Figure 17 Places Trip-Chained with the Child-Care Destination: The trip to the child-care centre is often combined with another destination. This figure depicts the places visited before and after the child-care centre.

Respondents most often are at work (61%), home (12%) or a transit stop (7%) before they visit their child-care destination. Respondents most often go home (70%, another place (10%) or a transit stop (5%) after they visit their child-care destination (see Figure 17). This indicated that the respondents are organizing their daily destinations so that the child-care centre is the first and last destination they visit on their tour. This has an effect on the type of transportation that respondents use to access their destinations, the time a respondent starts their day, and the time they end their day.

Table 3 Place Visited by Primary Activity: This table explores the activities performed by respondents at each place visited throughout the day.

		Start Place	Place 2	Place 3	Place 4	Place 5	Place 6	Place 7	Place 8	Place 9
Home	Working at home (for pay)	2%	0%	0%	0%	1%	0%	0%	0%	0%
	All other home	80%	0%	10%	19%	52%	47%	53%	60%	60%
Work	work/job	4%	16%	50%	15%	6%	0%	0%	0%	0%
	all other at work	0%	1%	3%	0%	0%	0%	0%	0%	0%
Child Care	Drop off or pick up child	5%	70%	19%	46%	26%	20%	5%	10%	0%
	all other child care	0%	0%	0%	0%	0%	0%	0%	0%	0%
School	Attending class	0%	0%	1%	0%	0%	0%	0%	0%	0%
	All other school	0%	1%	1%	1%	0%	3%	0%	0%	0%
Traveling	Change type of transportation	0%	1%	3%	3%	0%	8%	16%	0%	0%
	Drop off passenger from car	0%	2%	0%	1%	0%	0%	0%	0%	0%
	Pick up passenger from car	0%	0%	3%	0%	3%	3%	0%	0%	0%
	Other	2%	3%	0%	2%	3%	3%	0%	0%	0%
Other	Work business related	0%	1%	0%	2%	1%	0%	0%	0%	0%
	Service private vehicle	0%	0%	5%	0%	0%	0%	0%	0%	0%
	household errand	0%	1%	0%	4%	1%	6%	0%	0%	0%
	Eat meal outside of home	1%	0%	1%	1%	0%	3%	5%	0%	0%
	Health care	0%	0%	0%	0%	1%	3%	0%	0%	0%
	Outdoor recreation	0%	0%	0%	1%	2%	2%	5%	10%	20%
	Entertainment	2%	0%	1%	0%	2%	0%	0%	10%	0%
	Indoor recreation	0%	0%	2%	1%	0%	0%	0%	0%	0%
	Visit family	0%	1%	0%	0%	2%	0%	11%	0%	20%
	Other	4%	3%	1%	4%	0%	2%	5%	10%	0%

Table 3 is a detailed investigation of the locations that respondents visit on their daily tour and their activities at each destination. As part of the web-based survey, respondents were asked to indicate their primary activity at each place they traveled throughout the day. The primary activity question was set up as a multiple-choice drop down that listed a number of activities which were identified in travel diary research performed in other studies. Table 3 shows that place 9, often the last destination of the day, was regularly when respondents would visit family, take part in a recreational activity outside or be at home. The eighth place that a respondent would visit was often to pick up a child from child-care, take part in a recreation activity outside, visit somewhere for entertainment purposes or be at home. Table 3 also demonstrates that dropping off or picking up a child from child-care occurs most often as the second or fourth place that a respondent visits, however it also shows that this activity occurs often and throughout the day many times, supporting assumptions that the child-care centre is an important destination for households with pre-school aged children. The most common activities for households who responded to the web-based survey were home related, child-care-drop off and pick up, work, outdoor recreation, visiting family, eating a meal outside of home, and school. Table 3 also shows that some of the respondents who perform the child-care trip work from home based on their activity response of "working from home for pay". An analysis was performed comparing the transportation choices for respondents that work from home and it was found that 50% of those that worked from home used active transportation for the trip to pick-up and drop-off their child at the child-care centre destination (see Appendix B). Table 3 also shows that 80% of respondents start their day

at home, while 20% of respondents begin their daily tour from another location; work (4%), child-care pick-up/drop-off (5%), other (4%). This could represent respondents that work night shifts and begin their day at another destination which adds another complexity to the travel patterns of households with children.

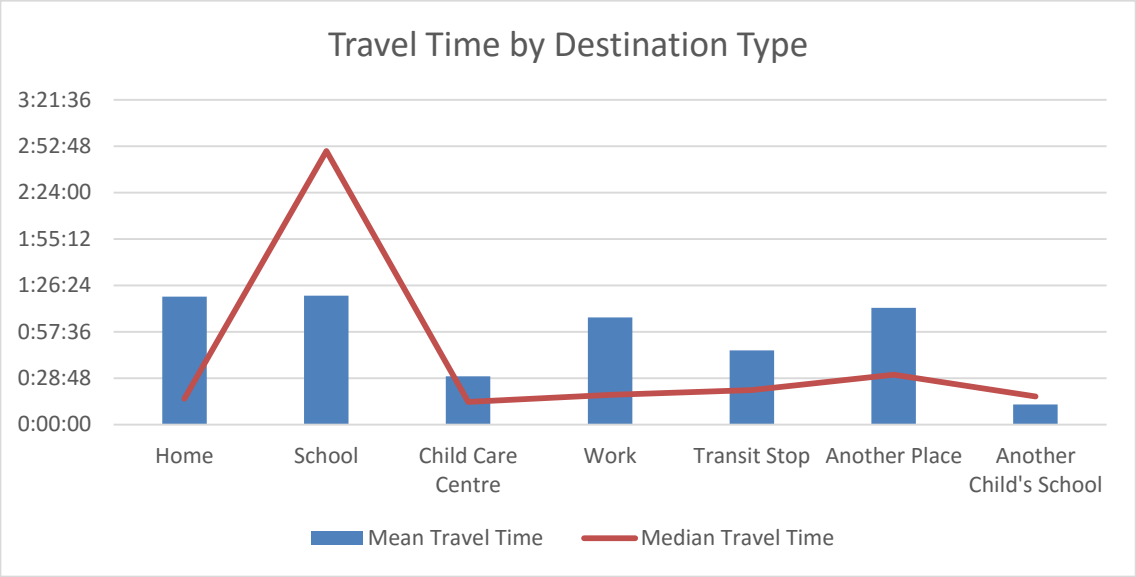


Figure 18 Travel Time to Destination Type: The figure depicts the difference between the departure and arrival time indicated by the respondents and then categorized by place.

Figure 18 displays the mean and median travel time for respondents by their destination. The travel times to child-care locations were the shortest with all trips being under thirty minutes. It was found that in households that had an adult who attended school, the trip to their school was one of the longest travel times that the household experienced, with the mean travel time being 1 hour and 20 minutes (see Figure 18).

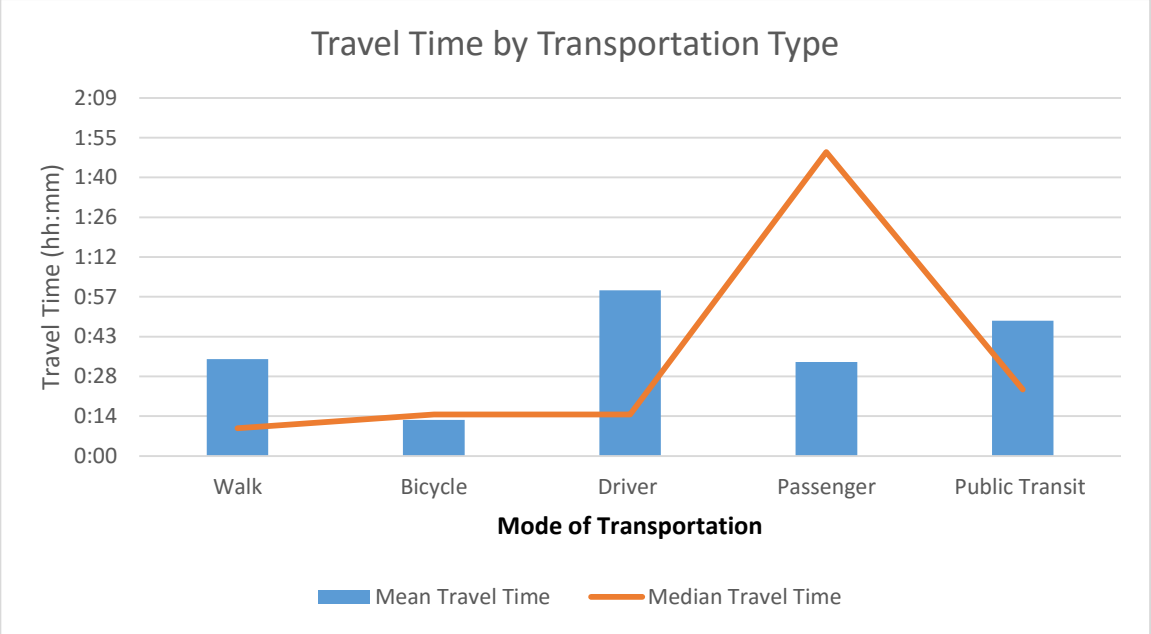


Figure 19 Travel Time by Transportation Type: The figure depicts the difference between departure and arrival times categorized by transportation type.

Figure 19 shows the mean and median travel time for respondents compared with mode choice. The mean travel time for respondents who used public transit was 50 minutes. The median travel time for respondents who walked or drove to their destination was between 10 and 15 minutes.

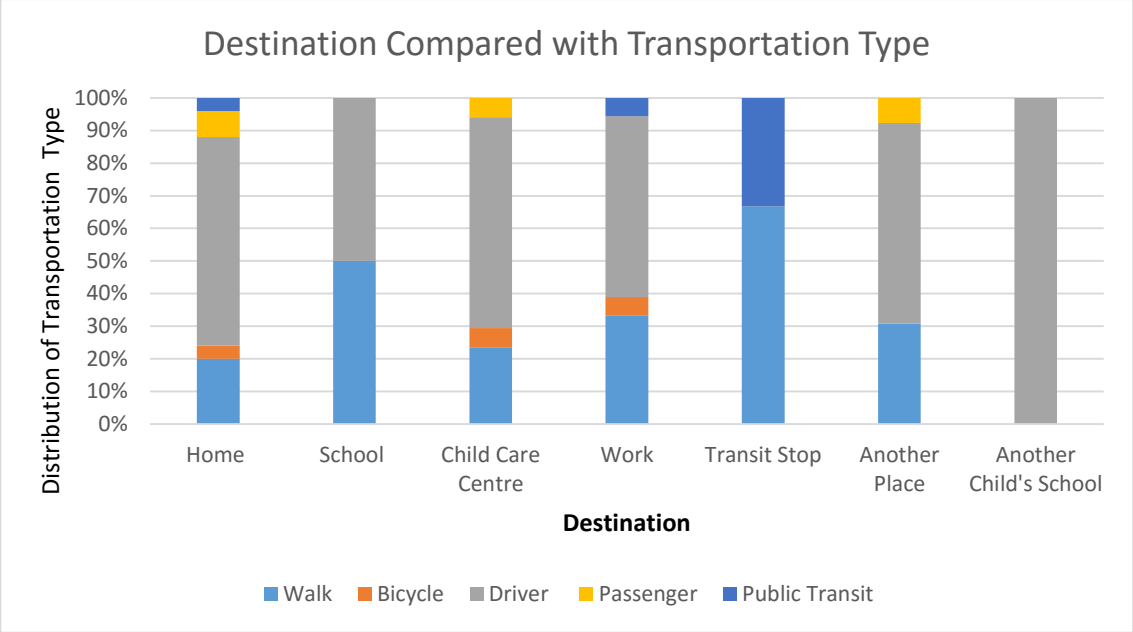


Figure 20 Destination Compared with Type of Transportation: The figure depicts the destinations visited daily by respondents and the mode of transportation used to travel.

Figure 20 shows the types of transportation used by respondents to access their daily destinations. It was found that driving is the most common (58%) transportation mode choice for all destinations with the exception of transit stops. Transit stops are most often accessed by walking or taking transit. Many respondents choose to walk when traveling to their home (20%), school (50%), child-care centre (23%) and work (33%).

4.3 CHILD-CARE DESTINATION

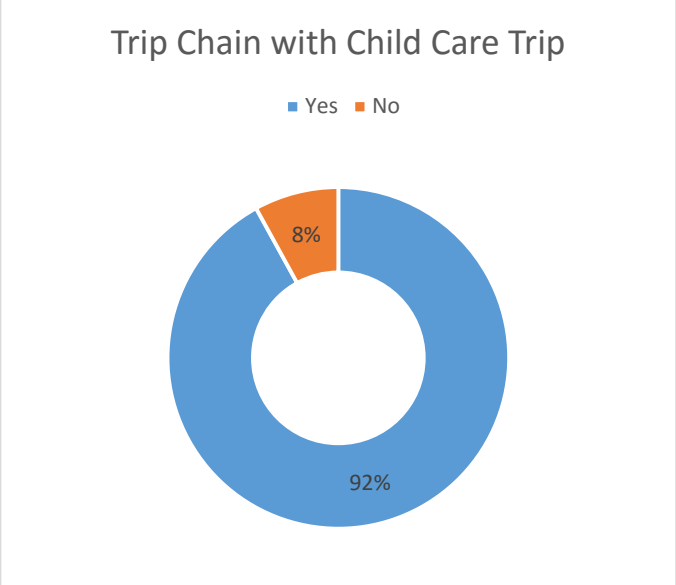


Figure 21 Trip Chain to Child-care: The figure depicts whether respondents combine their trip to child-care with another destination.

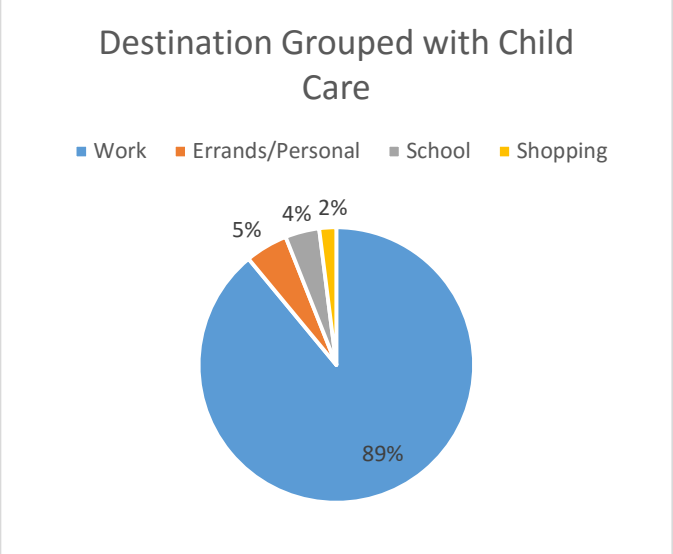


Figure 22 Destinations Grouped with Child-care: The figure depicts the destinations that are commonly grouped with the trip to child-care.

Most respondents (89%) live within thirty minutes travel of their child-care centre (see Figure 18). Despite living within thirty minutes of their child-care centre, most respondents (22%) choose to drive when accessing the child-care destination (see Figure 20). Ninety-two percent (92%) of respondents combine their child-care trip with another destination when travelling, with work being the most common (89%) (see Figure 22).

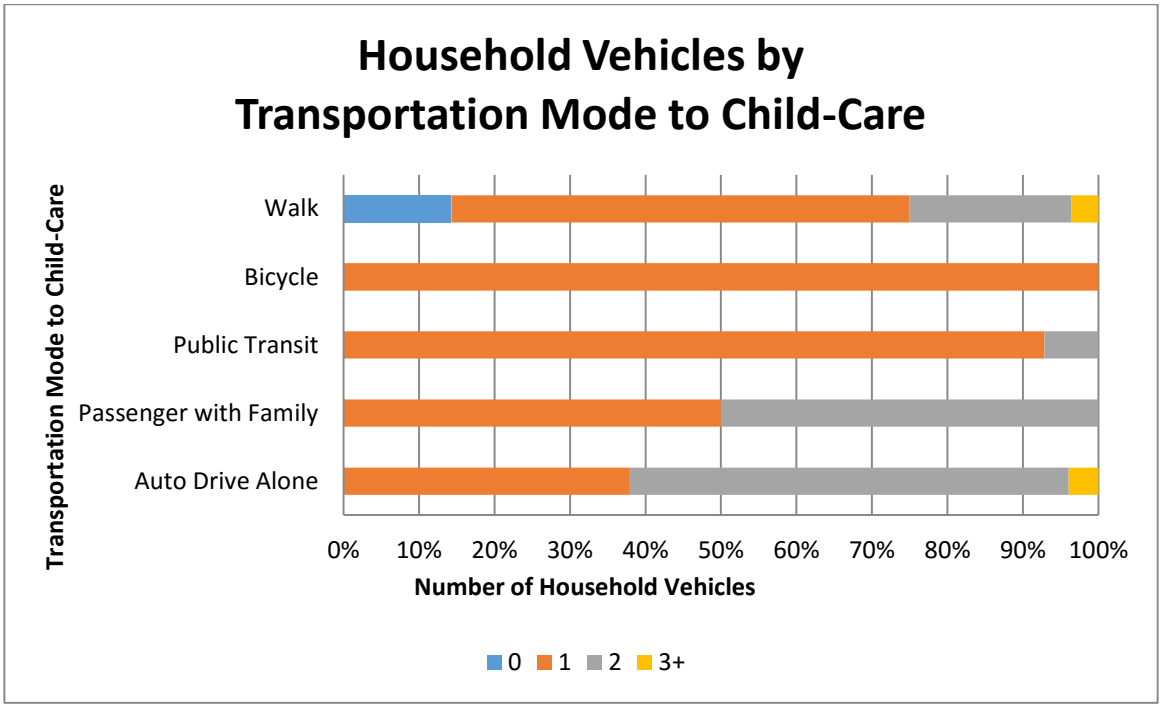


Figure 23 Household Vehicles by Transportation Mode to Child-Care: The figure depicts the mode of transportation used by respondents to travel to the child-care destination compared to household vehicle ownership.

Most households own at least one vehicle (see Appendix B). Figure 23 shows the number of household vehicles owned or leased compared to the mode of transportation used to access their child-care centre. Most households that own two vehicles or more, indicated that they primarily use a car based form of transportation, choosing to drive alone, with child, or drive as a passenger with other family members, when traveling to and from

their child-care centre. Most of the households that do not own a vehicle choose to walk to and from child-care. Most households that own one vehicle choose to use a sustainable form of transportation such as public transit, bicycle, or walk when traveling to and from child-care (see Figure 23).

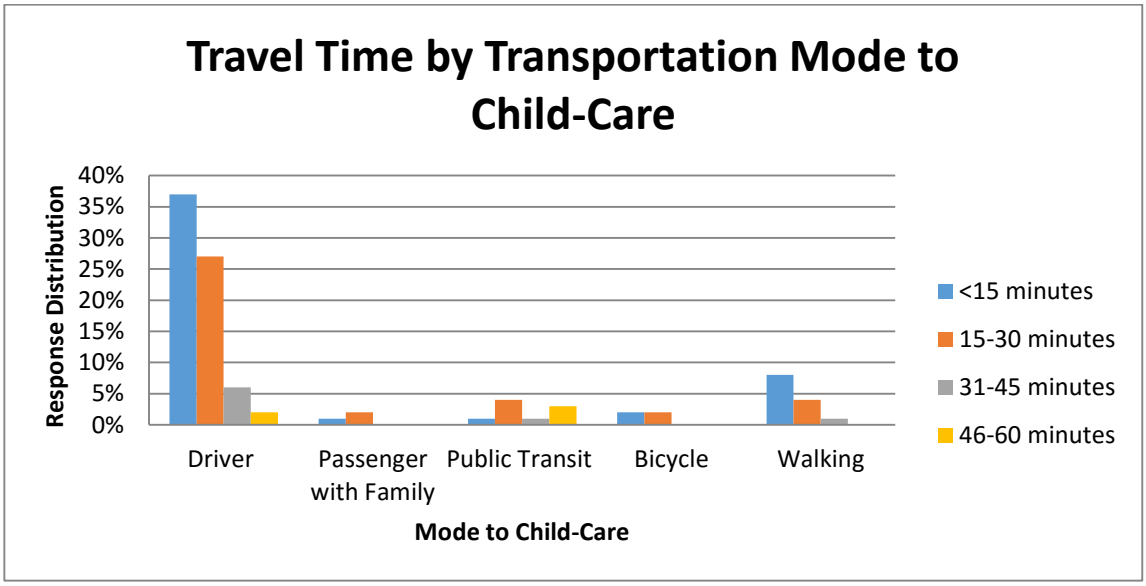


Figure 24 Travel Time by Transportation Mode to Child-Care: Respondents were asked the travel time range for their trip to child-care. The travel time range was then compared to their primary transportation mode for the trip to child-care.

The data collected through the travel diary shows that travel times to child-care was within thirty minutes for all respondents. However, when respondents were asked their travel time to child-care, 7% of respondents reported their travel time as between 31 and 45 minutes and 5% reported a travel time 46-60 minutes.

Households that choose to walk or bike to their child-care centre live within thirty minutes of travel. Households that self-reported that the travel time to their child-care centre was between 46-60 minutes chose to drive or take public transit (see Figure 24).

4.4 IMPACT OF CHILDREN ON TRANSPORTATION MODE CHOICES

In order to provide an understanding of the impact of pre-school aged children on travel behaviour, this section is an investigation of the households' primary mode of transportation. An analysis is performed of households' socio-economics, child-care and travel behavior as it relates to the mode of transportation that is most often used to access daily destinations. The intent is to establish what factors have the greatest influence on the mode of transportation that households with pre-school aged children most often use.

4.4.1 AUTO DRIVER ALONE AND PASSENGER WITH FAMILY

A number of trends were identified for the types of households with pre-school aged children that choose the car as their primary mode of transportation. Respondents with pre-school aged children commonly drive alone, with the child, or drive as a passenger with other family members. Auto driver alone is when the respondent is the driver of a vehicle and the only adult in the vehicle. Passenger with family is when one or more adult members of the household are present in the vehicle, in addition to children.

It was found that the majority of respondents to the web-based survey (69%) drive alone, with their child, when traveling to and from their child-care centre. Most respondents (97%) with pre-school aged children own at least one vehicle. Respondents that primarily drive alone, with their child, or drive as a passenger with other family members were found to place a high level of importance on having quick and easy access to their child should they need them. Parking availability and convenience were also important to respondents who primarily use a car oriented mode of transportation.

None of the respondents reported carpool with someone outside of the family as a mode of transportation. However, some commented that another household adult would choose to carpool when not traveling with the household children (see Quote #1).

> *"Our biggest challenge is the morning rush of having to get everyone where they need to go, in a timely manner. Walking, biking and transit will not work for my children and myself in our school and job, respectively because of scheduling. My husband however is usually left to his own devices, so he often carpools, bikes or takes the bus to and from work."* *Quote #1 Female Parent with Two Household Children*

4.4.1.1 Auto Driver Alone

Respondents who drive alone, with their child, were found to have an annual household income above $100 000 (50%), or an annual household income level between $20 000 - $40 000 (13%) (see Figure 25). Respondents whose households owned more than two household vehicles were more likely to choose to drive to the child-care centre (62%). Most respondents (53%) who drive felt that the need to group their trips (trip chain) was a barrier to using sustainable travel behaviour (see Appendix B).

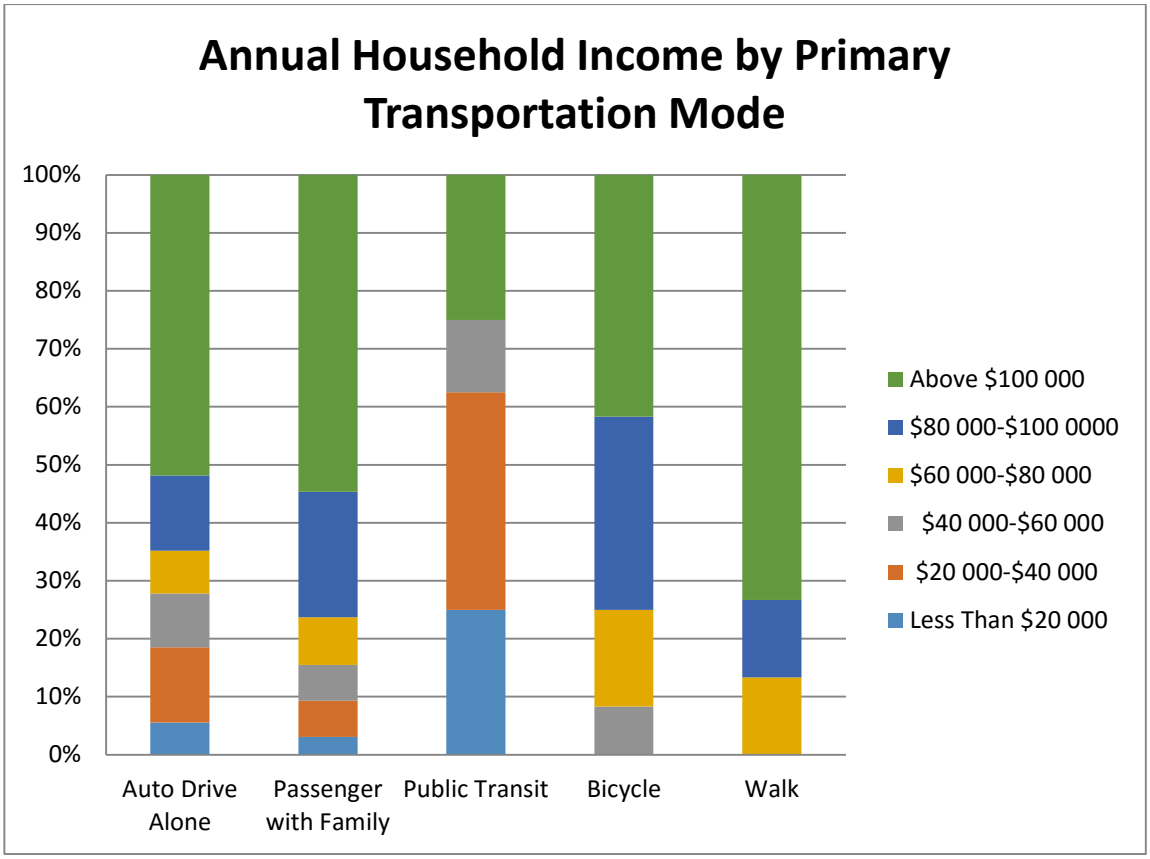


Figure 25 Household Annual Income by Primary Transportation Mode: The figure depicts the respondents' annual household income compared to the mode of transportation used to access everyday destinations.

4.4.1.2 Auto Passenger with Family

Few respondents (3%) choose to drive to their child-centre as a passenger with other family members, however many (50%) choose this as their primary mode of transportation. This may be because one household adult is responsible for the trip to the child-care centre as it is on their way to somewhere else (see Figure 12).

Most of the respondents (53%) that had more than one household child drive as a passenger in a personal vehicle with other family members (see Figure 26).

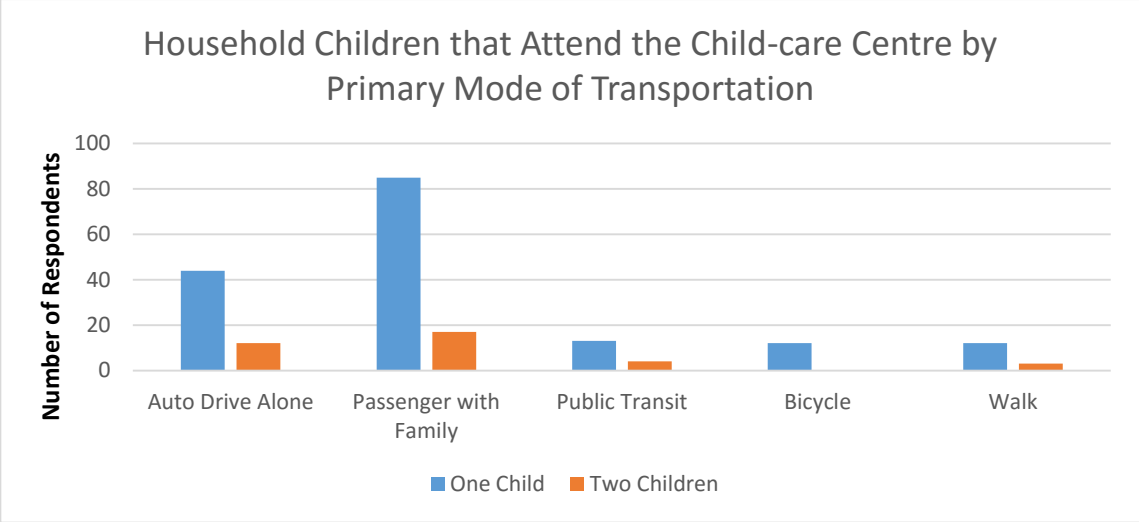


Figure 26 Household Children that Attend the Child-Care Centre by Mode of Transportation: The figure depicts the number of household children who attend the child-care centre compared to the mode of transportation used to access everyday destinations.

4.4.2 SUSTAINABLE TRANSPORTATION (TRANSIT, WALKING AND BIKING)

More households choose to walk for their trip to and from their child-care centre than those who choose walking as their primary transportation mode (see Figure 12). Some respondents drive alone, with their child, on the trip to the child-care centre and use sustainable travel behaviour from the child-care centre. From comments received, it is assumed that respondents who are driving to the child-care centre and using sustainable transportation for the trip from either drive as a passenger with other family members, leaving their car at the child-care centre or sharing the drop off/pick-up from child-care responsibility with another adult in their household. Respondents that own one household vehicle more often use a sustainable form of transportation such as public transit, bicycle or walk when traveling to and from their child-care centre (see Figure 23).

Respondents that use public transit or walk as their primary transportation mode felt that sustainability was very important. Most households (76%) that choose public transit, walking or biking have one child attending child-care (See Figure 26).

Sometimes there is an inevitable need for households to group their destinations when traveling due to time constraints and convenience. Households were asked if they felt the need to trip chain was a barrier when choosing sustainable forms of transportation such as walking, biking and public transit. The majority of respondents that use sustainable travel behaviour stated they did not think trip chaining was a barrier to walking, biking and using public transit (see Figure 27). Most of those that drive alone, with their child, (55%) or drive as a passenger with other family members (50%) felt that the need to trip chain was a barrier to using sustainable travel behaviour. This appraisal may be why these household are choosing to rely on a vehicle as their primary form of transportation.

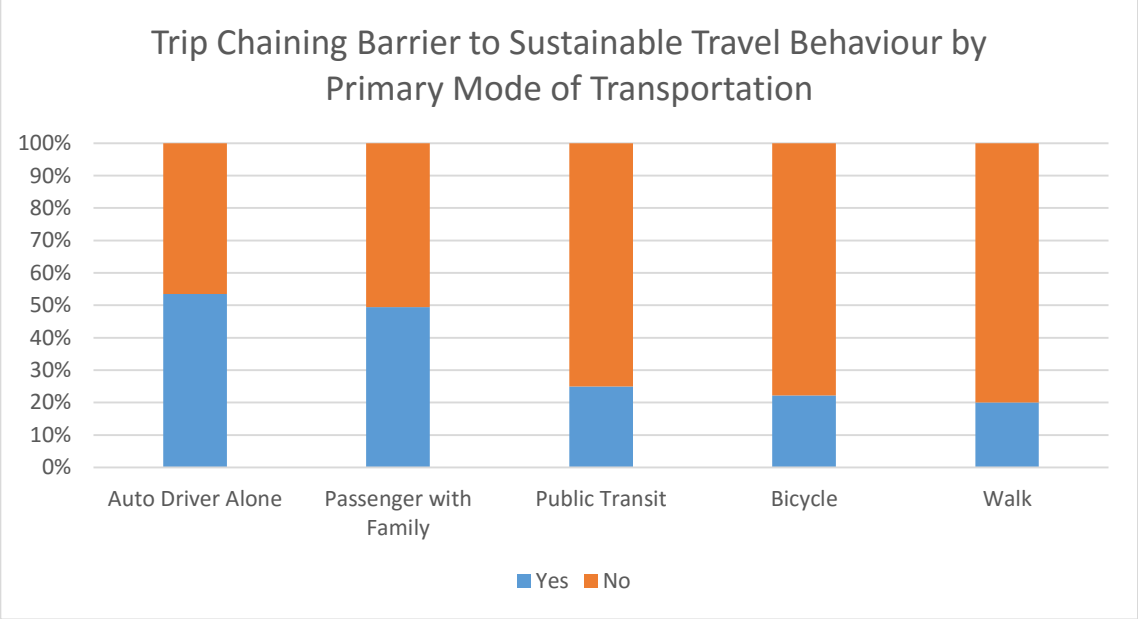


Figure 27 Trip Chaining Barrier to Sustainable Travel Behaviour by Primary Mode of Transportation: The figure depicts if respondents felt there was a barrier to using sustainable transportation compared to the mode of transportation most used to travel to daily destinations.

4.4.2.1 Public Transit

Respondents who use public transit as their primary mode of transportation had a household income level below $40 000 annually (see Figure 25). Most families that use public transit do not own a vehicle (24%) or own one household vehicle (77%). Respondents that use public transit did not feel that parking availability was important when choosing their mode. Respondents were asked to weigh the importance of cost when choosing how to travel. The "cost" variable can be attributed to any number of costs associated with travel. This question left it up to the respondent to appraise the costs of transportation and decide how important this is to their choices. Most respondents that often use public transit to access their daily destinations felt that cost of transportation was of a high importance (92%) (see Figure 28).

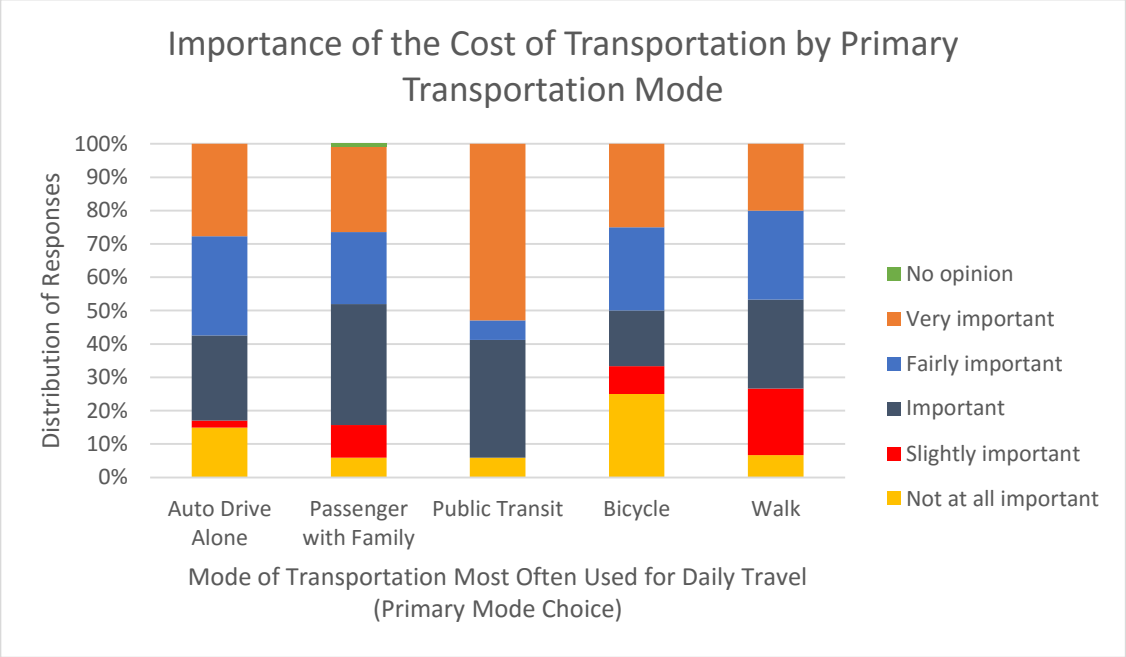


Figure 28 Importance of the Cost of Transportation by Primary Transportation Mode: The figure depicts the importance of the cost of transportation compared to primary transportation mode.

Most (78%) of the respondents that use public transit receive a subsidy for their child-care fees (see Figure 29). Public transit was the most common (38%) mode of transportation among respondents who stated that it takes more than sixty minutes to travel to their child-care centre (see Figure 19).

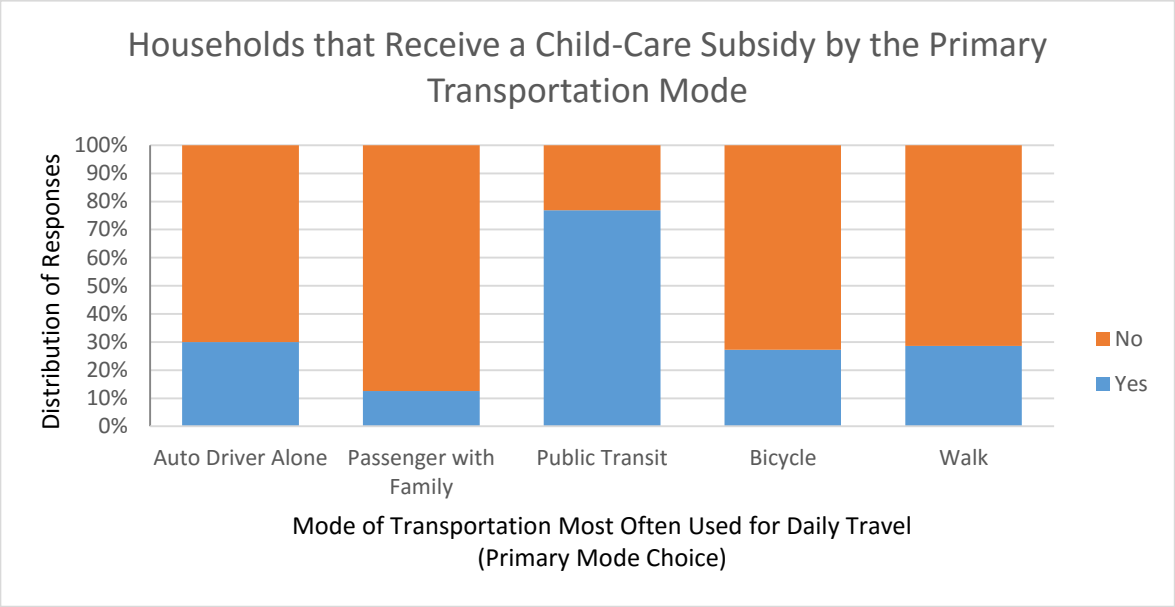


Figure 29 Households that Receive a Child-Care Subsidy by the Primary Transportation Mode: The figure depicts households that receive a child-care subsidy compared by the mode of transportation most often used for daily travel.

Most respondents felt that the distance from home and from their child-care centre to a transit stop was not a barrier to taking transit (see Appendix B). This is an indication that most respondents feel they have access to transit, but perhaps do not find the service convenient. As only 8% of respondents stated they use transit as their primary transportation mode.

Overall, respondents did not feel that strangers, their child's accessories, cost, access to storage, and child's behavior were a barrier to using public transit (see Appendix B).

However, the respondents that do use public transit were more likely to feel that their child's behavior was a barrier to transit use.

4.4.2.2 Bicycle

Respondents who bike as their primary mode of transportation had a high annual household income level compared to other modes, with all respondents having a household income level above $60 000. A small percentage of respondents that bike (8%) do not own a vehicle, while most own one household vehicle (92%). Respondents who bike did not feel that parking availability was important when choosing their mode. All respondents who bike felt there are barriers to using sustainable travel behaviour with children (see Figure 30). Respondents who bike felt that sustainability and exercise were important factors when choosing this mode. All of the respondents that bicycle to their daily destinations have one child that attends child-care. All respondents that bike live within thirty minutes of travel of their child-care centre.

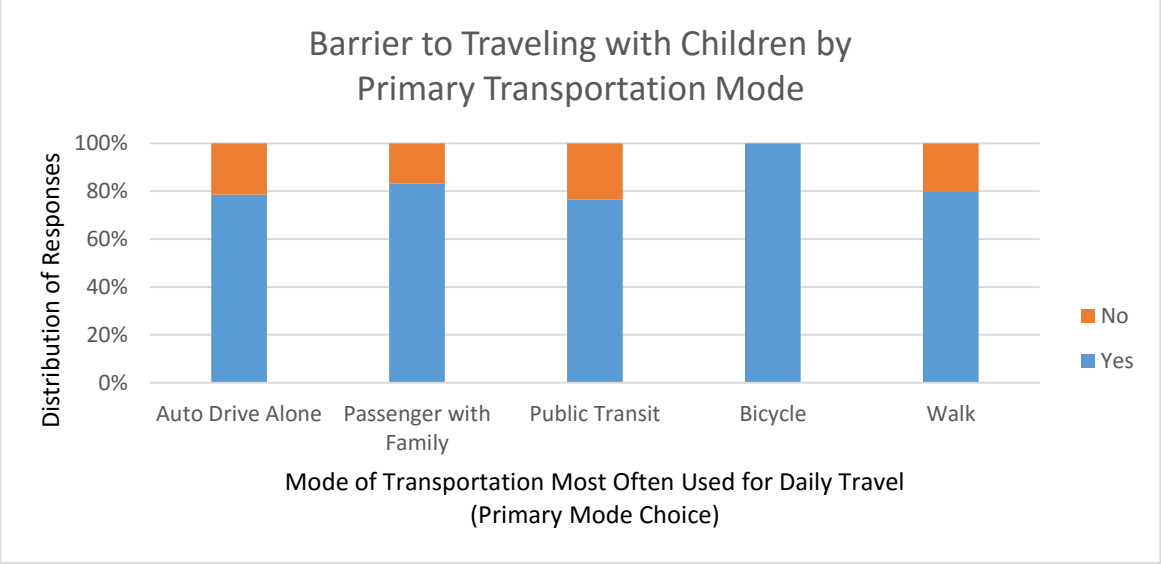


Figure 30 Barrier to Traveling with Children by Primary Transportation Mode: The figure depicts if respondents felt there was a barrier to traveling with children compared to the mode of transportation most often used for daily travel.

4.4.2.3 Walking

Respondents that walk to their daily destinations have an annual household income level of $60 000 and above. When choosing how to travel parking availability was important to very important to most respondents who walk (67%) (Figure 31). This suggests that many households that are choosing to walk may be doing so because of a lack of parking availability at their destination.

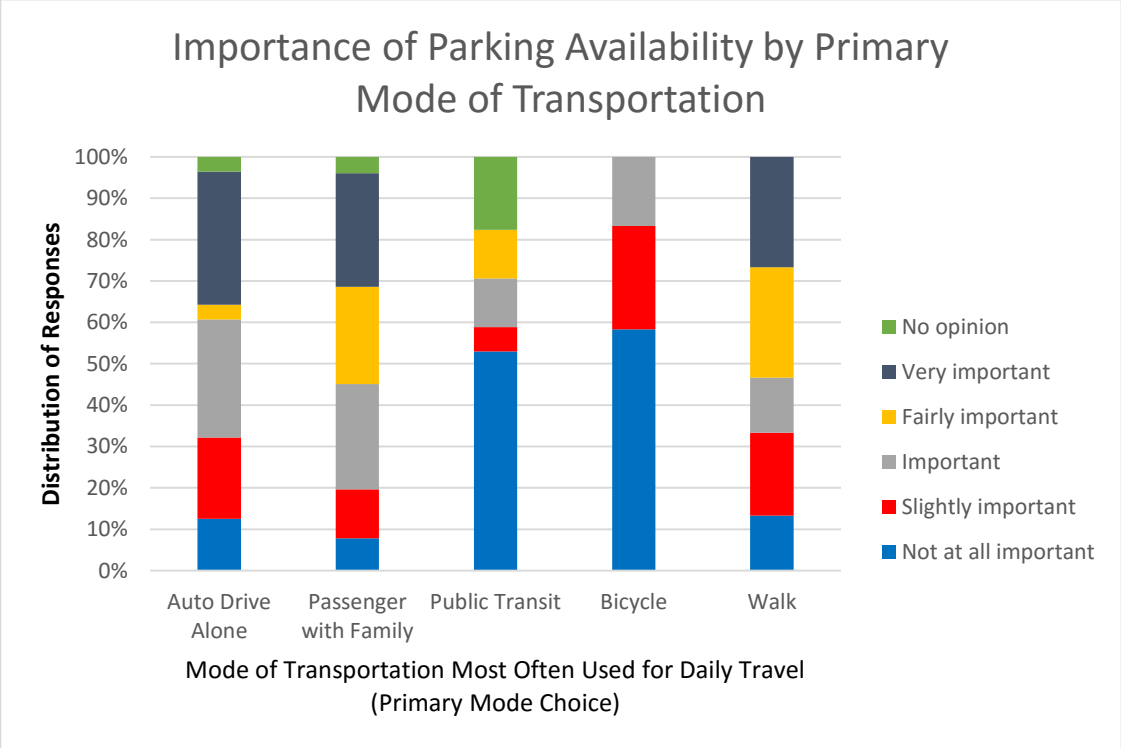


Figure 31 Importance of Parking Availability by Primary Mode of Transportation: The figure depicts the importance of parking availability to respondents compared to primary transportation mode.

All of the respondents that choose to walk to their daily destinations live within thirty minutes of travel of their child-care centre. Respondents were asked what factors were important in influencing them to drive to child-care (see Appendix B). Respondents that often walk to their daily destinations felt that weather was an important factor that may influence them to drive. In addition, respondents that choose to walk to their child-care

centre felt that weather was more important than those that walk to all their daily destinations.

4.5 IMPACT OF THE CHILD-CARE DESTINATION ON TRANSPORTATION BEHAVIOUR

To get a better understanding of the impact of pre-school aged children on household travel behavior, this section focuses on the four child-care centres that had the highest number of survey participants for the analysis (see Appendix A). Two of the centres are located in dense mixed use areas of Downtown Halifax, one in the South End and the other in the North End. The other two child-care centres are located in low density residential areas outside of the downtown, one in the suburb of Spyfield and the other in a rural area of Hammonds Plains. The intent of this analysis and report is to assist in identifying differences and commonalities between families' travel patterns based on child-care centre location.

4.5.1 EDWARD JOST CHILDREN'S CENTRE

Edward Jost Children's Centre is a non-profit facility located in Spryfield, HRM. The centre can accommodate up to fifty-three children between the ages of eighteen months and five years. Families using the centre have an overall lower annual household income level compared to the other three child-care centres of this analysis. While the density of this community varies, the portion of Spyfield in which the Edward Jost Children's Centre is located is medium density, mixed use.

Figure 32 Edward Jost Children's Centre: Pedestrian and Vehicle Access

Figure 33 Edward Jost Children's Centre: Herring Cove Road is the main access to the Edward Jost Children's Centre. The transportation infrastructure of the area includes multi-vehicle lanes, sidewalks, some paved shoulders, and bus stops without shelters.

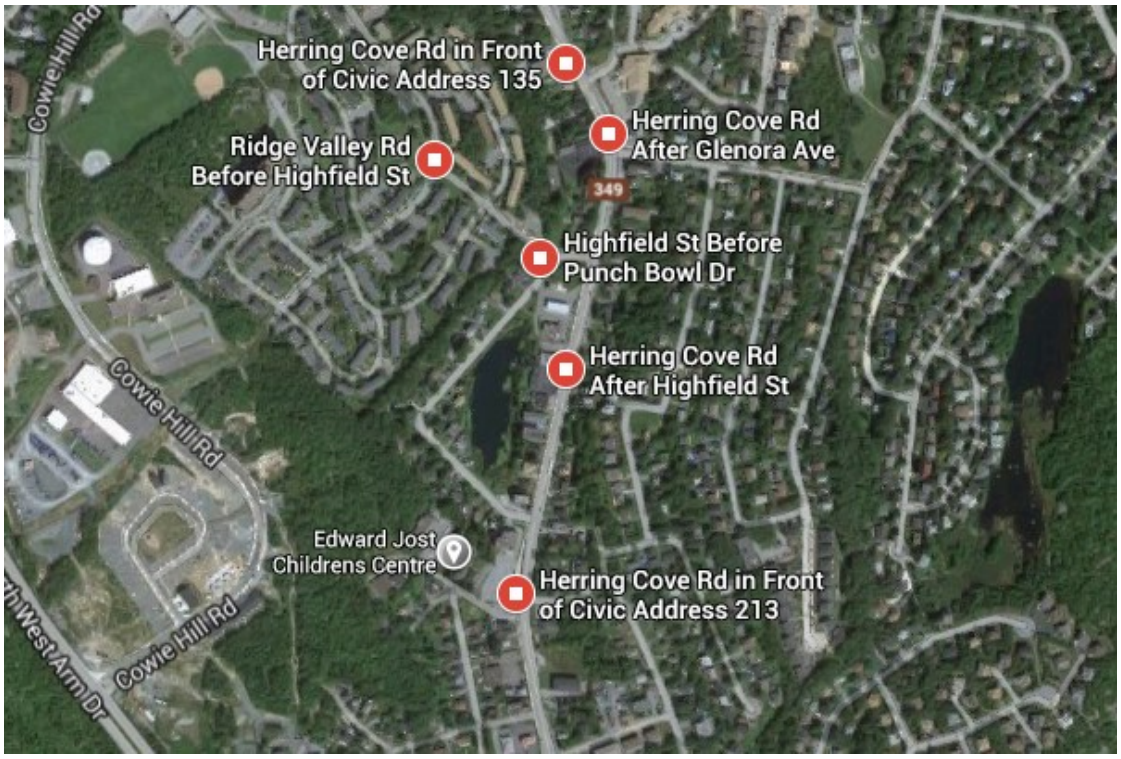


Figure 34 Bus Stop Locations that Service Edward Jost Children's Centre. The centre is serviced by routes 2, 4, 19, 20, & 52 with transit running along the Herring Cove Road.

There is a divide in annual household income levels for respondents of this centre with approximately half of the respondents falling in the $80 000 and above household income level and the other half falling below $40 000 (see Figure 35). Forty percent (40%) of the respondents reported that their child-care is subsidized.

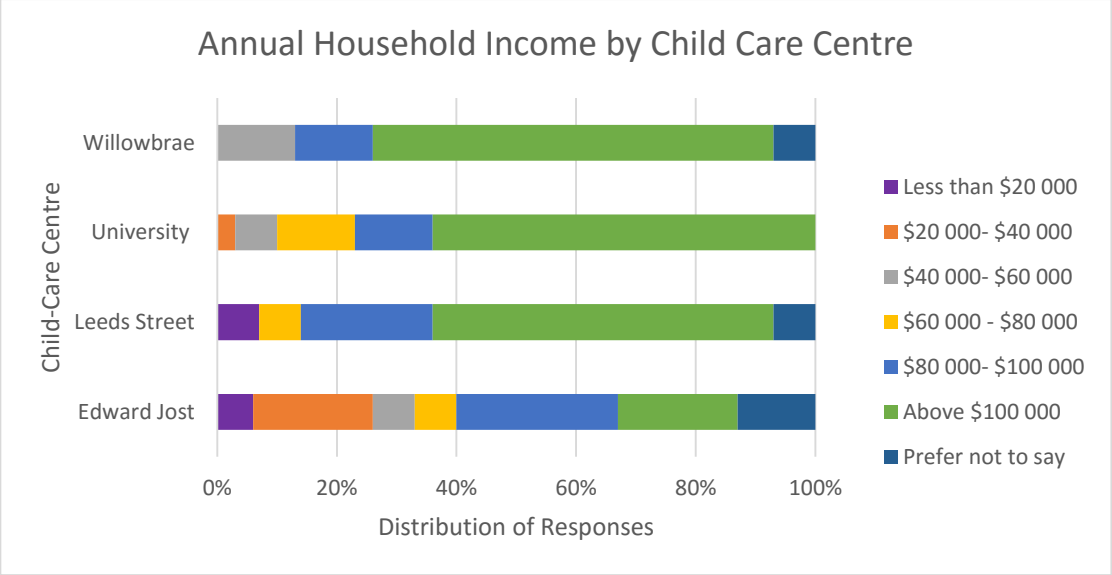


Figure 35 Annual Household Income by Child-Care Centre: The figure compares the annual household income of respondents by child-care centre.

Most respondents stated that their children attend the child-care centre on a full-time basis being there more than or equal to five times per week. The majority of respondents felt that the location of the centre to their home was important. Most work and home locations were located near the child-care centre and the greatest number of work locations were located on the peninsula (see Figure 36).

Figure 36 Edward Jost Children's Centre Respondents' Key Location: The map shows the home and work locations of respondents who use the Edward Jost Children's Centre in relation to the centre.

Most respondents who attend the Edward Jost Children's Centre own a vehicle although there are a few respondents (13%) who do not have access to a household vehicle. Respondents commented that the centre has poor access to transit because of the scheduling and stop locations of the routes that service this area. Ninety-three percent (93%) of the respondents who use this centre combine their child-care trip with another destination. Most (80%) of the respondents who trip chain combine their child-care centre and work trips. Twenty percent (20%) of the respondents stated they walk to and from the centre. Most respondents who attend this centre (80%) said they drive alone, with their child, to the centre. This number slightly declined with 7% of this group switching to transit when traveling from the child-care centre.

Participants of the web-based survey were asked the time it takes them to get from their home to their child-care centre. This travel time is self-reported and based on the mode that respondents most often use to travel to their child-care centre. Most respondents who have a child that attends the Edward Jost Children's Centre self-reported that they live within a fifteen minute travel distance of their child-care centre.

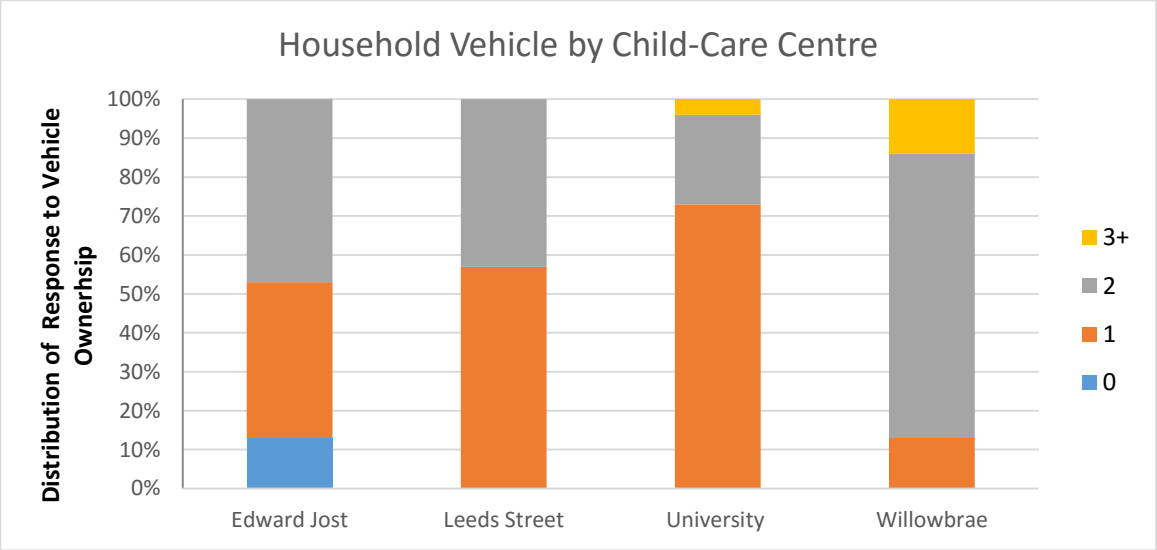


Figure 37 Household Vehicle by Child-care Centre: The figure compares the number of household vehicles by child-care centre.

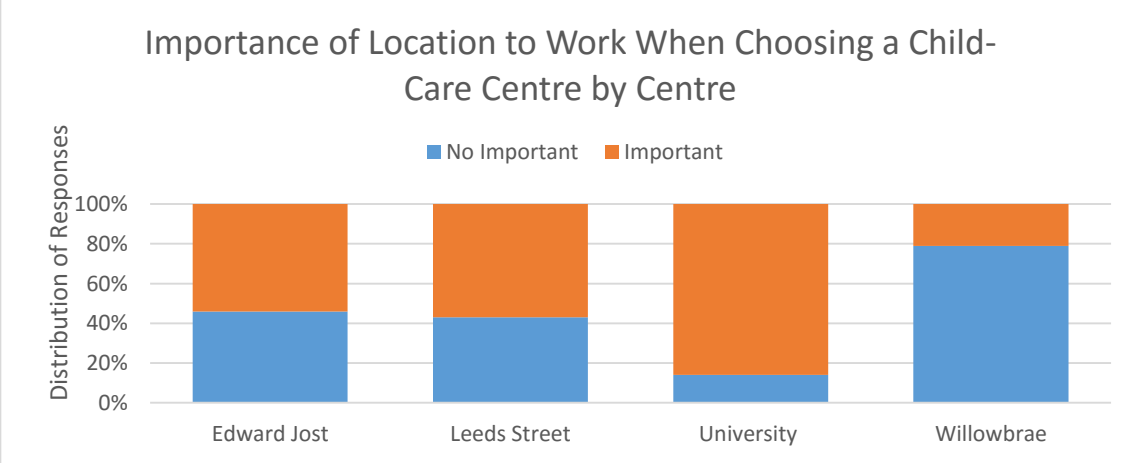


Figure 38 Importance of Location by Centre: The figure compares the importance of the location of the child-care centre in relation to respondents work location by child-care centre.

Many parents of this Centre commented that they felt there was a barrier to using public transit with young children, particularly because they felt that the vehicles and service are not friendly to strollers and the other items needed when traveling with children. Through an open ended question respondents were asked to comment on the barriers of using sustainable travel behaviour while traveling with children. Through this question respondents commented that even though they have access to bicycles with child seats and their children are able ride their own bicycles, they felt that the bicycle infrastructure in Halifax was not safe for family use. Most said that if they could legally ride on the sidewalk with their child this would support cycling more often. A few felt that time was a barrier as sustainable forms of transportation tend to take longer, especially when traveling in a family unit (see Quote 3). Respondents were asked to evaluate the level of importance of factors when deciding how they will travel to their daily destinations. Respondents who attend the Edward Jost Children's Centre place importance on sustainability, however, the time required to arrive at a destination was more important. Respondents commented that if the sustainable transportation systems were designed to be efficient and easy to use for families they would be more inclined to use them. Most households (54%) that attend the Edward Jost Children's Centre stated that they chose their child-care location because it was on their way to work (see Figure 38).

> *"The buses especially are not stroller friendly and there are no designated spots where you can place your stroller on the bus and sit next to it. In Europe buses are designed around all types of needs and not about how many people can be stuffed on a bus..."-Quote #2*
> *Edward Jost Married Female Parent with One Household Child*

"Time is the biggest barrier. My husband drives the kids to a nearby daycare, then buses to work and home. I drive to and from work and pick up the kids from daycare on the way home. If I bused, or if we walked to and from daycare, we would not be able to get to work on time, or pick up the kids from daycare before it closed. We think sustainability is vital - but the math just doesn't work." – Quote #3 Edward Jost Married Female Parent with Two Household Child

4.5.2 LEEDS STREET CHILD-CARE CENTRE

Leeds Street Child-Care Centre is a non-profit child-care centre located in a dense area in the North End of Halifax on a campus of the Nova Scotia Community College. The centre offers educational programming for the students of the Early Childhood Education program and prioritized care for children of students and staff. The centre can accommodate up to forty-one children between the ages of three months and five years. The location is well serviced by transit.

Figure 39 Leeds Street Child-Care Centre: Pedestrian, Vehicle, and Bicycle Access

Figure 40 Leeds Street Child-Care Centre: Leeds Street is the main access to the Leeds Street Child-Care Centre. The transportation infrastructure of the area consists of a local street, sidewalks, wide lanes, bike racks and a bus stop with a shelter.

Figure 41 Bus Stop Locations that Service Leeds Street Child-Care Centre: The child care centre is serviced by routes 7 and 9 with transit running along Leeds Street & Novalea Drive.

The household income range for the respondents from this centre is high with 78% of respondents having an annual household income above $80 000 (see Figure 35). Most (85%) of the respondents felt that cost was not important when considering a child-care centre. Fourteen percent (14%) of respondents stated their child-care was subsidized which seems consistent with the high household annual income. The majority (57%) of respondents stated their household owns one vehicle and 64% stated that their primary mode of transportation is to drive as a passenger in a car with other family members.

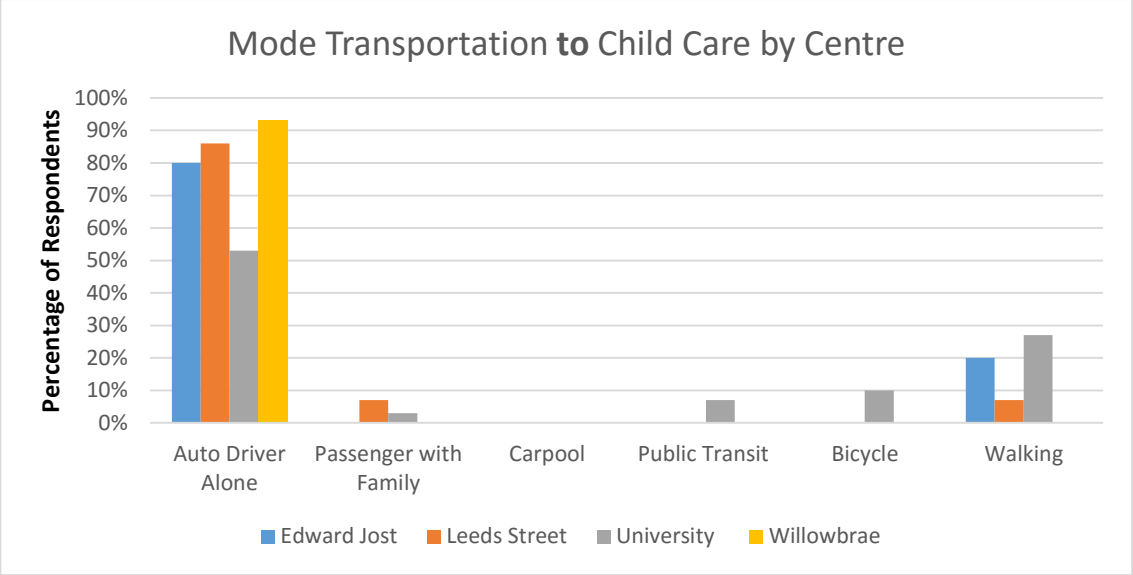


Figure 42 Mode of Transportation to Child Care: The figure compares primary transportation mode to child-care by centre.

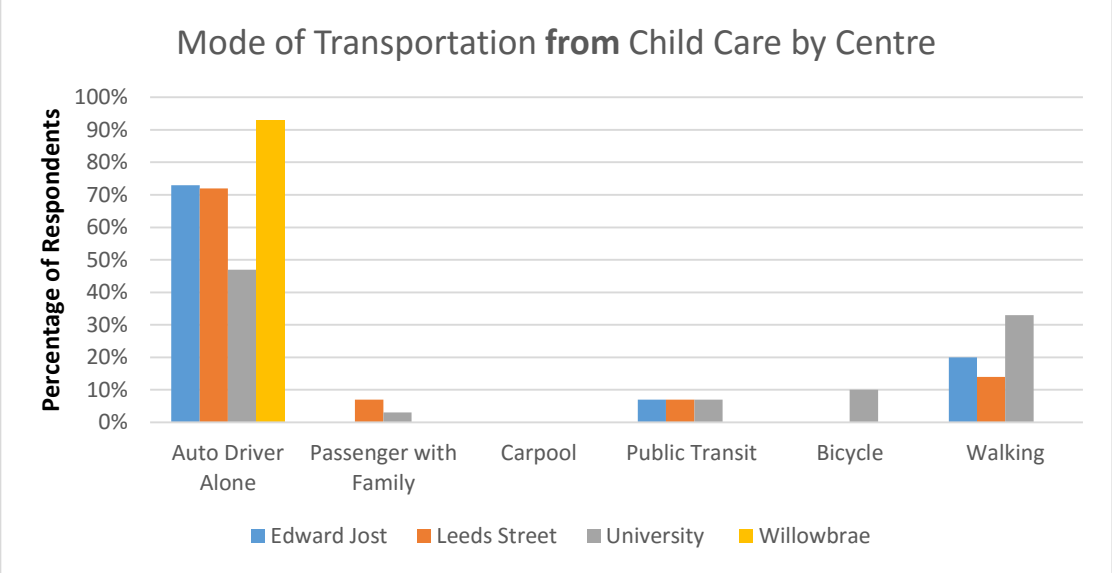


Figure 43 Mode of Transportation from Child-Care: The figure compares primary transportation mode from child-care by centre.

Most (93%) of respondents for the Leeds Street Child-Care Centre stated that they group their child-care trip with other destinations, 100% of respondents stated they grouped

with their trip to work. The majority of respondents who had a child that attended the Leeds Street Child-Care Centre had one child households (see Figure 49). All of the respondents stated their child was enrolled in the full-time child-care program, with the majority of respondents indicating their child attends the centre 4-5 times a week. Most (82%) of respondents who attended the Leeds Street Child-Care Centre auto drove alone as their mode to the child-care centre. This number decreased to 70% as the mode from the centre with a wider range choosing to drive as a passenger with other family members, walk and take transit (see Figure 42 and Figure 43). All of the respondents who attend the Leeds Street Child Centre stated they live within thirty minutes travel of their child-care centre, with 50% living within fifteen minutes (see Figure 44).

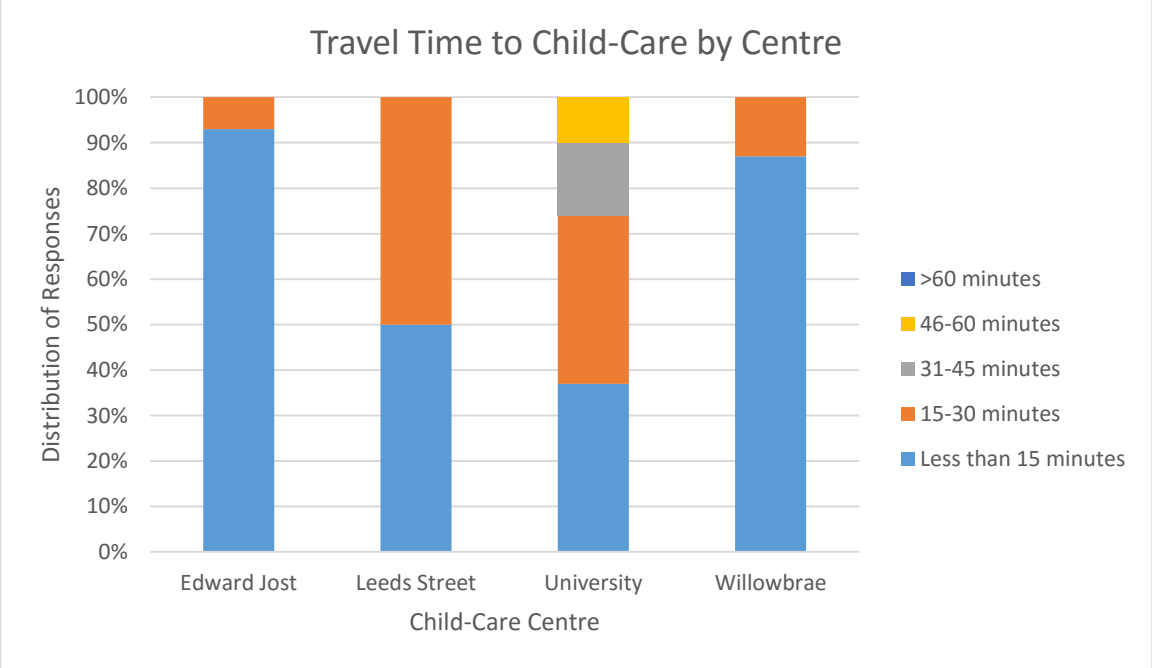


Figure 44 Travel Time to Child-care by Centre: The figure compares travel time to child-care by centre.

Most (80%) of respondents who attend the Leeds Street Child-Care Centre felt program availability was important when choosing a child-care centre and 93% felt that the

reputation of the centre was important (see Appendix B). The majority of respondents felt that the location of the child-care centre to work and home were not important when choosing a child-care program however most families work and home location are within a short distance of their child-care centre (see Figure 45).

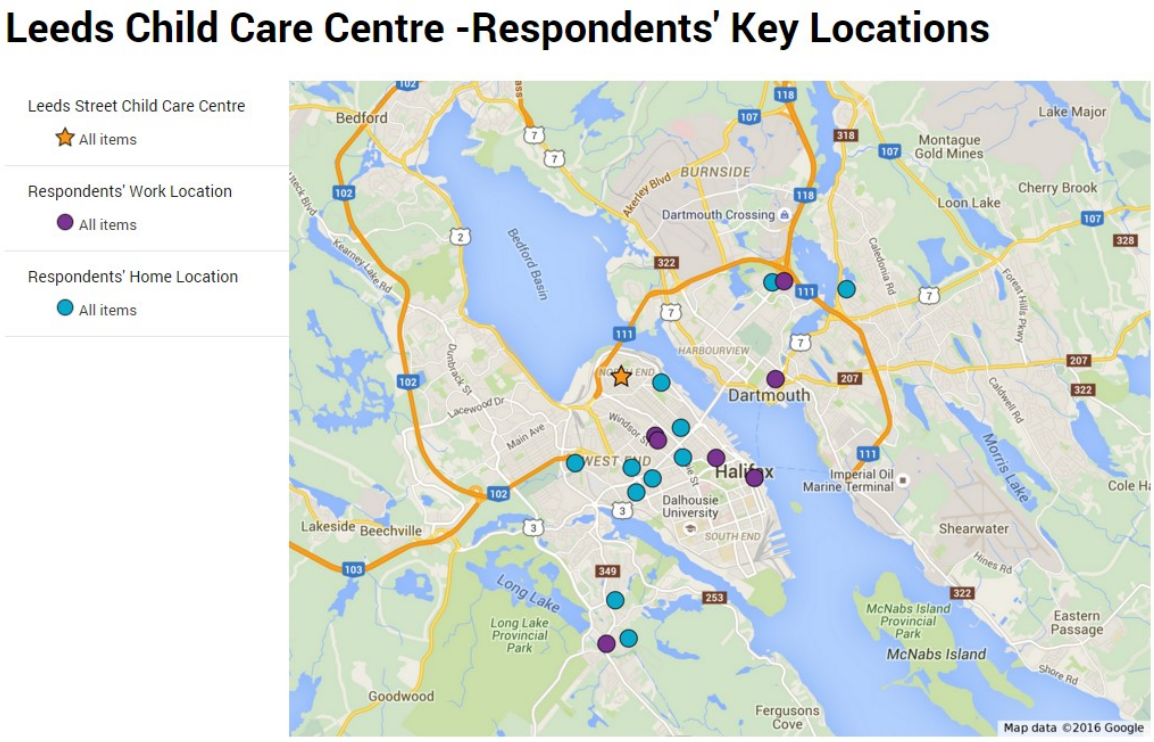


Figure 45 Leeds Street Child-Care Centre – Respondents' Key Locations: The map shows the home and work locations of respondents who use the Leeds Street Child-Care Centre in relation to the centre.

Many parents of the Leeds Street Child-Care Centre commented that they didn't feel that the sustainable transportation networks around their home were an option. Many felt that sustainable transportation options take too long, which is difficult when you have a young child who has many needs such a pee breaks, hunger, short attention spans, etc. The few families that do use sustainable travel behaviour to access destinations in their daily life commented that it was for a direct trip that was not too far or too long. Some respondents

commented about the amount of items required to travel with young children and how this can create a barrier for walking, biking and transit. Some of the female parents also commented that their spouse was likely to use sustainable travel behaviour when traveling alone; therefore, they would trade or share the trips with their children to accommodate sustainable travel behaviour for the other parent. Lack of sustainable transportation infrastructure at their work location, such as showers, lockers and indoor bike racks was a concern (see Quote 7). Some of the families also commented that trip chaining with their work trip was a barrier to taking transit, as they would have to get off the bus to drop their child off and then catch another to get to work. With the same concern, some parents stated that taking the bus would make them late to work.

> *"They (children) tire easily and can't walk far distances, or they get thirsty, hungry or have to use the bathroom during the walk and there isn't access to meet those needs during the walk" -." – Quote #4 Leed Street Single Female Parent with One Household Child*

> *"There are no buses that will get me directly (or close to) my office in a reasonable amount of time. We also drop off my partner at work on the days he rides with us - he will bike a couple days a week and run home a couple days a week. It's really just convenient and efficient to use our car." - Quote #5 Leed Street Married Female Parent with One Household Child*

"Preparation for weather conditions and extra time schedules with other children mean leaving one place and going to another sometimes at last minute." - *Quote #6 Leed Street Married Female Parent with One Household Child*

"I was running to daycare with her (child) and then too work, but we don't have a shower at work. It is easier to run from home and then drive separately. Also, I often need a vehicle at work" *Quote #7 Leed Street Married Male Parent with One Household Child*

"We drive from home to daycare, drop kids off (10-15mins) then drive to work. To take transit would be too cumbersome and take too long. There is no way we'd get to work on time." - *Quote #8 Leed Street Married Male Parent with One Household Child*

4.5.3 UNIVERSITY CHILDREN'S CENTRE (DALHOUSIE)

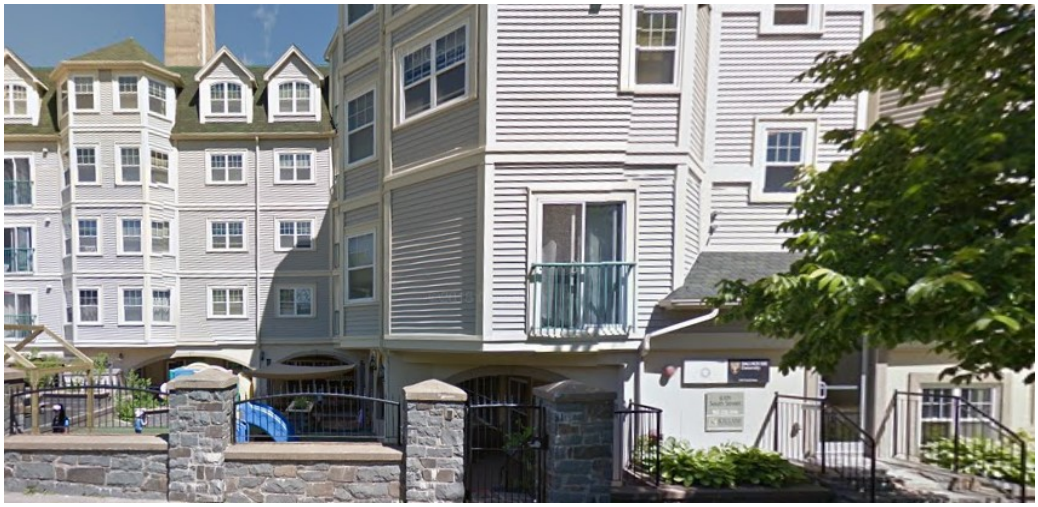


Figure 46 University Children's Centre: Pedestrian, Vehicle, and Bicycle Access

University Children's Centre is a non-profit organization that was originally formed to respond to a demand for child-care services on campus for students and staff. While the centre continues to provide support to the University community, it is now an independent organization separate from Dalhousie. The centre can accommodate up to seventy-eight children between the ages of four months and five years. The centre is located in the South End of Halifax, in a dense primarily residential area.

Figure 47 University Children's Centre: South Street is the main access to the University Children's Centre. The transportation infrastructure in this area consist of a local street, sidewalks, wide lanes, bike racks and bus stop without shelter

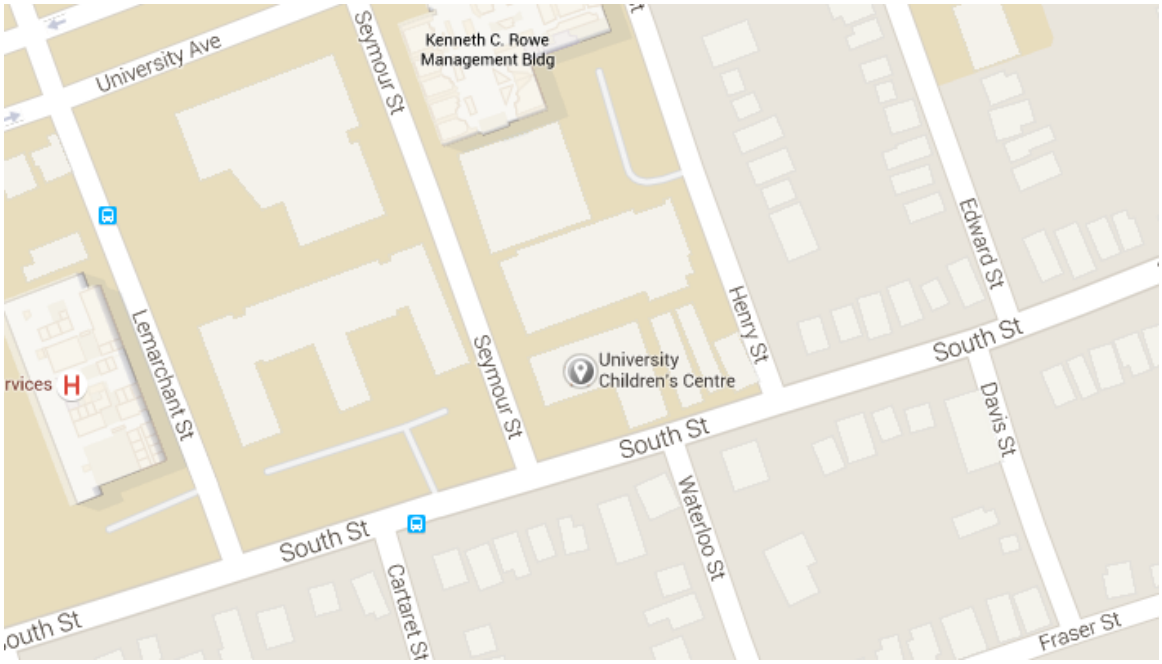


Figure 48 Bus Stop Locations that Service University Children's Centre: University Children's Centre is serviced by routes 1 and 7 with transit running along South Street and Robie Street.

Bus stop locations on South Street are local stops which means they are not serviced by shelters or multiple routes. Route #1 travels by every 10 minutes which makes it easier for parents to drop off children on the way to work. The University has a number of bicycle facilities such as bike racks, showers, lockers, and segregated lanes.

Most (76%) of respondents had an annual household income above $80 000 (see Figure 35). Twenty-three percent (23%) of respondents stated they receive a subsidy to pay for child-care which may be why 66% of respondents felt that cost was not important when choosing child-care. Most (73%) of respondents had one household vehicle, with 26% having two or more (see Figure 37). Twenty-seven percent (27%) of respondents who attend the University Children's Centre stated walking as their primary mode of transportation, with 20% stating they drive alone, with their child, and 40% drive as a passenger with other family members.

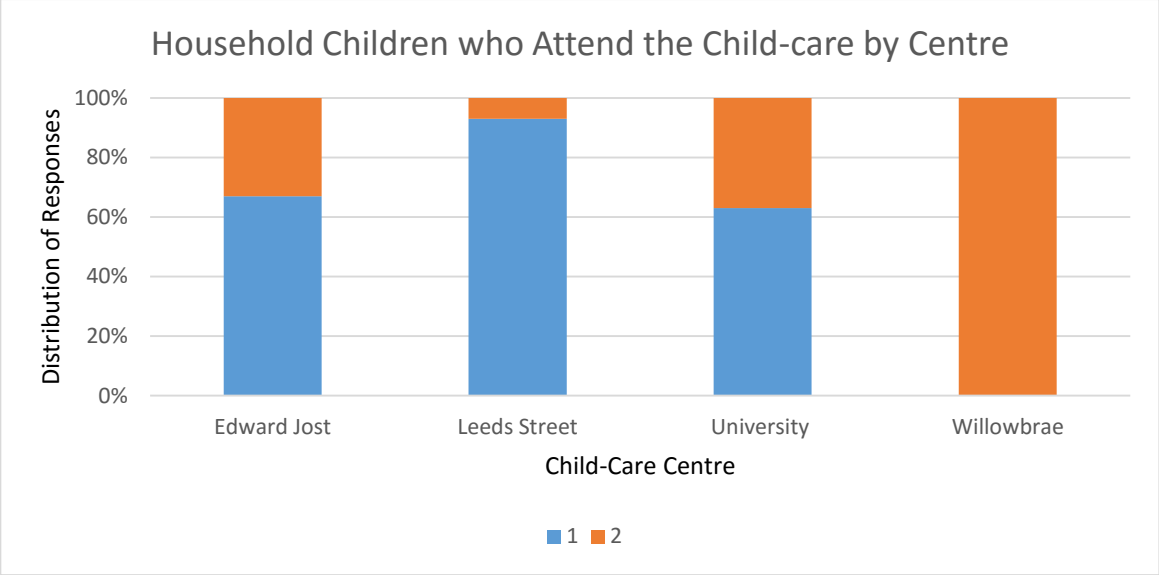


Figure 49 Household Children who attend the Child-care by Centre: The figure compares the number of household children that attend child-care by the child-care centre.

Almost all of the respondents stated they group their child-care trip with another destination, with 96% of those stating that they group with their trip to work. Most (79%) of the respondents had more than two children in their household (see Figure 51). This centre had a larger portion (45%) of respondents that use sustainable travel behaviour for the trip from the child-care centre compared to other centres. The number of respondents who use sustainable travel behaviour on the trip from their child-care centre increased compared to the trip to (see Figure 42 and Figure 43). Most (70%) of the respondents live within thirty minutes of travel from their centre (see Figure 44).

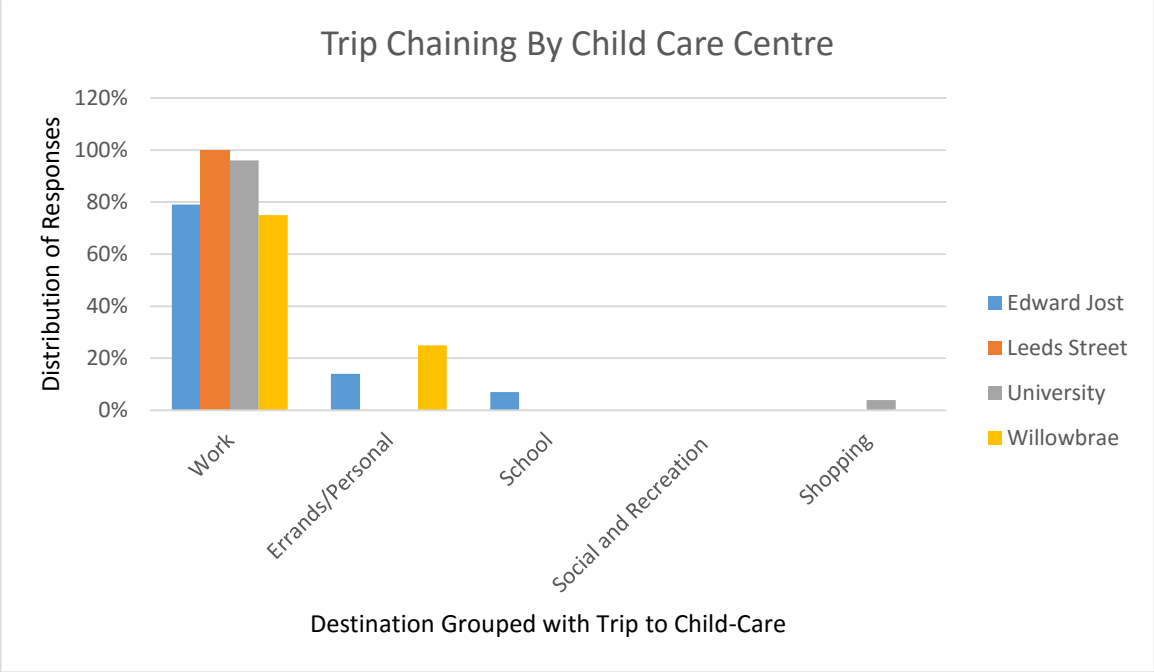


Figure 50 Trip Chaining by Child Care Centre: The figure depicts other destinations visited by respondents when taking children to child-care.

The University Children's Centre had the highest response from households with two or more children attending their centre compared to the other three centres in the study (see Figure 51). All the respondents who attended the University Children's Centre attended the full-time child-care program with most attending 4-5 times in a week. A majority of the respondents felt that the program availability was not important when choosing a child-care centre (see Appendix B). More than 90% of respondents who had a child attending the University Children's Centre stated that reputation of the child-care program was important when choosing child-care (see Appendix B).

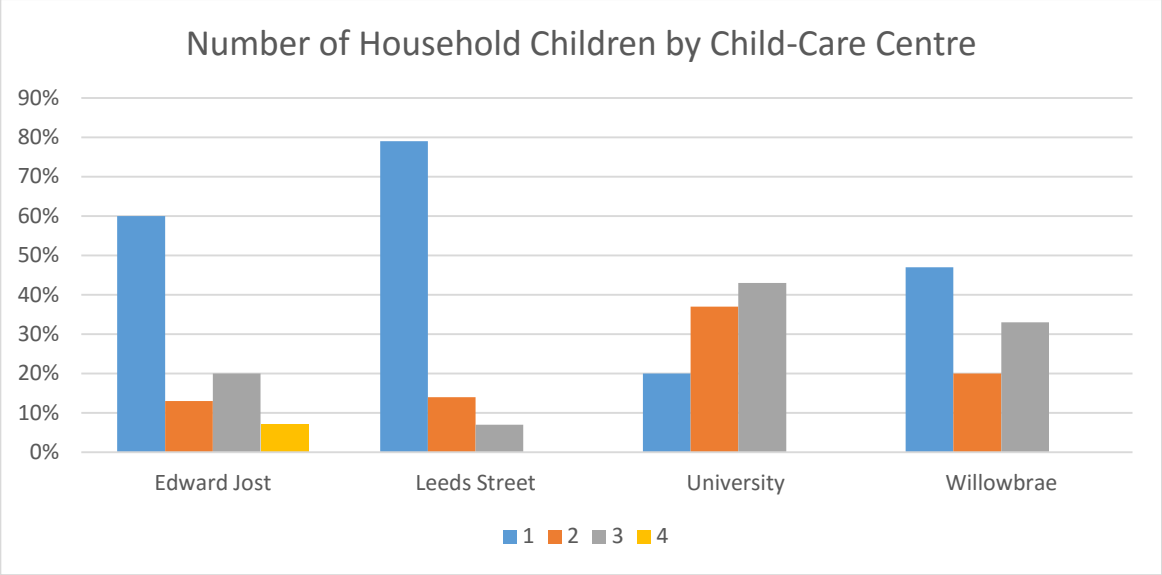


Figure 51 Number of Household Children by Child-Care Centre: The figure depicts the number of children in each family that utilizes the child-care centre. All children in each family may not necessarily attend said centre.

Most of the respondents felt that location of the centre to their work was important when choosing their centre and that location to home was not important. This is supported with families' work locations being located within and around the child-care centre (See Figure 52). The majority (62%) stated that special care or needs of their child was not important when choosing their child-care centre.

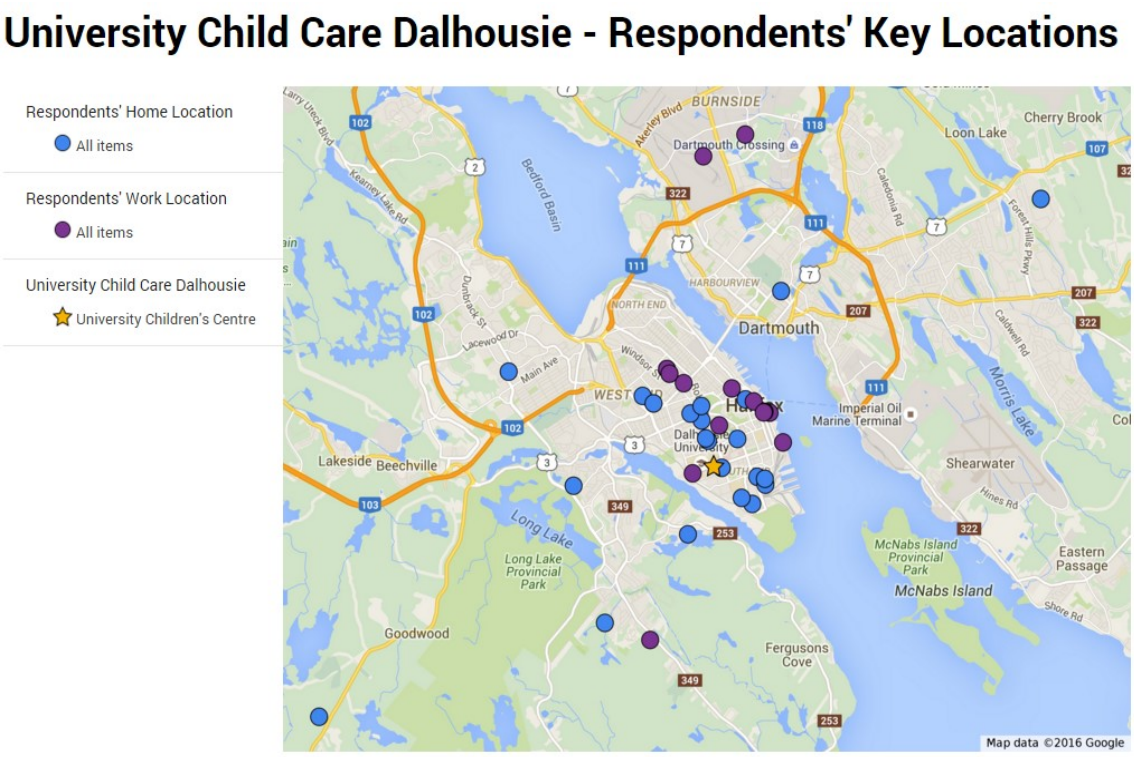


Figure 52 University Child-care Dalhousie- Respondents' Key Locations: The map shows the home and work locations of respondents who use the University Child Care Dalhousie in relation to the centre.

Some parents commented that it is difficult to use transit because of "potty" breaks, schedule constraints, and distance between transit stops (see Quote 12). A number of parents also commented that affluence is a factor. The South End of Halifax, where the Dalhousie Children's Centre is located, is very expensive to purchase a home and those with a high household income are able to buy a home in this area which would enable them to walk, bike or choose transit.

"We live way too far from work and school, and my street has no sidewalks and the bus route in that area is not straight forward. It would take 2 hours to get to and from work and school and take away from family time, not to mention create hostile children against public transportation because of crowded buses during rush hour." – Quote #9 Dalhousie Married Female Parent with One Household Child

"There are no designated bike lanes in our neighbourhood and we live off a busy road. When applying for a license there should be a mandatory component about sharing the road with bikers. I used to have a bike seat for my daughter on my bike and after biking with her for a few months I decided the risk of biking on these streets was not worthwhile." – Quote #10 Dalhousie Married Female Parent with two Household Child

"Lack of bike lanes but more so lack of respect and consideration for bikers by drivers" – Quote #11 Dalhousie Married Female Parent with One Household Child

"Distances to sustainable transit stops can be a problem (children's range of walking before tiring, desire to be carried, etc). For example, it is two blocks to the nearest bus stop in our home neighbourhood. Our 2 year old will not walk that distance. There are no bike lanes along Quinpool, Connaught, or Oxford, major routes we would need to use to safely bike into work and school. We live too far to walk to work, school, and daycare." – Quote #12 Dalhousie Married Male Parent with Two Household Child

"Crossing roads like Quinpool is a joke on a bike - getting off to walk to the pedestrian crossing/button with a bike trailer, a tag-along and/or a youngster/novice on a bike with you is not sensible/safe yet it seems to be what our traffic planners have in mind for us. Why can't Halifax have push-buttons where cyclists can press them without getting off their bike? Look at the Vancouver system, and how cyclists (on 7th or 3rd, or thereabouts) can cross VERY busy roads like Granville and Bernard and using a push button." — Quote #13 Dalhousie Single Female Parent with Two Household Child

Expense is a major one. We are lucky to be able to afford a home downtown and can afford the equipment necessary to avoid car travel (e.g. chariot for bike travel, double stroller, etc.) — Quote #14 Dalhousie Married Female Parent with One Household Child

4.5.4 WILLOWBRAE CHILD-CARE (HAMMONDS PLAINS)

Figure 53 Willowbrae Child-Care: Vehicular Access

Willowbrae Child-Care is a for profit organization that is designed for children with varying needs. The centre can accommodate up to one hundred and twelve children between the ages of eighteen months and twelve years. The centre is located in Hammond Plains, a low density residential area far from Downtown Halifax. This neighbourhood is affluent with an average family income of $105 598 (2006 Census). Most (67%) of respondents whose child or children attend Willowbrae Child-Care indicated that their annual household income level is above $100 000 (see Figure 35). Twenty percent (20%) of the respondents stated they receive a subsidy for child-care and 87% of the respondents said cost was not a factor when choosing their child-care.

Figure 54 Willowbrae Child-Care: The Hammonds Plains Road is the main access to the Willowbrae Child-Care Centre. The transportation infrastructure in this area consists of a busy arterial road with multiple lanes.

Figure 55 Bus Stop Location that Services Willowbrae Child-Care: Willowbrae Child-Care is serviced by route 33 with transit running along Hammonds Plains Road.

Most (73%) of respondents had two or more vehicles (see Figure 37). All of the respondents who attend Willowbrae Child-Care use a car related form of transportation (53% auto driver alone, 47% passenger with family) to access their daily destinations. The majority of respondents drive alone, with their child, for their trip to and from the child-care centre (see Figure 42 and Figure 43). This was the one centre in this study in which all of the respondents stated they use the same mode of transportation to and from the child-care centre. Most (86%) of the respondents stated they combine their trip to child-care with another destination, 25% of those who combine trips stated they combine with "personal and errands" and 75% said they grouped with "work".

The trip chaining with destinations for doing errands ("personal and errand") may be related to the fact that this centre had a more even split between respondents whose children attend the centre part-time (43%) and those whose children attend full-time (50%) (see Figure 57). Most of the respondents self-reported that they live within fifteen minutes of travel, without indicating mode, from their centre. This is supported by 93% assessing that the location of their centre to home was very important when choosing child-care.

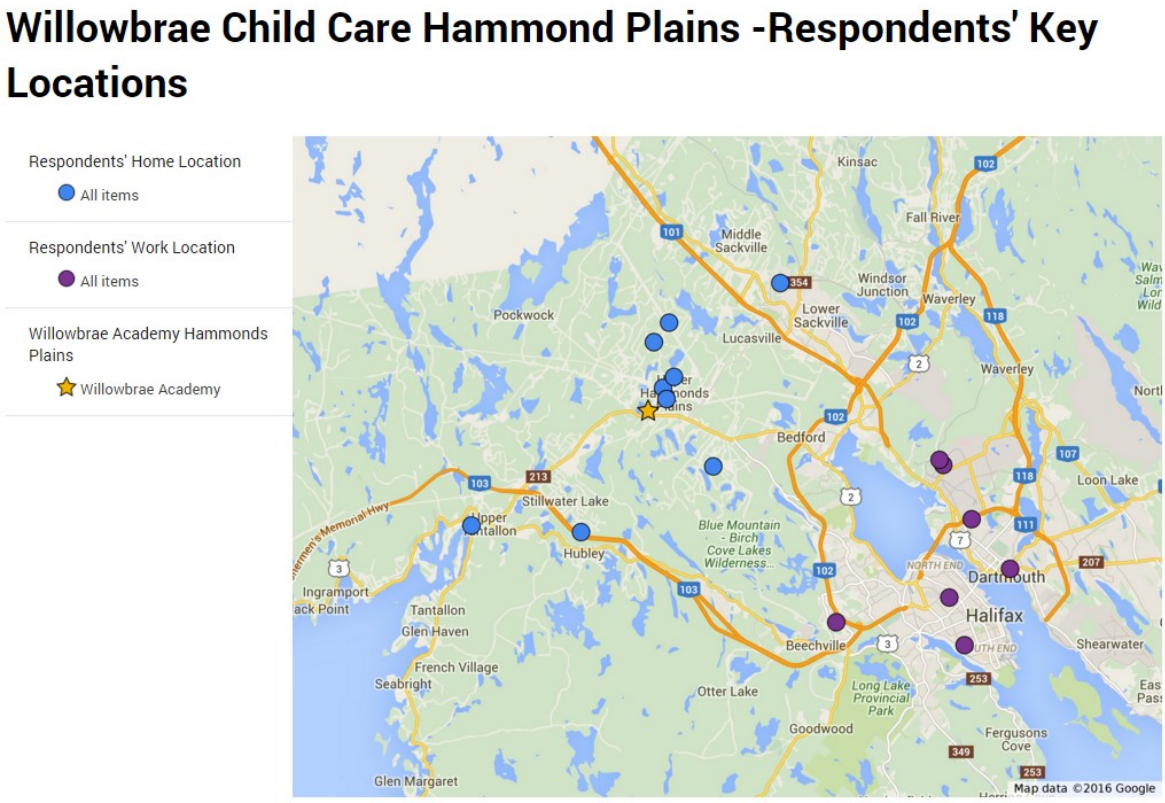


Figure 56 Willowbrae Child-Care Hammonds Plains - Respondents' Key Locations: The map shows the home and work locations of respondents who use Willowbrae Child-Care in relation to the centre.

Willowbrae Child-Care promotes its programming as catering to individual child needs. Nineteen percent (19%) stated that special care for their child was a consideration when choosing child-care. The majority (57%) of respondents that attend the Willowbrae Child-Care said program availability was not important when choosing a child-care program. Nineteen percent (19%) felt that location of the centre to their work was important. All respondents' homes are located around the child-care centre with the work locations being located further away in Downtown Halifax (see Figure 56).

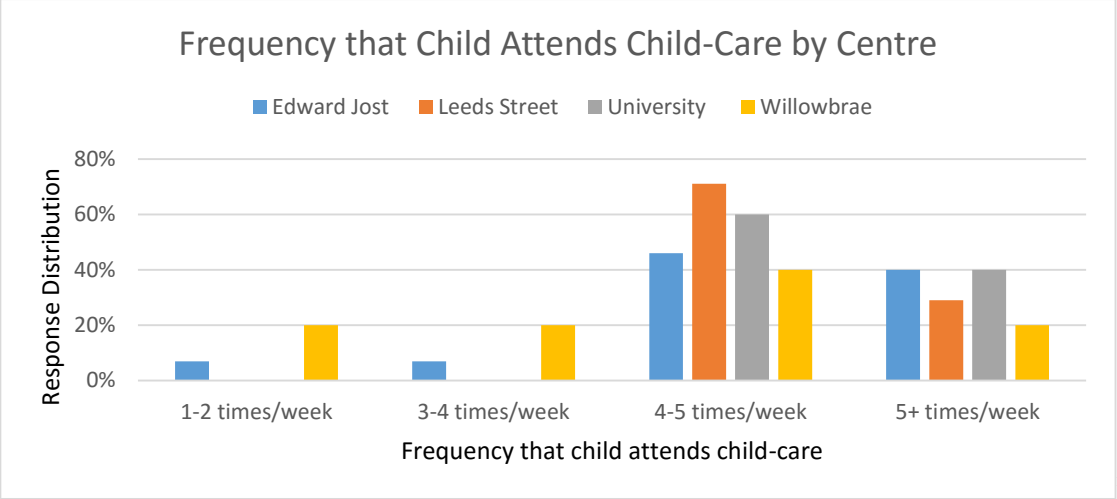


Figure 57 Frequency that Child Attends Child-Care by Centre: The figure compares how often that child attends child-care by centre.

Some parents who attended Willowbrae Child-Care in Hammond Plains stated that cars parked on either side of the road to drop children off was a hindrance to using sustainable travel behaviour (see Quote #15). This is interesting because there are no sidewalks in this area, so families who walk and bike must do so on the shoulder of the road. When other parents drive and park in this area it becomes a hindrance to parents that would choose alternative modes. Most parents commented on the businesses on the Hammonds Plains Rd, the lack of bike and walk infrastructure, the very limited transit service, and the absence of lighting.

> *"Traffic in our neighbourhood is heavy and concerning when walking with an infant and a toddler. Transit is infrequent and a long walk to reach the bus stop." – Quote #15 Willowbrae Married Female Parent with Two Household Child*

"There are no sidewalks for safe travel. I would love to walk my kids to school - it's only 1.5km away - but the road is busy and the cars go very quickly. Without a sidewalk I feel very unsafe." – Quote #16

Willowbrae Married Female Parent with One Household Child

"Keeping younger children occupied so that they do not get themselves into trouble example would be keeping child in seat" – Quote #17

Willowbrae Married Male Parent with One Household Child

"Availability of sidewalks, insufficient lighting" – Quote #18

Willowbrae Married Female Parent with One Household Child

4.5.5 OBSERVATIONS ON COMMONALITIES AND DISSONANCE OF HOUSEHOLDS

As a result of the investigation of the impact of the child care destination on household transportation behaviour, observations were made about the commonalities and dissonance between households.

4.5.5.1 Family Commonalities

A number of commonalities were identified that are present for all families and are not dependent on the location of the child-care centre.

Adults of the households are more likely to choose to drive alone with their child (auto driver alone) on the trip to child-care. Adults of the household are more likely to use sustainable travel behaviour on their trip from child-care. This is most likely attributed to different adults of the household driving to and from the child-care centre. Households often group their trip to child-care with other destinations, with the work trip being the

most common. However, households that have children who attend a part-time child-care program are less likely to trip chain. Reputation of the child-care program was important to respondents when choosing a child-care centre. Special care, for children with special needs, was not of importance to respondents when choosing their child-care centre. Respondents are more likely to use sustainable forms of transportation when travelling to child-care than they are when travelling to other destinations. This may be because families responding to this survey typically live within thirty minutes travel time of their child-care centre and therefore have more opportunities to use sustainable travel behaviour when accessing the child-care destination. Households who responded to this survey do not regularly use public transit. Eight percent (8%) of families choose transit as their mode of transportation. There was no increase in transit use identified for households that attend a child-care centre that is well-serviced by transit. Among the sustainable transportation modes, parents and children are more likely to choose to walk or drive as a passenger in a car with other family members in comparison to transit and biking.

4.5.5.2 Location Dependent (dissonances between families)

A number of variables, such as location of child-care to work and home, vehicle ownership, household income, and mode choice, were identified to vary between households and appear to be reliant on the child-care centre and location.

The importance placed by households on the location of a child-care centre in relation to their work or home when choosing a child-care centre varied based on the location of their child-care centre. The location of the child-care centre in relation to the respondent's home was more important to households that attend a child-care centre located in a rural

or suburban location. The location of centre to work was more important to households who attend a child-care centre located in a dense downtown area. The importance of cost for child-care varied by child-care centre location. Respondents whose children attend a centre that is located in communities with a low average annual income were more likely to state that cost of child-care was important when choosing a centre. The importance of capacity and space availability to respondents changed based on the location of their child-care centre. Household vehicle ownership also varied by child-care centre. Respondents with children that attend a centre located in a dense area own fewer vehicles than those who attend a centre that is located in a lower density area. Respondents with a child that attends a centre in a low income area owned fewer vehicles. There also was a difference in the number of household children that attended the child-care centre by centre. The respondents that identified University Child-Care and Willowbrae Child-Care as their child-care centre had more than one household child that attended the centre.

CHAPTER 5: BARRIERS, CHALLENGES AND OPPORTUNITES

The goal of this research is to provide a baseline study of travel patterns and transportation challenges for households with pre-school aged children (<5 years) in the child-care centre setting of Halifax Nova Scotia. The study provides insight to potential barriers among this group in using sustainable travel behaviour; it also points to opportunities through land use and transportation planning for supporting greater use of walking, biking and public transit by families with children in child-care. Presentation and analysis in Chapter four describes the travel patterns of households with pre-school aged children in the child-care setting. In this chapter, barriers and challenges are identified from the results of Chapter four and then explored to find opportunities.

5.1 BARRIERS AND CHALLENGES

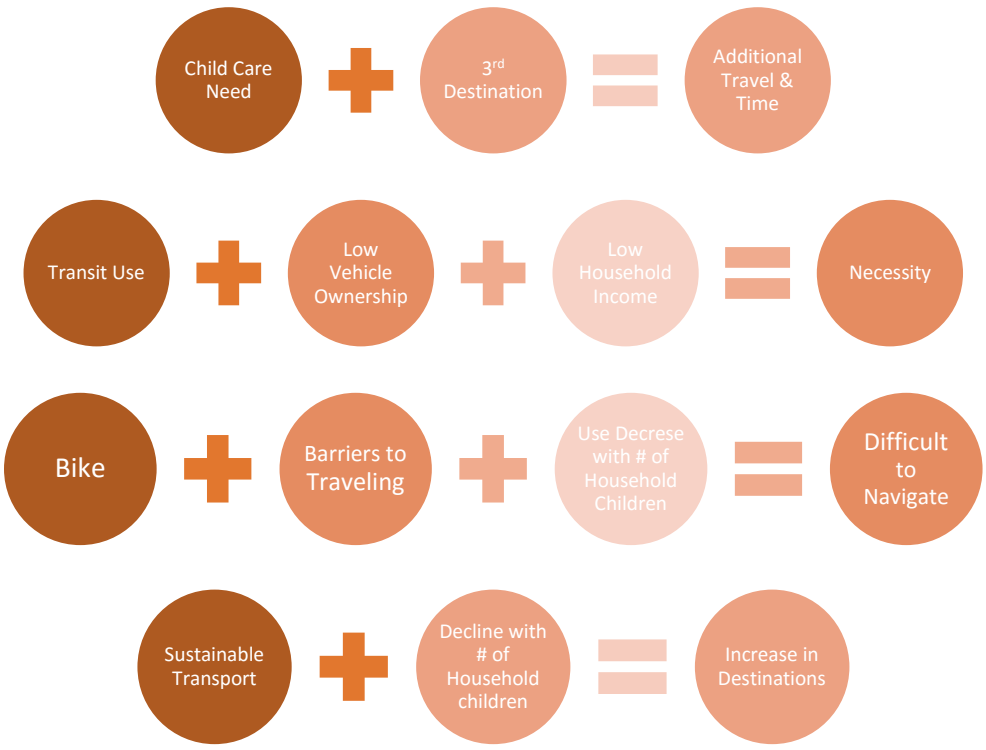


Figure 58 Barriers and Challenges for Sustainable Travel: The figure explores the barriers identified in the survey results and the subsequent transportation challenges.

Respondents more often choose sustainable modes of transportation for trips that include traveling to and from a child-care centre. The child-care centre, more than other daily destinations, is conducive for the respondents to choose to walk, bike or use transit. As such, there could be an opportunity to focus sustainable planning initiatives on the child-care destination.

Respondents that use transit often report an annual household income below $40 000. Many of these respondents also did not own a household vehicle which would make using public transit a necessity, not an option, particularly for respondents whose child-care centre is not located near their home. The California State Department of Transportation (Caltrans) performed a study to assess the impact of child-care locations on parents' use of public transit. The study examined child-care centres in California that were located within one-third of a mile of a transit station. The study found that levels of transit use are much higher at the child-care centres located close to a transit corridor. For this reason, Caltrans (n.d.) recommends that transit oriented development incorporate child related space such as playgrounds and child-care facilities in addition to the space typically set aside for retail business so as to reduce the time required to travel to destinations and the need to transfer.

Most households did not feel that the possibility of their child misbehaving was a barrier to using public transit. However, families that chose public transit were more likely to think their child's behavior was somewhat of a barrier to transit use. This may be related to previous public transit experiences that have led to this concern. However, these households have continued to use transit, which suggests that this is not a large enough barrier to inspire them to switch modes of transportation.

Carpooling with someone outside of the family was not reported by respondents to the web-based survey. However, some commented that another household adult would choose to carpool when not traveling with the household children. Respondents linked this with time constraints and lack of flexibility associated with sharing a ride with another household. The ability to car-pool with people outside the family may also be constrained by the need for car seats. Nova Scotia provincial regulation requires that children under the age of nine or who are less than one hundred and forty five centimeters tall must use a car or booster seat. The requirement of transporting a car seat while carpooling may be impractical for households with children in child-care.

Time with family was very important to most households when choosing their primary mode of transportation except for those that chose to bike. When biking, it can be difficult to interact with a child while other modes may be easier. Driving is typically faster which can free up more time to spend with the family in other activities or at home. Public transit and walking can take longer but provide more time to spend with a child during the trip.

The majority of families felt that there are barriers to using sustainable travel behaviour with children independent of the type of transportation they use to access their daily destinations. Households that bike unanimously agreed that there are barriers to using sustainable travel behaviour when traveling with children. Survey responses found that all of the households that use a bicycle as their primary mode have one household child that attends their child-care centre. This may be because the options available for bicycle child carriers, especially if transporting more than one child, are limited. Segregated active transportation paths are used all over the world to physically separate cyclists from motor

vehicle traffic (Pucher, 2010). These shared paths are implemented because of the perceived safety which has been found to increase the use of sustainable modes of transportation. Pucher (2008) in a study of cycling facility best practices, found that the most common reason for not cycling is the perceived safety risk. This is particularly true among elderly, parents of children and women who when asked what would increase their use of cycling most (80%) said separate cycling facilities.

The number of household children and the number of children that attended child-care are factors that influenced the mode of transportation the respondents used to access their daily destinations. Respondents with one household child were more open to using sustainable travel behaviour and respondents with more than two household children were more likely to choose a vehicle oriented mode. This could suggest that transportation demand management programs and policies targeting households with pre-school aged children may be most effective if focused on families with one child.

Overall respondents felt that convenience and freedom were the most important factors when choosing their primary mode. Sustainable transportation initiatives should be marketed with a focus on the convenience to quickly access all needs and the freedom to do unplanned activities. These factors are important to families and they may choose not to use sustainable travel behaviour if they perceive it would prevent them from easily performing their daily travel requirements.

Almost all of respondents stated they trip chain (92%). Of the few (8%) of respondents that do not trip chain, most (47%) stated their main means of transportation is to be a drive as a passenger in a car with other family members. These respondents may be choosing not to trip chain, because they are “catching” a ride with a family member to a

location they are already going to and it could be inconvenient to ask that they stop at another destination. Most households (89%) grouped their child-care centre trip with their trip to work. Most households do not require child-care unless they are going to a location that would not be suitable to bring a child, such as work. Besides combining the work and child-care trip, other common destinations grouped with the child-care trip were errands (43%), school (38%) and shopping (19%). This is most likely because the "freedom" and "convenience" associated with driving a private vehicle that enables parents to stop and perform other errands.

The majority of respondents that use sustainable travel behaviour stated they did not think trip chaining was a barrier to using sustainable travel behaviour. However, those households that rely on car related transportation were an even split between those that thought trip chaining was a barrier and those who thought it was not a barrier to using sustainable travel behaviour.

Most households felt that the neighbourhood around their child-care centre was safe, however this was most pronounced in families that use sustainable travel behaviour (see Appendix B). This is most likely for a couple reasons, first that the families who use sustainable travel behaviour experience the neighbourhood from the perspective of a sustainable transportation user. The second is that those who think that the neighbourhood around their child-care centre is unsafe have already made the decision to drive to and from the centre.

Exercise and weather are the factors that influence the type of transportation that respondents choose for the trip to and from their child-care centre destination. Respondents that placed a high importance on exercise were more likely to walk or bike.

Respondents that primarily walk, bike or take public transit felt that weather was an important factor in determining whether to drive to their destination. Parking availability was very important to households that chose to walk (27%) which may be an indicator that households are choosing to walk when there is limited parking available at their destination.

5.2 OPPORTUNITIES

Results from Chapter four & the findings of section 5.1 suggest planning opportunities that may support sustainable transportation planning at the child-care centre destination. The data also indicates that many stakeholders would need to be involved to encourage parents to use sustainable travel behaviour including employers, child-care providers, municipal government leaders and planners, provincial government leaders and staff, and local transit providers.

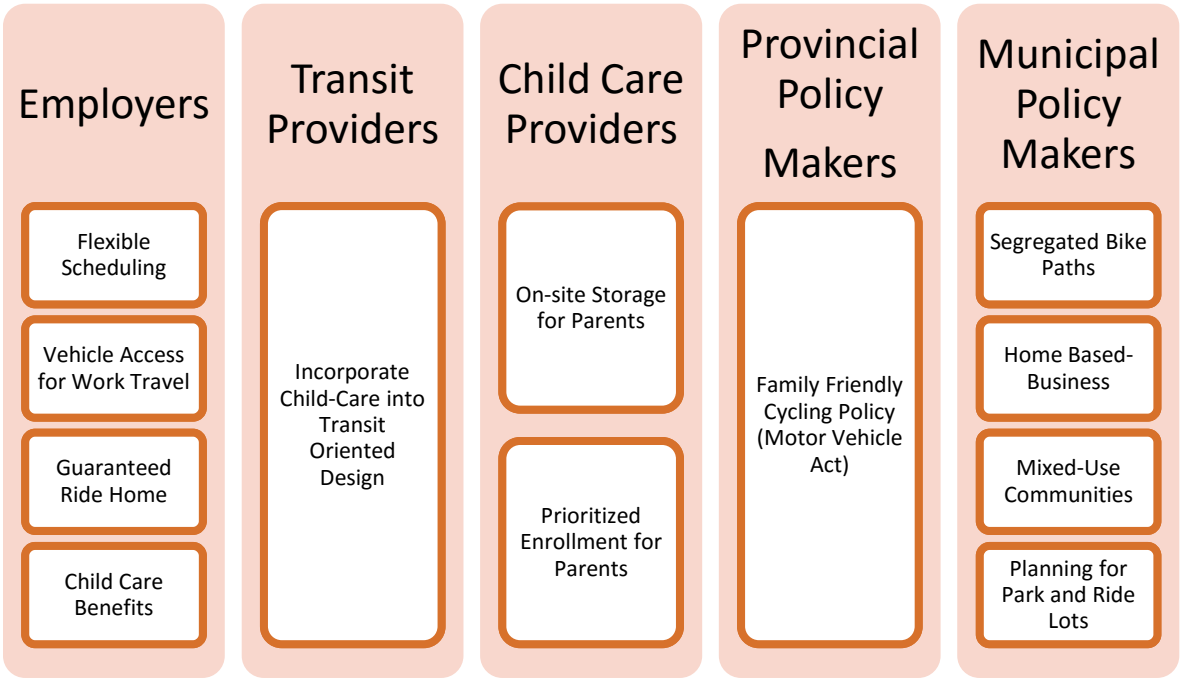


Figure 59 Opportunity for Sustainable Transportation Planning: The figure explores opportunities to address barriers and challenges to travel through sustainable transportation planning.

5.2.1 EMPLOYERS

The results of Chapter four showed that respondents have concern for scheduling and arriving on time at work. This is an important factor of consideration for families when choosing their transportation mode. The data showed that the adults of the household often share the responsibility of dropping off and picking up their child from child-care. The adult who performs the trip to pick up their child from child-care is more likely to use sustainable travel behaviour. This trip typically occurs at the end of the day when there are less time commitments. Flexible start times, telecommuting and shorter work weeks are common practices employers can implement that support employees who are parents. Brescoll (2013) studied maximum work hour legislation and provisions for shorter and flexible work hours for parents with young children that were implemented in European Countries. This legislation was implemented in order to support healthy home environments and improve child-care options for households with young children. This study found that employers whose employees took advantage of such programs saw a high performance rate for workers and an increase in employee retention.

Chapter four identified that the child-care trip is almost always grouped with the trip to work. Therefore, there may be opportunity for employers to host a child-care centre or locate near child-care centres in order to reduce the complexity of daily travel. This practice can increase the opportunity for households with pre-school aged children to use sustainable travel behaviour. Morrissey (2011) found that in recent years employers have increased their attention to child-care as a work-life benefit for employees. There are many benefits to implementing child-care within the work environment including decreasing work and family conflicts, increasing employee productivity and supporting

child development. In more recent years, locating child-care within the work environment has been used as a transportation demand management measure in order to reduce employee reliance on vehicles and travel times. In additions these measures may be used to encourage employees to use more sustainable forms of transportation as a means of reducing parking demand at the work site.

Chapter four of this thesis presented the qualitative comments of households with pre-school aged children on the barriers to using sustainable travel behaviour. The results indicated households felt pressured to drive to work because they required access to a vehicle for work related travel. There are some program examples, such as at Dalhousie University, where a car share program is available and paid for by employers so employees may use the service for work related travel. This program is intended to reduce the need for employees to drive (Anonymous, 2011). Another employer based program, is the Guaranteed Ride Home, where employers offer taxi chits to employees who use sustainable transportation and require a ride home in the event of a personal or family illness, unscheduled overtime or any other unexpected emergency (Hollis, 2015). This type of program may satisfy the concerns of survey respondents who stated that they choose to drive so they have access to a vehicle in the event that they need quick transportation to their child because they are ill or hurt.

5.2.2 CHILD-CARE PROVIDER

There is an important role that child-care providers can take in encouraging sustainable travel behaviour. Child-care providers that locate facilities near transit can influence transit use of parent and staff through program design and communication with local government. A concern identified by child-care providers as part of the Caltrans (n.d.)

Child-care and Transit: Making the Link in California study is that there are concerns regarding traffic congestion and parking that occur when families are picking-up and dropping-off their children at peak times. This congestion around the child-care centre can lead to conflict and create dangerous situations. In order to address this concern there is opportunity for child-care providers to encourage sustainable travel behaviour among parents to create a wider mode share and reduce the reliance on personal vehicles.

Previous chapters found that the child-care trip is almost always combined with travel to another destination. Comments from participants show that there is a lot of equipment and items required to travel with a young child. This can become a struggle when parents are continuing on from the child-care centre to work while using sustainable transportation. Parents that choose to bike may have to continue to cycle with their child carrier attached and those who take transit may be required to bring their child's items with them on the bus. With this in mind, there may be opportunity for child-care centres to implement a policy allowing parents to leave strollers, child carriers, etc. at the child-care centre to be picked up at the end of the day. This would remove the barrier of having to continue on the tour with their child's items after they have been dropped off, hopefully supporting households in using sustainable travel behaviour. No research examples of this type of policy could be found, however this would be a reasonable response to the concerns that have been communicated by respondents in this study.

In addition, because it was found that the child-care trip is almost always grouped with travel to another destination there may be opportunity for child-care providers to choose to locate close to the destinations commonly grouped with child-care in order to reduce the complexity of the household tour which may lead to more sustainable transportation

use. Caltrans (n.d) found that that child-care program administrators should expand or relocate child-care at transit oriented developments, for example locating within walking distance of transit corridors and work. Child-care located on transit routes, with other services nearby, will help to promote a more walkable community and create connections between households with young children and transit.

Chapter four, section 4.5.4, identified that congestion around the child-care site from other parents dropping off and picking up children can deter other households from using sustainable travel behaviour. Caltrans (n.d) recommends that to address concerns regarding drop off and pick up child-care program administrators should consider prioritizing enrollment for families who live in the surrounding neighbourhood or who use public transit as a way of reducing parent issues with congestion during pick up and drop off.

5.2.3 MUNICIPAL POLICY MAKERS

Municipal Government may fund land use planning for mixed-use and walkable communities in order to locate child-care in areas that will encourage sustainable travel behaviour. This study supports interdisciplinary work on transportation and child-care for future research.

Respondents reported that a lack of infrastructure keeps them from walking and biking. In Nova Scotia, there are not always connected sidewalks, bike lanes or bike paths. There is a provincial policy that requires adults to ride their bicycle on the road as a vehicle. Families traveling with young children are concerned about being on the road with cars; a situation that they consider dangerous. There is opportunity to plan for connected walking and biking infrastructure that accommodates families and children such as segregated

active transportation paths (Putcher, 2010). Many studies support this type of infrastructure and have found that creating safe places to bicycle is important in increasing bicycle use in elderly, parents and children (Sallis, 2013, Stewart, 2011).

The personal travel diary portion of the survey revealed that respondents who work from home are likely to use active transportation for the trip to and from their child-care centre. Residential areas are generally not designed for home-based businesses. Planners use zoning to segregate and protect vulnerable uses such as residential areas from conflicting uses such as business. For this reason, Land Use By-Laws are often restrictive with thw type of business, floor area and size limits, strict rules on signs, parking of commercial vehicles and hiring employees to work that do not live on the property (Bennett, 1999). However, in recent years, home-based business has been credited with boosting the local economy and enabling start-up companies (Hong, 2013). Planners are now amending planning policy to allow for more types of business to operate in residential areas (Hong, 2013). Transportation studies are now looking at this type of policy as an approach that could lead to a reduction in road congestion because fewer people would be traveling to and from work during peak travel times (Chen. 2001, Gibbs, 2009). Based on findings of this research, this type of municipal planning policy may also support active transportation use within households with pre-school aged children, provided they have access to child-care within close proximity to their home.

This study found that parents are more likely to use sustainable travel behaviour when traveling without their child. Parents take the bus, bike or walk after they have dropped their child off at child-care. There is opportunity to use Land Use By-Law regulations to permit child-care facilities to establish and operate in residential areas, allowing parents

to easily access their child-care destination from home and use sustainable transportation on the way to work, or another destination. The Bedford Hammond Plains Land Use By-Law is an example of policy that is preventing child-care facilities from establishing in residential areas (see Land Use Policy Example). Section 9 Day Care Facilities permits daycare facilities in residential areas however this policy is limiting because of the following requirements: 1.) Only two employees may be employed that do not reside at the facility 2.) The facility must be occupied as a dwelling and 3.) A maximum of 50% of the dwelling floor area may be devoted to the child-care use (Halifax Regional Municipality, 1996). This policy places restrictions on the type of facilities that can operate in a residential area and limits the location options for child-care providers as well as the child-care options available for parents that wish

Land Use Policy Example

9. Day Care Facilities (RC-Mar 3/09;E-Mar 21/09) Day care facilities (RC-Mar 3/09;E-Mar 21/09) and after school care shall be permitted in any dwelling in any RSU, RTU, RMU, RCDD, RR, and RTH Zone provided that: a) it shall be conducted by the resident occupants in their residence who may employ as well not more than two employees; (NWCC-Mar 24/05;E-Apr 2/05) b) the maximum number of children in each facility shall not exceed 14; c) the building must be occupied as a dwelling unit; d) there is clear sight distance for 200 feet on either side of the driveway(s), except on a cul-de-sac; e) these facilities must be located no closer than 500 feet to one another; f) a maximum of 50% of the dwelling floor area may be devoted to the child care use; g) there is a minimum street distance of 500 feet between daycare facilities; and h) subject to b),c),d),e),and f), of Section 8 pertaining to home occupations. Notwithstanding (a) and (h), outdoor play areas and play equipment shall be permitted. -(Halifax Regional Municipality, 1996).

to access a child-care facility in their residential area.

This study found that some parents are more likely to take transit, bike or walk after dropping their children off at child-care. The travel diary results found that these parents are leaving their vehicles. Respondents stated that they are parking on-street, at local business or driving back to their home before continuing to their next destination. Planning efforts to reduce road congestion suggest that locating public parking lots on the outskirts of employment areas are an important transportation link that encourages residents who live in low density areas to use sustainable travel behaviour (Schneider, 2011). The parking lots enable the resident to park their car and continue to their destination by carpool, public transit, biking or walking. Considering the results of this research there may be opportunity to plan for public parking lots around child-care centres and schools, or to plan for child-care around existing park and ride or transit hubs. This would allow parents to leave their vehicles and choose an alternative mode to get to work, and or personal errands.

Last, the Halifax Regional Municipality is in the process of completing a Centre Plan Review for the Regional Centre. The intent of the Centre Plan is to complete communities and give targets for population and employment growth. One of the vision statements identified for the Centre Plan is to strive to be an open, safe, affordable, accessible and welcoming place to all people of all walks of like (Centre Plan, n.d.). This statement is fitting with the objectives of this study and there may be opportunity to integrate study findings into the Centre Plan in order to represent the needs of households with pre-school aged children.

"The Regional Centre's cultural vitality is rooted in its diverse population and accordingly it will strive to be an open, safe, affordable, accessible and welcoming place to people of all walks of life."- Centre Plan Vision Statement

5.2.4 PROVINCIAL POLICY MAKERS

There is opportunity for Provincial Government to play a role in policy to support Municipalities in planning for child-care and sustainable travel behaviour in households with pre-school aged children. As part of the Government of Nova Scotia licensing process for child-care, child-care providers are required to offer confirmation that the plan for the child-care facility adheres to local planning regulations. In some municipalities there are requirements for specific types of new developments, to provide travel plans (Government of Nova Scotia, 1998). This tool is most often used by municipalities when a proposed new construction project falls within a pre-specified floor area or if the development requires a development agreement. There may be opportunity to build on this type of policy by requiring child-care providers to provide a travel plan when applying for a license for their facility.

As part of the web-based survey, households were given the opportunity to provide comment on what they felt were barriers to using sustainable travel behaviour when traveling with young children. Some respondents commented that being unable to ride legally on the sidewalk, in the province of Nova Scotia, was a huge barrier to biking with children. The Motor Vehicle Act of Nova Scotia in section 171 (2) states that " no person shall ride a bicycle, tricycle, or similar machine on a sidewalk, provided, nothing in this Section shall be deemed or construed to prevent the use of velocipedes or similar

machines by children on a sidewalk in a public square, park, city or town.". This regulation permits children to ride their bike on a sidewalk but prohibits parents from riding on the sidewalk with them. In addition, this does not take into account bicycle carriers with children. Most respondents commented that they felt it is would be safer for them to be on the sidewalk separated from vehicular traffic. A review of the above policy in the Motor Vehicle At and how it relates to households with pre-school aged children and their transportation choices may be in order. An amendment that clarifies Section 171 (2) of the Motor Vehicle Act and prohibits adult bicycles from riding on the sidewalk but enables them to accompany a child would support families. Most of Canada and the United States prohibit adults from riding their bicycles on the sidewalk. Seattle, Portland is an example of a family friendly policy. Oregon Law (ORS 814.410) permits bicycles to ride on the sidewalk under the same rights as a pedestrian as long as they operate in a safe manner. In addition, the government has released the "Portland's Family Biking Guide" to support families and different age groups with biking in the area.

5.2.5 TRANSIT PROVIDERS

Findings of this research indicated transit was being used out of necessity by the sample population. Respondents commented that the low frequency for many of the routes in the Halifax Regional Municipality was a barrier. Respondents also rated, on a Likert-Scale, that the need to group the child-care trip with other destinations was a large barrier to choosing transit. Respondents commented that the time required to take a bus to the child-care centre, drop off the child, and wait for a second bus to get to the next destination was too much of a hurdle. Research into transit oriented development has found that orienting services around transit terminals is an important step to supporting changes in travel

behaviour (Kamruzzaman, 2014). Incorporating child-care centres, as an important service, in transit oriented development projects would help to address the transportation needs of households with pre-school aged children.

Caltrans (n.d.) suggests that incorporating other child accommodations into transit oriented design, in addition to child-care services, such as playgrounds is an important step to accommodating households with pre-school aged children in the public transit system. Preliminary research into transit oriented design and the findings of this study suggest that there may be opportunity for transit planners to incorporate features that accommodate child development into transit infrastructure. For instance, features such as games, colors, playground equipment, and toys that will occupy children and stroller storage, would provide a clear message to families that they are a priority in planning for the transit system. Another potential strategy would be for transit providers when developing new transit terminals to design and reserve a space for a child-care facility, therefore child-care is incorporated directly into the design of the terminal. Transit providers may then actively seek out a child-care provider to establish within the terminal. There may be opportunity for government to encourage this type of development and partnership by requesting that child-care be a factor in funding decisions for transit oriented design projects.

CHAPTER 6: CONCLUSIONS

The goal of this research was to establish a baseline of the travel patterns and determine transportation challenges for households with pre-school aged children in registered child-care centres in the Halifax Regional Municipality, Nova Scotia. The study addressed this goal by collecting data through an electronic survey that was distributed to all licensed child-care centres in the area. The data collected provides an in-depth look at the routine weekday travel patterns and behaviours of families as they drop off and pick up their children at child-care. This data provides opportunity to draw conclusions about transportation challenges and opportunities to improve transportation networks, and opportunity to support families in using sustainable transportation.

It is my hope that this research will generate the discussion of how to promote and design communities that cater to families with young children through transportation planning. Lastly, it is my hope that future research will build on these findings.

6.1 IMPLICATIONS FOR PLANNING

Walsh (2010) found that the best method of encouraging individuals to choose more sustainable methods of transportation is to improve the accessibility, efficiency, and convenience of the alternative transportation modes. Thus enabling sustainable transportation to compete with the personal benefits of single occupancy vehicle. The findings of this thesis, with the focus on the transportation needs of families, shows how these criteria are important for forming inclusive communities. Sustainable transportation planning must design for networks that are seamless for families, so that when deciding how to get to their destination, the car is not the most obvious answer. In order to achieve this, there are opportunities for many stakeholders. Employers may implement policy to

allow flexible scheduling, provide vehicle access for work related travel, guaranteed ride home programing and child-care benefits. Child-care providers may consider offering on-site storage for parents and prioritizing enrollments. Municipal Policy makers and Planners may work towards implementing segregated and protected bike paths, permitting home-based business and mixed-use communities, and planning for parking lots that can support residents who live in out-lying areas. The Government of Nova Scotia may look at modeling parts of the Nova Scotia Vehicle Act after Oregon legislation to support family cycling. Transit Planners may consider incorporating child-care needs into transit oriented projects.

6.2 LIMITATIONS AND IMPLICATIONS FOR FUTURE RESEARCH

As this study focused on a specific geographic area, future research may investigate if findings apply to other areas or are unique to the HRM setting. The web-based survey with the electronic personal travel diary was an original method developed for this research. This method obtained a rich data set and could be applied to future transportation research.

A large amount of data was collected as part of this thesis. The researcher focused on creating a baseline to identify possible trends and opportunities. There is opportunity for future research to further investigate travel relationships of this group and to expand on the data collected through the travel diary portion of the survey. Possible future research questions for this data include: 1.) What is the impact of the build environment on mode choice to and from child-child care destination? 2.) How do the travel patterns of households with pre-school aged children compare to the travel patterns of other households in the HRM area? 3.) What are the spatial patterns affecting home to child-

care distance for households with preschool aged children? There is also the opportunity to augment this travel behaviour research with qualitative data through focus group sessions within the child-care environment.

Policy and planning opportunities have been identified in section 5.2 of this thesis. Opportunities identified are supported by the baseline data and other transportation studies. Future research may further develop or implement these opportunities in order to establish if they are a successful means of addressing the transportation barriers and challenges of households with young children. Possible future research questions for these opportunities include: 1.) How do flexible work place policies influence the travel patterns of households with preschool aged children? 2.) How do current HRM land-use policies impact the travel patterns of households with preschool aged children? What policy changes are required to support these households? 3.) How can transportation demand management practices be applied to the child-care destination?

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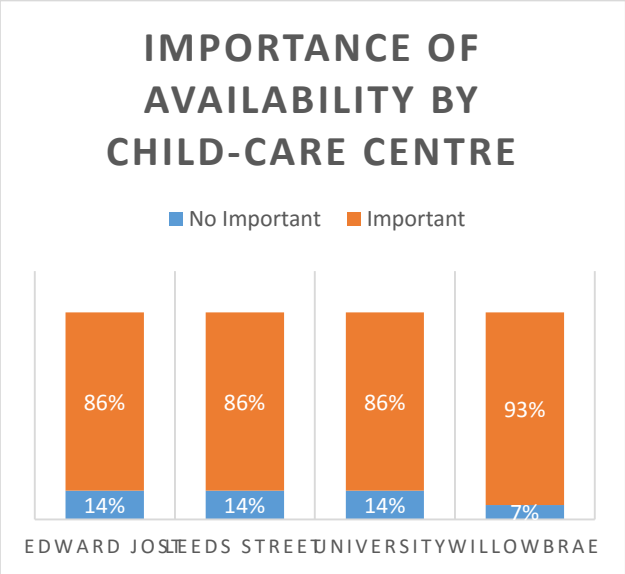
APPENDIX A: DISTRIBUTION OF RESPONDENTS BY CHILD-CARE CENTRE

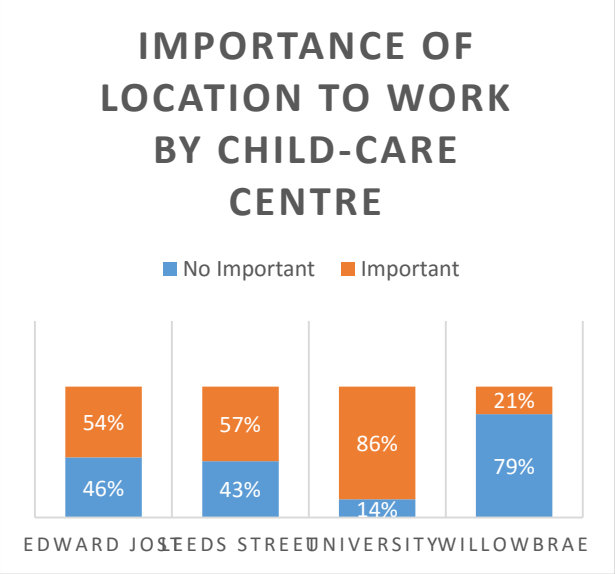
Centre	Count	Percentage
Chebucto Family Centre	2	1.15
The Children's Garden	1	0.57
Creative Kids	1	0.57
Dartmouth Child Development	1	0.57
Day Dreams Childcare	1	0.57
East Preston Day Care Centre	2	1.15
Edward Jost Annex	4	2.30
Edward Joast Children's Centre	15	8.62
Fox Hollow Child-care Centre	2	1.15
Friends for Life Child-care	2	1.15
Halifax Independent Elementary	1	0.57
Kids and Company (Barrington)	1	0.57
Kids R Kids Day Care	1	0.57

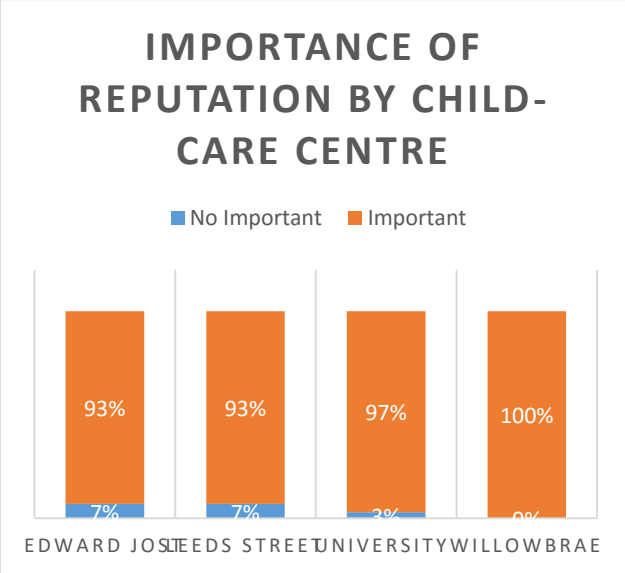
Leeds Street Child-care Centre	14	8.05
Maple Tree Montessori Ltd.	12	6.90
North Preston Day Care	2	1.15
Peter Green Hall Children's Centre	1	0.57
Point Pleasant Child-care (Infant)	1	0.57
St Joseph's Children Centre (Damascus Road)	2	1.15
St Joseph's Children's Centre (Duke Tower)	11	6.32
University Children's Centre (Dalhousie)	30	17.24
University Children's Centre (Life Sciences)	3	1.72
Waverley Road Children's Center	1	0.57
Wee Bairn Preschool	1	0.57
Wee Care Development Centre	1	0.57
Willowbrae Childcare Academy	9	5.17

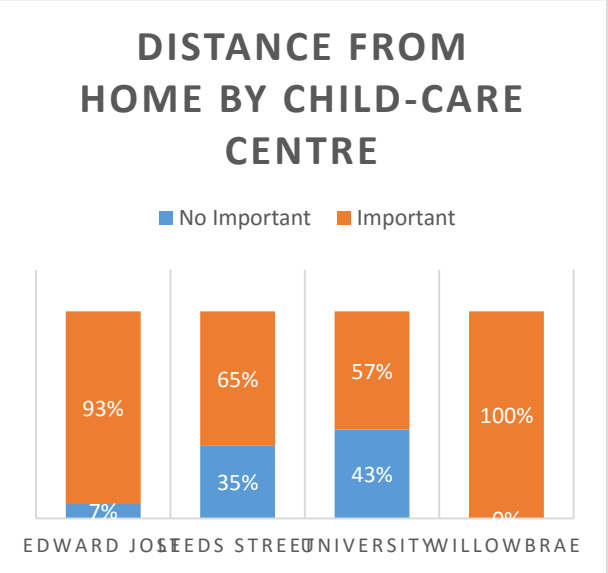
Willowbrae Childcare Academy (site 2)	5	2.87
Willowbrae Childcare Academy Hammonds Plains	15	8.62
Windsor Street Childcare Centre	2	1.15
YMCA Purdy's Warf	13	7.47
YWCA Child-care Program	10	5.75
YWCA Spryfield Child-care Centre	7	4.02
Total	174	

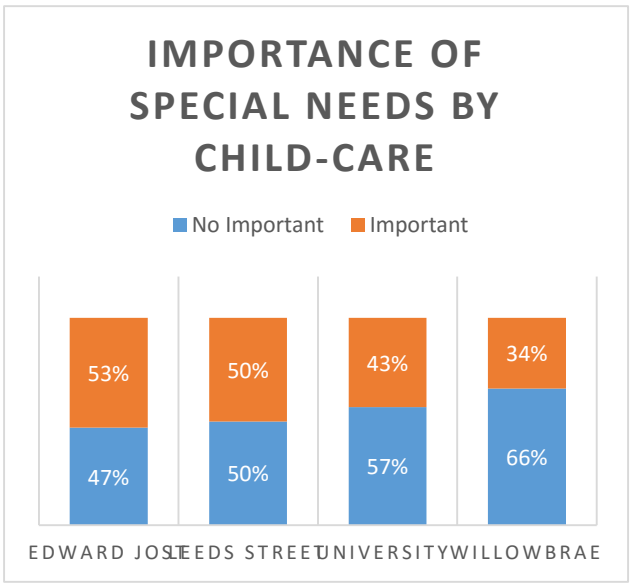
APPENDIX B: ADDITIONAL GRAPHS










IMPORTANCE OF SPECIAL NEEDS BY CHILD-CARE
No Important
Important
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EDWARD JOSEPH
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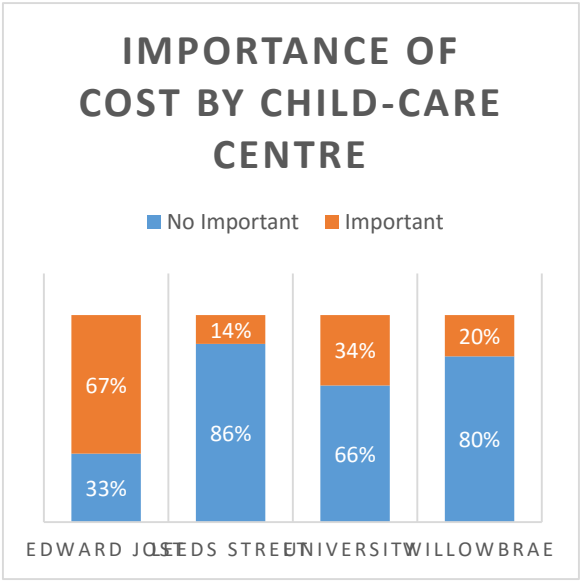
WILLOWBRAE


IMPORTANCE OF COST BY CHILD-CARE CENTRE
No Important
Important
67%
33%
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86%
34%
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80%
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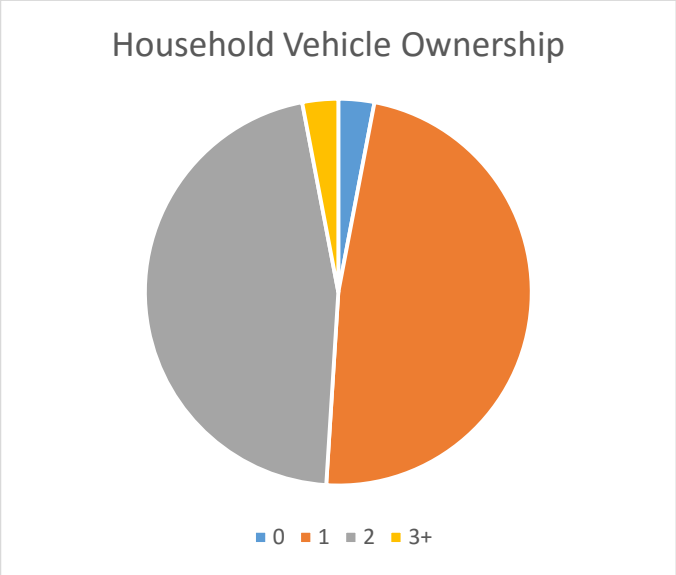
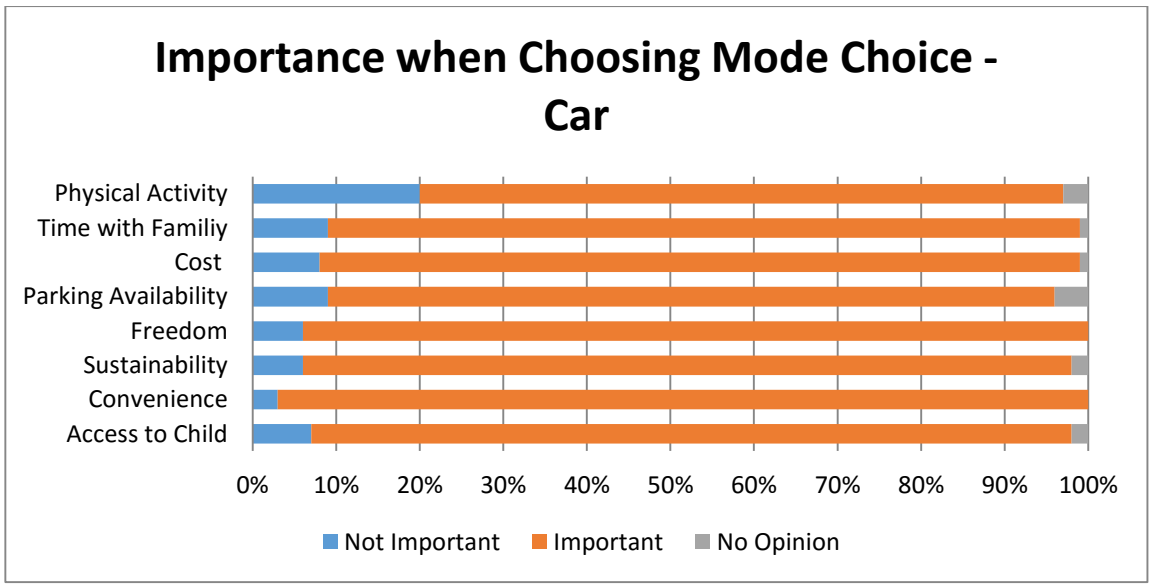
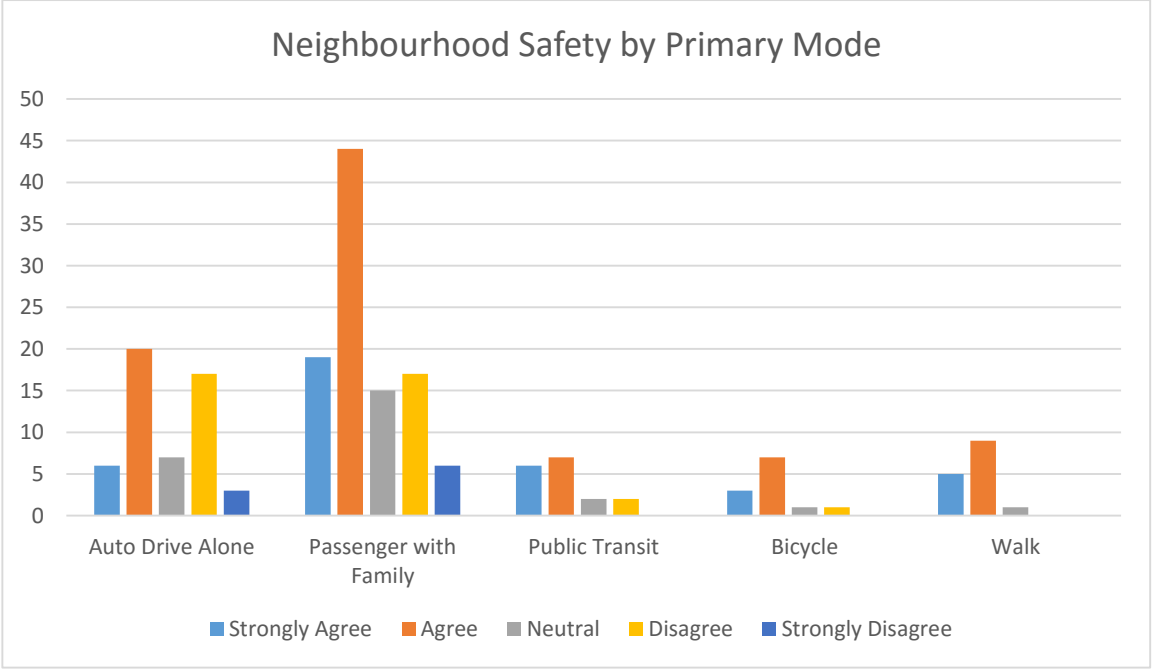
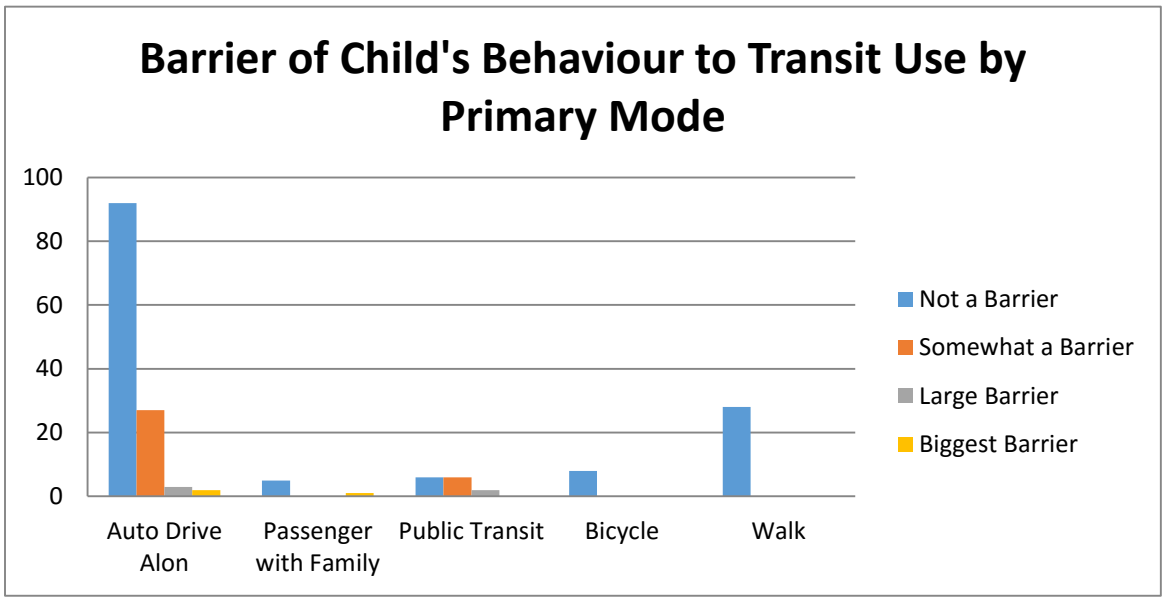
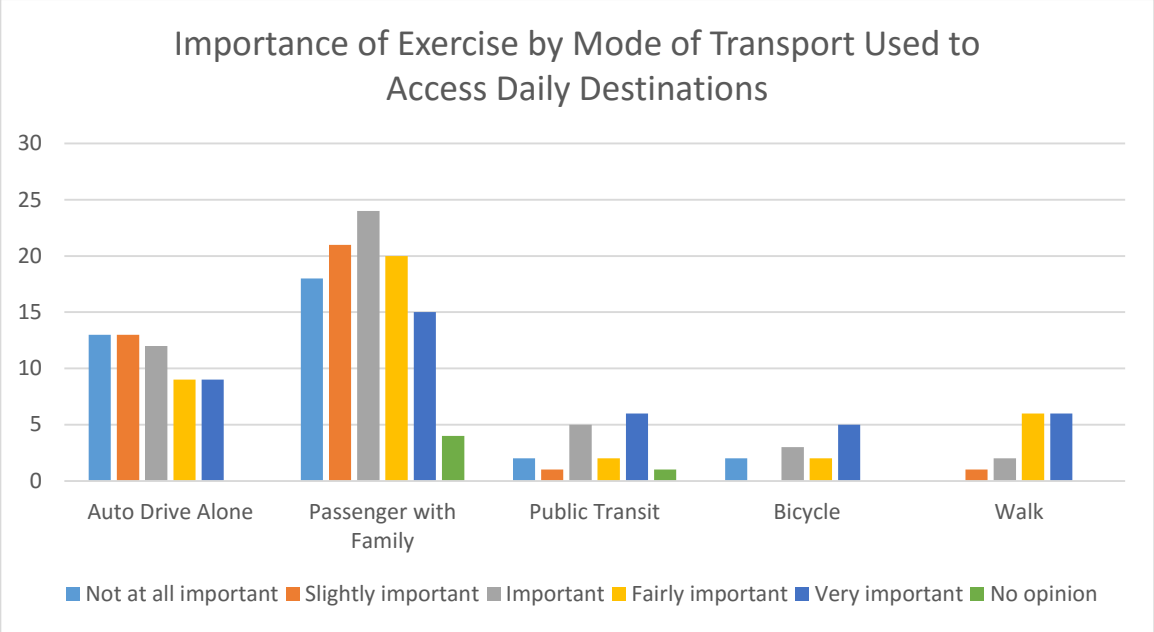
LEEDS STREET
UNIVERSITY
WILLOWBRAE

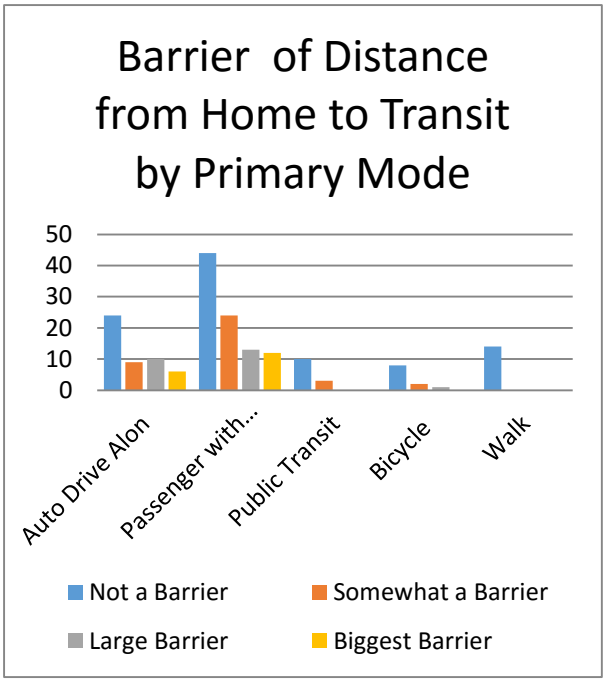

Household Vehicle Ownership
0
1
2
3+

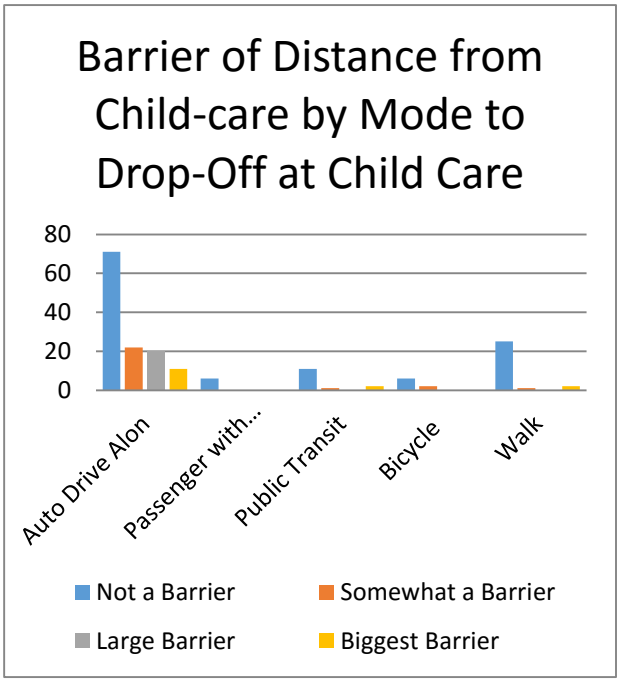

Importance when Choosing Mode Choice - Car
Physical Activity
Time with Familiy
Cost
Parking Availability
Freedom
Sustainability
Convenience
Access to Child
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Not Important
Important
No Opinion

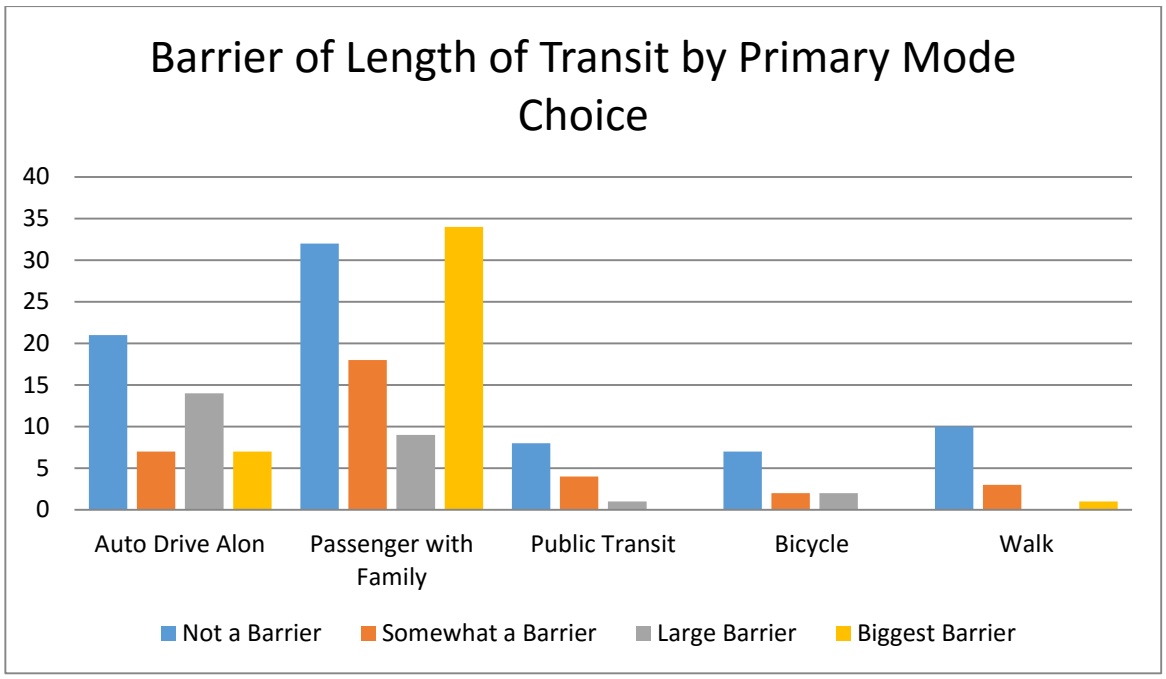

Neighbourhood Safety by Primary Mode
50
45
40
35
30
25
20
15
10
5
0
Auto Drive Alone
Passenger with Family
Public Transit
Bicycle
Walk
Strongly Agree
Agree
Neutral
Disagree
Strongly Disagree

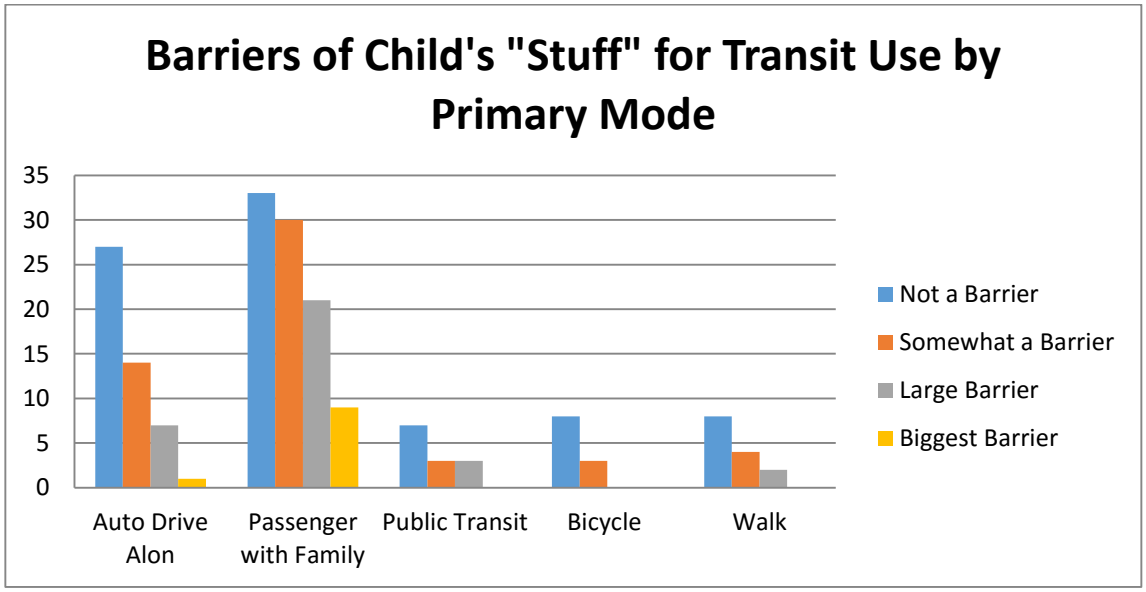

Barrier of Child's Behaviour to Transit Use by Primary Mode
100
80
60
40
20
0
Auto Drive Alon
Passenger with Family
Public Transit
Bicycle
Walk
Not a Barrier
Somewhat a Barrier
Large Barrier
Biggest Barrier

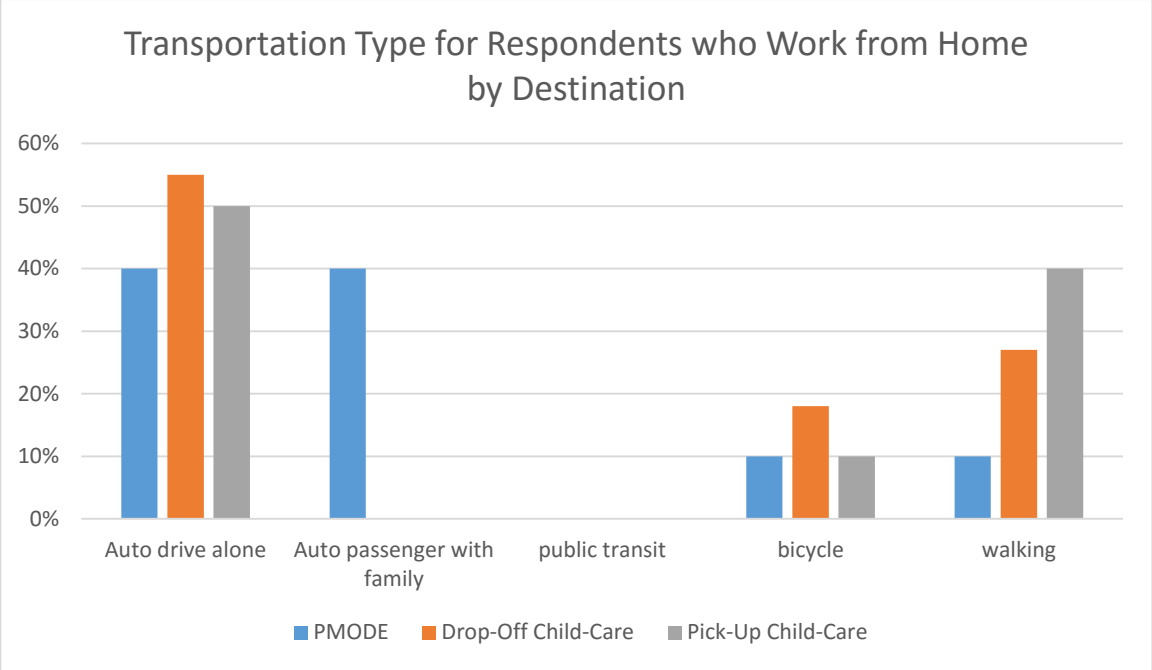

Importance of Exercise by Mode of Transport Used to Access Daily Destinations
30
25
20
15
10
5
0
Auto Drive Alone
Passenger with Family
Public Transit
Bicycle
Walk
Not at all important
Slightly important
Important
Fairly important
Very important
No opinion


Barrier of Distance from Home to Transit by Primary Mode
50
40
30
20
10
0
Auto Drive Alon
Passenger with...
Public Transit
Bicycle
Walk
Not a Barrier
Somewhat a Barrier
Large Barrier
Biggest Barrier


Barrier of Distance from Child-care by Mode to Drop-Off at Child Care
80
60
40
20
0
Auto Drive Alon
Passenger with...
Public Transit
Bicycle
Walk
Not a Barrier
Somewhat a Barrier
Large Barrier
Biggest Barrier


Barrier of Length of Transit by Primary Mode Choice
40
35
30
25
20
15
10
5
0
Auto Drive Alon
Passenger with Family
Public Transit
Bicycle
Walk
Not a Barrier
Somewhat a Barrier
Large Barrier
Biggest Barrier


Barriers of Child's "Stuff" for Transit Use by Primary Mode
35
30
25
20
15
10
5
0
Auto Drive Alon
Passenger with Family
Public Transit
Bicycle
Walk
Not a Barrier
Somewhat a Barrier
Large Barrier
Biggest Barrier


Transportation Type for Respondents who Work from Home by Destination
60%
50%
40%
30%
20%
10%
0%
Auto drive alone
Auto passenger with family
public transit
bicycle
walking
PMODE
Drop-Off Child-Care
Pick-Up Child-Care

APPENDIX C: RECRUITMENT MATERIALS

Re: Opportunity for {insert child-care centre name}

Dear {Insert Child-care Centre Director},

The Dalhousie Transportation Collaboratory (DalTRAC) is conducting a travel survey of Halifax Regional Municipality (HRM) residents with pre-school aged children (children younger than 5 years of age). All families that have children who attend a provincially registered child-care centre in the HRM are invited to participate in this study. The main purpose of this study is to investigate how families travel and examine the barriers, challenges and opportunities to traveling with young children. The results of this survey will provide myself and DalTRAC with valuable travel information on households with young children and inform research on how to plan for more family friendly communities.

As a registered child-care centre, I would like to request {insert child-care centre name}'s support in distributing our survey to families that use your centre. This is important research that will provide insight in to important issues such as equitable transportation access to child-care and opportunities for children development and physical activity. As a thank you for distributing this survey, your centre will be entered in a draw for a $100 Visa gift card. In addition, if {insert child-care centre name} has the highest family response rate of all the participating centres, you will receive a $100 Visa gift card.

If {insert child-care centre name} is interested in participating in this opportunity, please respond to this e-mail indicating your intent to participate and the number of families that use your centre. I've attached an invite to the survey that you can distribute to families.

The following link can be used to access the survey- https://surveys.dal.ca/opinio/s?s=22634 . If you have further questions about this survey please feel free to contact myself, Caroline King (c.king@dal.ca) or Dr. Ahsan Habib, Thesis Supervisor (ahsan_habib@dal.ca).

Thank you for your support,

Caroline A. King Graduate Researcher Dalhousie Transportation Collaboratory Dalhousie University C.King@dal.ca

Re: Opportunity for {insert child-care centre name}

Dear {Insert Child-care Centre Director},

I haven't heard back from you. Just a reminder, the DalTRAC research team is conducting a travel survey of Halifax Regional Municipality (HRM) residents with pre-school aged children (children younger than 5 years of age).

As a registered child-care centre, I would like to request {insert child-care centre name}'s support in distributing our survey to families that use your centre. This is important research that will provide insight in to important issues such as equitable transportation access to child-care and opportunities for children development and physical activity. As a thank you for distributing this survey, your centre will be entered in a draw for a $100 Visa gift card. In addition, if {insert child-care centre name} has the highest family response rate of all the participating centres, you will receive a $100 Visa gift card.

If {insert child-care centre name} is interested in participating in this opportunity, please respond to this e-mail indicating your intent to participate and the number of families that

use your centre. I've attached an invite to the survey that you can distribute to families. The following link can be used to access the survey- https://surveys.dal.ca/opinio/s?s=22634 . If you have further questions about this survey please feel free to contact myself, Caroline King (c.king@dal.ca) or Dr. Ahsan Habib, Thesis Supervisor (ahsan_habib@dal.ca).

Thank you for your support,

Caroline A. King Graduate Researcher Dalhousie Transportation Collaboratory Dalhousie University C.King@dal.ca

Re: Opportunity for {insert child-care centre name}

Dear Parents,

{insert child-care centre name} has been recruited to participate in a travel survey of Halifax Regional Municipality (HRM) residents with pre-school aged children (children younger than 5 years of age) conducted by The Dalhousie Transportation Collaboratory (DalTRAC).

The main purpose of this study is to investigate how families travel and examine the barriers, challenges and opportunities to traveling with young children. The results of this survey will provide the principal researcher and DalTRAC with valuable travel information on households with young children and inform research on how to plan for more family friendly communities.

This survey is a great opportunity for {insert child-care centre name]'s families to voice their travel experiences. Our centre has the opportunity to win up to $200 in Visa gift card for our participation.

I ask that you complete the survey at the following link-
https://surveys.dal.ca/opinio/s?s=22634

Upon completion of this survey you will be entered to win a $50 Visa gift card.

If you have further questions about this survey please feel free to contact the principal researcher

Caroline King (c.king@dal.ca) or Dr. Ahsan Habib, Thesis Supervisor (ahsan_habib@dal.ca).

Thank you for your participation,

{Insert Name of Child-care Centre Director}

The Relative Influence of Young Children on Families Mode Choice: An Investigation of Travel Behaviour and Challenges

Do you have a child under the age of 5 years?

Your child's child care centre has been recruited to participate in a travel survey of HRM families with pre-school aged children.

Do you experience challenges in daily travel with your family?

The main purpose of this study is to investigate how families travel and examine the barriers, challenges and opportunities to traveling with young children. The results of this survey will provide the principal researcher and DalTRAC with valuable travel information on households with young children and inform research on how to plan for more family friendly communities.

DalTRAC is looking to hear from you!

DalTRAC

DALHOUSIE UNIVERSITY
Inspiring Minds

Principal Researcher
Caroline A. King
(C.King@dal.ca)

Thesis Supervisor
Dr. Ahsan Habib
(Ahsan_Habib@dal.ca)

To participate, complete the survey at the following link
https://surveys.dal.ca/opinio/s?s=27202

APPENDIX D: SURVEY TOOL

Paper Example

Child Care Centre Family Questionnaire- 2015

*****Dalhousie Transportation Collaboratory (DalTRAC) is a research lab associated with Dalhousie University comprised of Planning and Engineering students who perform research in the field of transportation. For more information and updates from the DalTRAC planning team visit https://blogs.dal.ca/daltrac/*

The Relative Influence of Young Children on Families Mode Choice: An Investigation of Travel Behaviour and Challenges

Dear Survey Participant,

The Dalhousie Transportation Collaboratory (DalTRAC) is conducting a travel survey of Halifax Regional Municipality (HRM) residents with pre-school aged children (children younger than 5 years of age). All families that have children who attend a provincially registered child-care centre in the HRM are invited to participate in this study. The main purpose of this study is to investigate how families travel and examine the barriers, challenges and opportunities to traveling with young children. The results of this survey will provide the principal researcher and DalTRAC with valuable travel information on households with young children and inform research on how to plan for more family friendly communities.

The travel survey contains basic questions about your family, your chosen child-care centre and how you travel and will take approximately 15-20 minutes to complete. Your participation in this survey is voluntary. You may withdraw your consent and discontinue

participation in the project at any time. Should you wish to withdraw, leave the remaining questions incomplete. Incomplete surveys will be deleted.

Please note that individual response will be kept confidential and will only be used to produce statistical summaries. All data will be stored electronically, password protected and destroyed within 5 years of the completion of this study. Supervisors and DalTRAC members may use data for further analysis during this time. Should you wish to receive an electronic copy of the final report for this research, please indicate at the end of the survey. The following link can be used to access the survey- https://surveys.dal.ca/opinio/s?s=27202

The survey will remain open until March 31st, after this date responses will no longer be accepted. Upon completion of this survey you will be entered to win either 1 of 4 $25 Visa Gift Cards, 1 of 2 $50 Visa Gift Cards, or a $100 Visa Gift Card. In addition, the child-care centre with the highest family response rate will receive a $100 Visa gift card. If you have further questions about this survey please feel free to contact the principal researcher Caroline King (c.king@dal.ca) or Dr.Ahsan Habib (Thesis Supervisor) (ahsan_habib@dal.ca).

Thank you for your participation,

Caroline A. King

Graduate Researcher

Q1: By clicking Yes below you acknowledge that you have read and understand that:

Your participation in this survey is voluntary. You may withdraw your consent and discontinue participation in the project at any time. Should you wish to withdraw, leave the remaining questions incomplete. Incomplete surveys will be deleted. Your refusal to participate will not result in any penalty.

- Yes, I want to participate
- No, I do not want to participate

Socioeconomics

Q2: What is your annual household income?

- Less than $20 000
- $20 001 - $40 000
- $40 001 - $60 000
- $60 001 - $80 000
- $80 001 - $100 000
- Above $100 000 Prefer not to say

Q3: How many people over the age of 16 are in your household?

- 0
- 1
- 2
- 3
- 4
- 5
- 6+

Q4: Please list the children currently residing in your household: (Please indicate the number in each age group)

- 0-18 months
- 18-months- 5 years
- 5-18 years

Q5: How many vehicles does your household own or have access to? (Leased, and owned vehicles)

- 0
- 1
- 2
- 3
- 4
- 5
- 6+

Q6: What is your household's primary mode of transportation?

- Auto Drive Alone Auto Passenger (With Family)
- Auto Passenger (With another Family)
- Public Transit
- Bicycle Walking
- Other

Q7: Please rate the following in order of importance on their influence of your household's primary mode choice.

	Not at all important	**Slightly important**	**Important**	**Fairly important**	**Very important**	**No opinion**
Access to Child Convenience						
Sustainability						
Freedom						
Parking Availability						
Cost						
Family Time						
Physical Activity						

Q8: Please rate your agreement of the following statement: The neighbourhood surrounding my home is safe for sustainable transportation (i.e. walking, biking, transit) use.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q9: Do you feel that there are barriers to using sustainable transportation (i.e. walking, biking, transit) when traveling with young children? Please explain your response

- Yes
- No

Child-Care

Please answer the following questions for only the child(ren) of your household under the age of 5 years

Note that for the purposes of this survey a child care centre is defined as a licensed centre located outside the home that provides care for pre-school aged children (children under the age of 5 years) In Nova Scotia, a child care centre is required to be licensed if it cares for more than six

children under the age of 5 inclusive of their own, or More than eight school age children (age 5-12 inclusive of their own)

Q10: What is the name of your child(ren)'s child care centre?

Q11: What is the postal code of your child(ren)'s child care centre location? Please provide in a six digit format without space (i.e. B4A4C5)

Q12: How many children from your household attend this child care centre?

- 1
- 2
- 3
- 4+

Q13: Please identify the type of program your child(ren) attends at their child care centre

- After School
- Full-Time
- Part-Time

Q14: How often does your child(ren) attend their child-care centre?

- 1-2 times/week
- 3-4 times/week
- 4-5 times/week
- 5+ times/week

Q15: Please rate the following in order of their importance when you decided to send your child(ren) to their current child care centre.

	Not at all important	**Slightly important**	**Important**	**Fairly important**	**Very important**	**No opinion**
Availability- they had spaces available for my child						
Reputation- they have a good reputation in my community						
Location- they're located close to my work location						
Location - they're located close to our home						

Special Care- they met special care requirements of my child						
Cost-They were the most affordable option						

Q16: Are your child care fees subsidized at this centre?

- Yes
- No

Q17: Who most often drops off/picks up your child(ren) from child care? Please indicate their relationship to the child(ren).

- Parent
- Grandparent
- Sibling
- Aunt/Uncle
- Foster Parent
- Other Family Member
- In-home Child Care Provider
- Outside Child Care Provider
- Other

- Neighbour Family Friend

Q18: What is your household's primary mode of transportation to your child's child care centre?

- Walk
- Bicycle
- Driver
- Passenger
- Public Transit
- Access-A-Bus
- Taxi
- 8. Other

Q19: What is your household's primary mode of transportation from your child's child care centre?

- Walk
- Bicycle
- Driver
- Passenger
- Public Transit
- Access-A-Bus
- Taxi
- Other

Q20: How many minutes, on a typical weekday, does it take from your home to get to you child's child care centre?

Q21: Do you frequently group your child care trip with other trips? (Example- Home ----> Child Care ----> Work)

- Yes
- No

Q22: What trip do you group in a typical week with you child care centre trip?

- Work
- School
- Shopping
- Errands/Personal
- Social and Recreational Activities

Q23: Do you feel that your trip grouping is a barrier to sustainable transportation use? Please explain.

- Yes
- No

Q24: Please indicate how important the following are when deciding whether to drive to you child care centre.

	Not at all important	**Slightly important**	**Important**	**Fairly important**	**Very important**	**No opinion**
Distance (Too far						
Convenience (Time pressures)						
Safety (Traffic danger)						
Trip Chaining (I am on my way somewhere else)						
Weather						

Q25: How much of a barrier are each of the following to using transit to get to child care?

	Not a barrier	**Somewhat a barrier**	**Largest barrier**	**Biggest Barrier**
Distance from home to transit stop				
Distance from transit stop to child care centre				
Length of transit trip				
Dealing with strangers on transit				
Carrying child/their stuff				
Cost of transit				
Lack of stroller/carseat storage				
Lack of stroller/carseat storage				

Q26: Please rate your agreement of the following statement: The neighbourhood surrounding my child(ren)'s child care centre is safe for sustainable transportation (i.e. walking, biking, transit) use.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Personal Travel Diary Introduction

Please complete the following questions for the person who resides in your households and most often drops off and picks up your child(ren) from a child care centre.

Q27: What is your gender?

Q28: What is your age?

Q29: What is your relationship to the child(ren)?

Q30: What is your marital status?

Q31: What is your employment status?

Q32: What is the postal code of your local residence? Please provide in a six digit format without space (i.e. B4A4C5)

Q33: What is the postal code of your work location? Please provide in a six digit format without space (i.e. B4A4C5)

Personal One-Day Travel Diary

Please complete the following questions for the person who resides in your households and most often drops off and picks up your child(ren) from a child care centre. Please use the following travel diary to record information about ALL the PLACES you visited on the last week-day. Specifically, list the:

Places you visited

The place name, exact address and/or cross-streets, city, province and postal code are critical for assessing household travel patterns.

If you ride the bus or carpool/vanpool: please record each bus stop or carpool/vanpool meeting place where you get on or off as a separate place.

What is a place? A place is a location you travel to, whether its for a few moments (gas station, drive-thru, dropping of a child, etc.) or for many hours (work, event, etc.)

Exact times that you arrived and departed each place.

How you traveled to each place

Identify your mode of travel from the drop down list and if this was your only option for traveling.

Other travel information

How many people were you traveling with? Were they from your household? Plus additional details depending on how you traveled.

Activities or what you did at each place

Identify the most applicable activity from the drop down list. First identify the main activity you did and then select for any other activities.

Q34: For what day of the week are you completing this travel diary?

- Monday
- Tuesday
- Wednesday
- Thursday
- Friday

Child Care Based Household Travel Questionnaire

DALTRAC
DALHOUSIE TRANSPORTATION COLLABORATORY

PLACE

A. Where do you start your day?

☐ My Home ☐ My School ☐ Another Place
☐ My Work ☐ Transit Stop

B. What is the NAME and ADDRESS of this PLACE?

_____ Name of Place (if any) or Transit Stop
_____ City
_____ Postal Code
_____ Street Address or Nearest Cross-Streets
_____ Province

C. What time did you arrive? _____ : _____ ☐ AM ☐ PM

D. How did you travel there? (Write code from List 1)

☐ Mode of Transport

E. Could you have traveled any other way, one answer only? (Write code from List 1)

☐ Mode of Transport

F. How many people traveled with you? (Don't include yourself) _____

G. Of those, how many were household members? _____

H. If you traveled by auto/van/truck:

☐ Did not use a household vehicle

_____ Which household vehicle (year/make/model)

Did you get out of the vehicle? ☐ Yes ☐ No (drive-thru, drop-off, etc)

If yes, where did you park?

☐ Parking Lot ☐ Street
☐ Parking Garage ☐ Other

How much did you pay to park?
$ _____ per _____

OR If you traveled by public transit:

Which type of transit did you take?

☐ Local Bus ☐ MetroX
☐ Ferry ☐ MetroLink

_____ Route/Bus #

How much did you pay for this trip?
$ _____ ☐ Pass

How much did the pass cost? _____ Type of pass?
$ _____ per _____

I. To what extend was your journey to this place

Stressful — Relaxing
Boring — Exciting
Depressing — Pleasant

J. What activities did you do there?(Write Code from List 2) ☐ Main Activity ☐ Other Activity

K. What time did you depart? ☐ AM ☐ PM
_____ : _____

Thank You

Q179: Would you be interested in participating in a short one-time focus group at your child-care centre to further explore some of the barriers, challenges and opportunities to traveling with young children?

If yes, please provide your email address

Q180: Would you like to receive a electronic copy of the final report for this research?

If yes, please provide your e-mail address

Q181: Thank you for taking the time to complete this survey. If you wish to be entered in a draw for a $50 Visa Gift Card please provide the following information.

- Name
- E-mail
- Phone Number